receives as inputs three digital row select signals **466** (Row Select [0:2]) coded in binary to generate a desired one of the row enable signals R**0**-R**7** at any given time. Similarly, the column decoder receives as inputs three digital column select signals **464** (Column Select [0:2]) coded in binary to generate a desired one of the column enable signals C**0**-C**7** at any given time. Both the row decoder **460-1** and the column decoder **460-2** receive a common clock signal **462** (Clk) that serves to synchronize the generation of a given row enable signal and a given column enable signal so as to select a particular one of the microcoil cells **250** at a given time. In one exemplary implementation, the clock signal **462**, row select signals **466** and column select signals **464** are provided by one or more processors **600**, as discussed above in connection with **FIGS. 1 and 2**, such that these signals may be generated pursuant to programmable and/or user-selected computer control.

[**0130**] **FIG. 13** also conceptually illustrates four variable current sources **420-1**, **420-2**, **420-3** and **420-4** that provide a controllable variable current to the microcoil cells **250** of the array **200**B. An exemplary one of the four current sources, namely variable current source **420-1**, is shown as configured to receive three digital current level signals **468-1** (Current Level [0:2]) and a control voltage **469** (V_{CTRL}), and provide as an output to the array a controllably variable current **470-1** (I_1). As discussed further below in connection with **FIG. 16**, in one embodiment the variable current source **420-1** is configured to provide one of eight different currents based on the digital binary coded current level signals **468-1** and a voltage of the control voltage V_{CTRL}. In the configuration of **FIG. 13**, while not explicitly indicated in the figure, each of the other current sources **420-2**, **420-3**, and **420-4** also receive as inputs three binary coded digital current level signals and the control voltage V_{CTRL}, and provides a corresponding variable current output having eight different possible current levels. In one aspect of this embodiment, the digital current level signals for each of the variable current sources may be provided by one or more processors **600**, as discussed above in connection with **FIGS. 1 and 2**, such that these signals may be generated pursuant to programmable and/or user-selected computer control.

[**0131**] Finally, **FIG. 13** also illustrates that the array **200**B of this embodiment receives a DC power supply voltage Vdd common to all of the microcoil cells **250** of the array, as well as a "direction" signal **472** (Dir), also common to all of the microcoil cells **250**, that determines the direction (polarity) of current flowing through the microcoils of each microcoil cell **250**. This direction signal **472** is discussed in greater detail below in connection with **FIGS. 14 and 15**.

[**0132**] In one aspect of the embodiment of **FIG. 13**, the variable current sources are configured with respect to the microcoil cells such that each current source provides current to all of the microcoils in one quadrant of the array. For example, in one implementation, the current source **420-1** provides current to the microcoils of the first quadrant **200**B-**1**, the current source **420-2** provides current to the second quadrant **200**B-**2**, the current source **420-3** provides current to the third quadrant **200**B-**3**, and the current source **420-4** provides current to the fourth quadrant **200**B-**4**. In this configuration, each quadrant of the array **200**B operates in a substantially similar fashion; accordingly, one quadrant of the array is now discussed in greater detail.

[**0133**] **FIG. 14** is a diagram illustrating various interconnections of components in the first quadrant **200**B-**1** of the array **200**B shown in **FIG. 13**, according to one embodiment of the present disclosure. The row enable signals R**0**-R**3**, provided by the row decoder **460-1** in **FIG. 13**, are shown on the left side of **FIG. 14**, and the column enable signals C**0**-C**3**, provided by the column decoder **460-2** in **FIG. 13**, are shown on the top of **FIG. 14**. The first quadrant **200**B-**1** includes sixteen identical microcoil cells **250** arranged in four rows and four columns and coupled to the row enable signals and column enable signals. Each of the microcoil cells **250** also is coupled to the direction signal **472** (which is shared by all quadrants of the array), as well as the variable current source **420-1**, which provides the controllably variable current **470-1** (I_1) to all microcoil cells of the quadrant **200**B-**1**. As also illustrated in **FIG. 14**, each microcoil cell **250** includes a logic AND gate **460-3** that provides a coil enable signal **474** when both the row enable signal and column enable signal corresponding to the cell are present. The coil enable signal **474** is applied to a microcoil switching unit **460-4**, which includes a microcoil **212** and various switches for controlling current through the microcoil upon application of the coil enable signal **474**.

[**0134**] **FIG. 15** illustrates the contents of the microcoil switching units **460-4** shown in **FIG. 14**. Each microcoil switching unit includes a microcoil **212** (e.g., similar to those discussed above in connection with **FIGS. 7-12**) connected to a current direction (polarity) switch **460-5** (S**1**) and a coil enable switch **460-6** (S**2**). The power supply voltage Vdd is applied to the polarity switch S**1**, and a connection to the variable current source (indicated as C in **FIG. 15**) is provided to the coil enable switch S**2** to allow the current **470-1** to flow through the coil when the switch S**2** is closed. The polarity switch S**1** is controlled by the direction signal **472**, and the coil enable switch S**2** is controlled by the coil enable signal **474**; specifically, the coil enable signal **474** causes the switch S**2** to close to allow the current **470-1** to pass through the microcoil **212** when both the row enable signal and column enable signal corresponding to the microcoil cell that includes the microcoil are present. In one aspect of this embodiment, the direction signal **472** may be provided by one or more processors **600**, as discussed above in connection with **FIGS. 1 and 2**, such that this signal may be generated pursuant to programmable and/or user-selected computer control.

[**0135**] **FIG. 16** illustrates details of the variable current source **420-1** that provides the controllably variable current **470-1** to the first quadrant **200**B-**1** of the array. Again, in FIG. **13**, the other current sources **420-2**, **420-3** and **420-4** may be implemented identically to the current source **420-1**. According to one embodiment, the current source **420-1** includes a current level decoder **422-1** that receives the digital binary coded current level signals **468-1** and provides eight enable outputs to selectively close one of eight switches **424-1**A through **424-1**H (in one exemplary implementation, the current level decoder **422-1** may employ a "thermometer code"). One side of each switch is connected to a "base" current source, such that there are eight different base current sources **426-1**A through **426-1**H. The other side of each switch **424-1**A through **424-1**H is connected in common to provide the controllably variable current **470-1** (I_1), having one of eight different possible current levels at any given time (i.e., the current I_1 is some multiple of the current provided by a given base current source).