

MEMORY EXPANSION BOARDS FOR USE WITH FLASHMODULE PRODUCTS



FLASH Memory MODULES

512K Flash
1M EPROM
upto 8M SRAM



FEATURES

- 512k-bytes of Flash EEPROM
- 1 M-byte of EPROM
- Up to 8 M-bytes Static RAM
- Battery Backup
- Intelligent Memory Detection
- FlashFormatter
- Data Logger
- 8 modes of operation
- Supported in United Kingdom

The picture shows a FlashFormatter with 2MByte SRAM. Actual Size (100 x 80 mm)

DESCRIPTION

The Flash memory modules are available for use with the FlashModule product range. They can also be used with other products in the Module product range although they can not be used as Formatters with these products. There are a number of combinations of the basic memory expansion card. The expansion card adds an extra 512 k-bytes of Flash EEPROM, up to 1 M-byte of EPROM and up to 8 M-bytes of static RAM to that already present on the FlashModule controller. The card is fitted with 5 Volt only flash memory and can be powered from a single 5 Volt supply. When one of these products is used with a FlashModule controller the controller detects the amount and type of additional memory and the Minos memory manager is set up accordingly. All the memory on these expansion cards is accessed with zero wait states. Two visual indicators are fitted to the board. The first shows when power is supplied to the board, the second is a status LED that is used during programming cycles.

The FlashFormatter is a memory expansion card fitted with a Flash EEPROM and a normal EPROM. The Flash memory can be used to store programs or object code to be programmed into the flash memory fitted to the FlashModule. The EPROM contains the default system settings in case the user corrupts both Flash memories. It can be used to format the Flash EEPROM on a FlashModule for use with the Minos operating system, and so it is only supplied with a multi license copy of Minos. The function of the FlashFormatter is determined by the setting of the option switches when power is first ap-

plied. The Flash memory on the FlashModule can either replace the boot Flash on the FlashModule or extend the size of the Flash memory. The EPROM on the FlashFormatter occupies the same address space as the Flash memory and is selected using a switch. To prevent accidental erasing of the FlashModules' Flash EEPROM a secondary switch must be activated before the erasure takes place. The FlashFormatter can be purchased with static RAM fitted as well as the program memory. The FlashFormatter board is supplied as part of a Multi License Development Pack for the FlashModule product range.

The static RAM expansion adds up to 8 M-bytes of battery backed static RAM to the controller. The RAM card addition is available in three different capacities, 2 M-bytes, 4 M-bytes and 8 M-bytes. The battery backup is provided by an on board battery and power supply monitor. While the sup-

ply voltage is in excess of 4.5 Volts the static RAMs are powered by the main power supply and they can be accessed. When the supply voltage falls below this limit the static RAM is disabled and powered from the battery. Data will be retained in the static RAM under battery backup conditions for up to one month. The user using a link on the board can clear all data in the static RAMs.

The static RAM expansion makes the ideal addition to the FlashModule product range for remote data logging. Large amounts of data can be stored in this RAM for collection at a later date. The data can be retrieved either via the serial port or by unplugging the expansion card and plugging it into a master unit attached to a host computer. The example program shows a typical data logging application where data is logged and time stamped if it is

FLASH Memory MODULES

```
#include <stdio.h>
#include <adio.h>
#include <time.h>
#include <minos.h>

#define HighLimit 0xf0          /* Define upper limit */
#define LowLimit 0xd0          /* Define lower limit */
#define phonenum "atdt0044371876077" /* Dial string for modem */
#define hangup "ath"          /* Hangup command for modem */
#define station 232           /* Station number */

FILE *modem;                  /* Handle for modem */

void sendwarning(int data)
{
    fprintf(modem,phonenum); fflush(modem); delay(100);
    if (data < 65000)          /* Dial modem & send message */
        fprintf(modem,"Station %d has exceeded the limits %d times"
            ,station,data);
    else
        fprintf(modem,"Station %d needs attention",station);
    fprintf(modem,hangup);
    fflush(modem);
}

void main(void)
{
    unsigned int *buffer;      /* pointer to the buffer RAM */
    struct tm time;            /* structure to hold time */
    int data, channel, limit_exceeded=0;
    *buffer = (unsigned short *) 0xd00000; /* initialise buffer start */
    adioinit();                /* initialise analogue I/O */
    modem = fopen("S2","w+"); /* open path to modem */
    while (limit_exceeded < 65535) /* loop until buffer is full */
    {
        for( channel=0;channel<8;channel++) /* read each channel in turn */
        {
            data = adc(channel); /* read adc & check value */
            if ((data < LowLimit) || (data > HighLimit))
            {
                gettime(&time); /* read the system time */
                toggledi(); /* flash Led */
                *buffer = channel; *buffer++; /* store channel no */
                *buffer = data; *buffer++; /* store data read */
                *buffer = time.tm_hour; *buffer++; /* store current time */
                *buffer = time.tm_min; *buffer++;
                *buffer = time.tm_sec; *buffer++;
                *buffer = time.tm_mday; *buffer++; /* store current date */
                *buffer = time.tm_mon; *buffer++;
                *buffer = time.tm_year; *buffer++;
                limit_exceeded += 1; /* increment count */
            }
            if (limit_exceeded % 1000 == 0)
                sendwarning(limit_exceeded); /* send message to control */
        }
        delay(100); /* wait for 10 seconds */
    }
    fprintf(modem,phonenum); fflush(modem); delay(100);
    fprintf(modem,"Station %d shutting down (data overflow)",station);
    fprintf(modem,hangup);
    fflush(modem);
    fclose(modem); /* close path to modem */
}
```

ORDER CODES

Order Number	Product Name	1 off	100 off
M-100FM	Modula-2 Development Pack	£495	
<i>Multi License Minos Modula-2 programming package (including FM-200)</i>			
C-100FM	C Development Pack	£595	
<i>Multi License Minos 'C' programming package (including FM-200)</i>			
F-512F	FlashFormatter	£345	
<i>512 k-byte Flash EEPROM, 1 M-byte EPROM, Multi license Minos</i>			
F-512F2M	FlashFormatter + 2M SRAM	£395	
<i>512 k-byte Flash EEPROM, 1 M-byte EPROM, 2 M-byte SRAM, Multi license Minos</i>			
F-2M	2 M-byte Static RAM Card	£145	£95
<i>2 M-byte Static RAM with Battery Backup 100 x 80</i>			
F-4M	4 M-byte Static RAM Card	£195	£135
<i>4 M-byte Static RAM with Battery Backup 100 x 118 mm</i>			
F-8M	8 M-byte Static RAM Card	£295	£195
<i>8 M-byte Static RAM with Battery Backup 100 x 170 mm</i>			

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outside a set of predetermined limits. At various limits the controller uses a modem to inform the control station of its status. When the data buffer is nearly full a different message is sent requesting assistance. The program can be used to log 65,535 blocks of data in the standard format shown

when using the 2 M-byte expansion board. Using some simple data compression techniques this can be increased to 400,000 blocks, which with average data, could be one block every minute for a whole year.

SPECIFICATION

Flash EEPROM. 512 k-bytes, 8 sectors, 64 k-byte sectors, 5 Volt only, 0 wait states, Boot or expansion.

EPROM. 512 k-bytes, expandable up to 1 M-byte, 32 pin JEDEC standard, 0 wait states, Boot or expansion, system defaults.

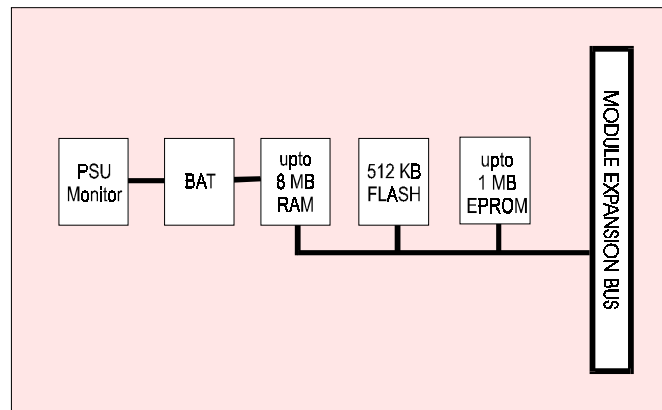
Static RAM. 2 M-bytes, 4 M-bytes, 8 M-bytes, battery backed, 0 wait states

Battery Backup. 3 Volt Vanadium Lithium compound cell, 1 month typical retention, on board power supply monitor/switch.

Size. FlashFormatter and up to 2 M-bytes 100 x 80mm, 4 M-bytes 100 x 118mm, 8 M-bytes 100 x 170mm.

Power Supply. Single 5 Volt operation, < 50mA typ.

Environmental. Operating temperature 0 - 70 degC, 0 to 90% relative humidity (non condensing)



The picture shows the block diagram of the FlashMemory Module



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