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Halloween Prop Control – Two Motor – Sequence of Operation

1. Switch SW1 is controlled by the Prop-1 controller and is activated when the second PIR is activated.

2. Relay 1 momentarily energizes and closes contacts 1 and 2.
   a. Contact 1 activates sound 2 on sound card.
   b. Contact 2 energizes Relay 2.

3. Relay 2 energizes and closes contact 2, which powers Raise / Lower motor in the Raise direction. Power is fed through switch SW2 (Upper Limit 1), maintaining power to Relay 2.

4. When prop reaches top of travel switch SW2 opens, de-energizing Relay 2 and turning off power to Raise / Lower motor.

5. When scare reach top of travel, switch SW6 (Upper Limit 2) closes to activate Timer Relay 5.

6. Timer Relay 5 closes contact 2 which energizes Relay 6, Timer Relay 5 has to stay ON long enough too allow switch SW7 (Rear Tilt 2) to close as the prop starts its forward travel.

7. Relay 6 is energized, closing contact 2 and powering the Tilt motor through Relay 7.

8. As the prop tilts forward it closes switch SW7, allowing Relay 6 to self power.

9. When the prop reaches the full forward tilt position it closes switch SW4 (Forward Tilt 1). The following happens:
   a. Relay 4 is energized, closing contacts 1 and 2.
   b. Relay 4 is self powered through Switch SW5 (Lower Limit 1), which is closed.
   c. Relay 3 is energized, switching polarity of the Raise / Lower motor, motor does not come on at this time, it is just preparing for the downward travel.
   d. When contract 2 is closed it breaks the triggering circuit for Timer Relay 5.

10. SW8 (Forward Tilt 2) closes powering Relay 7. The following happens:
    a. This switches polarity of the power to the Tilt Motor.
    b. Power is fed through Contact 3 to maintain Relay 7 energized.
    c. Delay On Timer Relay 8 is energized. Relay 8 is set to allow the prop to remain in the forward tilt position long enough to complete sound effects, sets "scare factor".

11. When Relay 8 times out it energizes and powers Tilt Motor through Relay 7. As the prop travels back to its rear position, when it reaches the maximum rear travel switch SW7 opens, de-energizing Relay 6 and cutting power to the Tilt motor.

12. The prop also closes switch SW3 (Rear Tilt 2) energizing the Raise / Lower Motor in the lower direction.

13. The prop reaches the lower limit of travel and opens switch SW5, de-energizing Relay 4, Relay 3 and the Raise / Lower motor.

14. The prop is ready for next cycle.

15. SW9 (Lower Limit 2) opens when prop begins its upward travel. This prevents accidental restarting the cycle while the prop is in operation. This would have catastrophic results as it would cause the Raise / Lower Motor to begin to travel up without any stops, tearing the prop apart. I came up with this easy fix rather quickly after I tested an "oh no" thought. Works good though.

History and Upcoming Changes:

In 2008 the prop was controlled by a person pressing three switches. The three switches were: (1) – Sound file, (2) – Sound file and prop motion, (3) – Sound file. In 2009 I was task to make it automated, no people. So after many months of trying to get the PIR (Passive Infra-Red) detectors to work with various circuits, I found the Prop-1 controllers from EFX-TEX (www.efx-tek.com). These guys are great, they sell a great product line and their online forums will help develop a program for the Prop-1. The Prop-1 is programmed for many uses through a simple Basic Stamp 1 microprocessor. I use my laptop and a USB cable to adjust the program.

This is a very complicated method to control the prop. Initially I set it up this way because I didn't realize something as great as the Prop-1 controller was available. I plan on replacing all the relays and the majority of the limit switches with a second Prop-1 controller. I'll use travel times to determine how long for the motor to run and with direction it is to run. The first Prop-1 controller with still run the PIRs and will send the start signal to the second Prop-1. I will use two Prop-1s due to limited input / output connections. They are only $40 each and by splitting the two functions up I'll also have cleaner code in the microprocessors.