

**NAME**

*rgbasm* — Game Boy assembler

**SYNOPSIS**

```
rgbasm [-EhVvw] [-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`  
 Allow two characters to be used for binary constants in addition to the default ‘0’ and ‘1’. Valid characters are numbers other than ‘0’ and ‘1’, letters, ‘.’, ‘#’, or ‘@’.
- `-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`  
 Allow four characters to be used for graphics constants in addition to the default ‘0’, ‘1’, ‘2’, and ‘3’. Valid characters are numbers other than ‘0’ to ‘3’, letters, ‘.’, ‘#’, or ‘@’. The defaults are 0123.
- `-h`, `--help`  
 Print help text for the program and exit.
- `-I path`, `--include path`  
 Add a new “include path”; *path* must point to a directory. When **aINCLUDE** (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* **equus** "*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 **STRSLICE()** 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), *rgbasm-old*(5), *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>.