

**NAME**

rgbds — object file format documentation

**DESCRIPTION**

This is the description of the object files used by *rgbasm*(1) and *rgblink*(1). *Please note that the specifications may change.* This toolchain is in development and new features may require adding more information to the current format, or modifying some fields, which would break compatibility with older versions.

**FILE STRUCTURE**

The following types are used:

*LONG* is a 32-bit integer stored in little-endian format. *BYTE* is an 8-bit integer. *STRING* is a 0-terminated string of *BYTE*.

; Header

BYTE ID[4] ; "RGB9"

LONG RevisionNumber ; The format's revision number this file uses

LONG NumberOfSymbols ; The number of symbols used in this file

LONG NumberOfSections ; The number of sections used in this file

; Symbols

REPT NumberOfSymbols ; Number of symbols defined in this object file.

STRING Name ; The name of this symbol. Local symbols are stored  
; as "Scope.Symbol".

BYTE Type ; 0 = LOCAL symbol only used in this file.  
; 1 = IMPORT this symbol from elsewhere  
; 2 = EXPORT this symbol to other objects.  
; Bit 7 is independent from the above value, and  
; encodes whether the section is unionized

IF (Type & 0x7F) != 1 ; If symbol is defined in this object file.

STRING FileName ; File where the symbol is defined.

LONG LineNum ; Line number in the file where the symbol is defined.

LONG SectionID ; The section number (of this object file) in which  
; this symbol is defined. If it doesn't belong to any  
; specific section (like a constant), this field has  
; the value -1.

LONG Value ; The symbols value. It's the offset into that  
; symbol's section.

ENDC

ENDR

; Sections

REPT NumberOfSections

STRING Name ; Name of the section

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LONG      Size      ; Size in bytes of this section

BYTE      Type      ; 0 = WRAM0
                ; 1 = VRAM
                ; 2 = ROMX
                ; 3 = ROM0
                ; 4 = HRAM
                ; 5 = WRAMX
                ; 6 = SRAM
                ; 7 = OAM

LONG      Org        ; Address to fix this section at. -1 if the linker should
                ; decide (floating address).

LONG      Bank       ; Bank to load this section into. -1 if the linker should
                ; decide (floating bank). This field is only valid for ROMX,
                ; VRAM, WRAMX and SRAM sections.

BYTE      Align      ; Alignment of this section, as N bits. 0 when not specified.

LONG      Ofs        ; Offset relative to the alignment specified above.
                ; Must be below 1 << Align.

IF        (Type == ROMX) || (Type == ROM0) ; Sections that can contain data.

BYTE      Data[Size] ; Raw data of the section.

LONG      NumberOfPatches ; Number of patches to apply.

REPT      NumberOfPatches

        STRING      SourceFile      ; Name of the source file (for printing error
                                ; messages).

        LONG        Offset          ; Offset into the section where patch should
                                ; be applied (in bytes).

        LONG        PCSectionID     ; Index within the file of the section in which
                                ; PC is located.
                                ; This is usually the same section that the
                                ; patch should be applied into, except e.g.
                                ; with LOAD blocks.

        LONG        PCOffset        ; PC's offset into the above section.
                                ; Used because the section may be floating, so
                                ; PC's value is not known to RGBASM.

        BYTE        Type            ; 0 = BYTE patch.
                                ; 1 = little endian WORD patch.
                                ; 2 = little endian LONG patch.
                                ; 3 = JR offset value BYTE patch.

        LONG        RPNSize         ; Size of the buffer with the RPN.
                                ; expression.

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        BYTE      RPN[RPNSize] ; RPN expression. Definition below.

    ENDR

    ENDC

    ENDR

; Assertions

    LONG    NumberOfAssertions

    REPT    NumberOfAssertions

        STRING    SourceFile      ; Name of the source file (for printing the failure).

        LONG      Offset          ; Offset into the section where the assertion is located.

        LONG      SectionID       ; Index within the file of the section in which PC is
                                   ; located, or -1 if defined outside a section.

        LONG      PCOffset        ; PC's offset into the above section.
                                   ; Used because the section may be floating, so PC's value
                                   ; is not known to RGBASM.

        BYTE      Type            ; 0 = Prints the message but allows linking to continue
                                   ; 1 = Prints the message and evaluates other assertions,
                                   ;      but linking fails afterwards
                                   ; 2 = Prints the message and immediately fails linking

        LONG      RPNSize         ; Size of the RPN expression's buffer.

        BYTE      RPN[RPNSize]   ; RPN expression, same as patches. Assert fails if == 0.

        STRING    Message        ; A message displayed when the assert fails. If set to
                                   ; the empty string, a generic message is printed instead.

    ENDR

```

## RPN DATA

Expressions in the object file are stored as RPN. This is an expression of the form “2 5 +”. This will first push the value “2” to the stack, then “5”. The “+” operator pops two arguments from the stack, adds them, and then pushes the result on the stack, effectively replacing the two top arguments with their sum. In the RGB format, RPN expressions are stored as *BYTE*s with some bytes being special prefixes for integers and symbols.

Value	Meaning
\$00	+ operator
\$01	- operator
\$02	* operator
\$03	/ operator
\$04	% operator
\$05	unary -

\$10 | operator  
\$11 & operator  
\$12 ^ operator  
\$13 unary ~  
\$21 && comparison  
\$22 || comparison  
\$23 unary !  
\$30 == comparison  
\$31 != comparison  
\$32 > comparison  
\$33 < comparison  
\$34 >= comparison  
\$35 <= comparison  
\$40 << operator  
\$41 >> operator  
\$50 BANK(symbol), a *LONG* Symbol ID follows.  
\$51 BANK(section\_name), a null-terminated string follows.  
\$52 Current BANK()  
\$60 HRAMCheck. Checks if the value is in HRAM, ANDs it with 0xFF.  
\$61 RSTCheck. Checks if the value is a RST vector, ORs it with 0xC7.  
\$80 *LONG* integer follows.  
\$81 *LONG* symbol ID follows.

**SEE ALSO**

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

**HISTORY**

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