BIRD FEEDER ELECTRIC RETRIEVER

CONTENTS

A bird feeder that is close to trees attracts more birds than one that is in the open and away from trees. Some birds need the protection of the trees from predators (such as hawks) and do not venture far from the tree line to a feeder. Other birds do not mind the distance, thus to get the best variety of visitors the feeder is placed not far from the tree line.

Depending on the lot, this may make it difficult to refill the feeder, as is the case for my lot. To avoid an accident, I built an electric bird feeder retriever, based on a discarded garage door opener. The final result is very satisfactory and handy, specially in the winter.

Because the design is based on a used garage door opener (mine was a Sears model) specific instructions on how to make one cannot be given, only general guidelines and notes and photos of the built unit. I will list features, recommendations, hints, and problems that I experienced while building this unit.

General Project Scope

The bird feeder unit should move the feeder from next to the house to next to the tree, a distance of 50 ft. The design is based on a garage door opener, repackaged into a smaller unit for appearance and to make it rain proof. By using the normal garage door control, a single push button would control the motion, to the tree, back to the house, and stop.

A single loop of 1/16” diameter steel cable was used, with a pulley at the tree, another at a counterweight, and driven by a pulley mounted in place of the original chain sprocket.

Features were added to protect against the cable jumping the pulleys, to protect against freezing rain, and to protect the house wiring from moderate lightning strikes on nearby trees.

Features of the unit

Two units were inspected, a chain drive unit and a screw drive unit. The screw drive unit was not suitable because the speed of the output shaft is too high. Also, the chain drive unit has bearings suitable for the side forces created by the chain or the cable.

The particular unit I used turns the lamp on when it is first powered up. This feature is used to power a line relay. The relay is then released when the timer would turn the lamp off. The lamp is not used, and the relay is connected to the same circuit.

The motor was mounted originally in a rocking cradle that trips a switch should the torque on the motor be above a preset limit. This cradle and limit switch were used in the repackaged unit, so if the cable or feeder get stuck, the unit stops.

The original circuit board of the garage door opener was used without any circuit modification.

Repackaging

The motor and worm gear unit was removed from the original enclosure and mounted on an 1/8” aluminum plate. The unit has two screw driven limit switches that stop the motor on either limit. These screws and gears were rearranged to achieve a smaller footprint. Hint: the repackaging

resulted in a very small package, but this makes it harder for servicing, and took many hours to complete. It looks nice though, but I suggest to make it a bit larger.

If size is not an issue, the original garage door opener can be mounted almost as is vertically inside a wooden enclosure. The mechanical work necessary would be then the addition of the idler pulleys and replacing the chain sprocket with the drive pulley.

Hint: There is considerable pull by the cable on the unit when the feeders are full and there is high wind conditions. Therefore the repackaging must take these forces into account and have the necessary strength in the fastening from drive pulley to enclosure, and from enclosure to the wall of the house.

Bird Feeder Retrieval Mechanism

The chain sprocket was replaced by a home turned custom pulley that is fixed to the shaft in the same way as the sprocket. The diameter of the pulley must be calculated according to the distance the bird feeder has to travel and the range of motion of the limit switches. to allow this safety feature to stop the motor automatically at the end of the travel. The drive pulley used is shown in Figure 4, and has a working diameter of approximately 1.3".for a feeder travel of xxxx Hint: This pulley was made with a round profile where the cables ride. A flat profile would be better as it reduces the friction of the cables rubbing against each other. Note that the cable makes a full turn around the drive pulley.

The smaller idler pulleys are ball bearing replacement units for patio screen doors. The arrangement of the idler pulleys was selected to prevent the cable from jumping the pulley under large swaying of the tree (high wind conditions).

The large pulleys (see Fig 1) at the tree, the feeder and the counterweight are garage door replacement units, they have ball bearings and these were heavily greased and protected by a hand made plastic cover.

The pulley mounted at the tree can swing sideways through a small arc, to accommodate the extremes of the swings of the tree. It is attached to the tree through a steel strap that wraps loosely around the tree trunk.

The counterweight and springs (I used 6 bungy cords in parallel plus a concrete weight) are sized for: the weight of the feeders, the length of the run, and how much sag can be accommodated. The concrete weight would keep the cables in tension even if all bungy cords failed. To have a second thistle feeder hanging below the first feeder more bungy cords were added later.

Where the two cables enter the unit, two rubber strips minimize the amount of rain water and snow that enters the area the drive pulley is located.

Feeder Pulley

The feeder hangs from both cables, with an idler pulley on the top cable, and cable clamps on the lower cable. This arrangement reduces the stress on the cable, and reduces significantly the swinging of the feeder in the wind.

Electrical Circuit and Lightning Protection

A double pole relay is used to open both feed lines, the hot and the neutral. This way, moderate voltage surges coming through the steel cable due to lightning are not fed into the house wiring. For the same reason, the unit is grounded through a ground rod driven into the ground by the unit, and not through the house wiring ground wire (check local code). An MOV across the power feed provides additional surge protection. Note that this protection is limited by the voltage standoff capability of the relay contacts and of the push button unit described next.

To energize the unit a momentary contact push button bridges the relay contacts (see circuit diagram), and the lamp circuit then energizes the relay. The unit will later time out and de-energize the relay, thus I do not need to remember to turn off the unit. A second push button is used to control the travel of the feeder.

Hint: If lightning is not an issue in your area, and the garage door opener has a remote control, then the unit can be left energized and operated through the remote.

Electrical Installation

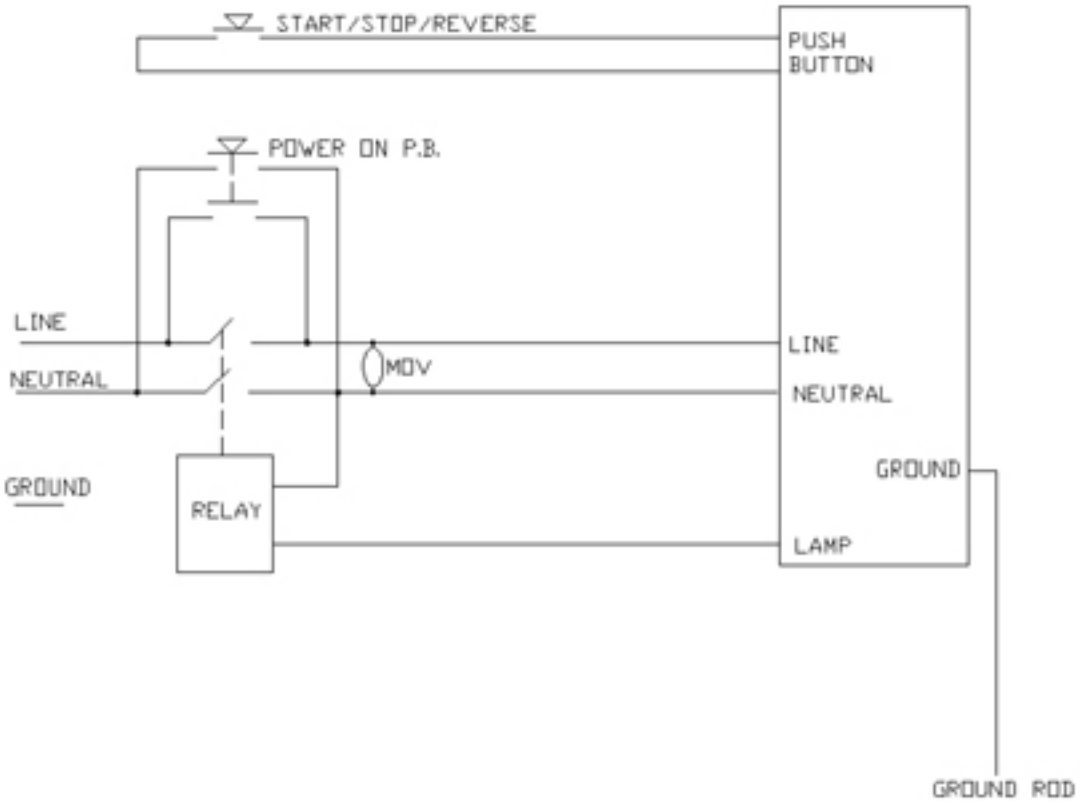
The relay, the push buttons and the MOV were installed in a regular house wiring junction box. A blank panel was drilled to mount the push buttons. Screw type terminal strips were used at the junction box and at the unit to terminate the wiring. The unit was mounted in the wall on a location that allowed easy access from the inside for the wiring. Unfortunately, this location did not make a perpendicular run to the tree, but was off by about 6 degrees. To accommodate this angle, a vertical shaft with two small pulleys was added. See photo Hint: when selecting a mounting location, it is best to have a perpendicular run from the wall to the tree. Otherwise either add a vertical shaft as shown in the photo, or mount the unit at an angle to the wall, which can be done with a wedge shaped base.

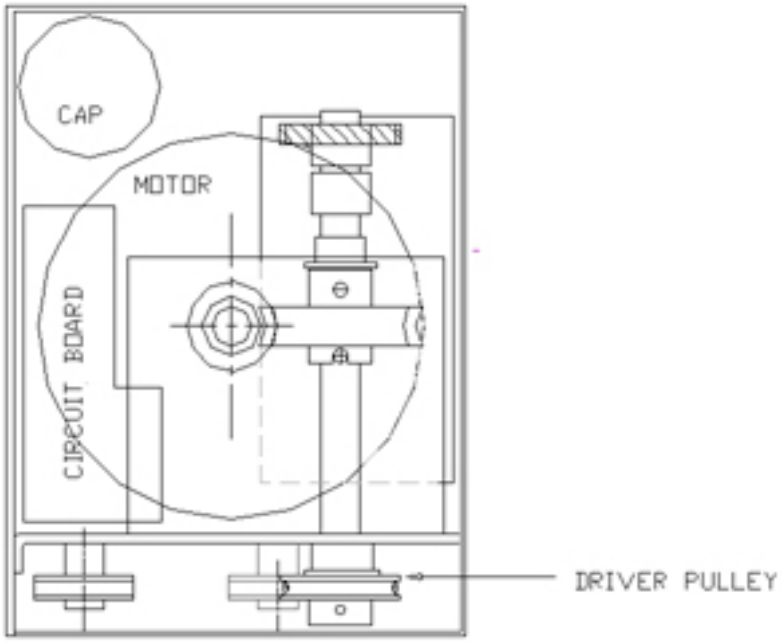
Conclusion

The result of all this beats walking down the hill to reach the feeder, at any time but specially in the winter, and reduces the slipping and falling hazard, so it was a good investment of time. We have enjoyed the show the birds provide at and around the feeder.

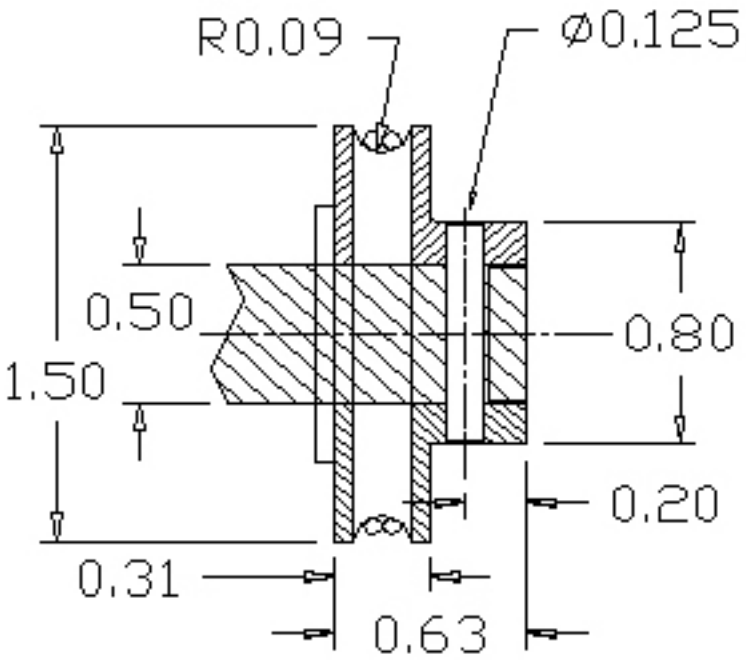
Parts List

QUANTITY	DESCRIPTION	ALLIED CATALOG No.
1	ac operated relay - class 78	850-1821
1	Socket for relay	850-1074
1	MOV surge protector	586-0134
1	Power ON Pushbutton Switch DPPT	870-8752
1	Pushbutton SPDT	870-8750
1	Cap for power-on pushbutton - red	870-407C
1	Cap for power-on pushbutton - black	870-407A
2	Screw Terminal Strip	824-2812
OTHER PARTS		
1	Garage door opener	
1	1/16 " steel cable	
2	steel cabl;e clamps	
3	2 ¾ in garage door pulley (ball bearing)	
4	1 ¼ in patio door replacement pulley (ball bearing)	
1	4" Drain pipe - length as required	
6 ft	1/2 x 1/8 steel strap for tree trunk pulley	





BOTTOM VIEW
GENERAL ARRANGEMENT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