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April 1st, 2010
Renesas Electronics Corporation

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H8/300L Super Low Power Series

Converting an ASCII Code to a 1-Byte Hexadecimal Number (NIBBLE)

Introduction

The software NIBBLE converts '0' to '9' and 'A' to 'F' into ASCII codes.

Target Device

H8/38024

Contents

1. Arguments

Description		Memory area	Data length (bytes)
Input	ASCII code	R0L	1
Output	1-byte hexadecimal number	R0L	1
	Occurrence of conversion	C flag (CCR)	

2. Changes to Internal Registers and Flags

R0		R1	R2	R3	R4	R5	R6	R7
—	○	—	—	—	—	—	—	—

I	U	H	U	N	Z	V	C
—	—	×	—	×	×	×	×

Legend
—: No change
×: Undefined
○: Result

3. Specifications

Program memory (bytes)
24
Data memory (bytes)
0
Stack (bytes)
0
Clock cycle count
38
Reentrant
Possible
Relocation
Possible
Interrupt
Possible

4. Description

4.1 Details of functions

1. The following arguments are used with the software NIBBLE:
   R0L: Sets an ASCII code as an input argument. After execution of the software NIBBLE, the corresponding 1-byte hexadecimal number is placed in R0L.
   C flag (CCR): Indicates the state after execution of the software NIBBLE as an output argument.
   C flag = 1: The input ASCII code is other than '0' to '9' or 'A' to 'F'.
   C flag = 0: The input ASCII code is '0' to '9' or 'A' to 'F'.
2. The following figure illustrates the execution of the software NIBBLE. When the input argument is set as shown in (1), a corresponding 1-byte hexadecimal number (H'0F) is placed in R0L as shown in (2).

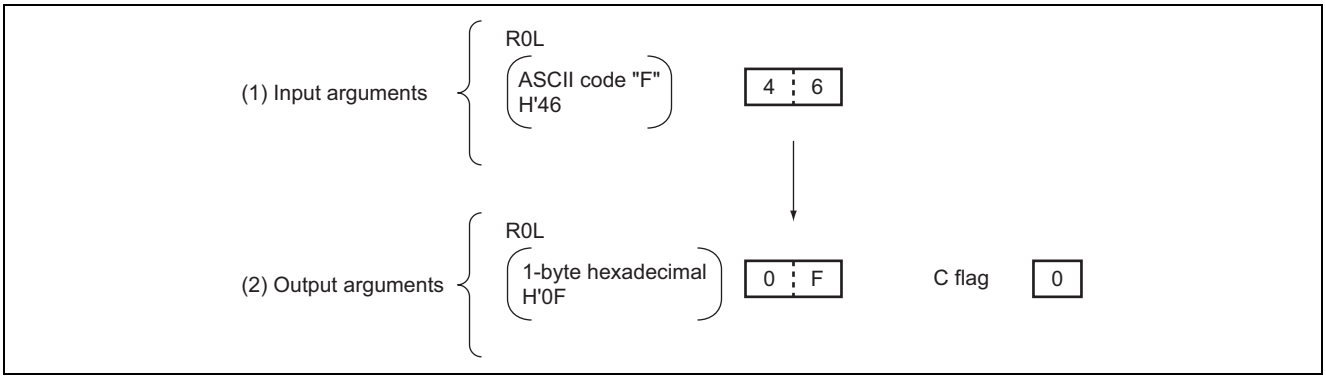


Figure 1 Example of Software NIBBLE Execution

4.2 Notes on usage

When any data other than ASCII code '0' to '9' or 'A' to 'F' is set in R0L, the data will be lost after execution of the software NIBBLE.

4.3 Data memory

The software NIBBLE uses no data memory.

4.4 Example of usage

Set an ASCII code in the input argument and call the software NIBBLE as a subroutine.

```
WORK1     . RES. B      1     ---------  Reserve a data memory area in which the user program places
                                          a 1-byte ASCII code.

WORK2     . RES. B      1     ---------  Reserve a data memory area in which the user program places
                                          a corresponding 1-byte hexadecimal.
            .
            .
            .
            MOV. B      @WORK1, R0L  -------  Place the ASCII code set by the user program
                                              in the input argument
          +-------------------------+
          | JSR         @NIBBLE     |  -------  Call the software NIBBLE as a subroutine.
          +-------------------------+
          BCS           SKIP         -------  Branch to the skip processing routine when the input data
                                              is any other than '0' to '9' or 'A' to 'F'.

          MOV. B  R0L,  @WORK2,      -------  Place the 1-byte hexadecimal set in the output argument
                                              in the data memory area of the user program.
            .
            .
            .
SKIP      +-------------------------+
          | Processing routine for  |
          | invalid ASCII code      |
          +-------------------------+
            .
            .
            .
```

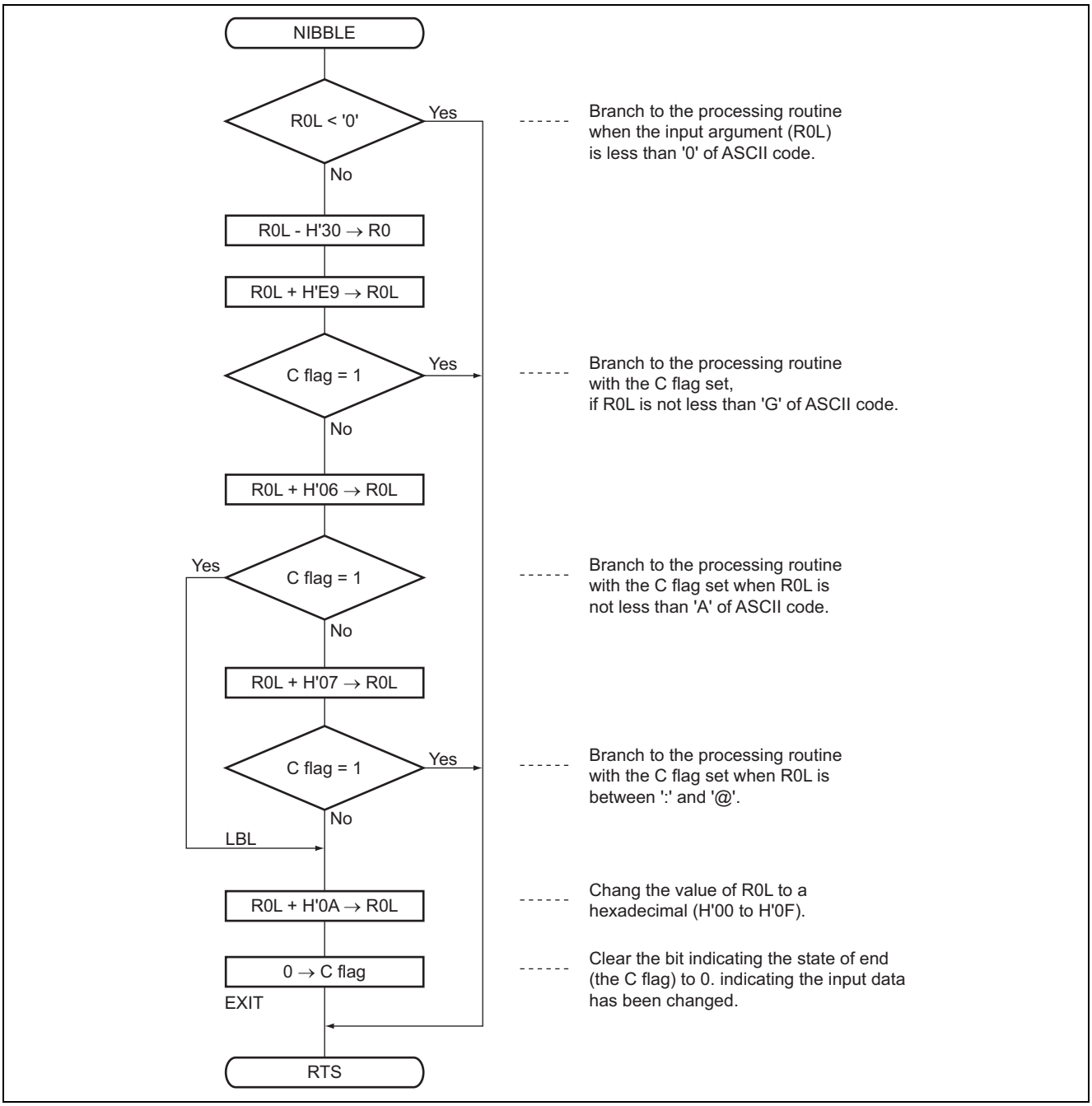
4.5 Operation

1. On the basis of the status of the C flag showing the result of the operation on R0L, the software NIBBLE determines whether the data set in R0L falls in the '0' to 'F' range of the ASCII code table ([▭] in table 1).
2. The software further perform operations to exclude the ':' to '@' range ([▭] in table 1).
3. In the process of steps 1 and 2, the C flag is set to 1 when the input data is outside the '0' to '9' and 'A' to 'F' ranges.

Table 1 ASCII Code Table

LSD \ MSD		0 000	1 001	2 010	3 011	4 100	5 101	6 110	7 111
0	0000	NUL	DLE	SP	0	@	P	`	p
1	0001	SOH	DC1	!	1	A	Q	a	q
2	0010	STX	DC2	"	2	B	R	b	r
3	0011	ETX	DC3	#	3	C	S	c	s
4	0100	EOT	DC4	$	4	D	T	d	t
5	0101	ENG	NAK	%	5	E	U	e	u
6	0110	ACK	SYN	&	6	F	V	f	v
7	0111	BEL	ETB	'	7	G	W	g	w
8	1000	BS	CAN	(	8	H	X	h	x
9	1001	HT	EM	)	9	I	Y	i	y
A	1010	LF	SUB	*	:	J	Z	j	z
B	1011	VT	ESC	+	;	K	[	k	{
C	1100	FF	FS	,	<	L	\	l	|
D	1101	CR	GS	-	=	M	]	m	}
E	1110	SO	RS	.	>	N	↑	n	~
F	1111	SI	VS	/	?	O	←	o	DEL

5. Flowchart


NIBBLE
R0L < '0'
Yes
No
R0L - H'30 → R0
R0L + H'E9 → R0L
C flag = 1
Yes
No
R0L + H'06 → R0L
C flag = 1
Yes
No
R0L + H'07 → R0L
C flag = 1
Yes
No
LBL
R0L + H'0A → R0L
0 → C flag
EXIT
RTS
Branch to the processing routine when the input argument (R0L) is less than '0' of ASCII code.
Branch to the processing routine with the C flag set, if R0L is not less than 'G' of ASCII code.
Branch to the processing routine with the C flag set when R0L is not less than 'A' of ASCII code.
Branch to the processing routine with the C flag set when R0L is between ':' and '@'.
Chang the value of R0L to a hexadecimal (H'00 to H'0F).
Clear the bit indicating the state of end (the C flag) to 0. indicating the input data has been changed.

6. Program List

```
*** H8/300 ASSEMBLER VER 1.0B ** 08/18/92 20:08:15
PROGRAM NAME =
 1                              ;*************************************************************
 2                              ;*
 3                              ;*      00 - NAME     :CHANGE 1 BYTE ASCII CODE
 4                              ;*                     TO 4 BIT HEXAGON (NIBBLE)
 5                              ;*
 6                              ;*************************************************************
 7                              ;*
 8                              ;*      ENTRY    :R0L (1 BYTE ASCII CODE)
 9                              ;*
10                              ;*      RETURN   :R0L (4 BIT HEXADECIMAL)
11                              ;*                C flag of CCR (C = 0;FALSE , C = 1;TRUE)
12                              ;*
13                              ;*************************************************************
14                              ;
15  NIBBLE_c C    0000                      .SECTION              NIBBLE_code,CODE,ALIGN=2
16                                          .EXPORT               NIBBLE
17                              ;
18  NIBBLE_c C    0000            NIBBLE    .EQU $                ;Entry point
19  NIBBLE_c C    0000  F030                MOV.B    #H'30,R0H
20  NIBBLE_c C    0002  1808                SUB.B    R0H,R0L      ;R0L - #H'30 -> R0L
21  NIBBLE_c C    0004  4510                BCS      EXIT         ;Branch if R0L<'0'
22  NIBBLE_c C    0006  88E9                ADD.B    #H'E9,R0L
23  NIBBLE_c C    0008  450C                BCS      EXIT         ;Branch if R0L<'F'
24  NIBBLE_c C    000A  8806                ADD.B    #H'06,R0L
25  NIBBLE_c C    000C  4504                BCS      LBL          ;Branch if R0L<=H'FF
26  NIBBLE_c C    000E  8807                ADD.B    #H'07,R0L
27  NIBBLE_c C    0010  4504                BCS      EXIT         ;Branch if R0L<=H'FF
28  NIBBLE_c C    0012            LBL
29  NIBBLE_c C    0012  880A                ADD.B    #H'0A,R0L    ;Change R0L to ASCII CODE
30  NIBBLE_c C    0014  06FE                ANDC     #H'FE,CCR    ;Clear C flag of CCR
31  NIBBLE_c C    0016            EXIT
32  NIBBLE_c C    0016  5470                RTS
33                              ;
34                                          .END
*****TOTAL ERRORS 0
*****TOTAL WARNINGS 0
```

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Revision Record

		Description	
Rev.	**Date**	**Page**	**Summary**
1.00	Sep.18.03	—	First edition issued
2.00	Nov.30.06	All pages	Content correction

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