CLAMATOR® *MINI*

MANUAL

Overview

Thank you for purchasing the Clamator *MINI* Voice System.
This device is developed for easy install and easy use.

When any of the twenty-four inputs are activated, the sound file with the same number is played out trough the audio connectors.

The CM24-R is equipped with a Radio Interface allowing you to connect a transceiver to the Voice Unit and have the messages played out trough the transceiver.

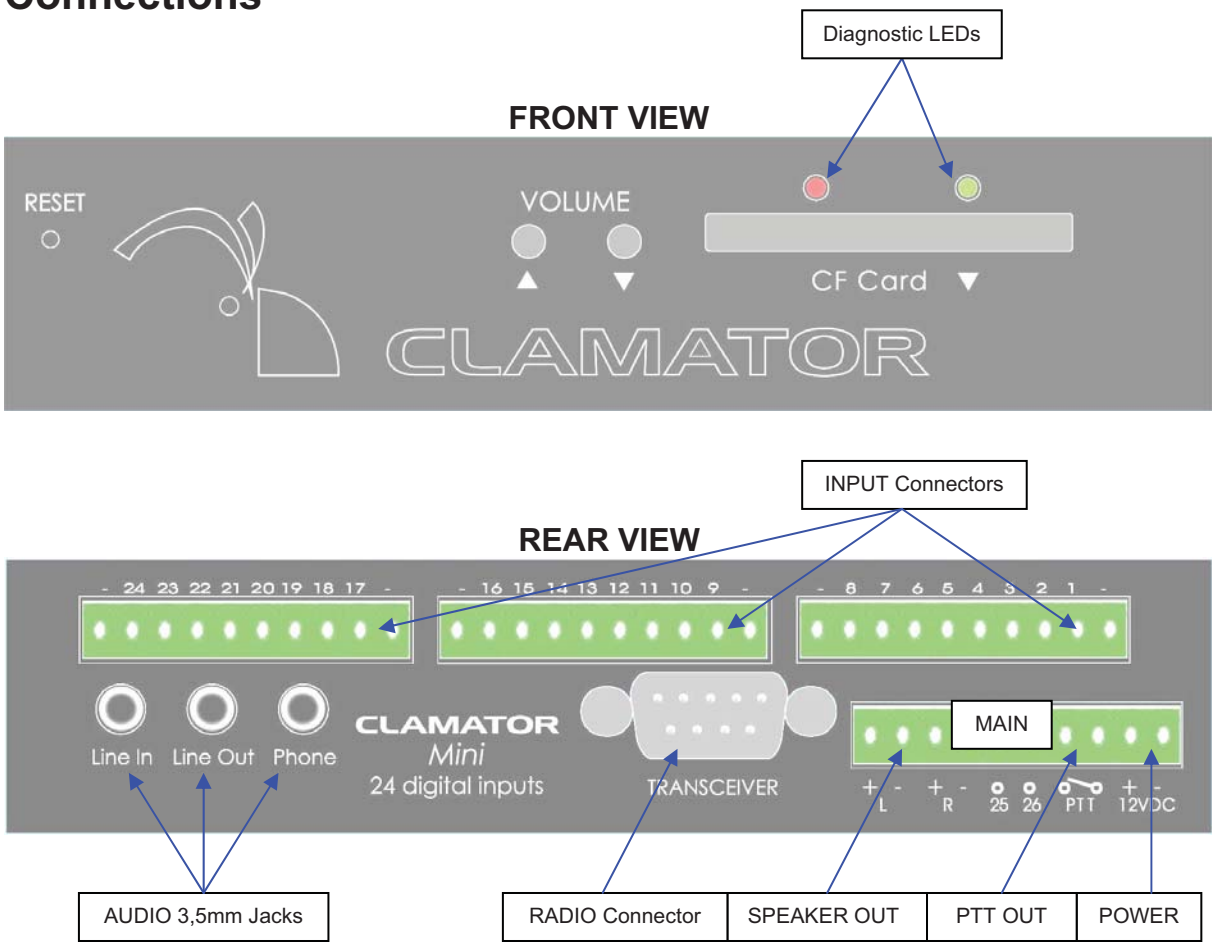
If you want more personalized messages, simply replace the existing sound files with your own. Sound files are easily copied onto the card via your PC or laptop, using a Compact FLASH adapter.

Features

The Clamator *MINI* Voice System incorporates the following features:

- Uses inexpensive, industry standard Compact FLASH (CF) Cards.
- Diagnostic LED s to indicate operating status.
- Twenty-four built-in contact inputs to activate sounds.
- Push To Talk (PTT) dry relay contact output that closes whenever a sound is played.
- Digital Up/Down volume control push buttons.
- Built-in 20 Watt Class D Stereo Amplifier.
- Scriptable via built-in ACS Basic.
- (Only in CM24-R) Built-in Radio Interface with CAS (Carrier Activity Signal) sensor.

Connections



Volume

The sound volume level is controlled by two pushbuttons on the front of the Clamator *MINI*: one for Up and one for Down. A momentary button press of the Up button raises the volume level, a button press of the Down button lowers the volume level. Pressing and holding the button for ¼ second starts an automatic volume increase/decrease until the button is released or the maximum/minimum volume is achieved. The volume is essentially db linear in sixty-four, 1db increments from 0db -66db.The current volume level is remembered in non-volatile memory on the Clamator *MINI* and is restored to its last setting upon power-up.

Connectors

Connections to the MAIN and INPUT connectors are supplied to the unit with a ten pin, 2-piece pluggable terminal block style connector.

Power Supply

The Clamator *MINI* requires a regulated or unregulated voltage of 10V to 18V DC.
The unit has resetable fusing internally to protect the Power input. Should the fuse trip, remove power, correct the fault, wait a minute for the fuse to reset, then re-apply power.

PTT Connection

The Push-To-Talk (PTT) relay dry contact output on the Main connector is activated whenever a sound is playing. The contact output is implemented with a relay whose contacts are rated at 1A @ 30VDC maximum. The Common and Normally Open relay contacts are available on the Main connector.

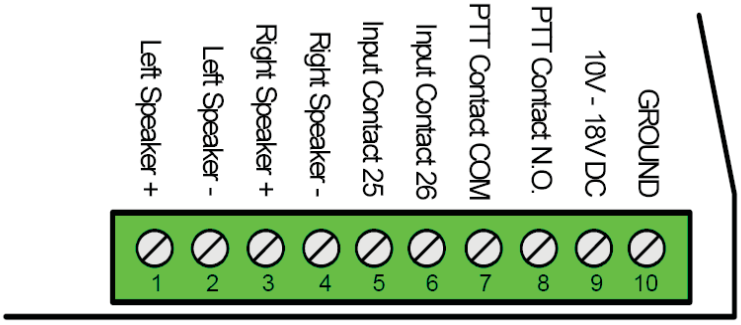
25 and 26 Connection

These connections are for future use only.

Speaker Connection

The speaker terminals on the Main connector provide connections for two external left and right speakers. These may be either 4 or 8 ohm speakers, with 4 ohms providing higher output power. The speakers should be capable of handling up to 20 watts.

NOTE THAT THE SPEAKER OUTPUTS ARE NOT REFERENCED TO GROUND.
EACH SPEAKER REQUIRES ITS OWN PAIR OF WIRES, AND NEITHER WIRE MAY BE CONNECTED TO GROUND.



Pin #	Signal
1	Left Speaker +
2	Left Speaker
3	Right Speaker +
4	Right Speaker
5	Not In Use
6	Not In Use
7	PTT Contact COM
8	PTT Contact N.O.
9	10VDC 18VDC
10	Ground

Transceiver Connector

D-SUB 9pin male connector.
Radio Interface connector. (Only in CM24-R version.)

Pin #	Signal Name JB2 = DCE	Signal Name JB2 = DTE
2	TX (from unit)	RX (to unit)
3	RX (to unit)	TX (from unit)
5	Ground(GND)	Ground(GND)
7	Carrier Activity Signal (CAS) IN	Carrier Activity Signal (CAS) IN
8	Audio OUT	Audio OUT
9	+5VDC	+5VDC

LINE OUT Connector

The volume controlled sound is also available at an audio line level (1V RMS @ 0db volume, 47K ohms) at the 3.5mm Stereo LINE OUT jack on the rear of the Clamator *MINI*.

Pin #	Signal
TIP	Left
RING	Right
SLEEVE	Ground

LINE IN Connector

Line level audio appearing at the 3.5mm Stereo LINE IN jack (1V RMS @ 0db volume, 47K ohms) on the rear of the Clamator *MINI* may be enabled to be amplified at the current volume setting and presented to the speakers/Line Outputs whenever another sound is not playing.

Pin #	Signal
TIP	Left
RING	Right
SLEEVE	Ground

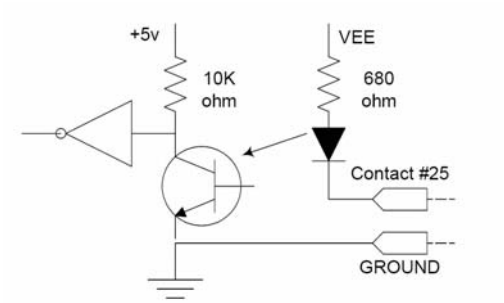
PHONES Connector

The volume controlled sound is also available for driving stereo headphones (35mW @ 0db volume, 32 ohms) at the 3.5mm Stereo PHONES jack on the rear of the Clamator *MINI*.
NOTE: The common headphone output is not referenced to, and should not be connected to Ground.

Pin #	Signal
TIP	Left
RING	Right
SLEEVE	Common

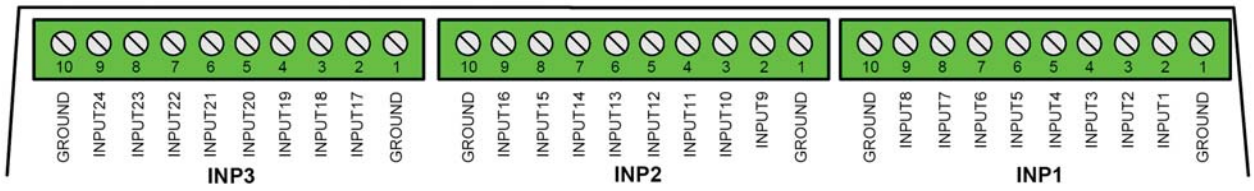
INPUT Connectors

The CM24/CM24-R provides twenty four contact inputs. The contacts are numbered 1 through 24 and are associated with sound files named sound1.WAV through sound24.WAV.
The Cathodes of the LEDs in the optocouplers are connected to the Input connector port pins. The Anodes of the LEDs in the optocouplers are connected to an internal 12VDC power supply, with a 680 ohm current limiting resistor in series. The output transistor of each optocoupler has a 10K pullup resistor on its collector, with the emitter connected to ground and is buffered by an inverting gate.
The following diagram is representative of one input:



An input is activated by sinking current from the corresponding input pin to ground.
A Ground connection is supplied on pins 1 and 10 of each Input connector for this purpose.
The input current sink requirement is approximately 15 mA.
The Input connectors consist of three 10 pin, 2 piece terminal block style connectors mounted adjacently.
The inputs can be wired to switches or other such devices, normally opened.
The contact inputs are debounced by sampling them using a periodic interrupt. The sample rate is 50 Hertz (20 milliseconds). Valid input closures are detected by reading a 0 - 0 - 1 (open, open, closed) sample sequence. Valid input opens are detected by reading a 1 - 1 - 0 (closed, closed, open) sample sequence.

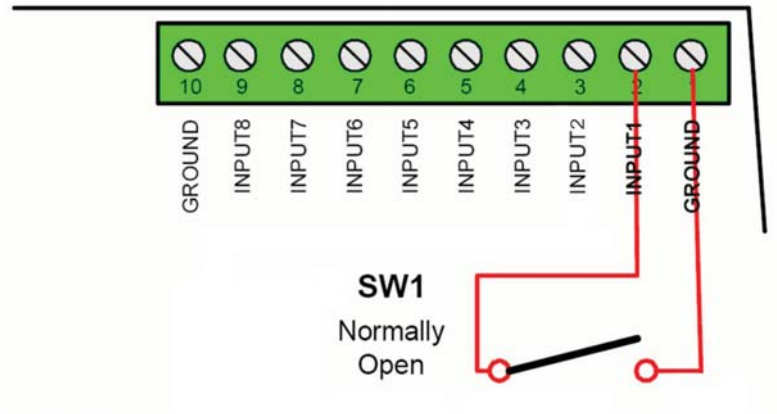
The pinout is shown in the following rear diagram and table:



INP3 Pin #	Rear Signal	INP2 Pin #	Rear Signal	INP1 Pin #	Rear Signal
1	GROUND	1	GROUND	1	GROUND
2	INPUT17	2	INPUT9	2	INPUT1
3	INPUT18	3	INPUT10	3	INPUT2
4	INPUT19	4	INPUT11	4	INPUT3
5	INPUT20	5	INPUT12	5	INPUT4
6	INPUT21	6	INPUT13	6	INPUT5
7	INPUT22	7	INPUT14	7	INPUT6
8	INPUT23	8	INPUT15	8	INPUT7
9	INPUT24	9	INPUT16	9	INPUT8
10	GROUND	10	GROUND	10	GROUND

Contact Wiring

On the INPUT Contact Modules, switch contacts are wired between the Input pin number and a ground located on either end of the connector.
Switches should be of the form: Normally Open (N.O.)
Switches that are Normally Open have no electrical connection between the switch terminals unless the switch is activated closed.



Technical specifications

	CM-24 Without radio interface	**CM-24R** With radio interface
Power consumption	10-15VDC / 350mA@12V	10-15VDC /~450mA*@12V
Number of inputs/type	24/digital	24/digital
Connectors	Line In/Line Out/Phones/ SPKR/PTT	Line In/Line Out/Phones/ SPKR/PTT/Transceiver
Memory card type	Compact Flash (CF)	Compact Flash (CF)

CE ☑ RoHS ☑ EMC ☑ IP20 * Depending on radio type

Programming the Compact FLASH Card

Compact Flash Card Requirements

The Clamator *MINI* is designed to use only Compact FLASH Cards (CF Cards) that support the True IDE ATA mode at 3.3 volt operation.
Tested cards include SanDisk, Kingston, Techworks, Dane-Elec, Memorex and Hitachi.
The SanDisk card was tested, since they manufacture 90% of the retail cards on the market.
Compact FLASH Cards are available in many local electronics or camera stores.
Note that not all LEXAR Media Compact Flash cards are 100% compatible in True IDE mode and as such may NOT BE COMPATIBLE with the Clamator *MINI*.

Programming

The Clamator *MINI* is chipped with a Compact FLASH Card containing default sound files and settings.

To change the sound files and/or the settings for the number of playouts and time interval between playouts for each input:

1. Insert the Compact FLASH Card into a Compact FLASH adapter connected to your computer.
2. Sound files are copied to the Compact FLASH Card just as if it were a disk drive. Sound files must be named “sound1.WAV” through “sound24.WAV” to be accepted by the Clamator *MINI*.
3. Open the “CFSOUND.BAS” file in the Windows “Notepad” program or similar text editor.
4. Scroll down to the “Settings” section and replace the default values for each input number.
5. Save the modified file to the Compact FLASH Card and you are done.

Please take care not to use audio tracks that are copyrighted. Please be advised that you as the user are solely responsible for audio that you record and play from the Clamator *MINI* unit.

Installing and Removing the Compact FLASH Card

Care should be taken when installing or removing the Compact FLASH Card. Please be certain to insert the card with a straight and level motion. Please do not force the card to insert. Otherwise, some of the 50 pins in the socket may become damaged and the card and/or your Clamator *MINI* may become unusable.
Before REMOVING the Compact FLASH Card under Windows 95 or later, Microsoft recommends that you double click on the Compact FLASH adapter icon at the bottom of your computer screen. This will bring up the adapter properties window. Click on socket status tab, then select the card you wish to remove by clicking on it. Finally, click on the stop button. Windows will then tell you that the card socket services have been stopped. Under Windows XP you may also right-click on the folder and select Eject.
Failure to stop the card reader and/or Eject the CF card may result in incorrect or incomplete data on the card.
On the Clamator *MINI* this will all happen automatically simply by removing the card.

Formatting the CF Card

Compact FLASH cards must only be formatted using the FAT12 (floppy) FAT16 or FAT32 file systems. NTFS, Linux EXT3 or other file system formats are not supported. The maximum supported partition size is 4G. The Clamator *MINI* will attempt to locate a valid, active partition on the formatted card in order to be able to access the files. CF cards that have been previously used in some digital cameras may not be correctly formatted, or may not have valid partitions defined.
By default, Windows XP will format any Compact Flash card of 64MB or more with FAT32 format. The Clamator *MINI* uses the FAT (FAT16 or FAT32) format and can not operate with a NTFS formatted card. You must select FAT or FAT32 file system to format your Compact Flash card in a Windows XP PC.

Digital Audio Recording

Initially make all recordings with a sample rate of at least 44KHz and 16-bit mono or stereo. This high quality, first-generation recording will later provide the greatest bandwidth and produce the best sounding final audio.

Recommended Recording Procedure

1. Record any audio clip of your choosing @ 44KHz, 16-bit Mono or Stereo. Make sure that your samples do not clip (go above or below the sample window). The peaks of your audio clip, should, however, fill vertically at least 95% of the sample window. If they do not, you will need to boost your input signal by using a pre-amp or by some other means.
2. Edit the clip until satisfied. You can use a sound editor or filter program, such as Audacity-win-1.2.6 to normalize the amplitude of the sample. Use this command cautiously though, since it also tends to amplify noise levels. It is always preferable to re-record your sound clip at a higher level to achieve better fidelity.

It is imperative that all initial editing and filtering be done to the audio clip while it is formatted at 16-bit stereo and 44.1KHz. Please be certain that your recording environment is absolutely quiet.
Also remember that digital play-out devices do not introduce any static of their own other than quantization noise. They only play back exactly what was recorded. If there is excessive static in the audio clip or sample, then there was probably static in it originally.

Audio Rates Supported

The Clamator *MINI* supports 16-bit mono or stereo Windows PCM format (.WAV) sound files at a sampling rate of 44.1KHz (44,100Hz) only.
The Clamator *MINI* reads the sampling rates and formats encoded in the .WAV sound files whenever a card is first inserted or a sound playout is triggered. The Clamator *MINI* will not play any file that does not meet these requirements. Further, this error condition should be identified by the red led flashing twice every six seconds.

The Clamator *MINI* operation:

The operation of the *Clamator MINI* is controlled by the interpreted execution of a program that is written in the ACS Basic language.
If a CF card is present, the unit looks for a file named CFSOUND.BAS and, if found, loading the file and executing the Basic program.

Compact FLASH Card Loading and Scanning

Once programmed with the desired sounds, the card is inserted into the slot on the front of the Clamator *MINI*. The green LED indicator should begin to flash indicating that the unit is scanning and loading the files from the card. When the card is correctly loaded and scanned, the green LED should flash once a second. Any problems encountered while reading the CF card are indicated by a repeating sequence of flashes on the red LED indicator.
The card may be removed at any time. In that case, both the green and red LED indicators should turn off.

Diagnostic LED Codes (Red & Green LEDs)

Green LED
Flashes three times a second while scanning or loading CF Card files.
Flashes once a second while running ACS Basic mode.
Red LED Error Flashes
The Red LED can indicate up to 4 error conditions by flashing 1 to 4 unique numeric code patterns from the following table in a continuously repeating sequence. The Red LED flashes at three times a second for the value of the pattern, followed by a half second gap, then the next pattern.

Flash Count	Error Condition
One	Problem w/ATA interface, non-compatible CF card, bad CF card, execution stops.
Two	Error opening .WAV file for that input, incorrect filename, file does not exist.
Three	Error when reading file, file corrupted, unsupported file type, the sound doesn't start or stops playing.
Four	No valid *.WAV files
Five	No valid FAT or FAT32 file system found on the CF Card, execution stops.
Six	Error seeking within file when starting or resuming sound, the sound doesn't start or resume.
Seven	Error initializing CODEC, execution stops.
Eight	Invalid .WAV file internal structure, file is ignored.
Nine	Unsupported .WAV format (not Windows PCM), file is ignored.
Ten	Unsupported .WAV sample rate (not 44.1KHz), file is ignored.
Eleven	Unsupported .WAV sample size (not 16-bit), file is ignored.
Twelve	Contact closure without matching sound file, a contact closure with matching sound file stops this code from flashing.
Thirteen	Speaker is muted by RS-232 command or ACS Basic command.
Fourteen	Problem with CFSOUND.INI file entries.