Operator’s Manual
HANSS with Biofeedback

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Important Safety Instructions

- The HANSS with Biofeedback should be properly fitted by a physical therapist to situate the user in the proper anatomical position.
- For INDOOR Operation ONLY. Dirt, Dust, Water, and etc. will damage the Biofeedback Sensors and the RF Transmitter and RF Receiver circuitry.
- Before operating the HANSS with Biofeedback, ensure the Attachment Clamps at tight on the Attachment Pole and RF Transmitter Housing is properly attached to the user’s power chair.
- Ensure that all cables and wiring are collected and neatly kept to prevent wrapping around the Head and Neck regions.
- Do NOT Operate the HANSS with Biofeedback alone. Have Adult Supervision to remove the HANSS with Biofeedback in case of an emergency (choking, seizure, etc.).
- Do NOT plug anything except a 3.5mm, 2 Pole, Audio cable into the Audio In or Audio Out Connections.
- Do NOT use any Audio Cables that have exposed wires or cracked or missing shielding.
- Perform ALL Preventative Maintenance in accordance with the Operator’s Manual.
Parts and Accessories

1. Shoulder Support
   a. Center Fabric Cover
   b. Wing Fabric Cover
   c. Inner Foam Core
   d. Biofeedback Switch Compartment
   e. Chin Strap

2. Attachment Mechanism
   a. Power Chair Attachment Bracket
   b. Power Chair Attachment Bracket Screws
c. Attachment Pole  
d. Attachment Pole Socket Joint  
e. Attachment Pole Socket Joint Screws  
f. Adjustable Position Hinge Joints  
g. Adjustable Position Hinge Joint Screws  
h. Adjustable Ball and Socket Joint  
i. Adjustable Ball and Socket Joint Screws  
j. Attachment Bracket
3. RF Receiver
   a. RF Receiver Plastic Housing
   b. RF Receiver Metal Plate
   c. RF Receiver Wrist Strap
   d. Inner RF Receiver Housing Screw
   e. Outer RF Receiver Housing Screw
   f. RF Receiver PCB
      i. Component List
   g. Vibrating Motor
   h. Battery Compartment
   i. RF Receiver PCB Compartment
   j. Battery Connector
   k. ON/OFF Switch
4. RF Transmitter
   a. RF Transmitter Plastic Housing -
   b. RF Transmitter Housing Screws -
   c. RF Transmitter PCB
      i. Component List
   d. Biofeedback Switches -
   e. Audio Input Jack -
   f. Audio Output Jack -
   g. ON/OFF Switch -
   h. Battery Door -
   i. Battery Connector
**Features**

1. **Electrical Features**
   a. Biofeedback allows the positive reinforcement of correct anatomical position through the use of playing music from an audio device.
   b. Tactile, vibrating feedback alerts the user when the device senses the incorrect anatomical position.
   c. Both positive and negative feedback mechanisms can be used together in combination or individually.
   d. Biofeedback sensors accurately and comfortably determine the anatomical position of the user.

2. **Mechanical Features**
   a. Generic Attachment Pole Socket Joint allows the use of multiple types of Attachment Poles to fit a variety of power chairs.
   b. Soft, expandable nylon fabric covers the soft inner core to comfortably and correctly position the upper torso in the power chair.
   c. Adjustable inner metal core allows the HANSS to be conformed to a variety of body sizes and types.
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1. Introduction

1.1 General Overview of Device

The HANSS with Biofeedback provides comfortable support for the upper torso, neck complex, and head along with positive and negative feedback when the incorrect anatomical position is presented. When the user is in the correct anatomical position, music from an audio device will be relayed from the Audio Input to the Audio output and the RF Receiver Housing will not vibrate. However, when the biofeedback sensors sense the incorrect anatomical position, the music from the audio device will cut between the Audio Input and Audio Output and the RF Receiver Housing will vibrate.

1.1.1 Electrical Components

In order to provide the positive feedback for the correct anatomical position and negative feedback for the incorrect position, electrical circuitry with RF technology was selected. All the electrical components are divided into two major sections, those associated with the RF Transmitter circuitry and those with the RF Receiver circuitry.

First, the RF Transmitter circuitry provides a series of important electrical tasks. The electrical components associated with the RF Transmitter include: the RF Transmitter PCB, Biofeedback Switches, Audio Input Jacks, Audio Output Jacks, and Power Supply. This circuitry has a series of inputs that includes the data about the user’s anatomical position and the audio device music. The output of the RF Transmitter circuitry includes: an RF frequency signal and the audio device music to the headphones. When the correct anatomical position is sensed, a voltage applied to a relay causes the input audio signal to be transferred to the output audio jack. However, when the incorrect anatomical position is sensed, a voltage is applied to the RF Transmitter causing an RF signal to be sent.

Second, the RF Receiver circuitry performs another set of electrical task for the overall function of the device. The components associated with the RF Receiver include: the RF Receiver PCB, Vibrating Motors, and Power Supply. The input to the RF Receiver is an RF signal and the output is the vibration of both of the vibrating motors. When the correct anatomical position is sensed, the vibrating motors will not vibrate due to the absence of a RF signal. Contrarily, when the incorrect anatomical position is sensed, the vibrating motors will vibrate reminding the user to correct their posture.

1.1.2 Mechanical Components

The mechanical components of the HANSS with Biofeedback provide the necessary anatomical support for the user. The three majors components of the Mechanical Components includes the Shoulder Support, Chin Support, and Power Chair Attachment Mechanism. The
Shoulder Support positions the user’s upper torso and shoulder back against the seat of the power chair that counteracts weak abdominal and upper torso muscles. Also, the Chin Support situates the user’s head and neck in the correct anatomical position to compensate for weak neck muscles. Finally, the Power Chair Attachment Mechanism provides a stable link between the Shoulder Support and the power chair.

The Shoulder Support correctly and comfortably positions the upper torso and shoulders in the user’s power chair. This is accomplished by a strong but flexible inner metal core surrounded by a soft foam core and wrapped in a comfortable fabric cover. The flexible inner core allows the Shoulder Support to be custom fit to the user based on their specific anatomy.

Next, the Chin Support lifts and positions the chin in the proper position to compensate for the weak muscles of the neck. The Chin Support consists of an adjustable, expandable strap and a padded chin cup to connect the chin and the Chin Support.

Finally, the Power Chair Attachment Mechanism allows the HANSS to be attached to a variety of different power chairs. The versatility of the mount, because of the Ball and Socket Joint of the Attachment Pole Socket Joint, enables any Attachment Post to be used as long as a ½ inch diameter ball is located on one end.

1.2 Step by Step Instruction on How to Use Device
The following two sections describe the necessary steps to operate the HANSS with Biofeedback.

1.2.1 How to Use the Biofeedback
The following steps correctly allow the user to operate the Biofeedback component of the HANSS with Biofeedback with both the audio positive feedback and vibrating negative feedback. Below, Figure 1 depicts the RF Transmitter and Figure 2 displays the RF Receiver.
Figure 1. RF Transmitter With Necessary Components to Operate the Device

Figure 2. RF Receiver With Necessary Components to Operate the Device

1. Plug one end of the 3.5mm Audio Cable into the Audio In Jack of the RF Transmitter and the other into the Audio Device.
2. Plug in a pair of headphones into the Audio Output Jack of the RF Transmitter.
3. Slide the ON/OFF switch of the RF Transmitter and RF Receiver to the ON position.
4. Play music on the Audio Device.
5. Adjust Song and Volume as needed on the Audio Device.

The below set of steps allows the user to operate the Biofeedback component of the HANSS with Biofeedback using only the vibrating negative feedback.

1. Slide the ON/OFF switch of the RF Transmitter and RF Receiver to the ON position
Finally, the next set of steps allows the user to operate the Biofeedback component of the HANSS with Biofeedback using only the audio as positive feedback.

1. Plug one end of the 3.5mm Audio Cable into the Audio In Jack of the RF Transmitter and the other into the Audio Device.
2. Plug in a pair of headphones into the Audio Output Jack of the RF Transmitter.
3. Slide the ON/OFF switch of the RF Transmitter to the ON position.
4. Play music on the Audio Device.
5. Adjust Song and Volume as needed on the Audio Device.

1.2.2 How to Use the HANSS

To operate the HANSS, three sets of fitting procedures are required: attach the correct Attachment Pole, mounting the device to the power chair and adjusting the device to the user. Furthermore, the final set of instructions shows how the user can get in and out the device.

First, the user must select the appropriate Attachment Pole. Below, the list of steps allows the user to install the correct Attachment Pole. Figure 3 provides a visual schematic of the screws required to be removed for installing Attachment Pole.

![Attachment Pole](image)

**Figure 3. How to Install the Attachment Pole**

1. Select the Attachment Pole based on the Attachment Bracket on the power chair.
2. Remove BOTH Attachment Pole Socket Joint Screws and Adjustable Position Hinge Joint Screw illustrated in Figure 3 using a 5/32-inch Allen wrench.
3. Place the selected Attachment Pole top ball joint into the Attachment Pole Socket.

Second, the HANSS must be attached to the power chair. The following set of steps allows the HANSS to attach to the power chair using the provided Attachment Bracket and Attachment Pole. Figure 4 displays the required hardware to attach the Attachment Pole to the Attachment Bracket.

![Figure 4. How Attach the HANSS with Biofeedback to the Power Chair](image)

1. Loosen all FOUR Power Chair Attachment Bracket Screws with a Flat Head Screwdriver
2. Slide the Attachment Pole into the Attachment Bracket and position at the required height.
3. Tighten all FOUR Power Chair Attachment Bracket Screws to hold the Attachment Pole firmly in place.

Third, the Shoulder Support must be customized to fit the user with the help of a physical therapist. The following set of instructions allows for the proper fitting of the HANSS with Biofeedback to the user.

2. Place the user in the power chair with the Shoulder Support over the user’s shoulders and around the user’s head and neck.
3. Situate the user in the correct anatomical position determine by a physical therapist.
4. Tighten the Adjustable Position Hinge Joint Screws and Adjustable Ball and Socket Joint Screws to hold the user in the correct anatomical position.
Finally, to enter and exit the device, loosen the FOUR Power Chair Attachment Bracket Screws.
2. Maintenance

The following sections describe the necessary maintenance required for the HANSS with Biofeedback.

2.1 Electrical Components

2.1.1 RF Transmitter

To keep the RF Transmitter operational, the user should perform quarterly maintenance to prevent device failure or user injury. Quarterly maintenance consists of four major sections: inspecting the battery, visual inspection of the device, operational function inspection, and cleaning. First, the 9V battery, located under the battery door of the RF Transmitter Housing, should be replaced every 4 months or as necessary based on amount of use. Disconnect the 9V battery and replace with a new 9V battery. Second, a complete visual inspection of the device should be completed. The visual inspection involves inspecting all external wiring for defects such as crack or frayed wiring of the Biofeedback Sensors, Audio In cable, and Audio Out Cable. Also, inspect the RF Transmitter Housing for cracks. If any damage is found to the wiring, the wire or cable should be replaced. Damage to the device housing should be repaired using an epoxy or resin. Third, an operational test should be performed on the RF Transmitter device. To accomplish the operational test follow the instructions below.

1. Turn OFF the RF Transmitter and RF Receiver
2. Connect a Pair of Functional Headphones to the Audio Out Jack
3. Connect an Music Source to the Audio In Jack using the Audio Input Cable
4. Turn ON RF Transmitter
5. Press each of the Biofeedback Sensors individually and listen for the audio signal over the headphones

Fourth, the outside casing of the RF Transmitter should be cleaned using a LIGHTLY dampened cloth. The RF Transmitter Housing, Audio Input cable, and Biofeedback Sensors wiring should be cleaned.

2.1.2 RF Receiver

Next, to keep the RF Receiver functioning properly, the user should perform quarterly maintenance to prevent device failure or personal injury. Quarterly maintenance of the RF Receiver involves three major sections: inspecting the state of the battery, visually inspecting the RF Receiver, operational testing, and cleaning the device. First, the 9V battery should be removed and replaced every 4 months or as necessary depending on the usage of the device. To remove and replace the battery follow the below instructions.
1. Turn OFF the RF Receiver and RF Transmitter
2. Take the RF Receiver Housing out of the RF Receiver Wrist Strap by undoing the Velcro flap
3. Remove the Inner RF Receiver Housing Screw from the RF Receiver Housing Plate with a Philips Screwdriver
4. Remove the 9V battery and replace with a new 9V battery
5. Close RF Receiver Housing Plate, replace Inner RF Receiver Housing Screw, and tighten
6. Replace RF Receiver Housing into the RF Receiver Wrist Strap

Second, the RF Receiver Housing should be visually inspected for any damage. Damage to the device housing should be repaired using an epoxy or resin. Third, an operational test should be performed on the RF Receiver. To accomplish the operational test follow the instructions below.

1. Turn ON the RF Transmitter and RF Receiver
2. Press each of the Biofeedback Sensors individually and Listen and Feel for the vibration of the RF Receiver

Finally, the outside of the RF Receiver Housing should be cleaned with a VERY LIGHTLY DAMPENED cloth. Furthermore, the RF Receiver Wrist Strap is machine washable if it becomes dirty.

2.2 Mechanical Components

2.2.1 Shoulder Support and Attachment Mechanism

To keep the HANSS is peak operating condition; the Shoulder Support user should complete preventative maintenance every quarter. Quarterly maintenance consists of three major sections: visual inspection of the device, operational inspection, and cleaning. First, visually inspect the Shoulder Support for any excessive wear or damage, and treat the problems as they occur. Second, an operational test should be performed on the Shoulder Support and Attachment Mechanism. A physical therapist should evaluate the position of the user in the device and make any modifications to the Attachment Mechanism to ensure proper anatomical position. Finally, the Shoulder Support and Attachment Mechanism should be cleaned to prolong the effective life of the device. The Shoulder Support can be cleaned in two different manners depending on the state of the device. One method is to use a DAMP cloth to remove any small stains from the cloth outer cover of the Shoulder Support. The second method of cleaning the Shoulder Support involves the removal of the cloth covering and machine-washing the cover. The cover should be allowed to AIR DRY to prevent shrinking of the fabric. The following steps need to be taken for Fabric Cover removal.
1. Turn OFF the RF Transmitter and RF Receiver
2. Un-attach the RF Transmitter Housing from the power chair
3. Loosen the Power Chair Attachment Bracket Screws
4. Remove the Attachment Pole from the Power Chair Attachment Bracket
5. Remove Center Fabric Piece
6. Remove Wing Fabric Pieces

To clean the Attachment Mechanism, use a LIGHTLY DAMPENED cloth to remove any dust or debris from the device.
3. Technical Description

3.1 Electrical Components

In this section of the Technical Description displays the circuit diagrams and custom PCB for the RF Transmitter and RF Receiver circuitry.

3.1.1 RF Receiver Circuitry

The RF Receiver circuitry was designed using National Instruments Multisim and then build on a breadboard to verify the function of the assembled components and National Instruments Ultiboard was used to create the custom PCB. Figure 5 displays the circuit schematic of the RF Receiver and Figure 6 displays the PCB.

Figure 5. National Instruments Multisim Circuit Schematic for the RF Receiver
The following electrical components are used for the RF Receiver. Component J1 is the connection for the RF Receiver module, J2 is the LM317T voltage regulator that outputs a constant 3.3V, and J3 is the wire connection for 9V battery. U1 and U2 are the 2N222A transistors, S1 and S2 are connections for the vibrating motors, and U4 corresponds to the 8-bit decoder. The resistors, R1 and R2, are associated with allowing current to flow to the resistors when the RF Receiver obtains a signal from the RF Transmitter. Also, resistor, R3, regulates the current flowing into the RF Receiver. Furthermore, R4 and R5 are the resistors used to regulate the voltage exiting the voltage regulator. Finally, U0 and U5 are holes drilled into the PCB to connect the plastic enclosure and PCB.

3.1.2 RF Transmitter Circuitry

The RF Transmitter Circuitry was designed using National Instruments Multisim and then build on a breadboard to determine the overall design was functional. A custom PCB was not created for this portion of the electrons. The RF Transmitter electrical components were assembled onto a generic PCB purchased at Radio Shack. Figure 7 displays the circuit schematic.
of the RF Transmitter, Figure 8 displays a picture of the propagated generic PCB, and Figure 9 depicts the Biofeedback Switch schematic.

Figure 7. National Instruments Multisim Circuit Schematic for the RF Transmitter
The following electrical components are used for the RF Transmitter. Component J1 is the connection for the RF Transmitter module, J2 is the LM317T voltage regulator that outputs a constant 3.3V, and J3 is the wire connection for 9V battery. U4 corresponds to the 8-bit encoder and U1 depicts the relay. Resistors R2 and R3, regulate the current flowing into the RF Transmitter and the voltage at the LADJ pins, respectively. Furthermore, R4 and R5 are the
resistors used to regulate the voltage exiting the voltage regulator. Finally, capacitor, C1, regulates the voltage on the $V_{CC}$ pin of the RF Transmitter.

3.2 Mechanical Components

This section of the operator’s manual will give a general description of the mechanical components of the HANSS with Biofeedback. The drawings in this section will displace the dimension of the individual components that were machine fabricated.

3.2.1 RF Receiver and RF Transmitter

Two plastic housings were produced for the RF Receiver and RF Transmitter. The RF Receiver Plastic Housing was machine milled from a solid block of white high-density polyethylene and a sheet metal lid was attached. Below, Figure 10 displays a schematic of the RF Receiver Plastic Housing. Not seen in Figure 10, the sheet metal lid was cut to the outer dimensions of the RF Receiver Plastic Housing to cover the milled socket.

![Figure 10. RF Receiver Plastic Housing](image)

The RF Transmitter Plastic Housing was a purchased electrical plastic housing that was modified to fit its use for this device. Figure 11, seen below, displays a schematic of the RF Transmitter Housing. The modification that were made to this generic piece were drilling two $\frac{1}{4}$” diameter holes for the Audio In Jack and Audio Out Jack and using a Dremel to cut a rectangle for the ON/OFF switch.
3.2.2 Attachment Mechanism, Chin Support, and Shoulder Support

For the Attachment Mechanism, Chin Support, and Shoulder Support the device used off-the-self components that were modified to fit the device.

The Attachment Mechanism contained two parts, the Attachment Pole and the Power Chair Attachment Bracket, that were custom fabricated for the device. All other component were purchased and used in their purchased state in the device. The Attachment Pole consists of a ½” by ½” solid square piece aluminum with a 5/8” ball welded to the top. The ball fits into the Attachment Pole Socket allowing planar and rotational movement of the Shoulder Support. Figure 12 depicts the Attachment Pole with ball attached. The Power Chair Attachment Bracket consists of 2 1 ½” steel brackets each with 2 Power Chair Attachment Bracket Screws to hold the Attachment Pole in place. Figure 13 displays the Power Chair Attachment Bracket.
The Chin Support was purchased and modified to fit the use in the device. To fit the device, the elastic straps were shortened on both ends and button snaps were added to the end. The length of the straps was tailored to the client during weekly meetings by a trial and error method.

The Shoulder Support consists of an aluminum core, wrapped in soft expandable foam, and covered by a comfortable fabric enclosure. The inner aluminum core consists of a 14” long, .75” wide, and .125” thick piece of 6061 Aluminum. Using a machine roller the curve for the head and neck of the user was created and a bender was used to create the angle of the shoulder flanges downward. Much of the fabrication of the Shoulder Support was done on a
trial and error basis working with the client to determine measurements.
4. Troubleshooting

The following Table lists the common problems associated with the HANSS with Biofeedback and solutions to correct these problems.

### 4.1 Electrical Components

<table>
<thead>
<tr>
<th>Problem</th>
<th>Steps to Provide Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Device is not ON</strong></td>
<td>1. Turn ON the RF Transmitter</td>
</tr>
<tr>
<td><strong>Device is not Correctly Connected</strong></td>
<td>1. Turn ON the RF Transmitter</td>
</tr>
<tr>
<td></td>
<td>2. Connect 3.5mm Audio Cable from Audio Device to the Audio Input Jack and Connect Headphones to the Audio Output Jack</td>
</tr>
<tr>
<td><strong>Increase the Volume of the Audio Device</strong></td>
<td>1. Following the Audio Device Instructions, increase the volume of the Audio Device</td>
</tr>
<tr>
<td><strong>Replace Battery in the RF Transmitter</strong></td>
<td>1. Replace 9V Battery on the RF Transmitter following the procedure in the Maintenance Section of the Operator’s Manual</td>
</tr>
<tr>
<td></td>
<td>2. Test Device for Proper Function</td>
</tr>
<tr>
<td><strong>Check RF Transmitter Electronics for Loose Wiring</strong></td>
<td>1. Turn OFF RF Transmitter and Unplug Audio In and Audio Out Connections</td>
</tr>
<tr>
<td></td>
<td>2. Open RF Transmitter Housing by removing both RF Transmitter Housing Screws</td>
</tr>
<tr>
<td></td>
<td>3. Look for loose wiring and reconnect as seen in the Technical Description</td>
</tr>
<tr>
<td></td>
<td>4. Ensure the Audio Input and Audio Output 3.5mm Headphone Jacks are properly wired</td>
</tr>
<tr>
<td></td>
<td>5. Close RF Transmitter Housing by replacing both RF Transmitter Housing Screws</td>
</tr>
<tr>
<td></td>
<td>6. Test Device for Proper Function</td>
</tr>
<tr>
<td><strong>Biofeedback Switches Don’t Function Properly</strong></td>
<td>1. Open RF Transmitter Housing by removing both RF Transmitter Housing Screws</td>
</tr>
<tr>
<td></td>
<td>2. Test All 3 Biofeedback switches by pressing each switch individually by measuring the voltages at the RF Transmitter PCB</td>
</tr>
<tr>
<td></td>
<td>3. Replace switches as needed and repair wiring as needed</td>
</tr>
<tr>
<td></td>
<td>4. Close RF Transmitter Housing by replacing both RF Transmitter Housing Screws</td>
</tr>
<tr>
<td></td>
<td>5. Test Device for Proper Function</td>
</tr>
<tr>
<td><strong>RF Transmitter Relay is Broken</strong></td>
<td>1. Replace the RF Transmitter Relay following the procedure in the Maintenance Section of the Operator’s Manual</td>
</tr>
</tbody>
</table>

No Audio Signal is Heard
<table>
<thead>
<tr>
<th>Condition</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn OFF the RF Transmitter</td>
<td>1. Turn OFF the RF Transmitter</td>
</tr>
<tr>
<td>Open RF Transmitter Housing by removing both</td>
<td>2. Open RF Transmitter Housing by removing both RF Transmitter</td>
</tr>
<tr>
<td>RF Transmitter Housing Screws</td>
<td>Housing Screws</td>
</tr>
<tr>
<td>Replace the Solid State Relay</td>
<td>3. Replace the Solid State Relay</td>
</tr>
<tr>
<td>Close RF Transmitter Housing by replacing</td>
<td>4. Close RF Transmitter Housing by replacing both RF Transmitter</td>
</tr>
<tr>
<td>both RF Transmitter Housing Screws</td>
<td>Housing Screws</td>
</tr>
<tr>
<td>Test Device for Proper Function</td>
<td>5. Test Device for Proper Function</td>
</tr>
</tbody>
</table>

**Device is not ON**

1. Turn ON the RF Transmitter and RF Receiver

**Replace Battery in the RF Receiver**

1. Replace 9V Battery in the RF Receiver by following the procedure in the Maintenance Section of the Operator’s Manual

**Replace Battery in the RF Transmitter**

1. Replace 9V Battery on the RF Transmitter following the procedure in the Maintenance Section of the Operator’s Manual

**Biofeedback Switches Don’t Function Properly**

1. Turn OFF the RF Transmitter
2. Open RF Transmitter Housing by removing both RF Transmitter Housing Screws
3. Test All 3 Biofeedback switches by pressing each switch individually by measuring the voltages at the RF Transmitter PCB
4. Replace switches as needed and repair wiring as needed
5. Close RF Transmitter Housing by replacing both RF Transmitter Housing Screws
6. Test Device for Proper Function

**Vibrator Motors are Damaged**

1. Turn OFF the RF Receiver and RF Transmitter
2. Take the RF Receiver Housing out of the RF Receiver Wrist Strap by undoing the Velcro flap
3. Remove the Inner and Outer RF Receiver Housing Screws from the RF Receiver Housing Plate with a Philips Screwdriver
4. Test the voltages supplied to the vibrating motors is equal to those in the Technical Description
5. Replace vibrating motors as needed
6. Replace the Inner and Outer RF Receiver Housing Screws from the RF Receiver Housing Plate with a Philips Screwdriver
7. Test Device for Proper Function

**Cover all Bare or Damaged Wire**

1. Wrap any bare wire and chipped or cracked casing with approved Electrical Tape

**Paint Scratched Areas with White Paint**

1. Use Paint, approved for use on plastic, to repair scratches to the Attachment Mechanism components
### 4.2 Mechanical Components

<table>
<thead>
<tr>
<th>Problem</th>
<th>Steps to Provide Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shoulder Support</strong>&lt;br&gt;Inner Metal Frame is Bent**</td>
<td><strong>Bend the Inner Metal Core to the Desired Shape</strong>&lt;br&gt;1. Remove the Shoulder Support from the Power Chair Attachment Bracket by loosening the Power Chair Attachment Bracket Screws&lt;br&gt;2. Place Shoulder Support on a Level Surface&lt;br&gt;3. Bend Shoulder Support back to the original position&lt;br&gt;4. Reinstall the Shoulder Support to the Power Chair Attachment Bracket by tightening the Power Chair Attachment Bracket Screws&lt;br&gt;5. Test Device for Proper Function</td>
</tr>
<tr>
<td><strong>Shoulder Support</strong>&lt;br&gt;Places Too Much Pressure on a Specific Area of the Head or Neck</td>
<td><strong>Remove Excess Foam from the Inner Foam Core</strong>&lt;br&gt;1. Remove the Shoulder Support from the Power Chair Attachment Bracket by loosening the Power Chair Attachment Bracket Screws&lt;br&gt;2. Remove the Center Fabric Cover and two Wing Fabric Covers following instructions in the Maintenance Section of the Operator’s Manual&lt;br&gt;3. Cut excess Inner Foam Core material from areas of concentrated pressure&lt;br&gt;4. Replace the Center Fabric Cover and two Wing Fabric Covers&lt;br&gt;5. Reinstall the Shoulder Support to the Power Chair Attachment Bracket by tightening the Power Chair Attachment Bracket Screws&lt;br&gt;6. Test Device for Proper Function</td>
</tr>
<tr>
<td><strong>Shoulder Support</strong>&lt;br&gt;Is Too Narrow and Applies Excess Pressure on the Neck</td>
<td><strong>Bend the Inner Metal Core to the Desired Shape</strong>&lt;br&gt;1. Remove the Shoulder Support from the Power Chair Attachment Bracket by loosening the Power Chair Attachment Bracket Screws&lt;br&gt;2. Place Shoulder Support on a Level Surface&lt;br&gt;3. Hold one of the Shoulder Support Wings in one hand and the other Shoulder Support Wing in the other hand and pull the Wings apart&lt;br&gt;4. Reinstall the Shoulder Support to the Power Chair Attachment Bracket by tightening the Power Chair Attachment Bracket Screws&lt;br&gt;5. Test Device for Proper Function</td>
</tr>
<tr>
<td><strong>Shoulder Support</strong>&lt;br&gt;Becomes Too Loose</td>
<td><strong>Tighten All Loose Hardware</strong>&lt;br&gt;1. Tighten All Hardware for the Attachment Pole Socket Joint, Adjustable Position Hinge Joints, Adjustable Ball and Socket Joint, Power Chair Attachment Bracket Screws</td>
</tr>
<tr>
<td><strong>Biofeedback Switches</strong>&lt;br&gt;Become Dislocated</td>
<td><strong>Replace Biofeedback Switch</strong>&lt;br&gt;1. Remove the Shoulder Support from the Power Chair Attachment Bracket by loosening the Power Chair Attachment Bracket Screws&lt;br&gt;2. Remove the Center Fabric Cover and two Wing Fabric Covers following instructions in the Maintenance Section of the Operator’s Manual</td>
</tr>
<tr>
<td>Biofeedback Switches are Not Pressed When in the Correct Anatomical Position</td>
<td>Reposition A Biofeedback Switch</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3. Tape loose Biofeedback Switches back into the Biofeedback Switch Compartments using an adhesive tape</td>
<td>1. Remove the Shoulder Support from the Power Chair Attachment Bracket by loosening the Power Chair Attachment Bracket Screws</td>
</tr>
<tr>
<td>4. Replace the Center Fabric Cover and two Wing Fabric Covers</td>
<td>2. Remove the Center Fabric Cover and two Wing Fabric Covers following instructions in the Maintenance Section of the Operator’s Manual</td>
</tr>
<tr>
<td>5. Reinstall the Shoulder Support to the Power Chair Attachment Bracket by tightening the Power Chair Attachment Bracket Screws</td>
<td>3. Use a sharp knife to remove foam padding from the Inner Foam Core to form a compartment to place the Biofeedback Switch</td>
</tr>
<tr>
<td>6. Test Device for Proper Function</td>
<td>4. Tape Biofeedback Switch into the Biofeedback Switch Compartments using an adhesive tape</td>
</tr>
<tr>
<td>7. Test Device for Proper Function</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chin Support is Too Loose</th>
<th>Change the Chin Support Button Snap</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Remove the Shoulder Support from the Power Chair Attachment Bracket by loosening the Power Chair Attachment Bracket Screws</td>
<td>1. Remove Chin Support</td>
</tr>
<tr>
<td>2. Remove Button Snap from the Chin Support using Pliers</td>
<td>2. Remove Button Snap from the Chin Support using Pliers</td>
</tr>
<tr>
<td>3. Replace Button Snap on the Chin Support to shorten the length</td>
<td>3. Replace Button Snap on the Chin Support to shorten the length</td>
</tr>
<tr>
<td>4. Reattach the Chin Support</td>
<td>4. Reattach the Chin Support</td>
</tr>
<tr>
<td>5. Test Device for Proper Function</td>
<td>5. Test Device for Proper Function</td>
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</table>

<table>
<thead>
<tr>
<th>Chin Support Will Not Connect to the Shoulder Support</th>
<th>Replace the Chin Support Button Snap</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Remove Chin Support</td>
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<tr>
<td>2. Remove Button Snap from the Chin Support using Pliers</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Missing Hardware from the Attachment Mechanism</th>
<th>Replace Any Hardware for the Attachment Pole Socket Joint, Adjustable Position Hinge Joints, Adjustable Ball and Socket Joint, Power Chair Attachment Bracket Screws</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Purchase 1 inch long, 5/32 inch diameter Allen Head screws</td>
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</tr>
<tr>
<td>2. Install where necessary</td>
<td>2. Install where necessary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attachment Mechanism Becomes Wet</th>
<th>Dry All Metal Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use a dry cloth to remove any precipitation from the Attachment Mechanism</td>
<td>1. Use a dry cloth to remove any precipitation from the Attachment Mechanism</td>
</tr>
<tr>
<td>2. Remove the Shoulder Support from the Power Chair Attachment Bracket by loosening the Power Chair Attachment Bracket Screws</td>
<td>2. Remove the Shoulder Support from the Power Chair Attachment Bracket by loosening the Power Chair Attachment Bracket Screws</td>
</tr>
<tr>
<td>3. Remove the Center Fabric Cover and two Wing Fabric Covers following instructions in the Maintenance Section of the Operator’s Manual</td>
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</tr>
<tr>
<td>Attachment Mechanism Paint is Scratched</td>
<td>Paint Scratched Areas with Black Paint</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>1. Use Paint, approved for use on metal, to repair scratches to the Attachment Mechanism components</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manual</th>
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<tbody>
<tr>
<td>4. Allow Fabric Components to air dry</td>
</tr>
<tr>
<td>5. When dry, replace the Center Fabric Cover and two Wing Fabric Covers</td>
</tr>
<tr>
<td>6. Reinstall the Shoulder Support to the Power Chair Attachment Bracket by tightening the Power Chair Attachment Bracket Screws</td>
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<tr>
<td>7. Test Device for Proper Function</td>
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<tr>
<th>Shoulder Support Fabric Cover Rips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Tears in the Fabric Cover</td>
</tr>
<tr>
<td>1. Remove the Shoulder Support from the Power Chair Attachment Bracket by loosening the Power Chair Attachment Bracket Screws</td>
</tr>
<tr>
<td>2. Remove the Center Fabric Cover and two Wing Fabric Covers following instructions in the Maintenance Section of the Operator’s Manual</td>
</tr>
<tr>
<td>3. Use Black Thread and a Sewing Needle to close all fabric rips</td>
</tr>
<tr>
<td>4. Replace the Center Fabric Cover and two Wing Fabric Covers</td>
</tr>
<tr>
<td>5. Reinstall the Shoulder Support to the Power Chair Attachment Bracket by tightening the Power Chair Attachment Bracket Screws</td>
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</table>

Large Holes In the Fabric Cover |
1. Remove the Shoulder Support from the Power Chair Attachment Bracket by loosening the Power Chair Attachment Bracket Screws |
2. Remove the Center Fabric Cover and two Wing Fabric Covers following instructions in the Maintenance Section of the Operator’s Manual |
3. Cut a patch of fabric to cover the hole in the Fabric Cover |
4. Use Black Thread and a Sewing Needle to sew the Fabric Patch to the inside of the Fabric Cover |
5. Replace the Center Fabric Cover and two Wing Fabric Covers |
6. Reinstall the Shoulder Support to the Power Chair Attachment Bracket by tightening the Power Chair Attachment Bracket Screws |