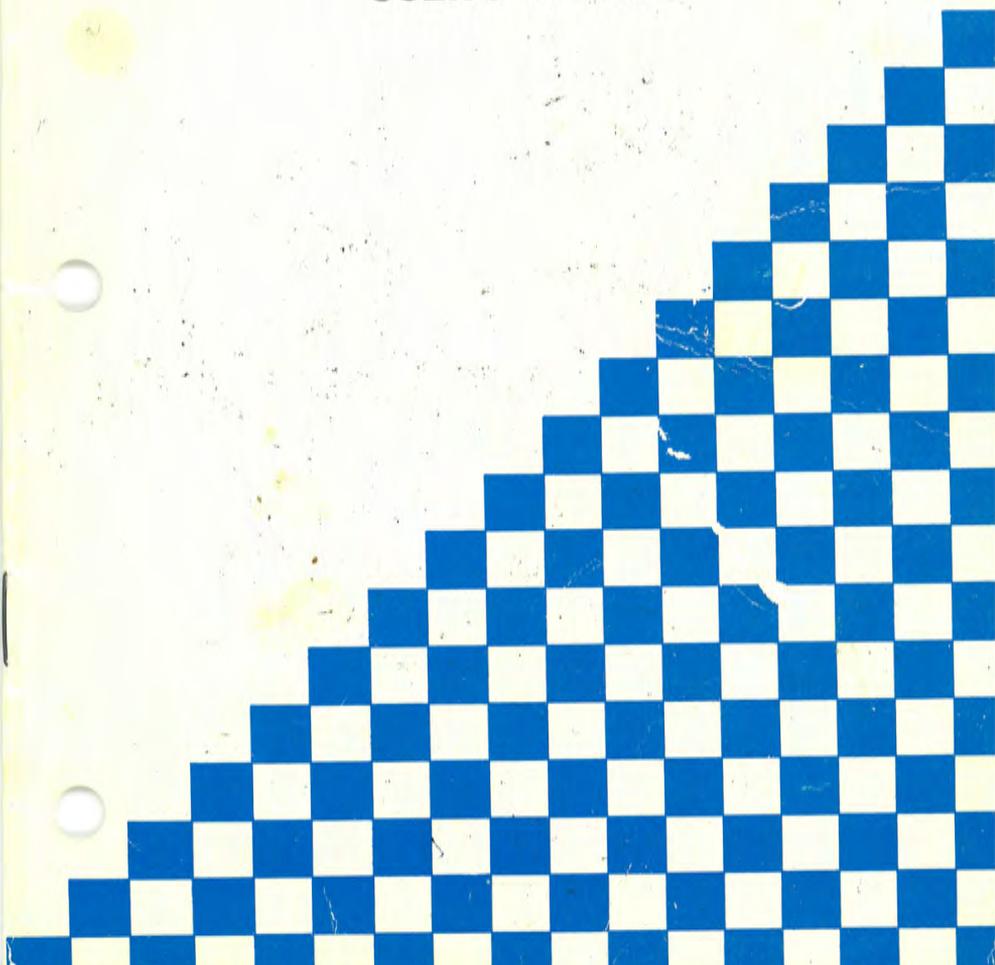




**KW-518**

**2.5 MB RAM CARD**

**USER'S MANUAL**



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**CAUTION:** *In order to avoid damaging the DRAM Chips, always remember to*

- 1. Discharge yourself of static electricity before handling KW-518.*
- 2. Insert or remove the DRAM chips only at a static-free workstation.*

**Manufacturer:**  
**Kouwei Electronic Corporation**

## SECTION 1 INTRODUCTION

KW-518 is an adapter designed for use in 286 microcomputer systems with up to 2.5 Mb of memory expansion capacity.

The "split memory addressing" function of KW-518 can round out the base memory of 286 system to its 640 Kb limit in addition to providing memory in the 15 Mb memory expansion area.

Throughout this manual the term "base memory" is defined as the user-accessible memory in the address range prior to the 640K to 1024K reserved area and the term "extension memory" defined as the user-accessible memory in the 15Mb memory expansion area which starts at 1024K.

### 1.1 FEATURES

- \*Sockets for all memory chips.
- \*User-upgradable memory size.
- \*Split memory addressing to address base memory completely before addressing the extension memory.

### 1.2 INSTALLATION

The steps listed below are to be followed when installing KW-518:

1. Insert DRAM chips into the vacant memory bank(s) one bank at a time according to the expected expansion. Memory ICs are to be inserted from the lowest order vacant bank to contiguous higher order bank(s) with 41256 type. The only exception is using 4164 type on bank 1 under the following conditions:
  1. Base memory is 512Kb
  2. Extension memory is 0 Kb
  3. Starting address is selected at 512K

In this case, only 128 Kb of memory can be enabled on bank 1, therefore, the use of 4164 type to insert into bank 1 is recommended.

2. Configure the IC-inserted banks and starting address with DIP switches following directions in section 2.
3. Plug KW-518 into one of the I/O slots with a 36-pin and 62-pin card-edge-socket, power must be turned off when installing.
4. Turn on the power and run SETUP program to reflect the switch configuration, the program is usually supplied with your personal computer system.

Fig. 1.1 shows a draft board layout of KW-518 indicating locations of DIP switches and memory banks. Note each bank is consisted of two 9-socket rows with the ninth chip used for parity checking.



## 2.2 STARTING ADDRESS

To select the starting address for KW-518 provided memory expansion, abide by the following guidelines:

(Addresses are expressed in decimal with K meaning 2 to the power of 10 and M meaning 2 to the power of 20).

- KW-518 shall not be made responding to addresses already used by memories from system board or other RAM expansion cards.
- The base memory before installing KW-518 has to be correctly reflected by switch or jumper settings on the system board to avoid overlapping mentioned above.
- The address range 640K through 1024K are reserved for video RAM, I/O ROM, etc., and are unable to be set as the starting address.
- For systems with 512Kb of base memory and no extension memory, the starting address assigned to KW-518 can be 512K or 1024K.
- In general, for expansion beyond address 1024K, no gaps between memory are allowed.

The switch 1 through 7 on SW1 are used to configure the starting address determined by the following table:

Table 2.2

Starting address		Toggle switch settings on SW1						
in M	in K	S1	S2	S3	S4	S5	S6	S7
0.250	256	OFF	ON	OFF	ON	ON	ON	ON
* 0.500	512	ON	ON	OFF	ON	ON	ON	ON
→ 1.000	1024	ON	ON	ON	OFF	OFF	OFF	OFF
1.250	1280	OFF	ON	ON	OFF	OFF	OFF	OFF
1.375	1408	ON	OFF	ON	OFF	OFF	OFF	OFF
1.500	1536	OFF	OFF	ON	OFF	OFF	OFF	OFF
1.750	1792	ON	OFF	OFF	OFF	OFF	OFF	OFF
1.875	1920	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2.000	2048	ON	ON	ON	ON	OFF	OFF	OFF
2.250	2304	OFF	ON	ON	ON	OFF	OFF	OFF
2.375	2432	ON	OFF	ON	ON	OFF	OFF	OFF
2.500	2560	OFF	OFF	ON	ON	OFF	OFF	OFF
2.750	2816	ON	OFF	OFF	ON	OFF	OFF	OFF
2.875	2944	OFF	OFF	OFF	ON	OFF	OFF	OFF
3.000	3072	ON	ON	ON	OFF	OFF	OFF	ON
3.250	3328	OFF	ON	ON	OFF	OFF	OFF	ON
3.375	3456	ON	OFF	ON	OFF	OFF	OFF	ON
3.500	3584	OFF	OFF	ON	OFF	OFF	OFF	ON
3.750	3840	ON	OFF	OFF	OFF	OFF	OFF	ON
3.875	3968	OFF	OFF	OFF	OFF	OFF	OFF	ON
4.000	4096	ON	ON	ON	ON	OFF	OFF	ON
4.250	4352	OFF	ON	ON	ON	OFF	OFF	ON
4.375	4480	ON	OFF	ON	ON	OFF	OFF	ON
4.500	4608	OFF	OFF	ON	ON	OFF	OFF	ON
4.750	4864	ON	OFF	OFF	ON	OFF	OFF	ON
4.875	4992	OFF	OFF	OFF	ON	OFF	OFF	ON
5.000	5120	ON	ON	ON	ON	OFF	ON	OFF
5.250	5376	OFF	ON	ON	OFF	OFF	ON	OFF
5.375	5504	ON	OFF	ON	OFF	OFF	ON	OFF
5.500	5632	OFF	OFF	ON	OFF	OFF	ON	OFF
5.750	5888	ON	OFF	OFF	OFF	OFF	ON	OFF
5.875	6016	OFF	OFF	OFF	OFF	OFF	ON	OFF
6.000	6144	ON	ON	ON	ON	OFF	ON	OFF
6.250	6400	OFF	ON	ON	ON	OFF	ON	OFF
6.375	6528	ON	OFF	ON	ON	OFF	ON	OFF
6.500	6656	OFF	OFF	ON	ON	OFF	ON	OFF
6.750	6912	ON	OFF	OFF	ON	OFF	ON	OFF
6.875	7040	OFF	OFF	OFF	ON	OFF	ON	OFF
7.000	7168	ON	ON	ON	OFF	OFF	ON	ON
7.250	7424	OFF	ON	ON	OFF	OFF	ON	ON
7.375	7552	ON	OFF	ON	OFF	OFF	ON	ON
7.500	7680	OFF	OFF	ON	OFF	OFF	ON	ON
7.750	7936	ON	OFF	OFF	OFF	OFF	ON	ON
7.875	8064	OFF	OFF	OFF	OFF	OFF	ON	ON
8.000	8192	ON	ON	ON	ON	OFF	ON	ON
8.250	8448	OFF	ON	ON	ON	OFF	ON	ON
8.375	8576	ON	OFF	ON	ON	OFF	ON	ON
8.500	8704	OFF	OFF	ON	ON	OFF	ON	ON

*Handwritten note: 3000*

Table 2.2

Starting address		Toggle switch settings on SW1						
in M	in K	S1	S2	S3	S4	S5	S6	S7
8.750	8960	ON	OFF	OFF	ON	OFF	ON	ON
8.875	9088	OFF	OFF	OFF	ON	OFF	ON	ON
9.000	9216	ON	ON	ON	OFF	ON	OFF	OFF
9.250	9472	OFF	ON	ON	OFF	ON	OFF	OFF
9.375	9600	ON	OFF	ON	OFF	ON	OFF	OFF
9.500	9728	OFF	OFF	ON	OFF	ON	OFF	OFF
9.750	9984	ON	OFF	OFF	OFF	ON	OFF	OFF
9.875	10112	OFF	OFF	OFF	OFF	ON	OFF	OFF
10.000	10240	ON	ON	ON	ON	ON	OFF	OFF
10.254	10496	OFF	ON	ON	ON	ON	OFF	OFF
10.375	10624	ON	OFF	ON	ON	ON	OFF	OFF
10.500	10752	OFF	OFF	ON	ON	ON	OFF	OFF
10.750	11008	ON	OFF	OFF	ON	ON	OFF	OFF
10.875	11136	OFF	OFF	OFF	ON	ON	OFF	OFF
11.000	11264	ON	ON	ON	OFF	ON	OFF	ON
11.250	11520	OFF	ON	ON	OFF	ON	OFF	ON
11.375	11648	ON	OFF	ON	OFF	ON	OFF	ON
11.500	11776	OFF	OFF	ON	OFF	ON	OFF	ON
11.750	12032	ON	OFF	OFF	OFF	ON	OFF	ON
11.875	12160	OFF	OFF	OFF	OFF	ON	OFF	ON
12.000	12288	ON	ON	ON	ON	ON	OFF	ON
12.250	12544	OFF	ON	ON	ON	ON	OFF	ON
12.375	12672	ON	OFF	ON	ON	ON	OFF	ON
12.500	12800	OFF	OFF	ON	ON	ON	OFF	ON
12.750	13056	ON	OFF	OFF	ON	ON	OFF	ON
12.875	13184	OFF	OFF	OFF	ON	ON	OFF	ON
13.000	13312	ON	ON	ON	OFF	ON	ON	OFF
13.250	13568	OFF	ON	ON	OFF	ON	ON	OFF
13.375	13696	ON	OFF	ON	OFF	ON	ON	OFF
13.500	13824	OFF	OFF	ON	OFF	ON	ON	OFF
13.750	14080	ON	OFF	OFF	OFF	ON	ON	OFF
13.875	14208	OFF	OFF	OFF	OFF	ON	ON	OFF
14.000	14336	ON	ON	ON	ON	ON	ON	OFF
14.250	14592	OFF	ON	ON	ON	ON	ON	OFF
14.375	14720	ON	OFF	ON	ON	ON	ON	OFF
14.500	14848	OFF	OFF	ON	ON	ON	ON	OFF
14.750	15104	ON	OFF	OFF	ON	ON	ON	OFF
14.875	15232	OFF	OFF	OFF	ON	ON	ON	OFF
15.000	15360	ON	ON	ON	OFF	ON	ON	ON
15.250	15616	OFF	ON	ON	OFF	ON	ON	ON
15.375	15744	ON	OFF	ON	OFF	ON	ON	ON
15.500	15872	OFF	OFF	ON	OFF	ON	ON	ON
15.750	16128	ON	OFF	OFF	OFF	ON	ON	ON
15.875	16256	OFF	OFF	OFF	OFF	ON	ON	ON

\*When selecting this starting address (for system board with 512Kb base memory and no extension memory only), bank 1 on KW-518 is preferably plugged with 4164 type DRAM, for only 128Kb can be enabled on bank 1 under these conditions.

SECTION 3 SET-UP EXAMPLES

The following examples are used to illustrate methods in setting up the switches, in each example we hypothesize that no other adapters were used to provide extension memory.

The units used in these examples to express memory size and addressing (in decimal) are Kb and K, they can be converted to Mb or M for your reference with the formulas:

$$1 M = 1024 K \quad 1 Mb = 1024 Kb$$

1. A system board has 512 Kb of DRAM installed with no extension memory. To install a KW-518 two approaches in determining the starting address can be selected, each supported by inserting a different type of memory IC into bank 1:

Case 1: Starting address set at 1024K

The base memory size (512 Kb) is not affected and all the KW-518 memory contribute to the extension memory. Use only 41256 type to fill any bank(s), including bank 1.

Case 2: Starting address set at 512 K

The memory on bank 1 will contribute to the base memory, the memory from other banks will contribute to extension memory. Because only 128 Kb on bank 1 can be enabled in this case, the recommended DRAM for bank 1 is 4164 type.

To illustrate case 2, refer to the following configuration (suppose bank 1 is inserted with 4164 type ICs, bank 2,3,4,5 are inserted with 41256 type ICs).

SW1								SW2			
1	2	3	4	5	6	7	8	1	2	3	4
ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON

Amount of memory inserted vs. banks.

BANK1	BANK2	BANK3	BANK4	BANK5
128Kb	512Kb	512Kb	512Kb	512Kb

2. A system board has 640Kb of DRAM installed with no extension memory. To install a KW-518 to it, the starting address has to be set at the lowest unclaimed address space in the expansion memory area, which is 1024 K, all the memory from the KW-518 will contribute to the extension memory. The base memory will remain at 640 Kb. Suppose that all five banks are inserted with 41256 type ICs, the extension memory is now 512 Kb \*5 = 2560 Kb, the following configuration will help illustrate this example:

SW1								SW2			
1	2	3	4	5	6	7	8	1	2	3	4
ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON

Amount of inserted memory vs. banks.

BANK1	BANK2	BANK3	BANK4	BANK5
512Kb	512Kb	512Kb	512Kb	512Kb

3. A system board has 1024 Kb of DRAM installed, of which 512 Kb are assigned to be the base memory and another 512 Kb to the expansion memory area. To install a KW-518, the starting address has to be set adjacent to the upper limit of the extension memory existed, which is:

$$1024 K + 512 K = 1536 K$$

all the memory on KW-518 will contribute to the extension memory. Suppose each of the five banks are inserted with 41256 type ICs, the extension memory resulted will be:

$$512 Kb + (512 Kb *5) = 3072 Kb$$

The base memory size will stay at 512 Kb.

To help illustrate this example, please refer to the following configuration:

SW1								SW2			
1	2	3	4	5	6	7	8	1	2	3	4
OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON

Amount of memory inserted vs. banks

BANK1	BANK2	BANK3	BANK4	BANK5
512Kb	512Kb	512Kb	512Kb	512Kb

4. The DRAM IC installed on a system board accounts to 1024 Kb, and 640 Kb of which are assigned to be the base memory with the rest 384 Kb to the expansion memory area. To install a KW-518, the starting address has to be set at the lowest unclaimed address space in the expansion memory area which is:

$$1024 K + 384 K = 1408 K$$

In case all the five banks are inserted with 41256 type ICs, the resulted extension memory will be:

$$384 Kb + (512 Kb *5) = 2944 Kb$$

The base memory remains at 640 Kb.

To better understand, please refer to the following configuration:

SW1								SW2			
1	2	3	4	5	6	7	8	1	2	3	4
ON	OFF	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON

Amount of memory inserted vs. banks.

BANK1	BANK2	BANK3	BANK4	BANK5
512Kb	512Kb	512Kb	512Kb	512Kb

\*If the system incorporates other adapter with RAM expansion to respond extension memory before installing KW-518, then the starting addresses and extension memories concluded from the above examples has to be added with the corresponding adapter's memory dimension.

APPENDIX  
BLOCK DIAGRAM OF KW-518

