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H8/300H Tiny Series

Conversion of an 8-Bit Binary Number to Two Digits of ASCII Code (COBYTE)

Introduction

Converts an 8-bit binary number to the corresponding two-digit ASCII code.

Target Device

H8/300H Tiny Series

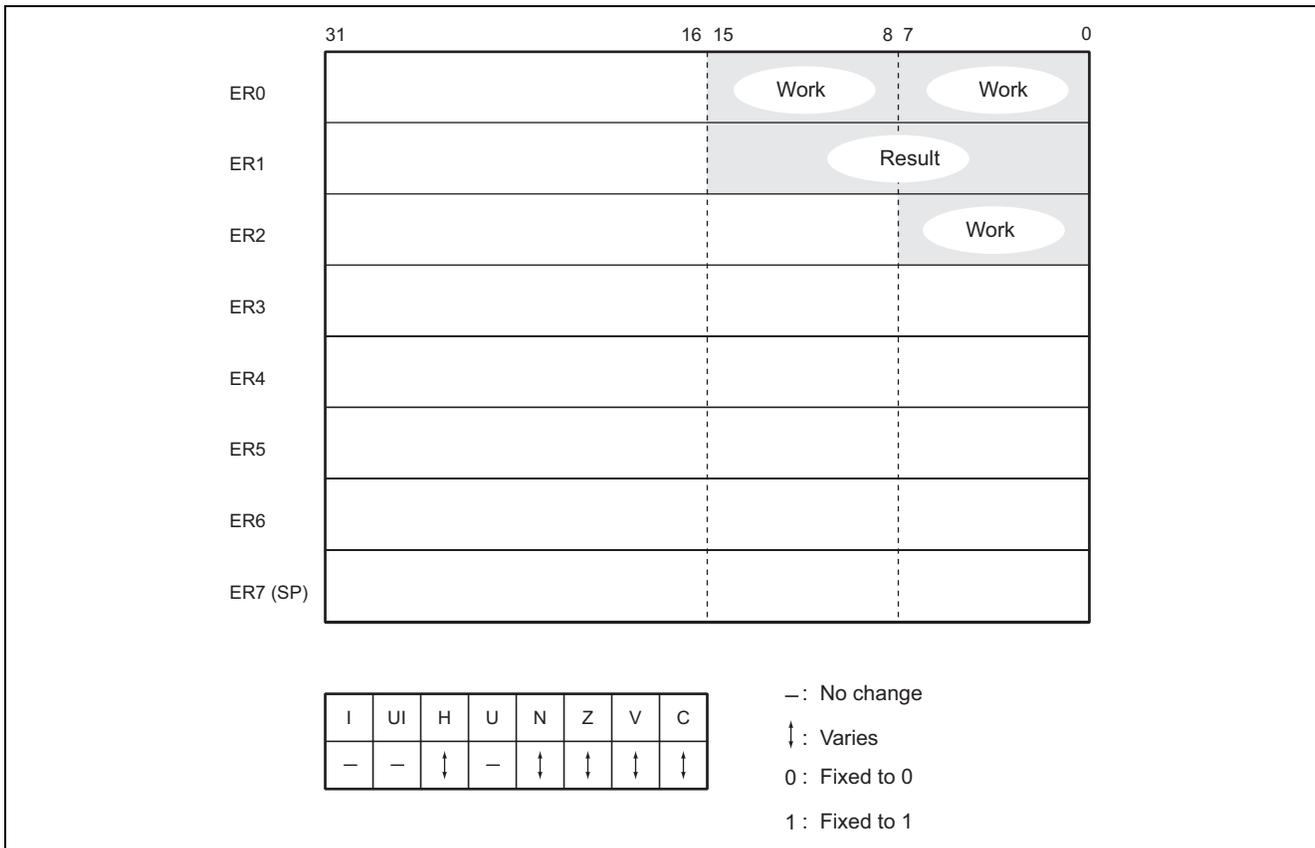
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1. Arguments

Contents	Storage Location	Data Length (Bytes)
Input 8-bit binary number	R0L	1
Output 2-digit ASCII code	R1	2

2. Changes to Internal Registers and Flags



3. Programming Specifications

Program memory (bytes)
38
Data memory (bytes)
0
Stack (bytes)
0
Number of cycles
72
Re-entrant
Yes
Relocatable
Yes
Interrupts during execution
Yes

4. Description

4.1 Description of Functions

1. The arguments are as follows.
 R0L : Holds the 8-bit binary number for conversion to ASCII code as the input argument.
 R1 : The result of conversion to two digits of ASCII code is set here; the respective digits correspond to the higher- and lower-order four bits of the 8-bit binary number.
2. The following figure illustrates the execution of the COBYTE subroutine. After the input argument has been set, the 8-bit binary number is converted to ASCII code and the result placed in R1.

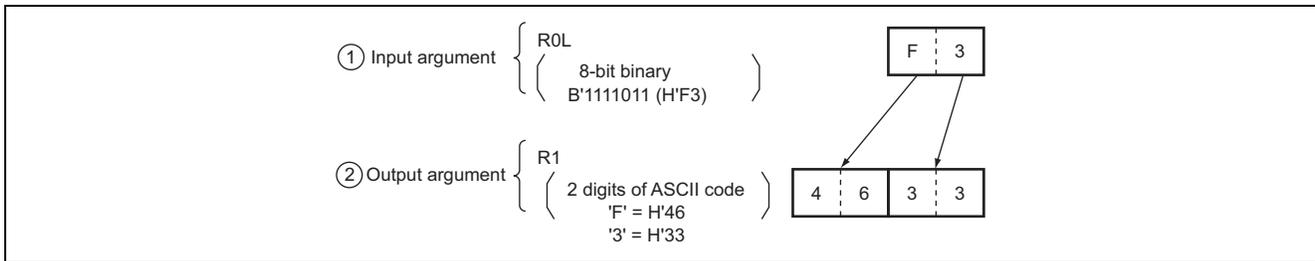


Figure 1 Example of COBYTE Execution

4.2 Usage Note

The 8-bit binary number in R0L is lost in the execution of COBYTE.

4.3 Description of Data Memory

No data memory is used by COBYTE.

4.4 Example of Usage

After setting the 8-bit binary number, call the COBYTE subroutine.

```

WORK1 . RES. B 1 ..... Reservation of the data memory area for setting of the 8-bit binary number by the user program.

WORK2 . ALIGN 2 .....
      . RES. W 1 ..... Reservation of the data memory area to hold the 2-digit ASCII code by the user program.
      .
      .
      .
MOV. B @WORK1, R0L ..... Sets the 8-bit binary number specified by the user program in R0L.

JSR @COBYTE ..... Subroutine call of COBYTE.

MOV. W R1, @WORK2 ..... Transfers the 2-digit ASCII code returned as the output argument to the data memory area of
                           the user program.
    
```

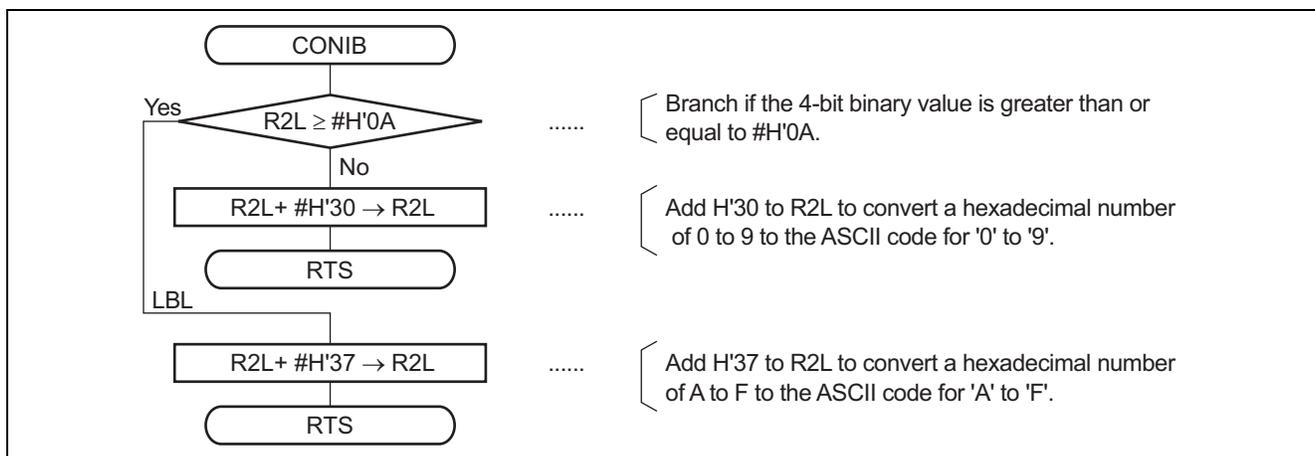
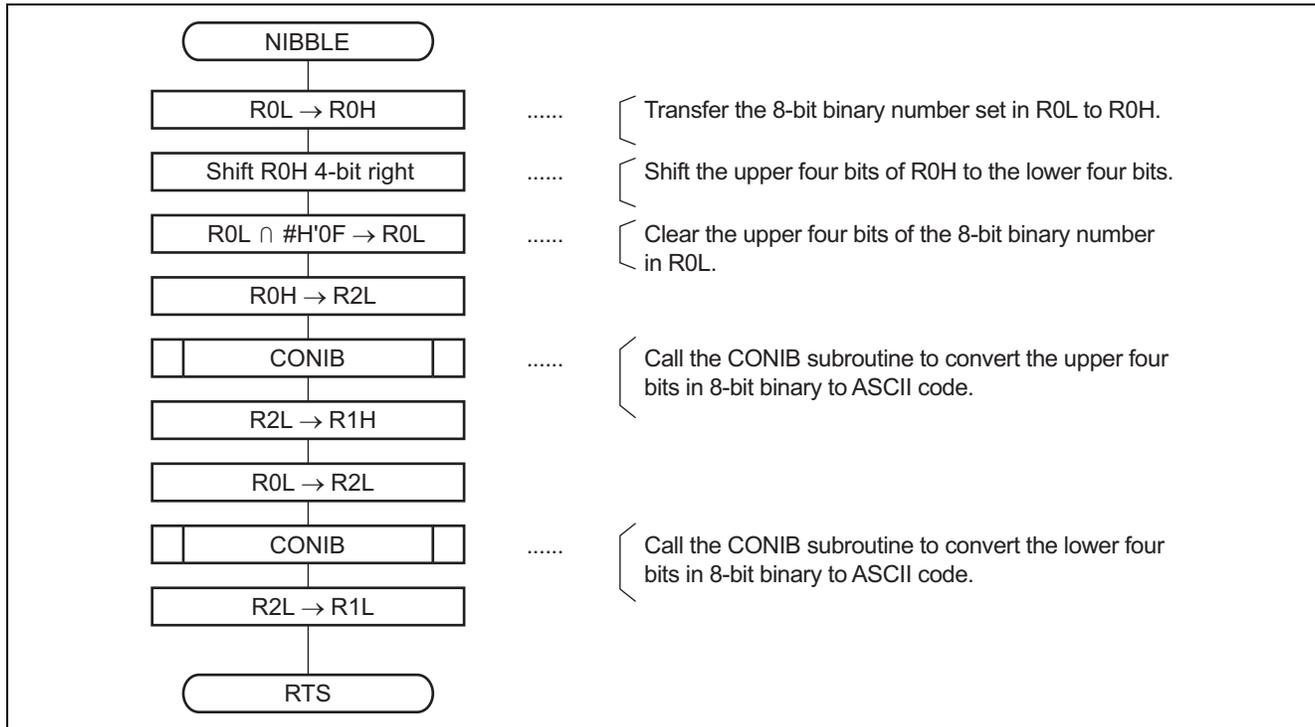
4.5 Principles of Operation

1. The 8-bit binary number set in R0L is divided into the higher- and lower-order 4-bit units.
2. The data in each set of four bits is tested by the comparison instruction (CMP.B). H'30 is added to a value in the range from H'00 to H'09 (the part enclosed by in the ASCII code table below); H'37 is added to a value from H'0A to H'0F (the part enclosed by in the table). The data is thus converted to ASCII code.

Table 4.1 ASCII Coding

MSD \ LSD		0	1	2	3	4	5	6	7
		000	001	010	011	100	101	110	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



6. Program Listing

```

1          1          ;*****
2          2          ;*
3          3          ;*          NAME : CHANGE 8 BIT BINARY
4          4          ;*          TO 2 BYTE ASCII CODE (COBYTE)
5          5          ;*
6          6          ;*****
7          7          ;*
8          8          ;*          ENTRY : R0L          (8 BIT BINARY)
9          9          ;*
10         10         ;*          RETURN : R1          (2 BYTE ASCII CODE)
11        11         ;*
12        12         ;*****
13        13         ;
14        14         .CPU          300HN
15        15         .SECTION     COBYTE_code, CODE, ALIGN=2
16        16         .EXPORT     COBYTE
17        17         ;
18        18         COBYTE .EQU    $          ;Entry point
19        19         MOV.B       R0L,R0H
20        20         ;
21        21         SHLR       R0H
22        22         SHLR       R0H
23        23         SHLR       R0H
24        24         SHLR       R0H          ;Shift high 4 bits to low 4 bits (R0H)
25        25         ;
26        26         AND.B      #'0F,R0L    ;Select lower 4 bits (R0L)
27        27         ;
28        28         MOV.B      R0H,R2L
29        29         BSR        CONIB      ;Branch subroutine CONIB
30        30         MOV.B      R2L,R1H    ;Set 1st ASCII code in R1H
31        31         ;
32        32         MOV.B      R0L,R2L
33        33         BSR        CONIB      ;Branch subroutine CONIB
34        34         MOV.B      R2L,R1L    ;Set 2nd ASCII code in R1L
35        35         ;
36        36         RTS
37        37         ;-----
38        38         CONIB      ;Change R2L to ASCII code
39        39         CMP.B      #'0A,R2L
40        40         BCC        LBL        ;Branch if R2L will be ASCII "A"- "F"
41        41         ADD.B      #'30,R2L   ;Reshape R2L to ASCII "0"- "9"
42        42         RTS
43        43         ;
44        44         LBL        ADD.B      #'37,R2L
45        45         RTS
46        46         ;
47        47         .END

*****TOTAL ERRORS      0
*****TOTAL WARNINGS    0

```

Revision Record

Rev.	Date	Description	
		Page	Summary
2.00	Feb.28.06	—	Format has been changed from Hitachi version to Renesas version.

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