

**NAME**

rgbasm-old — obsolete language documentation

**DESCRIPTION**

This is the list of features that have been removed from the *rgbasm*(5) assembly language over its decades of evolution, along with their modern alternatives. Its goal is to be a reference for backwards incompatibility, when upgrading an old assembly codebase to work with the latest RGBDS release. It does *not* attempt to list every syntax bug that was ever fixed (with some notable exceptions), nor new reserved keywords that may conflict with old identifiers.

**REMOVED**

These are features which have been completely removed, without any direct alternatives. Usually these features were limiting the addition of other features, or had awkward limits on their own intended effects.

**Automatic LD to LDH conversion (rgbasm -l)**

Deprecated in 0.7.0, removed in 0.8.0.

*rgbasm*(1) used to automatically treat 'LD' as LDH if the address was known to be in the \$FF00-\$FFFF range, with the -L flag to opt out. *rgbasm*(1) 0.6.0 added a -l flag to opt in instead.

Instead, use LDH, and remove the -L and -l flags from *rgbasm*(1).

**Automatic NOP after HALT (rgbasm -H)**

Deprecated in 0.7.0, removed in 0.8.0.

*rgbasm*(1) used to automatically insert a NOP after HALT, with the -h flag to opt out. *rgbasm*(1) 0.6.0 added a -H flag to opt in instead.

Instead, use an explicit NOP after HALT, and remove the -h and -H flags from *rgbasm*(1).

**Nested macro definitions**

Removed in 0.4.2.

Instead, put the nested macro definition inside a quoted string (making sure that none of its lines start with **ENDM**), then interpolate that string. For example:

```
MACRO outer
    DEF definition EQU$ " "
    MACRO inner
        println (\1) - (\1)
    \nENDM " "
    {definition}
    PURGE definition
ENDM
outer 10
inner 3 ; prints 7
```

**Negative DS**

Removed in 0.3.2.

This was used to "rewind" the value of @ in RAM sections, allowing labeled space allocations to overlap.

Instead, use **UNION**.

**Section-local charmaps**

Deprecated in 0.3.9, removed in 0.4.0.

Defining a **CHARMAP** inside a **SECTION** when the current global charmap was the 'main' one used to only define that character mapping within that **SECTION**.

Instead, use **PUSHC** and **POPC** and switch to a different character mapping for that section.

**\_\_FILE\_\_ and \_\_LINE\_\_**

Deprecated in 0.6.0, removed in 0.7.0.

Instead, use **WARN** or **FAIL** to print a complete trace of filenames and line numbers.

**\_\_PI**

Deprecated in 0.5.0, removed in 0.6.0.

Instead, use 3.141592653.

**\_\_DATE\_\_ and \_\_TIME\_\_**

Deprecated in 1.0.0.

Instead, use **\_\_ISO\_8601\_LOCAL\_\_**.

**Treating multi-character strings as numbers**

Deprecated in 0.9.0, removed in 1.0.0.

Instead, use a multi-value **CHARMAP**, or explicitly combine the values of individual characters.

**Treating strings as numbers**

Deprecated in 1.0.0.

Instead, use character constants or the **CHARVAL** function.

**rgbgfx -f/--fix and -F/--fix-and-save**

Removed in 0.6.0.

Instead, use `rgbgfx -c/--colors` to explicitly specify a color palette. If using `-c` embedded, arrange the PNG's indexed palette in a separate graphics editor.

**rgbgfx -D/--debug**

Removed in 0.6.0.

**REPLACED**

These are features whose syntax has been changed without affecting functionality. They can generally be updated with a single search-and-replace.

**Defining constants and variables without DEF**

Deprecated in 0.7.0, removed in 0.8.0.

**EQU**, **EQUUS**, **=**, **RB**, **RW**, and **RL** definitions used to just start with the symbol name, but had to be typed in column 1.

Instead, use **DEF** before constant and variable definitions. Note that **EQUUS** expansion does not occur for the symbol name, so you have to use explicit `{interpolation}`.

**Defining macros like labels**

Deprecated in 0.6.0, removed in 0.7.0.

Macros used to be defined as `name : MACRO`.

Instead, use `MACRO name`. Note that **EQUUS** expansion does not occur for the macro name, so you have to use explicit `{interpolation}`.

**Defining variables with SET**

Deprecated in 0.5.2, removed in 0.6.0.

Variables used to be defined as `name SET value`.

Instead, use `DEF name = value`.

**Global labels without colons**

Deprecated in 0.4.0, removed in 0.5.0.

Labels used to be definable with just a name, but had to be typed in column 1.

Instead, use explicit colons; for example, `Label :` or exported `Label ::`.

**'\,' in strings within macro arguments**

Deprecated in 0.5.0, removed in 0.7.0.

Macro arguments now handle quoted strings and parenthesized expressions as single arguments, so commas inside them are not argument separators and do not need escaping.

Instead, just use commas without backslashes.

**'\*' comments**

Deprecated in 0.4.1, removed in 0.5.0.

These comments had to have the '\*' typed in column 1.

Instead, use ';' comments.

**STRIN, STRRIN, STRSUB, and CHARSUB**

Deprecated in 1.0.0.

These functions used 1-based indexing of string characters, which was inconsistent with the 0-based indexing used more often in programming.

Instead of **STRIN**, use **STRFIND**; instead of **STRRIN**, use **STRRFIND**; instead of **STRSUB**, use **STRSLICE**; and instead of **CHARSUB**, use **STRCHAR**.

Note that **STRSLICE** takes a start and end index instead of a start index and a length.

**PRINTT, PRINTI, PRINTV, and PRINTF**

Deprecated in 0.5.0, removed in 0.6.0.

These directives were each specific to one type of value.

Instead, use **PRINT** and **PRINTLN**, with **STRFMT** or {interpolation} for type-specific formatting.

**IMPORT and XREF**

Removed in 0.4.0.

Symbols are now automatically resolved if they were exported from elsewhere.

Instead, just remove these directives.

**GLOBAL and XDEF**

Deprecated in 0.4.2, removed in 0.5.0.

Instead, use **EXPORT**.

**HOME, CODE, DATA, and BSS**

Deprecated in 0.3.0, removed in 0.4.0.

Instead of **HOME**, use **ROM0**; instead of **CODE** and **DATA**, use **ROMX**; and instead of **BSS**, use **WRAM0**.

**JP [HL]**

Deprecated in 0.3.0, removed in 0.4.0.

Instead, use **JP HL**.

**LDI A, HL and LDD A, HL**

Deprecated in 0.3.0, removed in 0.4.0.

Instead, use **LDI A, [HL]** and **LDD A, [HL]** (or **LD A, [HLI]** and **LD A, [HLD]**; or **LD A, [HL+]** and **LD A, [HL-]**).

**LDIO**

Deprecated in 0.9.0, removed in 1.0.0.

Instead, use **LDH**.

**LD [C], A and LD A, [C]**

Deprecated in 0.9.0, removed in 1.0.0.

Instead, use `LDH [C], A` and `LDH A, [C]`.

Note that `LD [$FF00+C], A` and `LD A, [$FF00+C]` were also deprecated in 0.9.0, but were *undeprecated* in 0.9.1.

### **LDH [n8], A and LDH A, [n8]**

Deprecated in 0.9.0, removed in 1.0.0.

LDH used to treat "addresses" from `$00` to `$FF` as if they were the low byte of an address from `$FF00` to `$FFFF`.

Instead, use `LDH [n16], A` and `LDH A, [n16]`.

### **LD HL, [SP + e8]**

Deprecated in 0.3.0, removed in 0.4.0.

Instead, use `LD HL, SP + e8`.

### **LDHL SP, e8**

Supported in ASMotor, removed in RGBDS.

Instead, use `LD HL, SP + e8`.

### **OPT z**

Deprecated in 0.4.0, removed in 0.5.0.

Instead, use **OPT p**.

### **rgbasm -i**

Deprecated in 0.6.0, removed in 0.8.0.

Instead, use `-I` or `--include`.

### **rgbfix -O/--overwrite**

Deprecated in 1.0.0.

Instead, use  
`-Wno-overwrite`.

### **rgbgfx -h/--horizontal**

Removed in 0.6.0.

Instead, use `-Z` or `--columns`.

### **rgbgfx --output-\***

Deprecated in 0.7.0, removed in 0.8.0.

Instead, use `--auto-*`.

## **CHANGED**

These are breaking changes that did not alter syntax, and so could not practically be deprecated.

### **Trigonometry function units**

Changed in 0.6.0.

Instead of dividing a circle into 65536.0 "binary degrees", it is now divided into 1.0 "turns".

For example, previously we had: `delim $$`

- `SIN(0.25) == 0.00002`, because `0.25 binary degrees = $0.25 / 65536.0$ turns = $0.000004 tau$ radians = $0.000008 pi$ radians`, and `$sin ( 0.000008 pi ) = 0.00002$`
- `SIN(16384.0) == 1.0`, because `16384.0 binary degrees = $16384.0 / 65536.0$ turns = $0.25 tau$ radians = $pi / 2$ radians`, and `$sin ( pi / 2 ) = 1$`
- `ASIN(1.0) == 16384.0`

Instead, now we have:

- `SIN(0.25) == 1.0`, because  $0.25$  turns =  $0.25$  tau radians =  $\pi / 2$  radians, and  $\sin(\pi / 2) = 1$
- `SIN(16384.0) == 0.0`, because  $16384$  turns =  $16384$  tau radians =  $32768 \pi$  radians, and  $\sin(32768 \pi) = 0$
- `ASIN(1.0) == 0.25`

delim off

### % operator behavior with negative dividend or divisor

Changed in 0.5.0.

Instead of having the same sign as the dividend (a remainder operation), ‘%’ has the same sign as the divisor (a modulo operation).

For example, previously we had:

- `13 % 10 == 3`
- `-13 % 10 == -3`
- `13 % -10 == 3`
- `-13 % -10 == -3`

Instead, now we have:

- `13 % 10 == 3`
- `-13 % 10 == 7`
- `13 % -10 == -7`
- `-13 % -10 == -3`

### \*\* operator associativity

Changed in 0.9.0.

Instead of being left-associative, ‘\*\*’ is now right-associative.

Previously we had `p ** q ** r == (p ** q) ** r`.

Instead, now we have `p ** q ** r == p ** (q ** r)`.

### 8-bit and 5-bit color conversion

Changed in 1.0.0.

RGBGFX takes 8-bit RGB colors as its PNG input, and outputs 5-bit GBC colors. Its `-r/--reverse` mode does the opposite 5-bit to 8-bit conversion. Instead of the previous inaccurate conversions, we now do accurate rounding to the nearest equivalent.

Previously to convert an 8-bit color channel to 5-bit, we truncated it as `c >> 3`; and to reverse a 5-bit color channel to 8-bit, we extended it as `(c << 3) | (c >> 2)`.

Instead, now we round 8-bit to 5-bit as `(c * 31 + 127) / 255`, and round 5-bit to 8-bit as `(c * 255 + 15) / 31`.

### BUGS

These are misfeatures that may have been possible by mistake. They do not get deprecated, just fixed.

### Space between exported labels’ colons

Fixed in 0.7.0.

Labels with two colons used to ignore a space between them; for example, `Label : :`.

Instead, use `Label ::`.

**Space between label and colon**

Fixed in 0.9.0.

Space between a label and its colon(s) used to be ignored; for example, `Label :` and `Label ::`. Now they are treated as invocations of the `Label` macro with `:` and `::` as arguments.

Instead, use `Label :` and `Label ::`.

**Extra underscores in integer constants**

Fixed in 1.0.0.

Underscores, the optional digit separators in integer constants, used to allow more than one in sequence, or trailing without digits on either side. Now only one underscore is allowed between two digits, or between the base prefix and a digit, or between a digit and the `'q'` fixed-point precision suffix.

**ADD r16 with implicit first HL operand**

Fixed in 0.5.0.

For example, `ADD BC` used to be treated as `ADD HL, BC`, and likewise for `'DE'`, `'HL'`, and `'SP'`.

Instead, use an explicit first `'HL'` operand.

**= instead of SET**

Fixed in 0.4.0.

The `=` operator used to be an alias for the **SET** keyword, which included using `=` for the **SET** instruction.

Instead, just use **SET** for the instruction.

**SEE ALSO**

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

**HISTORY**

*rgbasm(1)* 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>.