

**NAME**

`rgbasm` — Game Boy assembler

**SYNOPSIS**

```
rgbasm [-EHhLlVvw] [-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] [-W warning] asmfile
```

**DESCRIPTION**

The **rgbasm** program creates an RGB object file from an assembly source file. 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.
- `-H`, `--nop-after-halt`  
By default, **rgbasm** inserts a **nop** instruction immediately after any **halt** instruction, but this has been deprecated and prints a warning message the first time it occurs. The `-H` option opts into this insertion, so no warning will be printed.
- `-h`, `--halt-without-nop`  
Disables inserting a **nop** instruction immediately after any **halt** instruction.
- `-I path`, `--include path`  
Add a new "include path; *path*" must point to a directory. When a **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.
- `-L`, `--preserve-ld`  
By default, **rgbasm** optimizes loads of the form **LD** [**\$FF00+n8**],**A** into the opcode **LDH** [**\$FF00+n8**],**A**, but this has been deprecated and prints a warning message the first time it occurs. The `-L` option disables this optimization.
- `-l`, `--auto-ldh`  
Optimize loads of the form **LD** [**\$FF00+n8**],**A** into the opcode **LDH** [**\$FF00+n8**],**A**.
- `-M depend_file`, `--dependfile depend_file`  
Print *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*  
When padding an image, pad with this value. 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.
- 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.

## 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.
- Werror=  
Make the specified 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 is an error if used with a meta warning, such as -Werror=all.

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). 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`.
- Wlong-string  
Warn when a string too long to fit in internal buffers 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-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.

- 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's absolute value is  $2^{**}N$  or greater. `-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 `-Wunmapped-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'.
- 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).

**BUGS**

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

**SEE ALSO**

*rgbasm*(5), *rgbfix*(1), *rgblink*(1), *rgbds*(5), *rgbds*(7), *gbz80*(7)

**HISTORY**

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