

A Note on Using C Compilers M3T-NC308WA and M3T-NC30WA --On Testing Equality/Inequality Between a Variable and a Constant--

Please take note of the following problem in using C compilers (with an assembler and integrated development environment) M3T-NC308WA and M3T-NC30WA

- On testing equality/inequality between a variable of type signed or unsigned char and a constant
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1. Products and Versions Concerned

M3T-NC308WA V.5.00 Release 1 and V.5.10 Release 1

for the M32C/80 and M16C/80 series MCUs

M3T-NC30WA V.5.00 Release 1 through V.5.10 Release 1

for the M16C/60, M16C/30, M16C/Tiny, M16C/20, M16C/10, and R8C/Tiny series MCUs

2. Description

Testing equality/inequality between a variable of type signed or unsigned char and a constant may generate incorrect code.

2.1 Conditions

This problem occurs if the following five conditions are satisfied:

- (1) In an if statement exist two or more controlling expressions testing equality/inequality between a variable of type signed or unsigned char and a constant.
- (2) The variables in (1) are such as arrays or aggregates (whose elements are arranged continuously in memory space).
- (3) Operators used in the controlling expressions in (1) are all "==" or "!=".
- (4) The controlling expressions in (1) are associated with each other by a logical OR operator.

(5) The following compile options are used:

- a. Any of those, -O1, -O2, -O3, -OR, and -OS, and -Ocompare_byte_to_word (-OCBTW), or
- b. O4 only, or
- c. O5 only

2.2 Example

```
-----  
char  c[2];          /* Condition (2) */  
  
int   func( void )  
{  
    if( c[0] == 1 || c[1] == 1 ) /* Conditions (1), (2), (3),  
                                and (4) */  
        return 0;  
    else  
        return 1;  
}
```

3. Workaround

This problem can be circumvented in any of the following ways:

- (1) Split the if statement.

```
-----  
char  c[2];  
  
int   func( void )  
{  
    if( c[0] == 1 ) /* One of split if statement */  
        return 0;  
    else if( c[1] == 1 ) /* The other of split if statement */  
        return 0;  
    else  
        return 1;  
}
```

- (2) Don't use -Ocompare_byte_to_word (-OCBTW) together with any of the options -O1, -O2, -O3, -OR, and -OS.
- (3) Use -O3 instead of -O4 or -O5.

4. **Schedule of Fixing the Problem**

In the M3T-NC308WA, we plan to fix this problem in its next release.

In the M3T-NC30WA, this problem has been resolved in its V.5.20 Release 1, so please upgrade your product to it.

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