

# AN AUTOMATIC TRIGGER FOR BIRD FRIGHTENING DEVICES

by Steve Price and John Adams<sup>1</sup>

## INTRODUCTION

This triggering unit for animal frightening devices was developed because of an expressed need for a more effective method of breaking up starling and grackle roosts. The USDA, Animal Damage Control (ADC) office in Louisville, KY, suggested that a device which detected the presence of the birds before activating and then emitted different sounds would be much more effective than single functioning devices on timers. Existing frightening devices have limited effectiveness because the birds become accustomed to the repeated and periodic actuations of the same thing over and over again. In November of 1986, Mr. Bernice Constantin, District Supervisor for the Kentucky ADC office approached John Adams and Steve Price about the possibility of developing such a device. John Adams is over electrical maintenance at a large Louisville plant and Steve Price is an electronic engineer for the Navy. The two agreed to undertake the project, and by the spring of 1987 the first prototype model had been constructed.

## DEVELOPMENT

From the very beginning, several goals were established for the design:

- 1) The detection circuit must be able to

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<sup>1</sup>/ Adams Dominion, Inc.  
1212 Wieble Rd.  
Crestwood, KY 40014

discriminate against other ambient sounds while being very sensitive to the sounds of the particular species.

- 2) The trigger circuit must be able to randomly select any of several different frightening devices.
- 3) The trigger circuit must have a random delay before actuation and a random duration of actuation.
- 4) The circuit must be battery operated and consume very little energy for detection and triggering.

All of these goals have been accomplished, along with a number of other features, on the present unit.

The present triggering unit, which has a patent pending, is the sixth generation of development of this device. All of the earlier prototype models were self contained frightening devices containing such features as a strobe, loud bang, siren, and high frequency sound which actuated randomly when the device triggered. These various prototypes were tested by both ADC in Louisville and Bowling Green, KY Field Station of the Denver Wildlife Research Center. They were tested in both large and small starling/grackle roosts in Kentucky. The devices definitely triggered at the

sound of the birds while ignoring almost all ambient sounds. The birds avoided the area surrounding the device for about a 40 to 60 foot radius. Several new ideas resulted from the testing:

- 1) Size and power limitations of the self contained device caused its frightening range to be limited; therefore, the detection/trigger unit should also be manufactured as a separate device to be used with existing more powerful frightening devices.
- 2) The detection circuit should be made more sensitive and adjustable so that the range of detection could be matched to the frightening devices used.
- 3) The detection circuit should be shut down at times it is not needed. This also eliminates any false detections due to prolific summer night sounds, and it saves energy.
- 4) The filter elements that determine the species detected should be mounted on a replaceable plug-in module so one unit can be used to control different species.

#### THE PRESENT DEVICE

These ideas were all incorporated into the present device, which is shown in Figure 1. The device consists of two separate units. The first is the detection/trigger

unit which contains all of the electronics including four separate power output transistors. The other unit, the battery box, houses a battery for powering external frightening devices. It also powers the detection/trigger electronics. The box contains four relays which are energized by the four output transistors of the detection/trigger unit. These relays actuate frightening devices which are connected to each of the four pair of terminals on the battery box. A total of 25 amps at 12 volts can be supplied to four different frightening devices. The device connected to output 1 on the box is actuated every time the circuit triggers. Output 2, 3, and 4 are selected randomly during an actuation. This is so a different sound may be made or a different frightening device activated each time the target animal noises are detected.

The real heart of this device is the detection circuit. The ability to discriminate against ambient sounds while at the same time being very sensitive to particular species is a function of the detector, which is called a Spectral Energy Envelope Detector. Figure 2(a) shows the spectral energy distribution of the sound of starlings (sound energy vs. frequency). Rather than just looking for sound energy in the spectrum of the starlings, the detector continually monitors the shape of the energy spectrum of all sounds being received, looking for the correct shape. Many sounds such as wind and leaves produce sound energy within



a) Battery Box and Detection/Trigger Unit



b) Battery Box, inside view

Figure 2. Automatic Trigger For Bird Frightening Devices

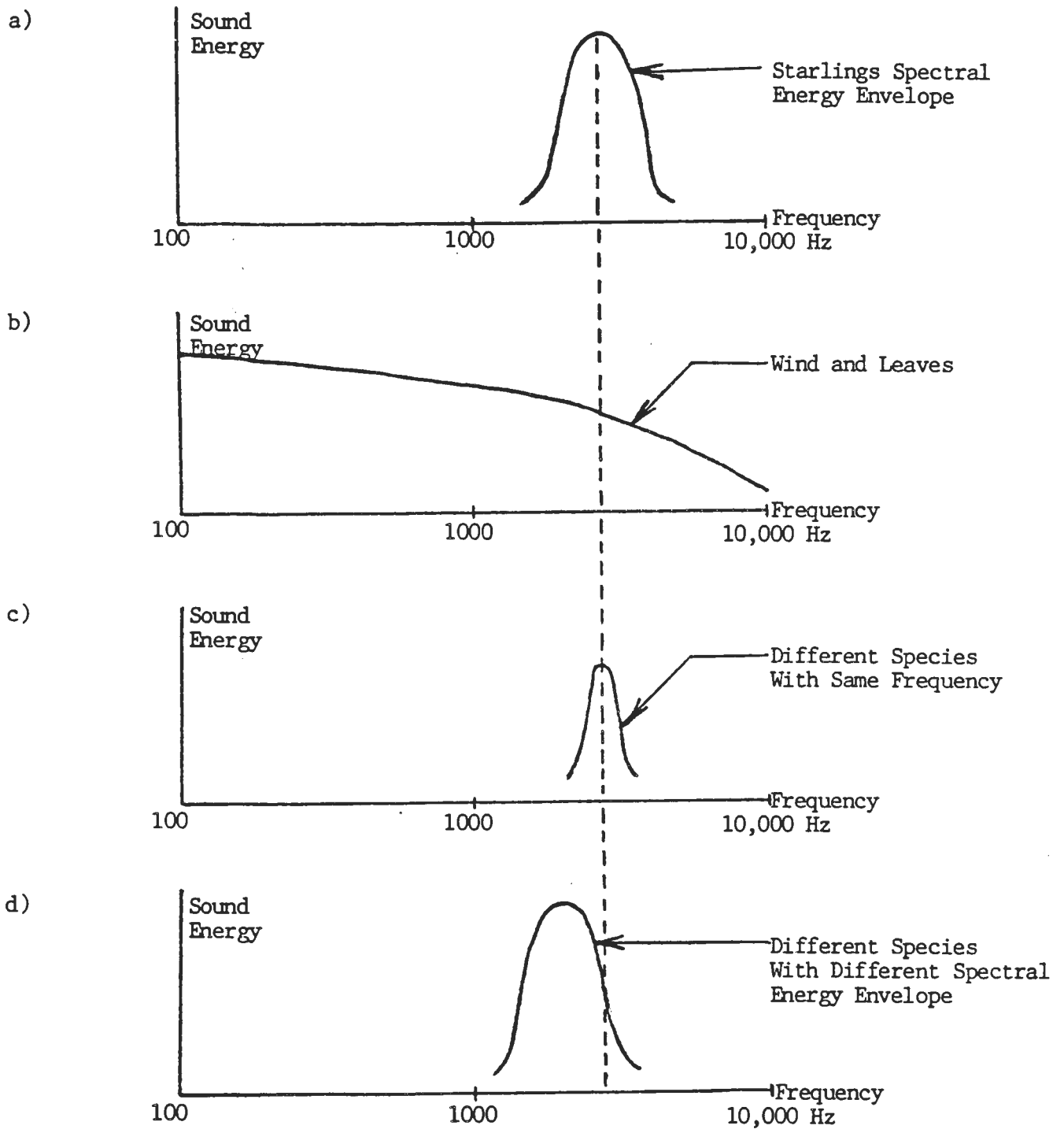


Figure 2. Spectral Energy Envelope Comparison

the spectrum of the birds, but the shape of the sound energy spectrum produced is all together different as is shown in Figure 2(b). Thus they are rejected by the detector. On the other hand, a different species bird may produce sounds which fall entirely within the spectrum of the starling (Figure 2(c) ), and could possibly trigger the device, if they persist. The detector has a built in tolerance so that two or three chirps will not trigger it. Generally the detector is much less sensitive to other birds, or totally rejects them (see Figure 2 (d) ). In order for the desired species to be detected, its sound must be slightly louder than the ambient sound.

The detection unit has a plug-in module which entirely determines the species to be detected. This module plugs into the circuit board. A quality tape recording of the species to be frightened, preferably under actual conditions, is used to develop each plug-in module. Modules can be tailored for a species in a particular environment, if desired. At present modules for starling/grackle roosts, and also for Canada geese have been developed. The plug-in modules are not limited to birds, but any animal which makes a distinctive sound which is louder than its environment could be detected.

#### VARIATIONS

The configuration of the device shown in Figure 1 is only one of several different possible arrangements. The only purpose for the battery

box and relays is to provide up to 25 amps to external frightening devices. The detection/trigger unit by itself can switch four devices and up to 5 amps total. This unit , or even just the circuit board itself, could be adapted to existing frightening devices, where the user furnishes the battery. The circuit board draws only 9 milli- amps and requires a supply voltage of 9 to 15 volts DC. Another configuration is the self contained unit with built in frightening devices, as the earlier prototypes were. Such a device could handle smaller roosts, such as in residential areas.

#### APPLICATION

The applications for this device are almost limitless. It can be used in roosts, orchards, crops, gardens, berry farms, airports and in commercial, industrial, military, municipal, and residential applications. Only the future will tell how successful it is. Feed-back from the various users will be important to the future development since almost any parameter of the circuit function can be varied.