

Galaxian board - Note and Sound Effect

There are 3 sets of output ports used for sounds in the galaxian board.

- a) PITCH, addressed at 7800-7FFF (or B800-BFFF) determines the pitch of the note produced by a tone generator, according to the 8 bits of data written to the port. The tone generator generates 3 square waves; a fundamental, frequency F, a second harmonic, 2F and a fourth harmonic, 4F. The pitch of the tone is produced according to the following formula:-

$$F = \frac{96}{256-K} \text{ kHz, where K is the pitch data.}$$

The 3 resultant outputs are mixed together through a network of resistors and analogue switches. K = 'FF' switches the tone generator off.

- b) SOUND, addressed at 6800-6FFF (A800-AFFF)
This port is arranged as a set of 8 addresses, with only the least significant data bit having effect. There are 3 sound generators which produce the sound of the spaceship motors. These 3 generators are switched on or off by writing to address 6800, 6801, 6802.

The sound of a 'HIT' is produced by writing a '1' and then a '0' to address 6803, and the 'FIRE' sound is produced by writing a '1' and then a '0' to address 6805. To generate these 2 sounds, the noise generator circuit must be active, which means that the star field must be switched on, (by writing a '1' to address 7004 or B004). The noise generator may be on without the star field by cutting pin 15 of IC 2B.

Addresses 6806 and 6807 switch on or off analogue switches in the tone generator circuit. Address 6806 changes the volume level of 2F, the second harmonic, and 6807 switches F, the fundamental frequency, on or off.

- c) DRIVER, addressed at 6000-67FF (A000-A7FF).
This port consists of 4 bits, addressed at 6004, 6005, 6006 and 6007. The 4 bit value written into this port determines the cycling speed of the sound of the spaceship motors, producing the effect of a change in speed of the motors. Address 6000 to 6003 are normally unused, but are sometimes used to switch between sets of character prompts.