Teardown of PEAK^{TM} PKCORJ GARAGE PARKING SENSOR

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***Abstract*—In this document we describe the teardown process of a PEAK^{TM} PKCORJ GARAGE PARKING SENSOR. We detail the advertised function of the device, discuss the process of opening and removing the various components from the shell and describe various components that are of interest. Furthermore, we discuss some of the more novel design decisions observed and how some of the components and design decisions may be appropriated for future projects.**

***Index Terms*—teardown, electronics, sensor, design**

I. Introduction

THE PEAK^{TM} PKCORJ GARAGE PARKING SENSOR is advertised per the packaging as an "easy to install and use" solution to "safely park your vehicle every time." The sensor was purchased at a local DOLLARAMA for 4 CAD. The device is intended for use in personal garages. An ultrasonic sensor attached to the main device detects the distance of any object in front of it – presumably a vehicle – and gives feedback in the form of a glowing light which changes color depending upon how close an object is. According to the packaging, the sensor will turn green if the object is within 4-8 feet, yellow if it is between 2-4 feet and red if it is between 0-2 feet. According to the packaging, the system is also programmable via a "learn" button which allows the user to define the optimal distance from the sensor. While the packaging originally came with a detailed manual for the device, it has long been lost and all attempts at recovering the manual online have failed.

II. Motivation

The motivation for this teardown was simply to see what sort of components are inside of it, to document the internals and to find potentially salvageable parts for use in future projects. The form factor of the device in-packaging looked like a promising source of modular components. Moreover, it is the experience of the author that electronic devices purchased from the DOLLARAMA tend to be built as inexpensively as possible and hence the designs often rely on stock through-hole components that are accessible for repurposing as opposed to difficult-to-remove surface mounted devices.

III. Required Tools

The only tools required for this teardown was Phillips size 1 screwdriver.

IV. Teardown Process and Description

A. Opening the Shell

The teardown process was fairly straightforward. There are four screws on the back of the device that serve to hold the back of the shell to the front. Once removed, the shell comes apart with very little effort.

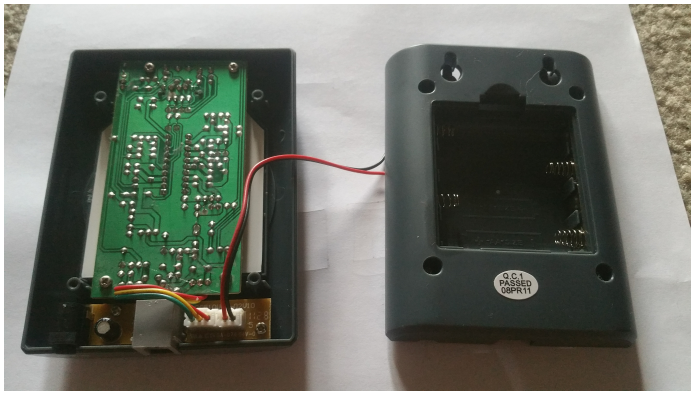

Fig. 1. The parking sensor once the screws have been removed revealing the primary printed circuit board

As is evident in Fig. 1, the front and the back portions of the shells are connected to one another via a two-wire plug. This plug serves as the connection between the battery bank (on the right) and the rest of the circuitry (on the left). Two distinct printed circuit boards are visible. The smaller one in the lower-left portion of Fig. 1 connects to both the main printed circuit board and the the ultrasonic sensor (not pictured). In the lower left-hand section of Fig. 1, the jack for an external power supply is present along with a capacitor.

B. The Main Printed Circuit Board

To free the main PCB, four screws – one on each corner – must be removed. The PCB must also be unplugged from the secondary PCB as it is connected via a three-wire (red, yellow, green) plug. On the side opposite the traces there are a number of components as can be seen in Fig. 2. These components are:

- HT46R503 2K 8-Bit OTP MCU with OPA and Comparator [1]
- 8 KHz Oscillator
- 7 transistors:
  - S8050
  - S8550
  - S9104
  - S9014 x 4

- 7039A-1 Low Power Detector
- 7333A Low power high voltage regulators
- Various Capacitors between 0.0001 μF and 220 μF
- Various Resistors

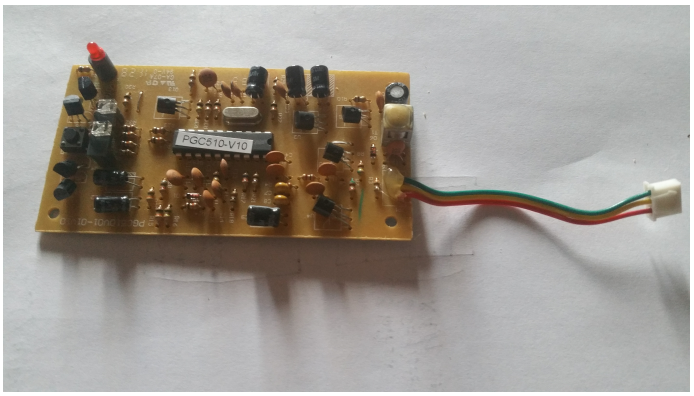

Fig. 2. The primary printed circuit board with components visible

C. The Secondary Printed Circuit Board

The secondary circuit board, pictured in Fig. 3, is removed with two standard Phillips screws. This board contains a single capacitor, a power jack for external power, a two-pronged plug to connect to the battery pack, a three-pronged plug to connect to the main board, and a patch cable which connects to the sensor.

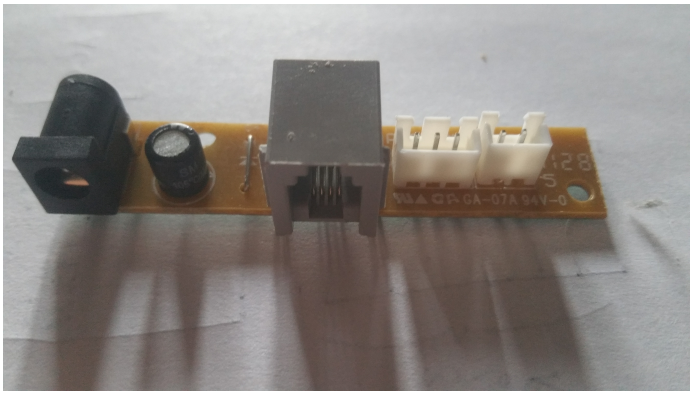

Fig. 3. The secondary printed circuit board. This board connects the sensor to the primary circuit board.

D. The Sensor

A proximity sensor is connected to the secondary printed circuit board via a patch cable (pictured in Fig. 4). The sensor appears to be an ultrasonic sensor which works by emitting a pulse of human-inaudible sound and "listening" for the pulse to return.

Fig. 4. An ultrasonic sensor is connected to the secondary board via a patch cable – shown here after having the end cut

V. Conclusion

The PEAK^{TM} PKCORJ GARAGE PARKING SENSOR is a simple and inexpensive device that provides an easy tear-down and contains a few salvageable parts. The ultrasonic sensor is a likely candidate for future use as is the battery bank that is formed into the back half of the shell. Unfortunately, there seems to be very little in the way of documentation for this device, and attempts to find subsequent copies of this model have turned up very little.

APPENDIX

Fig. 5. The front packaging of the PEAK^{TM} PKCORJ GARAGE PARKING SENSOR

Fig. 6. The back packaging of the PEAK^{TM} PKCORJ GARAGE PARKING SENSOR

REFERENCES

[1] HOLTEK SEMICONDUCTOR INC.(2009).HT46RS03/HT46RS03E/HT46RS03P/HT46RS03PE 2K 8-Bit OTP MCU with OPA & Comparator.[online] Hsinchu, Taiwan: HOLTEK SEMICONDUCTOR INC. Available at: https://datasheetspdf.com/pdf/1064358/HoltekSemiconductor/HT46RS03PE/1 [Accessed 19 Jan. 2019].