i.e. voltages **V3** and **V4** represent X and Y values for the centre of the position of the applied force.

[**0090**] The interface circuit **103** of **FIG. 1** is shown in the circuit diagram in **FIG. 16**. The interface circuit supplies the necessary voltages to connectors **206**, **207**, **211** and **212**, and measures voltages V1 ,V2,V3 and V4 as detailed above with respect to **FIG. 15**. The interface circuit also provides output values at serial communication output **1601**, comprising values corresponding to the XY (two dimensional) position of the mechanical interaction on the sensor and a Z value depending upon area of the mechanical interaction, or area and force of the mechanical interaction.

[**0091**] When designing an interface circuit, resistors **1504** and **1507** are chosen according to the resistance of the sensor as measured from one connector on layer **201**, to another connector on layer **202**, while a typical target pressure is applied to the sensor. A value of 10 Kohms is typical for resistors **1504** and **1507**.

[**0092**] The measurement process is controlled by a program running in a peripheral interface controller (PIC) **1602**, of the type PIC16C711. As well as being capable of supplying the required output voltages at pins **1**, **2**, **10**, **11**, **12** and **13**, the PIC **1602** includes an analogue to digital converter which it uses to process analogue voltages received at input pins **17** and **18**. The input pins **17** and **18** receive outputs from high impedance buffers **1603** and **1604** respectively. The buffers **1603** and **1604** are half of unity gain operational amplifiers of the type TL062, and provide a high impedance buffer between the sensor output voltages and the PIC **1602** input ports.

[**0093**] The PIC **1602** has an external crystal oscillator (not shown) running at 4 MHz connected across pins **15** and **16**. Positive five volts is supplied to pin **14** and ground is connected to pin **5**. Pin **4** (the internal reset input) is held at positive five volts via a series resistor of 100 ohms.

[**0094**] The program running within the peripheral interface circuit of **FIG. 16** is outlined in the flow chart of **FIG. 17**. At step **1701** the hardware is initialised and this process is detailed later with reference to **FIG. 18**. At step **1702** the circuit **103** measures values of voltages **V1** and **V2** and calculates a Z value of the interaction. The details of step **1702** are described later with reference to **FIG. 19**. At step **1703** a question is asked as to whether the Z data is greater than a predetermined value. If the answer to this question is no then the program returns to step **1702**. Thus the circuit measures Z values until a Z value greater than a predetermined value is detected. If the answer to the question at step **1703** is yes then the circuit measures voltages **V1**,**V2**,**V3** and **V4** and calculates a Z value at step **1704**. Step **1704** is described later in more detail with reference to **FIG. 20**. At step **1705** a question is asked as to whether the calculated Z value is still above the predetermined value. If the question is answered in the affirmative, a further question is asked at step **1706** as to whether enough samples have been obtained. Typically, between 3 and 10 sets of samples are taken, with lower numbers of sets of samples being taken when a fast response time is required. If the answer to the question at step **1706** is no, then the program returns to step **1704** and a further set of measurements are made. When the answer to the question at step **1706** is yes, or when the answer to the question at step **1705** is no, then the program calculates average values of the samples of the voltages **V3** and **V4**, and of the values of Z which have been collected. Thus, the program measures a predetermined number of voltages before finding the average values, or if the Z value drops below. a predetermined value, the average values are calculated immediately. By using the average of a number of samples the effect of mains power electromagnetic interference or other such environmental noise may be minimised.

[**0095**] A simple calculation to find an 'average' value for say the X value, is to find the mean average of the maximum and minimum values of the stored values **V3**. i.e. a 'smoothed' value for X is found by adding the maximum stored value of **V3** to the minimum stored value of **V3** and dividing the result by two.

[**0096**] To further improve accuracy, values of X, Y, and Z that differ by a large amount from their immediately preceding and immediately subsequent values are excluded from the calculations of the average. In addition, known methods of eliminating mains electricity supply interference may be applied to the signals received from the sensor.

[**0097**] At step **1708** the averaged values for **V3** and **V4** representing XY positional co-ordinates and the averaged values of the Z data are output at the serial communication output **1601**. The program then returns to step **1702** and looks for an indication of further mechanical interaction.

[**0098**] Step **1701** of **FIG. 17** is shown in further detail in **FIG. 18**. Within the initialisation step **1701**, at step **1801** the interrupts are cleared and then at step **1802** pins **17** and **18** are set up as analogue to digital converter inputs. The micro ports of a PIC16C711 may be configured as low impedance outputs or high impedance inputs. When in high impedance input mode, pins **17** and **18** can be programmed to connect via an internal multiplexer, to the analogue to digital converter. At step **1803** the ports which are to be used as inputs or outputs are configured in their initial state. At step **1804** all system variables are cleared and all interrupts are disabled.

[**0099**] Step **1702** of **FIG. 17** is shown in further detail in **FIG. 19**. Within step **1702**, at step **1901**, the ports corresponding to pins **2** and **10** are reconfigured as output ports and at step **1902** pin **2** is set to zero while pin **10** is set to positive five volts. Thus connector **207** is grounded via resistor **1504** and five volts are applied to connector **211**. At step **1903** a time delay, (typically of 250 microseconds in a sensor measuren 100 millimetres by 100 millimetres with an outer layer resistance of 3.5 Kohms) is provided to allow voltages to settle before the voltage at pin **17** is measured and stored. Thus voltage **V1** present at connector **207** is measured and stored.

[**0100**] At step **1905** pins **2** and **10** are reconfigured as high impedance inputs while pins **1** and **12** are reconfigured as low impedance outputs. At step **1906** the voltages the voltages on pins **1** and **12** are set to zero and positive five volts respectively. Thus connector **212** is grounded via resistor **1507** while five volts are supplied to connector **206**. A suitable time delay, equivalent to that at step **1903**, is provided at step **1907** before the voltage at pin **18** is measured and stored at step **1908**. Thus the voltage present on connector **212** is measured and stored as voltage **V2**. At step **1909** a Z value is calculated from stored voltages **V1** and **V2**, and then stored. The pins **1** and **12** are reconfigured back to their initial state of high impedance inputs at step **1910**.