

AR-B7041
8MB/4MB SOLID STATE DISK
User's Guide

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0.PREFACE

0.1 COPYRIGHT NOTICE AND DISCLAIMER

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0.2 WELCOME TO THE AR-B7041 DISK CARD

This guide introduces the Acrosser AR-B7041 Disk board.

Use the information describes this card's functions, features, and how to start, set up and operate your AR-B7041. You also could find general system information here.

0.3 BEFORE YOU USE THIS GUIDE

The AR-B7041 diskette provides the newest information about the card. **Please refer to the README.DOC file of the enclosed utility diskette.** It contains the modification and hardware & software information, and adding the description or modification of product function after manual published.

0.4 RETURNING YOUR BOARD FOR SERVICE

If your board requires servicing, contact the dealer from whom you purchased the product for service information. If you need to ship your board to us for service, be sure it is packed in a protective carton. We recommend that you keep the original shipping container for this purpose.

You can help assure efficient servicing of your product by following these guidelines:

1. Include your name, address, telephone and facsimile number where you may be reached during the day.
2. A description of the system configuration and/or software at the time is malfunction.
3. A brief description is in the symptoms.

0.5 TECHNICAL SUPPORT AND USER COMMENTS

User's comments are always welcome as they assist us in improving the usefulness of our products and the understanding of our publications. They form a very important part of the input used for product enhancement and revision.

We may use and distribute any of the information you supply in any way we believe appropriate without incurring any obligation. You may, of course, continue to use the information you supply.

If you have suggestions for improving particular sections or if you find any errors, please indicate the manual title and book number.

Please send your comments to Acrosser Technology Co., Ltd. or your local sales representative.

Internet electronic mail to: webmaster@acrosser.com

0.6 ORGANIZATION

This information for users covers the following topics (see the Table of Contents for a detailed listing):

- Chapter 1, "Overview," provides an overview of the system features and packing list.
- Chapter 2, "Installation," describes the utility diskette using, solid state disk's writing protect function, and the watchdog timer.
- Chapter 3, "Solid State Disk," describes the various type SSD's installation steps and how to adjust the jumper, and the connectors setting.
- Chapter 4, Specifications & SSD Types Supported
- Chapter 5, Memory Banks & Index
- Chapter 6, Placement & Dimensions

0.7 STATIC ELECTRICITY PRECAUTIONS

Before removing the board from its anti-static bag, read this section about static electricity precautions.

Static electricity is a constant danger to computer systems. The charge that can build up in your body may be more than sufficient to damage integrated circuits on any PC board. It is, therefore, important to observe basic precautions whenever you use or handle computer components. Although areas with humid climates are much less prone to static build-up, it is always best to safeguard against accidents may result in expensive repairs. The following measures should generally be sufficient to protect your equipment from static discharge:

- Touch a grounded metal object to discharge the static electricity in your body (or ideally, wear a grounded wrist strap).
- When unpacking and handling the board or other system component, place all materials on an antic static surface.
- Be careful not to touch the components on the board, especially the "golden finger" connectors on the bottom of every board.

1. OVERVIEW

This chapter provides an overview of your system features and capabilities. The following topics are covered:

- Introduction
- Packing List
- Features

1.1 INTRODUCTION

The AR-B7041 is a solid state disk card that can be used as the system disk or as a replacement for mechanical disk drives in any IBM PC/XT/AT or compatible computer. It is ideal for, but not limited to, the following applications:

- Diskless PC workstations
- High reliability and/or high speed access applications
- Heavy duty disk access requirements
- PC controller for industrial or line test instruments
- Environments hostile to standard floppy disks & drives (Dust, moisture, vibration, etc.)

This card is a byte wide memory card that plugs into any free slot of system. Eight 32-pin JEDEC DIP sockets may be populated with up to 8MB of EPROM, 4MB of FLASH EPROM/SRAM or combinations of them. The AR-B7041 also provides one piggyback connector to install AR-B7017 cards (4MB ROM/RAM/FLASH module), for maximum of 12MB disk space.

Data retention of SRAM is ensured by an on-board Lithium battery or using an external battery pack that may be connected to the AR-B7041. A write protect function allows you to prevent data on SRAM disk or FLASH disk from accidental deletion or overwrite.

The AR-B7041 and AR-B7017 supports 5V FLASH EPROMs. This enables you to program FLASH EPROMs on-board directly. If small page (less or equal to 512 bytes per page) 5V FLASHs are used, you can format FLASH disk and copy files onto the FLASH disk just like using a normal disk. This feature will extend the life of your FLASH EPROM chips by only reprogram a small area. You should use all of the related DOS command (such as COPY, DEL, ..etc.) to update files on the 5V FLASH disk.

The AR-B7041 ROM/RAM disk card is extremely easy to install and use. However, it is advised that you read this manual before you begin to install.

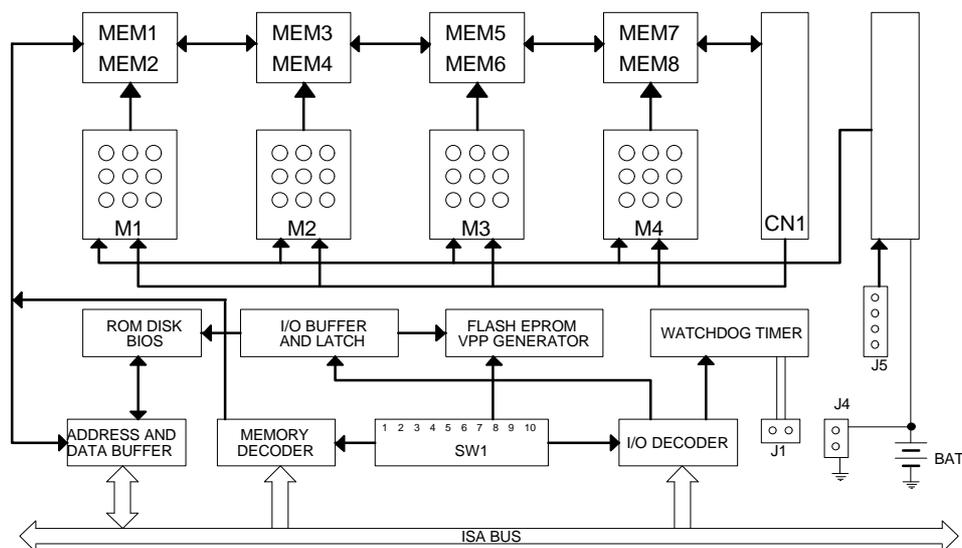


Figure 1-1 AR-B7041 Functional Block Diagram

1.2 PACKING LIST

The accessories are included with the system. Before you begin installing your AR-B7041 board, take a moment to make sure that the following items have been included inside the AR-B7041 package.

- The quick setup manual
- 1 AR-B7041 solid state disk card
- 1 Software utility

If you purchased an AR-B7017, please check that the following items have been included in the AR-B7017 package.

- 1 AR-B7017 ROM/RAM disk card
- 6 Mounting screws (2 for spare)
- 3 Mounting standoffs (1 for spare)
- 1 2-wired battery cable

NOTE: If there are any discrepancies, please contact your Acrosser distributor immediately.

1.3 FEATURES

The system provides a number of special features that enhance its reliability, ensure its availability, and improve its expansion capabilities, as well as its hardware structure.

- ISA bus add-on card designed for PC/XT, PC/AT systems.
- Fully compatible with standard floppy disk drive
- Eight 32-pin JEDEC DIP sockets
- Maximum capacity of 8MB EPROM, 4MB FLASH/SRAM or combinations
- One AR-B7017 piggy back modules can be carried by AR-B7041 and have a maximum of 12MB disk capacity
- Accepts 128Kx8 to 1Mx8 EPROM
- Accepts 64Kx8 to 512Kx8 5V FLASH EPROM
- Accepts 128Kx8 to 512Kx8 SRAM
- Software and hardware write protect functions
- 850mAH Lithium battery for SRAM data retention. External battery connector also included
- Supports on-board FLASH EPROM programmer and programming utility
- Switch selectable drive unit (8 combinations of A:, B:, C: or D:)
- Switch selectable of I/O and memory address. Occupies only 4 I/O address and 16KB memory address
- Programmable watchdog timer
- LED indicator for disk data access and watchdog timer status

2. INSTALLATION

This chapter describes the procedure of the utility diskette installation. The following topics are covered:

- Overview
- Utility Diskette
- Write Protect Function
- Watchdog Timer

2.1 OVERVIEW

This chapter provides information for you to set up a working system based on the AR-B7041 card. Please read the details of the card's hardware descriptions before installation carefully, especially jumpers' setting, switch settings and cable connections.

When you install the card please notice the following item:

1. Make sure the base I/O address does not conflict with other I/O cards.
2. Make sure the memory address not conflict with other memory cards.
3. Make sure the jumper settings for the memory are all installed properly.
4. Don't use the invalid shadow RAM address.
5. Prevent to use the same range of memory address as the AR-B7041 used, if you have install EMS driver.
6. If you are using the MS-DOS 6.2 to format SRAM or 5V FLASH EPROM disk, you might get some bad sectors in your ROM/RAM disk. This will reduce the capacity of your FLASH/SRAM disk. To solve this problem, please type:

```
C:\>FORMAT [drive number] /U/C
or
C:\>FORMAT [drive number] /U/C/S
```

2.2 UTILITY DISKETTE – SSD UTILITY

To support the AR-B7041 solid state disk's operations, the following files have been provided on the enclosed diskette.

(A) PGM7041.EXE

PGM7041.EXE PGM7041.EXE is used to program the 12V FLASH EPROM after the ROM pattern files are generated by RFG.EXE. The PGM7041.EXE can also program the correctness of the ROM pattern files onto 5V FLASH EPROM (start from MEM1) or SRAM for testing the ROM pattern files.

To execute PGM7041.EXE, the main menu will be displayed on your screen. There are 8 options on the main menu.

Quit to DOS

Quits and exits to the DOS.

OS Shell

Exits from PGM7041 temporarily to the DOS prompt. Type EXIT to return to PGM7041 main menu.

Load ROM File

If this option is used, the PGM7041 will prompt you for the ROM pattern file name. This option is useful if you have not previously entered a ROM pattern file name or if you wish to use a different ROM pattern file. The PGM7041 will check and display the ROM file name, ROM file size, (FLASH) memory capacity and the number of ROM pattern files that will be loaded and copied onto the (FLASH) memory chips.

Verify Memory

If ROM pattern files were loaded without error, this option instructs PGM7041 to verify the contents of (FLASH) memory chips with the current ROM pattern files.

Program Memory

If there are no mistakes in your ROM pattern file, then this menu option will erase (FLASH) memory, write the current ROM pattern files onto (FLASH) memory and verify data that was just written to (FLASH) memory, using the ROM pattern files.

Memory Type/Mfr.

Before you program the (FLASH) memory chips, make sure that the FLASH's type and manufacture match the one shown on the main menu. Otherwise, you can use this option to select the proper type and manufacture and instruct the program to use a right programming algorithm.

Select PGM Chips

Normally the PGM7041 will program all ROM pattern files onto the FLASH memories with the ROM pattern files just loaded. But you can use this option to select which memory chips that you want to program and which memory chips need to be skipped. The PGM7041 will only program the selected chips when writing data to the FLASH memory. This is very useful when some of the memory chip were verified and programmed previously.

Select FLASH PLSCNTs

If the 12V FLASHs have been programmed several times, please select the <Slowest> FLASH PLSCNT mode instead of <Standard> mode. In the <Slower> or <Slowest> mode, PGM7041.EXE will retry more times to program data onto the 12V FLASHs correctly. The default setting is <Slowest> mode.

Move the reverse video bar to the "Program Memory" option then press ENTER. PGM7041 will write the ROM pattern files onto the (FLASH) memories. Ensure that data is verified by the PGM7041 correctly.

(B) SWAP41.EXE

SWAP41.EXE This program demonstrates how to reassigns your AR-B7041 card to the drive unit set by SW1-5, SW1-6 and SW1-7. This file should be executed in the first line of your <AUTOEXEC.BAT> file.

(C) AUTOEXEC.BAT

AUTOEXEC.BAT This is a sample batch file to illustrate how to create an <AUTOEXEC.BAT> file, if you are planning to use the AR-B7041 as a boot drive.

(D) RFG.EXE

RFG.EXE This program is used to generate ROM pattern files in a binary format. Each ROM pattern file has the same size as the FLASH or EPROM and can be easily programmed on to the FLASH with on-board programmer or on to EPROM with any EPROM programmer. If you have specified a DOS drive in the *.PGF file, RFG will generate bootable ROM pattern files for the EPROM or FLASH disk. The RFG supports the following DOS: MS-DOS, PC-DOS, DR-DOS, and X-DOS.

NOTE: If you want to use AR-B7041 with any DOS which is not supported by RFG, please send your requirement to Acrosser Technology Co., Ltd. or contract with your local sales representative.

The RFG.EXE provided in the utility diskette is a program that converts the files you list in the PGF and convert them into ROM pattern file. The RFG will determine how many EPROMs are needed and generate the same number of ROM pattern files. These ROM pattern files are named with the name assigned by the ROM_NAME in the PGF and the extension names are *.R01, *.R02 ...etc. To generate ROM pattern files.

The ROM File Generator main menu will be displayed on the screen. There are 7 options on the main menu. They serve the following functions:

Quit to DOS

Quits and exits to the DOS

OS Shell

Exits from the RFG temporarily to the DOS prompt. Type <EXIT> to return to the RFG main menu.

Load PGF File

If this option is used, the RFG will prompt you for the PGF file name. This option is useful if you have not previously entered a PGF name or you wish to use a different PGF file. The RFG will check and display the PGF filename, ROM pattern file name, EPROM capacity, DOS version and the number of ROM pattern files that will be generated.

Type Current PGF File

This option instructs the RFG to use the DOS type command to display the contents of the current PGF file.

Generate ROM File(s)

If there is no mistake in your *.PGF file, then this menu option will generate ROM pattern files. The number of ROM pattern file generated by the RFG will depend on the total capacity needed by your files. For instance, if 3 files are generated, then you will need to use 3 EPROMs (The size depends upon the number stated in your PGF). The ROM pattern files will have the same file names, but will have different extension names. For example:

TEST.R01, TEST.R02, TEST.R03 ..etc.

Display Error in PGF File

This option displays errors that were detected in your PGF.

Help to PGF File

This option gives information on how to write a PGF file and how to generate ROM pattern files. An example PGF is also included.

Move the reverse video bar to <Generate ROM File(s)> then press [ENTER]. The ROM pattern file is a binary file. The file size will be the same size as the EPROM that you assigned in the PGF. For example, if you are using 128KX8 EPROM memory chips, then the size of ROM patterns file will be 131072 bytes. For other chips the file size will be:

64KX8 EPROM---65536 bytes
256KX8 EPROM --262144 bytes
512KX8 EPROM---524288 bytes
1MX8 EPROM -----1048576 bytes

(E) RFGDEMO.PGF

RFGDEMO.PGF This file provides a sample PROGRAM GROUP FILE which illustrates how to create ROM pattern files correctly.

The PGF is an ASCII text file that can be created by using any text editor, word processor or DOS <COPY CON> command. The PGF lists what files will be copied and if DOS is going to be copied. This file can have any DOS filename, but the extension name must be *.PGF. For example, followings are valid filenames.

RFGDEMO.PGF
MYRFG.PGF
MSDOS.PGF
...

An examples of the *.PGF file is as follow.

```
ROM_NAME=TEST1    ; ROM pattern file name is TEST1
                  ; The output file names will be TEST1.R01, TEST1.R02..etc.
DOS_DRIVE=C:      ; DOS system drive unit is drive C:
                  ; If user does not want to copy DOS system files onto the ROM disk
                  ; write as DOS_DRIVE=NONE
ROM_SIZE=128      ; 128 means 128KX8 (27C/29F010) EPROM size used
                  ; 256 means 512KX8 (27C/29F020) EPROM size used
                  ; 512 means 512KX8 (27C/29F040) EPROM size used
                  ; 1024 means 1MX8 (27C080) EPROM size used
```

The following 3 files are options which depend on whether the ROM disk is to be bootable or not.

```
CONFIG.SYS
AUTOEXEC.BAT
SWAP41.EXE
```

; Below are user's files

```
A:\USER1.COM    ; File USER1.COM on root of drive A:
USER2.EXE       ; File USER2.EXE on current directory & drive
C:\TTT\USER3.TXT ; File USER3.TXT on sub-directory TTT of drive C:
```

(F) WD7041.EXE

WD7041.EXE This program demonstrates how to enable and trigger the watchdog timer. It allows you to test the <TIMES-OUT & RESET> function when the watchdog timer is enabled.

(G) WP7041.EXE

WP7041.EXE This program demonstrates how to enable and disable software write protected function. It also shows the current protect mode of write or read only memory.

2.3 WRITE PROTECT FUNCTION

The AR-B7041 provides hardware and software write protect functions for small page 5V FLASH disk and only software write protected function for SRAM disk. This is to prevent your data on 5V FLASH or SRAM disk from accidental deletion or overwrite. If your FLASH/SRAM disk is write protected, any write operation to the protected FLASH/SRAM disk will get a write protect error:

```
Write protect error writing drive A
About, Retry, Fail?
```

2.3.1 Hardware Write Protect

To enable the hardware protect function for small page 5V FLASH disk set the SW1-8 and SW1-9 to the ON and OFF position, please refer to the "Switch Setting".

2.3.2 Software Write Protect

If you need the write protect function and sometimes you have to write or update data on your FLASH/SRAM disk, you can use the software write protect instead of hardware write protect. The software write protect function is enabled or disabled by writing a data to an I/O port.

2.3.3 Enable the Software Write Protect

Write 80h to the base port+0 address

Example 1: (in assembly language)

```
MOV DX, 220H      ; If the AR-B7041's base I/O address is 220H
MOV AL, 80H      ; Enable byte = 80h
OUT DX, AL
```

Example 2: (in BASICA language)

```
OUT &H220, &H80; REM If the AR-B7041's base I/O address is 220h
```

Example 3: (in Turbo C language)

```
outportb(0x220,0x80); /*If the AR-B7041's base I/O address is 220h*/
```

2.3.4 Disable the Software Write Protect

Write 0 to the base port+0 address

Example 1: (in assembly language)

```
MOV DX, 220H      ; If the AR-B7041's base I/O address is 220h
MOV AL, 00H      ; Disable byte=00h
OUT DX, AL
```

Example 2: (in BASICA language)

```
OUT &H220, &H00; REM If the AR-B7041's base I/O address is 220h
```

Example 3: (in Turbo C language)

```
outportb(0x220,0x00); /*If the AR-B7041's base I/O address is 220h*/
```

2.4 WATCHDOG TIMER

This section describes how to use the Watchdog Timer, disabled, enabled, and trigger.

The AR-B7041 is equipped with a programmable time-out period watchdog timer. User can use the program to enable the watchdog timer. Once you have enabled the watchdog timer, the program should trigger it every time before it times out. If your program fails to trigger or disable this timer before it times out because of system hang-up, it will generate a reset signal to reset the system. The time-out period can be programmed to be 3 to 42 seconds.

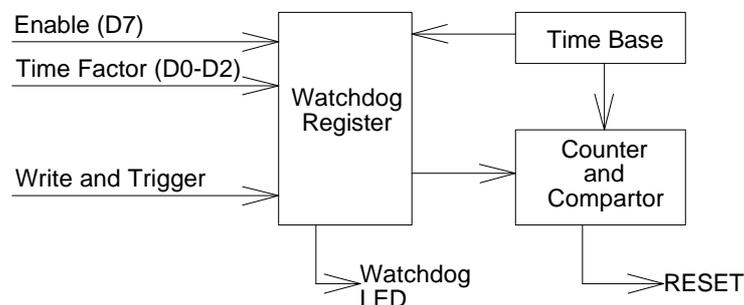


Figure 2-1 Watchdog Block Diagram

2.4.1 Watchdog Timer Setting

The watchdog timer is a circuit that may be used from your program software to detect crashes or hang-ups. Whenever the watchdog timer is enabled, the LED will blink to indicate that the timer is counting. The watchdog timer is automatically disabled after reset.

Once you have enabled the watchdog timer, your program must trigger the watchdog timer every time before it times-out. After you trigger the watchdog timer, it will be set to zero and start to count again. If your program fails to trigger the watchdog timer before time-out, it will generate a reset pulse to reset the system.

The factor of the watchdog timer time-out constant is approximately 6 seconds. The period for the watchdog timer time-out period is between 1 to 7 timer factors.

If you want to reset your system when watchdog times out, the following table listed the relation of timer factors between time-out period.

Time Factor	Time-Out Period (Seconds)
80H	3
81H	6
82H	12
83H	18
84H	24
85H	30
86H	36
87H	42

Table 2-1 Time-Out Setting

2.4.2 Watchdog Setting

(1) Reset Signal Output of Watchdog Timer (J1)

J1 is used to connect to reset header of main board or CPU card.

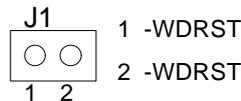


Figure 2-2 J1: Reset Signal Output of Watchdog Timer

(2) Watchdog LED Header (J2)

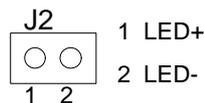


Figure 2-3 J2: Watchdog LED Header

2.4.3 Watchdog Timer Enabled

To enable the watchdog timer, you have to output a byte of timer factor to the watchdog register whose address is base port+3m 76h or 77h. The following is a BASICA program which demonstrates how to enable the watchdog timer and set the time-out period at 24 seconds.

```

1000 REM Points to command register
1010 WD_REG% = BASE_PORT% + 3
1020 REM Timer factor = 84H
1030 TIMER_FACTOR% = %H84
1040 REM Output factor to watchdog register
1050 OUT WD_REG%, TIMER_FACTOR%
.,etc.
```

2.4.4 Watchdog Timer Trigger

After you enable the watchdog timer, your program must write the same factor as enabling to the watchdog register at least once every time-out period to its previous setting. You can change the time-out period by writing another timer factor to the watchdog register at any time, and you must trigger the watchdog before the new time-out period in next trigger. Below is a BASICA program which demonstrates how to trigger the watchdog timer:

```
2000     REM Points to command register
2010     WD_REG% = BASE_PORT% + 3
2020     REM Timer factor = 84H
2030     TIMER_FACTOR% = &H84
2040     REM Output factor to watchdog register
2050     OUT WD_REG%, TIMER_FACTOR%
      .,etc.
```

2.4.5 Watchdog Timer Disabled

To disable the watchdog timer, simply write a 00H to the watchdog register.

```
3000     REM Points to command register
3010     WD_REG% = BASE_PORT% + 3
3020     REM Timer factor = 0
3030     TIMER_FACTOR% = 0
3040     REM Output factor to watchdog register
3050     OUT WD_REG%, TIMER_FACTOR%
      ., etc.
```

3.SOLID STATE DISK

The section describes the various type SSDs' installation steps as follows. This chapter describes the procedure of the installation. The following topics are covered:

- Overview
- Switch Setting
- Jumper Setting
- ROM Disk Installation
- AR-B7017

3.1 OVERVIEW

Eight 32-pin JEDEC memory sockets on the AR-B7041 can be populated with up to 8MB of EPROM, 4MB of FLASH, 4MB of SRAM or combinations the EPROM/SRAM or FLASH/SRAM. Each socket accepts the following memory chips:

EPROM: 27C080 (1Mx8), 27C040 (512Kx8), 27C020 (256Kx8) and 27C010 (128Kx8)

Small Page 5V FLASH: 29C040A (512Kx8), 29C040 (512Kx8), 29C020 (256Kx8), 29C010 (128Kx8), 29C512 (64Kx8), 28EE010 (128Kx8), 28EE011 (128Kx8), 29EE010 (128Kx8), 29EE011 (128Kx8) and 28SF040 (512Kx8)

Large Page 5V FLASH: 29F040 (512Kx8), 29F020 (256Kx8), 29F010 (128Kx8) and 29F512 (64Kx8)

SRAM: 584000 (512Kx8), 581000(128Kx8)

The AR-B7041 uses a 3.6volt Lithium non-chargeable battery to backup stored data in the SRAM memory when the power is off. Please use low power SRAM chips for a longer data retention period. (These SRAM chips are usually designated with a <L> in the chip model code.)

3.2 SWITCH SETTING

We will show the locations of the AR-B7041 switch, and the factory-default setting.

CAUTION: The switch setting needs to adjust with the jumpers setting, make sure the jumper settings and the switch setting are correct.

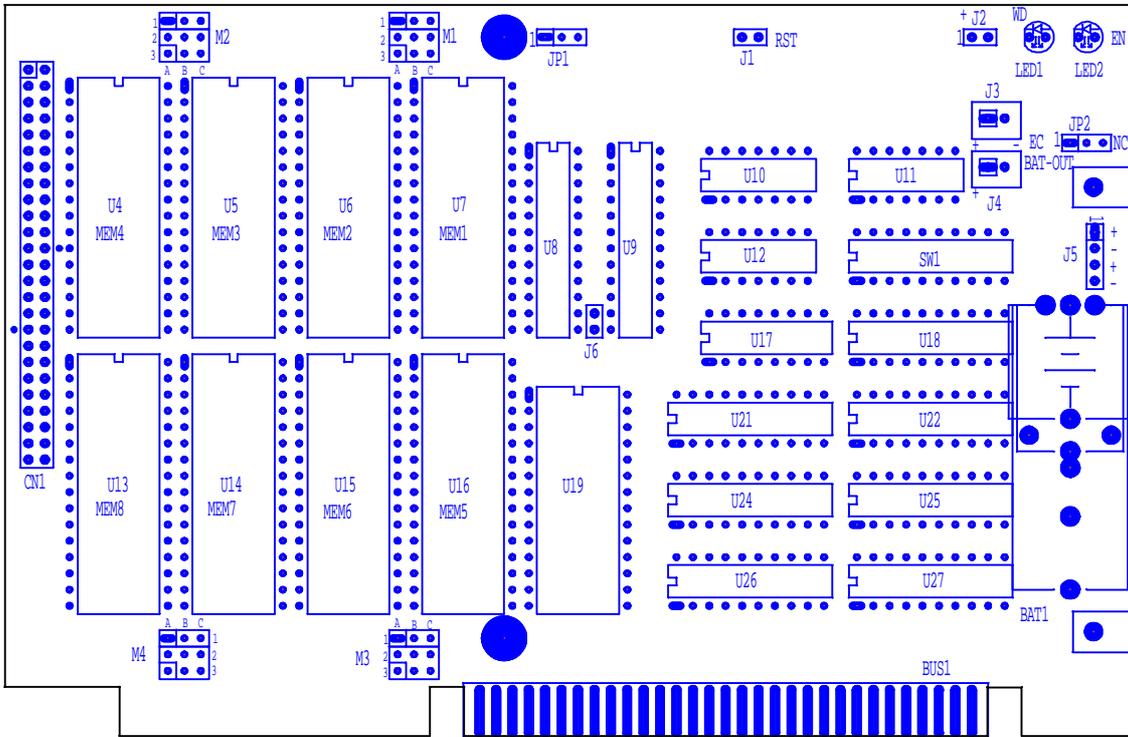


Figure 3-1 AR-B7041 Jumper & Connector Location

3.2.1 Overview

There is 1 DIP Switch located on the AR-B7041. It performs the following functions:

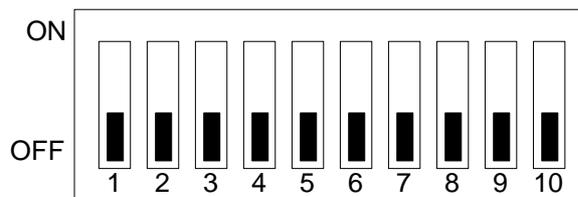


Figure 3-2 SW1: Switch Select

- SW1-1 & SW1-2 Set the base I/O port address
- SW1-3 & SW1-4 Set the starting memory address
- SW1-5, SW1-6 & SW1-7 Set the drive number of solid state disk
- SW1-8 & SW1-9 Set the used ROM memory chips
- SW1-10 ROM disk write protected function

3.2.2 I/O Port Address Select (SW1-1 & SW1-2)

SW1-1 and SW1-2 are provided to select one of the four base port addresses for the watchdog timer and the solid state disk. The AR-B7041 occupies 4 I/O port addresses. The following state selections of base port address.

SW1-1	SW1-2	Base Port	Solid State Disk	Watchdog
OFF (*)	OFF	220h	220h-222h	223h & 76h-77h
ON	OFF	2A0h	2A0h-2A2h	2A3h & 76h-77h
OFF	ON	320h	320h-322h	323h
ON	ON	3A0h	3A0h-3A2h	3A3h

Table 3-1 I/O Port Address Select

3.2.3 SSD Firmware Address Select (SW1-3 & SW1-4)

The AR-B7041's SSD firmware occupies 16KB of memory. SW1-3 and SW1-4 are used to select the memory base address. You must select an appropriate address so that the AR-B7041 will not conflict with memory installed on other add-on cards. Do not to use the shadow RAM area or EMM driver page frame in this area.

SW1-3	SW1-4	Firmware Address	Bank Memory Address
OFF (*)	OFF	CC00:0 (8KB)	CE00:0 (8KB)
ON	OFF	D000:0 (8KB)	D200:0 (8KB)
OFF	ON	D400:0 (8KB)	D600:0 (8KB)
ON	ON	D800:0 (8KB)	DA00:0 (8KB)

Table 3-2 SSD Firmware Address Select

If you are going to install the EMM386.EXE driver, please use the [X] option to prevent EMM386.EXE from using the particular range of segment address as an EMS page which is used by AR-B7041. For example, write a statement in the CONFIG.SYS file as follow: (If the memory configuration of AR-B7041 is CC00:0)

DEVICE=C:\DOS\EMM386.EXE X=CC00-CFFF

3.2.4 SSD Drive Number (SW1-5, SW1-6 & SW1-7)

The AR-B7041 can simulate one or two disk drives. You can assign the drive number of AR-B7041 by configure SW1-5, SW1-6 & SW1-7.

If you have copied DOS to the ROM/RAM disk, the computer will always boot from the ROM/RAM disk. After the DOS is booted, the first disk number will be A: until the program SWAP41.EXE is executed. The SWAP41.EXE changes the drive number according to the setting of SW1-5, SW1-6 & SW1-7.

If your AR-B7041 does not have DOS and is not assigned as drive A, the computer will boot from your hard disk or floppy disk. In this case, the BIOS of AR-B7041 will set the drive number of ROM/RAM disk to desired drive number automatically without having to run SWAP41.EXE after system booting. Do not assign the AR-B7041 with drive 0 (drive A:) when the ROM/RAM disk does not have DOS. This is just like that you put a non-DOS disk in the floppy disk.

If you install only one kind of memory chip on the ROM/RAM disk, the AR-B7041 will simulate one disk drive.

SW1-5	SW1-6	SW1-7	Occupies floppy disk number (SSD)
OFF	OFF	OFF	0 (Note 1)
ON	OFF	OFF	1
OFF	ON	OFF	2
ON	ON	OFF	3
OFF	OFF	ON	0
ON	OFF	ON	0
OFF	ON	ON	0 or 1 (Note 2)
ON	ON	ON	0 or 2 (Note 3)

Table 3-3 SSD Drive Number

NOTE: 1. Factory preset

2. If there is no DOS on this ROM/RAM disk, the disk number will be 1. If any DOS is found by the AR-B7041 BIOS, the disk number will be 0. But, you can change the disk number from 0 to 1 by pressing <ESC> key during system boot-up.
3. If there is no DOS on this SSD, the disk number will be 2 (C: or D: or ..). If any DOS is found by AR-B7041 SSD BIOS, the disk number will be 0 (A:). But, you can change the disk number from 0 to 2 by pressing the <ESC> key during system bootup.

(1) Simulate 2 Disk Drive

When (FLASH) EPROM and SRAM are used on the AR-B7041, or you only have installed SRAM that does not start from MEM1 socket, the AR-B7041 will simulate two disk drives. The drive numbers respect to those switch settings when AR-B7041 simulates two disk drives.

SW1-5	SW1-6	SW1-7	Occupies floppy disk number	
			FLASH (EPROM)	SRAM
OFF	OFF	OFF	0	1
ON	OFF	OFF	1	2
OFF	ON	OFF	2	3
ON	ON	OFF	3	Disable (Note 4)
OFF	OFF	ON	0	2
ON	OFF	ON	0	3
OFF	ON	ON	0 or 1 (Note 2)	1
ON	ON	ON	0 or 2 (Note 3)	2

Table 3-4 SSD Drive Number for Simulate 2 Disk Drive

NOTE: 1. Factory preset

2. If there is no DOS on this ROM/RAM disk, the disk number will be 1. If any DOS is found by the AR-B7041 BIOS, the disk number will be 0. But, you can change the disk number from 0 to 1 by pressing <ESC> key during system boot-up.
3. If there is no DOS on this SSD, the disk number will be 2 (C: or D: or ..). If any DOS is found by AR-B7041 SSD BIOS, the disk number will be 0 (A:). But, you can change the disk number from 0 to 2 by pressing the <ESC> key during system bootup.
4. ROM and RAM disks can not exist simultaneously if the disk number starts from 3.

(2) Disk Drive Name Arrangement

If any logical hard disk drives exist in your system, there will also be a different disk number depending on which version DOS you are using.

The solid state disk drive number with their respective DOS drive designation are listed in table as follows. The solid state disk drive number is changeable as the DOS version. The following table expresses the variety.

Condition	Floppy disk No.				Logical hard disk			
	0	1	2	3	1	2	3	4
No Logical hard disk	A:	B:	C:	D:	--	--	--	--
1 Logical hard disk	A:	B:	C:	D:	E:	--	--	--
2 Logical hard disk	A:	B:	C:	D:	E:	F:	--	--
3 Logical hard disk	A:	B:	C:	D:	E:	F:	G:	--
4 Logical hard disk	A:	B:	C:	D:	E:	F:	G:	H:

Table 3-5 SSD Drive Number for DOS Version before 5.0

Condition	Floppy disk No.				Logical hard disk			
	0	1	2	3	1	2	3	4
No Logical hard disk	A:	B:	C:	D:	--	--	--	--
1 Logical hard disk	A:	B:	D:	E:	C:	--	--	--
2 Logical hard disk	A:	B:	E:	F:	C:	D:	--	--
3 Logical hard disk	A:	B:	F:	G:	C:	D:	E:	--
4 Logical hard disk	A:	B:	G:	H:	C:	D:	E:	F:

Table 3-6 SSD Drive Number for DOS Version 5.0 and Newer

3.2.5 ROM Type Select (SW1-8 & SW1-9)

SW1-8 & SW1-9 are used to select the memory type of ROM disk which is going to be used on the AR-B7041.

SW1-8	SW1-9	EPROM Type
OFF	OFF	UV EPROM (27Cxxx)
ON	OFF	5V FLASH 29Fxxx
OFF	ON	5V FLASH (29Cxxx & 28Eexxx)
ON	ON	12V FLASH (28Fxxx)

Table 3-7 ROM Type Select

NOTE: It is also used to perform the hardware write protection of small page 5V FLASH (29Cxxx ..etc.) disk.

3.2.6 Write Protected Select (SW1-10)

SW1-10 is used to enable or disable the write protect function of the SRAM disk or small page 5V FLASH disk. If SW1-10 is set to the <ON> position, the FLASH/SRAM disk will operate in the same manner as a write protected floppy disk. A write protect floppy disk is a <read only> disk. This function will protect your important file(s) from accidental deletion.

SW1-10	Disk Access
OFF	Read/Write
ON	Read Only

Table 3-8 Write Protected Select

3.3 JUMPER SETTING

Jumper pins allow you to set specific system parameters. Set them by changing the pin location of jumper blocks. (A jumper block is a small plastic-encased conductor [shorting plug] that slips over the pins.) To change a jumper setting, remove the jumper from its current location with your fingers or small needle-nosed pliers. Place the jumper over the two pins designated for the desired setting. Press the jumper evenly onto the pins. Be careful not to bend the pins.

We will show the locations of the AR-B7041 jumper pins, and the factory-default setting.

CAUTION: Do not touch any electronic component unless you are safely grounded. Wear a grounded wrist strap or touch an exposed metal part of the system unit chassis. The static discharges from your fingers can permanently damage electronic components.

3.3.1 Memory Type Setting (M1 ~ M4 & JP1)

Before installing the memory into memory sockets MEM1 through MEM8 you have to configure the memory type which will be used (ROM/RAM) on the AR-B7041 card. Each jumper selects the memory type of four continuous sockets.

You can configure the AR-B7041 as a (FLASH) EPROM disk (ROM only), a SRAM disk (SRAM only) or a combination of (FLASH) EPROM and SRAM disk.

It is not necessary to insert memory chips into all of the sockets. The number of SRAM chips required depends on your RAM disk capacity. The number of EPROM chips required depends on the total size of files that you plan to copy onto the ROM disk and whether or not it will be bootable.

Insert the first memory chip into MEM1 if you are going to configure it as a ROM or SRAM disk. If you use a combination of ROM and RAM, then insert the (FLASH) EPROM chip starting with the MEM1, and insert the SRAM chips starting from the first socket which is configured as SRAM.

- M1: is used to configure the memory type of MEM1 to MEM2
- M2: is used to configure the memory type of MEM3 to MEM4
- M3: is used to configure the memory type of MEM5 to MEM6
- M4: is used to configure the memory type of MEM7 to MEM8

CAUTION: When the power is turned off, please note the following precautions.

1. If your data has been stored in the SRAM disk, do not change the jumper position or data will be lost.
2. Make sure jumpers are set properly. If you mistakenly set the jumpers for SRAM and you have EPROM or FLASH installed, the EPROM or FLASH will drain the battery's power.

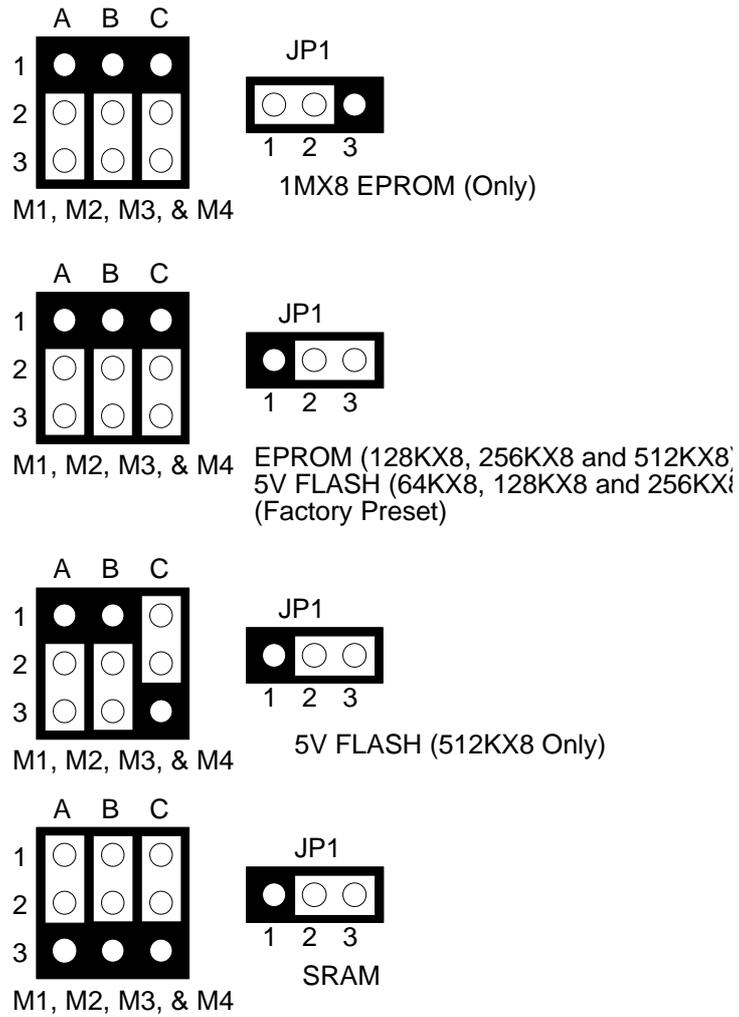


Figure 3-3 M1~M4 & JP1: Memory Type Setting

3.3.2 Bus Connector

(1) XT-Bus (BUS1)

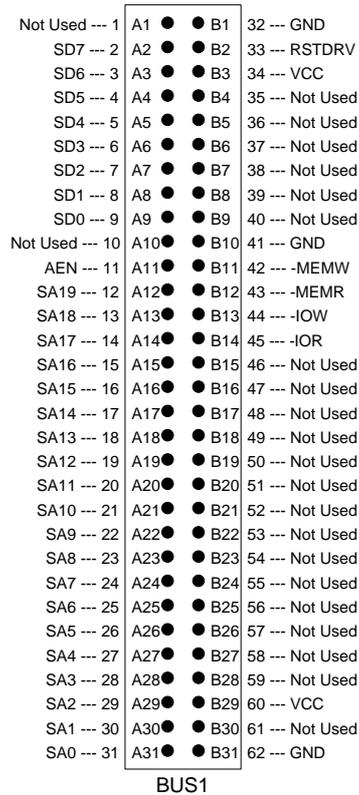


Figure 3-4 BUS1: XT-Bus

(2) Piggy-Back Connector (CN1)

CN1 is used to connect with the AR-B7017.

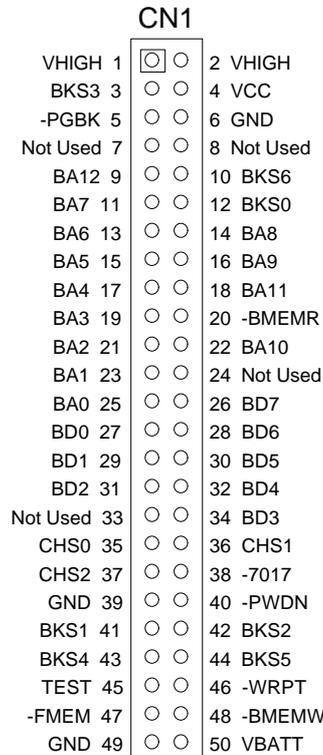


Figure 3-5 CN1: Piggy-Back Connector

3.3.3 Battery Setting

(1) Battery Charge Enable/Disable (JP2)

If the AR-B7041 uses a 3.6V Ni-Cd rechargeable battery for SRAM data retention, the on-board charge circuit can be enabled by set the JP2 jumper. The battery will be charged when the power is on.

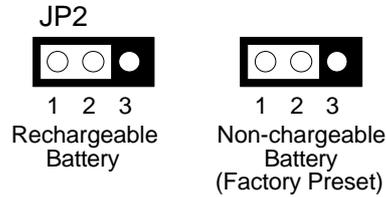


Figure 3-6 JP2: Battery Charge Enable/Disable

(2) Battery Output Connector (J4)

The J4 is used to connect the battery to the AR-B7017 when the AR-B7017 is going to be removed from the AR-B7041. A two-wired cable provided with the AR-B7017 is used to do this job. This would be very convenient if you are using the SRAM on the AR-B7017 and you want to remove the AR-B7017 temporarily.

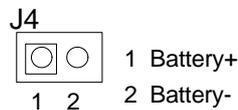


Figure 3-7 J4: Battery Output Connector

(3) External Battery Connector (J3 & J5)

J3 and J5 allow users to connect an external 3.6 to 6 VDC battery to the AR-B7041 if the on-board battery is empty. Only the SRAM disk will sink the battery current. If no SRAM chips are used, no battery is needed. The battery charger on AR-B7041 does not source charge current to the external battery which connected to J3 or J5.

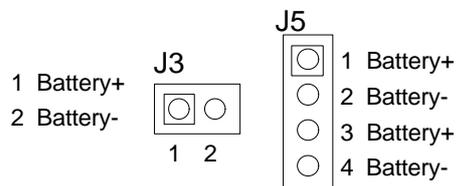


Figure 3-8 J3 & J5: External Battery Connector

3.4 ROM DISK INSTALLATION

The section describes the various type SSDs' installation steps as follows. The jumper and switch adjust as SSD's different type to set.

3.4.1 UV EPROM (27Cxxx)

(1) Switch and Jumper Setting

Step 1: Use jumper block to set the memory type as ROM (FLASH).

Step 2: Select the proper I/O base port, firmware address, disk drive number and EPROM type on SW1.

Step 3: Insert programmed EPROM(s) or FLASH(s) chips into sockets starting at MEM1.

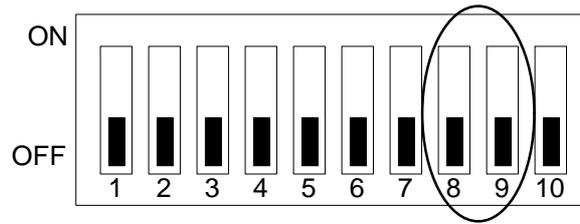


Figure 3-9 UV EPROM (27CXXX) Switch Setting

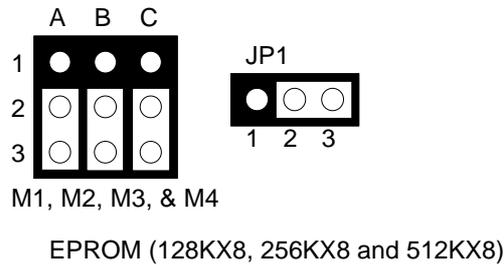
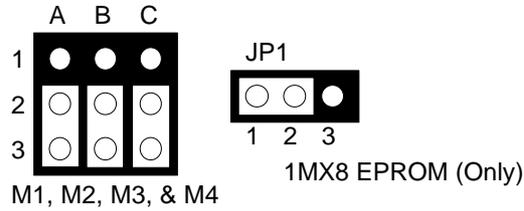


Figure 3-10 UV EPROM Jumper Setting

(2) Software Programming

Use the UV EPROM, please refer to the follow steps:

- Step 1:** Turn on the power and boot DOS from hard disk drive or floppy disk drive.
- Step 2:** Making a Program Group File (*.PGF file)
- Step 3:** Using the RFG.EXE to generate ROM pattern files, and counting the ROM numbers as the pattern files.
- Step 4:** In the DOS prompt type the command as follows.
`C:\>RFG [file name of PGF]`
- Step 5:** In the RFG.EXE main menu, choose the <Load PGF File> item, that is user editing *.PGF file.
- Step 6:** Choose the <Generate ROM File(s)>, the tools program will generate the ROM files, for programming the EPROMs.
- Step 7:** Program the EPROMs
 Using the instruments of the EPROM writer to load and write the ROM pattern files into the EPROM chips. Make sure that the EPROMs are verified by the program without any error.
- Step 8:** Install EPROM chips
 Be sure to place the programmed EPROMs (R01, R02 ...) into socket starting from MEM1 and ensure that the chips are installed in the sockets in the proper orientation.

3.4.2 Large Page 5V FLASH Disk

If you are using large page 5V FLASH as ROM disk, it is the same procedure as step 1 to step 4 of using the UV EPROM.

(1) Switch and Jumper Setting

Step 1: Use jumper block to set the memory type as ROM (FLASH).

Step 2: Select the proper I/O base port, firmware address, disk drive number and large page 5V FLASH type on SW1.

Step 3: Insert programmed EPROM(s) or FLASH(s) chips into sockets starting at MEM1.

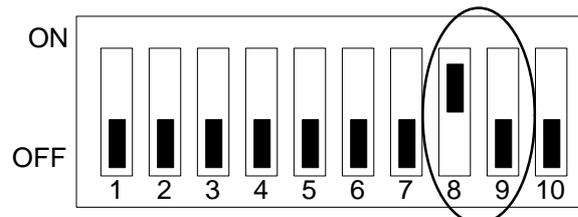


Figure 3-11 5V Large FLASH (29FXXX) Switch Setting

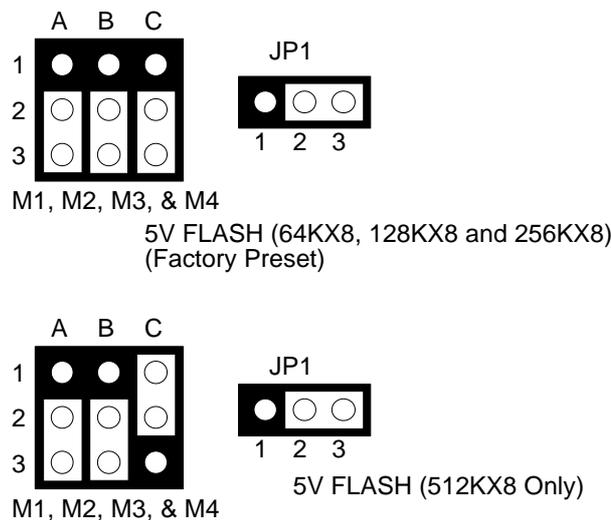


Figure 3-12 Large Page 5V FLASH Jumper Setting

(2) Software Programming

And then, you should create a PGF and generate ROM pattern files by using the RFG.EXE.

Step 1: Making a Program Group File (*.PGF file)

Step 2: Generate ROM pattern files

Step 3: Turn off your system, and then install FLASH EPROMs into the sockets.

NOTE: Place the appropriate number of FLASH EPROM chips (the numbers depends on the ROM pattern files generated by RFG.EXE) into the socket starting from MEM1 and ensure that the chips are installed in the sockets in the proper orientation. Line up and insert the AR-B7041 board into any free slot of your computer.

Step 4: Turn on your system, and Program FLASH EPROMs.

NOTE: The FLASH EPROM program is built-in the AR-B7041 board. The FLASH EPROMs can be programmed on the AR-B7041. Before programming the FLASH EPROMs, please insert at least the same number of FLASH EPROMs, please insert at least the same number of FLASH EPROMs, please insert at least the same number of FLASH chips as the ROM pattern files generated.

Step 5: The PGM7041.EXE file is a program that loads and writes the ROM pattern files onto the (FLASH) memory chips. To program the FLASH EPROM.

Step 6: In the DOS prompt type the command as follows.

C: \>PGM7041 [ROM pattern file name]

Step 7: In the main menu, choose the <Load ROM File> item, that is the ROM_NAME=[file name] in the *.PGF file.

Step 8: Choose the <Program Memory> item, this item program will program the EPROMs.

NOTE: Move the reverse video bar to the <Program memory> option then press <ENTER>. PGM7041 will write the ROM pattern files onto the (FLASH) memories. Ensure that data is verified by the PGM7041 correctly.

Step 9: Reboot the system

NOTE: Reboot your computer by making a software or hardware reset.

3.4.3 Small Page 5V FLASH ROM Disk

(1) Switch and Jumper Setting

Step 1: Use jumper block to set the memory type as ROM (FLASH).

Step 2: Select the proper I/O base port, firmware address, disk drive number and EPROM type on SW1.

Step 3: Insert programmed EPROM(s) or FLASH(s) chips into sockets starting at MEM1.

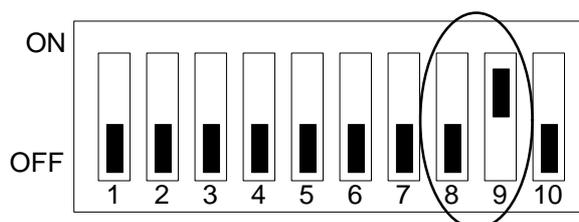


Figure 3-13 5V FLASH (29CXXX & 28EEXXX) Switch Setting

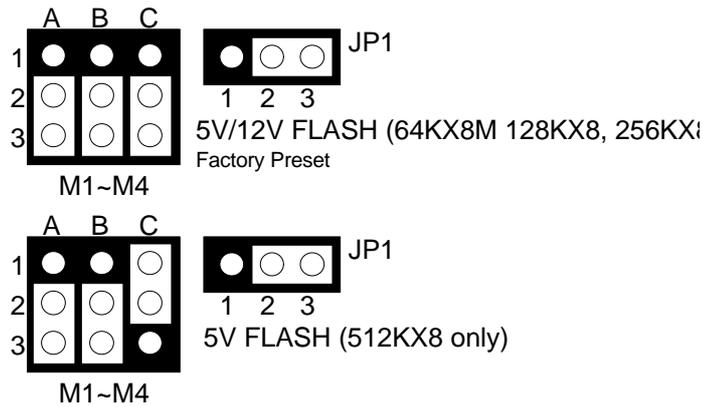


Figure 3-14 5V FLASH (29CXXX & 28EEXX) Jumper Setting

(2) Using Tool Program

If small page 5V FLASH EPROMs are used, it is the same procedure as step 1 to step 4 of using the UV EPROM:

- Step 1:** Making a Program Group File (*.PGF file)
- Step 2:** Generating ROM pattern files
- Step 3:** Installing FLASH EPROMs
- Step 4:** Programming FLASH EPROMs
- Step 5:** Reboot system

(3) Typing DOS Command

You can use another way to format and copy files to the 5V FLASH EPROM. This method provides the convenience of using a RAM disk. You can use the DOS <FORMAT> and <COPY> command to format and copy files. Follow the following steps to format and copy files to the FLASH disk. it is the same procedure as step 1 to step 4 of using the UV EPROM.

- Step 1:** Turn on your computer, when the screen shows the SSD BIOS menu, please hit the [F1] key during the system boot-up, this enables you to enter the FLASH setup program. If the program does not show up, check the switch setting of SW1.
- Step 2:** Use <Page-Up>, <Page-Down>, <Right>, and <Left> arrow keys to select the correct FLASH memory type and how many memory chips are going to be used.
- Step 3:** Press the [F4] key to save the current settings.
- Step 4:** After the DOS is loaded, use the DOS [FORMAT] command to format the FLASH disk.
 - To format the disk and copy DOS system files to the disk.
 - C:\>FORMAT [ROM disk letter] /S /U
 - To format the disk without copying DOS system files.
 - C:\>FORMAT [ROM disk letter] /U
- Step 5:** Copy your program or files to the FLASH disk by using DOS [COPY] command.

CAUTION: It is not recommended that the user formatted the disk and copy files to the FLASH disk very often. Since the FLASH EPROM's write cycle life time is about 10,000 or 100,000 times, writing data to the FLASH too often will reduce the life time of the FLASH EPROM chips, especially the FLASH EPROM chip in the MEM1 socket.

3.4.4 RAM Disk

(1) Switch and Jumper Setting

Step 1: Use jumper block to set the memory type as ROM (FLASH).

Step 2: Select the proper I/O base port, firmware address, disk drive number on SW1.

Step 3: Insert programmed SRAM chips into sockets starting at MEM1.

NOTE: If you use the SRAM, please skip the SW1-8 & SW1-9 setting.

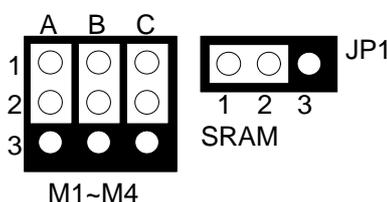


Figure 3-15 SRAM Jumper Setting

(2) Software Programming

It is very easy to use the RAM disk. The RAM disk operates just like a normal floppy disk. A newly installed RAM disk needs to be formatted before files can be copied to it. Use the DOS command [FORMAT] to format the RAM disk.

Step 1: Use jumper block to select the memory type as SRAM refer.

Step 2: Select the proper I/O base port, firmware address and disk drive number on SW1.

Step 3: Insert SRAM chips into sockets starting from MEM1

Step 4: Turn on power and boot DOS from hard disk drive or floppy disk drive.

Step 5: Use the DOS command [FORMAT] to format the RAM disk. If you are installing SRAM for the first time.

To format the RAM disk and copy DOS system files onto the RAM disk.

```
C: \>FORMAT [RAM disk letter] /S /U
```

To format the RAM disk without copying DOS system files into the RAM disk.

```
C: \>FORMAT [RAM disk letter] /U
```

Step 6: Use the DOS command [COPY] to copy files onto the RAM disk. For example, if you want to copy file <EDIT.EXE> to the RAM disk from drive C: and the RAM disk is assigned as drive A:.

```
COPY C: EDIT.EXE A:
```

NOTE: In addition, you can use any other DOS command to operate the RAM disk.

3.4.5 Combination of ROM and RAM Disk

The AR-B7041 can be configured as a combination of one ROM disk and one RAM disk. Each disk occupies a drive unit.

Step 1: Use jumper block to select the proper ROM/RAM configuration you are going to use.

Step 2: Insert the first programmed EPROM into the socket mem1, the second into the socket MEM2, etc.

Step 3: Insert the SRAM chips starting from the first socket assigned as SRAM.

Step 4: Select the proper I/O base port, firmware address and disk drive number on SW1.

Step 5: Turn on power and boot DOS from hard disk drive or floppy disk drive.

Step 6: Use the DOS command [FORMAT] to format the RAM disk.

C: \>FORMAT [RAM disk letter] /U

Step 7: If 5V FLASH (small page) is being used for the first time.

And then use the DOS command [FORMAT] to format the FLASH disk.

Step 8: If large page 5V FLASH is being installed for the first time, please use the FLASH programming utility RFG.EXE to program ROM pattern files.

NOTE: Users can only boot DOS from the ROM disk drive if the AR-B7041 is configured as a ROM and a RAM disk. You don't need to copy DOS onto the RAM disk.

3.5 AR-B7017

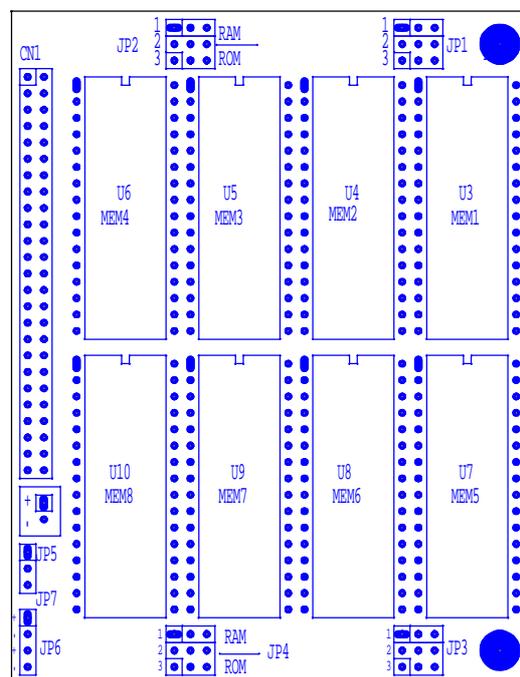


Figure 3-16 AR-B7017 Jumper & Connector Location

3.5.1 Memory Type Setting (JP1 ~ JP4)

The AR-B7017 provides 4 sockets for memory chips.

- JP1: is used to configure the memory type of MEM1 & MEM2
- JP2: is used to configure the memory type of MEM3 & MEM4
- JP3: is used to configure the memory type of MEM5 & MEM6
- JP4: is used to configure the memory type of MEM7 & MEM8

CAUTION: When the power is turned off, please note the following precautions.

1. If your data has been stored in the SRAM disk, do not change the jumper position or data will be lost.
2. Make sure jumpers are set properly. If you mistakenly set the jumpers for SRAM and you have EPROM or FLASH installed, the EPROM or FLASH will drain the battery's power.

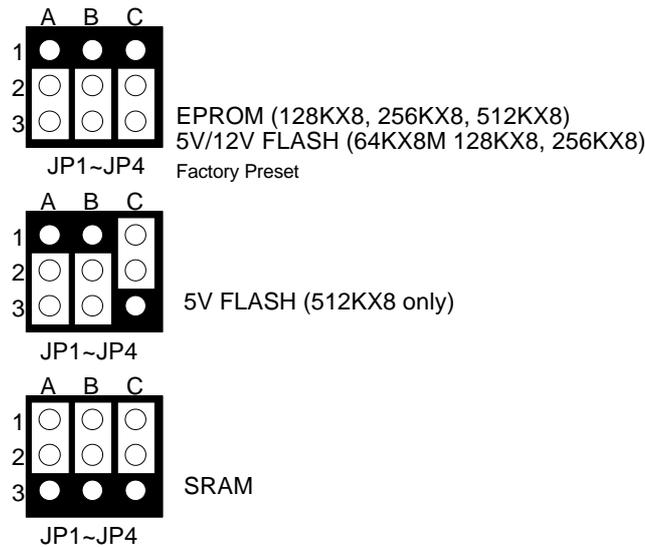


Figure 3-17 JP1~JP4: Memory Type Setting

3.5.2 Battery Setting

(A) Battery Output Connector (JP5)

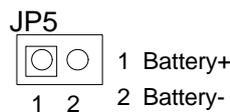


Figure 3-18 JP5: Battery Output Connector

(B) External Battery Connector (JP6)

There are two external battery connectors (JP5 and Jp6) on the AR-B7017. JP5 is used to supply power to the SRAM chips when system power is turned off and you want to remove the AR-B7017 module from AR-B7041 temporarily. JP6 is a 4-pin external battery connector and is designed to supply the power of SRAM when the AR-B7017 is going to be removed from the AR-B7041 for a long time. The voltage range of the external battery should be 3.6VDC to 6 VDC. The pin assignments of the JP6 are defined as follows:

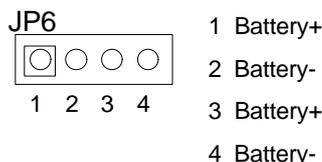
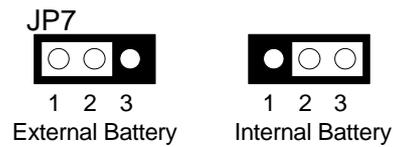
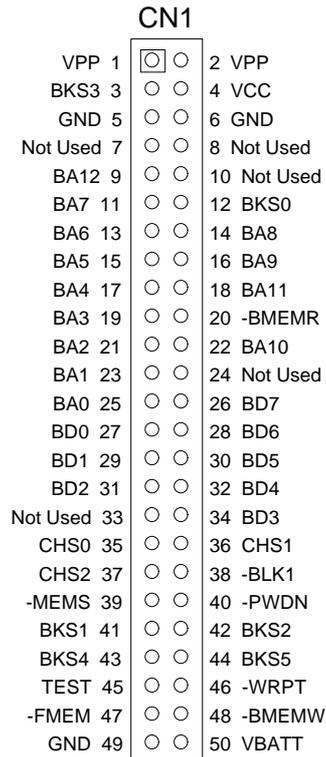


Figure 3-19 JP6: External Battery Connector

(C) External Battery Supplied for SRAM Data Storage (JP7)**Figure 3-20 JP7: External Battery Supplied for SRAM Data Storage****3.5.3 Piggy-Back Connector (CN1)**

CN1 is used to connect with the AR-B7041.

**Figure 3-21 CN1: Piggy-Back Connector**

4. SPECIFICATIONS & SSD TYPES SUPPORTED

4.1 AR-B7041

Memory Socket:	8
Disk Capacity:	EPROM – 8MB maximum FLASH – 4MB maximum SRAM – 4MB maximum
Piggyback Connector:	1
Total Cards in One System:	2 maximum
Expansion Capacity:	24MB maximum
Accepts EPROMs:	27C010 (128Kx8), 27C020 (256Kx8), 27C040 (512Kx8), or 27C080 (1Mx8)
Accepts 5V FLASHs:	64Kx8 to 512Kx8 (28EExxx, 28SFxxx, 29Cxxx, 29Fxxx or 29EExxx)
Accepts SRAMs:	581000 (128Kx8) or 584000 (512Kx8)
Bus Interface:	8 bit ISA bus
Watchdog Timer:	Programmable time-out interval from 6 to 42 seconds
Onboard Battery:	850mAH Lithium battery
External Battery:	Provides connector for external battery
Power Supply:	+5V only
Power Consumption:	+5V DC +/- 5%, 0.5A maximum
SRAM Data Retention Current:	2uA for every SONY CXK581000P-10L SRAM + 4uA
LED Indicator:	Access LED and watchdog LED
Operating Temperature:	0 to 60 degrees C (140 degree F)
Humidity:	0 to 95% (non-condensing)
Storage Temperature:	-25 to 85 degree C
PCB:	2 layers
Dimensions:	11.4 cm x 17.5 cm (4.49" x 6.89")
Weight:	180g (w/o FLASHs, EPROMs and SRAMs)

4.2 AR-B7017

Memory Socket:	8
Disk Capacity:	EPROM – 4MB maximum FLASH – 4MB maximum SRAM – 4MB maximum
Installation:	Piggyback
Accepts EPROM:	27C010 (128Kx8), 27C020 (256Kx8) and 27C040 (512Kx8)
Accepts 5V FLASH:	64Kx8 to 512Kx8 (28EExxx, 28SFxxx, 29Cxxx, 29Fxxx or 29EExxx)
Accepts SRAM:	581000 (128Kx8) and 584000 (512Kx8)
External Battery:	Provides connector for external battery
Power Supply:	+5V only
Power Consumption:	+5V DC +/- 5%, 0.1mA maximum
SRAM Data Retention Current:	2uA for every SONY CXK581000P-10L SRAM + 4uA
Operating Temperature:	0 to 60 degree C (140 degree F)
Humidity:	0 to 95% (non-condensing)
Storage Temperature:	-25 to 85 degree C
PCB:	2 layers
Dimensions:	10.4cm x 8.1cm (4.09" x 3.19")
Weight:	60g (w/o FLASHs, EPROMs and SRAMs)

4.3 SSD TYPES SUPPORTED

The following list contains SRAMs supported by the AR-B7041:

AKM	AKM628128	(128Kx8, 1M bits)
HITACHI	HM628128	(128Kx8, 1M bits)
NEC	UPD431000A	(128Kx8, 1M bits)
SONY	CXK581000P/M	(128Kx8, 1M bits)
HITACHI	HM628512	(512Kx8, 4M bits)
NEC	UPD434000	(512Kx8, 4M bits)
SONY	CXK584000P/M	(512Kx8, 4M bits)

The following list contains small page 5V FLASHs supported by the AR-B7041:

ATMEL	AT29C512	(64Kx8, 512K bits)
SST	PH29EE512	(64Kx8, 512K bits)
ATMEL	AT29C010	(128Kx8, 1M bits)
AMD	Am29F010	(128Kx8, 1M bits)
SST	28EE010	(128Kx8, 1M bits)
SST	28EE011	(128Kx8, 1M bits)
SST	PH29EE010	(128Kx8, 1M bits)
WINBOND	W29EE011	(128Kx8, 1M bits)
ATMEL	AT29C020	(256Kx8, 2M bits)
ATMEL	AT29C040	(512Kx8, 4M bits)
ATMEL	AT29C040A	(512Kx8, 4M bits)
SST	PH28SF040	(512Kx8, 4M bits)

The following list contains large page 5V FLASHs supported by the AR-B7041:

AMD	Am29F512	(64Kx8, 512K bits)
AMD	Am29F010	(128Kx8, 1M bits)
AMD	Am29F020	(256Kx8, 2M bits)
AMD	Am29F040	(512Kx8, 4M bits)

The following list contains EPROMs supported by the AR-B7041:

AMD	Am27C010	(128Kx8, 1M bits)
ATMEL	AT27C010	(128Kx8, 1M bits)
FUJITSU	MBM27C1001	(128Kx8, 1M bits)
HITACHI	HN27C101	(128Kx8, 1M bits)
INTEL	D27C010	(128Kx8, 1M bits)
MITSHUBISHI	M5M27C101	(128Kx8, 1M bits)
NEC	D27C1001	(128Kx8, 1M bits)
NS	NM27C010	(128Kx8, 1M bits)
SGS-THOMSON	M27C1001	(128Kx8, 1M bits)
TI	TMS27C010	(128Kx8, 1M bits)
TOSHIBA	TCS711000	(128Kx8, 1M bits)
AMD	Am27C020	(256Kx8, 2M bits)
ATMEL	AT27C020	(256Kx8, 2M bits)
FUJITSU	MBM27C2001	(256Kx8, 2M bits)
HITACHI	HN27C201	(256Kx8, 2M bits)
INTEL	D27C020	(256Kx8, 2M bits)
MITSHUBISHI	M5M27C201	(256Kx8, 2M bits)
NEC	D27C2001	(256Kx8, 2M bits)

NS	NM27C020	(256Kx8, 2M bits)
SGS-THOMSON	M27C2001	(256Kx8, 2M bits)
TI	TMS27C020	(256Kx8, 2M bits)
TOSHIBA	TCS712000	(256Kx8, 2M bits)
AMD	Am27C040	(512Kx8, 4M bits)
ATMEL	AT27C040	(512Kx8, 4M bits)
FUJITSU	MBM27C4001	(512Kx8, 4M bits)
HITACHI	HN27C401	(512Kx8, 4M bits)
INTEL	D27C040	(512Kx8, 4M bits)
MITSUBISHI	M5M27C401	(512Kx8, 4M bits)
NEC	D27C4001	(512Kx8, 4M bits)
NS	NM27C040	(512Kx8, 4M bits)
SGS-THOMSON	M27C4001	(512Kx8, 4M bits)
TI	TMS27C040	(512Kx8, 4M bits)
TOSHIBA	TCS714000	(512Kx8, 4M bits)
ATMEL	AT27C080	(1Mx8, 8M bits)
SGS-THOMSON	M27C8001	(1Mx8, 8M bits)

5. MEMORY BANKS & INDEX

5.1 USING MEMORY BANKS

This chapter provides the information about how to access the memory on the AR-B7041 without using the AR-B7041 SSD BIOS. The AR-B7041 hardware cut every 8K bytes of memory into a memory bank. To access the data in memory, you have to assign the chip number and the bank number. On every chip, the memory bank number starts from the number zero. The last memory bank number depends on the size of the memory chip used on the AR-7041. For example, if you use the 256K bytes memory chip, the bank number on every chip would be in the range of 0 to 31. The chip number and the bank number are determined by the bank selected register and the chip selected register on the AR-B7041.

The I/O addresses of these registers are determined by of SW1-1 and SW1-2. The memory address of the memory bank is located on the range selected by SW1-3 and SW1-4.

The I/O port address of the bank select register is base port+0, and the I/O port address of the chip select register is base port +1. The following is the format of the bank select register and bank enable register.

Register	I/O Port	D7	D6	D5	D4	D3	D2	D1	D0
Bank Select Register	Base + 0	WPE	A6	A5	A4	A3	A2	A1	A0
Chip Select Register	Base + 1	0	0	0	1	CS3	CS2	CS1	CS0

Where:

WPE Write protect enable bit
A6 – A0 Bank select bits, A0 is the LSB.
CS2 – CS0 Chip select bits of MEM1 to MEM8, CS0 is the LSB
CS3 0 for AR-B7041, 1 for AR-B7017

For different types of memory, A0 to A6 have different explanations. These bits are used to select the bank number of specific memory located by CS0 to CS3.

Memory	A6	A5	A4	A3	A2	A1	A0
64KB EPROM/FLASH	0	0	1	0	BS2	BS1	BS0
128KB EPROM/FLASH	0	0	1	BS3	BS2	BS1	BS0
256KB EPROM/FLASH	0	BS4	1	BS3	BS2	BS1	BS0
512KB EPROM/FLASH	0	BS4	BS5	BS3	BS2	BS1	BS0
1MB EPROM	BS6	BS4	BS5	BS3	BS2	BS1	BS0
128KB SRAM	0	1	0	BS3	BS2	BS1	BS0
512KB SRAM	0	BS5	BS4	BS3	BS2	BS1	BS0

CAUTION: BS0 to BS6 are the memory bank select bits. For example, 128KB memory has sixteen 8K-byte banks, so 4 bits (BS0 to BS3) are needed.

Example 1: Select the 10th bank of the MEM4 on the AR-B7041. The AR-B7041 is using 27C020 (256K*8), and the base port is &H220.

```
100 base_port=&H220
110 OUT base_port+0,&H19
120 OUT base_port+1,&H13
```

Example 2: Select the last bank of MEM5 on the second AR-B7017 piggyback module. The AR-B7017 is using 27C040 (512K*8), and the base port is &H3A0.

```
200 base_port=&H3A0
210 OUT base_port+0,&H3F
220 OUT base_port+1,&H1C
```

5.2 EXPANDING THE AR-B7041'S MEMORY CAPACITY

There are 2 ways to expand the AR-B7041's memory capacity. One is installing 2 AR-B7041 cards in one system and other is using the AR-B7017 memory expansion module.

Up to two AR-B7041 cards can be installed simultaneously. The AR-B7041 firmware will automatically link all of the AR-B7041 cards. In order to use multiple cards, be sure that the AR-B7041 firmware address and base I/O ports meet the following requirements:

- All of the AR-B7041 cards must have contiguous I/O base port
- Each AR-B7041 firmware address must be set to occupy a contiguous area of memory.

The following table illustrates all of valid settings:

Valid Combination Item	AR-B7041			
	First		Second	
	Base I/O Port	Memory Address	Base I/O Port	Memory Address
1	220h	CC00h	2A0h	D000h
2	220h	D000h	2A0h	D400h
3	220h	D400h	2A0h	D800h
4	2A0h	CC00h	320h	D000h
5	2A0h	D000h	320h	D400h
6	2A0h	D400h	320h	D800h
7	320h	CC00h	3A0h	D000h
8	320h	D000h	3A0h	D400h
9	320h	D400h	3A0h	D800h

The AR-B7041 provides 8 sockets for memory chips. Each AR-B7041 card also could be piggy-backed 1 AR-B7017 to have more sockets for more memory capacity. Five combinations of AR-B7041 and AR-B7017 are valid, they are as following:

First		Second	
AR-B7041	AR-B7017	AR-B7041	AR-B7017
Installed	None	None	None
Installed	None	Installed	None
Installed	Installed	None	None
Installed	Installed	Installed	None
Installed	Installed	Installed	Installed

The AR-B7017 accepts the same kinds of memory chips that the AR-B7041 uses. Every AR-B7017 provides eight 32-pin JEDEC DIP sockets for a maximum of 4MB FLASHs, EPROMs or SRAMs. The AR-B7017 is installed on the AR-B7041 through the piggyback connector CN1. When you create the ROM pattern files with extensions exceeding .R08, the files with extensions .R01 to R08 are placed in the first AR-B7041 card from MEM1 to MEM8, and the files with extensions .R09 to .R16 go into the AR-B7017 installed on the first AR-B7041 or the second card from MEM1 to MEM8 if no AR-B7017 module, etc.

If no AR-B7017 is used, the locations and sequence of memory chips are listed on the following table:

Pattern Number	Socket Name	Card of Sockets Located
R01	MEM 1	First AR-B7041
R02	MEM 2	
R03	MEM 3	
R04	MEM 4	
R05	MEM 5	
R06	MEM 6	
R07	MEM 7	
R08	MEM 8	
R09	MEM 1	Second AR-B7041
R10	MEM 2	
R11	MEM 3	
R12	MEM 4	
R13	MEM 5	
R14	MEM 6	
R15	MEM 7	
R16	MEM 8	

If you need to expand the memory capacity, you should install one AR-B7017 on the CN1 piggy-back connector of the first AR-B7041. The following table shows the locations and sequence of all AR-B7041 and AR-B7017 sockets.

Chip Number	Socket Name	Card of Sockets Located
R01	MEM 1	First AR-B7041
R02	MEM 2	
R03	MEM 3	
R04	MEM 4	
R05	MEM 5	
R06	MEM 6	
R07	MEM 7	
R08	MEM 8	
R09	MEM 1	Second AR-B7017
R10	MEM 2	
R11	MEM 3	
R12	MEM 4	
R13	MEM 5	
R14	MEM 6	
R15	MEM 7	
R16	MEM 8	
R17	MEM 1	Second AR-B7041
R18	MEM 2	
R19	MEM 3	
R20	MEM 4	
R21	MEM 5	
R22	MEM 6	
R23	MEM 7	
R24	MEM 8	
R25	MEM 1	Second AR-B7017
R26	MEM 2	
R27	MEM 3	
R28	MEM 4	
R29	MEM 5	
R30	MEM 6	
R31	MEM 7	
R32	MEM 8	

5.3 INDEX

(1) AR-B7041

Name	Function	Page
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SW1	Switch Select	3-2
M1 ~ M4	Memory type setting	3-7
JP1	1Mx8 EPROM select	3-7
JP2	Battery charge select	3-9
J1	Reset signal output of watchdog timer	2-6
J2	Watchdog LED header	2-6
J3	2-pin external battery connector	3-9
J4	Battery output for AR-B7017 module	3-9
J5	4-pin external battery connector	3-9

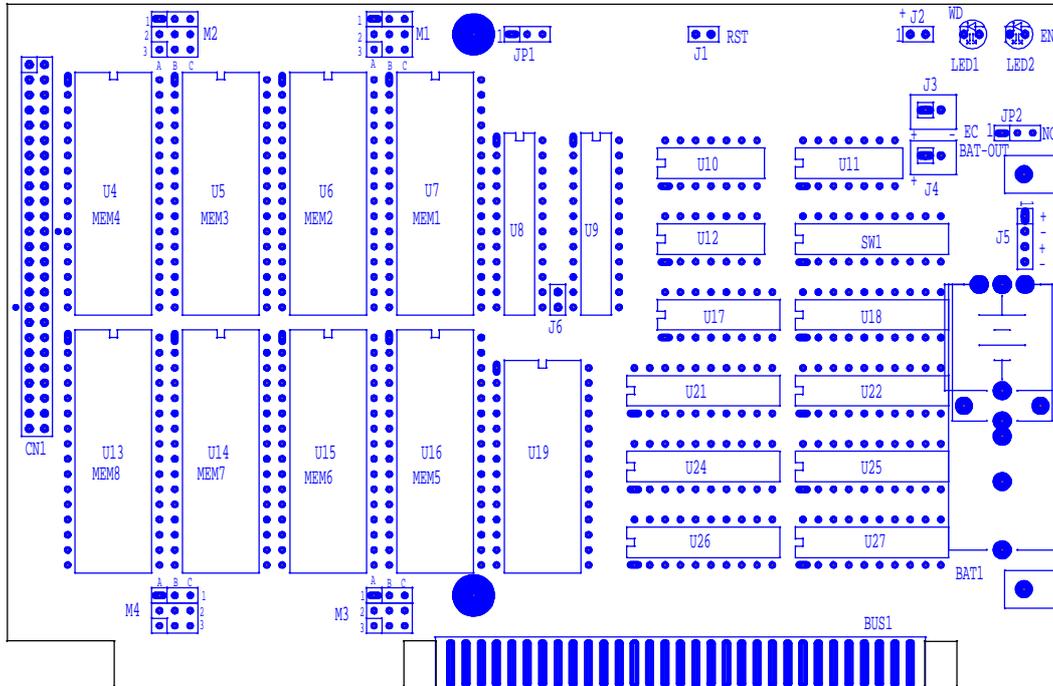
(2) AR-B7017

Name	Function	Page
CN1	Piggy-back connector	3-17
JP1 ~ JP4	Memory type setting	3-16
JP5	Battery Output Connector	3-16
JP6	4-pin external battery connector	3-16
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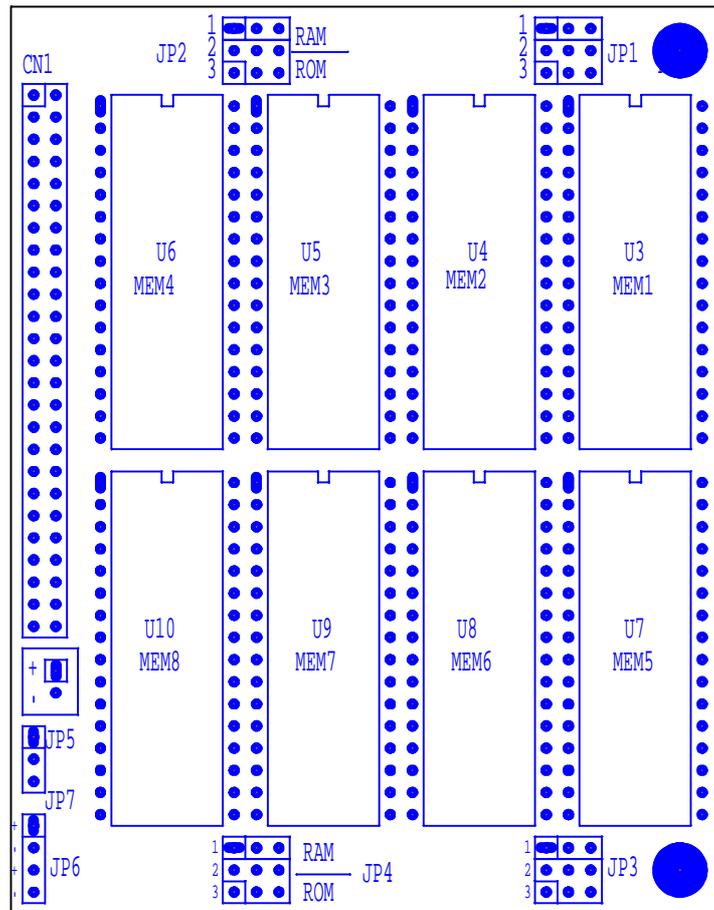
6. PLACEMENT & DIMENSIONS

6.1 PLACEMENT

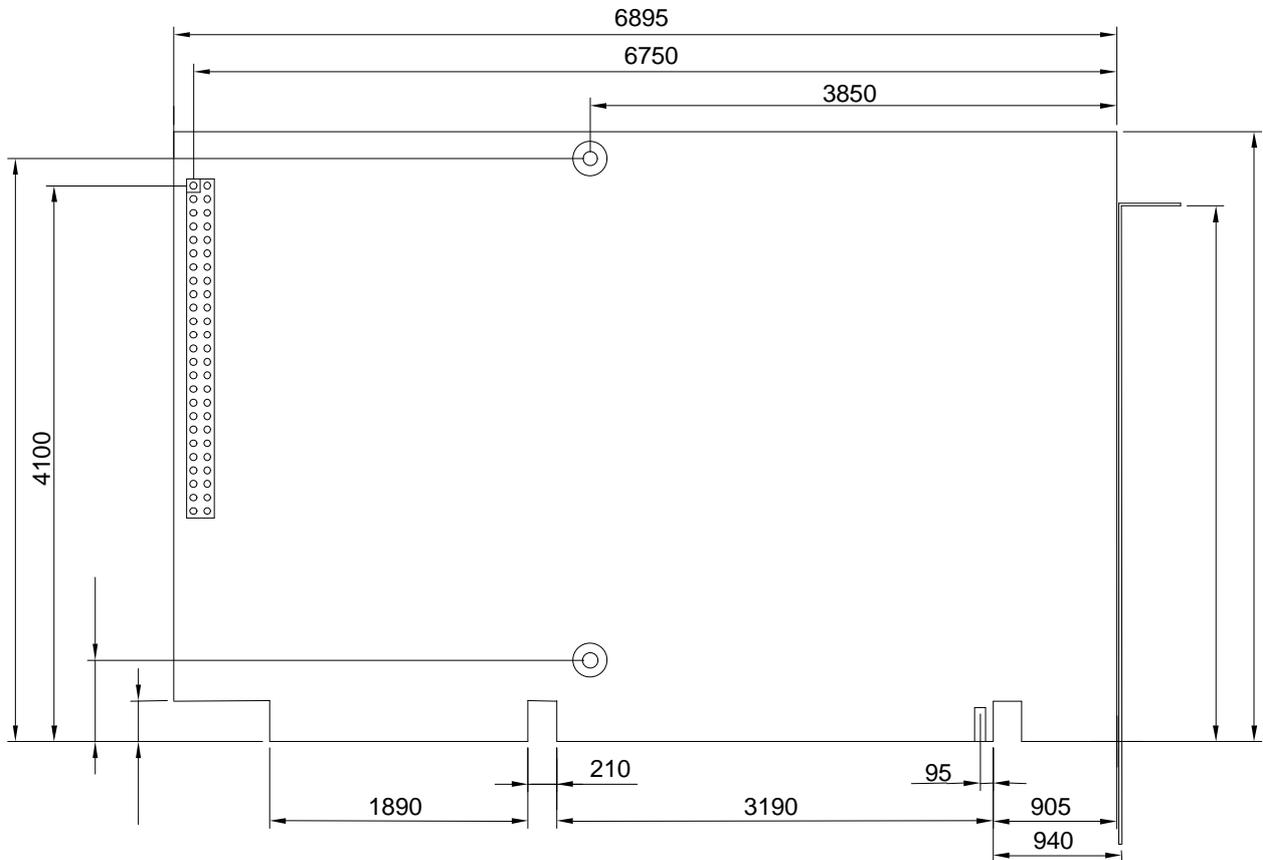
(1) AR-B7041



(2) AR-B7017



6.2 DIMENSIONS FOR AR-B7041



Unit: mil (1 inch = 25.4 mm = 1000 mil)

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