

**NAME**

**rgbasm** — Game Boy assembler

**SYNOPSIS**

```
rgbasm [ -EVvw] [ -b chars] [ -D name[=value]] [ -g chars] [ -I path]
[ -M depend_file] [ -MG] [ -MP] [ -MT target_file] [ -MQ target_file]
[ -o out_file] [ -P include_file] [ -p pad_value] [ -Q fix_precision]
[ -r recursion_depth] [ -s features:state_file] [ -W warning]
[ -X max_errors] asmfile
```

**DESCRIPTION**

The **rgbasm** program creates an RGB object file from an assembly source file. The object file format is documented in **rgbds**(5).

The input *asmfile* can be a path to a file, or **-** to read from standard input.

Note that options can be abbreviated as long as the abbreviation is unambiguous: **--verb** is **--verbose**, but **--ver** is invalid because it could also be **--version**. The arguments are as follows:

**-b** *chars*, **--binary-digits** *chars*

Change the two characters used for binary constants. The defaults are 01.

**-D** *name*[=*value*], **--define** *name*[=*value*]

Add a string symbol to the compiled source code. This is equivalent to *name* **EQU** "*value*" in code, or *name* **EQU** "1" if *value* is not specified.

**-E**, **--export-all**

Export all labels, including unreferenced and local labels.

**-g** *chars*, **--gfx-chars** *chars*

Change the four characters used for gfx constants. The defaults are 0123.

**-I** *path*, **--include** *path*

Add a new “include path”; *path* must point to a directory. When **INCLUDE** (including the implicit one from **-P**) or **INCBIN** is attempted, **rgbasm** first looks up the provided path from its working directory; if this fails, it tries again from each of the “include path” directories, in the order they were provided.

**-M** *depend\_file*, **--dependfile** *depend\_file*

Write **make**(1) dependencies to *depend\_file*.

**-MG** To be used in conjunction with **-M**. This makes **rgbasm** assume that missing files are auto-generated: when **INCLUDE** (including the implicit one from **-P**) or **INCBIN** is attempted on a non-existent file, it is added as a dependency, then **rgbasm** exits normally instead of erroring out. This feature is used in automatic updating of makefiles.

**-MP** When enabled, this causes a phony target to be added for each dependency other than the main file. This prevents **make**(1) from erroring out when dependency files are deleted.

**-MT** *target\_file*

Add a target to the rules emitted by **-M**. The exact string provided will be written, including spaces and special characters.

**-MT** *fileA* **-MT** *fileB*

is equivalent to

**-MT** '*fileA fileB*'.

If neither this nor **-MQ** is specified, the output file name is used.

- MQ** *target\_file*  
Same as **-MT**, but additionally escapes any special make(1) characters, essentially '\$'.
- o** *out\_file*, **--output** *out\_file*  
Write an object file to the given filename.
- P** *include\_file*, **--preinclude** *include\_file*  
Pre-include a file. This acts as if a **INCLUDE** "*include\_file*" was read before the input *asmfile*.
- p** *pad\_value*, **--pad-value** *pad\_value*  
Use this as the value for **DS** directives in ROM sections, unless overridden. The default is 0x00.
- Q** *fix\_precision*, **--q-precision** *fix\_precision*  
Use this as the precision of fixed-point numbers after the decimal point, unless they specify their own precision. The default is 16, so fixed-point numbers are Q16.16 (since they are 32-bit integers). The argument may start with a '.' to match the Q notation, for example, **-Q** .16.
- r** *recursion\_depth*, **--recursion-depth** *recursion\_depth*  
Specifies the recursion depth past which **rgbasm** will assume being in an infinite loop. The default is 64.
- s** *features:state\_file*, **--state** *features:state\_file*  
Write the specified *features* to *state\_file*, based on the final state of **rgbasm** at the end of its input. The expected *features* are a comma-separated subset of the following:
  - equ** Write all numeric constants as **def** *name* **equ** *value*.
  - var** Write all variables as **def** *name* **=** *value*.
  - equs** Write all string constants as **def** *name* **equs** "*value*".
  - char** Write all characters as **charmap** *name*, *value*.
  - macro** Write all macros as **macro** *name* ... **endm**.
  - all** Acts like **equ, var, equs, char, macro**.
 This flag may be specified multiple times with different feature subsets to write them to different files (see **EXAMPLES** below).
- V, --version**  
Print the version of the program and exit.
- v, --verbose**  
Be verbose.
- W** *warning*, **--warning** *warning*  
Set warning flag *warning*. A warning message will be printed if *warning* is an unknown warning flag. See the **DIAGNOSTICS** section for a list of warnings.
- w**  
Disable all warning output, even when turned into errors.
- X** *max\_errors*, **--max-errors** *max\_errors*  
If more than this number of errors (not warnings) occur, then abort the assembly process; **-X** 0 disables this behavior. The default is 100 if **rgbasm** is printing errors to a terminal, and 0 otherwise.

## DIAGNOSTICS

Warnings are diagnostic messages that indicate possibly erroneous behavior that does not necessarily compromise the assembling process. The following options alter the way warnings are processed.

**-Werror**

Make all warnings into errors. This can be negated as **-Wno-error** to prevent turning all warnings into errors.

**-Werror=**

Make the specified warning or meta warning into an error. A warning's name is appended (example: **-Werror=obsolete**), and this warning is implicitly enabled and turned into an error. This can be negated as **-Wno-error=** to prevent turning a specified warning into an error, even if **-Werror** is in effect.

The following warnings are “meta” warnings, that enable a collection of other warnings. If a specific warning is toggled via a meta flag and a specific one, the more specific one takes priority. The position on the command-line acts as a tie breaker, the last one taking effect.

**-Wall**

This enables warnings that are likely to indicate an error or undesired behavior, and that can easily be fixed.

**-Wextra**

This enables extra warnings that are less likely to pose a problem, but that may still be wanted.

**-Weverything**

Enables literally every warning.

The following warnings are actual warning flags; with each description, the corresponding warning flag is included. Note that each of these flag also has a negation (for example, **-Wcharmap-redef** enables the warning that **-Wno-charmap-redef** disables; and **-Wall** enables every warning that **-Wno-all** disables). Only the non-default flag is listed here. Ignoring the “no-” prefix, entries are listed alphabetically.

**-Wno-assert**

Warn when **WARN**-type assertions fail. (See “Aborting the assembly process” in `rgbasm(5)` for **ASSERT**).

**-Wbackwards-for**

Warn when **FOR** loops have their start and stop values switched according to the step value. This warning is enabled by **-Wall**.

**-Wbuiltin-args**

Warn about incorrect arguments to built-in functions, such as **STRSUB()** with indexes outside of the string's bounds. This warning is enabled by **-Wall**.

**-Wcharmap-redef**

Warn when re-defining a charmap mapping. This warning is enabled by **-Wall**.

**-Wdiv**

Warn when dividing the smallest negative integer ( $-2^{31}$ ) by -1, which yields itself due to integer overflow.

**-Wempty-macro-arg**

Warn when a macro argument is empty. This warning is enabled by **-Wextra**.

**-Wempty-strrpl**

Warn when **STRRPL()** is called with an empty string as its second argument (the substring to replace). This warning is enabled by **-Wall**.

**-Wlarge-constant**

Warn when a constant too large to fit in a signed 32-bit integer is encountered. This warning is enabled by **-Wall**.

**-Wmacro-shift**

Warn when shifting macro arguments past their limits. This warning is enabled by **-Wextra**.

**-Wno-nested-comment**

Warn when the block comment start sequence `‘/*’` is found inside of a block comment. Block comments cannot be nested, so the first `‘*/’` will end the whole comment.

**-Wno-obsolete**

Warn when obsolete constructs such as the `_PI` constant or `PRINTT` directive are encountered.

**-Wnumeric-string=**

Warn when a multi-character string is treated as a number. **-Wnumeric-string=0** or **-Wno-numeric-string** disables this warning. **-Wnumeric-string=1** or just **-Wnumeric-string** warns about strings longer than four characters, since four or fewer characters fit within a 32-bit integer. **-Wnumeric-string=2** warns about any multi-character string.

**-Wpurge=**

Warn when purging symbols which are likely to have been necessary. **-Wpurge=0** or **-Wno-purge** disables this warning. **-Wpurge=1** or just **-Wpurge** warns when purging any exported symbol (regardless of type). **-Wpurge=2** also warns when purging any label (even if not exported).

**-Wshift**

Warn when shifting right a negative value. Use a division by `2**N` instead.

**-Wshift-amount**

Warn when a shift's operand is negative or greater than 32.

**-Wtruncation=**

Warn when an implicit truncation (for example, `db` to an 8-bit value) loses some bits. **-Wtruncation=0** or **-Wno-truncation** disables this warning. **-Wtruncation=1** warns when an N-bit value is `2**N` or greater, or less than `-2**N`. **-Wtruncation=2** or just **-Wtruncation** also warns when an N-bit value is less than `-2**(N-1)`, which will not fit in two's complement encoding.

**-Wunmapped-char=**

Warn when a character goes through charmap conversion but has no defined mapping. **-Wunmapped-char=0** or **-Wno-unmapped-char** disables this warning. **-Wunmapped-char=1** or just **-Wunmapped-char** only warns if the active charmap is not empty. **-Wunmapped-char=2** warns if the active charmap is empty, and/or is not the default charmap `'main'`.

**-Wunmatched-directive**

Warn when a `PUSHC`, `PUSHO`, or `PUSHS` directive does not have a corresponding `POPC`, `POPO`, or `POPS`. This warning is enabled by **-Wextra**.

**-Wunterminated-load**

Warn when a `LOAD` block is not terminated by an `ENDL`. This warning is enabled by **-Wextra**.

**-Wno-user**

Warn when the `WARN` built-in is executed. (See “Aborting the assembly process” in `rgbasm(5)` for `WARN`).

**EXAMPLES**

You can assemble a source file in two ways.

Straightforward way:

```
$ rgbasm -o bar.o foo.asm
```

Pipes way:

```
$ cat foo.asm | rgbasm -o bar.o -  
$ rgbasm -o bar.o - < foo.asm
```

The resulting object file is not yet a usable ROM image—it must first be run through `rgblink(1)` and then `rgbfix(1)`.

Writing the final assembler state to a file:

```
$ rgbasm -s all:state.dump.asm foo.asm
```

Or to multiple files:

```
$ rgbasm -s equ,var:numbers.dump.asm -s equs:strings.dump.asm  
foo.asm
```

## BUGS

Please report bugs on *GitHub*: <https://github.com/gbdev/rgbds/issues>.

## SEE ALSO

`rgbasm(5)`, `rgblink(1)`, `rgbfix(1)`, `rgbgfx(1)`, `gbz80(7)`, `rgbds(5)`, `rgbds(7)`

## HISTORY

**rgbasm** was originally written by Carsten Sørensen as part of the ASMotor package, and was later repackaged in RGBDS by Justin Lloyd. It is now maintained by a number of contributors at <https://github.com/gbdev/rgbds>.