September 1989

AN AUTOMATIC TRIGGER FOR BIRD FRIGHTENING DEVICES

Steve Price
Adams Dominion, Inc.

John Adams
Adams Dominion, Inc.

Follow this and additional works at: http://digitalcommons.unl.edu/ewdcc4

Part of the Environmental Health and Protection Commons

http://digitalcommons.unl.edu/ewdcc4/34

This Article is brought to you for free and open access by the Eastern Wildlife Damage Control Conferences at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in 4 - Fourth Eastern Wildlife Damage Control Conference (1989) by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
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 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
goose 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
millicamps 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.