



Compatible  
with **THE  
SOUND  
SOURCE**

Bring your  
software to life  
with speech, music  
and sound effects.

## **Programmer's Guide to the Stereo Sound Source**

The Sound Source consists of two modules: the D/A Converter Module and the Speaker Box Module. The D/A Converter Module contains a custom IC containing circuits for a timing generator, 16-level FIFO, and D/A converter. The Speaker Box Module contains the speaker, amplifier, batteries, and voltage regulation. The two modules are connected with a 4-conductor cable.

The D/A IC timing generator transfers data from the FIFO to the D/A converter at a fixed rate of 7 kHz  $\pm$  3%.

### **Power Control**

As shown in diagram 1, the signal line SELECT from the D/A Module controls the power supply to the Speaker Box Module. If the SELECT line can source current (approx. 1 ma), the Speaker Box will turn on. When the speaker box is turned on, it will supply +5 volts back to the D/A Module. Pulsing the SELECT line low for brief periods (1 to 10 msec) to strobe the D/A chip will not affect the power control circuit.

When the Sound Source is turned on, you will hear a pop on the speaker. This is due to the power being applied to the amplifier at the Speaker Box.

The SELECT line is connected to pin 17 of the printer interface. Pin 17 is normally set low by the BIOS at power-on and reset, turning off the Sound Source.

The Sound Source user should return pin 17 low before returning to DOS.

### **Storing Data to the D/A Converter**

Eight bit data sent to the D/A converter is loaded into a 16 level FIFO. Data is clocked from this FIFO at the fixed rate of 7 kHz  $\pm$  3%. The rising edge of the pulse on Pin 17 from the printer interface is used to clock data into the FIFO. Note from diagram 1 that the SELECT and -SHFT inputs to the D/A chip are isolated from pin 17 by an RC time constant.

8-bit unsigned data is converted to an analog voltage as follows:

255	Maximum voltage
...	
128	Mid level
...	
0	Minimum voltage

#### Checking FIFO Status

As shown in diagram 1, pin 16 provides current to the collector register of a monostable inverter. Pin 16 will be high when the FIFO status the D/A chip is full. Thus when pin 16 is low, more samples can be sent to the D/A chip.

#### Using Interrupts to Send Data to the Sound Source

To send data to the sound source under interrupt control, the program can "steal" the system timer interrupt and raise the rate to 300 Hz by changing the timer divider from its normal setting of 9 to a setting of 3048. This corresponds to about 12 samples of sound data per interrupt (at the rate of 1000 samples/second). The interrupt handler would need to acknowledge the timer interrupt 31 out of 32 times. The last timer control would be passed to the normal BIOS interrupt handler to maintain the system time.

A good practice is to write the interrupt handler so that it always sends 8 samples without checking the status of the FIFO of the sound source, and it then waits up to 8 more while polling the status of the FIFO. This technique will prevent a "lock up" condition if the sound source is not connected or is otherwise not operational.

### Example Routine

; Stand up to F samples to Sound Source, checking status

```
FB_POWER_UP=      04H ; code for power-up of Sound Source
FB_POWER_DOWN=    05H ; code for power-down of Sound Source
FB_XTRIG0=        06H ; code for status of Sound Source

                MOV     CX,8
                MOV     DX,PORT ; address of polar data
                INC     DX       ; address of status port

SLOOP:          IN      AL,DX    ; read status
                TEST    AL,00H   ; check pin 19
                JNZ     EXIT_SLOOP ; jump if FIFO is full

                DEC     DI        ; points to data port
                LODSB            ; get next sample
                OUT     DX,AL     ; send to FIFO
                INC     DI        ; points to control port

                MOV     AX,FB_XTRIG0
                OUT     DX,AL
                PUSH    AX        ; delay a little
                POP     AX
                MOV     AX,FB_POWER_UP
                OUT     DX,AL
                PUSH    AX
                POP     AX
                PUSH    AX
                POP     AX
                DEC     DI        ; address of status again
                LOOP    SLOOP     ; up to 8 times . . .
```

### Note for Trady Computers with Special Adapter

Due to small differences in the pinout interface on Trady Computers that require a special adapter to operate with the Sound Source, the following changes to the above routine are necessary:

```
FB_POWER_UP=      04H ; code for power-up of Sound Source
FB_POWER_DOWN=    05H ; code for power-down of Sound Source
FB_XTRIG0=        05H ; code for status of Sound Source
```

