Technical Specifications

Operation Mode
playback only

Sound File Format
Windows WAV
- 8 bit PCM (uncompressed)
- mono
- sampling rate: 11.025/22.05 KHz

Max. Number of Sound Files
10 per trigger input

Memory Type
SD card formatted with FAT16, or
SDHC card formatted with FAT32

Max. Memory Capacity
2GB (SD), 32GB (SDHC)

Max. Recording Time (w/32GB card)
800 hours (sampling rate = 11.025 KHz)

Supply Voltage
12~32 VDC

Typical Standby Current
50 mA

Max. Audio Output
10W (4 Ohm load)

Serial Interface
none

Parallel Interface
20 trigger inputs

Physical Dimensions
DM2220A (board only): 3.0" x 4.7"
EM2220A (enclosed): 3.7" x 5.0" x 1,2"

Firmware Version
1.0 ~ 1.1

Interface Descriptions

Power Input Terminals: VDC & GND
Use a well regulated DC power supply to obtain the best sound quality. Connect the power supply's positive to terminal VDC, negative to terminal GND (the ground).

Speaker Output Terminals: SP1 & SP2
The speaker output is single ended. Terminal SP1 is internally connected to power ground. Depending on the ambient temperature, additional cooling may be required to obtain the maximum output.

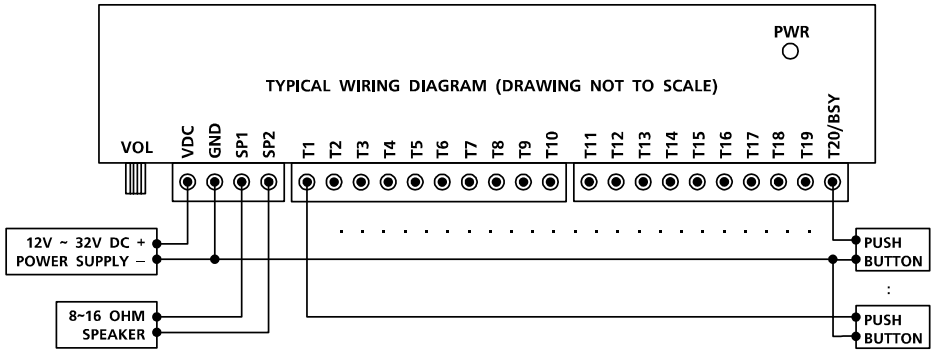
Trigger Input Terminals: T1 - T20
These inputs are internally pulled up to 3.3V through 10K resistors, and protected with 1K serial resistors against static discharge. An input is automatically disabled if no sound file is associated with it - see the *File Number Assignment* section for more information.

Busy Output Terminal: T20
This output is open collector with 100 mA current rating. It shares the same terminal with trigger input T20 and is disabled by default. To enable it (and disable T20), move the internal jumper J1 (both shorting caps) to the BSY position while the power is turned off.

Power Light (PWR)
The power light is turned on when power is applied.

Volume Pot (VOL)
Turn the knob clockwise to increase the output level.

Typical wiring diagram for push button activation



File Number Assignment

The file number is a three digit number used to associate a sound file with a particular trigger input. The file number must be added in front of the original filename in the following manner:

010, 011, ...019 for input T1
020, 021, ...029 for input T2
.....
190, 191, ...199 for input T19
200, 201, ...209 for input T20

Up to ten files may be associated with each input, and the file numbers must be consecutive. For example, to associate three files with T1, the file numbers must be 010, 011 and 012. If the files are numbered 010, 011 and 014, then only 010 and 011 will be associated with T1. If an input has no file associated with it, it is automatically disabled.

The files associated with an input will be used sequentially, one file per trigger. For example, if two files (010 and 011) are associated with T1, the first trigger will play file 010, the second trigger will play file 011, and the third trigger will play file 010 again.

Device Configuration

The device can be configured to operate in many different ways by adding on the flash card a plain text file called MODE.TXT, with three upper case letters in it according to the following.

First Letter = Priority Mode

D = Decreasing (prioritized)
Inputs are prioritized with T1 being the highest and T20 being the lowest. If multiple inputs are triggered at the same time, the input with the highest priority wins. Also, in the Interrupt mode (see below), a higher priority input can interrupt a lower priority one, but not vice versa.

R = Round-robin (unprioritized)
Inputs are not prioritized. If multiple inputs are triggered at the same time, they will take turn to play. For example, if both T1 and T2 are triggered, T1 will play first. After T1 ends, if both T1 and T2 are still triggered, then T2 will play. However, if T2 is not triggered when T1 ends, then T2 will not play. That means the system does not memorize previous triggers, it always checks the inputs again after a playback ends.

Second Letter = Play Mode

N = Non-interrupt
The file plays once and is not interruptible until it is played to the end. At that point the inputs are checked again according to the priority mode. The hardware reset is the only way to stop the playback prematurely.

I = Interrupt
The file plays once but can be interrupted by any other input if the inputs are not prioritized (Round-robin mode), or by any input of higher priority if the inputs are prioritized (Default mode).

H = Hold
The file plays for as long as the input is triggered, and stops as soon as the trigger is removed. The playback is not interruptible until the file is played to the end. At that point, the inputs are checked again according to the priority mode.

Third Letter = Trigger Mode

C = Close (repeatable)
An input is triggered when it's at or near 0V (ground). Therefore if an input is tied to the ground through a switch, it is triggered when the switch is closed.

O = Open (repeatable)
An input is triggered when it's at or near 3.3V. Therefore if an input is tied to the ground through a switch, it is triggered when the switch is open (because the inputs are internally pulled up to 3.3V).

M = Make (play once)
An input is triggered when it changes from 3.3V to 0V. Therefore if an input is tied to the ground through a switch, it is triggered at the very moment when the switch is closed.

B = Break (play once)
An input is triggered when it changes from 0V to 3.3V. Therefore if an input is tied to the ground through a switch, it is triggered at the very moment when the switch is opened.

Special Considerations on Certain Modes

DHM & RHM
The Hold mode requires the triggering condition to be held in order to keep playing the file. However, the triggering condition for the Make mode is always momentary (a transition from 3.3V to 0V) and cannot be held. Therefore both DHM and RHM are useless in theory. However, these two modes have been changed to work in the following manner: The file will start to play when the input changes from 3.3V to 0V, and continue to play for as long as the input is at 0V. The playback stops as soon as the input returns to 3.3V, or when the end of the file is reached. Therefore, if the input stays at 0V after triggering, the file will be played only once.

DHB & RHB
Similar to DHM & RHM, these two mode are useless in theory and changed to work in the following manner: The file will start to play when the input changes from 0V to 3.3V, and continue to play for as long as the input is at 3.3V. The playback stops as soon as the input returns to 0V, or when the end of the file is reached. Therefore, if the input stays at 3.3V after triggering, the file will be played only once.

Trouble Shooting Guide

1. Does not play any file at all.
a. File numbers are not assigned properly.
b. The system is in the wrong mode due to missing or incorrect configuration file.
c. If the flash card is inserted when the power is on, the system may not work. To fix this problem, turn the power off for a few seconds to reset the system.
d. The volume pot may need to be adjusted.
e. Some flash cards, especially those having been used in digital cameras, may need to be reformatted in a PC.

2. Plays the wrong file.
a. File numbers are not assigned properly.
b. The system is in the wrong mode due to missing or incorrect configuration file.