Operator's Manual

Shampoo/Conditioner Identification Device

By:
Lu Ma
Nahum Kryzman
Raj Shah
Team No. 4

Client Contact:

Shampoo/Conditioner Identification Device
Brooke Hallowell, Ph.D., CCC-SLP, F-ASHA
Associate Dean, Research and Sponsored Programs Director,
School of Hearing, Speech and Language Sciences
College of Health and Human Services
Grover Center
Ohio University
Athens, OH 45701
(740) 593-1356
hallowel@ohio.edu
Important Safety Instruction

⚠️ ONLY open the battery compartment in a dry environment.

⚠️ Always seal the plastic protection layer completely after replacing the batteries.

⚠️ ONLY use AAA batteries for the device.

⚠️ Do not alter the electrical circuit.

⚠️ Secure the strap tight around the shampoo/conditioner bottles before using the device.

⚠️ Use the device with appropriate sized bottles (avoid any bottles that are too small or too large i.e. travel sized shampoo/conditioner)

⚠️ Place the shampoo/conditioner bottles in a safe place to avoid possible damage from dropping.

⚠️ Avoid submerging the device in water
Parts and Accessories

Casing

Front View:
**Side View:**

![Side View Image]

**Speaker**

![Speaker Image]
Circuitry

Front View:

Back View
Features

The unique features that this device offers include the audio output upon the push of a button to help users identify the objects, the water proof casing that is customizable to be used with different shampoo/conditioner bottles. The compact size of the device prevents adding excess weight to the shampoo/conditioner bottles. All the electrical components are sealed air-tight to ensure client’s safety in the shower. The battery compartment can be easily removed from the plastic protection layer which allows convenient replacements of batteries.
Table of Contents:

Section                                                                 Page Number

1. Introduction

1.1 General Overview of the device  7- 8
1.2 Instructions on how to use the device  8-13

2. Maintenance  13-14

3. Technical Description  14-19

4. Trouble Shooting  19-22
1. Introduction

1.1 General Overview

This device is a message player with an adjustable strap, customizable to different size bottles via a waterproof iPod strap/holder. It consists of a voice-recorder player, which plays a pre-recorded message (“shampoo” for the shampoo device and “conditioner” for the conditioner device) outputted through a small, integrated speaker when activated. A large button, located on the surface of the device serves as the activation point.

The device operates on two AAA batteries included with the device. The two AAA batteries are housed in a battery box connected by a pair of wires to the circuit board. In order to make the device operational, the two AAA must be installed. To do this, remove the sealed
circuit board inside iPod holder. Open the top zip-lock seal on battery side of the waterproof seal. (Only the top seal on this side can be opened as the rest is sealed off to protect the circuitry.) Once it has been opened, remove the battery box and open it. Install the batteries according to the positive and negative charges. Then place the battery box back into the waterproof seal and seal the opening. Then place the device, speaker and button facing up, back into the holder. Make sure the speaker is aligned with the speaker window of the holder.

*Figure 2.* Insulated circuitry inside of the iPod Holder
1.2 How to Use

If the batteries have not been installed then follow steps 1 through 5 before proceeding, otherwise skip to step 6.

1. Remove the sealed circuit board inside IPod holder.

2. Open the top zip-lock seal on battery side of the waterproof seal. (Only the top seal on this side can be opened as the rest is sealed off to protect the circuitry.)
3. Once it has been opened, remove the battery box and open it. Install the batteries according to the positive and negative charges.

4. Place the battery box back into the waterproof seal and seal the opening TIGHT.
5. Then place the device, speaker and button facing up, back into the holder and close the holder. *Make sure the speaker is aligned with the speaker window of the holder.
6. Loosen the strap until the opening is larger than the intended container to be strapped to.

7. Then put the strap around the container at about the midpoint.
8. Pull the strap until it is tight around the container and close the Velcro strap.

9. Now push the button on the device to hear the pre-recorded message.

### 2. Maintenance

**Electrical**

**Battery:**

The batteries for the device should be checked after numbers of uses. To check the battery level, press the button on the device to activate the sound. If the sound is weak or no sound is produced at all, then it means the battery needs to be replaced. For instructions on how to replace the batteries, please see steps 1 through 5 in “How To Use” section.

**Mechanical:**

**Circuit Casing:**

Check the circuit casing every few weeks or immediately after any possible damage for tears or openings that might allow water to enter the circuitry. The circuit casing is enclosed inside the holder. To get to the casing, simply open the holder and remove. Since the battery compartment of the casing is not completely sealed, there is a chance that the zip-lock to the battery box might be open. It is crucial to look for these signs as it may lead to an electrical hazard.

**IPod Holder:**

Periodically check the outer casing/holder for any signs of damage such as tears or looseness. Make sure that the holder’s opening Velcro flap remains in usable condition, that is, it still sticks well enough to prevent the circuit from falling out. Also be sure to check the strap’s Velcro condition and look for tears and breakages. Damages to these components may lead to the circuit falling out or the device detaching from the container.

**Cleaning**

**IPod Holder:**

Since there are several openings on the holder exposing the sealed circuit, water and other foreign elements can accumulate inside the
holder. To prevent buildup, be sure to clear the drainage holes on the bottom of the holder and to empty out the buildup by opening the holder, removing the circuitry, and flipping the holder upside to shake out any fluids or objects. Failure to maintain cleanliness of the device may lead to damage to the circuit and holder.

3. Technical Description

This device is consisted of a voice pad message maker used in greeting cards that is able to play back up to 45 seconds of message. This voice message circuit is connected to a small speaker to output the pre-recorded audio message. The speaker used for the device is an 8 ohm 1 watts myler speaker. It has an 83 dB sound pressure level and a full frequency range, and it is 35mm in length and 20mm in width.

![Small 8 Ohm 1 Watt speaker](image)

**Figure 3.** Small 8 Ohm 1 Watt speaker

This speaker is connected to an amplification system to ensure that the audio output is loud enough for the client. The amplification system used is based around a Speaker Peripheral Module made by Digilent inc. This system is based around an LM4876 audio amplifier. The LM4876 is a single audio power amplifier capable of delivering 1.1W of continuous average power to an 8Ω load. This amplifier runs of a voltage range between 3.3 and 5 Volts. Like other audio amplifiers in the Boomer series, the LM4876 is designed specifically to provide high quality output power with a minimal amount of external components. This amplifier also draws very little current, only 6.5 mA, which ensures that the batteries are not drained quickly. This system is perfectly suited for a battery powered portable system, which fits our requirements.
The team was only able to obtain one Digilent board so the second amplification system was designed from the schematic that Digilent provided on the website. The schematic was converted into a PCB layout and all the necessary parts were ordered and put together for the second system. This was the perfect setup to allow for the system to function with enough volume to be heard with water running in the background.

Figure 4. Amplification Schematic
Figure 5. Digilent board

The entire device is powered by two AAA batteries contained in a battery holder. All the electrical components are sealed air tight in a thin layer of plastic protection layer. However, the battery holder was left open for easy access when changing the batteries.

Figure 6. sealed circuit
The entire circuit was then placed into a waterproof iPod Pro Armband. The iPod Pro Armband is made to be used for swimming or diving. The armband is made from superior quality neoprene. Neoprene is a type of synthetic rubber that is often used in applications that require water resistance such as wetsuits and hoses.

In addition to making the device shock-proof, corrosion resistance is absolutely necessary for daily use and long-term product life, and Neoprene is also used in corrosion-resistant coatings. In making sure that these requirements are met, there is a need to ensure that the weight of the entire device is still kept within a reasonable limit. A device that is light in weight would reduce risk of injury to the client, in-case the bottle/device falls. The iPod casing is ideal for this purpose also because it is very light in weight, and it is only 9.7cm in length and 6.45cm in width.

The device also needs to be able to customize to various bottle sizes, and the strap of the iPod Pro Armband allows this. The strap can be extended or shortened to fit the diameter of any typical shampoo/conditioner bottles. Once the appropriate size is found, it is fastened by a buckle such as the water bottle shown in the following picture.
Figure 8. Device on a bottle
# 4. Trouble Shooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
</table>
| When button is pushed there is no sound output. | - Drained batteries  
                                - Batteries improperly installed  
                                - Damaged circuit                          | Take the circuit out of holder.  
                            Does the red LED blink when the button is pushed?  
                            **No:**  
                            1. First make sure the batteries are correctly installed. When they are, push the button again. If the LED still doesn’t blink red then change both batteries with new ones.  
                            2. If it still doesn’t blink red after replacing the batteries, then the circuit may be damaged. Check for any signs of damage to the seal or moisture buildup inside the seal. If there is, then please remove the batteries and return the device back to the manufacturer for replacement. |
<table>
<thead>
<tr>
<th>Issue</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>When button is pushed, the sound output is weak.</td>
<td>Low batteries</td>
<td>Take the circuit out of holder. Open the battery compartment of the seal and replace the batteries with 2 AAA batteries.</td>
</tr>
<tr>
<td>Water is collecting in the internal sealed bag.</td>
<td>Defective bag.</td>
<td>Ensure that the water-tight seal is closed on the plastic container. If there is a hole in the bag return it to the manufacturer for replacement.</td>
</tr>
<tr>
<td>Holder’s straps cannot be secured</td>
<td>- Worn out Velcro - Dirty Velcro</td>
<td>Make sure the Velcro straps are clean and free of any substances preventing them from sticking. If</td>
</tr>
</tbody>
</table>
the Velcro is clean, then the straps are worn out. Contact the manufacturer for a replacement.