

**: Mjølner BETA Low Level Primitives**

# Table of Contents

<a href="#">Copyright Notice</a>	1
<a href="#">13. MjølnerBETA Low Level Primitives</a>	3
<a href="#">Introduction</a>	3
<a href="#">Low Level Operations</a>	3
<a href="#">Syntax</a>	3
<a href="#">Addressing Conventions</a>	3
<a href="#">Operations</a>	4
<a href="#">Bitwise logical complement (one's complement)</a>	4
<a href="#">Bitwise logical and, or, exclusive or</a>	4
<a href="#">Shift of a long</a>	4
<a href="#">Get byte/short from a long</a>	4
<a href="#">Put byte/short into a long</a>	5
<a href="#">Get bits from a long</a>	5
<a href="#">Put bits into a long</a>	5
<a href="#">This object</a>	5

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# 13. Mjølner BETA Low Level Primitives

- [Introduction](#)
- [Low Level Operations](#)
- [Syntax](#)
- [Addressing Conventions](#)
- [Operations](#)
  - ◆ [Bitwise logical complement \(one's complement\)](#)
  - ◆ [Bitwise logical and, or, exclusive or](#)
  - ◆ [Shift of a long](#)
  - ◆ [Get byte/short from a long](#)
  - ◆ [Put byte/short into a long](#)
  - ◆ [Get bits from a long](#)
  - ◆ [Put bits into a long](#)
  - ◆ [This object](#)

## Introduction

This document describes the semantics of the low-level primitives available in the Mjølner implementation of the BETA language. There are currently some syntactic inconveniences. These may be fixed with a grammar change in a future version.

## Low Level Operations

Low level operations on bits, bytes and words are available as described below. Use of these operations may in general be platform dependent.

## Syntax

The syntax is as follows

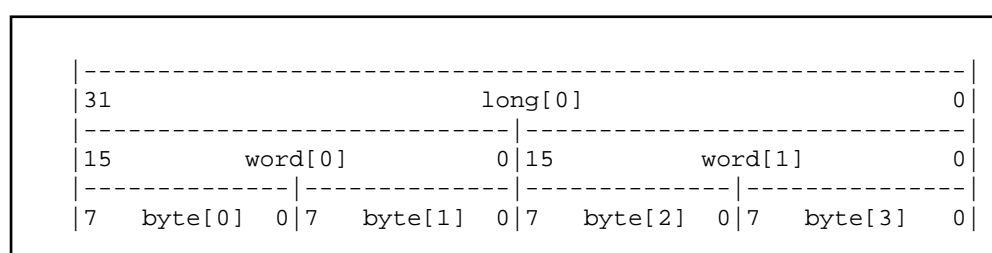
`%op`

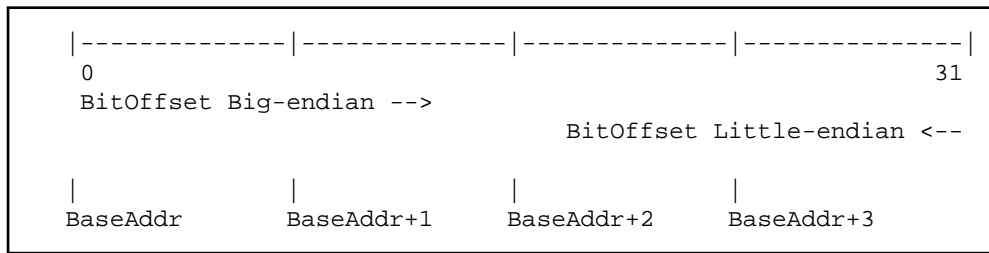
i.e., the `%` indicates, that `op` is a special low-level operation.

In the following, `E`, `val`, and `inx` are assumed to be integer evaluations, `A` is an integer object, and `R` is a repetition object.

## Addressing Conventions

The addressing conventions of bytes, words, longs and bitfields follow the big-endian (Motorola, SPARC etc.) conventions:





Notice that a BitOffset is addressed from the most significant bit on big-endian architectures, and from the the least significant bit on little-endian architectures (`nti`, `linux`).

## Operations

The following operations are available.

### Bitwise logical complement (one's complement)

```
OP:      %Bnot
usage:   %Bnot E
```

### Bitwise logical and, or, exclusive or

```
OP:      %Band, %Bor, %Bxor
usage:   E1 OP E2
ex:      E1 %Band E2
```

Note the `B` in these operations - `B` stands for bitwise. A future version may use the syntax `%and`.

### Shift of a long

```
OP:      %srl      shift right logical
          %sll      shift left logical
          %sra      shift right arithmetic
          %sla      shift left arithmetic
          %ror      rotate right
          %rol      rotate left
usage    E1 OP E2
ex:      E1 %sll E2
```

### Get byte/short from a long

```
OP:      byteNo  -> A.%getByte
          shortNo -> A.%getShort
          longNo  -> A.%getLong
          byteNo  -> A.%getSignedByte
          shortNo -> A.%getSignedShort
```

where `byteNo` is an integer-evaluation in `[0,3]`, `shortNo` in `[0,1]` and `longNo` in `[0]`.

```
Usage:  E1 -> A1.%getBytes -> A2
Ex:    1 -> A.%getBytes -> B
```

Note: `byteNo -> A.%getLong` is the same as `A`.

## Put byte/short into a long

```
OP:      (val,byteNo) -> A.%putByte
          (val,shortNo) -> A.%putShort
          (val,longNo) -> A.%putLong
```

The same restrictions for `byteNo` etc. as in [Get byte/short from a long](#) apply here.

```
usage:   (val,E) -> A.OP
ex.:    (val,3) -> A.%putByte
```

The same restrictions for `byteNo` etc. as in [Get byte/short from a long](#) apply here.

Note: `(val,E)->A.%putLong` is the same as `val->A`.

## Get bits from a long

```
OP:      (pos,width) -> A.%getBits
          (pos,width) -> A.%getSignedBits
```

where `pos, width` in `[0,31]` are integer-evaluations.

```
usage: (pos,width) -> A.%getBits -> V
```

## Put bits into a long

```
OP:      (val,pos,width) -> A.%putBits
```

where `pos, width` in `[0,31]` are integer-evaluations.

```
usage: (V,12,4) -> A.%putBits
```

## This object

Note: This operation is needed in some cases where `THIS(P)` cannot be used. E.g. inside singular objects in the `do`-part.

Notice that `THIS(Object)` will NOT work, you must use the operation below:

```
OP:      %thiss object
```

A reference to the current object is returned.

```
Usage:  %thiss object -> S[]
```

where  $s$  is declared as  $s: \text{^Object}$ .

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## BETA Language Modifications