

The switch inputs are standard low-power Schottky TTL inputs. To use them, connect each one to 560-ohm pull-down resistors connected to the ground and through single-pole, momentary-contact pushbutton switches to the +5 volt supply.

The hand-control inputs are connected to the timing inputs of an NE558 quadruple 555-type analog timer. Addressing \$C07X sends a signal from the 74LS154 that resets all four timers and causes their outputs to go to 1 (high). A variable resistance of up to 150K ohms connected between one of these inputs and the +5V supply controls the charging time of one of four 0.022-microfarad capacitors. When the voltage on the capacitor passes a certain threshold, the output of the NE558 changes back to 0 (low). Programs can determine the setting of a variable resistor by resetting the timers and then counting time until the selected timer-input changes from high to low. The resulting count is proportional to the resistance.

The game I/O signals are all available on a 16-pin DIP socket labeled GAME I/O on the main circuit board inside the case. The switches and the paddles are also available on a D-type miniature connector on the back of the Apple IIe; see J8 and J15 in Figure 7-15d (Figure 7-16d for the extended keyboard IIe).

Table 7-19
Game I/O connector signals

Internal connector pin	Back-panel connector pin	Signal	Description
1	2	+5V	+5V power supply. Total current drain from this pin must not exceed 100mA.
2,3,4	7,1,6	PB0–PB2	Switch inputs. These are standard 74LS inputs.
5	—	STROBE'	Strobe output. This line goes low during øo of a read or write instruction to location \$C040.
6,10,7,11	5,8,4,9	PDL0–PDL3	Hand control inputs. Each of these should be connected to a 150K-ohm variable resistor connected to +5V.