

So to the cures:

None of these is technically elegant, but they do work. They should be tried in order until the problem is cured. Don't go in for overkill, as this is unnecessary, and undesirable.

- 1). Go for a National 81LS97 in the IC2 position (AMD devices seem to have lower noise immunity although AMD deny this). You have 7 81LS97s to play with, 3 on the NASCOM, 1 on the buffer, and 3 on the memory, one at least is likely to be made by National. Swap these ICs about for the best results in the IC2 position.
- 2). Grid off the Ground and +5 volt supplies. On the underside of the pcb it will be noted that the GND and +5 rails supplying the TTL ICs terminate at the end of each row. Wire links can be fitted to connect these rails to the equivalent rails supplying the RAM chips, thus completing the "grid" on the power supply rails, thereby reducing power supply noise. Take care not to short out the power supply rails by "gridding" to the wrong tracks.
- 3). The 74LS04 on the buffer board may be replaced with 74S04. Bit of a naughty one this, as far as loading goes, but it does tidy up the MREQ waveform.
- 4). On ICs 4-11 only, fit a 4K7 resistors from pin 9 to pin 14 of each chip, thus pulling the outputs of the RAMs to +5V.
- 5). On ICs 4-11 only, in addition to 4 (above), fit 47pF ceramic capacitors from pin 14 to pin 16, thus producing a time constant on the RAM output.

Various combinations of these cures have been tried with 100% success on the few boards that have come our way, and although not 'elegant' solutions have transformed recalcitrant RAM boards into perfect working members of the species.

Please write to the INMC if you have come across any other oddities in the RAM or buffer boards.

#### STOP PRESS!

We have recently discovered that noise on the NASCOM 1 itself can cause problems with expansion, but fortunately this is easily cured. If you look at the corner of the board where the modulator is situated you will see an issue number. If it is "ISS.C" ignore these comments. Otherwise you may find it worthwhile to add a few links to the back of the board along the long edge of the board where the power supplies are connected. The links should "bus up" the ground and 5V supply rails and the easiest way to do this is to connect the ground of each decoupling capacitor at the edge of the board to the next decoupling capacitor at the edge. Similarly connect the 5V sides. Be careful not to get them twisted!!

If you are at all uncertain about any of these modifications, please contact your distributor, NASCOM, or the INMC. If in doubt, stop. If you return the system for repair you should include the NASCOM, memory and buffer boards to ensure that the system is totally operational when returned to you.