

The case for <BUILDS

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Resident Forth on small embedded microcontrollers
e.g. MaxForth on DSP5680x,
CamelForth on MSP430

Typically code space in Flash ROM, and a small amount of RAM
(e.g. MSP430G2553: 16 K Flash ROM, 0.5K RAM)

Resident Forth compiler needs to compile directly to Flash ROM.

Primary characteristic: each memory location can be written *once*.
Locations cannot be changed once written;
Flash can be erased but only in large blocks.
Usually erased to all ones.

For most compiler actions this is a minor change, e.g.,

```
: IF ['] ?BRANCH I, IHERE 0 I, ; IMMEDIATE
```

becomes

```
: IF ['] ?BRANCH I, IHERE CELL IALLOT ;  
IMMEDIATE
```

(“I” prefix refers to Instruction space, i.e., Flash ROM)

The problem is CREATE ... DOES> . CREATE leaves the run-time action DOCREATE in the newly defined word’s code field. This means that DOES> cannot change that action.

```
: CREATE    HEADER    DOCREATE I, HERE I, ;
```

(Note ROMable variables/data compile a pointer to HERE.)

CREATE is overloaded!

CREATE currently overloads two functions:

1. To define a data structure.
2. To define a “defined word” in a CREATE...DOES> construct.

These are conceptually distinct uses, and it is an accident of history that we use CREATE for both (because it has been easy for DOES> to change the action of a CREATED word).

The solution is to bring back <BUILDS , which performs the function of CREATE but does not store anything in the code field (i.e., leaves that cell unprogrammed).

```
: <BUILDS    HEADER CELL IALLOT ;
```

This does not solve the problem of applying DOES> a *second* time to a defined word's code field, but that is an extremely rare usage.

Standards Compliance:

This becomes a *non-standard-compliant* Forth system, as CREATE...DOES> cannot be used.

But applications are modified easily, by changing CREATE...DOES> to <BUILDS...DOES> wherever used.

Alternatives:

1. Make DOCREATE (the run-time action of a CREATED word) test a second cell for a DOES> pointer.
2. Make the inner interpreter test for CFA=\$FFFF and invoke DOCREATE.
3. Make \$FFFF the code address for CREATE. (Rarely viable.)