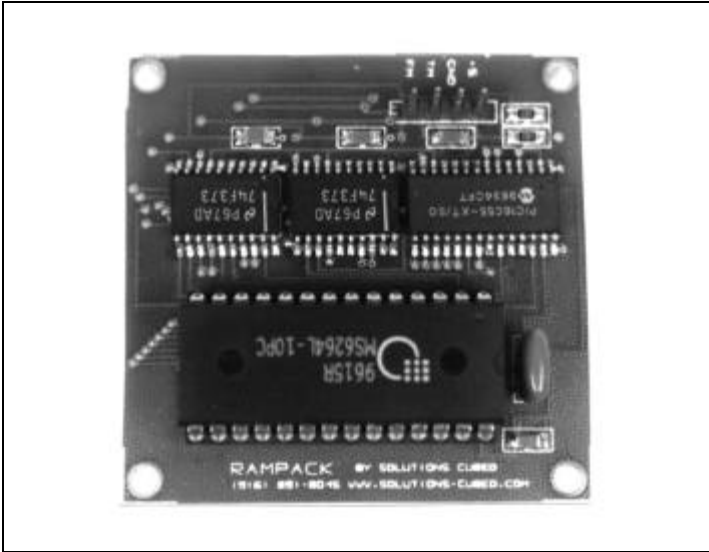


MINI-MODS

●●●●●●●●●● Miniature Engineering Modules

RAMPack



Description

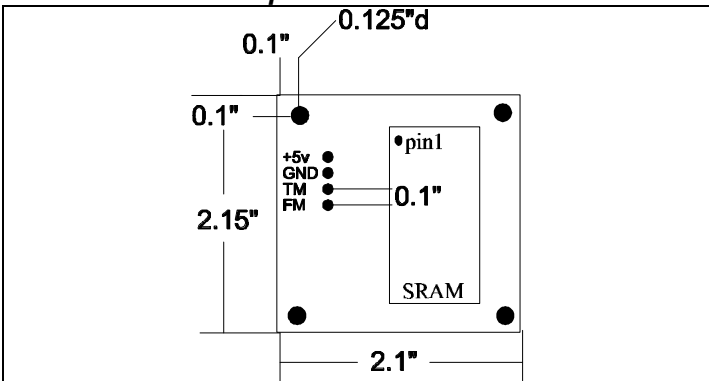
The RAMPack module maintains 8Kx8 bytes of RAM. The module makes use of buffers and an on board microcontroller in order to allow addressable access to the RAM using only two i/o lines.

An automatic baud rate detection scheme allows the user to use a variety of baud rates without setting hardware jumpers. The RAMPack supports 1200, 2400, 4800, and 9600 baud rates.

The 8Kx8 bytes of low cost static RAM comes socketed. If the user requires non-volatile RAM(RAM whose data stays valid after power is removed), a higher priced NVRAM can be purchased and inserted into the socket.

The RAMPack could be used for storage of data in remote information gathering devices, such as temperature loggers. The additional RAM could also be used to extend variable space in microcontrollers

Mechanical Specifications



Operational Ratings

Operating Temperature:	0°C to 70°C
Storage Temperature:	-45°C to 85°C
Minimum Operational Voltage:	3.0V
Maximum Operational Voltage:	7.0V
Voltage on Any Header Pin:	-0.3V to 7.0V
Maximum Current Sunk by TM/FM pin:	25mA
Maximum Current Sourced TM pin:	5mA
Average DC operational current:	10mA
Data Rates:	1.2, 2.4, 4.8, 9.6 kbaud
Sync Byte:	hex55, binary"0101 0101"
Write Command:	hex00, binary"0000 0000"
Read Command:	hex01, binary"0000 0001"

RAM

The primary benefit of the RAMPack Mini-Mod is that it gives the Master Unit access to additional data space without the need for many i/o's. An 8Kx8 byte RAM chip requires as much as 8 data lines, 13 address lines, and 4 control lines, for a total of 25 i/o pins. With the RAMPack you only need two.

The RAMPack comes with a socketed SRAM. With this kind of RAM(the S is for "static"), if power is removed from the system then the data in the RAM is lost. We placed the RAM in a socket so that it could be replaced with a much more expensive NVRAM. Non-volatile RAM, or NVRAM, retains its data even with power loss. Dallas Semiconductor (214-450-0448) makes a plug in NVRAM replacement for the SRAM available on the RAMPack. The part number for this replacement is the DS1225AB.

Data Transfer

The RAMPack communicates using serial 8N1 communication(1 start bit, 8 data bits, 1 stop bit, no parity) LSB first. A specific serial protocol, is required to ensure good communication. This Mini-Mod requires a sync byte(hex55) to be the first byte sent. The RAMPack measures the "Master" units baud rate by means of the sync byte. If a hex55 is not received first the RAMPack will ignore the byte.

The sync byte should be followed immediately by the command byte(read or write). The third byte in the communication stream is the amount byte. The amount byte is either the number of bytes to be read or the number of bytes to be written.

If bytes are to be read the 4th and 5th bytes sent are high address byte and low address byte where the read is to begin. If bytes are to be written, the 4th and 5th bytes are the high address byte and the low address byte that the first byte is to be written to. If multiple bytes are to be read or written, the RAMPack increments the address pointer as needed. The amount byte should be no larger than 8 to prevent timing errors in the communication.



SOLUTIONS CUBED

3029-F Esplanade
Chico, CA 95973

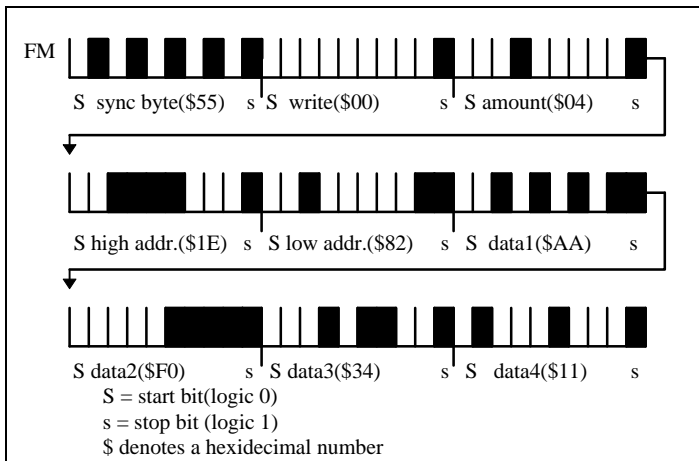
phone (916) 891-8045
fax (916) 891-1643
www.solutions-cubed.com



Communication Protocols

Write-

The following timing diagram details the method for writing four bytes(data1-data4)to RAM, starting at address hex1E82. You must send a start bit followed by the 8 data bits and a stop bit for each byte. Data is sent to the RAMPack on the FM pin(From Master). The RAMPack will determine the baud rate to use from the sync byte. The first byte sent is the sync byte(hex55); which is followed by the write command(hex00). The third byte is the amount byte, which details the amount of bytes to be written. In this case the amount is hex04. The next two bytes are the high and low address bytes. This address is hex1E82, see the memory map for available locations. Make sure that you address only locations that actually exist(don't write to hex7FFF). After the address bytes are sent, the data bytes follow. Data1 will be written to location hex1E82. Data2 will be written to hex1E83, data3 to hex1E84, and data4 to hex1E85.

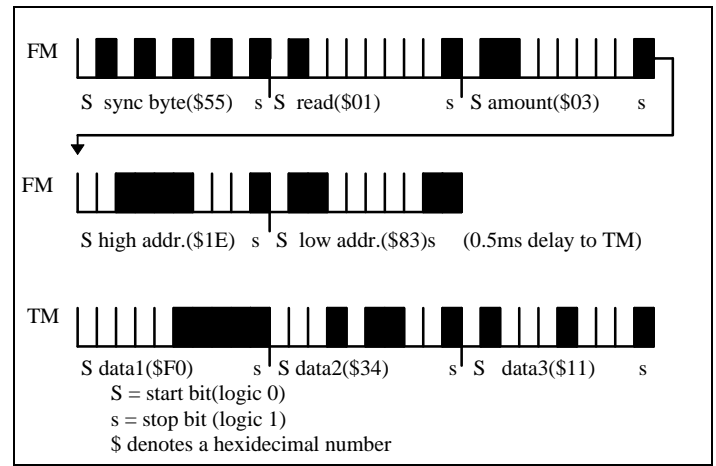


data format for WRITE(on FM pin)

Read-

The following timing diagram details the method for reading three bytes(data1-data3)from RAM, starting at address hex1E83. The sync through address bytes are sent on the FM pin. The first byte sent is the sync byte(hex55); which is followed by the read command(hex01). The third byte is the amount byte, which details the amount of bytes to be read. In this case the amount is hex03. The next two bytes are the high and low address bytes. This address is hex1E83. After the address bytes are received by the RAMPack waits for about 0.5ms. When this period elapses the data bytes will be sent LSB first on the TM(To Master)pin. Data1 will be read from location hex1E83, data2 will be read from hex1E84, and data3 from hex1E85. Data sent on the TM pin is sent 8N1, as described above. The baud rate of data on the TM pin is the same as the rate of data on the FM pin when the read command was received.

If a data stream is interrupted or incomplete a watchdog timer will reset the RAMPack in about 18ms. Further communication prior to this reset is possible if the data format remains correct.



Data format for READ

Memory Map

The RAMPack allows you to store bytes of data at any of the 8,192 byte locations detailed below.

hex address		dec address
\$00 00	1K RAM	0000
\$03 FF		1023
\$04 00	2K RAM	1024
\$07 FF		2047
\$08 00	3K RAM	2048
\$0B FF		3071
\$0C 00	4K RAM	3072
\$0F FF		4095
\$10 00	5K RAM	4096
\$13 FF		5119
\$14 00	6K RAM	5120
\$17 FF		6143
\$18 00	7K RAM	6144
\$1B FF		7167
\$1C 00	8K RAM	7168
\$1F FF		8191

Byte address locations

Other Mini-Mods

Mini-Watt- A 5V@200mA power supply with built in charging circuit. Provides 5V with two NiCad batteries. Can act as an battery-backed power supply, or as a portable battery-powered supply. Just 2"x3" in size. \$29.95. Add \$15 for 2-1000mAh NiCads and a 9V@500mA power cube(for charging).

Pocket Watch- Real time clock with an alarm setting and alarm output. Keeps track of time, date, year with leap year compensation. Serially addressable. This Mini-Mod utilizes auto-baud detect. It can operate at 2400, 4800, and 9600 baud. \$19.95.

Motor Mind- Serially controlled H-bridge motor driver. Allows control of DC motors. Provides the ability to read a tachometer, change direction, adjust speed, and dynamically brake the motor. Up to 30V motors and 2A continuous current load(package power dissipation must not be exceeded). This Mini-Mod operates at 2400 baud. \$29.95.