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Renesas Electronics Corporation

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H8/300H Tiny Series

ASCII Code to 1-Byte-Hexadecimal Conversion (NIBBLE)

Introduction

Converts the ASCII code for '0' to '9' or 'A' to 'F' to the 1-byte hexadecimal number.

Target Device

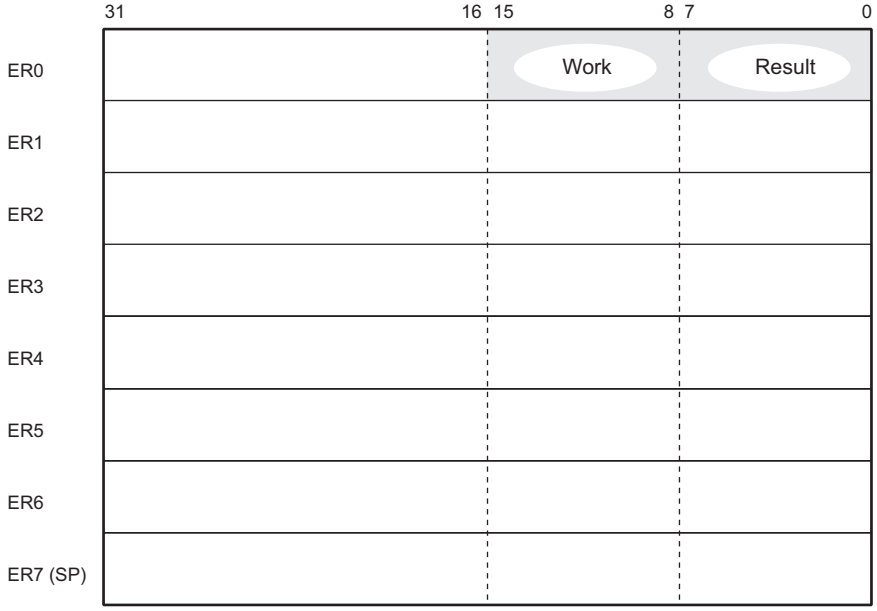
H8/300H Tiny Series

Contents

1. Arguments

	Contents	Storage Location	Data Length (Bytes)
Input	ASCII code	R0L	1
Output	1-byte hexadecimal number	R0L	1
	Indicator of conversion	C flag (CCR)	—

2. Changes to Internal Registers and Flags



I	U	H	UI	N	Z	V	C
–	–	↕	–	↕	↕	↕	↕

–: No change
↕: Varies
0: Fixed to 0
1: Fixed to 1

3. Programming Specifications

Program memory (bytes)
24
Data memory (bytes)
0
Stack (bytes)
0
Number of cycles
38
Re-entrant
Yes
Relocatable
Yes
Interrupts during execution
Yes

4. Description

4.1 Description of Functions

1. The arguments are as follows.
   R0L: Set the ASCII code here. The 1-byte hexadecimal number is placed here by execution of the NIBBLE subroutine.
   C flag (CCR): Indicates the status after execution of the software NIBBLE as the output arguments.
   C flag = 1: The input ASCII code is in neither of the ranges '0' to '9' and 'A' to 'F'
   C flag = 0: The input ASCII code is in the ranges '0' to '9' or 'A' to 'F'
2. The following figure illustrates the execution of the NIBBLE subroutine. When the input argument is set to the ASCII code for 'F', the corresponding hexadecimal digit (H'0F) is set in R0L.

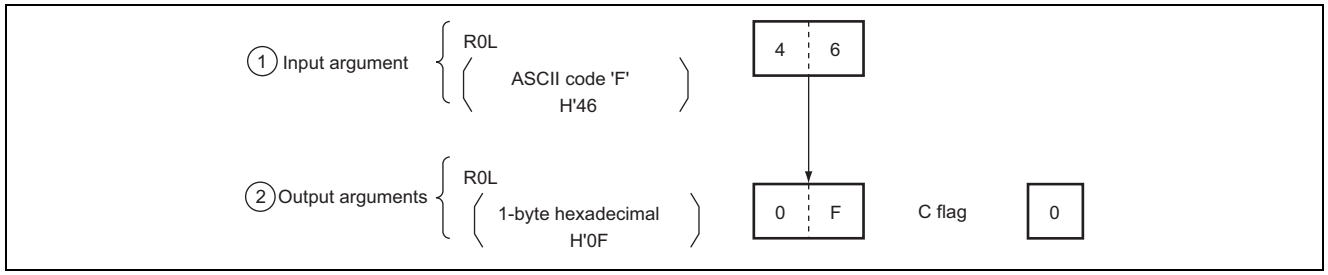


Figure 1 Example of NIBBLE Execution

4.2 Usage Note

Input data that is not in the ranges of the ASCII codes for '0' to '9' or 'A' to 'F' is lost in the execution of NIBBLE.

4.3 Description of Data Memory

No data memory is used by NIBBLE.

4.4 Example of Usage

After setting the ASCII code, call the NIBBLE subroutine.

```
WORK1   . RES. B 1          ..... Reservation of the data memory area for setting of a 1-digit ASCII code in the user program.
WORK2   . RES. B 1          ..... Reservation of the data memory area where the 1-byte hexadecimal number will be placed in the
                                  user program.
          .
          .
          .
        MOV. B @WORK1, R0L  ..... Sets, as the input argument, the ASCII code specified by the the user program.
        JSR    @NIBBLE      ..... Subroutine call of NIBBLE.
        BCS    SKIP         ..... Branches to the required processing routine if the input data is other than '0' to '9' and 'A' to 'F'.
        MOV. B R0L, @WORK2  ..... Transfers the 1-byte hexadecimal number from the output argument to the data memory area
          .                       of the user program.
          .
          .
SKIP    Processing routine for out -of-range
        ASCII codes
          .
          .
          .
```

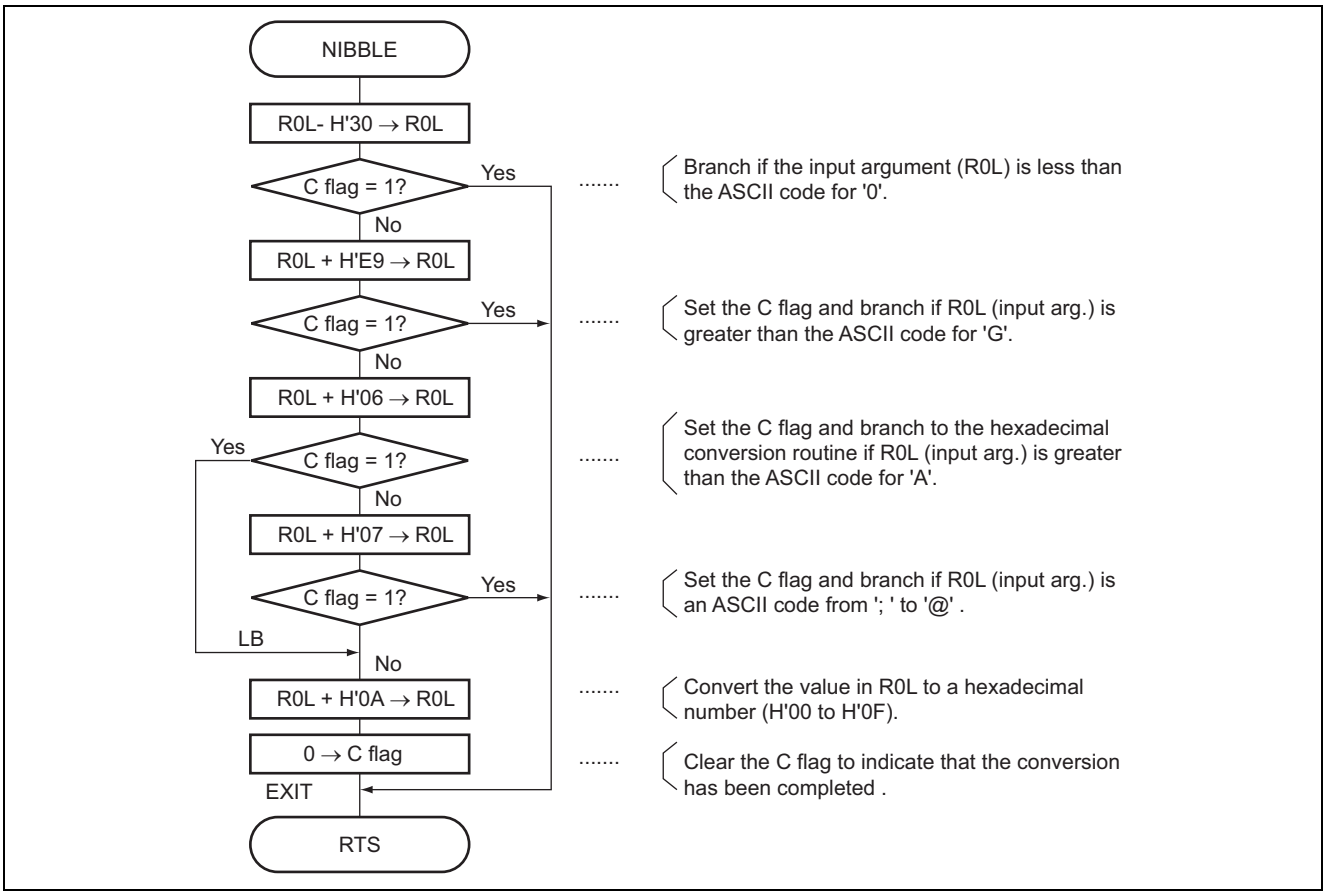
4.5 Principles of Operation

1. Whether or not the data set in R0L falls within the ASCII code range '0' to '9' or 'A' to 'F' (the parts enclosed by ▣ in the table below) is determined by tests of the C flag, which indicates the results of calculation in R0L.
2. Further operation is performed to exclude codes in the range from ':' to '@' (the shaded parts of the table).
3. If the data is in neither of the ranges '0' to '9' and 'A' to 'F', the C flag is set to '1' during the processing of steps 1 and 2.

Table 1 ASCII Coding

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	DC_1	!	1	A	Q	a	q
2	0010	STX	DC_2	“	2	B	R	b	r
3	0011	ETX	DC_3	#	3	C	S	c	s
4	0100	EOT	DC_4	$	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- H'30 → R0L
C flag = 1?
Yes
No
R0L + H'E9 → R0L
C flag = 1?
Yes
No
R0L + H'06 → R0L
Yes
C flag = 1?
No
R0L + H'07 → R0L
C flag = 1?
Yes
LB
No
R0L + H'0A → R0L
0 → C flag
EXIT
RTS
Branch if the input argument (R0L) is less than the ASCII code for '0'.
Set the C flag and branch if R0L (input arg.) is greater than the ASCII code for 'G'.
Set the C flag and branch to the hexadecimal conversion routine if R0L (input arg.) is greater than the ASCII code for 'A'.
Set the C flag and branch if R0L (input arg.) is an ASCII code from '; ' to '@' .
Convert the value in R0L to a hexadecimal number (H'00 to H'0F).
Clear the C flag to indicate that the conversion has been completed .

6. Program Listing

```
1                       1  ;*********************************************************************
2                       2  ;*                                                                   *
3                       3  ;*       NAME :     CHANGE 1 BYTE ASCII CODE                       *
4                       4  ;*                  TO 4 BIT HEX. (NIBBLE)                         *
5                       5  ;*                                                                   *
6                       6  ;*********************************************************************
7                       7  ;*                                                                   *
8                       8  ;*       ENTRY:     R0L           (1 BYTE ASCII CODE)               *
9                       9  ;*                                                                   *
10                     10  ;*       RETURN:    R0L           (4 BIT HEXADECIMAL)               *
11                     11  ;*                  C flag of CCR (C=0: FALSE,  C=1: TRUE)          *
12                     12  ;*                                                                   *
13                     13  ;*********************************************************************
14                     14  ;
15                     15            .CPU       300HN
16    0000             16            .SECTION   NIBBLE_code,CODE,ALIGN=2
17                     17            .EXPORT    NIBBLE
18                     18  ;
19          00000000   19  NIBBLE    .EQU       $               ;Entry point
20    0000  F030       20            MOV.B      #H'30,R0H
21    0002  1808       21            SUB.B      R0H,R0L         ;R0L - #H'30 (‘0’) -> R0L
22    0004  4510       22            BCS        EXIT            ;Leave if R0L < 0
23    0006  88E9       23            ADD.B      #H'E9,R0L       ; H’E9-H’30= ‘9’
24    0008  450C       24            BCS        EXIT            ;Branch if R0L > 'F'
25    000A  8806       25            ADD.B      #H'06,R0L       ;
26    000C  4504       26            BCS        LBL             ;Branch if R0L >= H'FF
27    000E  8807       27            ADD.B      #H'07,R0L       ;
28    0010  4504       28            BCS        EXIT            ;Branch if R0L >= H'FF
29    0012  880A       29  LBL       ADD.B      #H'0A,R0L       ;Change R0L to ASCII CODE
30    0014  06FE       30            ANDC       #H'FE,CCR       ;Clear C flag of CCR
31                     31  ;
32    0016             32  EXIT
33    0016  5470       33            RTS
34                     34  ;
35                     35            .END
*****  TOTAL ERRORS   0
*****  TOTAL WARNINGS 0
```

Revision Record

Rev.	Date	Description	
		Page	Summary
2.00	Jun.12.06	—	Format has been changed from Hitachi version to Renesas version.

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