



## ENGINEER CHANGE ORDER (ECO) ANALYSIS FORM

<b>Manufacturer:</b>	Unisyn
<b>System:</b>	OVS 2.0.A (Freedom Vote Tablet)
<b>ECO Number:</b>	16979
<b>ECO Description:</b>	Change positions of keys on ADA Keypad

**Overview:**

This Engineering Change Order (ECO) documented a change to the FVT keypad. The change was to physically switch the position and functionality of two buttons on the keypad. It included both changes to the hardware and source for the Open Voting Solution (OVS) version 2.0A.

**Supporting Documentation:**

- ECO 16979.pdf
- IR 00620.pdf
- 3 Old\_New FVT Keypad.pdf (*diagram containing side-by-side comparison*)
- Copy of FVT\_QA\_Keypad\_TC.xls (*manufacturer submitted test data*)

**Evaluation:**

A source code review was performed comparing the changes to the baseline source code for OVS 2.0A. This review showed modifications to two files: Constants.java and Acitivity\_test\_keypad.xml. These changes consisted of switching assignment of two constants, KEY\_RIGHT and KEY\_ENTER, in the Constants.java file. Below is the comparison for this change:

<pre style="font-family: monospace; font-size: 0.9em;"> 603      * up key code 604      */ 605      public static final int KEY_UP = KeyEvent.KEYCODE_NUMPAD_8; 606      /** 607      * right key code 608      */ 609      public static final int KEY_RIGHT = KeyEvent.KEYCODE_NUMPAD_6; 610      /** 611      * left key code 612      */ 613      public static final int KEY_LEFT = KeyEvent.KEYCODE_NUMPAD_4; 614      /** 615      * enter key code 616      */ 617      public static final int KEY_ENTER = KeyEvent.KEYCODE_E; 618      /** 619      * repeat key code 620      */ 621      public static final int KEY_REPEAT = KeyEvent.KEYCODE_NUMPAD_ADD; </pre>	<pre style="font-family: monospace; font-size: 0.9em;"> 605      * up key code 606      */ 607      public static final int KEY_UP = KeyEvent.KEYCODE_NUMPAD_8; 608      /** 609      * right key code 610      */ 611      public static final int KEY_RIGHT = KeyEvent.KEYCODE_E; 612      /** 613      * left key code 614      */ 615      public static final int KEY_LEFT = KeyEvent.KEYCODE_NUMPAD_4; 616      /** 617      * enter key code 618      */ 619      public static final int KEY_ENTER = KeyEvent.KEYCODE_NUMPAD_6; 620      /** 621      * repeat key code 622      */ 623      public static final int KEY_REPEAT = KeyEvent.KEYCODE_NUMPAD_ADD; </pre>
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The second change was to Activity\_test\_keypad.xml. This change consisted of switching the two data elements for buttonNext and buttonEnter to the value of FORWD and SELECT. Below is the comparison for this change:

```

65 android:id="@+id/buttonPrev" android:layout_width="14
66 android:layout_height="140dp" android:clickable="fals
67 android:focusable="false" android:text="BACK"
68 android:layout_alignTop="@+id/buttonEnter"
69 android:layout_toStartOf="@+id/textviewTitle" />
70 <Button style="@style/customButtonStyleBw"
71 android:id="@+id/buttonEnter" android:layout_width="1
72 android:layout_height="140dp" android:clickable="fals
73 android:focusable="false" android:text="SELECT"
74 android:layout_below="@+id/buttonUp"
75 android:layout_alignStart="@+id/buttonUp"
76 android:layout_marginTop="30dp" />
77 <Button style="@style/customButtonStyleBw"
78 android:id="@+id/buttonNext" android:layout_width="14
79 android:layout_height="140dp" android:clickable="fals
80 android:focusable="false" android:text="FORWD"
81 android:layout_above="@+id/buttonDown"
82 android:layout_toEndOf="@+id/textviewTitle" />
83 <Button style="@style/customButtonStyleBw"
84 android:id="@+id/buttonVolumeUp" android:layout_width

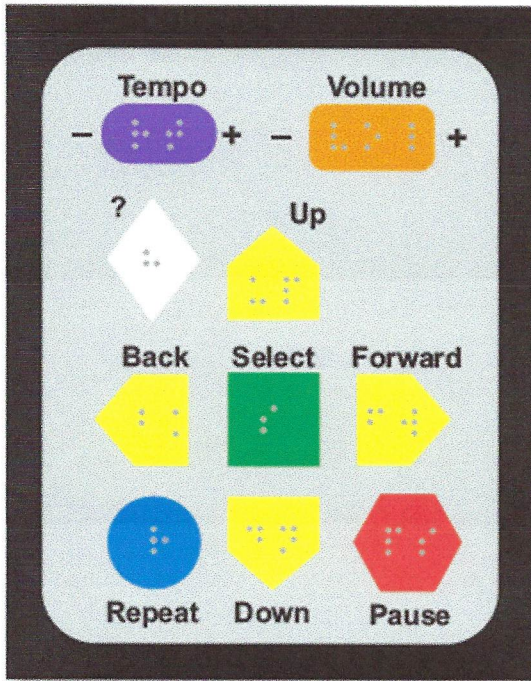
```

```

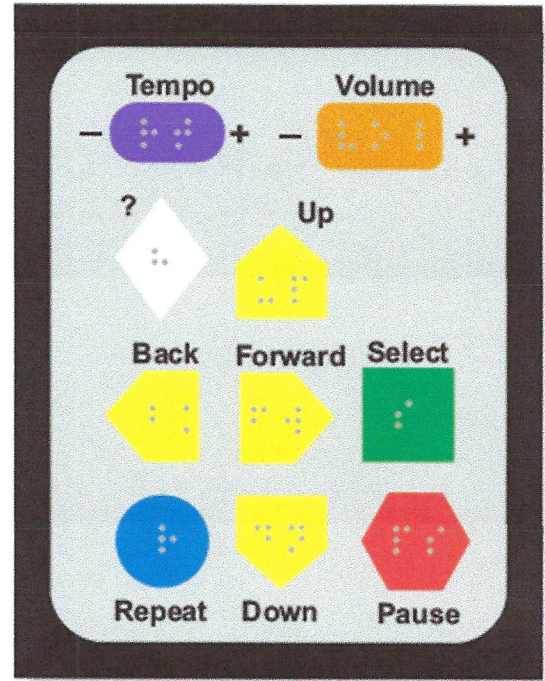
65 android:id="@+id/buttonPrev" android:layout_width="140dp"
66 android:layout_height="140dp" android:clickable="false"
67 android:focusable="false" android:text="BACK"
68 android:layout_alignTop="@+id/buttonNext"
69 android:layout_toStartOf="@+id/textviewTitle" />
70 <Button style="@style/customButtonStyleBw"
71 android:id="@+id/buttonNext" android:layout_width="140dp"
72 android:layout_height="140dp" android:clickable="false"
73 android:focusable="false" android:text="FORWD"
74 android:layout_below="@+id/buttonUp"
75 android:layout_alignStart="@+id/buttonUp"
76 android:layout_marginTop="30dp" />
77 <Button style="@style/customButtonStyleBw"
78 android:id="@+id/buttonEnter" android:layout_width="140dp"
79 android:layout_height="140dp" android:clickable="false"
80 android:focusable="false" android:text="SELECT"
81 android:layout_above="@+id/buttonDown"
82 android:layout_toEndOf="@+id/textviewTitle" />
83 <Button style="@style/customButtonStyleBw"
84 android:id="@+id/buttonVolumeUp" android:layout_width="140dp"

```

ECO# 16979 also includes the repositioning for the yellow 'Forward' button and the green 'Select' button. Below is a side-by-side comparison of the diagrams depicting the old and new keypads.



Old Keypad Layout



New Keypad Layout

Unisyn also provided Pro V&V with internal test cases detailing how the functionality of the switched button was tested.

**Engineering Recommendation:**

Pro V&V concludes from the analysis that this change is **De Minimis** as defined in section 3.4.2 of the EAC Voting System Testing and Certification Program Manual, Version 2.0. This conclusion is based on the following points:

- The hardware change consists of the repositioning of the physical button. These buttons have no electronic components associated with them. Although in different positions at the time, the buttons were present for all testing in the original test campaign.
- It is Pro V&V's determination that the software modifications implemented to switch the assignment of the functionality of the buttons pressed for the 'Forward' key and the 'Select' key do not alter the functionality for these components (the buttons are still being pressed to make a selection or to navigate the ballot). The original system tested utilized the same code; the functionality has just been reassigned to different positions.

Technical documentation and source code review performed to approve change. No additional testing required.

**Engineering Analysis: De Minimis**

**Reviewer:**

Wendy Owens  
Printed Name

Wendy Owens  
Signature

6/21/18  
Date

**Approver:**

Wendy Owens for Jack Cobb  
Printed Name

Wendy Owens  
Signature

6/21/18  
Date