Sound Controller 16X™

OPERATIONS MANUAL

Version 16.0a
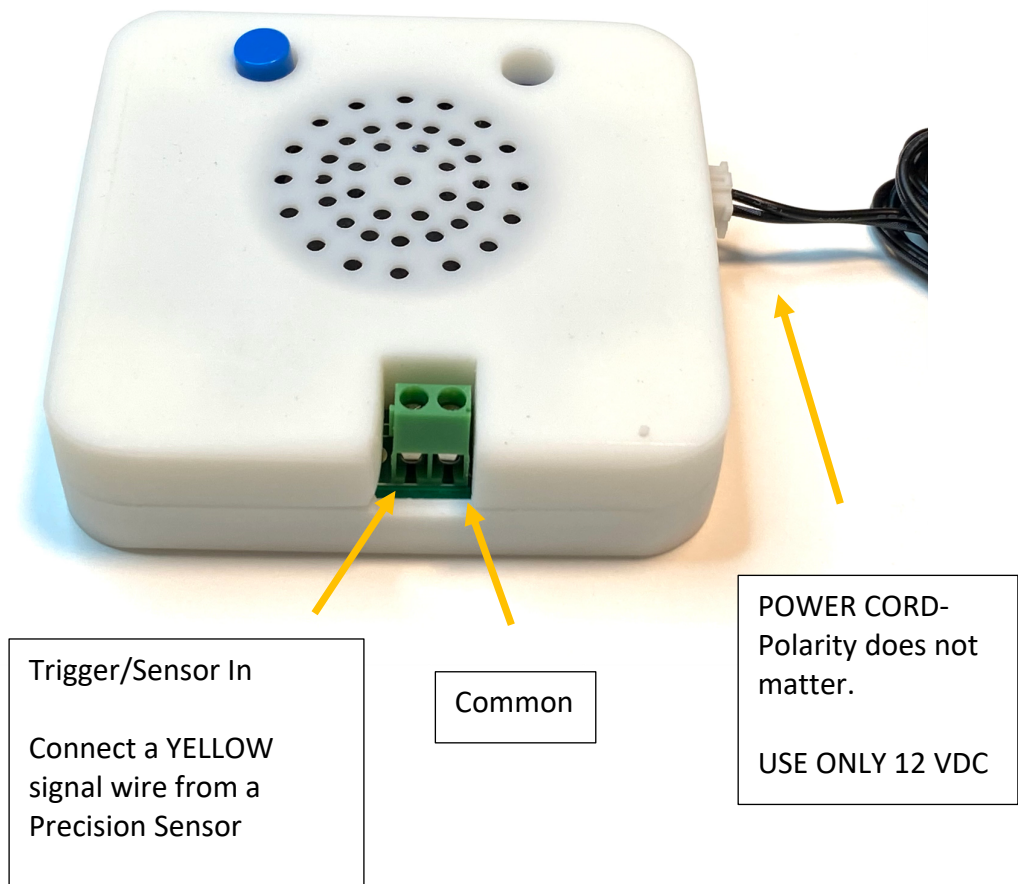
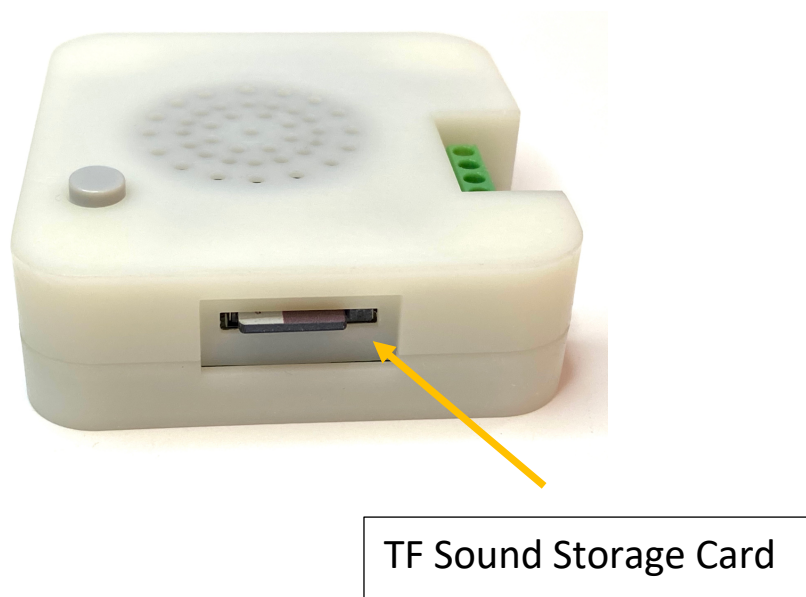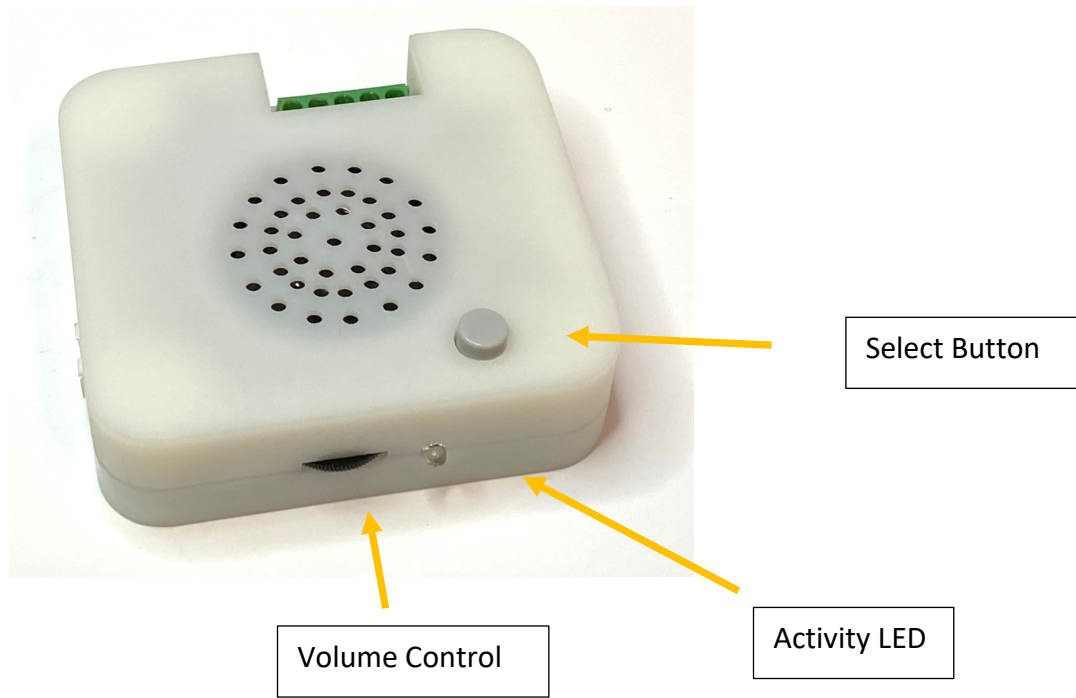Available External Plug and Speaker with sound baffle.

INTRODUCTION

The Model Train Technology™ *Sound Controller 16X™* provides an extremely simple, yet versatile, plug-and-play system for adding sound animation to your layout.
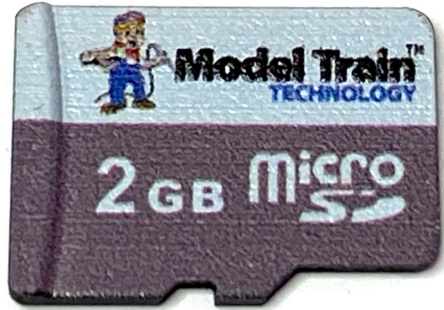
The main features are:

- Record and load your own sounds (MP3 files)
- 16 separate soundtracks
- 2GB (up to 32GB) TF Card sound storage *
- 16 trigger – by sensor, push button or DCC.
- Each channel has its own volume setting
- Play once or repeat a sound
- A sound can interrupt another sound.
- Built in speaker with sound baffle
- External speaker connection
- Four DCC Accessory Decoder, address settable
- Any DC voltage from 7-12VDC, or DCC up to 15V.

*The typical encoding standard for MP3 files is 128 kilobits per second. This works out to about **1 megabyte (MB) per minute of sound**. 1 GB is ~1000 MB. Thus, the 2 GB TF card included with the system had 2000 Minutes or 33 hours of recoding time.

Trigger/Sensor In

Connect a YELLOW
signal wire from a
Precision Sensor

Common

POWER CORD-
Polarity does not
matter.

USE ONLY 12 VDC

Select Button

Volume Control

Activity LED

TF Sound Storage Card

Inserting and Removing the TF Card

Note TF Card Orientation: Rotated 180 degrees.

The socket for the TF card is spring loaded. Slide in to insert. To remove, push in slightly and let the spring push the card out.

OVERVIEW

The MTT Sound Controller provides a new and unique approach to adding sound "events" to your layout. Up to now, sound cards, sound boards and other similar components had only one sound and you could turn it on or off. For some applications on the layout that is fine and appropriate.

However, there are two aspects of this situation that I wanted to change. The first one is that I wanted to be able to play my own sounds whether I recorded them myself or found them on the internet. Secondly, I wanted the sounds to interact with each other and the layout in a simple and intuitive way.

What do I mean by this?

Here is an example:

At a station, background noise of the station can be heard. As a train approaches the station and diverges from the mainline to the station track, it trips a sensor. An announcement of the train's arrival plays: "Amtrak 1043 now arriving from Orlando on Track 1". This sound

"interrupts" the background sound and plays once. When finished, the background sound resumes (in repeat mode).

When the train is ready to leave, you push a push button that triggers the departure announcement which once again interrupts the background sound. "Amtrak 1043 for Jacksonville, now leaving on track 1. All Aboard!!". After the announcement which plays once, the background sounds resume.

Since you are controlling the train as the engineer, you may now proceed and begin to leave the station. However, there is a road crossing in front of you so as you trip the detector the Crossing Flashers begin to flash (controlled by our Signal Controller). The same detector signal wire is connected to one of the inputs on the Sound Controller for the crossing bell. The Bell sound interrupts the station background sounds and plays continuously until the train has safely passed the road crossing. Then the Detector times out, releases (stops) the bell sound and it goes back to playing background sounds at the station.

By the way, the station background sound can also be triggered by a toggle switch on/off or by using our Precision Detector for any train motion near the station. You can also face the detector outward so that when someone is near the layout the sounds plays.

What is great about the MTT Sound Controller is there is no programming required, and the setup is darn simple.

Furthermore, those announcements and other sounds at the station can be ANYTHING you want them to be because they are your recordings. (we include several bells sounds and an announcement as an example).

There are a few other things about the sound boards that are sold separately or as part of a crossing flasher that we think can be improved. For example, it is often confusing to determine which terminals are for power, what voltage do they require, what kind of speakers to use, how to trigger them, etc. Hopefully we have removed that confusion and, just like our Signal Controller, you should be able to simply plug it in and go.

THEORY OF OPERATION

The Sound Controller has a single MP3 file player and therefore, can only play one sound at a time. When a sound is playing the blue LED will light and it will shut off when a sound is finished.

Each soundtrack can have one or more of these behaviors:

1. Play once and stop, or play continuously while the trigger is ON.

2. Interrupt a currently playing sound or No Interrupt.

Also,

• Once a soundtrack set to Play-Once has started, it will play to the end even if you release the trigger.

• An interrupt cannot interrupt another interrupt.

• If multiple similar soundtracks are activated simultaneously the priority will play from soundtrack 1 to soundtrack 16.

In the example, here is the configuration we used:

1. Crossing Bell	Repeat Play Interrupt	Precision Detector
2. Arrival Announcement	Play Once Interrupt	Precision Detector
3. Departure Announcement	Play Once Interrupt	Push Button
4. Background	Repeat No Interrupt	Toggle Switch

There are up to four sounds and a trigger for each sound. On the side of the Controller there is a green terminal block with five ports. The port closest to the black round speaker jack is COMMON. If you want to trigger a soundtrack manually, connect this ground through a single pole switch to the track you want to controller.

For testing purposes, you can simply touch a wire from ground to any of the port terminals and the sound for that port will play. Don't worry if you accidently connect other ports together with the wire. As long as you don't connect any external power on these ports you cannot harm them.

Do Not Connect Arduino GPIO pins directly to the Sound Controller triggers.

The MTT Sound Controller triggers are Open Drain to Ground style. The GPIO HIGH of an Arduino signal is 5V and it will destroy the trigger circuit.

The trigger behaviors mentioned above are set via DIP switches on the bottom of the controller. The first four are to set the Play Once or Repeat mode for the sounds. The switches 5-8 (left to right) set the trigger Interrupt. Default is OFF (no trigger).

CONFIGURING THE PUSHBUTTONS

The Sound Module 16X does not have dip switches like the 4-track version. Instead, you will put the Sound Module into "CONFIG" mode and then press the keypad buttons a specific number of times corresponding to the behavior that you want for each button.

To put the Sound Module into CONFIG mode, press and hold the select button on the Sound Module. The LED will initially light and then after 1-2 seconds it will go off. CONTINUE to hold the button until the LED comes back on. THEN release.

When in **CONFIG** mode, the LED Will blink once per second. NOTE that this is different than the heartbeat blip that flashes once every 4 seconds.

To exit **CONFIG** mode, press the SELECT button ONCE.

PUSHBUTTON BEHAVIORS

Each push button can have one or more of the following characteristics:

- Play Once or Repeat
- Interrupt (another soundtrack)
- Momentary or Toggle

The following table shows the button pushes to ENABLE or DISABLE each option:

Sound Module v4.1 wt 16 Button Pad

	Using Module		Using 16 Button
	STD MODE		CONFIG MODE*
1	Set Default Trk		Exit
2	Set Default Trk		Recite
3	Set Default Trk		Interrupt ON
4	Set Default Trk		Interrupt OFF
5	Play Once ON		Play Once ON
6	PlayOnce OFF		PlayOnce OFF
7			Toggle ON
8			Toggle OFF
9			Set Default Trk
13	RESET		

* In Config Mode the playback will be pin number followed by setting count. For example, Button 4 set to Play Once will echo 4 flashes, pause, then 5 flashes. Use 'recite" to show all the button settings.

HOW DOES RECITE WORK?

To confirm the setting for any particular button, while in CONFIG mode, press the button twice. It will echo back the configuration via blinks for that button. The sequence will be – Button Number, pause, configuration count, pause, configuration count, pause, configuration count. While this might sound confusing, after trying it a few times you will get the hang of it. Here are a few examples:

1.   Button 9, pause, 1 blink, pause, 3 blinks.

2.   Button 5, pause, 6 blinks.

3.   Button 12, pause, 5 blinks, pause, 3 blinks

Once the RECITE sequence is finished, the Sound Module will resume the CONFIG 1 second blink.

WIRING THE PUSHBUTTON & SOUND MODULE
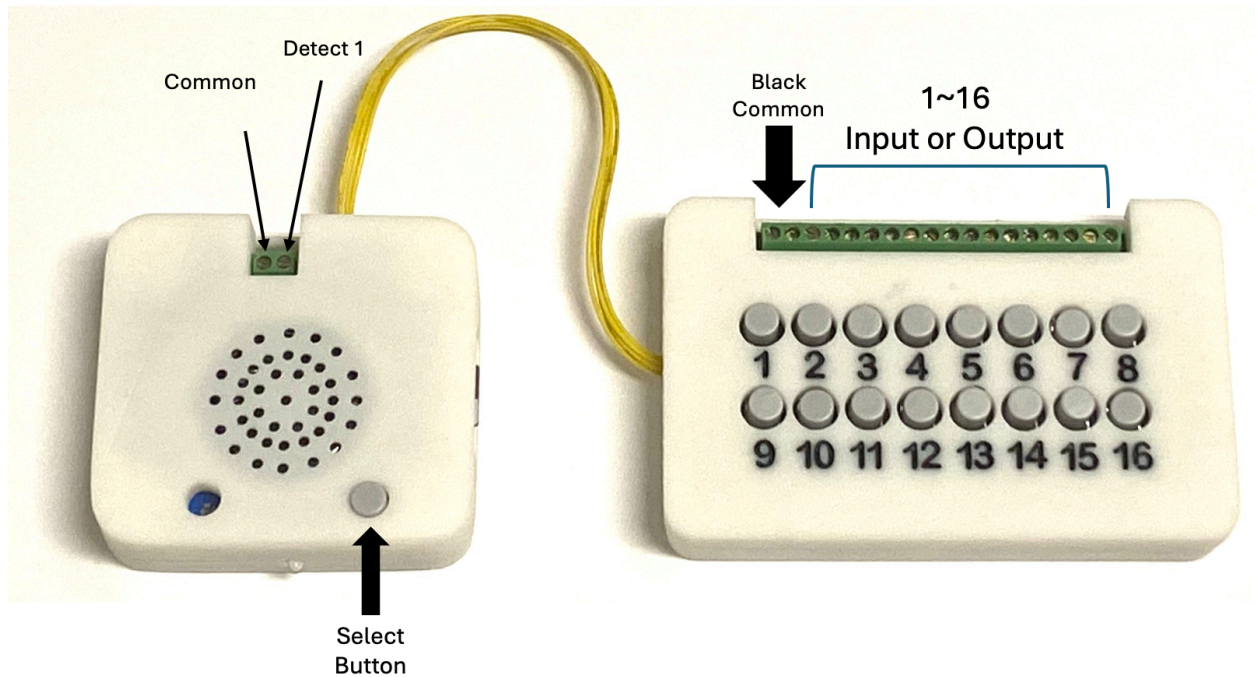
DO NOT CONNECT ANYTHING WITH A LOAD or VOLTAGE to any of the 16 Button module.

The terminal connections on the 16 Button module can be used for digital input or output. As input, you can mimic the pushbutton elsewhere on the layout or, use any one of our precision detectors.   As output, the push button is a momentary digital switch. You can connect the output to any of our signal controllers, gate controllers or the MICRO Sensor Hub. Using the MICRO

Sensor hub, you can connect the output from the button module to an input on any of the LLC-5 or MICRO-5 LED Lighting Controllers.

ADJUSTING THE VOLUME FOR EACH SOUND

While a track is playing, adjust the sound volume and then press the SELECT button once.   That will save the default volume for that sound on that track. Each track can have its own unique volume level.

To change the volume, play the track you want to adjust and while the sound is playing press select again. This will update the default sound level for the track that is playing.

LOADING SOUNDS TO YOUR SOUND MODULE

The TF Card is a 2GB (gigabyte) storage card for the four soundtracks. The sounds are contained in a folder named "01". DO NOT CHANGE THIS FOLDER NAME. Inside that folder each sound is prefaced with the track number like this:

001Bell.mp3
002Bell.mp3
003Bell.mp3
004SteamBell.mp3

When you plug the TF card into a TF Card read (connected to your computer via USB) the folder will pop up on your desktop. (there are slight differences as to what this will look like on a MAC versus a PC)

You may change the name of the soundtracks EXCEPT you must retain the "001", "002" preface for each of the files. So you could call track 1 = "001mybell".

Keep the names short and do not use special characters in the name.

If you like, you can use a TF card with up to 32GB however you still only have 16 sound tracks.

To move sounds to the Sound Module simply drag and drop those files from their source location on your PC into the folder.

SOUND FILES MUST BE .mp3 FILES

To remove a sound, we suggest you move it to your desktop via drag and drop. This copies the file to the desktop but does not remove it from the folder. Once you have that copy, then delete the file in the folder.

Some other guidelines:

1.   Only four files will play, and they will be the first four files you load into the folder. A fifth file will be ignored.

2.   If you try to move a file that is too big for the folder your operating system (Windows) will let you know and complain. We don't control that.

3.   <u>The order in which the files are load into the folder determines their order of play</u> on the Sound Controller. Sorting them in the folder, changing their names, etc. will have NO EFFECT. This only changes the VIEW of the files, not their actual location on the drive. If you delete a sound file that was previously track 1 and then you copy it back, it will now be track

4 – the last track copied in. The behavior settings follow the soundtrack number assign, not the soundtrack name.

4.   The files must be .MP3 files and we recommend that they be recorded at 128kbt. There are many programs available for free on the internet to do this. Many do not require you to install any software. Instead, they work from within your browser

BEWARE OF DOWLOADING PROGRAMS FROM THE INTERNET.

For the most part, it's not necessary since many programs will run safely on from within your browser.

5.   You can have up to four soundtracks, but you don't have to have four soundtracks. If you want a single 4-minute sound you can load a single sound and use trigger #1.

HOW TO CREATE .MP3 FILES

We will not be able to explain all the details but rather, we can give you some general ideas about how to record sound files and get them into MP3 format. There are also web sites that let you subscribe to their library of sounds and many are free.

We will be building a library of sounds along with further instructions and videos. If you get stuck, start with the videos to see if you can solve the problem.

Using your Phone:

All smart phones have an audio recording app. These will usually create an .M4a file which is an Audio only version of MPEG-4.   These will usually have higher quality than an equivalent MP3 file – and therefore the files are larger. The first portable song players were based on MP3 and our sound card is an MP3 player so we need to convert the file. It's fairly simple as things go on the PC. The hardest part is getting the audio file from your smart phone to the desktop.

Once you record a sound on your phone you will want to move that file onto your desktop. You can email it to yourself or text it to your email.

You can also email the non-MP3 source sound file to Support@ModelTrainTechnology.com and we will convert it for you. The file must be less than 4mb.

We will also be happy to convert and preinstall any soundtrack files that you might have.

Put "MP3" in the subject line.

Another step you can take is to edit the file. I do this to clip the dead space at the beginning and end of my original recording.

There are also both browser-based and installable Apps for Windows that can help you with this. We will also be developing some How-To videos for this.

DCC OPERATIONS

The **Sound Controller** can respond to DCC Accessory messages just like your turnout controllers.

You must set the Sound Module address to use DCC. You can use any valid ACCESSORY switch address between 1 and 2044. When the **Controller** receives a DCC turnout command (THROWN) that matches the one of the four **Controller** address, it will activate the trip function of the **Sound Controller** and start the playing the sound on that track. Change to CLOSED to turn it off. Since there are four tracks per **Sound Controller,** the DCC address set is for the first track, then followed by the 3 remaining tracks. An address of 3 sets the Sound Controller tracks as addresses 3,4,5,6. An address of 27 would set the tracks to 27,28,29,30.

- Thrown is On and Closed is Off. These commands act like triggers.

While DCC is connected and active, DCC commands will override the input signal. In other words, you can use detectors OR DCC to trigger the *Controller* but not at the same time.

To use DCC, the MTT Sound Controller must be connected to the A and B DCC track power. Any DDC system that is NMRA compliant will work.

SETTING THE CONTROLLER ADDRESS

With the Controller idle and in the non-tripped state, press and hold the select button for about 10 seconds. Within 1 second of beginning to press the button, all the signal lights will go out.

Continue to hold the select button until the light comes back on. Then release the button. The light will begin to blink. This indicates that the *Controller* is ready to accept a new address.

To set a new address, select the Accessory/Turnout number that you want to use on your DCC hand controller. This can be a number from 1-2044. Using your DCC hand controller, enter the number and then press the appropriate command to set a CLOSED or THROWN switch event. Either closed or thrown will work. This will be slightly different depending on the brand of DCC system that you are using.

To exit setting the address mode WITHOUT changing it, press the select button once. The Controller will return to its ready state.

As soon as you select either CLOSED or THROWN while in address setting mode (blinking light), the **Controller** will flash 4 times and the lights will go off. The **Controller** is now set to the new address.

ELECTRONICS AND STATIC ELECTRICITY

The **MTT Sound Controller™** circuit board and components are exposed when the cover is off. Electricity can be dangerous. Static electricity can cause component failure. Scuffing along a carpet and then touching one of the component connectors can cause a static spark. These components are rugged – some designed for the automotive industry. Just be mindful of the risk.   The current on the board will not harm you if the board is powered and operated as per the instructions.

ONE YEAR **MANUFACTURER WARRANTY**

We warrant this **product** to be free from defects in workmanship and materials, under normal residential use and conditions, for a period of one (1) year for the original invoice date. Shipping and handling fees are to be paid for by the customer.

<u>LIMITATION OF LIABILITY</u>

UNDER NO CIRCUMSTANCE SHALL COMPANY OR ITS AFFILIATES, PARTNERS, SUPPLIERS OR LICENSORS BE LIABLE FOR ANY INDIRECT, INCIDENTAL, CONSEQUENCIAL, SPECIAL OR EXEMPLARY DAMAGES ARRISING OUT OF OR IN CONNECTION WITH YOUR USE, OR INABILITY TO USE THE PRODUCT, WHETHER OR NOT THE DAMAGES WERE FORESEEABLE AND WHETHER OR NOT COMPANY WAS ADVISED OF THE POSSIBLITY OF SUCH DAMAGES. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, COMPANY'S AGGREGATE LIABILITY TO YOU SHALL NOT EXCEED THE AMOUNT OF THE PRODUCT. THE FOREGOING LIMITATION WILL APPLY EVEN IF THE ABOVE STATED REMEDY FAILS OF ITS ESSENTIAL PURPOSE.

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