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R8C/35C Group

UART Communication with PC Terminal Software Using 36.864 MHz High-Speed OCO

1. Abstract

This document describes the setting method and an application example of PC terminal software and UART communication using a 36.864 MHz high-speed on-chip oscillator (OCO).

2. Introduction

The application example described in this document applies to the following MCU:

- MCU : R8C/35C Group

This program can be used with other R8C/Tiny Series MCUs which have the same special function registers (SFRs) as the R8C/35C Group. Check the manual for any additions and modifications to functions. Careful evaluation is recommended before using this application note.

3. Application Example

3.1 Program Outline

Transmission/reception with PC terminal software can be performed in clock asynchronous serial I/O (UART) mode for the R8C/35C Group.

Specifications for this program are as follows:

(1) Use the keyboard for input: numbers up to three digits, + (0x2B), numbers up to three digits, and the return key (0x0D).
Example: 123 + 123 (return key)

(2) The R8C/35C Group adds the data input in number (1) above and transmits LF/NL (0x0A), = (0X3D), (calculation result), CR (0x0D), and LF/NL (0x0A) to the terminal software.
Example: (0x0A) = 246 (0x0D, 0x0A)

Table 3.1 shows the settings UART communication. Figure 3.1 shows the bit rate setting values.

Table 3.1 Settings for UART Communication

Function	Setting
Pins	TXD0 and RXD0
Transfer data length	8 bits
Stop bits	1
Parity	Parity disabled
BRG count source	f1
Data output select bit	TXD0 pin is set to CMOS output
Transfer format	LSB first
Bit rate	115200 bps

$$\frac{\text{System clock}\ 36.864\ \text{MHz} \times \text{FRA2 register}\ f2 \times \text{CLK0, CLK1 bit}\ f1}{16 \times \left(\text{U0BRG register}\ 9\ (\text{“0x09”}) + 1\right)} = 115200\ (\text{bps})$$

Figure 3.1 Bit Rate Setting Values

This sample program may include bit operations of unused functions for the SFR bit layout. Set these values according to the operations on the user system.

3.2 Pins and Memory

3.2.1 Pins

Table 3.2 Pins and Their Functions

Pin Name	I/O	Function
P1_4 (/TXD0/TRCCLK)	Output	Serial data output
P1_5 (/$\overline{\text{INT1}}$/RXD0/TRAIO)	Input	Serial data input

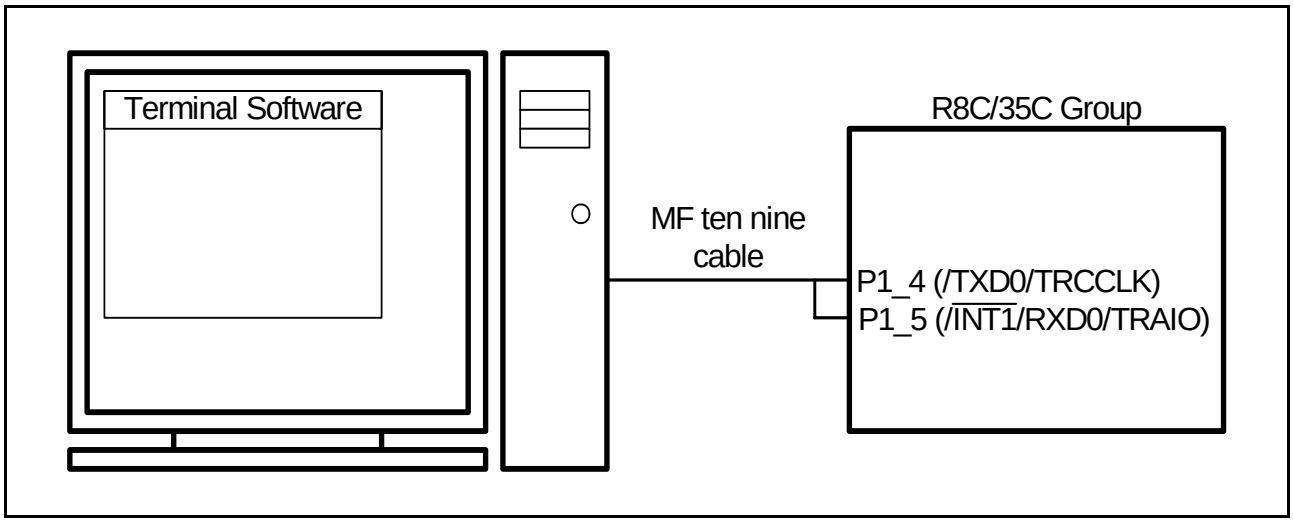


Figure 3.2 Pins

3.3 Memory

Table 3.3 Memory

Memory	Size	Remarks
ROM	823 bytes	In the rej05b1334_src.c module
RAM	15 bytes	In the rej05b1334_src.c module
Maximum user stack	16 bytes	main function: 3 bytes mcu_init function: 6 bytes uart_init function: 3 bytes pc communication function: 3 bytes input_left_part function: 7 bytes input_right_part function: 7 bytes input_data_calc_echo function: 3 bytes calculation_and_transmit function: 3 bytes
Maximum interrupt stack	0 bytes	Not used

Memory size varies depending on the C compiler version and compile options. The above applies to the following conditions:
C compiler: M16C/60, 30, 20, 10, and R8C/Tiny Series Compiler V.5.45 Release 00
Compile option: -c -finfo (see Note) -dir "$(CONFIGDIR)" -R8C
Note: -c -finfo cannot be used for the R8C/Tiny-only Free-version.

4. Setup

This section shows the initial setting procedures and values to set the example described in 3. Application Example. Refer to the R8C/35C Group Hardware Manual for details on individual registers.

4.1 System Clock Setting

(1) Enable writing to registers CM0, CM1, CM3, OCD, FRA0, FRA1, FRA2, and FRA3.

Protect Register (PRCR)

Address 000Ah

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	PRC3	PRC2	PRC1	PRC0
Setting Value	–	–	–	–	–	–	–	1

Bit	Symbol	Bit Name	Description	R/W
b0	PRC0	Protect bit 0	Enables writing to the CM0, CM1, CM3, OCD, FRA0, FRA1, FRA2, and FRA3 registers. 1: Write enabled	R/W

(2) Transfer the values in the FRA4 register to the FRA1 register to adjust the frequency of the high-speed OCO to 36.864 MHz.

High-Speed OCO Control Register 1 (FRA1)

Address 0024h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	–	–	–	–
Setting Value	FRA4 register value as of shipping							

Bit	Description	R/W
b7 - b0	The frequency of the high-speed OCO can be adjusted using b0 to b7.	R/W

Set the PRC0 bit in the PRCR register to 1 (write enabled) before rewriting the FRA1 register.

(3) Transfer the values in the FRA5 register to the FRA3 register to adjust the frequency of the high-speed OCO to 36.864 MHz.

High-Speed OCO Control Register 3 (FRA3)

Address 002Fh

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	–	–	–	–
Setting Value	FRA5 register value as of shipping							

Bit	Description	R/W
b7 - b0	The frequency of the high-speed OCO can be adjusted using b0 to b7.	R/W

Set the PRC0 bit in the PRCR register to 1 (write enabled) before rewriting the FRA3 register.

(4) Set the divide ratio of the high-speed OCO.

High-Speed OCO Control Register 2 (FRA2)

Address 0025h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	–	FRA22	FRA21	FRA20
Setting Value	0	0	0	0	0	0	0	0

Bit	Symbol	Bit Name	Description	R/W
b0	FRA20	High-speed OCO frequency switching bit	Division selection These bits select the division ratio for the high-speed OCO clock. b2 b1 b0 0 0 0: Divide-by-2 mode	R/W
b1	FRA21			R/W
b2	FRA22			R/W
b3	–	Reserved	Set to 0.	R/W
b4	–			
b5	–			
b6	–			
b7	–			

Set the PRC0 bit in the PRCR register to 1 (write enabled) before rewriting the FRA2 register.

(5) Start the high-speed OCO.

High-Speed OCO Control Register 0 (FRA0)

Address 0023h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	FRA03	–	FRA01	FRA00
Setting Value	–	–	–	–	–	–	–	1

Bit	Symbol	Bit Name	Description	R/W
b0	FRA00	High-speed OCO enable bit	1: High-speed OCO on	R/W

Set the PRC0 bit in the PRCR register to 1 (write enabled) before rewriting the FRA0 register.

(6) Wait until oscillation stabilizes.

(7) Select the high-speed OCO.

High-Speed OCO Control Register 0 (FRA0)

Address 0023h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	FRA03	–	FRA01	FRA00
Setting Value	–	–	–	–	–	–	1	–

Bit	Symbol	Bit Name	Description	R/W
b1	FRA01	High-speed OCO select bit (1)	1: High-speed OCO selected	R/W

NOTE:

1. Change the FRA01 bit under the following conditions.
   - FRA00 = 1 (high-speed OCO on)
   - The CM14 bit in the CM1 register = 0 (low-speed OCO on)
   - Bits FRA22 to FRA20 in the FRA2 register:
   - All division mode can be set when VCC = 3.0 to 5.5 V 000b to 111b
     Divide ratio of 4 or more when VCC = 2.7 to 5.5 V 010b to 111b (divide by 4 or more)
     Divide ratio of 8 or more when VCC = 2.2 to 5.5 V 110b to 111b (divide by 8 or more)

Set the PRC0 bit in the PRCR register to 1 (write enable) before rewriting the FRA0 register.

(8) Set the system clock dividing ratio to divided-by-1 mode.

System Clock Control Register 1 (CM1)

Address 0007h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	CM17	CM16	–	CM14	CM13	CM12	CM11	CM10
Setting Value	0	0	–	–	–	–	–	–

Bit	Symbol	Bit Name	Description	R/W
b6	CM16	System clock division select bit 1 (1)	b7 b6 0 0: No division mode	R/W
b7	CM17			R/W

NOTE:

1. When the CM06 bit is set to 0 (bits CM16 and CM17 enabled), bits CM16 and CM17 are enabled.

Set the PRC0 bit in the PRCR register to 1 (write enabled) before rewriting the CM1 register.

(9) Set the system clock division ratio selection bit 0.

System Clock Control Register 0 (CM0)

Address 0006h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	CM07	CM06	CM05	CM04	CM03	CM02	CM01	–
Setting Value	–	0	–	–	–	–	–	–

Bit	Symbol	Bit Name	Description	R/W
b6	CM06	System clock division select bit 0 (1)	0: Bits CM16 and CM17 in the CM1 register enabled	R/W

NOTE:
1. When the MCU enters stop mode, the CM06 bit becomes 1 (divide-by-8 mode).

Set the PRC0 bit in the PRCR register to 1 (write enabled) before rewriting the CM0 register.

(10) Disable writing to the CM0, CM1, CM3, OCD, FRA0, FRA1, FRA2, and FRA3 registers

Protect Register (PRCR)

Address 000Ah

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	PRC3	PRC2	PRC1	PRC0
Setting Value	–	–	–	–	–	–	–	0

Bit	Symbol	Bit Name	Description	R/W
b0	PRC0	Protect bit 0	Enables writing to the CM0, CM1, CM3, OCD, FRA0, FRA1, FRA2, and FRA3 registers. 0: Write disabled	R/W

4.2 Clock Asynchronous Serial I/O (UART) Mode Setting

4.2.1 Initial Setting

(1) Set P1_4 (TXD0) and P1_5 (RXD0) as input ports.

Port P1 Direction Register (PD1)

Address 00E3h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	PD1_7	PD1_6	PD1_5	PD1_4	PD1_3	PD1_2	PD1_1	PD1_0
Setting Value	–	–	0	0	–	–	–	–

Bit	Symbol	Bit Name	Description	R/W
b4	PD1_4	Port P1_4 direction bit	0: Input mode (functions as an input port)	R/W
b5	PD1_5	Port P1_5 direction bit		R/W

The PD1 register selects whether I/O ports are used for input or output. Each bit in the PD1 register corresponds to one port.

(2) Set the UART0 pin selection register

UART0 Pin Select Register (U0SR)

Address 0188h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	CLK0SEL0	–	RXD0SEL0	–	TXD0SEL0
Setting Value	0	0	0	0	0	1	0	1

Bit	Symbol	Bit Name	Description	R/W
b0	TXD0SEL0	TXD0 pin select bit	1: P1_4 assigned	R/W
b1	–	Nothing is assigned. If necessary, set to 0. When read, the content is 0.		–
b2	RXD0SEL0	RXD0 pin select bit	1: P1_5 assigned	R/W
b3	–	Nothing is assigned. If necessary, set to 0. When read, the content is 0.		–
b4	CLK0SEL0	CLK0 pin select bit	0: CLK0 pin not used	R/W
b5	–	Nothing is assigned. If necessary, set to 0. When read, the content is 0.		–
b6	–			
b7	–			

The U0SR register selects which pin is assigned to the UART0 I/O. To use the UART0 I/O pin, set this register. Set this register before setting UART0 associated registers. Also, do not change the setting value in this register during UART0 operation.

(3) Set the UART0 transmit interrupt control register (set interrupts to disable).

UART0 Transmit Interrupt Control Register (S0TIC)

Address 0051h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	IR	ILVL2	ILVL1	ILVL0
Setting Value	0	0	0	0	0	0	0	0

Bit	Symbol	Bit Name	Description	R/W
b0	ILVL0	Interrupt priority level select bit	b2 b1 b0 0 0 0: Level 0 (interrupt disabled)	R/W
b1	ILVL1			R/W
b2	ILVL2			R/W
b3	IR	Interrupt request bit	0: No interrupt requested	R/W (1)
b4	–	Nothing is assigned. If necessary, set to 0. When read, the content is undefined.		–
b5	–			
b6	–			
b7	–			

NOTE:
1. Only 0 can be written to the IR bit. Do not write 1 to this bit.

Rewrite the interrupt control register in the area where the interrupt request corresponding to the register is not generated.

(4) Set the UART0 receive interrupt control register (set interrupts to disable).

UART0 Receive Interrupt Control Register (S0RIC)

Address 0052h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	IR	ILVL2	ILVL1	ILVL0
Setting Value	0	0	0	0	0	0	0	0

Bit	Symbol	Bit Name	Description	R/W
b0	ILVL0	Interrupt priority level select bit	b2 b1 b0 0 0 0: Level 0 (interrupt disabled)	R/W
b1	ILVL1			R/W
b2	ILVL2			R/W
b3	IR	Interrupt request bit	0: No interrupt requested	R/W (1)
b4	–	Nothing is assigned. If necessary, set to 0. When read, the content is undefined.		–
b5	–			
b6	–			
b7	–			

NOTE:
1. Only 0 can be written to the IR bit. Do not write 1 to this bit.

Rewrite the interrupt control register in the area where the interrupt request corresponding to the register is not generated.

(5) Set the TE bit in the U0C1 register to 0.

UART0 Transmit/Receive Control Register 1 (U0C1)

Address 00A5h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	U0RRM	U0IRS	RI	RE	TI	TE
Setting Value	–	–	–	–	–	–	–	0

Bit	Symbol	Bit Name	Description	R/W
b0	TE	Transmit enable bit	0: Transmission disabled	R/W

(6) Set the RE bit in the U0C1 register to 0.

UART0 Transmit/Receive Control Register 1 (U0C1)

Address 00A5h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	U0RRM	U0IRS	RI	RE	TI	TE
Setting Value	–	–	–	–	–	0	–	–

Bit	Symbol	Bit Name	Description	R/W
b2	RE	Receive enable bit	0: Reception disabled	R/W

(7) Set the UART0 transmit/receive mode register.

UART0 Transmit/Receive Mode Register (U0MR)

Address 00A0h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	PRYE	PRY	STPS	CKDIR	SMD2	SMD1	SMD0
Setting Value	0	0	0	0	0	1	0	1

Bit	Symbol	Bit Name	Description	R/W
b0	SMD0	Serial I/O mode select bit	b2 b1 b0 1 0 1: UART mode, transfer data 8 bits long	R/W
b1	SMD1			R/W
b2	SMD2			R/W
b3	CKDIR	Internal/external clock select bit	0: Internal clock	R/W
b4	STPS	Stop bit length select bit	0: One stop bit	R/W
b5	PRY	Odd/even parity select bit	Enabled when PRYE = 1 0: Odd parity	R/W
b6	PRYE	Parity enable bit	0: Parity disabled	R/W
b7	–	Reserved bit	Set to 0.	R/W

(8) Set the UART0 transmit/receive control register 0.

UART0 Transmit/Receive Control Register 0 (U0C0)

Address 00A4h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	UFORM	CKPOL	NCH	–	TXEPT	–	CLK1	CLK0
Setting Value	0	0	0	0	–	0	0	0

Bit	Symbol	Bit Name	Description	R/W
b0	CLK0	BRG count source select bit (1)	b1 b0 0 0: f1 selected	R/W
b1	CLK1			R/W
b2	–	Reserved bit	Set to 0.	R/W
b4	–	Nothing is assigned. If necessary, set to 0. When read, the content is 0.		–
b5	NCH	Data output select bit	0: TXD0 pin set to CMOS output	R/W
b6	CKPOL	CLK polarity select bit	Set to 0 in UART mode.	R/W
b7	UFORM	Transfer format select bit	0: LSB first	R/W

NOTE:
1. If the BRG count source is switched, reset the U0BRG register.

(9) Set the UART0 transmit/receive control register 1.

UART0 Transmit/Receive Control Register 1 (U0C1)

Address 00A5h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	U0RRM	U0IRS	RI	RE	TI	TE
Setting Value	0	0	0	0	–	0	–	0

Bit	Symbol	Bit Name	Description	R/W
b0	TE	Transmit enable bit	0: Transmission disabled	R/W
b2	RE	Receive enable bit	0: Reception disabled	R/W
b4	U0IRS	UART0 transmit interrupt source select bit	0: Transmission buffer empty (TI = 1) 1: Transmission completed (TXEPT = 1)	R/W
b5	U0RRM	UART0 continuos receive mode enable bit (1)	0: Continuous receive mode disabled	R/W
b6	–	Nothing is assigned. If necessary, set to 0. When read, the content is 0.		–
b7	–			

NOTE:
1. In UART mode, set the U0RRM bit to 0 (continuous receive mode disabled).

(10) Set the UART0 bit rate register

UART0 Bit Rate Register (U0BRG)

Address 00A1h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	–	–	–	–
Setting Value	0	0	0	0	1	0	0	1

Bit	Description	R/W
b7 - b0	When the setting value is n, the U0BRG register divides the count source by n+1.	W

Write to the U0BRG register while transmission and reception are stopped. Use the MOV instruction to write to this register. Set bits CLK0 and CLK1 in the U0C0 register before writing to the U0BRG register.

(11) Set the UART0 transmit interrupt control register (set interrupts to disable).

UART0 Transmit Interrupt Control Register (S0TIC)

Address 0051h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	IR	ILVL2	ILVL1	ILVL0
Setting Value	0	0	0	0	0	0	0	0

Bit	Symbol	Bit Name	Description	R/W
b0	ILVL0	Interrupt priority level select bits	b2 b1 b0 0 0 0: Level 0 (interrupt disabled)	R/W
b1	ILVL1			R/W
b2	ILVL2			R/W
b3	IR	Interrupt request bit	0: No interrupt requested	R/W (1)
b4	–	Nothing is assigned. If necessary, set to 0. When read, the content is undefined.		–
b5	–			
b6	–			
b7	–			

NOTE:
1. Only 0 can be written to the IR bit. Do not write 1 to this bit.

Rewrite the interrupt control register in the area where the interrupt request corresponding to the register is not generated.

(12) Set the UART0 receive interrupt control register (set interrupts to disable).

UART0 Receive Interrupt Control Register (S0RIC)

Address 0052h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	–	–	IR	ILVL2	ILVL1	ILVL0
Setting Value	0	0	0	0	0	0	0	0

Bit	Symbol	Bit Name	Description	R/W
b0	ILVL0	Interrupt priority level select bit	b2 b1 b0 0 0 0: Level 0 (interrupt disabled)	R/W
b1	ILVL1			R/W
b2	ILVL2			R/W
b3	IR	Interrupt request bit	0: No interrupt requested	R/W (1)
b4	–	Nothing is assigned. If necessary, set to 0. When read, the content is undefined.		–
b5	–			
b6	–			
b7	–			

NOTE:
1. Only 0 can be written to the IR bit. Do not write 1 to this bit.

Rewrite the interrupt control register in the area where the interrupt request corresponding to the register is not generated.

4.2.2 Transmission Settings

(1) Set the TE bit in the U0C1 register to 1.

UART0 Transmit/Receive Control Register 1 (U0C1)

Address 00A5h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	U0RRM	U0IRS	RI	RE	TI	TE
Setting Value	–	–	–	–	–	–	–	1

Bit	Symbol	Bit Name	Description	R/W
b0	TE	Transmit enable bit	1: Transmission enabled	R/W

(2) Confirm the TI bit in the U0C1 register is 1.

(3) Write transmit data to the U0TB register.

4.2.3 Reception Setting

(1) Set the RE bit in the U0C1 register to 1.

UART0 Transmit/Receive Control Register1 (U0C1)

Address 00A5h

Bit	b7	b6	b5	b4	b3	b2	b1	b0
Symbol	–	–	U0RRM	U0IRS	RI	RE	TI	TE
Setting Value	–	–	–	–	–	1	–	–

Bit	Symbol	Bit Name	Description	R/W
b2	RE	Receive enable bit	1: Reception enabled	R/W

(2) Confirm the RI bit in the U0C1 register is 1.

(3) Read the U0RB register.

5. Function Table and Flowchart

5.1 Function Table

Declaration	void mcu_init(void)		
Outline	System clock setting		
Argument	Argument name		Meaning
	None		–
Variable (global)	Variable name		Contents
	None		–
Returned value	Type	Value	Meaning
	None	–	–
Function	Set system clock (36.864 Mhz high-speed OCO).		

Declaration	void uart_init(void)		
Outline	UART Associated SFR Initial Setting		
Argument	Argument name		Meaning
	None		–
Variable (global)	Variable name		Contents
	None		–
Returned value	Type	Value	Meaning
	None	–	–
Function	Process SFR initial setting associated with UART.		

Declaration	void pc_communication(void)		
Outline	PC communication		
Argument	Argument name		Meaning
	None		–
Variable (global)	Variable name		Contents
	unsigned char mode		–
Returned value	Type	Value	Meaning
	None	–	–
Function	Control communication with PC terminal.		

Declaration	void input_left_part(void)		
Outline	Left-part input		
Argument	Argument name		Meaning
	None		–
Variable (global)	Variable name		Contents
	unsigned char rcv_buf		Reference/setting
	unsigned char digit_num		Reference/setting
	unsigned short left_part_num		Setting
	unsigned short calc_data		Reference
	unsigned char mode		Setting
Returned value	Type	Value	Meaning
	None	–	–
Function	Maintain the left-part data in the formula.		

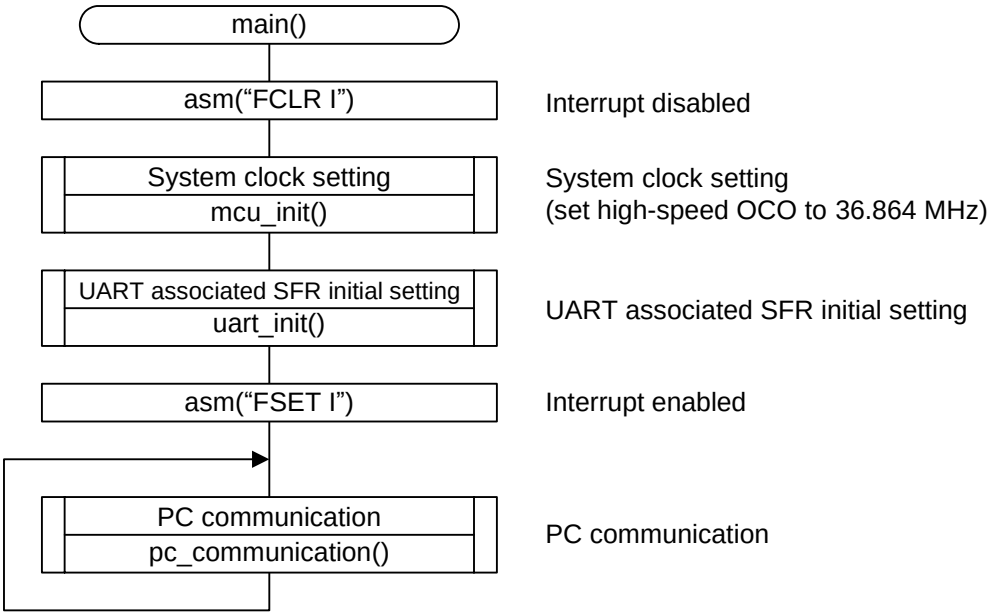
Declaration	void input_right_part(void)		
Outline	Right-part input		
Argument	Argument name		Meaning
	None		–
Variable (global)	Variable name		Contents
	unsigned char rcv_buf		Reference/setting
	unsigned char digit_num		Reference/setting
	unsigned short right_part_num		Setting
	unsigned short calc_data		Reference
	unsigned char mode		Setting
Returned value	Type	Value	Meaning
	None	–	–
Function	Maintain the right-part data in the formula.		

Declaration	void input_data_calc_echo(void)		
Outline	Input data calculation, echo processing		
Argument	Argument name		Meaning
	None		–
Variable (global)	Variable name		Contents
	unsigned char rcv_buf		Reference/setting
	unsigned char digit_num		Reference/setting
	unsigned char digit_1st		Reference/setting
	unsigned char digit_2nd		Reference/setting
	unsigned char digit_3rd		Reference/setting
	unsigned short calc_data		Setting
Returned value	Type	Value	Meaning
	None	–	–
Function	Check if the data received from PC terminal software is suitable. If the data is suitable, maintain it and echo transmit an echo to PC terminal software.		

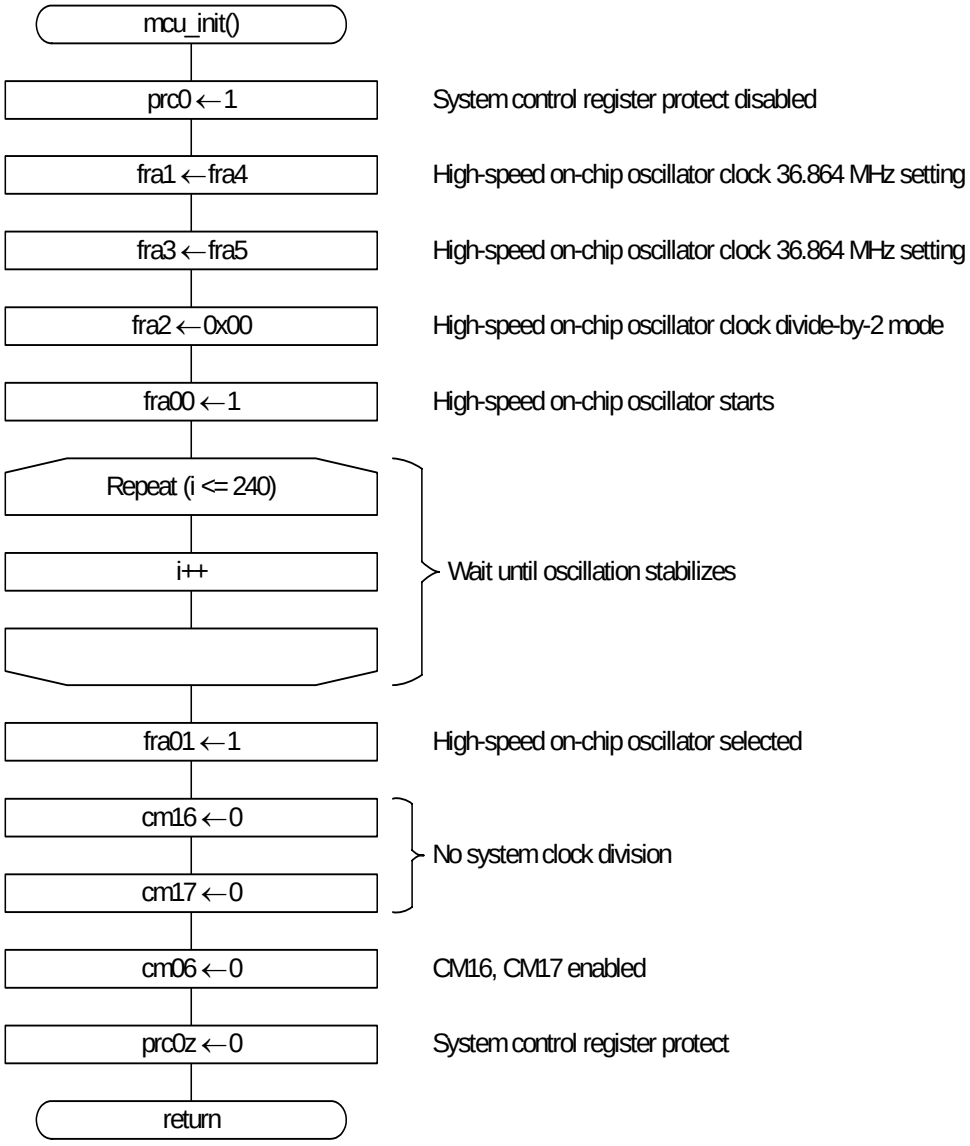
Declaration	void calculation_and_transmit(void)		
Outline	Data calculation and transmission		
Argument	Argument name		Meaning
	None		–
Variable (global)	Variable name		Contents
	unsigned char digit_1st		Reference/setting
	unsigned char digit_2nd		Reference/setting
	unsigned char digit_3rd		Reference/setting
	unsigned char digit_4th		Reference/setting
	unsigned short left_part_num		Reference
	unsigned short right_part_num		Reference
	unsigned short sum		Reference/setting
	unsigned char mode		Setting
Returned value	Type	Value	Meaning
	None	–	–
Function	Calculate the maintained data and transmit the calculation result data to PC terminal software.		

5.2 Flow Chart

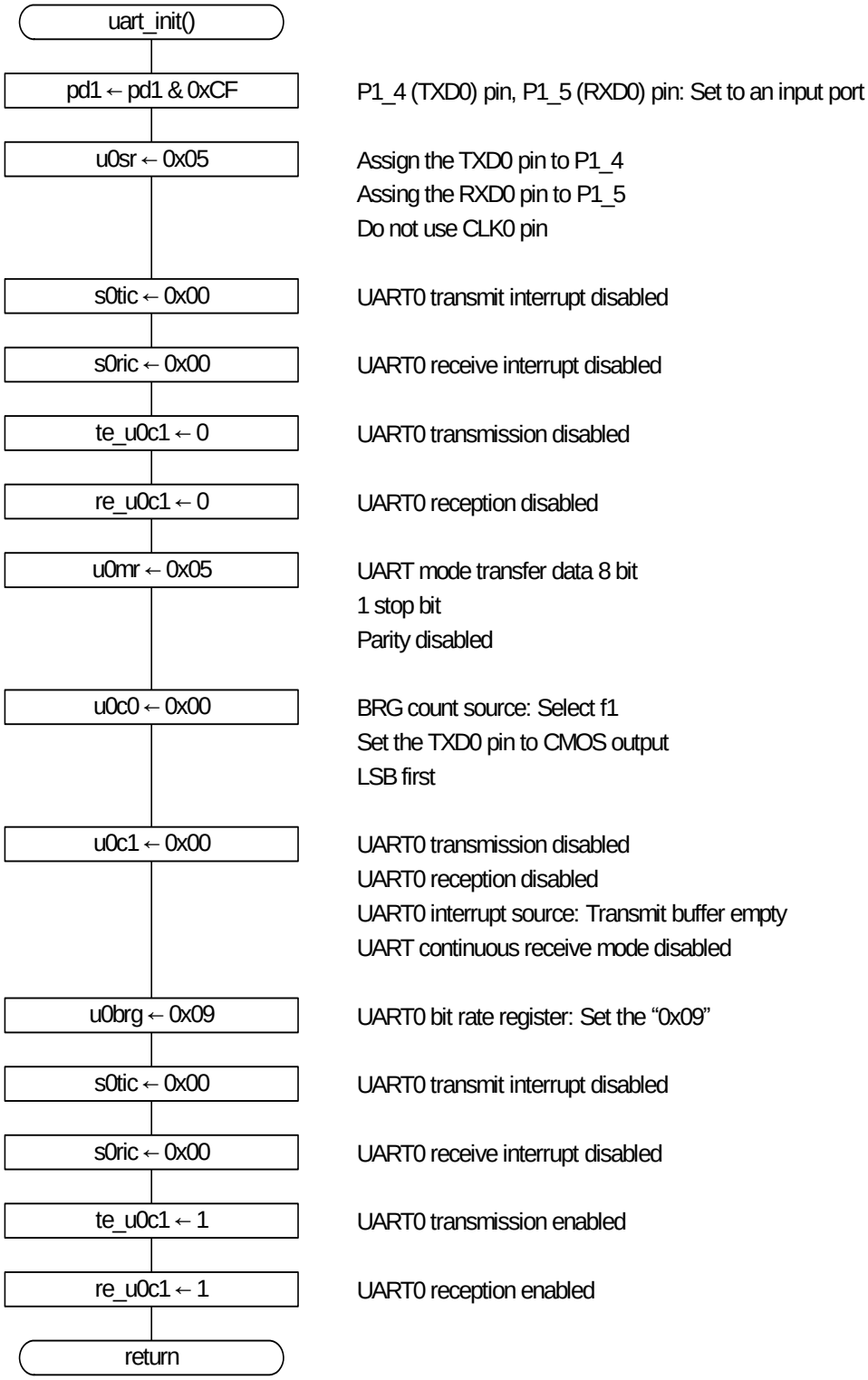
5.2.1 Main Function



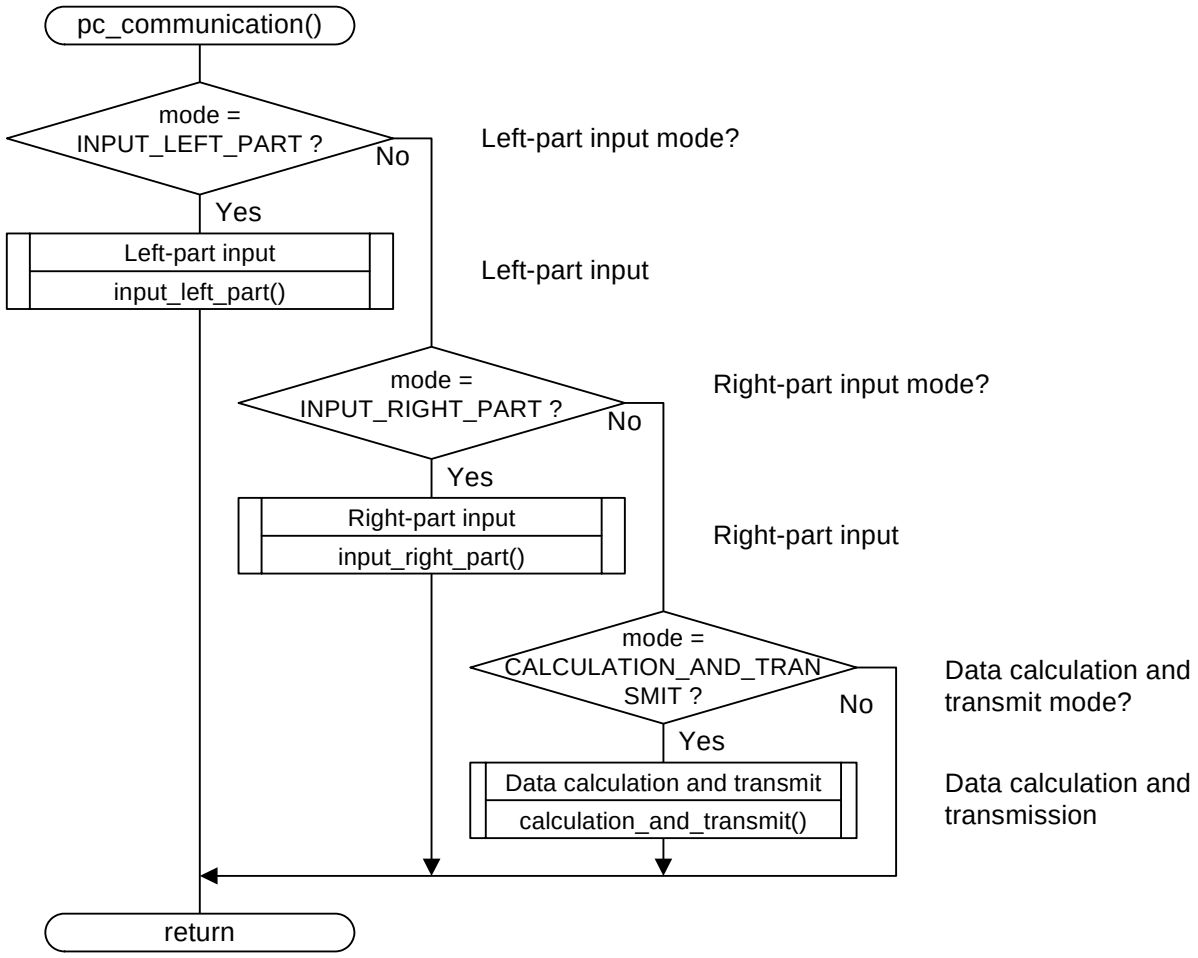
5.2.2 System Clock Setting



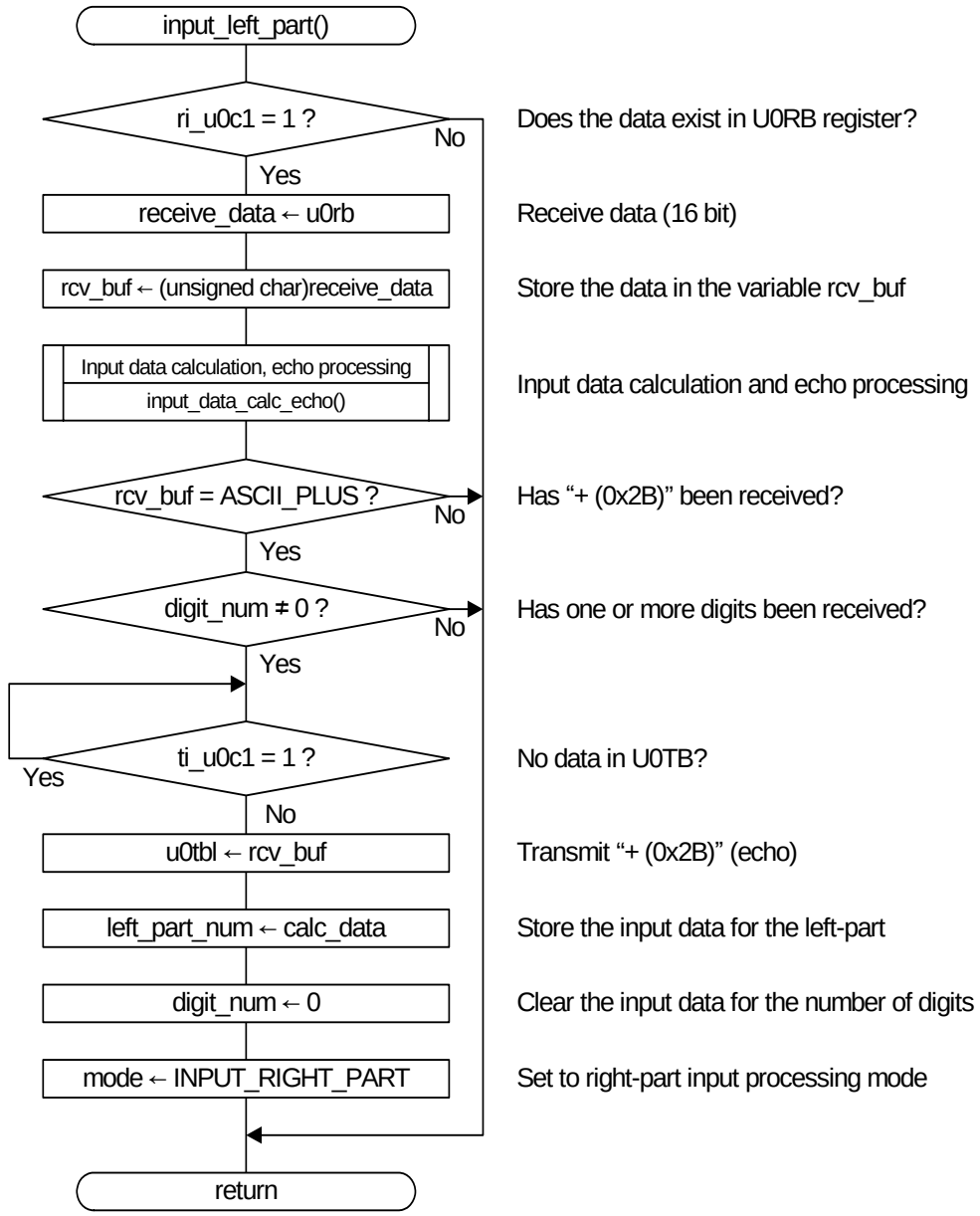
5.2.3 UART Associated SFR Initial Setting



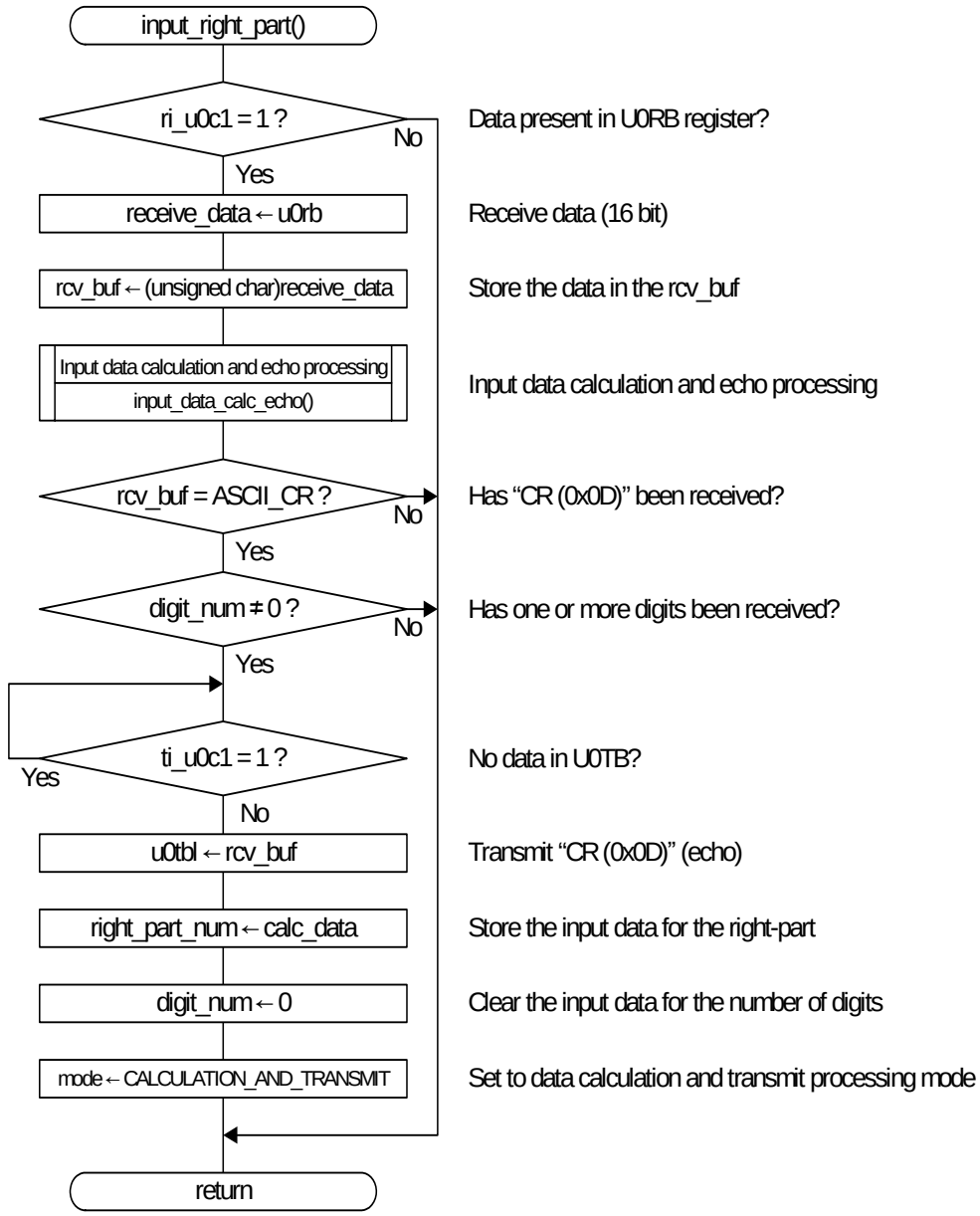
5.2.4 PC Communication



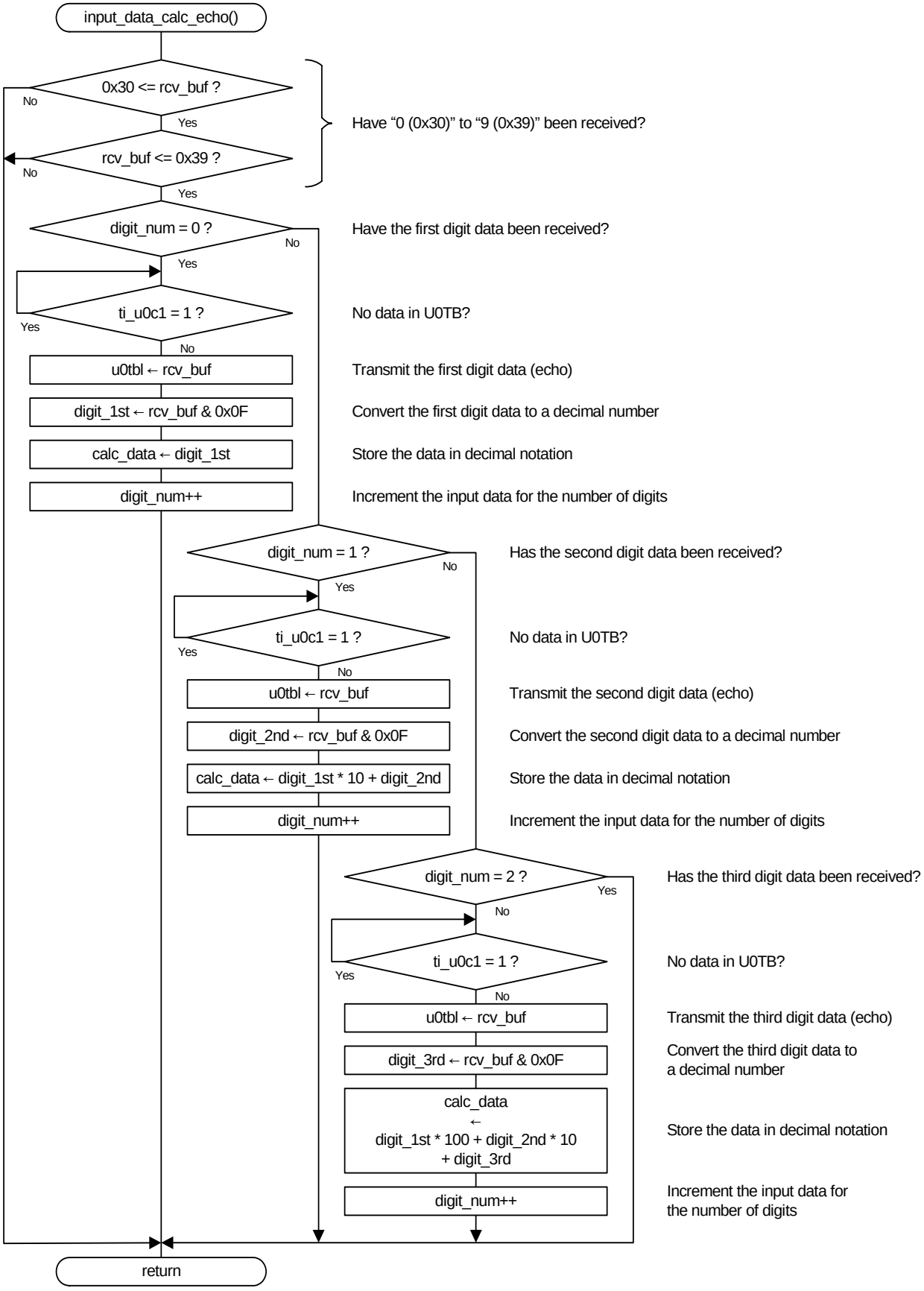
5.2.5 Left-Part Input



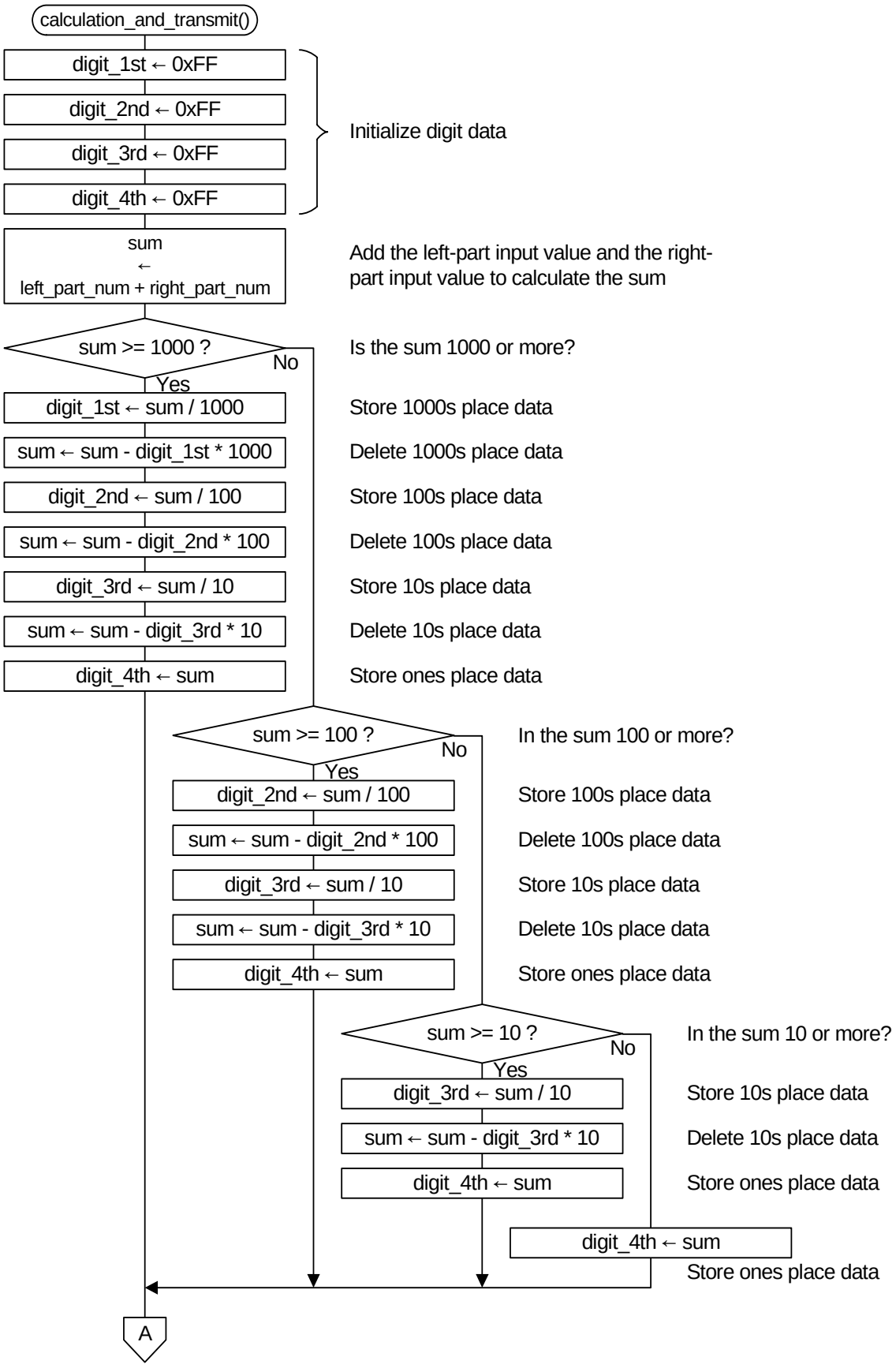
5.2.6 Right-Part Input

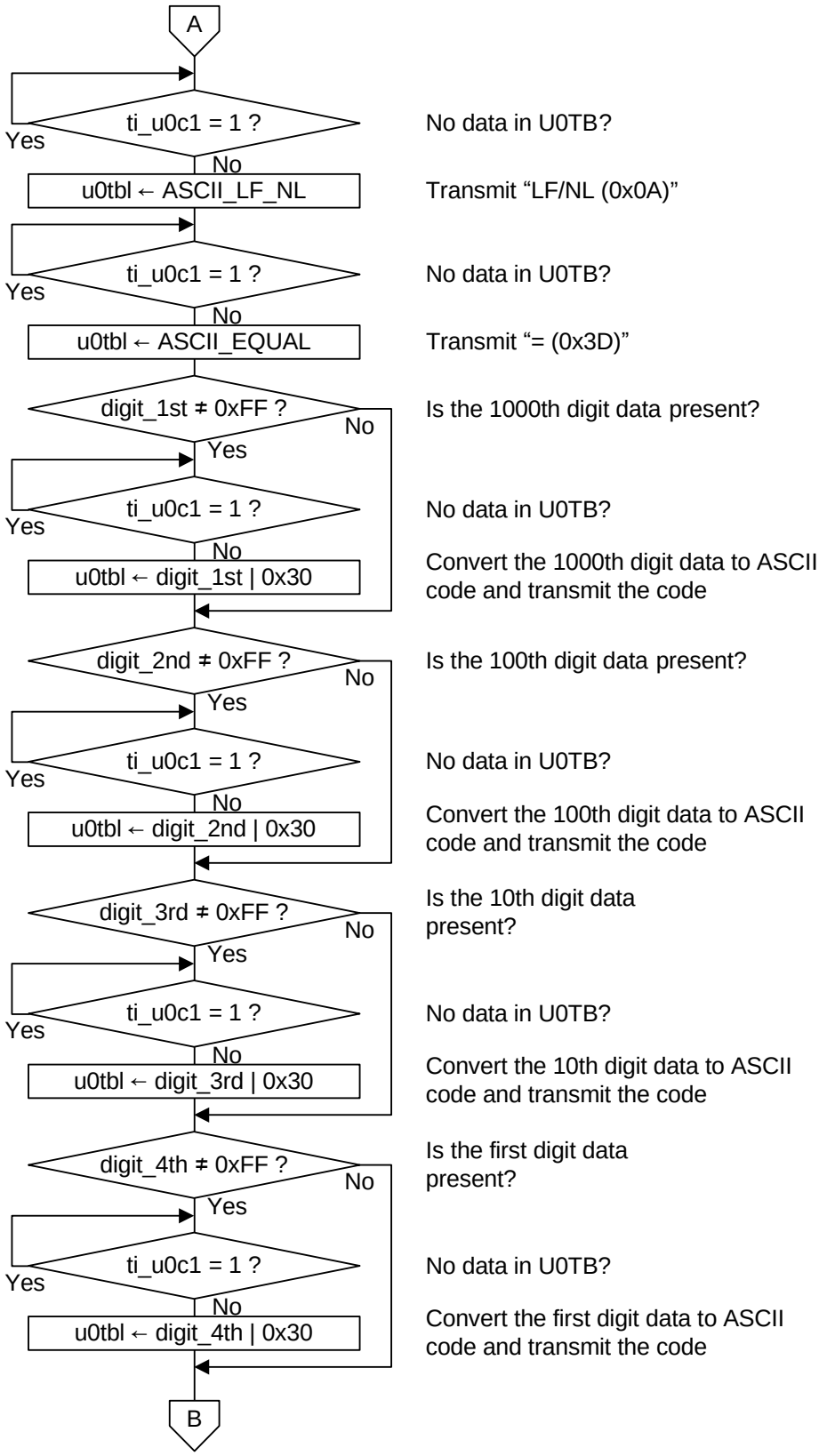


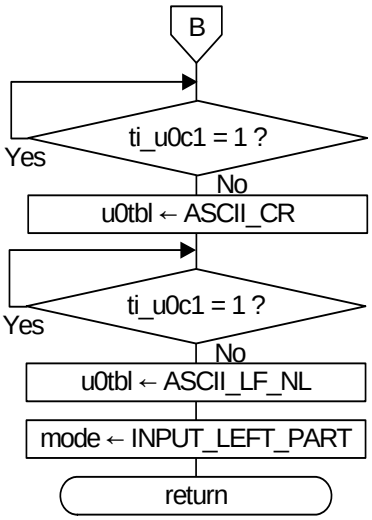
5.2.7 Input Data Calculation and Echo Processing



5.2.8 Data Calculation and Transmit Processing




A
ti_u0c1 = 1 ?
Yes
No
No data in U0TB?
u0tbl ← ASCII_LF_NL
Transmit “LF/NL (0x0A)”
ti_u0c1 = 1 ?
Yes
No data in U0TB?
No
u0tbl ← ASCII_EQUAL
Transmit “= (0x3D)”
digit_1st ≠ 0xFF ?
No
Is the 1000th digit data present?
Yes
ti_u0c1 = 1 ?
Yes
No data in U0TB?
No
u0tbl ← digit_1st | 0x30
Convert the 1000th digit data to ASCII code and transmit the code
digit_2nd ≠ 0xFF ?
No
Is the 100th digit data present?
Yes
ti_u0c1 = 1 ?
Yes
No data in U0TB?
No
u0tbl ← digit_2nd | 0x30
Convert the 100th digit data to ASCII code and transmit the code
digit_3rd ≠ 0xFF ?
No
Is the 10th digit data present?
Yes
ti_u0c1 = 1 ?
Yes
No data in U0TB?
No
u0tbl ← digit_3rd | 0x30
Convert the 10th digit data to ASCII code and transmit the code
digit_4th ≠ 0xFF ?
No
Is the first digit data present?
Yes
ti_u0c1 = 1 ?
Yes
No data in U0TB?
No
u0tbl ← digit_4th | 0x30
Convert the first digit data to ASCII code and transmit the code
B



No data in U0TB?

Transmit “CR (0x0D)”

No data in U0TB?

Transmit “LF/NL (0x0A)”

Set to left-part input processing mode

6. Sample Programming Code

A sample program can be downloaded from the Renesas Technology website.
To download, click “Application Notes” in the left-hand side menu of the R8C/Tiny Series page.

7. Reference Documents

Hardware Manual
R8C/35C Group Hardware Manual Rev.0.10
The latest version can be downloaded from the Renesas Technology website.

Technical Update/Technical News
The latest information can be downloaded from the Renesas Technology website.

Website and Support

Renesas Technology website
http://www.renesas.com/

Inquiries
http://www.renesas.com/inquiry
csc@renesas.com

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		Page	Summary
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