



## BUCHLA 221 KINESTHETIC INPUT PORT

### NOTES FOR ANALOG APPLICATIONS

The 221 interfaces with 300 Series digitally controlled systems or with 200 Series analog systems. Certain keys are intended to transmit only digital information and will not have any affect on the 221's analog voltage outputs. The devices on the 221 having no function in terms of analog control are: "clock", vertical cursor controls (   ) and keys 32 through 49.

1. When the instrument is first switched on the 221 must be initialized. With all fingers off the keys, push up the blue "reset" momentary contact switch. The 221 must also be reset when any adjustments to the "sensitivity" controls are made.
2. Voltage Inputs and Outputs

Voltage inputs and outputs are color coded red = pulse output, blue = control outputs, purple = fluxuating or integrated voltage outputs and black = control voltage inputs.

#### A. Key Activiated Voltages

##### 1. "Sensitivity"

This control allows the player to optimize the touch sensitivity of the 221 to his own needs. In the full clockwise position the 221 will be set to respond to the lightest touch. Any time the sensitivity is re-adjusted the keyboard must be reset. If the 221 seems to be giving irratic triggers it is because it has not been reset. The sensitivity control affects both the key responses and pressure voltage output (see below section 3).

##### 2. "Pulse"

This output generates pulses for triggering various function generators such as the 266 Source of Uncertainty, 281 Quad Function Generator, 208 Programmable Sound Source, etc. Pulses will be activated any time key 0 through 31 is touched. Sustain or gating information will remain present as long as the key is being touched. "Mode Select" and "Cursor" keys do not generate pulses.

##### 3. "Pressure"

This is a control output whose voltage is proportional to the finger pressure (or amount of finger contact) applied to keys 0 through 31. This voltage is particularly useful for controlling dynamic variables such as filter parameters, the timbre of a 259 Programmable Waveform Generator or 208 Complex Oscillator, modulation index, pulser speed, etc.

3. "Pressure" (con't)

will determine how much pressure is required to produce a certain voltage magnitude so it may be adjusted to individual needs (don't forget to reset).

4. "Key Voltage Output"

The output to the immediate right of the pressure output are voltage outputs for keys 0 through 31. These keys produce a choice of 32 equal division voltages. The most obvious application is the control of the 208 oscillators or a 259 PCWG. When this output is patched to a dedicated keyboard input it will provide 12 tone equal temperment response. Processing this voltage can produce equal tempered division of any interval. The entire key voltage range may be offset (for transpositions) by the Preset Voltage Source (see section B-2).

5. "Lateral Voltage Output"

Lateral movement of the keyboard (1/20 of an inch in both directions) provides proportional control voltages. Gently applying lateral pressure to the left generates negative or subtracting voltage and pressure to the right produces positive voltages. These controls may be independently summed with the key voltage by means of the "bend" control and are available independently from the jack to the immediate right of the key voltage output. If attached to an oscillator the keyboard will then simulate a clavichord response so pitches can be bent flat or sharp, depending on the direction and degree of lateral movement. The amount of pitch displacement is controlled by the "bend" control. Since this summed voltage is independent of the key/voltage output it is possible to track two oscillators at a fixed interval and bend only one of them to produce heterophonous effects.

## 6. "Portamento"

This output provides integrated forms of the summed key and lateral voltages for pitch glissandi or any other voltage controlled parameter. The time constant (amount of time required to slope between selected key voltages) may be manually offset by the portamento pot or determined by a control voltage. Turning this control clockwise minimizes the integration slope or portamento time. One possibility for voltage control of this function is with pressure producing longer portamento times - the harder a key is pressed the faster the pitch changes. If only portamento key voltages are needed eliminate the lateral voltage by turning down the "bend" pot. The lateral voltages are still available from their own output.

## B. Preset Voltage Source

### 1. "Control Voltage Outputs"

This section of the 221 has four continually variable voltages (purple jacks) each of which is set by its associated pot. These independent outputs may be used as manually variable offsets for any voltage controllable parameter to be easily access from the 221. Preset voltage 1 could determine a filter cut-off, 2 could set and vary a pulser period, 3 could control modulation index and 4 might determine the waveshape of an oscillator. The blue jack is a switched output for the preset voltages. With analog set-up the "Mode Select" keys and the third "Cursor Control" key define which of the 4 preset voltages is present at the output. The attachment of a preset voltage to the output is indicated by its associated red l.e.d. Mode Select key + 0 selects the left-most preset 1, ' + 50' selects preset 2, "Control" selects preset 3 and the righthand Cursor Control key " " selects preset 4. The preset output can then be attached to any parameter for pre-established offsets. As an example, four different Pulser periods or envelope decay times can be programmed and switched in as needed. Note the lateral Control keys have no effect on analog outputs and the labeling of the mode and cursor keys are meaningful only in terms of digital application. These keys do not generate pressure or pulse voltages.

### 2. "Key Voltage Shift"

This is a three position switch marked "octave", "none" and "preset".

#### a. "Octave"

In this position the key/voltage output can be offset in equal steps, producing octave transpositions for an oscillator (assumidly tuned for 12 tone equal-temperment). The

a. "Octave" (con't)

" + 0 addresses preset 1 which does not effect the established keyboard offset, Presets 2,3, and 4 each transpose the key voltages by 1, 2, and 3 octaves. The Preset Voltage levels have no affect on transposition in this mode and may be used as independent variables.

b. "None"

In this position the preset voltages have no affect on key voltages.

c. "Preset"

In this position the interval of transposition is proportional to the preset voltage setting and may be used for key voltage offsets of 1/2 steps, fifths, 9ths or any interval within a four octave range. It should be understood that these variables or fixed octave presets are summed with the key voltage before the integrator, so when using the portamento output any switched transposition will also be sloped.

d. "Voltage Source"

This is an X-Y axis joystick with complimentary voltage outputs for each axis. The arrow associated with each voltage output jack indicates the direction the stick is to be moved to produce a proportionate voltage increase at that output: As the player moves the stick to the left the  $X \leftarrow$  voltage increases as the  $X \rightarrow$  decreases. These controls are useful for dynamic parameters such as sound location, envelope shape etc. Complimentary outputs make it possible to inversely control parameters within the need of negative processing:  $X \leftarrow$  can control timbre while  $X \rightarrow$  controls envelope decay time. Both parameters are thus determined by a single control action.