

The sound chip on the ST is the General Instruments AY-3-8910. The capabilities of the chip range from pure tones, noise or a specific waveform called the ADSR envelope. The chip has 16 8-bit registers.

For pure tones (a specific frequency) do the following an any order:

- (1) Set Frequency of channel
 - Giaccess (100,128) ; /* 12-bit # in channel A */
 - Giaccess (10,129) ; /* frequency register */
- (2) Set Volume Level
 - Giaccess (8,136) ; /* Put volume 8 in channel A */
- (3) Enable Pure tone
 - Giaccess (254,135) ; /* Tone A in Voice/Enable register */

The 12-bit number divides a clock frequency of 125 khz providing a range of 125 khz to 30 hz. The lower 8-bits is formed by register 128 and the upper 4-bits by the register 129.

For noise:

- Giaccess (10,134) ; /* Set Noise Period */
- Giaccess (247,135) ; /* Enable Noise */

For waveform selection of the ADSR:

- Giaccess (16,136) ; /* Set volume to 16 */
- Giaccess (100,139) ; /* Set Envelope Period */
- Giaccess (0,140)
- Giaccess (14,141) ; /* Set Waveform Shape */

For note playing: The following can be used to hold a note:

```

/* delay using the 200hz timer */
        move.l    #timer,(sp)        ; Supexec call
        move.w   #38,-(sp)
        trap     #14
        bra      over
timer:   move.l   #$4ba,a0           ; 200hz timer
        move.l   (a0),d0             ; get timer value
        add.l    #1,d0               ; 1/200th of a sec.
wait:    cmp.l   (a0),d0
        bge     wait
        rts
over:
    
```

To turn on a note: use one of two ways:

- (1) Enable channel by Voice/Enable register
- (2) Vary Volume by register to some non-zero number

To read a register:

```
note_val = Giaccess (0,b) ; /* note_val contains value of register b. */
```

To write a register:

```
Giaccess (c,b+128) ; /* c is 8-bit value written to register b */
```

Reference Chart

register	description	bit placement								write code	
		7	6	5	4	3	2	1	0		
0	Channel A Frequency	8 bit fine tune - A								128	
1		4 bit coarse-A								129	
2	Channel B Frequency	8 bit fine tune - B								130	
3		4 bit coarse-B								131	
4	Channel C Frequency	8 bit fine tune - C								132	
5		4 bit coarse-C								133	
6	Noise Period	5 bit period control								134	
7	Voice/ Enable	1	1	Noise-0			Tone-0			135	
		IOB	IOA	C	B	A	C	B	A		
8	Volume Channel A			M	4 bit vol. -A						136
9	Volume Channel B			M	4 bit vol. -B						137
10	Volume Channel C			M	4 bit vol. -C						138
11	Envelope Period	8 bit fine tune								139	
12		8 bit coarse tune								140	
13	Envelope Shape				C	ATT	ALT	H			141
14	I/O Port A	8 bit parallel port								142	
15	I/O Port B	8 bit parallel port								143	

Gia_state = Giaccess(Gia_state,135); - save state of I/O

Giaccess(A,B) - Read from register, B is register number 0 to 15
 - Write to register, A is register number 0 to 15 plus 128

Frequency for channels is determined by a 12 bit number.

Voice/Enable - channels are turned by a 0
 - proper opening and closing with I/O ports set to one.