removing the cover. Modular arrangements of pins also eliminates tolerance stack up across the length of the display. By providing the blocks **74** in four and six cell arrangements, a variety of sized displays **20** can be created.

As best illustrated in the exploded view of FIG. **5**, each of the tactile pins **66** includes a rounded upper extent **86** that is adapted to be extended above cover **54** and felt by the user. A collar **88** is also included about each pin along its length. A plate **92** is secured over top of each mounting block **74** via a snap fit connection (note FIG. **5**). Plate **92** includes apertures that are sized to accommodate the upper extent **86** of pins **66** but that are smaller than collars **88**. Thus, plates **92** function in limiting the upward travel of pins **66**. Plate **92** is particularly useful during the assembly process. Namely, after installing blocks **74** into channel **82** of upper cover **54**, pins **66** may be inverted as cover **54** is mated with lower tray **56**.

Braille Cell Assemblies

The Braille cell assemblies **64** are described next. Each cell assembly **64** includes a PCB that is removably and electronically coupled to backplane board **62**. When secured, PCB's **68** are perpendicular to backplane board **62**. The total number of cell assemblies **64** involved will correspond to the number of Braille cells **26** contained within display **20**. Each PCB includes a female electrical connector **94** at its proximal end. This female electrical connector **94** is adapted to be coupled to a corresponding male connector **98** on the backplane board **62**. PCBs **68** can be removed and replaced as needed. Each PCB **68** also includes a series of stops **104** along the intermediate extent (note FIG. **7**). The function of stops **104** is described in greater detail hereinafter.

A series of bimorph reeds **72** are interconnected to either side of the PCB **68** by way of electrical contacts **106**. More specifically, four reeds **72** are connected to each side of PCB **68**. The distal end of each reed **72** is positioned beneath a corresponding tactile pin **66** (note FIG. **1**A). Upon the application of a voltage, an individual reed **72** applies the upward force necessary to expose a corresponding pin **66** through upper housing **54**. Each PCB **68** controls the operation of an individual Braille cell **26**. Each of the contacts **106** includes a base portion **108**, a support arm **112**, and a biasing arm **114**. Base portion **108** can include a series of apertures to decrease the weight of the contact. Each base **108** is adapted to be soldered to a PCB **68** using any of a variety of well known soldering techniques. When installed, support arm **112** of contact **106** is perpendicular to the face of PCB **68** and parallel to the backplane board **62**. Additionally, biasing arm **114** is angled at approximately a 45° angle relative to support arm **112**. Contacts **106** are preferably mounted in a staggered or stairstep arrangement. Namely, with reference to FIG. **7**, the uppermost contact **106** is closest to the proximal end of PCB **68** and the lowermost contact **106** is closest to the distal end of PCB **68**. When installed, reeds **72** have a similar staggered configuration. The staggered arrangement of reeds **72** allows the pins **66** to be aligned in rows. Each row of the Braille cell **26** corresponds to one side of the PCB **68**.

When soldered in place, contacts **106** are separated from one another and are electrically insulated. Adjacent contacts **106** form a fulcrum point **116** for an associated bimorph reed **72**. As indicated in FIG. **7**, each of these fulcrum points **116** is created between the biasing arm **114** of an upper contact **106** and the support arm **112** of a lower and adjacent contact **106**. When so arranged, biasing arm **114** forms an electrical contact with an electrode on the upper surface of reed **72** and support arm **112** of the immediately adjacent contact **106** forms an electrical contact with an electrode on the lower surface of reed **72**. Reed **72** is configured to bend about this fulcrum point **116** upon application of a voltage to upper and lower contacts **106**. Each of the bimorph reeds **72** is adapted to be inserted into one of these fulcrum points **116**. The intermediate extent of the bimorph **72** is then placed adjacent to a corresponding stop **104**. Stop **104** functions in limiting the downward bending moment of reed **72** and otherwise prevents interference between adjacent reeds **72**. Stops **104** thereby permit reeds **72** to be more closely positioned and allows for much tighter tolerances.

Once installed, the electrical connectors (**94** and **98**) provide voltage to the corresponding PCB **68** and allow voltage of opposite polarity to be delivered to the contacts **106** on PCB **68**. Namely, a negative voltage is applied to a first series of contacts **106** and a positive voltage is applied to a second series of contacts **106**. Thus, for example, a positive voltage may be applied to the upper most contact **106** while a negative voltage is applied to the adjacent and lower contact **106**. Adjacent contacts **106** are exposed to voltages of opposite polarity. This, in turn, allows opposite polarity voltage to be applied to the upper and lower surfaces of an individual reed **72**. Namely, biasing arm **114** can apply a positive voltage to the upper surface of reed **72** while the lower support arm **112** of an adjacent contact **106** applies a negative voltage to the lower surface of the same reed **72**. By applying the voltage in this manner, each bimorph reed **72** can be bent upon application of opposite polarity voltage. As a result, a corresponding tactile pin **66** is lifted. The pin **66** is lowered when the voltage is removed.

Method of Installing Contacts

The present disclosure also relates to an improved method for installing the electrical contacts **106** upon a PCB **68**. The method utilizes an alignment guide **118** for orienting a series of contacts **106** upon PCB **68**. Alignment guide **118** includes first and second surfaces (**122** and **124**) that are angled with respect to each other. In the depicted embodiment, the first and second surfaces (**122** and **124**) are at a right angle to each other. Alignment tabs **126** are formed at either end of second surface **124**. Alignment tabs **126** are dimensioned to fit into corresponding apertures **128** present on PCB **68**. The series of contacts **106** are releasably secured to a peripheral edge **132** of the second surface **124** of guide **118**. Contacts **106** are preferably connected to the second surface **124** via a score line. The score line is frangible and allows the contacts **106** to be separated by bending alignment guide **118** after contacts **106** have been soldered to PCB **68**. In the depicted and preferred embodiment, a series of five contacts **106** are secured to the second surface **124** of alignment guide **118**.

The installation method involves positioning the alignment guide **118** with the attached contacts **106** upon the PCB **68**. As best illustrated in FIG. **9**A, this is accomplished by inserting the tabs **126** on guide **118** into the alignment apertures **128** of PCB **68**. With the alignment guide **118** so positioned, the series of contacts **106** are properly aligned and spaced upon PCB **68** and are ready to receive reeds **72** between adjacent contacts **106**. Base portion **108** of each contact **106** is adapted to rest against the surface of PCB **68**. This also places each of the contacts **106** in a staggered relationship to each other. Namely, with reference to FIG. **7**, the uppermost contact **106** is closest to the rearward edge of PCB **68** and the lowermost contact **106** is closest to the forward edge of PCB **68**. This arrangement allows the bimorph reeds **72** to be similarly arranged in a staggered—or stairstep—fashion.