RENESAS Tool News

A Note on Using C Compilers
M3T-NC308WA and M3T-NC30WA
--On Referencing Members in a Union--

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

- On referencing members in a union

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.5.10 Release 1 and V.5.20 Release 1
      for the M16C/60, M16C/30, M16C/Tiny, M16C/20, M16C/10, and R8C/Tiny series MCUs

2. **Description**
   References to members in a union may not properly be made.

3. **Conditions**
   This problem occurs if the following six conditions are satisfied:

   (1) Any of the optimizing options -OR, -OS, -O, -O1, -O2, -O3, -O4, and -O5 is selected.

   (2) A union is defined as auto variable A.

   (3) A constant is assigned to a member B of the union defined in (2).

   (4) A write is made to another member C of the union above.
       (This write also affects the value of member B.)

   (5) The addresses of B and C are separated from each other by the number of bytes shown below.
       a. 2 bytes or more if the union is in the near area.
       b. 4 bytes or more if the union is in the far area.

(6) Member B is referenced after the write in (4) is made.

4. **Example**

```
--------------------------------------------------------------------
union UNION1 {
     unsigned long long     m64;
     unsigned long         m32[2];
};

extern unsigned long long     gi64;

void func(void)
{
     union UNION1    au;            /* Condition (2) */

     au.m64 = 0x1234567887654321ull;   /* Condition (3) */
     au.m32[1] = 0x44444444ul;        /* Conditions (4) and (5) */
     gi64 = au.m64;                   /* Condition (6) */
}
--------------------------------------------------------------------
```

5. **Workaround**
This problem can be circumvented in either of the following ways:

(1) Don't use any of the optimizing options -OR, -OS, -O, -O1, -O2, -O3, -O4, and -O5.

(2) Place a dummy asm function immediately after assigning a constant to member B of the union.

Example:
```
--------------------------------------------------------------------
union UNION1 {
     unsigned long long     m64;
     unsigned long         m32[2];
};

extern unsigned long long     gi64;

void func(void)
{
     union UNION1    au;
```

```
        au.m64 = 0x1234567887654321ull;
        asm();                       /* Dummy asm function */
        au.m32[1] = 0x44444444ul;
        gi64 = au.m64;
    }
    ----------------------------------------------------------------
```

6. Schedule of Fixing the Problem

We plan to fix this problem in our next release of the products.