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## ***Red Hat Enterprise Linux Release 9.2 Manual Pages on 'ar.1p' command***

**\$ man ar.1p**

AR(1P)                    POSIX Programmer's Manual                    AR(1P)

### PROLOG

This manual page is part of the POSIX Programmer's Manual. The Linux implementation of this interface may differ (consult the corresponding Linux manual page for details of Linux behavior), or the interface may not be implemented on Linux.

### NAME

ar ? create and maintain library archives

### SYNOPSIS

ar -d [-v] archive file...  
ar -m [-v] archive file...  
ar -m -a [-v] posname archive file...  
ar -m -b [-v] posname archive file...  
ar -m -i [-v] posname archive file...  
ar -p [-v] [-s] archive [file...]  
ar -q [-cv] archive file...  
ar -r [-cuv] archive file...  
ar -r -a [-cuv] posname archive file...  
ar -r -b [-cuv] posname archive file...  
ar -r -i [-cuv] posname archive file...  
ar -t [-v] [-s] archive [file...]  
ar -x [-v] [-sCT] archive [file...]

### DESCRIPTION

The ar utility is part of the Software Development Utilities option.

The ar utility can be used to create and maintain groups of files combined into an archive. Once an archive has been created, new files can be added, and existing files in an archive can be extracted, deleted, or replaced. When an archive consists entirely of valid object files, the implementation shall format the archive so that it is usable as a library for link editing (see c99 and fort77). When some of the archived files are not valid object files, the suitability of the archive for library use is undefined. If an archive consists entirely of printable files, the entire archive shall be printable.

When ar creates an archive, it creates administrative information indicating whether a symbol table is present in the archive. When there is at least one object file that ar recognizes as such in the archive, an archive symbol table shall be created in the archive and maintained by ar; it is used by the link editor to search the archive. Whenever the ar utility is used to create or update the contents of such an archive, the symbol table shall be rebuilt. The -s option shall force the symbol table to be rebuilt.

All file operands can be pathnames. However, files within archives shall be named by a filename, which is the last component of the path name used when the file was entered into the archive. The comparison of file operands to the names of files in archives shall be performed by comparing the last component of the operand to the name of the file in the archive.

It is unspecified whether multiple files in the archive may be identically named. In the case of such files, however, each file and pathname operand shall match only the first file in the archive having a name that is the same as the last component of the operand.

## OPTIONS

The ar utility shall conform to the Base Definitions volume of POSIX.1?2017, Section 12.2, Utility Syntax Guidelines, except for Guideline 9.

The following options shall be supported:

- a Position new files in the archive after the file named by the posname operand.
- b Position new files in the archive before the file named by the posname operand.
- c Suppress the diagnostic message that is written to standard error by default when the archive is created.
- C Prevent extracted files from replacing like-named files in the file system. This option is useful when -T is also used, to prevent truncated filenames from replacing files with the same prefix.
- d Delete one or more files from archive.
- i Position new files in the archive before the file in the archive named by the posname operand (equivalent to -b).
- m Move the named files in the archive. The -a, -b, or -i options with the posname operand indicate the position; otherwise, move the named files in the archive to the end of the archive.
- p Write the contents of the files in the archive named by file operands from archive to the standard output. If no file operands are specified, the contents of all files in the archive shall be written in the order of the archive.
- q Append the named files to the end of the archive. In this case ar does not check whether the added files are already in the archive. This is useful to bypass the searching otherwise done when creating a large archive piece by piece.
- r Replace or add files to archive. If the archive named by archive does not exist, a new archive shall be created and a diagnostic message shall be written to standard error (unless the -c option is specified). If no files are specified and the archive exists, the results are undefined. Files that replace existing files in the archive shall not change the order of the archive. Files that do not replace existing files in the archive shall be appended to the archive unless a -a,

- b, or -i option specifies another position.
- s Force the regeneration of the archive symbol table even if ar is not invoked with an option that modifies the archive contents. This option is useful to restore the archive symbol table after it has been stripped; see strip.
- t Write a table of contents of archive to the standard output. Only the files specified by the file operands shall be included in the written list. If no file operands are specified, all files in archive shall be included in the order of the archive.
- T Allow filename truncation of extracted files whose archive names are longer than the file system can support. By default, extracting a file with a name that is too long shall be an error; a diagnostic message shall be written and the file shall not be extracted.
- u Update older files in the archive. When used with the -r option, files in the archive shall be replaced only if the corresponding file has a modification time that is at least as new as the modification time of the file in the archive.
- v Give verbose output. When used with the option characters -d, -r, or -x, write a detailed file-by-file description of the archive creation and maintenance activity, as described in the STDOUT section.  
  
When used with -p, write the name of the file in the archive to the standard output before writing the file in the archive itself to the standard output, as described in the STDOUT section.  
  
When used with -t, include a long listing of information about the files in the archive, as described in the STDOUT section.
- x Extract the files in the archive named by the file operands from archive. The contents of the archive shall not be changed. If no file operands are given, all files in the ar?

chive shall be extracted. The modification time of each file extracted shall be set to the time the file is extracted from the archive.

## OPERANDS

The following operands shall be supported:

**archive** A pathname of the archive.

**file** A pathname. Only the last component shall be used when comparing against the names of files in the archive. If two or more file operands have the same last pathname component (basename), the results are unspecified. The implementation's archive format shall not truncate valid filenames of files added to or replaced in the archive.

**posname** The name of a file in the archive, used for relative positioning; see options `-m` and `-r`.

## STDIN

Not used.

## INPUT FILES

The archive named by `archive` shall be a file in the format created by `ar -r`.

## ENVIRONMENT VARIABLES

The following environment variables shall affect the execution of `ar`:

**LANG** Provide a default value for the internationalization variables that are unset or null. (See the Base Definitions volume of POSIX.1?2017, Section 8.2, Internationalization Variables for the precedence of internationalization variables used to determine the values of locale categories.)

**LC\_ALL** If set to a non-empty string value, override the values of all the other internationalization variables.

**LC\_CTYPE** Determine the locale for the interpretation of sequences of bytes of text data as characters (for example, single-byte as opposed to multi-byte characters in arguments and input files).

**LC\_MESSAGES**

Determine the locale that should be used to affect the format and contents of diagnostic messages written to standard error.

**LC\_TIME** Determine the format and content for date and time strings written by `ar -tv`.

**NLSPATH** Determine the location of message catalogs for the processing of `LC_MESSAGES`.

**TMPDIR** Determine the pathname that overrides the default directory for temporary files, if any.

**TZ** Determine the timezone used to calculate date and time strings written by `ar -tv`. If `TZ` is unset or null, an unspecified default timezone shall be used.

## ASYNCHRONOUS EVENTS

Default.

## STDOUT

If the `-d` option is used with the `-v` option, the standard output format shall be:

```
"d - %s\n", <file>
```

where `file` is the operand specified on the command line.

If the `-p` option is used with the `-v` option, `ar` shall precede the contents of each file with:

```
"\n<%s>\n\n", <file>
```

where `file` is the operand specified on the command line, if `file` operands were specified, and the name of the file in the archive if they were not.

If the `-r` option is used with the `-v` option:

\* If `file` is already in the archive, the standard output format shall be:

```
"r - %s\n", <file>
```

where `<file>` is the operand specified on the command line.

\* If `file` is not already in the archive, the standard output format shall be:

```
"a - %s\n", <file>
```

where <file> is the operand specified on the command line.

If the -t option is used, ar shall write the names of the files in the archive to the standard output in the format:

```
"%s\n", <file>
```

where file is the operand specified on the command line, if file operands were specified, or the name of the file in the archive if they were not.

If the -t option is used with the -v option, the standard output format shall be:

```
"%s %u/%u %u %s %d %d:%d %d %s\n", <member mode>, <user ID>,  
<group ID>, <number of bytes in member>,  
<abbreviated month>, <day-of-month>, <hour>,  
<minute>, <year>, <file>
```

where:

<file> Shall be the operand specified on the command line, if file operands were specified, or the name of the file in the archive if they were not.

<member mode>

Shall be formatted the same as the <file mode> string defined in the STDOUT section of ls, except that the first character, the <entry type>, is not used; the string represents the file mode of the file in the archive at the time it was added to or replaced in the archive.

The following represent the last-modification time of a file when it was most recently added to or replaced in the archive:

<abbreviated month>

Equivalent to the format of the %b conversion specification format in date.

<day-of-month>

Equivalent to the format of the %e conversion specification format in date.

<hour> Equivalent to the format of the %H conversion specification format in date.

<minute> Equivalent to the format of the %M conversion specification format in date.

<year> Equivalent to the format of the %Y conversion specification format in date.

When LC\_TIME does not specify the POSIX locale, a different format and order of presentation of these fields relative to each other may be used in a format appropriate in the specified locale.

If the -x option is used with the -v option, the standard output format shall be:

"x - %s\n", <file>

where file is the operand specified on the command line, if file operands were specified, or the name of the file in the archive if they were not.

## STDERR

The standard error shall be used only for diagnostic messages. The diagnostic message about creating a new archive when -c is not specified shall not modify the exit status.

## OUTPUT FILES

Archives are files with unspecified formats.

## EXTENDED DESCRIPTION

None.

## EXIT STATUS

The following exit values shall be returned:

- 0 Successful completion.
- >0 An error occurred.

## CONSEQUENCES OF ERRORS

Default.

The following sections are informative.

## APPLICATION USAGE

None.

## EXAMPLES

None.

## RATIONALE

The archive format is not described. It is recognized that there are several known ar formats, which are not compatible. The ar utility is included, however, to allow creation of archives that are intended for use only on one machine. The archive is specified as a file, and it can be moved as a file. This does allow an archive to be moved from one machine to another machine that uses the same implementation of ar. Utilities such as pax (and its forebears tar and cpio) also provide portable ``archives". This is not a duplication; the ar utility is included to provide an interface primarily for make and the compilers, based on a historical model.

In historical implementations, the -q option (available on XSI-conforming systems) is known to execute quickly because ar does not check on whether the added members are already in the archive. This is useful to bypass the searching otherwise done when creating a large archive piece-by-piece. These remarks may but need not remain true for a brand new implementation of this utility; hence, these remarks have been moved into the RATIONALE.

BSD implementations historically required applications to provide the -s option whenever the archive was supposed to contain a symbol table. As in this volume of POSIX.1?2017, System V historically creates or updates an archive symbol table whenever an object file is removed from, added to, or updated in the archive.

The OPERANDS section requires what might seem to be true without specifying it: the archive cannot truncate the filenames below {NAME\_MAX}. Some historical implementations do so, however, causing unexpected results for the application. Therefore, this volume of POSIX.1?2017 makes the requirement explicit to avoid misunderstandings.

According to the System V documentation, the options -dmpqrx are not required to begin with a <hyphen-minus> ('-'). This volume of POSIX.1?2017 requires that a conforming application use the leading <hyphen-minus>.

The archive format used by the 4.4 BSD implementation is documented in this RATIONALE as an example:

A file created by ar begins with the "magic" string "!<arch>\n". The rest of the archive is made up of objects, each of which is composed of a header for a file, a possible filename, and the file contents. The header is portable between machine architectures, and, if the file contents are printable, the archive is itself printable.

The header is made up of six ASCII fields, followed by a two-character trailer. The fields are the object name (16 characters), the file last modification time (12 characters), the user and group IDs (each 6 characters), the file mode (8 characters), and the file size (10 characters). All numeric fields are in decimal, except for the file mode, which is in octal.

The modification time is the file st\_mtime field. The user and group IDs are the file st\_uid and st\_gid fields. The file mode is the file st\_mode field. The file size is the file st\_size field. The two-byte trailer is the string "<newline>".

Only the name field has any provision for overflow. If any filename is more than 16 characters in length or contains an embedded space, the string "#1/" followed by the ASCII length of the name is written in the name field. The file size (stored in the archive header) is incremented by the length of the name. The name is then written immediately following the archive header. Any unused characters in any of these fields are written as <space> characters. If any fields are their particular maximum number of characters in length, there is no separation between the fields.

Objects in the archive are always an even number of bytes long; files that are an odd number of bytes long are padded with a <newline>, although the size in the header does not reflect this.

The ar utility description requires that (when all its members are valid object files) ar produce an object code library, which the linkage editor can use to extract object modules. If the linkage editor

needs a symbol table to permit random access to the archive, `ar` must provide it; however, `ar` does not require a symbol table.

The BSD `-o` option was omitted. It is a rare conforming application that uses `ar` to extract object code from a library with concern for its modification time, since this can only be of importance to make. Hence, since this functionality is not deemed important for applications portability, the modification time of the extracted files is set to the current time.

There is at least one known implementation (for a small computer) that can accommodate only object files for that system, disallowing mixed object and other files. The ability to handle any type of file is not only historical practice for most implementations, but is also a reasonable expectation.

Consideration was given to changing the output format of `ar -tv` to the same format as the output of `ls -l`. This would have made parsing the output of `ar` the same as that of `ls`. This was rejected in part because the current `ar` format is commonly used and changes would break historical usage. Second, `ar` gives the user ID and group ID in numeric format separated by a `<slash>`. Changing this to be the user name and group name would not be correct if the archive were moved to a machine that contained a different user database. Since `ar` cannot know whether the archive was generated on the same machine, it cannot tell what to report.

The text on the `-ur` option combination is historical practice?since one filename can easily represent two different files (for example, `/a/foo` and `/b/foo`), it is reasonable to replace the file in the archive even when the modification time in the archive is identical to that in the file system.

## FUTURE DIRECTIONS

None.

## SEE ALSO

`c99`, `date`, `fort77`, `pax`, `strip`

The Base Definitions volume of POSIX.1?2017, Chapter 8, Environment

Variables, Section 12.2, Utility Syntax Guidelines, <unistd.h>, de?  
scription of {POSIX\_NO\_TRUNC}

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