M66291GP Evaluation Board

M3A-0033

Instruction Manual

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RENESAS TECHNOLOGY CORPORATION

RENESAS SOLUTIONS CORPORATION

Contents

Chapter 1. Outline

M3A-0033 is a development board for evaluating Renesas original USB ASSP M66291GP, and combinating M3A-0033 mounted Renesas original 16bits microcomputer M16C/80 and M3A-0032 (enclosure), the chip can be evaluated easily. Moreover, since the debugging monitor is built in the microcomputer, an expensive debugger is not needed.

Features of this board is listed bellow, with the combination of M3A-0032 (enclosure).
- **Selectable the supply origin of external power supply**
 (Vbus power supply on USB line / regulated DC power supply).
- **Changeable the supply voltage to V_{CC} of M 16C/80 and IOVCC of M66291GP (5.0V/3.3V).**
- **DMA transfer (cycle steeling mode) between M16C/80 and M66291GP can be evaluated by connecting**
 ***Dreq0 pin of M66291GP and *INT1 pin of M16C/80.**
- **Both 16 bits and 8 bits bus with are available.**
- **Mounted the expansion bus interface for user application board for evaluation. Please refer section 8.5 when**
   create user application board.
- **RS-232C communication port with UART0 of M16C/80 is available.**

Note: The signal which has "*" in the head of a pin name is low active.
        Example: *Dreq0, it is low active, shown as $\overline{Dreq0}$.

Moreover, You can use M3A-0033 combining M3A-0029B (M66290AGP/FP evaluation board).

Chapter 2. Guarantee

(HardWare)

In one year , We troubleshoot your problem with no charge provided that you use this product in an environment stated under chapter 8 and you use under chapter 9.
One year later or when you use this product besides a method mentioned above , we repair it by compensation.

(1) M66291GP Eva.board (M3A-0033)
(2) M66291GP UH.board (M3A-0032)
(3) Serial Interface Cable

In requesting the repair of this product, contacts your distributor or nearest office of Renesas Technology.

(SoftWare)

In one month, We change it no charge , when it's medium breaks down. There is not a guarantee except this.

(1) Compiler (KNC308WA)
(2) Remote Debugger (KD308)
(3) Software for programming internal Flashmemory (FlashStart)

Chapter 3. System Configuration

3.1 System Configuration

The following lists the hardware and software products required for using the product.

1. PC for development (No package)
2. Remote Debugger (KD308)
3. Compiler (KNC308WA)
4. Software for programming internal flash memory (FlashStart)
5. Serial interface cable
6. M66291GP evaluation board (M3A-0033)
7. M66291GP utility board (M3A-0032)
8. Power supply cable
9. Regulated DC power supply (No package)
10. Host PC (No package)
11. USB cable (No package)

In addition, user application board is connectable with M3A-0033.

3.2 System Configuration Figure
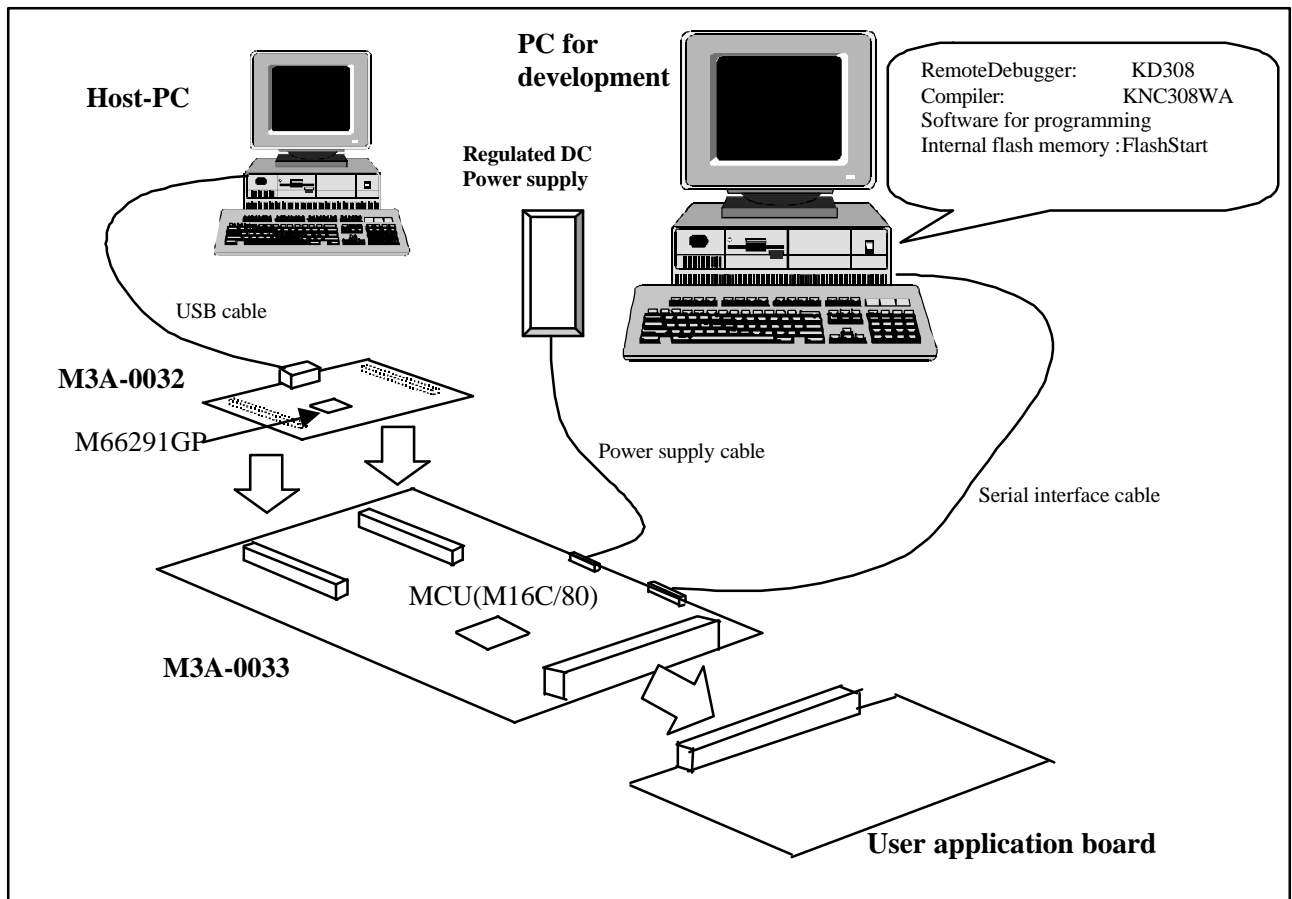
Figure 3-1 System Configuration

3.3 Top View

Top view of M3A-0033 is shown in Fig. 3-2, and explanation of main units is shown in Table 3-1.
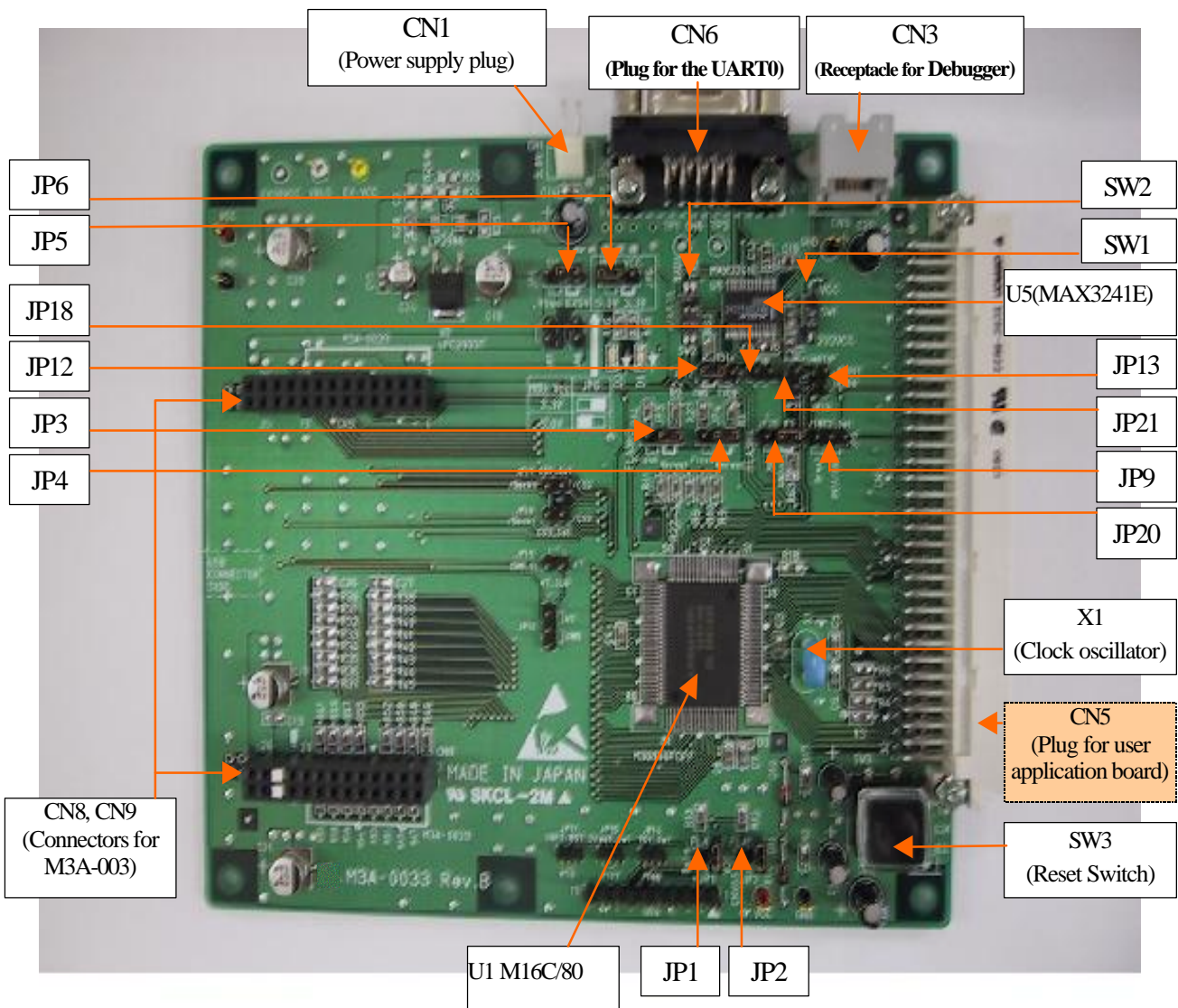
: This part is not mounted.   Please locate as necessary.

Figure. 3-2 M3A-0033 Top View

Table. 3-1 M3A-0033 Main Units

NO	Name	Explanation
U1	M16C/80	M16C/80 Renesas original high performance 16 bits flash microcomputer
U5	MAX3241E	RS232C standard voltage conversion IC for communication (CN3, CN6)
X1	Clock oscillator	Clock oscillator for M16/80: 10MHz.
SW1,SW2	Slide switch	For communication (CN3, CN6) setup (please refer "3.5" for details)
SW3	Reset switch	For reset (please refer section "3.6" for details)
JPx	Jumper switch	For various setup (please refer section "3.4" for details)
CN1	Power supply plug	For Regulated DC power supply
CN3	Receptacle for the debugger	For debugger communication
CN6	Plug for the UART0	For UART0 communication
CN8,CN9	Connectors for M3A-0032	For M3A-0032 connection. M3A-0029B is also connectable.

3.4 Jumper Switch Setup (JPx)

Jumper switches setup of M3A-0033 are shown in Table 3-2.

Table 3-2 Jumper switch setup of M3A-0033

JP	Name	Contents	
JP1	Flash memory programming setup (1)	**Short**: Programming to internal flash memory of M16C/80 by FlashStart. (Note1) **Open**: Debugging by KD308 or running user programmed by FlashStart(Default)	
JP2	Flash memory programming setup (2)		
JP3	Flash memory programming setup (3)	**Flash**: Programming to internal flash memory of M16C/80 by FlashStart. (Note1) **Normal**: Debugging by KD308 or running user programmed by FlashStart (Default)	
JP4	Flash memory programming setup (4)		
JP5	Power supply origin selection	Select power supply origin. (Regulated DC power supply / Vbus power supply on USB line) Usually, please set to "EX5V". (Note2)	
		"**EX5V**"	Select regulated DC power supply.
		"**Vbus**"	Select Vbus.
JP6	Supply voltage selection : VCC of M16C/80, IOVCC of M66291GP	Select supply voltage to VCC of M16C/80, and IOVCC of M66291GP (5.0V/3.3V). Usually, please set to "3.3V". (Note2)	
		"**3.3V**"	Supply 3.3V to VCC of M16C/80 and IOVCC of M66291GP.
		"**5.0V**"	Supply 5.0V to VCC of M16C/80 and IOVCC of M66291GP.
JP9	*INT2 of M16C/80 connection	**Open**: *INT2 of M16C/80 open (Default)	
		"*Dreq1"	*Dreq1 pin of M66291GP is assigned to *INT2 pin of M16C/80. (Note3)
JP12	UART0 TXD enable	**GND**: UART0 TXD is disabled. (Default) **TXD0**: UART0 TXD is enabled. (Note4)	
JP13	UART0 RXD enable	**Open**: UART0 RXD is disabled. (Default) **Short**: UART0 RXD is enabled. (Note4)	
JP18	*Dreq0 enable	Set up when the DMA transfer by using *Dreq0. Usually, please set to "OPEN". (Note3)	
		Jumper short-circuited	*Dreq0 pin of M66291GP is assigned to *INT1 pin of M16C/80.
JP20	UART0 RTS enable	**GND**: UART0 RTS is disabled. (Default) RTS pin of CN6 is connected to GND pin of M16C/80 (via MAX3241E) **P80** : UART0 RTS is enabled. RTS pin of CN6 is connected to P80 pin of M16C/80 (via MAX3241E) (Note4)	
JP21	UART0 CTS enable	**Open**: UART0 CTS is disabled. (Default) **Short**: UART0 CTS is enabled. (Note4)	

Note1. Please refer to "Chapter 7" about programming to built-in flash memory.

Note2. Please refer to section "6.1" for details.

Note3. Please refer to section "6.2" for details.

Note4. Please refer to section "6.3" for details.

Caution! : Please don't use JP7, JP8, JP10, JP11, JP14, JP15, JP16, JP17, and JP19.

          In case of connecting M3A-0029B, set JP6 to "3.3V" fixation, and JP9 is invalid.

3.5 Slide Switch (SW1, SW2)

Setup of slide switches are shown in Table 3-3.

Table 3-3 M3A-0033 Slide Switch

SW	Name	Setting	
SW1	MAX3241E Power supply	Set power supply to MAX3241E (U5) to ON/OFF. Usually, please set to "ON" side.	
		"ON"	Power is supplied to MAX3241E.
		"OFF"	Power is not supplied to MAX3241E. (Communication of CN3, CN6 is impossible)
SW2	Communication setup for debugger	Set communication to debugger via CN3 possible/impossible. Usually, please set to "ON" side.	
		"ON"	Communication is possible.
		"OFF"	Communication is impossible.

3.6 Reset Switch (SW3)

The reset switch is the task switch of double action. The reset signal to M66291GP and M16C/80 can be given by putting task switch. The input contents of reset signal are shown in Table 3-4.

Table 3-4 M3A-0033 Reset Switch

SW	Input operation	Contents	
		M66291GP(M3A-0032)	M16C/80(M3A-0033)
SW3	1st action	Hardware reset	-
	2nd action	Hardware reset	Hardware reset

Note: Please do not perform 2nd reset of M16C/80, M66291GP during debugging by KD308 since it becomes impossible to communicate debugging and KD308 stops.
If the reset switch has been pushed by mistake, please terminate KD308, and re-start KD308.

Chapter 4. Hardware Setup

4.1 M3A-0033 Setup

Please set jumpers as shown in Figure. 4-1. Jumpers are already set at the time of product shipment.
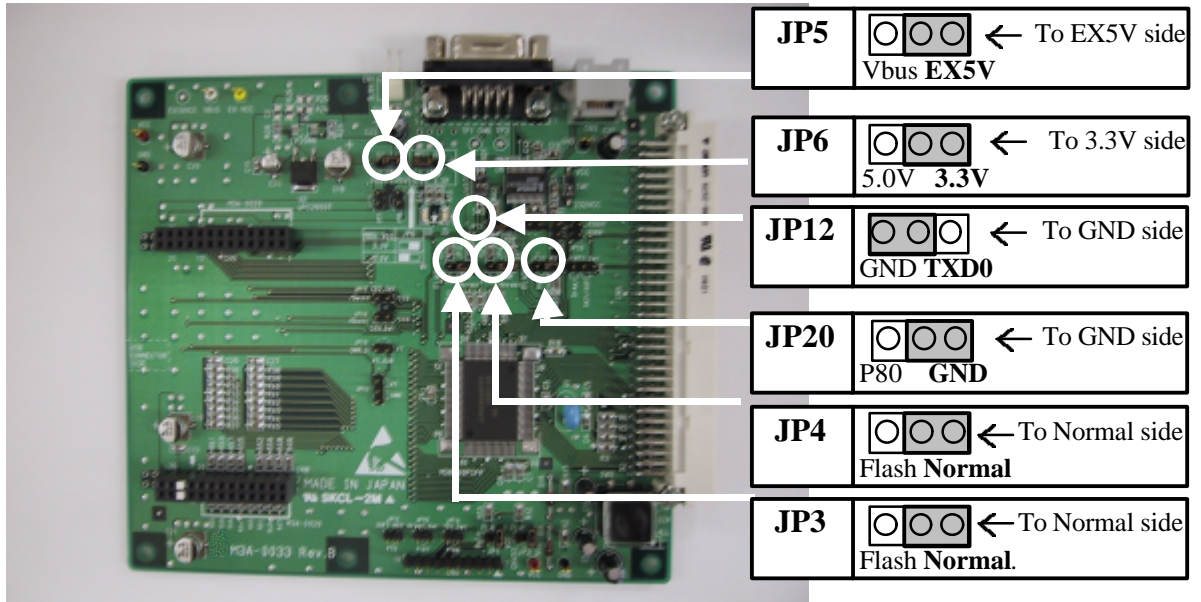
Figure. 4-1 M3A-0033 Jumper Setup

4.2 M3A-0032 Setup

Please set jumpes as shown in Figure. 4-2. Jumpers are already set at the time of product shipment.
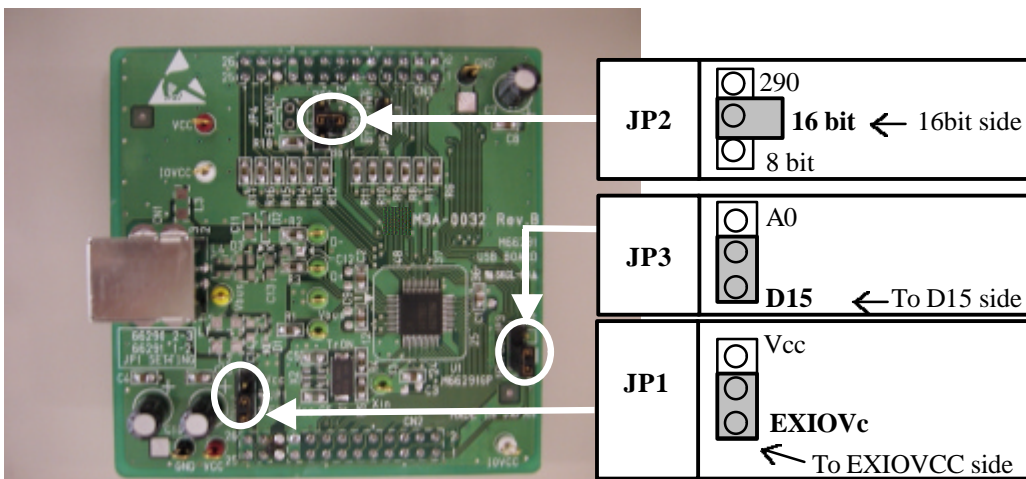
Figure. 4-2 M3A-0032 Jumper Setup

4.3 External Connection Details

Please connect cables according to figure 3-1.

1. The M3A-0032 USB ASSP daughter board
     Plug the M3A-0032 on to the M3A-0033.
   Note: Make sure CN2 is connected to CN8 and CN3 is connected to CN9.
2. External power supply
   Connect a 5.0V external regulated power supply to plug (CN1) of M3A-0033.
   Note: Be sure to observe the correct polarity and voltage. The M3A-0033 board has no reverse polarity protection.
3. Code development PC
   Connect the PC to CN3 of M3A-0033 using the serial cable provided.
4. USB Host PC (only required for evaluating the M66291GP)
   Connect the PC to the USB connector on M3A-0032 using a type A-B USB cable.

< Case: Connect M3A-0029B >

- Please setup M3A-0033 as section "4.1".
- Setup of M3A-0029B is unnecessary.
- Please connect the M3A-0029B instead of the M3A-0032 according to section 4.3.

Chapter 5. Software setup

5.1 Operation Environment
Each software attached to this product operates on PC for development shown in Table 5-1.

Table 5-1 PC Operation Environment for Development

PC	IBM PC/AT and its compatible machine
OS	Windows98,Windows98SE
CPU	Pentium166MHz or better (recommendation)
Memory	64Mbytes or more (recommendation)

Note1: KNC308WA operates on DOS prompt of Windows.
Note2: In KNC308WA and KD308, Special characters (space, etc.) cannot be included in a file name.
A network drive name neither is used, please assign the network drive name to a internal drive name when you use.

5.2 Installing KD308
5.2.1 Installation Procedure
Follow the procedure described below to install KD308.
(1) Run ' setup.exe ' in ENGLISH\KD308\SETUP on CD-ROM.
(2) Display the install's window , and install under the window.

5.2.2 Starting Up KD308
Before you can start up KD308, you must first set up hardware. For this setup, refer to Chapter 4.
To start up KD308, click [start] - [program] - [MITSUBISHI-TOOL] - [KD308] for Windows 98.
When you call up KD308, an Init dialog box (Figure 5.1) appears. Use this dialog box to set the operating environment required for start-up of KD308.
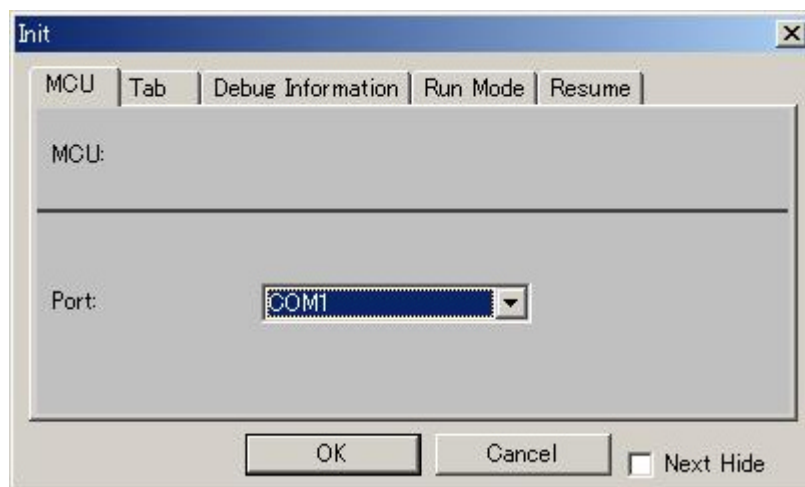
Figure 5-1 Init Window

The Init dialog box is detailed in KD308's manual. Here, set the following item to ensure that KD308 starts up normally.
When you have finished setting the above, click on the <OK> button in the Init dialog box. If communication is performed normally, KD308 starts up automatically and a window like the one shown in Figure 5-2 appears.
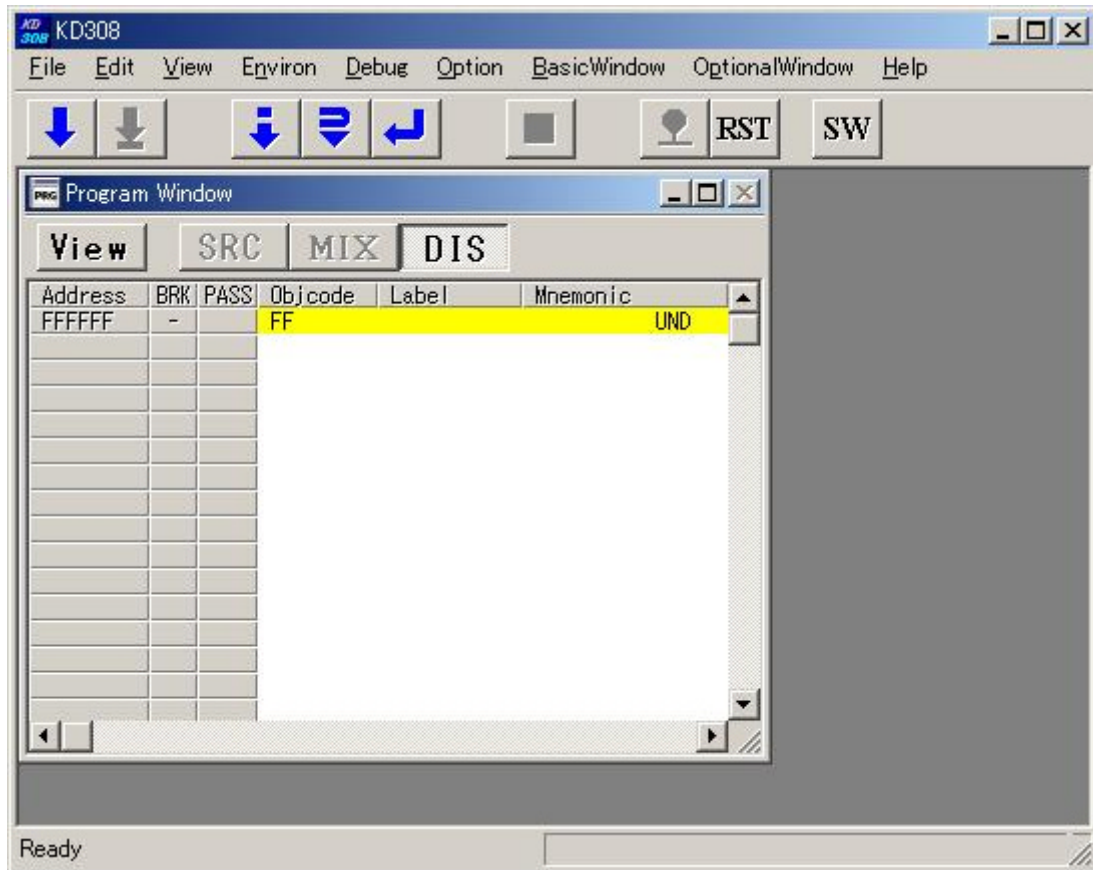
Figure 5-2 KDB308 Window

If M3A-0033 fails to communicate with the personal computer, an error dialog box like the one shown in Figure 5-3 appears.
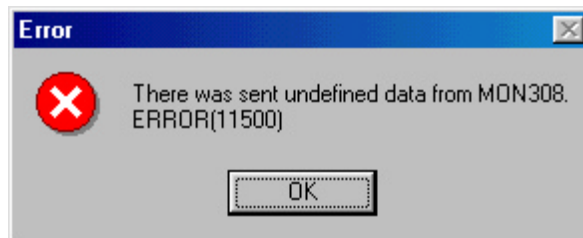
Figure 5-3 Example of Error Dialog Box at Start-up

When you click on the <OK> button in this error dialog box, the Init dialog box pops up again. If this error dialog box is displayed, refer to Section 9.8. KD308's detail operation read KD308's manual.

5.2.3 Quitting KD308

To quit KD308, select the menus [File] -> [Exit]. When you select the Exit menu, the Exit window shown in Figure 5-4 appears, so click on the <OK> button. If you click on the <Cancel> button, kD308 is not terminated.
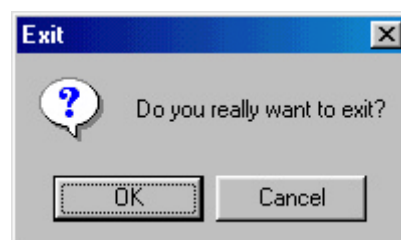
Figure 5-4 Exit Window

5.3 Installing KNC308WA

5.3.1 Installation Procedure

(1) Run ' setup.exe ' in ENGLISH\KNC308WA\SETUP on CD-ROM.
(2) Display the install's window , and install under the window.
(3) When install , display message of change 'Autoexec.bat' file.When not change 'Autoexec.bat' file,
   change 'Autoexec.bat' file yourself under part.
   Add the following lines to AUTOEXE.BAT:
     SET BIN308=(Install directory)\BIN
     SET LIB308=(Install directory)\LIB308
     SET INC308=(Install directory)\INC308
     SET TMP308=(Install directory)\TMP
     PATH=%PATH%;%BIN308%
(4) computer restart after install.

< Caution >

KNC308WA uses the same environment variables as used by NC308WA. Note that if you are using NC308WA in combination with NC308WA, the same environment variables are referenced.

5.3.2 Checking Operation of KNC308WA

Input the following command to check that KNC308WA operates normally.
(1) Command input
  >KNC308 -v
(2) Result
  All program versions are displayed as shown below:

  M16C/80 KNC308 COMPILER V.1.00
  Copyright 1998 MITSUBISHI ELECTRIC CORPORATION
  and MITSUBISHI ELECTRIC SEMICONDUCTOR SYSTEMS CORPORATION
  All Rights Reserved.

<If KNC308WA does not start up...>
(a) Check to see if the command path PATH is set correctly.
(b) If " a Windows NT character-mode" appears when executing a command, check the settings of the DOS window given below.

  1)Choose the property of the DOS window.
  2)Choose the button for "Advanced Program Settings" of program tag.
  3)Remove the check in the check box of:
       Prevent MS-DOS -based programs from detecting Windows.
  4)Close the DOS window, then execute the command again.

<If version numbers are not displayed...>
Check to see if each command (listed in Section 5.3.1) is expanded correctly in the directory you have specified for BIN308.

5.4 Installing FlashStart

5.4.1 Installation Procedure

(1) Create a directory on the personal computer's hard disk where you want the software to be installed.
(2) Copy all the contents of the directory ENGLISH\FLASHSTA held in the CD-ROM to the directory created in step 1.

5.4.2 Starting Up FlashStart

It clicks on"Flashsta.exe" in the copied file double for the start. When FlashStart starts, the window of the figure 5-5 opens. "Select Program" is to choose "Internal flash memory". Setup RS232C to use more than Pull Down List.
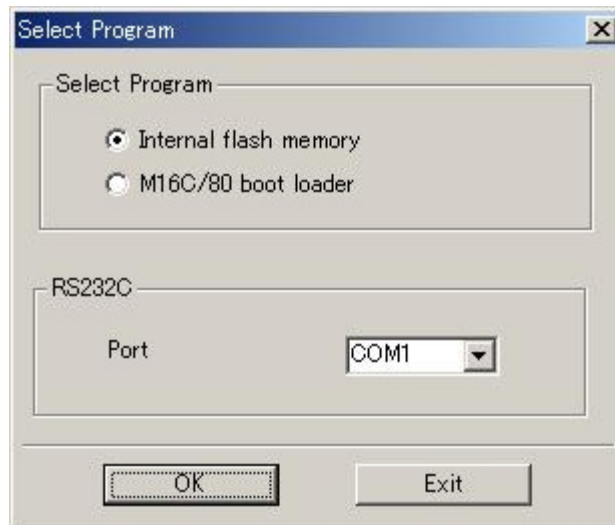
Figure 5-5 Set Baudrate Window

When click <OK> button, a windows appears.(Figure 5-6)
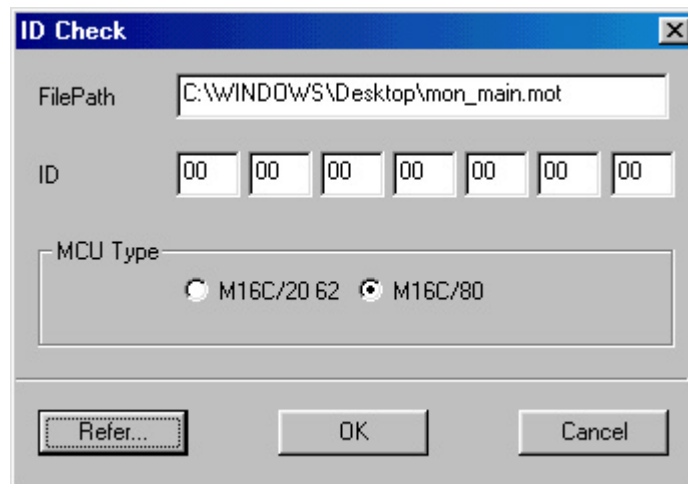
Figure 5-6 ID Check Window

Detail operation of ID check Window and FlashStart check Flash Start's manual.
When Figure 5-7 appears , please check to connection between Serial interface cable and M3A-0033.

Figure 5-7 Connection Error Window

5.4.3. Quitting FlashStart
When Flash Start quit. click <Exit> on Figure 5-8.

Figure 5-8 Main Window

5.5 Uninstalling KD308

To uninstall KD308. appears [start] - [settting] - [control panel] and click <add and move>. Select a <KD308 Ver1.00> in any list , click <add and move>. Appears uninstalling window, uninstall KD308.

5.6. Uninstalling KNC308WA

To uninstall KNC30WA. appears [start] - [settting] - [control panel] and click <add and move>. Select a <KNC308WA> in any list, click <add and move>. Appears uninstalling window, uninstall KNC308WA.

5.7. Uninstalling FlashStart

To uninstall FlashStart. delete a FlashStart's directory.

5.8. Referencing Electronic Manuals

Electronic Manuals of the Product are in the form of files in PDF (portable document format).
To reference them, the user needs Adobe Acrobat Reader, which is held in the CD-ROM attached, so install it when necessary.

  (1) Start up the installer on the CD-ROM holding the product.
  (2) Install Adobe Acrobat Reader according to what are contained in the Readme file.

The user can download Adobe Acrobat Reader from the home page of Adobe Systems Incorporated. For latest information as to Adobe Acrobat Reader, go to the following URLs.
  http://www.adobe.com

Chapter 6. Modification of the Setting of the M3A-0033

6.1 Changing Power Supply Setting

The power supply to M3A-0033 and M3A-0032, "External power supply (CN1)" or " Vbus power supply on USB line" are selectable. Please set up the jumper as Table 6-1.

Table 6-1 Jumper Setting for Supplying Origin of External Power Supply

Supply origin of external power supply	JP setting
Regulated DC power supply (CN1)	Set JP5 to "EX5V" side (Note).
Vbus power supply on USB line	Set JP5 to "Vbus" side.

Note: Please be sure to observe the correct polarity, since this board has no reserve polarity protection.

And, the supply voltage to VCC of M16C/80 and IOVCC of M66291GP, "5.0V" or "3.3V" is selectable. Please set up the jumper as shown in Table 6-2.

Table 6-2 Jumper Setting for Supplying Voltage to IOVCC of M16C/80, M66291GP

Supply voltage to IOVCC of M66291GP and VCC of M16C/80	JP setting
Supply 5. 0V	Set JP6 to "5.0V" side (Note).
Supply 3.3V	Set JP6 to "3.3V" side.

- 3.3V is supplied to CoreVCC of M66291GP for any above-mentioned setup.
- User should set JP1 of M3A-0032 to "EXIOVCC" side.
Note: Vbus power is then supplied when Vbus is selected as the origin of external power supply.

Table 6-3 shows the supply voltage by the combination of JP5 and JP6 setup.

Table 6-3 Supply voltage by combination of JP5 and JP6

JP setup		External power supply origin	Supply voltage		
JP5	JP6		M16C/80(M3A-0033)	M66291GP (M3A-0032)	
			VCC	IOVCC	CoreVCC
EX5V	5.0V	External power supply	5.0V	5.0V	3.3V
	3.3V		3.3V	3.3V	3.3V
Vbus	5.0V	Vbus	Vbus	Vbus	3.3V
	3.3V		3.3V	3.3V	3.3V

< Notes in case M3A-0029B is connected >

In case M3A-0029B is connected, please be sure to set JP5 to "EX5V" side, JP6 to "3.3V" side.
If it sets up other than the above, M3A-0029B does not operate. Moreover, the worst case, M66290AGP may be destroyed.

6.2 Setting for DMA Transfer Using *DREQ

Setting as shown in Table 6-6, *DREQ0 pin and *DREQ1 pin of M66291GP are assigned to *INT1 pin and *INT2 pin of M16C/80 respectively, and DMA transfer can be performed by handshake.

Table 6-4 Jumper Setting of *DREQ0 DMA Transfer

JP	Setting	Explanation
JP18	Short-circuit	*DREQ0 pin of M66291GP is connected to *INT1 pin of M16C/80.
JP9	Set "Dreq1" side	*DREQ1 pin of M66291GP is connected to *INT2 pin of M16C/80.

<Notes in case M3A-0029B is connected>

- Since the M66290 needs *Dack for DMA transfer, please short-circuit JP17 (When JP17 is short-circuited, *Dack pin of M66290A and *CS2 pin of M16C/80 will be connected and JP9 will be invalid).

6.3 Jumper Setting for Enabling UART0 (CN6) Communication

When enabling communication of UART0, please set up as shown in Table 6-5.

Table 6-5 Jumper Setting for UART0 Communication

JP	Setting	Explanation
JP12	Set "TXD0" side	TxD pin of CN6 is connected to TXD0 pin of M16C(via MAX3241E)
JP13	Short-circuit	RxD pin of CN6 is connected to RXD0 pin of M16C (via MAX3241E)

UART0 communication using CTS, RTS (RS232C standard) is also possible, please set it as Table 6-6.

Table 6-6 Jumper Setting of UART0 CTS and RTS

JP	Setting	Explanation
JP20	Set "P80" side	RTS pin of CN6 is connected to P80 pin of M16C/80 (via MAX3241E) (Note)
JP21	Short-circuit	CTS pin of CN6 is connected to CTS0 pin of M16C/80 (via MAX3241E)

Note: Software control is required for RTS handshake.

Chapter 7. Modification of the Monitor Program

7.1 Setting for Modification

When changing the oscillator of M3A-0033 into 20MHz, it is necessary to change the monitor program of internal flash memory of M16C/80. The change method of monitor program is shown below.

(1) Change and create monitor program.
Please refer section "7.2" about change method. In addition, the execution file (20MHz correspondence version monitor program) is prepared in \ENGLISH\PROGRAM\MONITOR\MOT (20MHz) folder attached CD-ROM, please use it.
(2) Change the jumper setup of M3A-0033 as Table 7-1.
(3) Attach a 20MHz oscillator on M3A-0033.
(4) Supply the power to M3A-0033.
(5) Start FlashStart.
(6) Program the changed monitor program using FlashStart (Note). Please set ID code to "00H" altogether.
Note: Please refer to the attached manual about the operation of FlashStart.
(7) Turn off the power supply of M3A-0033.
(8) Return the jumper setup changed by (2) to the original setup.

Table 7-1 Jumper Setup When Flash-Memory Programming

JP	Setting	Explanation
JP1	Short-circuit	Bus (Byte pin) is set
JP2	Short-circuit	CPU operation mode is set
JP3	Set "Flash" side	Flash programming is set
JP4	Set "Flash" side	Flash programming by using UART is set
JP5	Set "EX5V" side	The power is supplied from the regulated DC power supply.

7.2 How to Modify the Monitor Program

When CPU clock of M16C/80 is changed into 20MHz from 10MHz, user should change the communication baud rate of monitor program, and set the wait, the division ratio for programming to flash memory.
The source files of monitor program are in \ENGLISH\PROGRAM\MONITOR\SOURCE(10MHz) folder of attached CD-ROM, copy it to a suitable folder and correct the file.
The files to be corrected are shown in Table 7-2, and the following shows the change method. Executing ALLCOMP.BAT in the same folder after source file correction, the execution file of monitor program (mon_main.mot) is created.

Table 7-2 Correction File List

File to change	Explanation
Mon_cnt.a30	Initialize the monitor. In addition, the main routine
F_ram8_1.a30	Download to flash memory

<How to Change >
FILE :mon_cnt.a30
Line   Program
191; MOV.B #32, U1BRG ; Transmitting Speed   38400 BPS (20M) ◄─── Here, it is setting up the baud rate. Please set the baud rate needed as Table 7-3.
192; MOV.B #26, U1BRG ; Transmitting speed   38400 BPS (16M)
193; MOV.B #19, U1BRG ; Transmitting speed   38400 BPS (12M)
194; MOV.B #15, U1BRG ; Transmitting speed   38400 BPS (10M) ◄───
195; MOV.B #12, U1BRG ; Transmitting speed   38400 BPS (8M)
196; MOV.B #9, U1BRG ; Transmitting speed   38400 BPS (6M)
197; MOV.B #6, U1BRG ; Transmitting speed   38400 BPS (4M)

Table 7-3 Oscillator and Baud Rate Generator Contrast

Oscillator	10MHz	20MHz
Baud rate generator setup	15	32

FILE : F_ram8_1.a30
Line program
47 BSET PRC0 ; Protect Register
48;MOV.B #00010010B, MCD ; divide-by-1 mode main clock division register
49;MOV.B #00000010B, MCD ; divide-by-2 mode ◄
50;MOV.B #00000011B, MCD ; divide-by-3 mode
51 MOV.B #00000100B, MCD ; divide-by-4 mode ◄
52;MOV.B #00000110B, MCD ; divide-by-6 mode
53 BCLR PRC0 ; Protect register
54 BSET PRC1 ; Protect register

> Please set the division mode as Table 7-4.

Table 7-4 Division Ratio andOscillation Frequency

Oscillator	When 10MHz	When 20MHz
Division mode	Divide-by-2	Divide-by-4

FILE : f_ram8_1.a30
Line program
139; MOV.B #00010010B, MCD; divide-by-1 mode main clock division register
140; MOV.B #00000010B, MCD; divide-by-2 mode ◄
141; MOV.B #00000011B, MCD; divide-by-3 mode
142 MOV.B #00000100B, MCD; divide-by-4 mode ◄
143; MOV.B #00000110B, MCD; divide-by-6 mode

> Please set the division mode as Table 7-4.

Chapter8. M3A-0033 Specification

8.1 Block Diagram

The block diagram of M3A-0033 is shown in Figure 8-1.
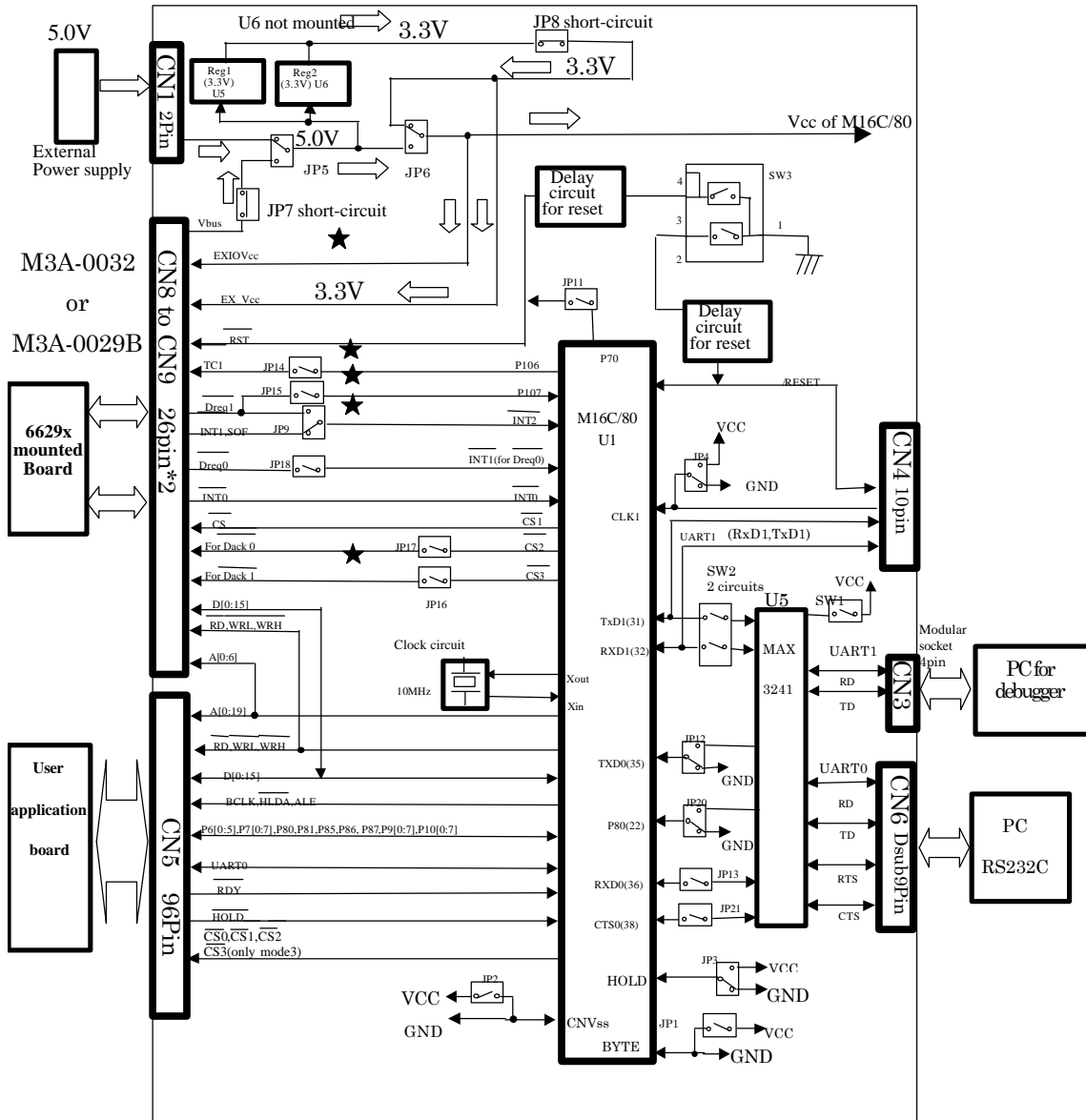
Note: When M3A-0029B is connected, the signal lines marked ★ are invalid.

Figure 8-1 M3A-0033 System Block Diagram

8.2 M16C/80 Part

M16C/80 is mounted on this board.
The specification of M16C/80 is as follows.
- Model name: M30800FCFP
- Built-in Memory: 128KB / 10KB
- Operation Frequency: 10MHz, external 2 wait
- Operation Voltage: 3.3V or 5.0V
- Bus: 16 bits separate bus

8.3 Monitor Program Specification And Memory Map Every M16C/80 CPU Mode

(1) Restrictions of Interrupts

The monitor program uses interrupts shown in Table8-1. For this reason, user program is not able to use those interrupts when you use debugger (KD308).
Note: When you run the M16C/80 independently, the user program can use them.

Table 8-1 Interrupts Used in Monitor Program

Used interrupts	Contents
UART1 interruption	Used when debugger communication
Single step	Used when step execution of user program
Address-match	Used when software break execution

(2) Interface with User Program

Controlling the stack information executed by REIT command, it starts user program from monitor program.

SP-4	PC(L)	
SP-3	PC(M)	
SP-2	FLG(L)	
SP-1	FLG(H)	PC(H)

(3) Memory Map

In M3A-0033, M16C/80 can operate in the mode 1 of memory expansion mode. The bus width is 16 bits (separate bus). The memory map is shown below.
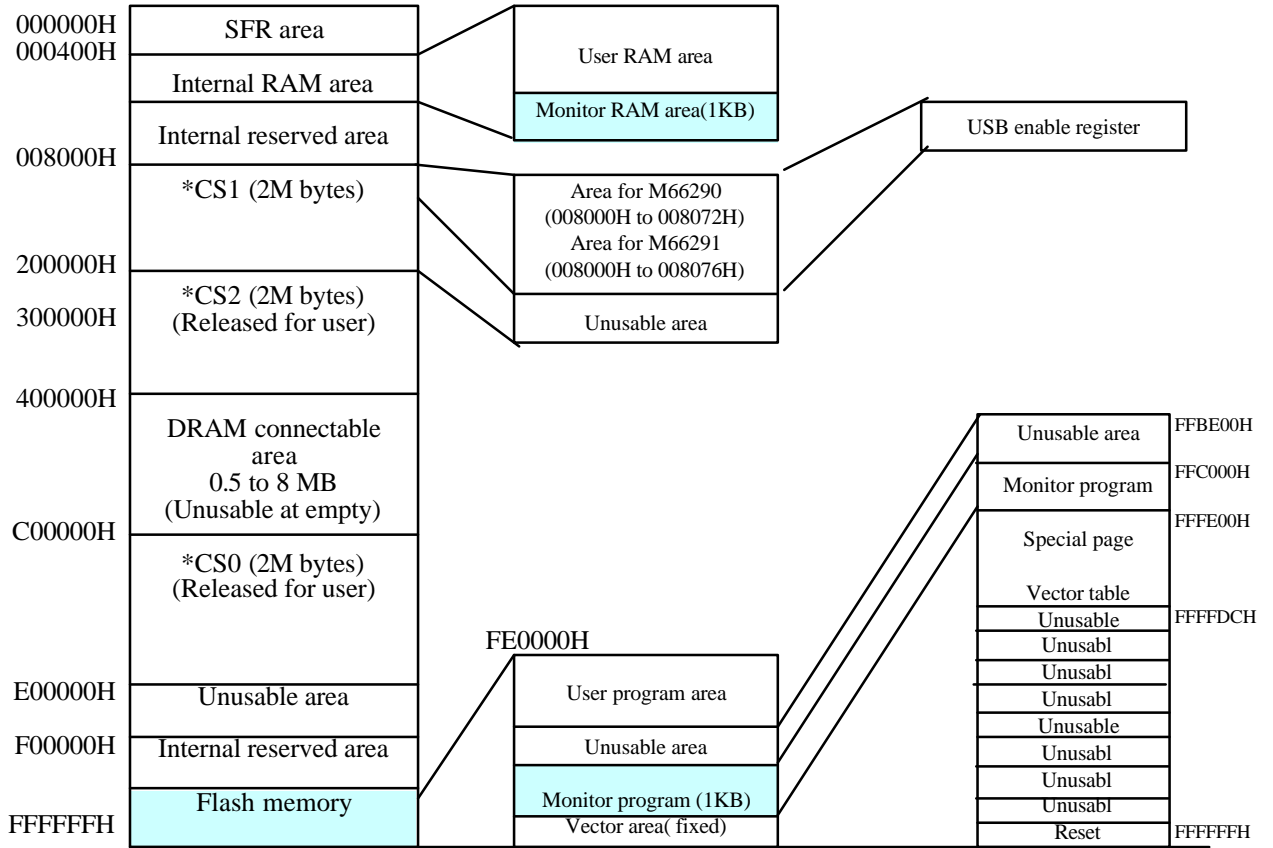
Figure 8-2 Memory Map 1

8.4 KD308 Communication Specification

Specifications of the monitor program of M3A-0033 and the serial communication to KD308, and connector pin assignment, the cable wiring are shown in Table 8-2.

Table 8-2 Serial Communication Specification, Connector Pin and Cable Wiring

Communication Method	RS232C	
Terminal	Baud rate:	38400bps
	Data length:	8 bits
	Start bit:	1 bit
	Stop bit:	1 bit
	Parity:	Nothing
Connector form	4 pin modular jack	
Communication cable	4 pin modular jack---9 pin Dsub connector	

8.5 Expansion Bus Interface

The following signals are assigned to the expansion bus interface for user application board.

-Address signal (A0-A19).. 20
-Data signal (D0-D15) 16
-Chipselect signal (*CS0 to *CS3)... 4
-Read/write signal (*RD, *WRL, *WRH)....................................3
-Bus control signal (RDY, HOLD, HLDA, BCLK, ALE)............5
-UART1 (P6_6, P6_7) 2
-General-purpose ports
(P6_0-P6_5, P7_0-P7_7, P8_0, P8_1, P8_5, P8_6)
-P8_7, P9_0-P9_7, P10_0-P10_7 35
-Reset signal (*RESET) 1
-External interrupt request signal (*INT0 to *INT2)....................3
-Vcc*2/GND*2/AVCC/AVSS/Vref 7

....
The numbers of expansion connector pins are 96 pins.

The assignment of expansion connector pins is shown in Table 8-3.

Table 8-3 CN5 Pin Assignment

CN5 Pin NO	M16C/80 Pin NO	Pin name	CN5 Pin NO	M16C/80 Pin NO	Pin name
1A	100	P97/ADTRG	17B	51	A19
2A	97	P100/AN0	18B	49	*CS2
3A	94	P102/AN2	19B	45	*WRH
4A	91	P105/AN5	20B	42	P54/HLDA
5A	88	D0	21B	39	P57/RDY
6A	85	D3	22B	36	P62
7A	82	D6	23B	33	P65
8A	79	D9	24B	30	P70
9A	76	D12	25B	27	P73
10A	73	D15	26B	24	P76
11A	70	A2	27B	21	P81
12A	67	A5	28B	18	*INT2
13A	63	A8	29B	11	P86
14A	59	A11	30B	6	P91
15A	56	A14	31B	3	P94
16A	53	A17	32B	-	(GND)
17A	47	*CS0	1C	-	(VCC)
18A	50	*CS3	2C	99	AVCC
19A	44	*RD	3C	96	AVSS
20A	41	P55/HOLD	4C	93	P103
21A	38	P60	5C	90	P106
22A	35	P63	6C	87	D1
23A	32	P66	7C	84	D4
24A	29	P71	8C	81	D7
25A	26	P74	9C	78	D10
26A	23	P77	10C	75	D13
27A	20	*INT0	11C	72	A0
28A	17	*NMI/P85	12C	69	A3
29A	10	P87	13C	66	A6
30A	5	P92	14C	61	A9
31A	2	P95	15C	58	A12
32A	1	P96	16C	55	A15
1B	-	(VCC)	17C	52	A18
2B	98	VREF	18C	48	*CS1
3B	95	P101	19C	46	*WRL
4B	92	P104	20C	43	P53/BLCK
5B	89	P107	21C	40	P56
6B	86	D2	22C	37	P61
7B	83	D5	23C	34	P64
8B	80	D8	24C	31	P67/TXD1
9B	77	D11	25C	28	P72
10B	74	D14	26C	25	P75
11B	71	A1	27C	22	P80
12B	68	A4	28C	19	*INT1
13B	65	A7	29C	12	*RESET
14B	60	A10	30C	7	P90
15B	57	A13	31C	4	P93
16B	54	A16	32C	-	(GND)

8.6 Expansion Interface for M3A-0032/M3A-0029B

Using the expansion interface (CN8,CN9), M3A-0032 and M3A-0029B can be connected. Connection details are shown in Table 8-4 and Table 8-5.

Table 8-4 Pin Assignment of CN8

CN8 Pin NO	M16C/80		M3A-0032 (connect to CN2) M66291GP		M3A-0029B(connect to CN2) M66290AGP	
	Pin NO	Pin name	Pin NO	Pin name	Pin NO	Pin name
1	-	(GND)	-	(GND)	-	(GND)
2	73	D15	40 (JP3=D15)	D15/A0	40	D15
3	74	D14	39	D14/P6	39	D14
4	75	D13	38	D13/P5	38	D13
5	76	D12	37	D12/P4	37	D12
6	77	D11	34	D11/P3	34	D11
7	78	D10	33	D10/P2	33	D10
8	79	D9	32	D9/P1	32	D9
9	80	D8	31	D8/P0	31	D8
10	-	(GND)	-	(GND)	-	(GND)
11	81	D7	30	D7	30	D7
12	82	D6	29	D6	29	D6
13	83	D5	28	D5	28	D5
14	84	D4	27	D4	27	D4
15	85	D3	26	D3	26	D3
16	86	D2	25	D2	25	D2
17	87	D1	24	D1	24	D1
18	88	D0	23	D0	23	D0
19	-	(GND)	-	(GND)	-	(GND)
20	-	(GND)	-	(GND)	-	(GND)
21	-	(NC)	-	(NC)	-	(NC)
22	-	(NC)	-	(NC)	-	(NC)
23	45	*WRH	41 (JP2=16bit)	*HWR/ *BYTE	-	(NC)
24	-	(VBUS)	5	VBUS	-	(NC)
25	-	(EXIOVCC)	-	(EXIOVCC)	-	(NC)
26	-	(EXIOVCC)	-	(EXIOVCC)	-	(NC)

Table 8-5 Pin Assignment of CN9

CN9 Pin NO	M16C/80		M3A-0032 (connect to CN3) M66291GP		M3A-0029B (connect to CN3) M66290AGP	
	Pin NO	Pin name	Pin NO	Pin name	Pin NO	Pin name
1	46	*WRL	44	*LWR	44	*WR
2	-	(GND)	-	(GND)	-	(GND)
3	44	*RD	43	*RD	43	*RD
4		(GND)	-	(GND)	-	(GND)
5	48	*CS1	45	*CS	45	*CS
6	-	(*RST)	46	*RST	8/46	*TRST /*RST
7	19	*INT1 (JP18 short-circuit)	47	*Dreq0	47	*Dreq
8	49	*CS2 (JP17 short-circuit)	48	*Dack0	48	*Dack
9	20	*INT0	42	*INT0	42	*INT
10	-	(GND)	-	(GND)	-	(GND)
11	-	(GND)	-	(GND)	-	(GND)
12	71	A1	17	A1	17	A1
13	70	A2	18	A2	18	A2
14	69	A3	19	A3	19	A3
15	68	A4	20	A4	20	A4
16	67	A5	21	A5	21	A5
17	66	A6	22	A6	22	A6
18	-	(GND)	-	(GND)	-	(GND)
19	-	(EX_VCC)	-	(EX_VCC)	-	(VCC)
20	-	(EX_VCC)	-	(EX_VCC)	-	(VCC)
21	-	(NC)	-	(NC)	(NC)	(NC)
22	72	A0	40 (JP3=A 0)	D15/A0	(NC)	(NC)
23	90	P106	10	*TC1	(NC)	(NC)
24	18	(*INT2) (JP9=*INT1_SOF)	11	*INT1/SOF	(NC)	(NC)
25	50	*CS3 (JP16 short-circuit)	8	*Dack1	(NC)	(NC)
26	18	(*INT2) (JP9=*DREQ1)	9	*Dreq1	(NC)	(NC)

Chapter 9. Usage Precautions

9.1 Restrictions on Register Operation

Table 9-1 lists the restrictions on register operation. If you modify the content of a register which is inhibited against modification, the operation of the monitor program cannot be guaranteed.

Table 9-1 Register Related Restrictions

Register name	Initial value	Restriction	Change in user program
Processor mode register 0	Initialized to 00H. Single chip mode	Please set to mode1 of memory expansion mode.	Changeable
Processor mode register 1	Initialized to 00H. Internal reserved area extension		Changeable
System clock control register 0	Initialized to 08H.		Changeable
System clock control register 1	Initialized to 20H.		Changeable
Main clock division register	Initialized to 12H. Selected main clock divide ratio: No divide		Changeable
ISP interrupt stack pointer	Initialized to 002300H.	Set a value bellow 002A00H. Value 002A00H through 002BFFH are used by the monitor program.	(Note1)
Protect register	-	If the monitor program starts immediately after Protect Register bit 2 (Port P9 Direction Register and SI/O3,4 Control Register write enable bit) is set to 1 (enabled), a write to some address by the monitor program occurs, so that the P9 Direction Register write enable bit is reset to 0 (disabled). Consequently, the P9 Direction Register cannot be written to in the following cases: 1) When a break to at the instruction that sets the write enable bit to 1 occurs 2) When Go, Step, Over, or Return to the instruction that sets the write enable bit to 1 is executed 3) When the P9 Direction Register is operated on from the dump window, etc.	Changeable
Flag register	-	Write to the D flag is ignored (Always D flag is 0, I flag is 1). Do not clear a flag in user program.	(Note)
UART1 transmit/receivce mode register	05H	Do not make changes.	Unchangeable
UART1 bit rate generator	1AH		
UART1 transmit/receive control register 0	10H		
UART1 transmit/receive control register 1	05H		
UART1 interrupt control register 0	07H		
UART transmit/receive control register 2	03H	Do not change bits 0, 2, 4, 5, and 6.	(Note)
UART1 transmit buffer register	-	Do not write any data to this register.	Unchangeable
UART1 receive buffer register	-	Do not read this register.	Unchangeable
Address match interrupt register	-	Do not modify this register.	Unchangeable

Note: Changeable (with restriction).

9.2 Restrictions on Interrupts

(1) Interrupt vector tables that reside in the fixed vector table

Interrupt vector tables that reside in the fixed vector table are not use the user program except reset. When used Interrupt vector tables that reside in the fixed vector table, will be change that they not run. The monitor program sets dummy function (REIT function) on Interrupt vector tables that reside in the fixed vector table.

Table 9-2 Interrupt Vector Table Addresses

Interrupt Cause	Specification for CPU	Specification for Monitor program
Undefined	FFFFDCH -FFFFDFH	Use inhibited (Note1)
Overflow	FFFFE0H -FFFFE3H	Use inhibited (Note1)
BRK instruction	FFFFE4H -FFFFE7H	Use inhibited
Address match	FFFFE8H -FFFFEBH	Use inhibited
Watchdog timer	FFFFF0H -FFFFF3H	Use inhibited
NMI	FFFFF8H -FFFFFBH	Use inhibited
Reset	FFFFFCH -FFFFFFH	FFFFFCH -FFFFFFH

Note1: Interrupt of Undefined , Overflow run at UND , INTO instruction.
UND , INTO instruction not use in the user program.

(2) Interrupts located in the variable vector table

The UART1 transmit/receive interrupts are used by the monitor program and cannot be used by a user program. All other interrupts can be used by a user program.

(a) When using INTB to set up the variable vector table, set 0FFCB00H at the addresses (software interrupt numbers 19, 20) that correspond to the UART1 transmit/receive interrupts.
(b) Do not disable interrupts (by clearing the I flag). (Note2)
(c) When using interrupts in your program, do not set the Interrupt Priority Level (IPL) to 7.
(d) "Step interrupt" may not be done in the case of multiplex interrupts, in this case, please set the beginning of each interrupt to "interrupt enabled".

Note2: When change a interrupt control register, need to be disable interrupt.
When be disable interrupt (I flag = 0), can't be STEP command function while disable interrupt. (see to section 9.6)

9.3 Restrictions on Break Point

- Maximum 4 break points are settable.
- Do not set a breakpoint in an instruction immediately after the LDC instruction. No break occurs even when you set a breakpoint in an instruction immediately after the LDC instruction.
- Program execution cannot be stopped by a break in the INT instruction. Once a break occurs, the GO command cannot be used thereafter.

<Example>

```
  NOP
  NOP
  NOP
  INT#3 <- Break     GO from interruption source cannot be used
  NOP
  NOP
```

9.4 Restrictions on Stop Mode or Wait Mode

The monitor program cannot be run in STOP modes and WAIT modes. Can't be changed STOP modes or WAIT modes in user program.

9.5 User Programs Real-time Capability

KD308 has two user program execution modes: Sampling Mode and Free-run Mode. In Sampling Mode, the monitor program periodically monitors the user programs execution status to detect stoppage of the user program caused by a break, etc. For this reason, the monitor program requests an interrupt during user program execution. Consequently, the user programs real-time capability is lost. In Free-run Mode, the user program execution is not monitored, so its real-time capacity is guaranteed.

(1) Sampling Mode

In this mode, the user programs execution status is periodically monitored when executing Go or Come. Therefore, this mode allows you to detect stoppage of the user program caused by a break, etc. Choose this mode when you perform regular debug.

(2) Free-run Mode

In this mode, the user programs execution status is not monitored when executing Go or Come. Although for this reason the user programs real-time capability is guaranteed, you cannot detect stoppage of the user program caused by a break, etc. Therefore, even when the user program has stopped, KD308 does not stop the operation executed by Go or Come. If you want to stop KD308, press the STOP button. Choose this mode when you want to run your program in real time.

9.6 Exceptional Step Execution

If the following two instructions are STEP, they operate differently than they are executed normally.

(1) REIT instruction , JMPS instruction , JSRS instruction

When above instruction is STEP, the program stops after executing one instruction after returning from the interrupt.

<Example>

```
Main                              Interruption
   ┐                    ┌
   └────────────────────┘
                              NOP
                              NOP
                              REIT   ⟵   Here execute STEP.
   ┐                    ┌
   └────────────────────┘
NOP
NOP  ⟵ PC after STEP execution
   │
```
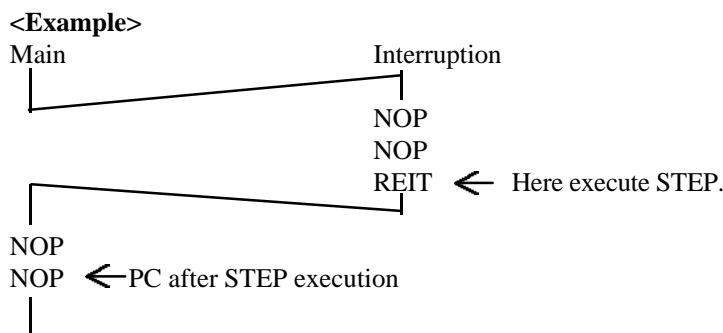
(2) INT Instruction

From the INT instruction, you cannot successively step through the internal processing of the INT instruction.

<Example>

```
NOP
NOP
INT  #3 ⟵ STEP              Skipped over when STEP is executed.
NOP    ↓
JMP  MAIN
```
INT_3:
```
NOP     ⟵ Address at which program execution ought to stop
NOP
REIT
```
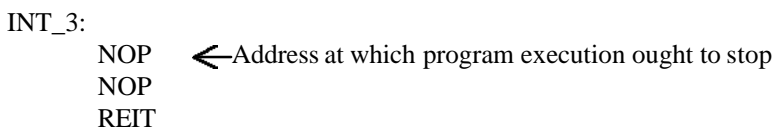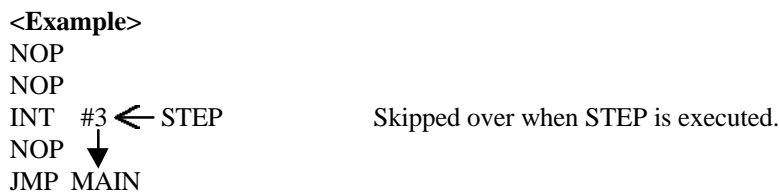
When using the INT instruction to debug your program, follow the procedure shown below. Set a software break for the internal processing of the INT instruction and use it in combination with the Go command.

<Example>
NOP
NOP
INT #3
NOP
JMP   MAIN   Execution by GO command
INT_3:
NOP <- break
NOP
REIT

(3) Operation of While Disable Interrupt
When to be disable interrupt , can't use STEP command while disable interrupt. 1 STEP command go at enable interrupt.

<Example>
FCLR I   ; Disable interrupt
AND   #00H, 0055H ; Change Timer Interrupt   1 STEP command go to enable interrupt
NOP
NOP
FSET I   ; Enable Interrupt

9.7 Performing Debug Using Symbols
To debug your program using symbols in KD308, add the debug option (-g) in KNC308WA before compile the programs.

9.8 Corrective Action when Communication Error Occurs at Start up
If a communication error occurs during start up, check the following:
(1)Whether the M3A-0033 hardware is correctly set up
(2) Whether cable is firmly connected and whether the power is turned on.
(3) Whether the serial port set in the Init dialog box matches the actual serial port where the M3A-0033 is connected.

9.9 Corrective Action when Communication Error Occurs During Debug
If a communication error occurs during debug, one probable cause is that the monitor program is made to go wild by the user program (ex, user programs runaway or access to monitor area). In such a case, follow the procedure below to initialize the system:
(1) Press the [OK] button in the error dialog box to close it.
(2) When an Exit dialog box appears, press the [Cancel] button to close it.
(3) Press KD308 reset button.
When the above is done, you can restart debugging. However, because the data in the user program area may have been damaged, recommends downloading your program again before you start debugging. If many communication error happen , check this.

<Your program have interrupt program. And don't set I flag in interrupt program>
When this interrupt program spend a time over 260us, please set I flag = 1 in the beginning of interrupt program.

9.10 Corrective Action when Error Occurs During Download

When a wrong occurs during download or reload (Ex. stop download), may be a problem that a part of program will be running. When run download or reload , will have to push a reset button on KD308 before running download or reload. After, will be download or reload.

9.11 Corrective Action when Error Occurs "A source file isn't found"

Confirm the following contents when the error of "A source file isn't found." occurs.
- Does it exist in the directory (or, folder) that an executive file is the same as the source file.
- Isn't a source file being opened with edit except for KD308?

9.12 Notes about Power Supply

Please supply power and set jumpers correctly, and be careful especially of the polarity of power supply.
M3A-0033 has no prevention function for power supply reverse putting. M3A-0033 becomes unusable if done.

- In the case of connecting M3A-0032, please set JP1 of M3A-0032 to "EXIOVCC" side.
- In the case of connecting M3A-0029B, please set JP6 of M3A-0033 to "3.3V" side.

Note: If the above-mentioned jumper setup is not done when using M3A-0032 and M3A-0029B,
    M3A-0033 and M3A-0032 and M3A-0029B may become impossible to use, please be careful of use.

9.13 Reset Signal

When JP11 is short-circuited, you can program the hardware-reset of the M66291 low pulsing $P7_0$ of the M16C/80.
Please refer the M66291 data sheet for the timing.
Note: When you program doesn't hardware-reset the M66291, please open JP11.
    If JP11 is short-circuited and $P7_0$ isn't cared, reset pin of the M66291 may be unstable.

9.14 DMA Transfer Using *DACK

In DMA transfer, using memory expansion mode 3, two Dacks of M66291GP can be assign to *CS2 pin and *CS3 pin of M16C/80. The memory map is shown in Figure9-1.
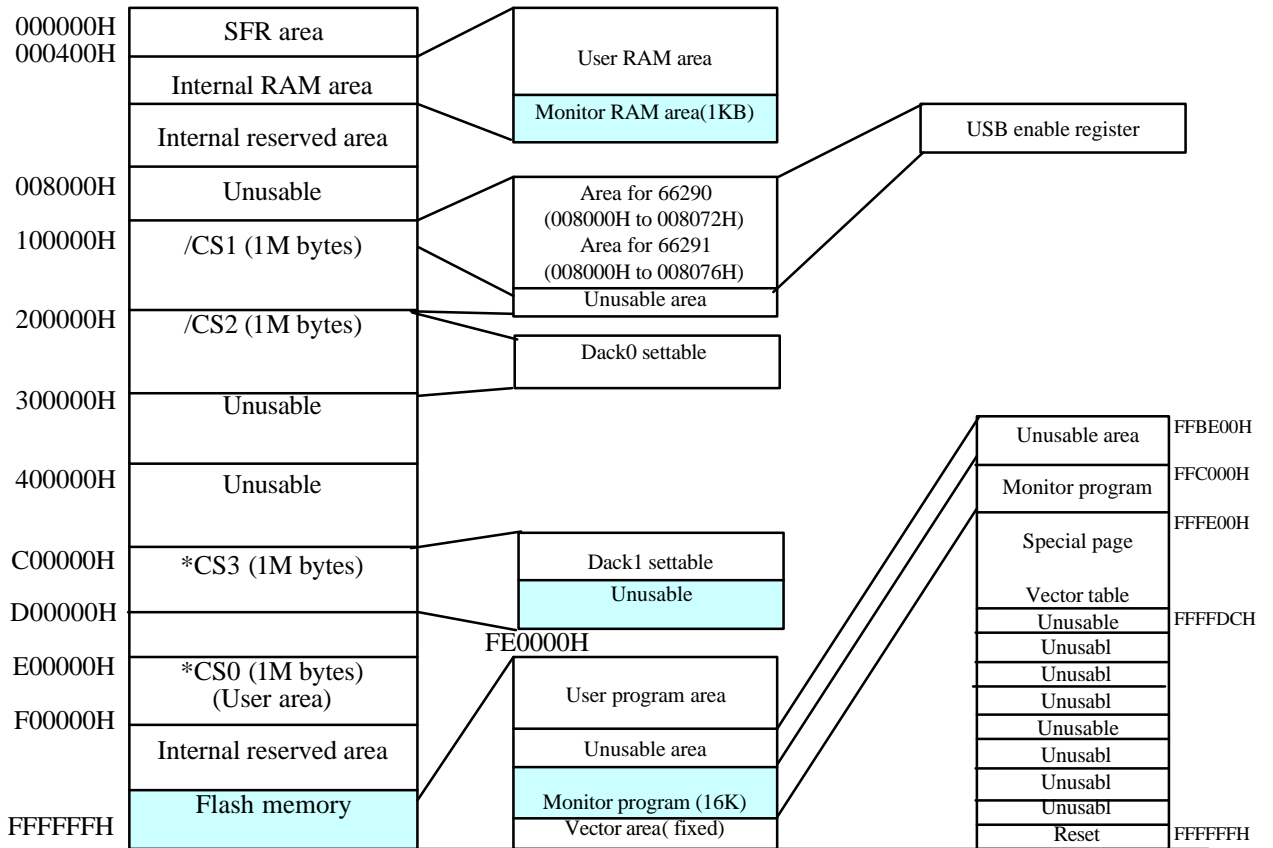
Figure 9-1 Memory Map 2

Please set up as shown in Table 9-4 after jumper setup described section "6.2".

Table 9-4 Jumper Setup of *DACK

JP	Setting	Explanation
JP17	Short-circuited.	*DACK0 pin of M66291GP is assigned to *CS2 pin of M 16C/80.
JP16 (Note)	Short-circuited.	*DACK1 pin of M66291GP is assigned to *CS3 pin of M 16C/80.

Note: JP16 does not function in the memory expansion mode 1. Please refer to the Figure 8-2 for details. Moreover, in case of connecting M3A-0029B, please refer section "6.2".

Bibliography

M66291GP data sheet

M16C/80 series software manual

M66291GP Evaluation Board M3A-0033

Instruction Manual   2003-07-01

Appendix1

Part List

NO.	Component Name		Component Specification		Notes
	Type	Symbol on Board	Product Number	Manufacture	
1	MCU(M16C/80)	U1	M30800FCFP	Renesas	
2	3-Terminal Regulator	U2	u PC2933T	NEC	
3	RS-232 Transceivers	U5	MAX3241ESSOP	MAXIM	
4	Ceramic Oscillator	X1	CSA10MTZ	Murata	10MHz
5	Push switch	SW3	SKHFAA	ALPS	
6	Connector(2pin)	CN1	BS2P-SHF-1AA	JST	
7	Connector(6pin)	CN3	3MJ64HOPLP-3	OKI	
8	Connector(32pin 3Rows)	CN5	XC5C-9622	OMRON	Note-1
9	Connector(9pin D-SUB)	CN6	17LE-23090-27(D3AB)	HIROSE	
10	Connector(13pin 2ROWS)	CN8,CN9	HKP-26FD2	Honda	
11	Diode	D10,D11	1SS94	Rohm	
12	Jumper SW(3pin)	JP3-JP6, JP12,JP20	WL-1	MAC8	Note-1
13	Jumper SW(2pin)	JP1,JP2,JP13,JP21	WL-1	MAC8	Note-1
14	SLIDE SWITCH	SW1	CHS-01	COPAL	
15	SLIDE SWITCH	SW2	CHS-02	COPAL	
16	Thick film rectangular	R1	MCR10EZHJ104	Rohm	100Kohm
17	Thick film rectangular	R2,R17	MCR10EZHJ153	Rohm	15Kohm
18	Thick film rectangular	R3-R11,R22, R30-R45,R62,R63	MCR10EZHJ223	Rohm	22Kohm
19	Thick film rectangular	R12,R13,R14,R27,R18	MCR10EZHJ103	Rohm	10Kohm
20	Thick film rectangular	R15,	MCR10EZHJ680	Rohm	68ohm
21	Thick film rectangular	R16	MCR10EZHJ221	Rohm	220ohm
22	Thick film rectangular	R23,R28	MCR10EZHJ000	Rohm	0ohm

Notes Note-1: Only printed pattern is available. No part is installed.		
	TYTLE	M66291GP(USB ASSP)Evaluation Board
	DRAWING NO.	PPL –M3A-0033A
(1/2)		

Appendix1

Part List

NO.	Component Name		Component Specification		Notes
	Type	Symbol on Board	Product Number	Manufacture	
23	Thick film rectangular	R46-R61	MCR10EZHJ101	Rohm	100ohm
24	Electrolytic Capacitor	C22,C23,C25	ECEA1CKA470	MEC	47 u /16V
25	Electrolytic Capacitor	C18,C19,C20,C21	UWF1C470MCR1GB	Nichicon	47 u /16V
26	Electrolytic Capacitor	C24	UWX1H100MCR1GB	Nichicon	10 u /50V
27	Electrolytic Capacitor	C16	ECEA1EKA100	MEC	10 u /25V
28	Electrolytic Capacitor	C17	ECEA1HKA010	MEC	1 u /50V
29	Ceramic Capacitor	C13,C14,C3,C4,C15,C1,C26,C27	GRM40F104Z50V	Murata	0.1 u/50V
30	Ceramic Capacitor	C5,C6	GRM40CH300J50V	Murata	30pF/50V
31	Ceramic Capacitor	C7,C8	GRM40CH471J50V	Murata	470pF/50V
32	Test Pin	TPVcc	LC-2-G(Red)	MAC8	
33	Test Pin	TPEX_Vcc	LC-2-G(Yellow)	MAC8	
34	Test Pin	TPVbus	LC-2-G(White)	MAC8	
35	Test Pin	TPGND	LC-2-G(Black)	MAC8	
36	Small, chip LEDs(Green)	D1	SML-210MT	Rohm	
37	Small, chip LEDs(Orange)	D2	SML-210DT	Rohm	
38	Push Switch Cap	For SW3	61AAA0091A	ALPS	
39	Push Switch Key top	For SW3	9AA9A0187A	ALPS	
40	Ceramic Capacitor	C9,C10,C11,C12	GRM40F334Z50V	Murata	0.33 u /50V

Notes		
	TYTLE	M66291GP(USB ASSP)Evaluation Board
	DRAWING NO.	PPL –M3A-0033A

(2/2)

Following devices are not mounted.
U6, C2, R24, R25, R26

Note:
1) The pins of JP7 are shorted.
   Please cut the shorted pattern, when you mount JP7.
2) The pins of JP8 are shorted.
   Please cut the shorted pattern, when you mount JP8.
3) JP10 1pin and JP10 2pin are shorted.
   Please cut the shorted pattern, when you use JP10.
4) When you mount U6, please unmount U2.
   Please use U2 with U6 alternately.

Voltage Supply

Appendix 2

M3A-0033RevB
(1/2)

CN5

VOLTAGE SUPPLY SELECT CIRCUIT

VCC (EXIOVcc)

C13 0.1u
C19 47UF
R16 220
GND
GND

D2
ORANGE LED

VCC

C25 47UF
C20 47UF
C21 47UF
C22 47UF
GND GND GND GND

EX_VCC

R15 68

D1
GREEN LED
GND

JP6
2 1
3
F2

SHORTED BY PATTERN

8pin DIP Type
LP2986
SHUT_DOWN
ERROR
SENCE
OUTPUT
GND
FEEDBACK
TAP
INPUT
CN3
U6
R2B
R23
F47
R24 R25
R26
C2

JP5
1
2
F15

SHORTED BY PATTERN

VBUS
JP7

μPC2933
U2
OUT IN
COM
FEB
GND

JP8
1 2
0.1u
C15
10UF
C24
GND

C1B
47UF
GND

CN1
1 EXT 5V
2 GND
F13
C14 0.1u
GND
C23 47UF
GND

GND

CN5C
U1 4PIN P93 32C
U1 7PIN P90 31C
U1 12PIN RESET 30C
U1 19PIN INT1 29C
U1 22PIN P80 28C
U1 25PIN P75 27C
U1 28PIN P72 26C
U1 31PIN P67 25C
U1 34PIN P64 24C
U1 37PIN P61 23C
U1 40PIN P56 22C
U1 43PIN P53 21C
U1 46PIN WRL 20C
U1 48PIN CS1 19C
U1 52PIN A18 18C
U1 55PIN A15 17C
U1 58PIN A12 16C
U1 61PIN A9   15C
U1 66PIN A6   14C
U1 69PIN A3   13C
U1 72PIN A0   12C
U1 75PIN D13 11C
U1 78PIN D10 10C
U1 81PIN D7   9C
U1 84PIN D4   8C
U1 87PIN D1   7C
U1 90PIN P106 6C
U1 93PIN P103 5C
U1 96PIN AVSS 4C
U1 99PIN AVCC 3C
VCC
F14

CN5b
U1 3PIN P94 32B
U1 6PIN P91 31B
U1 11PIN P86 30B
U1 18PIN INT2 29B
U1 21PIN P81 28B
U1 24PIN P76 27B
U1 27PIN P73 26B
U1 30PIN P70 25B
U1 33PIN P65 24B
U1 36PIN P62 23B
U1 39PIN P57 22B
U1 42PIN P54 21B
U1 45PIN WRH 20B
U1 49PIN CS2 19B
U1 51PIN A19 18B
U1 54PIN A16 17B
U1 57PIN A13 16B
U1 60PIN A10 15B
U1 65PIN A7   14B
U1 68PIN A4   13B
U1 71PIN A1   12B
U1 74PIN D14 11B
U1 77PIN D11 10B
U1 80PIN D8   9B
U1 83PIN D5   8B
U1 86PIN D2   7B
U1 89PIN P107 6B
U1 92PIN P104 5B
U1 95PIN P101 4B
U1 98PIN VREF 3B
VCC
F29

CN5A
U1 1PIN P86 32A
U1 2PIN P95 31A
U1 5PIN P92 30A
U1 10PIN P87 29A
U1 17PIN NMI 28A
U1 20PIN INT0 27A
U1 23PIN P77 26A
U1 26PIN P74 25A
U1 29PIN P71 24A
U1 32PIN P66 23A
U1 35PIN P63 22A
U1 38PIN P60 21A
U1 41PIN P55 20A
U1 44PIN RD   19A
U1 50PIN CS3 18A
U1 47PIN CS0 17A
U1 53PIN A17 16A
U1 56PIN A14 15A
U1 59PIN A11 14A
U1 63PIN A8   13A
U1 67PIN A5   12A
U1 70PIN A2   11A
U1 73PIN D15 10A
U1 76PIN D12 9A
U1 79PIN D9   8A
U1 82PIN D6   7A
U1 85PIN D3   6A
U1 88PIN D0   5A
U1 91PIN P105 4A
U1 94PIN P102 3A
U1 97PIN P100 2A
U1 100PIN P97 1A
F30

CN9
66291 PIN NAME
/WRL 1   WRL
GND   2
/RD   3   RD
GND   4
/CS   5   CS1
/RST 6   RST
/DREQ0 7 JP18 INT1
/DACK0 8 CS2
/INT0 9 JP17 INT0
GND   10
GND   11
A1   12 A1
A2   13 A2
A3   14 A3
A4   15 A4
A5   16 A5
A6   17 A6
GND   18
EX_VCC 19 EX_VCC
EX_VCC 20
21 JP19
A0 22 A0
/TC1 23
/INT1 /BOF 24 JP14 P106
/DACK1 25 JP16 CS3
/DREQ1 26

SHORTED BY PATTERN
between 1-2
JP10
2 A7
1

JP9
INT2

JP15
1 2 P107

CNB
66291 PIN NAME
GND   1
D15   2 R46 100 D15
D14   3 R47 100 D14
D13   4 R48 100 D13
D12   5 R49 100 D12
D11   6 R50 100 D11
D10   7 R51 100 D10
D9   8 R52 100 D9
D8   9 R53 100 D8
GND   10
D7   11 R54 100 D7
D6   12 R55 100 D6
D5   13 R56 100 D5
D4   14 R57 100 D4
D3   15 R58 100 D3
D2   16 R59 100 D2
D1   17 R60 100 D1
D0   18 R61 100 D0
GND   19
GND   20
21
22
/HWR / BYTE 23 WRH
Vbus 24 VBUS
EXIOVcc 25
EXIOVcc 26 EXIOVcc

Appendix 2

M3A-0033RevB
(2/2)