

# Package ‘foreign’

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**Title** Read Data Stored by 'Minitab', 'S', 'SAS', 'SPSS', 'Stata',  
'Systat', 'Weka', 'dBase', ...

**Depends** R (>= 4.0.0)

**Imports** methods, utils, stats

**Contact** see 'MailingList'

**Copyright** see file COPYRIGHTS

**Description** Reading and writing data stored by some versions of  
'Epi Info', 'Minitab', 'S', 'SAS', 'SPSS', 'Stata', 'Systat', 'Weka',  
and for reading and writing some 'dBase' files.

**ByteCompile** yes

**Biarch** yes

**License** GPL (>= 2)

**BugReports** <https://bugs.r-project.org>

**MailingList** R-help@r-project.org

**URL** <https://svn.r-project.org/R-packages/trunk/foreign/>

**NeedsCompilation** yes

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---

lookup.xport                      *Lookup Information on a SAS XPORT Format Library*

---

### Description

Scans a file as a SAS XPORT format library and returns a list containing information about the SAS library.

### Usage

```
lookup.xport(file)
```

### Arguments

`file`                      character variable with the name of the file to read. The file must be in SAS XPORT format.

**Value**

A list with one component for each dataset in the XPORT format library.

**Author(s)**

Saikat DebRoy

**References**

SAS Technical Support document TS-140: “The Record Layout of a Data Set in SAS Transport (XPORT) Format” available as <https://support.sas.com/techsup/technote/ts140.pdf>.

**See Also**

[read.xport](#)

**Examples**

```
## Not run: ## no XPORT file is installed.  
lookup.xport("test.xpt")  
  
## End(Not run)
```

---

read.arff

*Read Data from ARFF Files*

---

**Description**

Reads data from Weka Attribute-Relation File Format (ARFF) files.

**Usage**

```
read.arff(file)
```

**Arguments**

`file` a character string with the name of the ARFF file to read from, or a [connection](#) which will be opened if necessary, and if so closed at the end of the function call.

**Value**

A data frame containing the data from the ARFF file.

**References**

Attribute-Relation File Format [https://waikato.github.io/weka-wiki/formats\\_and\\_processing/arff/](https://waikato.github.io/weka-wiki/formats_and_processing/arff/).

**See Also**

`write.arff`; functions `write.arff` and `read.arff` in package **RWeka** which provide some support for logicals via conversion to or from factors.

---

read.dbf

*Read a DBF File*


---

**Description**

The function reads a DBF file into a data frame, converting character fields to factors, and trying to respect NULL fields.

The DBF format is documented but not much adhered to. There is no guarantee this will read all DBF files.

**Usage**

```
read.dbf(file, as.is = FALSE)
```

**Arguments**

<code>file</code>	name of input file
<code>as.is</code>	should character vectors not be converted to factors?

**Details**

DBF is the extension used for files written for the ‘XBASE’ family of database languages, ‘covering the dBase, Clipper, FoxPro, and their Windows equivalents Visual dBase, Visual Objects, and Visual FoxPro, plus some older products’ (<https://www.clicketyclick.dk/databases/xbase/format/>). Most of these follow the file structure used by Ashton-Tate’s dBase II, III or 4 (later owned by Borland).

`read.dbf` is based on C code from <http://shapelib.maptools.org/> which implements the ‘XBASE’ specification. It can convert fields of type "L" (logical), "N" and "F" (numeric and float) and "D" (dates): all other field types are read as-is as character vectors. A numeric field is read as an R integer vector if it is encoded to have no decimals, otherwise as a numeric vector. However, if the numbers are too large to fit into an integer vector, it is changed to numeric. Note that is possible to read integers that cannot be represented exactly even as doubles: this sometimes occurs if IDs are incorrectly coded as numeric.

**Value**

A data frame of data from the DBF file; note that the field names are adjusted to use in R using `make.names(unique=TRUE)`.

There is an attribute "data\_type" giving the single-character dBase types for each field.

**Note**

Not to be able to read a particular ‘DBF’ file is not a bug: this is a convenience function especially for shapefiles.

**Author(s)**

Nicholas Lewin-Koh and Roger Bivand; shapelib by Frank Warmerdam

**References**

<http://shapelib.maptools.org/>.

**See Also**

[write.dbf](#)

**Examples**

```
x <- read.dbf(system.file("files/sids.dbf", package="foreign"))[1]
str(x)
summary(x)
```

---

read.dta

*Read Stata Binary Files*

---

**Description**

Reads a file in Stata version 5–12 binary format into a data frame.

Frozen: will not support Stata formats after 12.

**Usage**

```
read.dta(file, convert.dates = TRUE, convert.factors = TRUE,
         missing.type = FALSE,
         convert.underscore = FALSE, warn.missing.labels = TRUE)
```

**Arguments**

file	a filename or URL as a character string.
convert.dates	Convert Stata dates to Date class, and date-times to POSIXct class?
convert.factors	Use Stata value labels to create factors? (Version 6.0 or later).
missing.type	For version 8 or later, store information about different types of missing data?
convert.underscore	Convert “_” in Stata variable names to “.” in R names?
warn.missing.labels	Warn if a variable is specified with value labels and those value labels are not present in the file.

## Details

If the filename appears to be a URL (of schemes 'http:', 'ftp:' or 'https:') the URL is first downloaded to a temporary file and then read. ('https:' is only supported on some platforms.)

The variables in the Stata data set become the columns of the data frame. Missing values are correctly handled. The data label, variable labels, timestamp, and variable/dataset characteristics are stored as attributes of the data frame.

By default Stata dates (%d and %td formats) are converted to R's Date class, and variables with Stata value labels are converted to factors. Ordinarily, read.dta will not convert a variable to a factor unless a label is present for every level. Use `convert.factors = NA` to override this. In any case the value label and format information is stored as attributes on the returned data frame. Stata's date formats are sketchily documented: if necessary use `convert.dates = FALSE` and examine the attributes to work out how to post-process the dates.

Stata 8 introduced a system of 27 different missing data values. If `missing.type` is TRUE a separate list is created with the same variable names as the loaded data. For string variables the list value is NULL. For other variables the value is NA where the observation is not missing and 0–26 when the observation is missing. This is attached as the "missing" attribute of the returned value.

The default file format for Stata 13, `format-115`, is substantially different from those for Stata 5–12.

## Value

A data frame with attributes. These will include "datalabel", "time.stamp", "formats", "types", "val.labels", "var.labels" and "version" and may include "label.table" and "expansion.table". Possible versions are 5, 6, 7, -7 (Stata 7SE, 'format-111'), 8 (Stata 8 and 9, 'format-113'), 10 (Stata 10 and 11, 'format-114'), and 12 (Stata 12, 'format-115').

The value labels in attribute "val.labels" name a table for each variable, or are an empty string. The tables are elements of the named list attribute "label.table": each is an integer vector with names.

## Author(s)

Thomas Lumley and R-core members: support for value labels by Brian Quistorff.

## References

Stata Users Manual (versions 5 & 6), Programming manual (version 7), or online help (version 8 and later) describe the format of the files. Or directly at [https://www.stata.com/help.cgi?dta\\_114](https://www.stata.com/help.cgi?dta_114) and [https://www.stata.com/help.cgi?dta\\_113](https://www.stata.com/help.cgi?dta_113), but note that these have been changed since first published.

## See Also

Different approaches are available in package **memisc** (see its help for `Stata.file`), function `read_dta` in package **haven** and package **readstata13**.

[write.dta](#), [attributes](#), [Date](#), [factor](#)

## Examples

```
write.dta(swiss,swissfile <- tempfile())
read.dta(swissfile)
```

---

read.epiinfo                      *Read Epi Info Data Files*

---

## Description

Reads data files in the .REC format used by Epi Info versions 6 and earlier and by EpiData. Epi Info is a public domain database and statistics package produced by the US Centers for Disease Control and EpiData is a freely available data entry and validation system.

## Usage

```
read.epiinfo(file, read.deleted = FALSE, guess.broken.dates = FALSE,
             thisyear = NULL, lower.case.names = FALSE)
```

## Arguments

file	A filename, URL, or connection.
read.deleted	Deleted records are read if TRUE, omitted if FALSE or replaced with NA if NA.
guess.broken.dates	Attempt to convert dates with 0 or 2 digit year information (see 'Details').
thisyear	A 4-digit year to use for dates with no year. Defaults to the current year.
lower.case.names	Convert variable names to lowercase?

## Details

Epi Info allows dates to be specified with no year or with a 2 or 4 digits. Dates with four-digit years are always converted to Date class. With the guess.broken.dates option the function will attempt to convert two-digit years using the operating system's default method (see [Date](#)) and will use the current year or the thisyear argument for dates with no year information.

If read.deleted is TRUE the "deleted" attribute of the data frame indicates the deleted records.

## Value

A data frame.

## Note

Some later versions of Epi Info use the Microsoft Access file format to store data. That may be readable with the **RODBC** package.

**References**

<https://www.cdc.gov/epiinfo/>, <http://www.epidata.dk>

**See Also**

[DateTimeClasses](#)

**Examples**

```
## Not run: ## That file is not available
read.epiinfo("oswego.rec", guess.broken.dates = TRUE, thisyear = "1972")

## End(Not run)
```

---

read.mtp

*Read a Minitab Portable Worksheet*

---

**Description**

Return a list with the data stored in a file as a Minitab Portable Worksheet.

**Usage**

```
read.mtp(file)
```

**Arguments**

`file` character variable with the name of the file to read. The file must be in Minitab Portable Worksheet format.

**Value**

A list with one component for each column, matrix, or constant stored in the Minitab worksheet.

**Note**

This function was written around 1990 for the format current then. Later versions of Minitab appear to have added to the format.

**Author(s)**

Douglas M. Bates

**References**

<https://www.minitab.com/>



**Examples**

```
## Not run:  
read.mtp("ex1-10.mtp")  
  
## End(Not run)
```

---

read.octave	<i>Read Octave Text Data Files</i>
-------------	------------------------------------

---

**Description**

Read a file in Octave text data format into a list.

**Usage**

```
read.octave(file)
```

**Arguments**

`file` a character string with the name of the file to read.

**Details**

This function is used to read in files in Octave text data format, as created by `save -text` in Octave. It knows about most of the common types of variables, including the standard atomic (real and complex scalars, matrices, and  $N$ -d arrays, strings, ranges, and boolean scalars and matrices) and recursive (structs, cells, and lists) ones, but has no guarantee to read all types. If a type is not recognized, a warning indicating the unknown type is issued, it is attempted to skip the unknown entry, and NULL is used as its value. Note that this will give incorrect results, and maybe even errors, in the case of unknown recursive data types.

As Octave can read MATLAB binary files, one can make the contents of such files available to R by using Octave's load and save (as text) facilities as an intermediary step.

**Value**

A list with one named component for each variable in the file.

**Author(s)**

Stephen Eglen <stephen@gnu.org> and Kurt Hornik

**References**

<https://www.gnu.org/software/octave/>

read.spss

*Read an SPSS Data File***Description**

read.spss reads a file stored by the SPSS save or export commands.

This was originally written in 2000 and has limited support for changes in SPSS formats since (which have not been many).

**Usage**

```
read.spss(file, use.value.labels = TRUE, to.data.frame = FALSE,
          max.value.labels = Inf, trim.factor.names = FALSE,
          trim_values = TRUE, reencode = NA, use.missings = to.data.frame,
          sub = ".", add.undeclared.levels = c("sort", "append", "no"),
          duplicated.value.labels = c("append", "condense"),
          duplicated.value.labels.infix = "_duplicated_", ...)
```

**Arguments**

file	character string: the name of the file or URL to read.
use.value.labels	logical: convert variables with value labels into R factors with those levels? This is only done if there are at least as many labels as values of the variable (when values without a matching label are returned as NA).
to.data.frame	logical: return a data frame?
max.value.labels	logical: only variables with value labels and at most this many unique values will be converted to factors if TRUE.
trim.factor.names	logical: trim trailing spaces from factor levels?
trim_values	logical: should values and value labels have trailing spaces ignored when matching for use.value.labels = TRUE?
reencode	logical: should character strings be re-encoded to the current locale. The default, NA, means to do so in UTF-8 or latin-1 locales, only. Alternatively a character string specifying an encoding to assume for the file.
use.missings	logical: should information on user-defined missing values be used to set the corresponding values to NA?
sub	character string: If not NA it is used by <code>iconv</code> to replace any non-convertible bytes in character/factor input. Default is ".". For back compatibility with <b>foreign</b> versions <= 0.8-68 use sub=NA.
add.undeclared.levels	character: specify how to handle variables with at least one value label and further non-missing values that have no value label (like a factor levels in R).

For "sort" (the default) it adds undeclared factor levels to the already declared levels (and labels) and sort them according to level, for "append" it appends undeclared factor levels to declared levels (and labels) without sorting, and for "no" this does not convert to factor in case of numeric SPSS levels (not labels), and still converts to factor if the SPSS levels are characters and `to.data.frame=TRUE`. For back compatibility with **foreign** versions  $\leq 0.8-68$  use `add.undeclared.levels="no"` (not recommended as this may convert some values with missing corresponding value labels to NA).

`duplicated.value.labels`

character: what to do with duplicated value labels for different levels. For "append" (the default), the first original value label is kept while further duplicated labels are renamed to `paste0(label, duplicated.value.labels.infix, level)`, for "condense", all levels with identical labels are condensed into exactly the first of these levels in R. Back compatibility with **foreign** versions  $\leq 0.8-68$  is not given as R versions  $\geq 3.4.0$  no longer support duplicated factor labels.

`duplicated.value.labels.infix`

character: the infix used for labels of factor levels with duplicated value labels in SPSS (default "\_duplicated\_") if `duplicated.value.labels="append"`.

...

passed to `as.data.frame` if `to.data.frame = TRUE`.

## Details

This uses modified code from the PSPP project (<http://www.gnu.org/software/pspp/> for reading the SPSS formats.

If the filename appears to be a URL (of schemes 'http:', 'ftp:' or 'https:') the URL is first downloaded to a temporary file and then read. ('https:' is supported where supported by `download.file` with its current default method.)

Occasionally in SPSS, value labels will be added to some values of a continuous variable (e.g. to distinguish different types of missing data), and you will not want these variables converted to factors. By setting `max.value.labels` you can specify that variables with a large number of distinct values are not converted to factors even if they have value labels.

If SPSS variable labels are present, they are returned as the "variable.labels" attribute of the answer.

Fixed length strings (including value labels) are padded on the right with spaces by SPSS, and so are read that way by R. The default argument `trim_values=TRUE` causes trailing spaces to be ignored when matching to value labels, as examples have been seen where the strings and the value labels had different amounts of padding. See the examples for `sub` for ways to remove trailing spaces in character data.

URL <https://docs.microsoft.com/en-us/windows/win32/intl/code-page-identifiers> provides a list of translations from Windows codepage numbers to encoding names that `iconv` is likely to know about and so suitable values for `reencode`. Automatic re-encoding is attempted for apparent codepages of 200 or more in a UTF-8 or latin-1 locale: some other high-numbered codepages can be re-encoded on most systems, but the encoding names are platform-dependent (see `iconvlist`).

**Value**

A list (or optionally a data frame) with one component for each variable in the saved data set.

If what looks like a Windows codepage was recorded in the SPSS file, it is attached (as a number) as attribute "codepage" to the result.

There may be attributes "label.table" and "variable.labels". Attribute "label.table" is a named list of value labels with one element per variable, either NULL or a named character vector. Attribute "variable.labels" is a named character vector with names the short variable names and elements the long names.

If there are user-defined missing values, there will be a attribute "Missings". This is a named list with one list element per variable. Each element has an element type, a length-one character vector giving the type of missingness, and may also have an element value with the values corresponding to missingness. This is a complex subject (where the R and C source code for read.spss is the main documentation), but the simplest cases are types "one", "two" and "three" with a corresponding number of (real or string) values whose labels can be found from the "label.table" attribute. Other possibilities are a finite or semi-infinite range, possibly plus a single value. See also [http://www.gnu.org/software/pspp/manual/html\\_node/Missing-Observations.html#Missing-Observations](http://www.gnu.org/software/pspp/manual/html_node/Missing-Observations.html#Missing-Observations).

**Note**

If SPSS value labels are converted to factors the underlying numerical codes will not in general be the same as the SPSS numerical values, since the numerical codes in R are always 1, 2, 3, ...

You may see warnings about the file encoding for SPSS save files: it is possible such files contain non-ASCII character data which need re-encoding. The most common occurrence is Windows codepage 1252, a superset of Latin-1. The encoding is recorded (as an integer) in attribute "codepage" of the result if it looks like a Windows codepage. Automatic re-encoding is done only in UTF-8 and latin-1 locales: see argument reencode.

**Author(s)**

Saikat DebRoy and the R-core team

**See Also**

A different interface also based on the PSPP codebase is available in package **memisc**: see its help for spss.system.file.

**Examples**

```
(sav <- system.file("files", "electric.sav", package = "foreign"))
dat <- read.spss(file=sav)
str(dat) # list structure with attributes

dat <- read.spss(file=sav, to.data.frame=TRUE)
str(dat) # now a data.frame

### Now we use an example file that is not very well structured and
### hence may need some special treatment with appropriate argument settings.
```

```

### Expect lots of warnings as value labels (corresponding to R factor labels) are incomplete,
### and an unsupported long string variable is present in the data
(sav <- system.file("files", "testdata.sav", package = "foreign"))

### Examples for add.undeclared.levels:
## add.undeclared.levels = "sort" (default):
x.sort <- read.spss(file=sav, to.data.frame = TRUE)
## add.undeclared.levels = "append":
x.append <- read.spss(file=sav, to.data.frame = TRUE,
  add.undeclared.levels = "append")
## add.undeclared.levels = "no":
x.no <- read.spss(file=sav, to.data.frame = TRUE,
  add.undeclared.levels = "no")

levels(x.sort$factor_n_undeclared)
levels(x.append$factor_n_undeclared)
str(x.no$factor_n_undeclared)

### Examples for duplicated.value.labels:
## duplicated.value.labels = "append" (default)
x.append <- read.spss(file=sav, to.data.frame=TRUE)
## duplicated.value.labels = "condense"
x.condense <- read.spss(file=sav, to.data.frame=TRUE,
  duplicated.value.labels = "condense")

levels(x.append$factor_n_duplicated)
levels(x.condense$factor_n_duplicated)

as.numeric(x.append$factor_n_duplicated)
as.numeric(x.condense$factor_n_duplicated)

## Long Strings (>255 chars) are imported in consecutive separate variables
## (see warning about subtype 14):
x <- read.spss(file=sav, to.data.frame=TRUE, stringsAsFactors=FALSE)

cat.long.string <- function(x, w=70) cat(paste(strwrap(x, width=w), "\n"))

## first part: x$string_500:
cat.long.string(x$string_500)
## second part: x$STRIN0:
cat.long.string(x$STRIN0)
## complete long string:
long.string <- apply(x[,c("string_500", "STRIN0")], 1, paste, collapse="")
cat.long.string(long.string)

```

**Description**

Generates a SAS program to convert the `ssd` contents to SAS transport format and then uses `read.xport` to obtain a data frame.

**Usage**

```
read.ssd(libname, sectionnames,  
         tmpXport=tempfile(), tmpProgLoc=tempfile(), sascmd="sas")
```

**Arguments**

<code>libname</code>	character string defining the SAS library (usually a directory reference)
<code>sectionnames</code>	character vector giving member names. These are files in the <code>libname</code> directory. They will usually have a <code>.ssd0x</code> or <code>.sas7bdat</code> extension, which should be omitted. Use of ASCII names of at most 8 characters is strongly recommended.
<code>tmpXport</code>	character string: location where temporary <code>xport</code> format archive should reside – defaults to a randomly named file in the session temporary directory, which will be removed.
<code>tmpProgLoc</code>	character string: location where temporary conversion SAS program should reside – defaults to a randomly named file in session temporary directory, which will be removed on successful operation.
<code>sascmd</code>	character string giving full path to SAS executable.

**Details**

Creates a SAS program and runs it.

Error handling is primitive.

**Value**

A data frame if all goes well, or `NULL` with warnings and some enduring side effects (log file for auditing)

**Note**

**This requires SAS to be available.** If you have a SAS dataset without access to SAS you will need another product to convert it to a format such as `.csv`, for example ‘Stat/Transfer’ or ‘DBMS/Copy’ or the ‘SAS System Viewer’ (Windows only).

SAS requires section names to be no more than 8 characters. This is worked by the use of symbolic links: these are barely supported on Windows.

**Author(s)**

For Unix: VJ Carey <stvjc@channing.harvard.edu>

**See Also**

[read.xport](#)

**Examples**

```
## if there were some files on the web we could get a real
## runnable example
## Not run:
R> list.files("trialdata")
 [1] "baseline.sas7bdat" "form11.sas7bdat"  "form12.sas7bdat"
 [4] "form13.sas7bdat"  "form22.sas7bdat"  "form23.sas7bdat"
 [7] "form3.sas7bdat"   "form4.sas7bdat"   "form48.sas7bdat"
[10] "form50.sas7bdat"  "form51.sas7bdat"  "form71.sas7bdat"
[13] "form72.sas7bdat"  "form8.sas7bdat"   "form9.sas7bdat"
[16] "form90.sas7bdat"  "form91.sas7bdat"

R> baseline <- read.ssd("trialdata", "baseline")
R> form90 <- read.ssd("trialdata", "form90")

## Or for a Windows example
sashome <- "/Program Files/SAS/SAS 9.1"
read.ssd(file.path(sashome, "core", "sashelp"), "retail",
         sascmd = file.path(sashome, "sas.exe"))

## End(Not run)
```

read.systat

*Obtain a Data Frame from a Systat File***Description**

read.systat reads a rectangular data file stored by the Systat SAVE command as (legacy) \*.sys or more recently \*.syd files.

**Usage**

```
read.systat(file, to.data.frame = TRUE)
```

**Arguments**

file                    character variable with the name of the file to read  
to.data.frame        return a data frame (otherwise a list)

**Details**

The function only reads those Systat files that are rectangular data files (mtype = 1), and warns when files have non-standard variable name codings. The files tested were produced on MS-DOS and Windows: files for the Mac version of Systat have a completely different format.

The C code was originally written for an add-on module for Systat described in Bivand (1992 paper). Variable names retain the trailing dollar in the list returned when to.data.frame is FALSE, and in that case character variables are returned as is and filled up to 12 characters with blanks on the right. The original function was limited to reading Systat files with up to 256 variables (a Systat limitation); it will now read up to 8192 variables.

If there is a user comment in the header this is returned as attribute "comment". Such comments are always a multiple of 72 characters (with a maximum of 720 chars returned), normally padded with trailing spaces.

**Value**

A data frame (or list) with one component for each variable in the saved data set.

**Author(s)**

Roger Bivand

**References**

Systat Manual, 1987, 1989

Bivand, R. S. (1992) SYSTAT-compatible software for modelling spatial dependence among observations. *Computers and Geosciences* **18**, 951–963.

**Examples**

```
summary(iris)
iris.s <- read.systat(system.file("files/Iris.syd", package="foreign")[1])
str(iris.s)
summary(iris.s)
```

---

read.xport

*Read a SAS XPORT Format Library*

---

**Description**

Reads a file as a SAS XPORT format library and returns a list of data.frames.

**Usage**

```
read.xport(file, ...)
```

**Arguments**

**file** character variable with the name of the file to read. The file must be in SAS XPORT format.

**...** passed to [as.data.frame](#) when creating the data frames.



**Value**

If there is a more than one dataset in the XPORT format library, a named list of data frames, otherwise a data frame. The columns of the data frames will be either numeric (corresponding to numeric in SAS) or factor (corresponding to character in SAS). All SAS numeric missing values (including special missing values represented by .\_, .A to .Z by SAS) are mapped to R NA.

Trailing blanks are removed from character columns before conversion to a factor. Some sources claim that character missing values in SAS are represented by ' ' or ' ': these are not treated as R missing values.

**Author(s)**

Saikat DebRoy <saikat@stat.wisc.edu>

**References**

SAS Technical Support document TS-140: “The Record Layout of a Data Set in SAS Transport (XPORT) Format” available at <https://support.sas.com/techsup/technote/ts140.pdf>.

**See Also**

[lookup.xport](#)

**Examples**

```
## Not run: ## no XPORT file is installed
read.xport("test.xpt")

## End(Not run)
```

---

S3 read functions

*Read an S3 Binary or data.dump File*

---

**Description**

Reads binary data files or data.dump files that were produced in S version 3.

**Usage**

```
data.restore(file, print = FALSE, verbose = FALSE, env = .GlobalEnv)
read.S(file)
```

**Arguments**

file	the filename of the S-PLUS data.dump or binary file.
print	whether to print the name of each object as read from the file.
verbose	whether to print the name of every subitem within each object.
env	environment within which to create the restored object(s).

**Details**

read.S can read the binary files produced in some older versions of S-PLUS on either Windows (versions 3.x, 4.x, 2000) or Unix (version 3.x with 4 byte integers). It automatically detects whether the file was produced on a big- or little-endian machine and adapts itself accordingly.

data.restore can read a similar range of files produced by data.dump and for newer versions of S-PLUS, those from data.dump(. . . . , oldStyle=TRUE).

Not all S3 objects can be handled in the current version. The most frequently encountered exceptions are functions and expressions; you will also have trouble with objects that contain model formulas. In particular, comments will be lost from function bodies, and the argument lists of functions will often be changed.

**Value**

For read.S, an R version of the S3 object.

For data.restore, the name of the file.

**Author(s)**

Duncan Murdoch

**Examples**

```
## if you have an S-PLUS _Data file containing 'myobj'
## Not run: read.S(file.path("_Data", "myobj"))
data.restore("dumpdata", print = TRUE)

## End(Not run)
```

---

write.arff

*Write Data into ARFF Files*

---

**Description**

Writes data into Weka Attribute-Relation File Format (ARFF) files.

**Usage**

```
write.arff(x, file, eol = "\n", relation = deparse(substitute(x)))
```

**Arguments**

x	the data to be written, preferably a matrix or data frame. If not, coercion to a data frame is attempted.
file	either a character string naming a file, or a connection. "" indicates output to the standard output connection.
eol	the character(s) to print at the end of each line (row).
relation	The name of the relation to be written in the file.

**Details**

relation will be passed through `make.names` before writing to the file, in an attempt to it them acceptable to Weka, and column names what do not start with an alphabetic character will have `X` prepended.

However, the references say that ARFF files are ASCII files, and that encoding is not enforced.

**References**

Attribute-Relation File Format [https://waikato.github.io/weka-wiki/formats\\_and\\_processing/arff/](https://waikato.github.io/weka-wiki/formats_and_processing/arff/).

**See Also**

[read.arff](#); functions `write.arff` and `read.arff` in package **RWeka** which provide some support for logicals via conversion to or from factors.

**Examples**

```
write.arff(iris, file = "")
```

---

write.dbf

*Write a DBF File*

---

**Description**

The function tries to write a data frame to a DBF file.

**Usage**

```
write.dbf(dataframe, file, factor2char = TRUE, max_nchar = 254)
```

**Arguments**

<code>dataframe</code>	a data frame object.
<code>file</code>	a file name to be written to.
<code>factor2char</code>	logical, default TRUE, convert factor columns to character: otherwise they are written as the internal integer codes.
<code>max_nchar</code>	The maximum number of characters allowed in a character field. Strings which exceed this will be truncated with a warning. See Details.

## Details

Dots in column names are replaced by underlines in the DBF file, and names are truncated to 11 characters.

Only vector columns of classes "logical", "numeric", "integer", "character", "factor" and "Date" can be written. Other columns should be converted to one of these.

Maximum precision (number of digits including minus sign and decimal sign) for numeric is 19 - scale (digits after the decimal sign) which is calculated internally based on the number of digits before the decimal sign.

The original DBASE format limited character fields to 254 bytes. It is said that Clipper and FoxPro can read up to 32K, and it is possible to write a reader that could accept up to 65535 bytes. (The documentation suggests that only ASCII characters can be assumed to be supported.) Readers expecting the older standard (which includes Excel 2003, Access 2003 and OpenOffice 2.0) will truncate the field to the maximum width modulo 256, so increase max\_nchar only if you are sure the intended reader supports wider character fields.

## Value

Invisible NULL.

## Note

Other applications have varying abilities to read the data types used here. Microsoft Access reads "numeric", "integer", "character" and "Date" fields, including recognizing missing values, but not "logical" (read as 0, -1). Microsoft Excel understood all possible types but did not interpret missing values in character fields correctly (showing them as character nuls).

## Author(s)

Nicholas J. Lewin-Koh, modified by Roger Bivand and Brian Ripley; shapelib by Frank Warmerdam.

## References

<http://shapelib.maptools.org/>

[https://www.clicketyclick.dk/databases/xbase/format/data\\_types.html](https://www.clicketyclick.dk/databases/xbase/format/data_types.html)

## See Also

[read.dbf](#)

## Examples

```
str(warpbreaks)
try1 <- paste(tempfile(), ".dbf", sep = "")
write.dbf(warpbreaks, try1, factor2char = FALSE)
in1 <- read.dbf(try1)
str(in1)
try2 <- paste(tempfile(), ".dbf", sep = "")
```

```
write.dbf(warpbreaks, try2, factor2char = TRUE)
in2 <- read.dbf(try2)
str(in2)
unlink(c(try1, try2))
```

---

write.dta

*Write Files in Stata Binary Format*


---

## Description

Writes the data frame to file in the Stata binary format. Does not write array variables unless they can be [drop](#)-ed to a vector.

Frozen: will not support Stata formats after 10 (also used by Stata 11).

## Usage

```
write.dta(dataframe, file, version = 7L,
          convert.dates = TRUE, tz = "GMT",
          convert.factors = c("labels", "string", "numeric", "codes"))
```

## Arguments

dataframe	a data frame.
file	character string giving filename.
version	integer: Stata version: 6, 7, 8 and 10 are supported, and 9 is mapped to 8, 11 to 10.
convert.dates	logical: convert Date and POSIXct objects: see section ‘Dates’.
tz	timezone for date conversion.
convert.factors	how to handle factors.

## Details

The major difference between supported file formats in Stata versions is that version 7.0 and later allow 32-character variable names (5 and 6 were restricted to 8-character names). The `abbreviate` function is used to trim variable names to the permitted length. A warning is given if this is needed and it is an error for the abbreviated names not to be unique. Each version of Stata is claimed to be able to read all earlier formats.

The columns in the data frame become variables in the Stata data set. Missing values are handled correctly.

There are four options for handling factors. The default is to use Stata ‘value labels’ for the factor levels. With `convert.factors = "string"`, the factor levels are written as strings (the name of the value label is taken from the `"val.labels"` attribute if it exists or the variable name otherwise). With `convert.factors = "numeric"` the numeric values of the levels are written, or NA if they cannot be coerced to numeric. Finally, `convert.factors = "codes"` writes the underlying integer

codes of the factors. This last used to be the only available method and is provided largely for backwards compatibility.

If the "label.table" attribute contains value labels with names not already attached to a variable (not the variable name or name from "val.labels") then these will be written out as well.

If the "datalabel" attribute contains a string, it is written out as the dataset label otherwise the dataset label is "Written by R."

If the "expansion.table" attribute exists expansion fields are written. This attribute should contain a `list` where each element is `character` vector of length three. The first vector element contains the name of a variable or "\_dta" (meaning the dataset). The second element contains the characteristic name. The third contains the associated data.

If the "val.labels" attribute contains a `character` vector with a string label for each value then this is written as the value labels. Otherwise the variable names are used.

If the "var.labels" attribute contains a `character` vector with a string label for each variable then this is written as the variable labels. Otherwise the variable names are repeated as variable labels.

For Stata 8 or later use the default `version = 7` – the only advantage of Stata 8 format over 7 is that it can represent multiple different missing value types, and R doesn't have them. Stata 10/11 allows longer format lists, but R does not make use of them.

Note that the Stata formats are documented to use ASCII strings – R does not enforce this, but use of non-ASCII character strings will not be portable as the encoding is not recorded. Up to 244 bytes are allowed in character data, and longer strings will be truncated with a warning.

Stata uses some large numerical values to represent missing values. This function does not currently check, and hence integers greater than 2147483620 and doubles greater than  $8.988e+307$  may be misinterpreted by Stata.

## Value

NULL

## Dates

Unless disabled by argument `convert.dates = FALSE`, R date and date-time objects (POSIXt classes) are converted into the Stata date format, the number of days since 1960-01-01. (For date-time objects this may lose information.) Stata can be told that these are dates by

```
format xdate %td;
```

It is possible to pass objects of class POSIXct to Stata to be treated as one of its versions of date-times. Stata uses the number of milliseconds since 1960-01-01, either excluding (format %tc) or counting (format %tC) leap seconds. So either an object of class POSIXct can be passed to Stata with `convert.dates = FALSE` and converted in Stata, or 315619200 should be added and then multiplied by 1000 before passing to `write.dta` and assigning format %tc. Stata's comments on the first route are at <https://www.stata.com/manuals13/ddatetime.pdf>, but at the time of writing were wrong: R uses POSIX conventions and hence does not count leap seconds.

## Author(s)

Thomas Lumley and R-core members: support for value labels by Brian Quistorff.

**References**

Stata 6.0 Users Manual, Stata 7.0 Programming manual, Stata online help (version 8 and later, also [https://www.stata.com/help.cgi?dta\\_114](https://www.stata.com/help.cgi?dta_114) and [https://www.stata.com/help.cgi?dta\\_113](https://www.stata.com/help.cgi?dta_113)) describe the file formats.

**See Also**

[read.dta](#), [attributes](#), [DateTimeClasses](#), [abbreviate](#)

**Examples**

```
write.dta(swiss, swissfile <- tempfile())
read.dta(swissfile)
```

---

write.foreign	<i>Write Text Files and Code to Read Them</i>
---------------	---

---

**Description**

This function exports simple data frames to other statistical packages by writing the data as free-format text and writing a separate file of instructions for the other package to read the data.

**Usage**

```
write.foreign(df, datafile, codefile,
             package = c("SPSS", "Stata", "SAS"), ...)
```

**Arguments**

df	A data frame
datafile	Name of file for data output
codefile	Name of file for code output
package	Name of package
...	Other arguments for the individual writeForeign functions

**Details**

The work for this function is done by `foreign::writeForeignStata`, `foreign::writeForeignSAS` and `foreign::writeForeignSPSS`. To add support for another package, eg Systat, create a function `writeForeignSystat` with the same first three arguments as `write.foreign`. This will be called from `write.foreign` when `package="Systat"`.

Numeric variables and factors are supported for all packages: dates and times (`Date`, `dates`, `date`, and `POSIXt` classes) and logical vectors are also supported for SAS and characters are supported for SPSS.

For `package="SAS"` there are optional arguments `dataname = "rdata"` taking a string that will be the SAS data set name, `validvarname` taking either "V6" or "V7", and `libpath = NULL` taking a

string that will be the directory where the target SAS dataset will be written when the generated SAS code been run.

For `package="SPSS"` there is an optional argument `maxchars = 32L` taking an integer that causes the variable names (not variable labels) to be abbreviated to not more than `maxchars` chars. For compatibility with SPSS version 12 and before, change this to `maxchars = 8L`. In single byte locales with SPSS versions 13 or later, this can be set to `maxchars = 64L`.

For `package="SPSS"`, as a side effect, the decimal indicator is always set by `SET DECIMAL=DOT`, which may override user settings of the indicator or its default derived from the current locale.

**Value**

Invisible NULL.

**Author(s)**

Thomas Lumley and Stephen Weigand

**Examples**

```
## Not run:
datafile <- tempfile()
codefile <- tempfile()
write.foreign(esoph, datafile, codefile, package="SPSS")
file.show(datafile)
file.show(codefile)
unlink(datafile)
unlink(codefile)

## End(Not run)
```



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