# Alesis MMT8 8x Memory Expansion Modification

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**This modification expands the memory of the Alesis MMT8 to 8x the original memory capacity. It works just as if you had 8 separate MMT8's – each "bank" is an entire MMT8 memory bank.**

**The total cost of the expansion should be around $US40!!**

**Each bank is accessed by switching an 8 position rotary switch to choose the current memory. Each memory holds 99 songs, 99 parts, 8 tracks – just like the original MMT8 memory.**

**The down side of this expansion is that you can't use a part from, say, memory bank 1, and another part from memory bank 2, and put them into the same song. Each memory is isolated from the other. However, you can save and load the memory contents from each memory bank as a whole bank, as individual songs, or individual parts, just like doing memory dump on the original memory.**

**You can also save individual parts or songs, and change memory, and load them into the next memory. But you can't directly copy a part or song from one memory to another. You have to save them and then load them into the next memory.**

## Equipment

Soldering iron, 15W (no greater – can damage the circuit tracks by excess heat)
Solder
Antistatic wrist band and cable
Wire cutters

## Components required

**RAM chips -** Texas Instruments BQ4014Y 256K x 8 Nonvolatile SRAM chips (2 required): about US$18.00 each
http://focus.ti.com/docs/prod/folders/print/bq4014y.html

2x 28-Pin IC Sockets: to fit the above RAM chips – may not be required, depending on if your MMT8 chips are already in sockets.

Hookup wires, insulated, of different colours

10k ¼ watt resistors – 6 needed

Rotary encoder switch: about US$3.00
http://www.jameco.com/webapp/wcs/stores/servlet/ProductDisplay?langId=-1&storeId=10001&catalogId=10001&productId=549407

## Procedure:

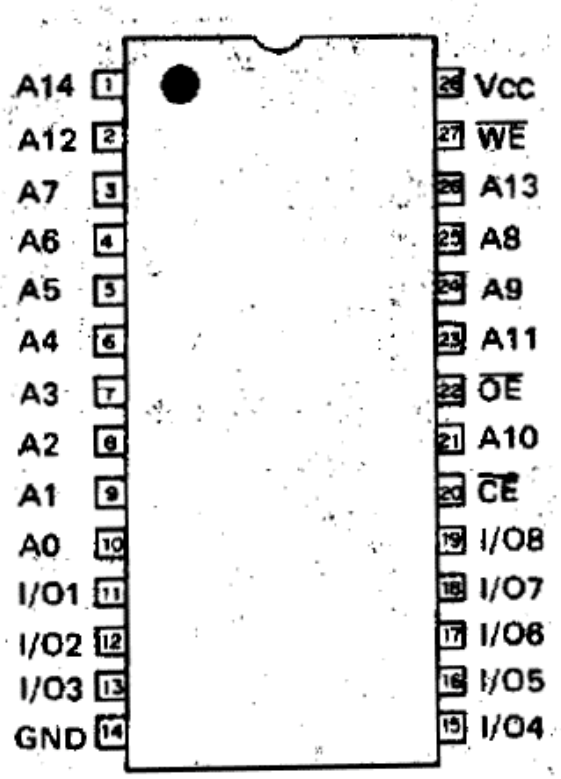
Put on the antistatic wrist band and cable, connect the cable somewhere to earth, such as a water tap. This will prevent static discharge building up and damaging your chips.

Study the pin out diagrams for each chip below. Also, examine the actual chips when you get them. Make sure you can identify which is **pin 1** on the chip (it has a little embossed circle next to it with a "1" in it on the top of the chip).

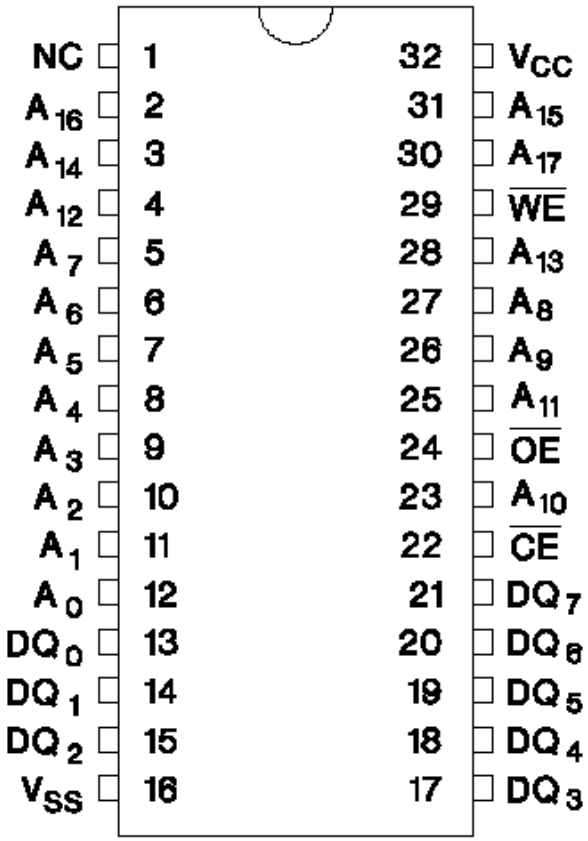
The original 28-pin 32kx8-bit SRAM and the 32-pin 2Mbit NVRAM have the address pins and data pins in the same location. The differences are:

The **2Mbit** chip has **32 pins – it is a larger physical chip**, and pins 2, 30 and 31on the top are the **3 highest address** lines. The pin with "NC" (Not Connected) is not used.

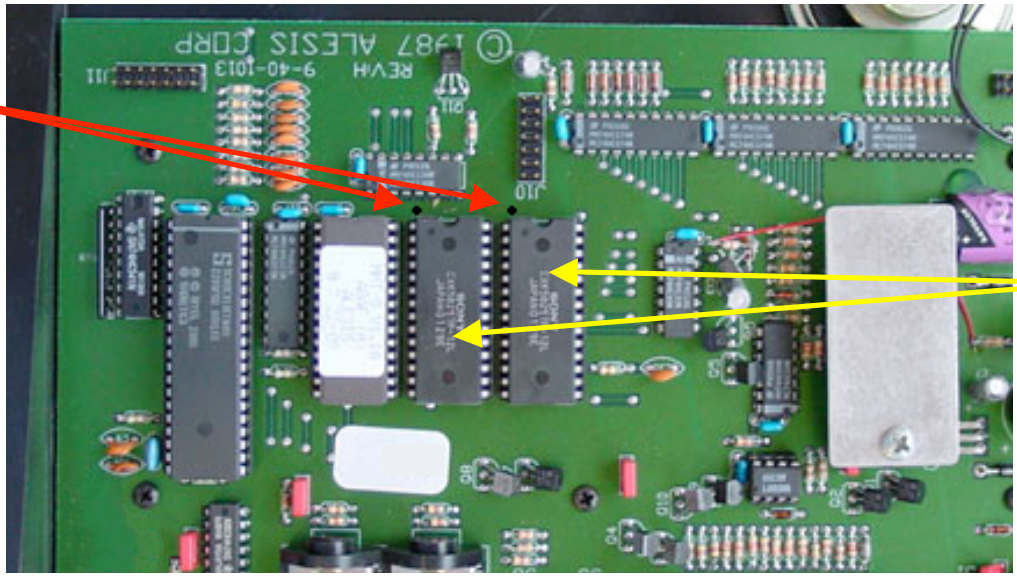
**Original MMT8 RAM chips CXK58257P-12L**




**New NV-RAM chips BQ4014Y 2MBit 256K x 8**




**Pin 1 position pen marks**



**The 2 RAM chips to be replaced**

1) Locate the 2 **RAM chips** on the MMT8 circuit board, and put a **mark on the circuit board** with a felt tip pen where the location of **pin 1** is, for each chip, so you remember which way they go in (check the pin diagram of the old chip). **Remove** the old **RAM** chips (if they are already in sockets, just carefully pull them out, and leave the sockets in place). If there were no sockets, and you had to desolder the old chips to remove them, **take two 28 pin IC sockets**, and solder the sockets in place where the chips used to be.

## The +5V Vcc Power Supply Wire

2) Drill a small hole somewhere in the circuit board 1cm away from the **Vcc leg of one socket** (check the pin diagram of the old chip to locate this). The hole must miss any tracks on the other side of the board. Pass an **insulated wire** through the hole to the other side of the circuit board (the track side). Solder the Vcc wire to the Vcc circuit track, where it connects to the **pad** of the **Vcc socket pin** on the track side of the board. The other end of this wire, which is at the other side of the hole, is now the new +5V power supply. Leave it free for the moment. In the new RAM chips, pin 32 is the +5V power supply pin Vcc, which this wire will connect to when we install the chips.

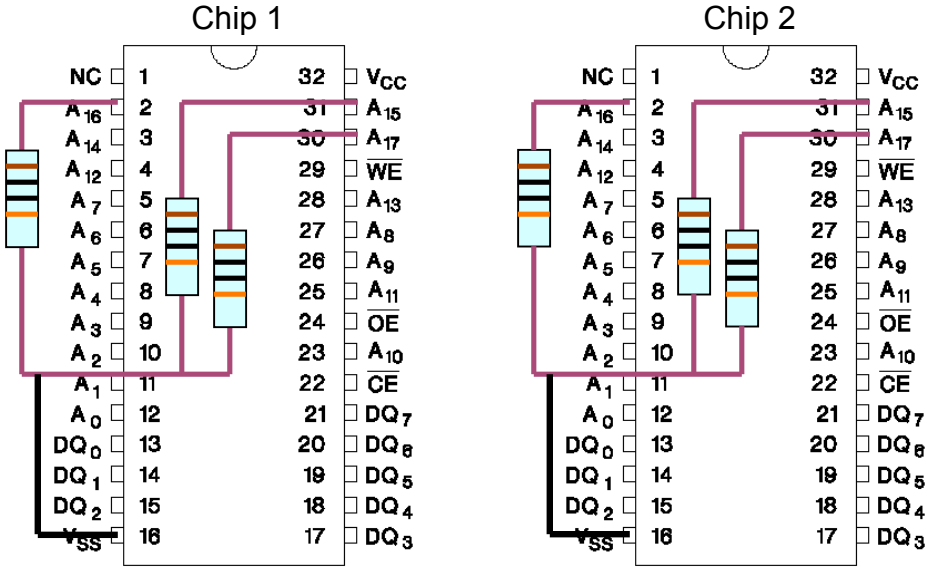
## The new chips

3) Take the new chips, and bend outwards horizontally the leg of pins **1** (NC), **2** (A16), **30** (A17), **31** (A15) and **32** (Vcc) on each chip. **Pin 1**, labeled **NC** (Not Connected) can be cut off to avoid confusion, as it is not used by this chip. Now **insert the chips in the socket**, taking care to insert them the **right way around** (look at the new chip diagram to locate pin 1 that you cut off - if the chip is in correctly, this should then be near the mark you put on the board where pin 1 was on the old chips). When inserted in the sockets, the 2 chips should have the pins 1, 2, 31 and 32 **overhanging the socket**, with nothing underneath. One of the chips may sit slightly on top of a smaller chip next to the end of the socket. This is ok, so long as the pins in the RAM chip seat properly in the socket.

You may have to bend the horizontal legs up between the 2 chips, so that they don't touch each other's legs and short out.

## The Address Pins

4) Solder a **10k resistor** to each leg of the bent out **address pins 2, 30, and 31** of the new chips. Solder the **other end** of the resistors on each chip **together**, and solder an **insulated wire** where they join. Solder the other end of the wire to the exposed **top of pin 16** of the new chips – this is the **Vss pin**, which is the **GND** or "ground" pin of the chip:

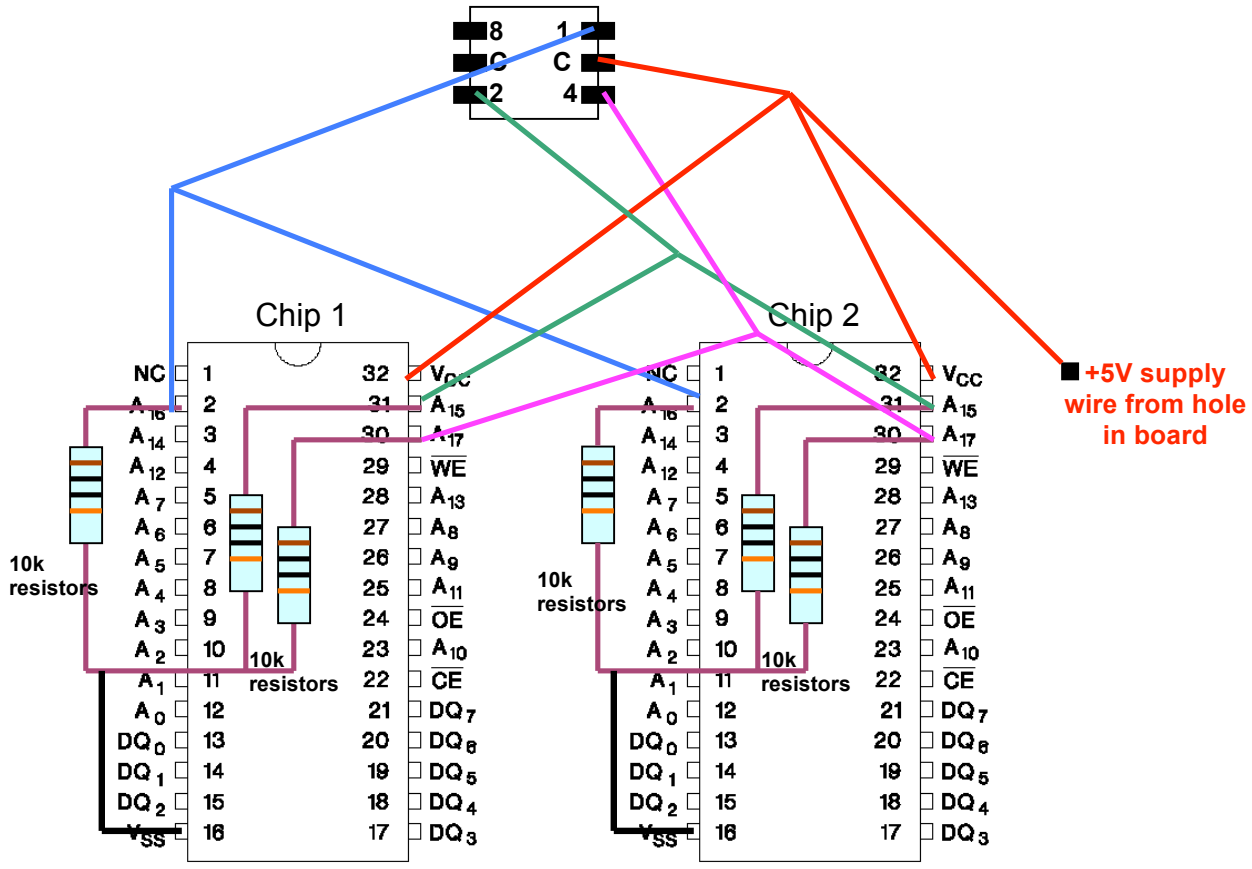


# The Rotary Encoder

5) Solder **insulated wires**, at the place where the **10k resistors connect** to each leg of address pin **2** (A16) of each of the new chips. Join the other ends of these 2 wires together, and solder it to the pin labeled "1" on the **rotary encoder switch**. Do the same for address pins **31** (A15) on each chip, and connect them to the pin labeled "2" on the rotary encoder switch. Do the same for address pins **30** (A17) on each chip, and connect them to the pin labeled "4" on the rotary encoder switch.

6) Solder an **insulated wire** to the **centre terminal**, marked "C" (either one – they're both connected to each other) of the rotary encoder. Solder the other end of the wire to the +5V supply wire to provide +5V to the rotary encoder. Solder a wire to each of the bent out Vcc pins of each chip. Join the other ends of these wires together, and solder them to the +5V power supply wire.

**4-bit Rotary Encoder (underside view)**




That's basically it! You're finished!!!

## Testing

Screw the MMT8 board back in place, and loosely do up the casing, dangling the rotary encoder out of the casing for testing. When you are sure everything is working, you can tidy it up by mounting the encoder somewhere convenient on the front panel, with the wires going through a small hole in the casing somewhere.

Turn the rotary encoder to position “0” with a small screwdriver. This is the first memory position.

Connect the power supply to the MMT8 and switch it on. It may show all the songs and parts as empty, or everything may appear scrambled. To be sure, reset the machine and clear the memory – switch it off. Press and hold the ERASE, PAGE UP, and PAGE DOWN buttons, and turn on the power while holding these buttons down for 3 seconds. This will initialize and erase the memory and ensure there is no random data in it.

Plug the MMT8 into a MIDI synth, and try recording a part. Record a few parts, make a few simple, quick songs.

Now change the memory.

Using a small screwdriver, turn the encoder to position “1”, which is the 2nd memory position. Initialise the memory, repeat the procedure, record some tracks. Repeat for the other memory positions.

When you get to encoder position “7”, this is the final 8th memory. If you now keep turning the encoder (it can turn continuously around and around) to position “8”, there is no new memory – it will start from the first memory again for position “8”, and the 2nd memory for position “9”. Turning it to the “0” position starts it from scratch again at memory 1, then 2, 3, 4 etc.