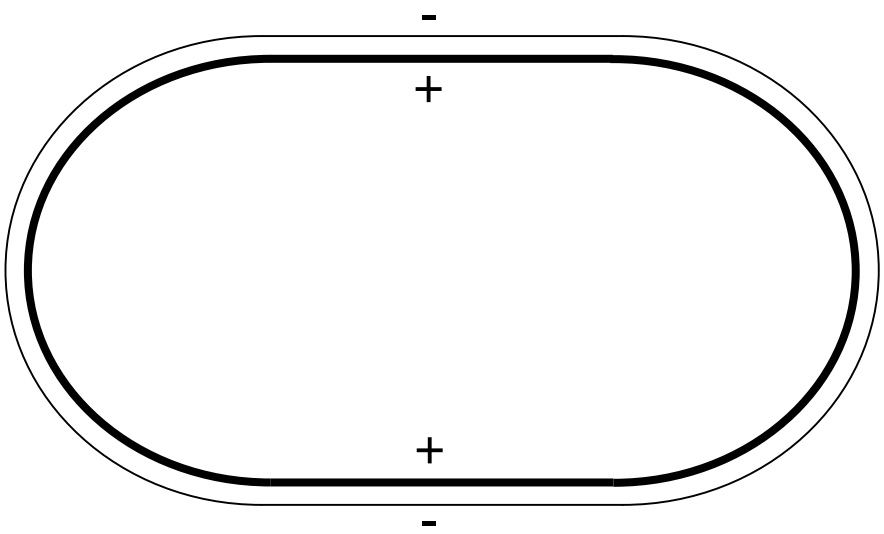
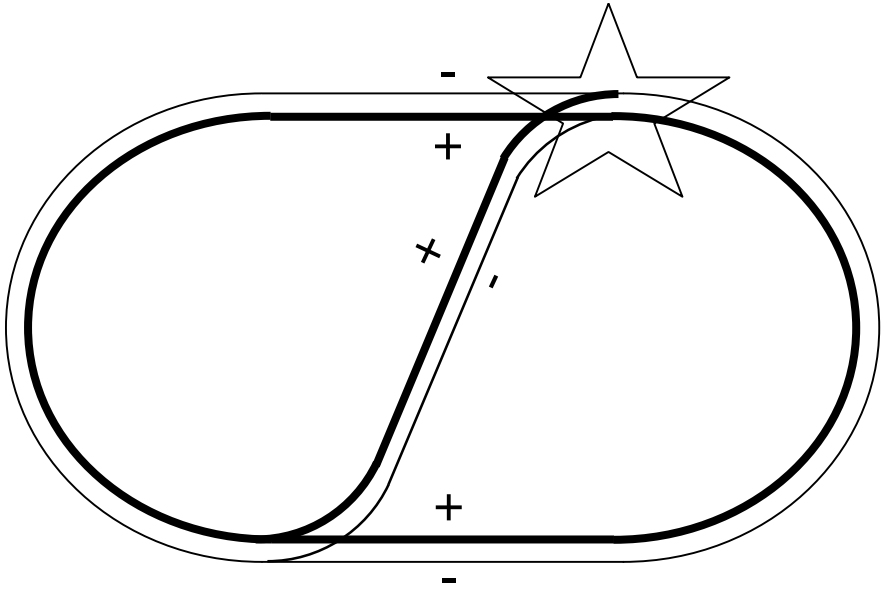
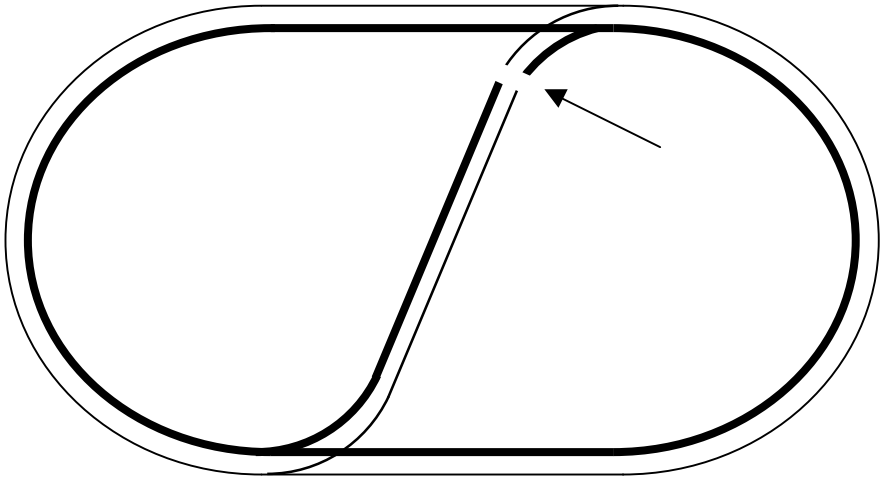
ARTICLE 1, Figure 1



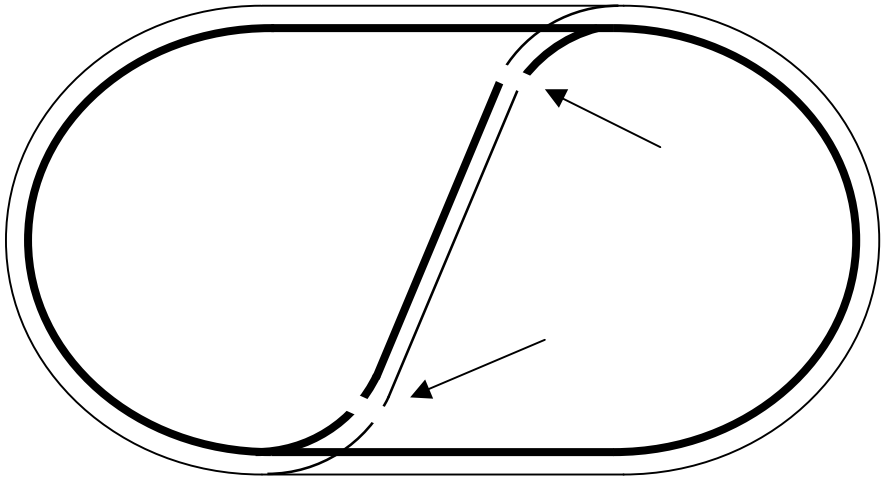
(a) A simple oval presents no opportunity for short circuits



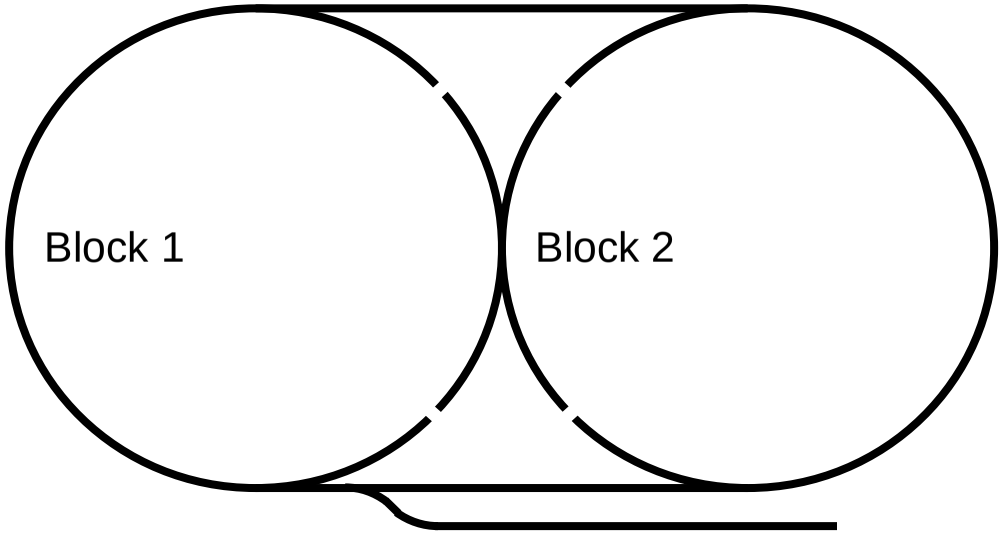
(b) A diagonal reversing pass in the oval creates a short circuit



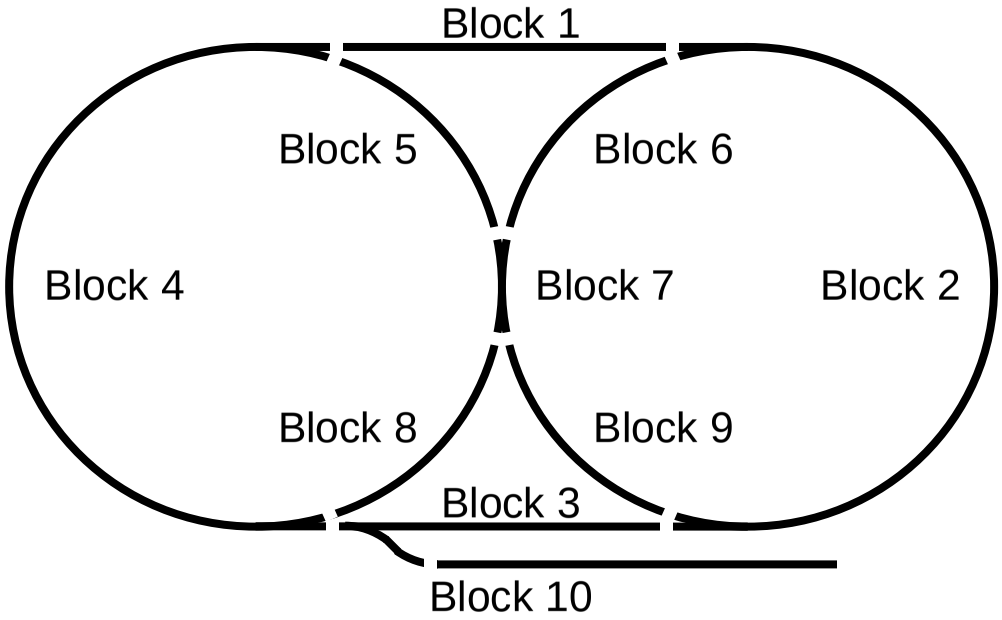
(c) A cut in both tracks will remove the short circuit



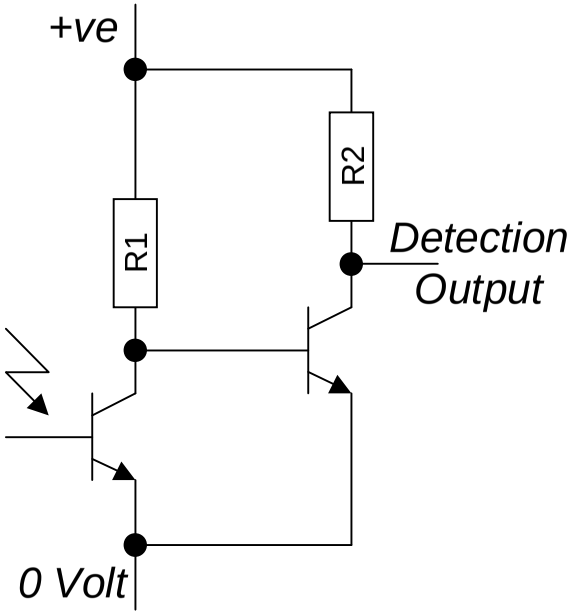
(d) Adding a second cut in both tracks creates an independent “block”



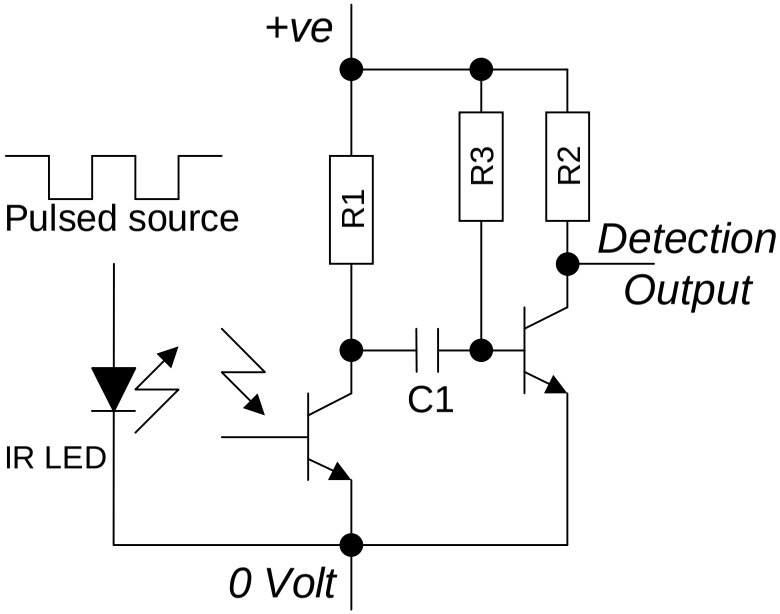
(a) Simple layout divided into two blocks for DCC control



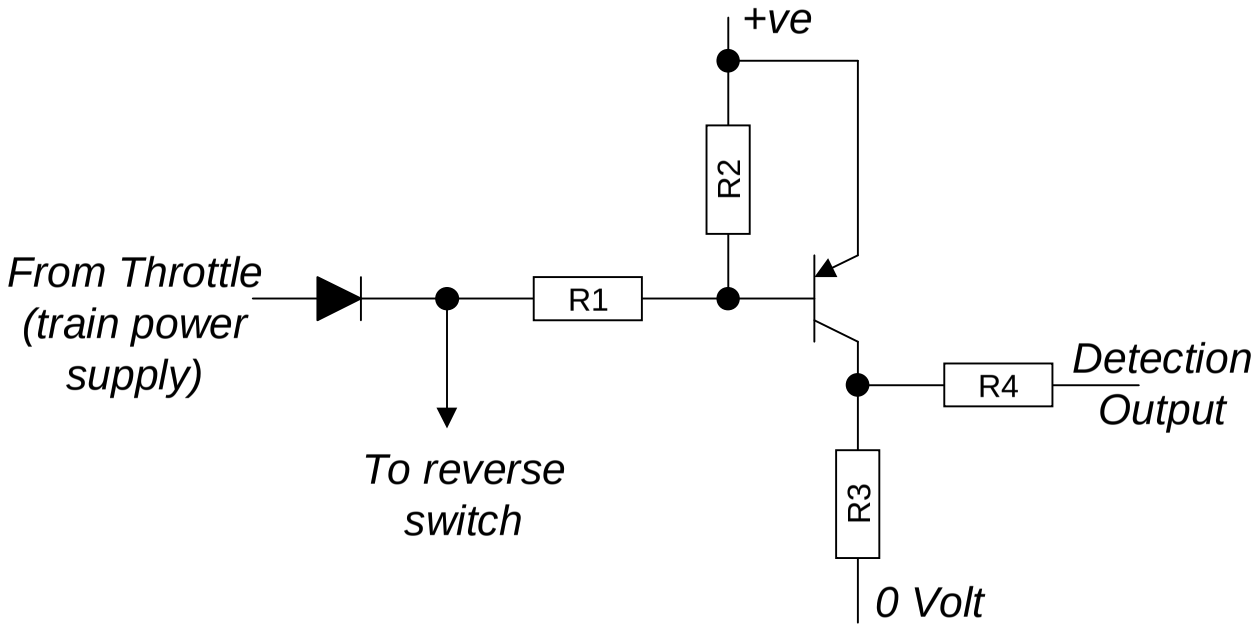
(b) Same layout divided into ten blocks for conventional control



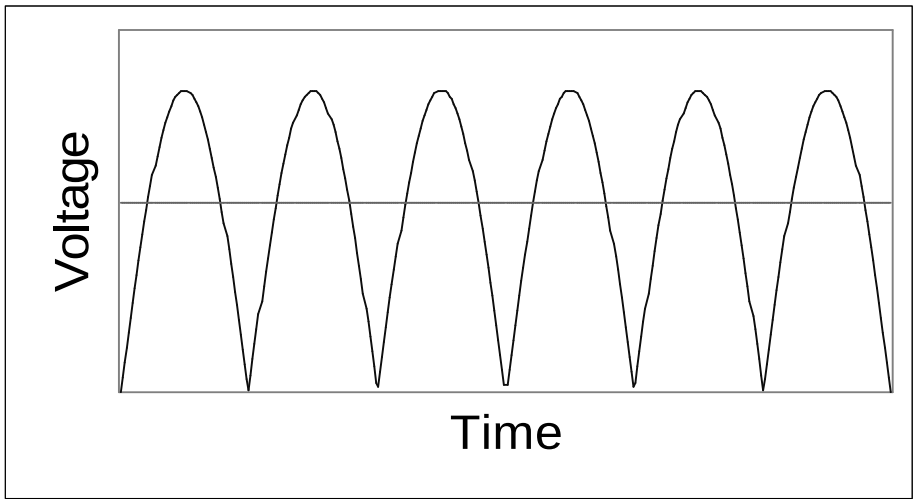
(a) Simple optical detector



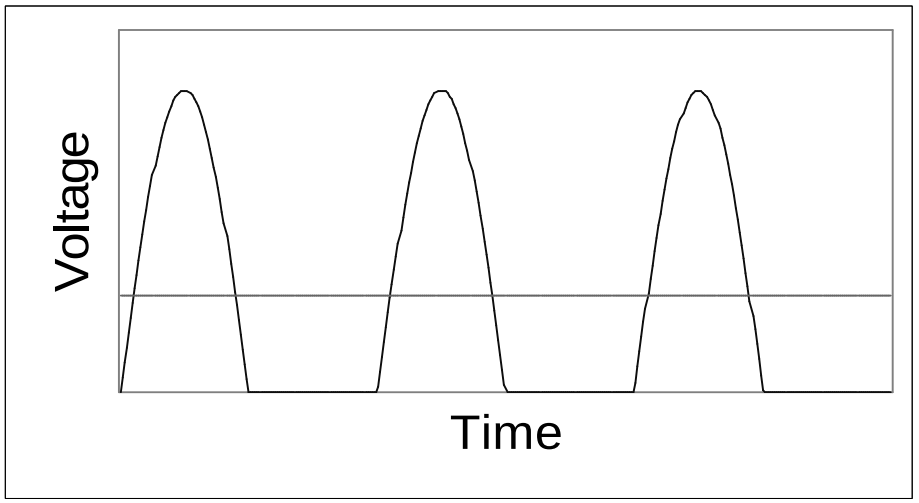
(b) improved optical detector



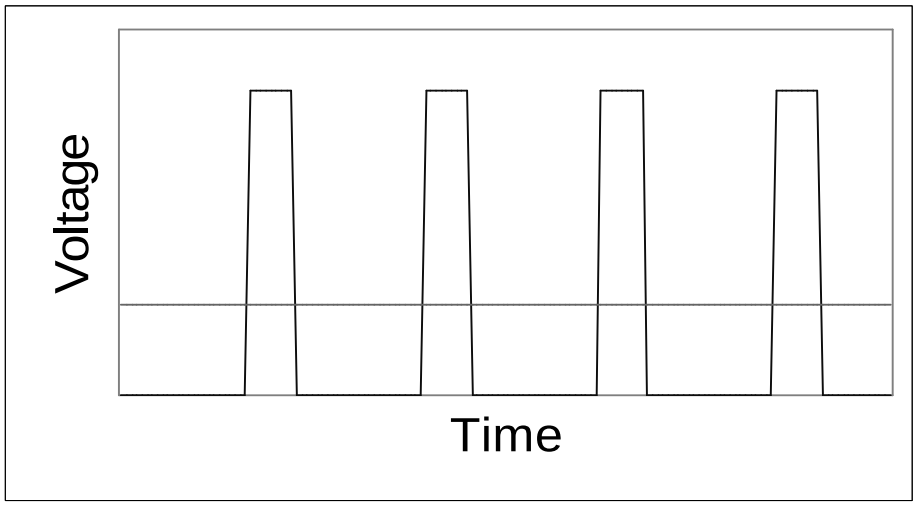
(c) simple load detector



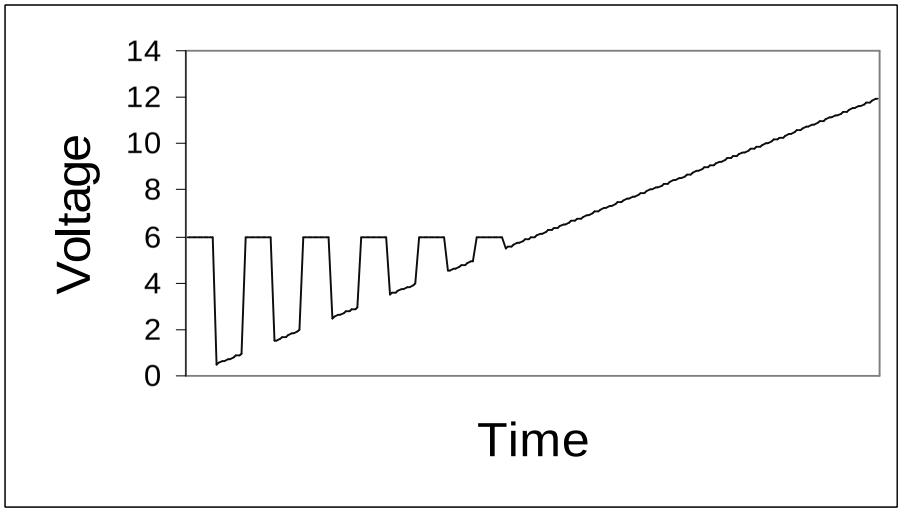
(a) Full wave rectified AC waveform showing RMS level



(b) Half wave rectified AC waveform showing RMS level

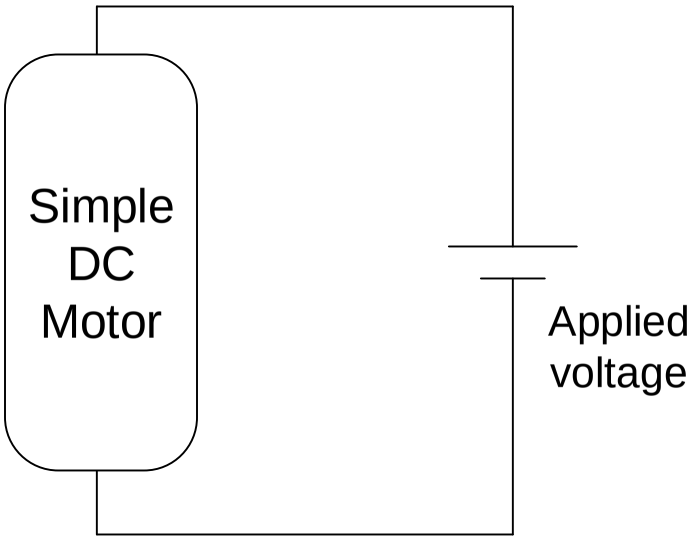


(c) Pulse Width Modulation waveform showing RMS level

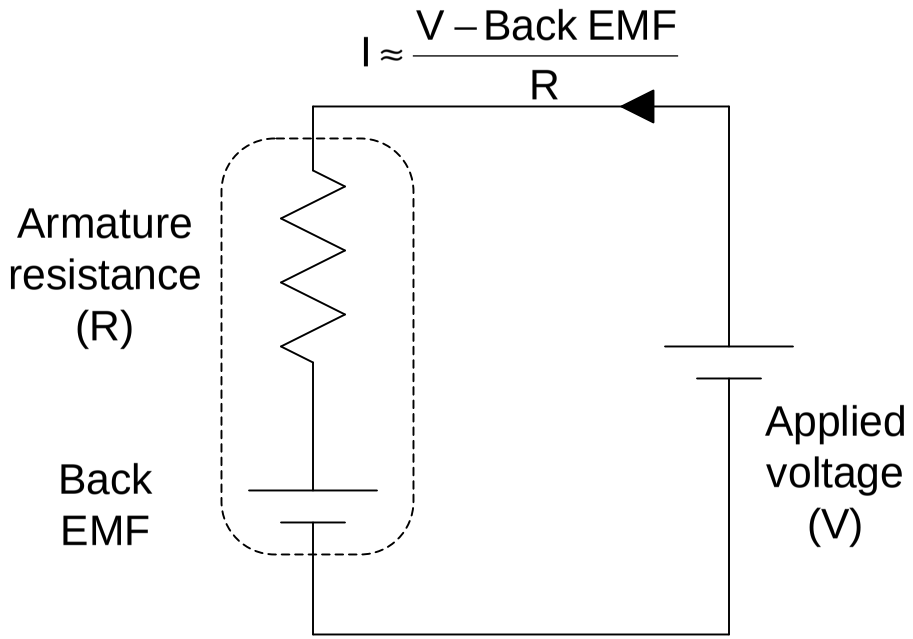


(d) Pulse Width Modulation superimposed on a pure DC floor

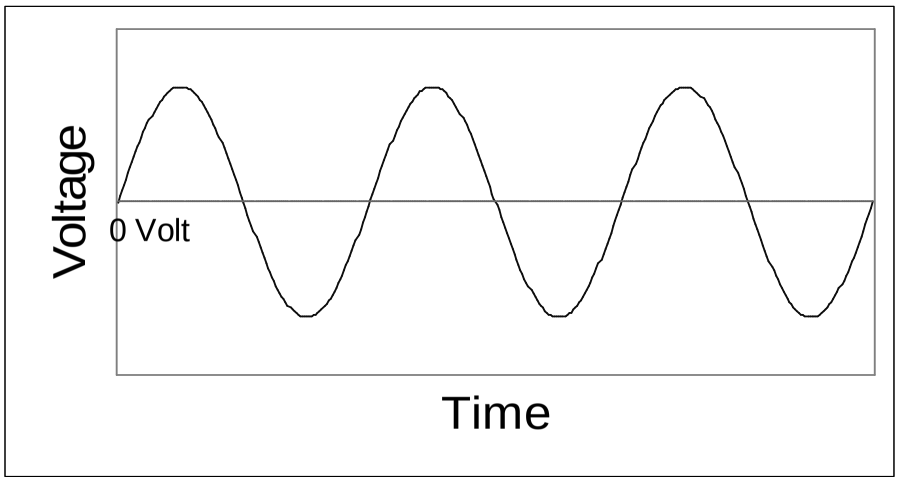
ARTICLE 2, Figure 2



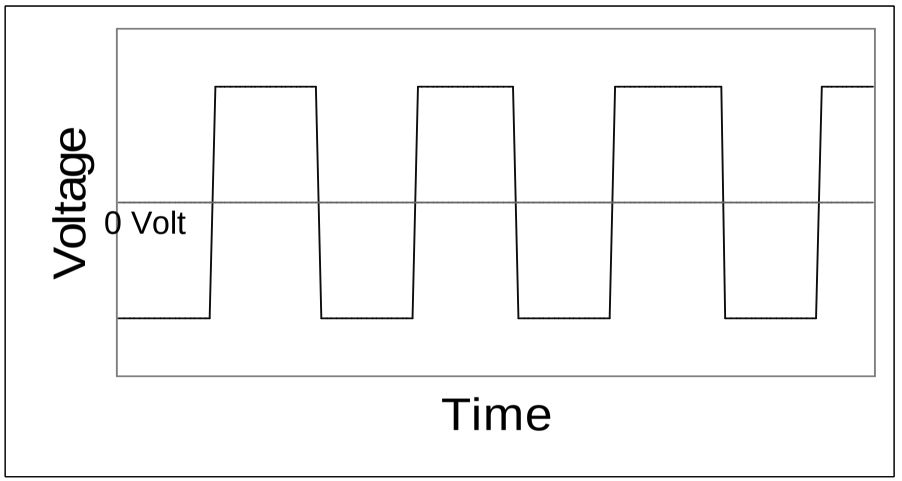
(a) In a simple circuit, a DC motor is powered from a DC voltage source



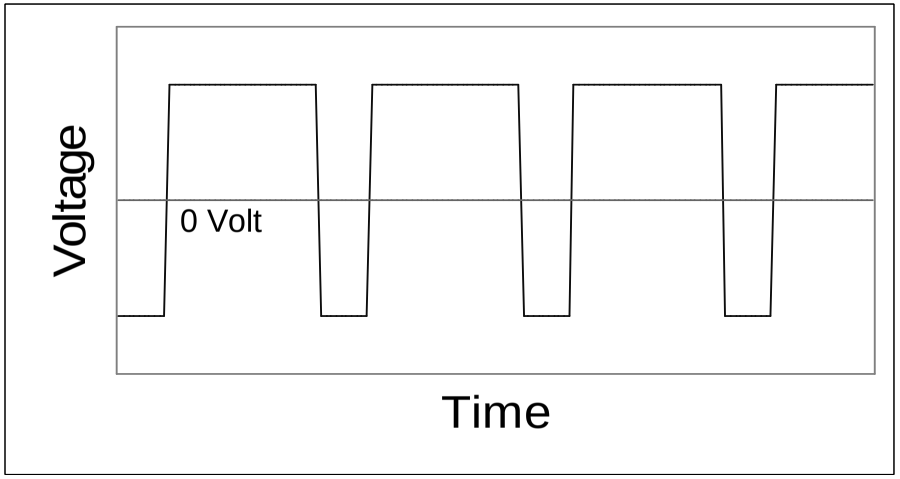
(b) The current which flows in this simple motor circuit will be approximately the same as if the motor was replaced by an equivalent resistance and voltage source



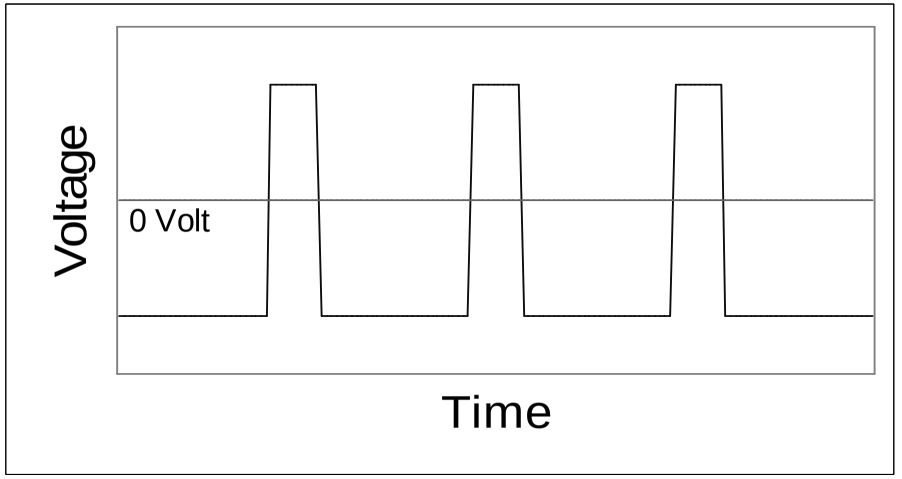
(a) Unrectified AC waveform showing a zero average level



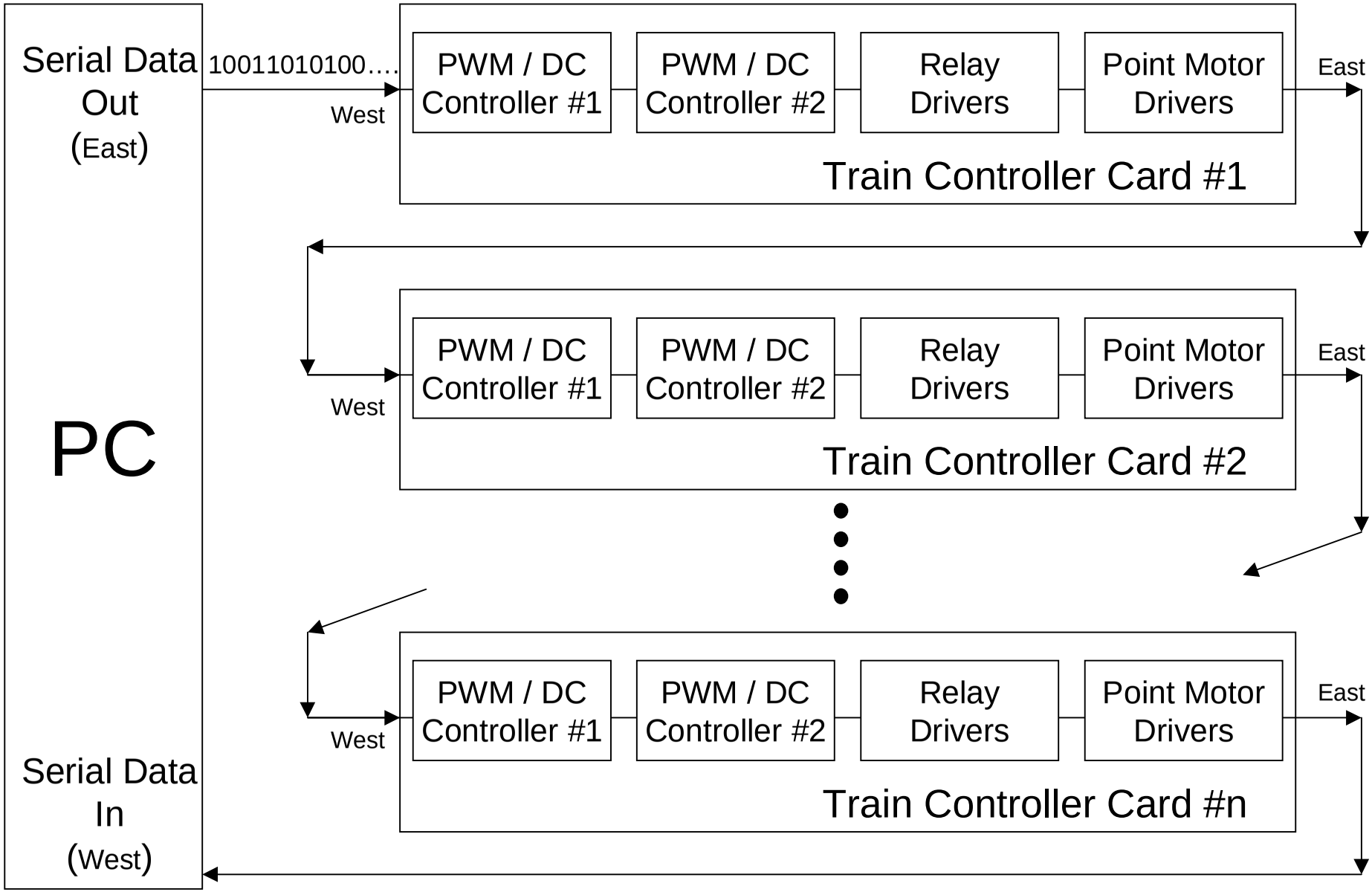
(b) Typical DCC waveform showing a zero average level



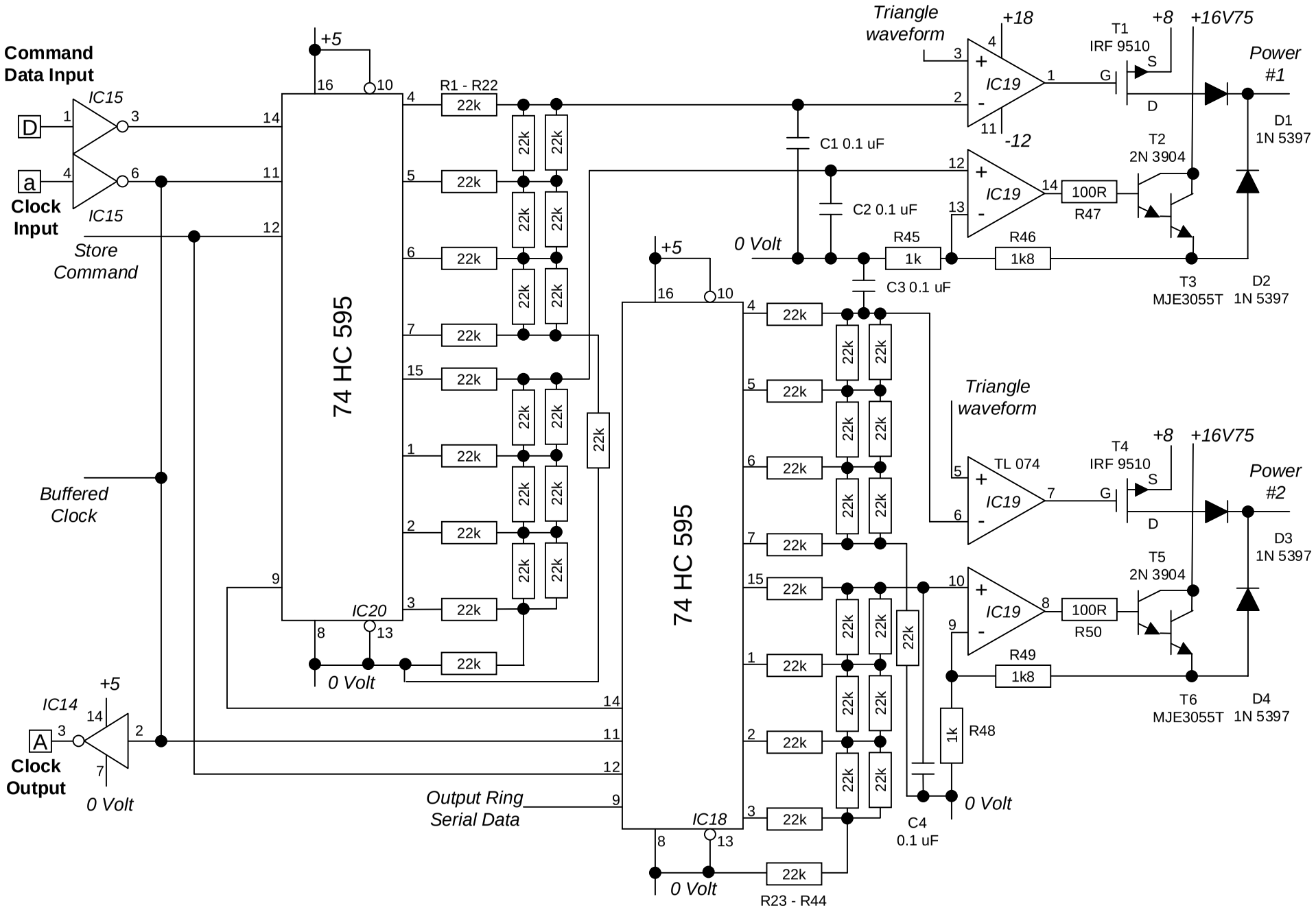
(c) Typical DCC waveform showing a positive average level



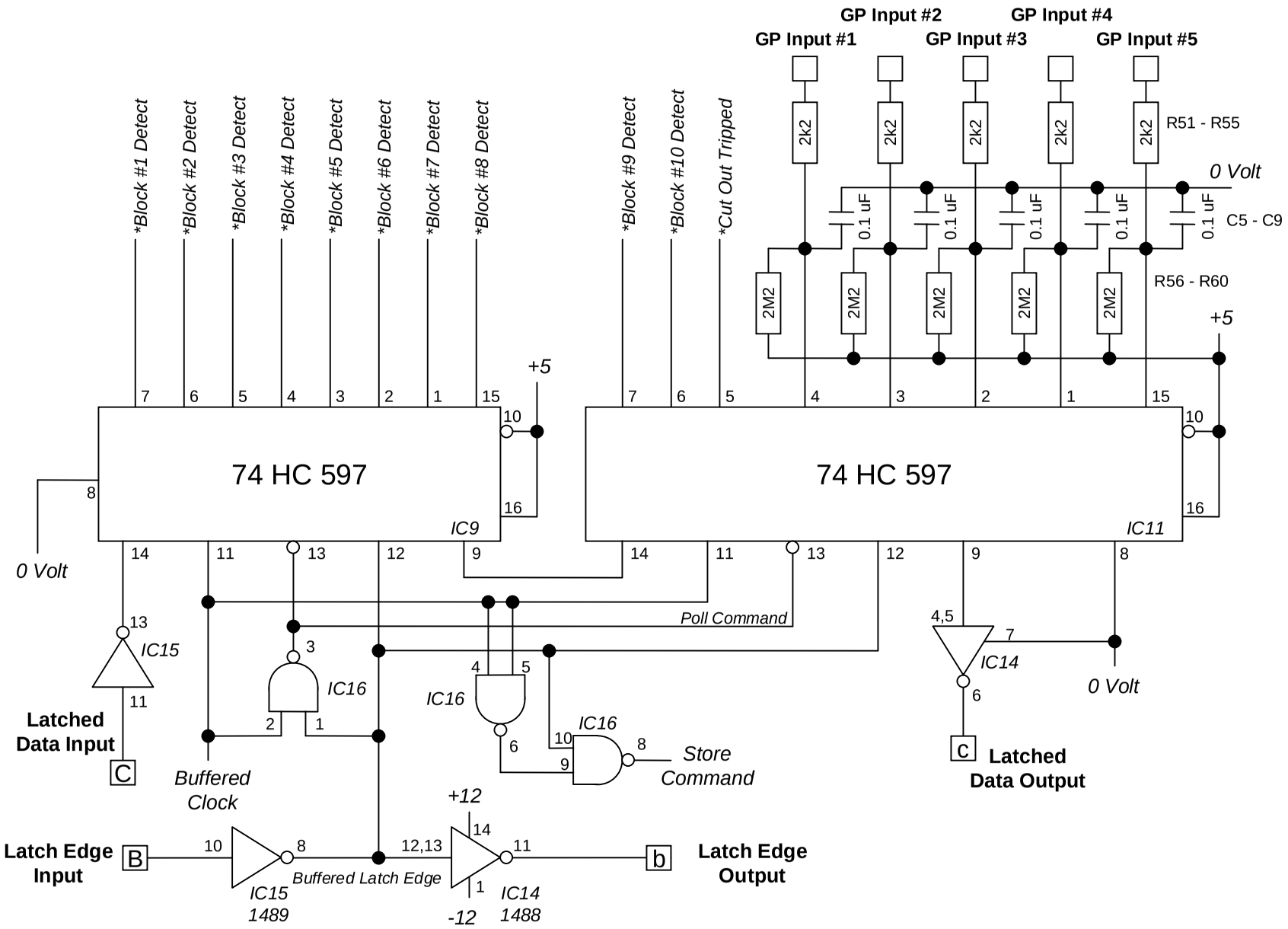
(d) Typical DCC waveform showing a negative average level



ARTICLE 3, Figure 1

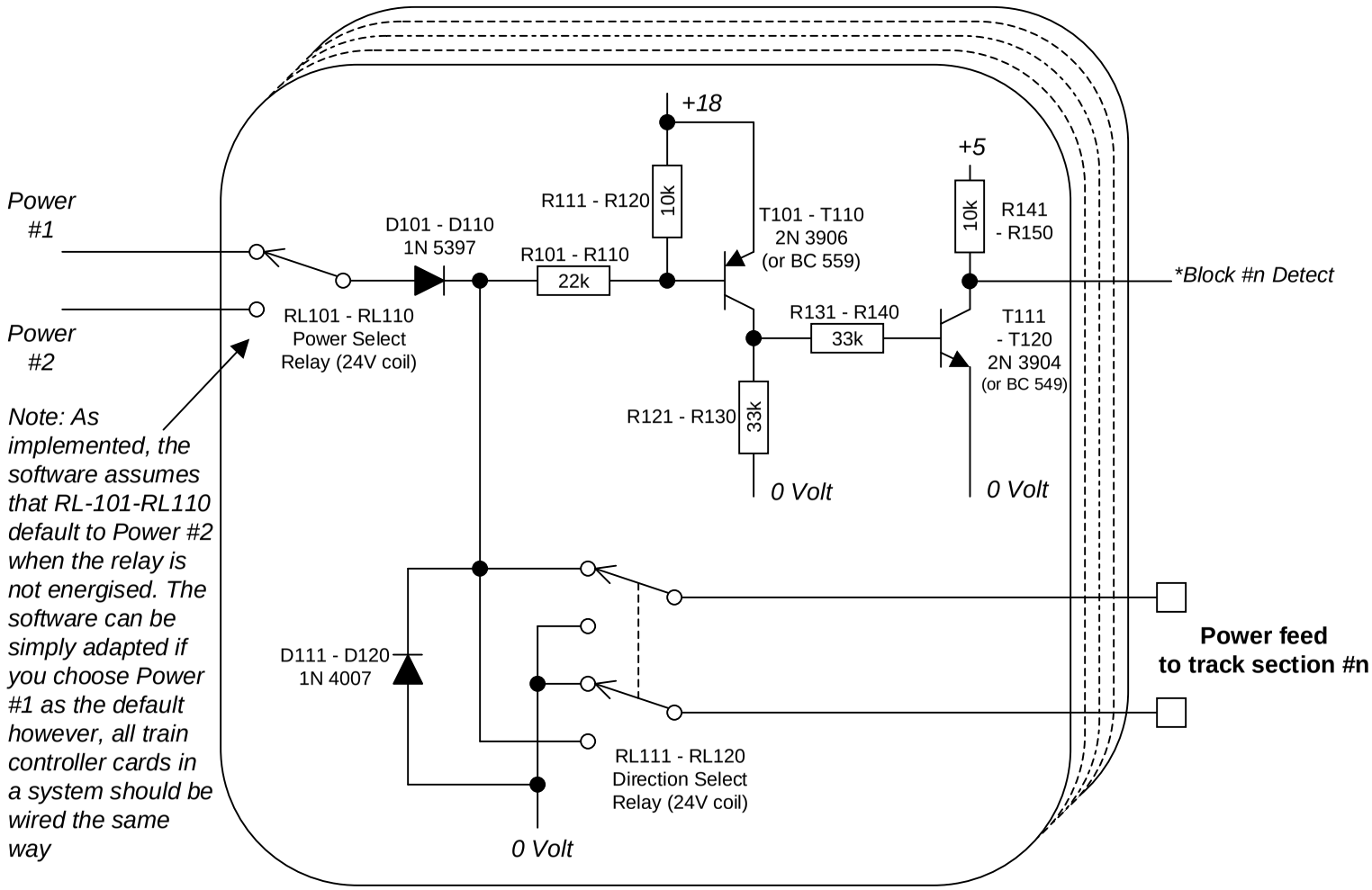


ARTICLE 3, Figure 2

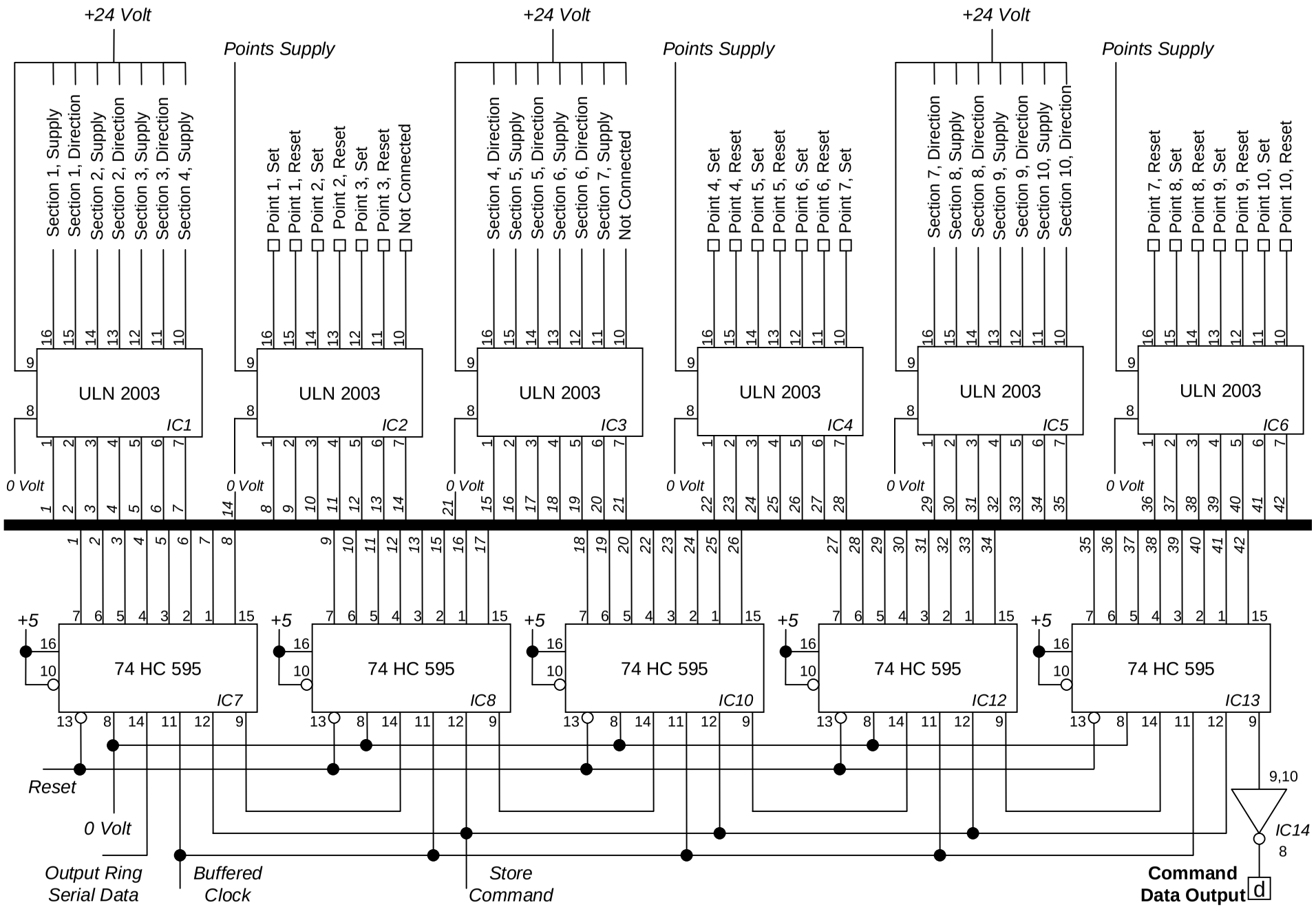


ARTICLE 3, Figure 3

(Note that this circuit is repeated 10 times,
once for each block)

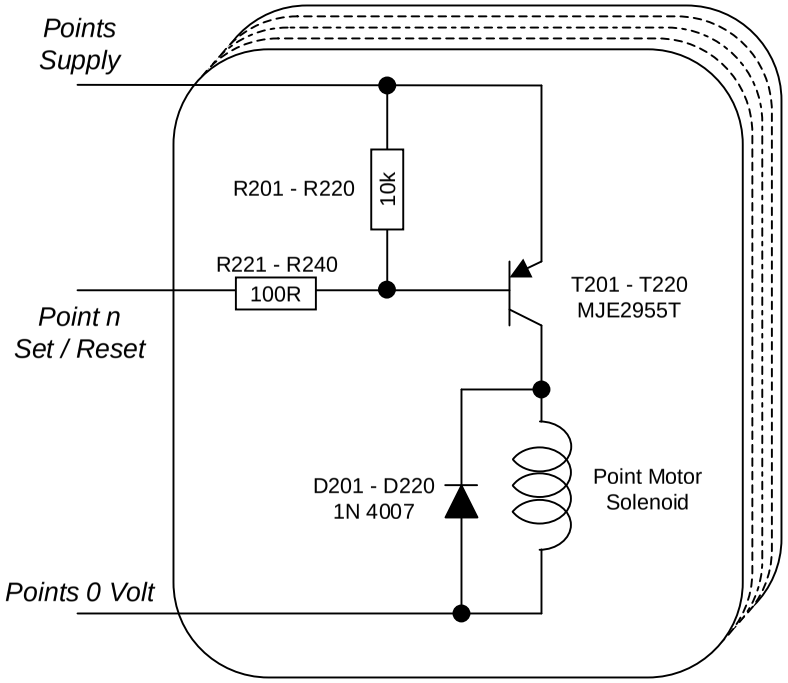


ARTICLE 3, Figure 4

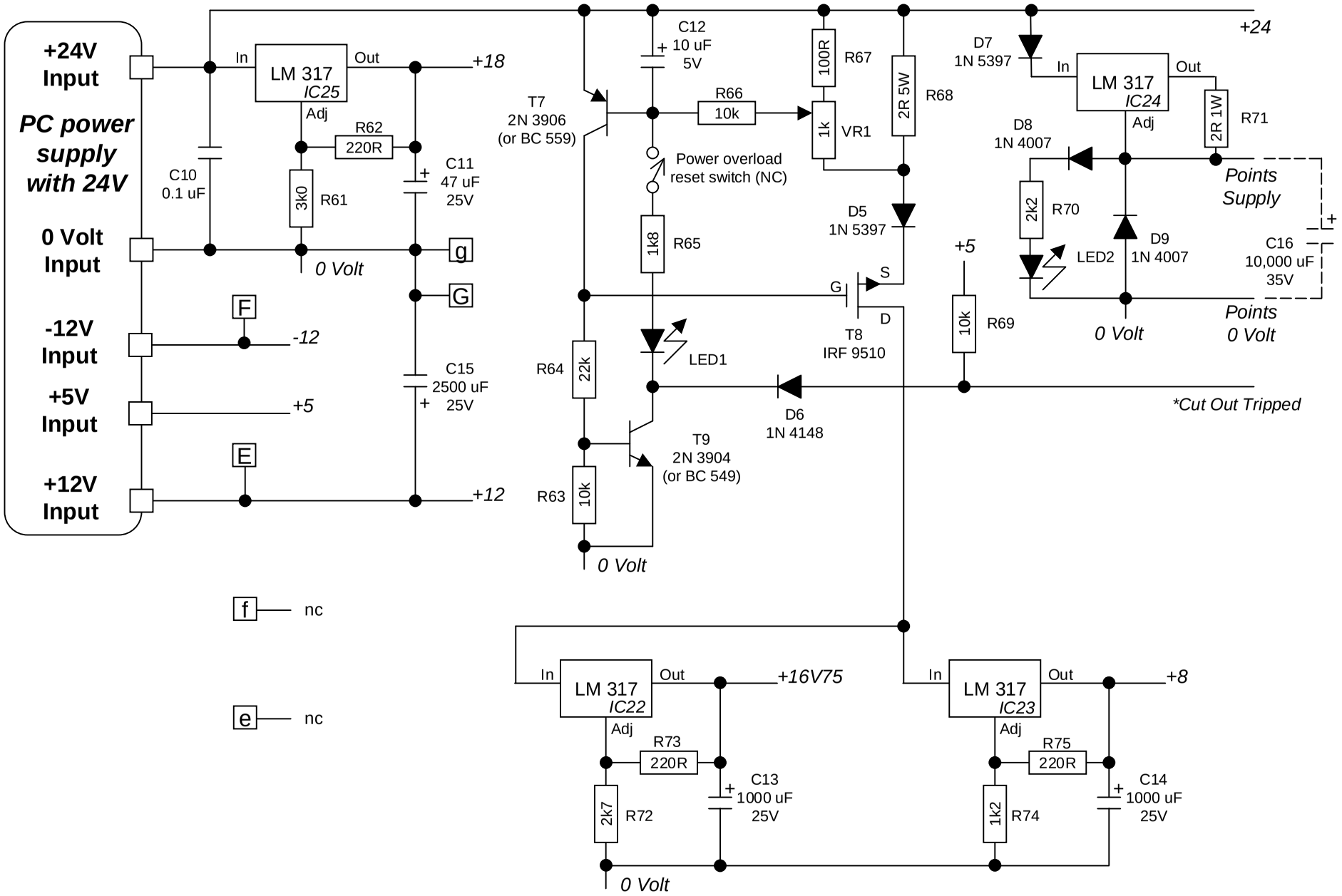


ARTICLE 3, Figure 5

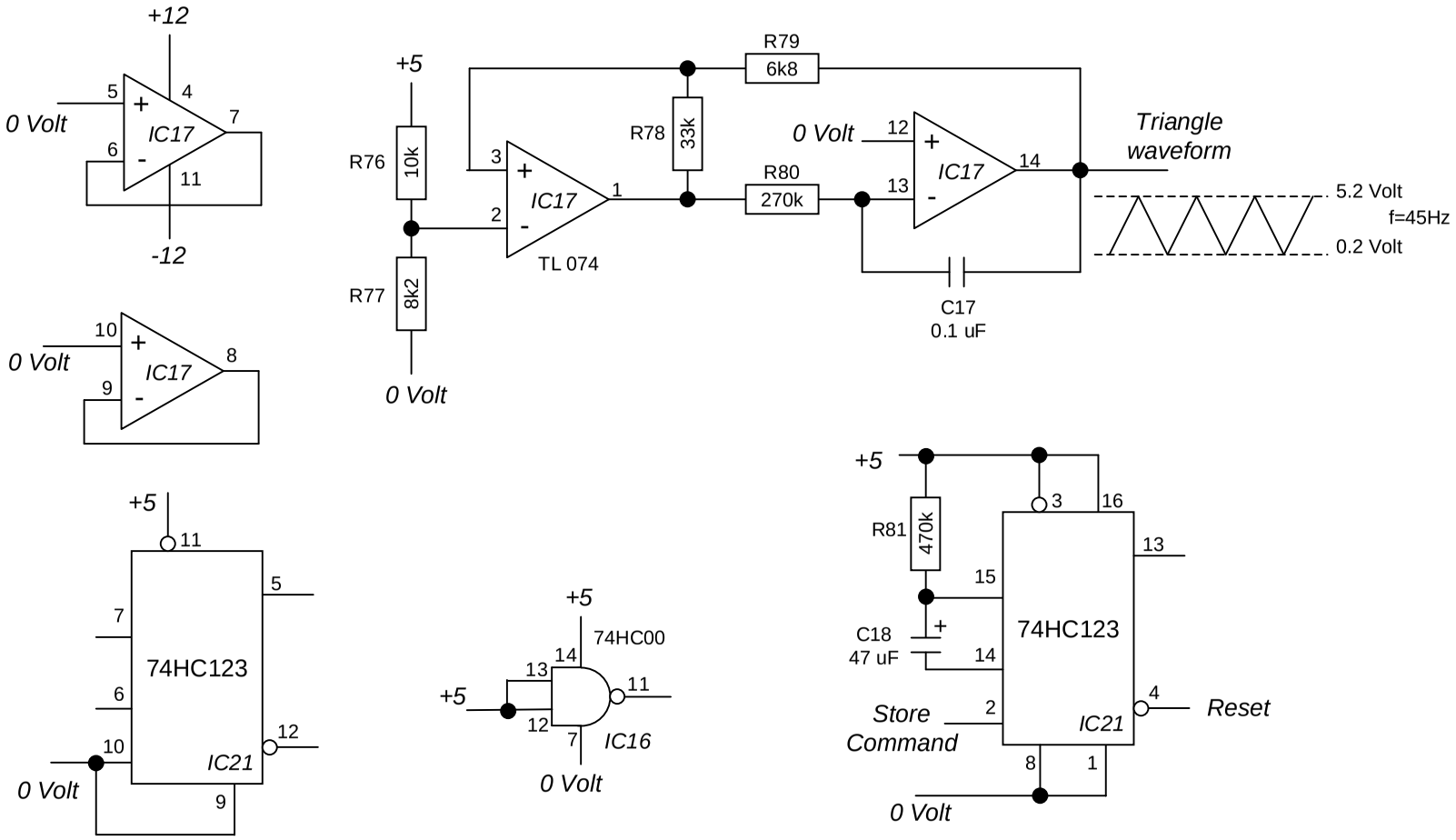
(Note that this circuit is repeated 20 times,
once for each point motor solenoid)



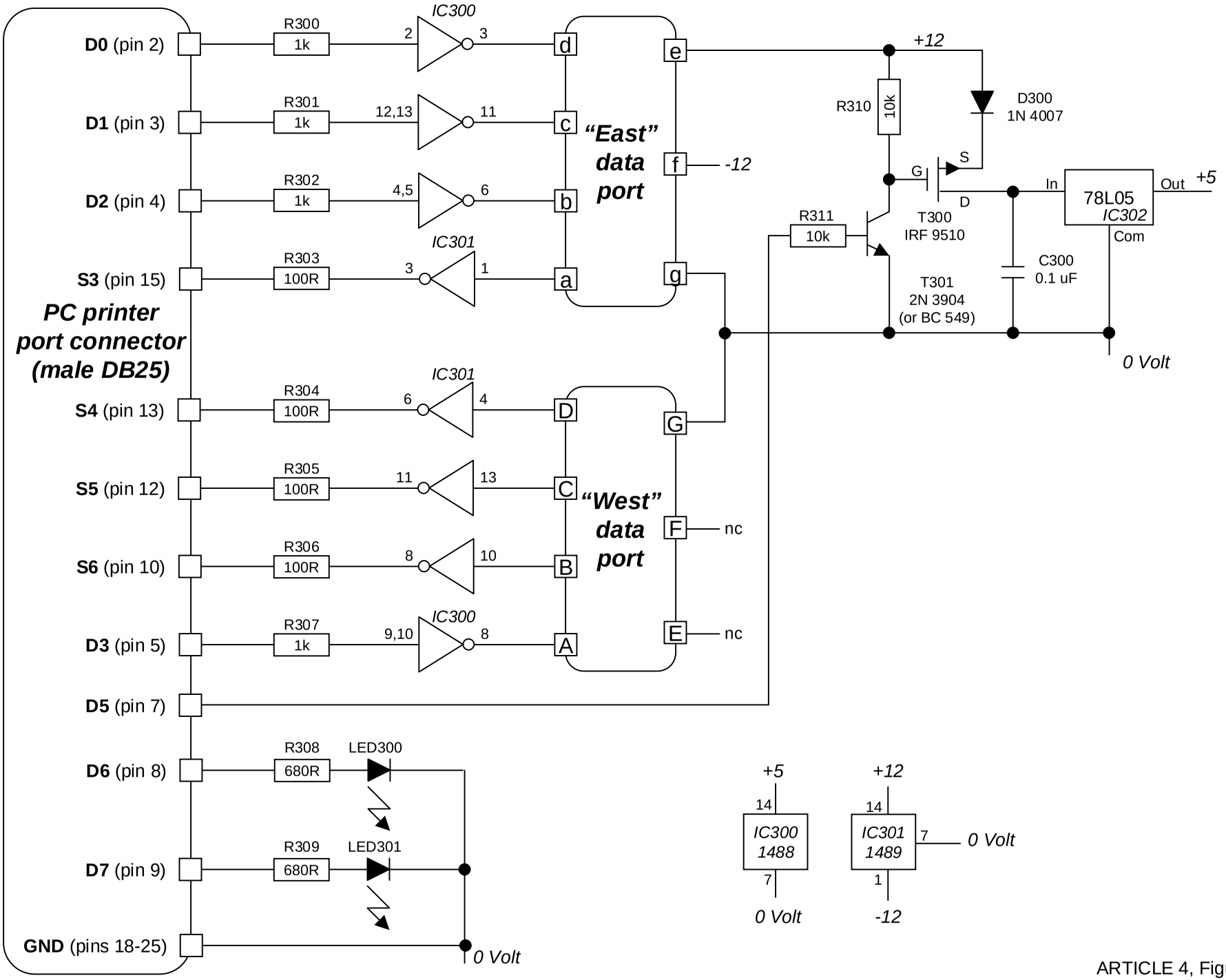
ARTICLE 4, Figure 1



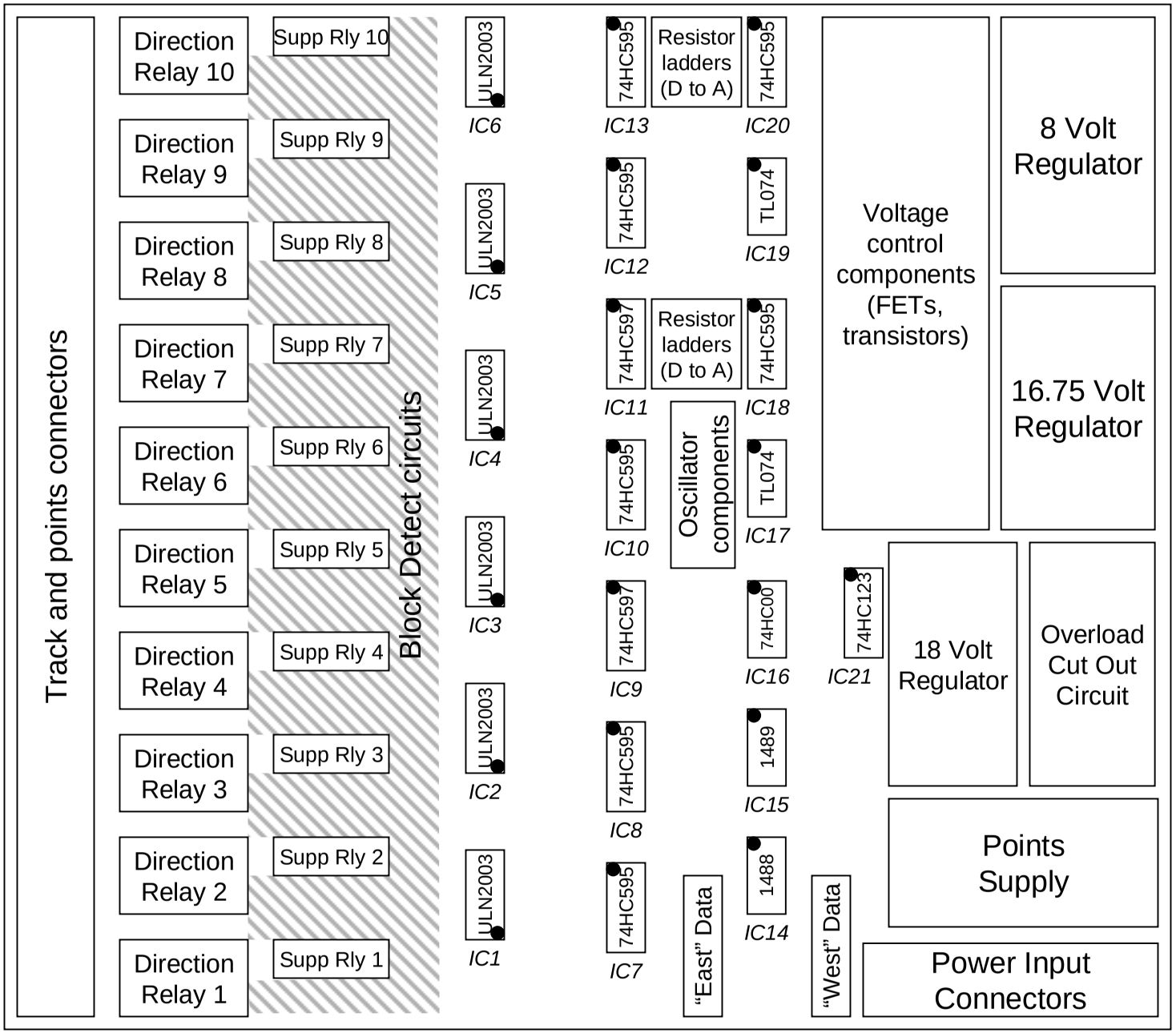
ARTICLE 4, Figure 2



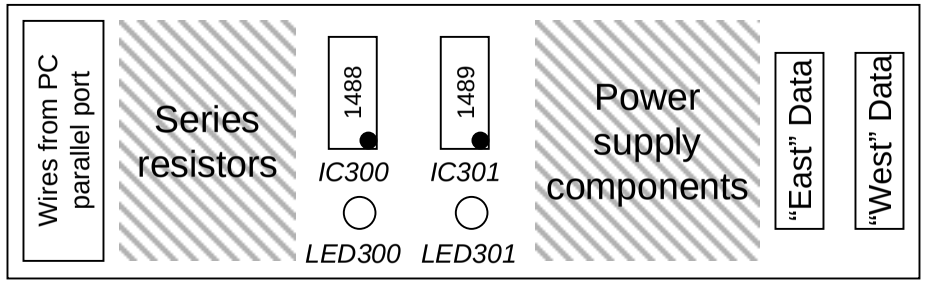
ARTICLE 4, Figure 3



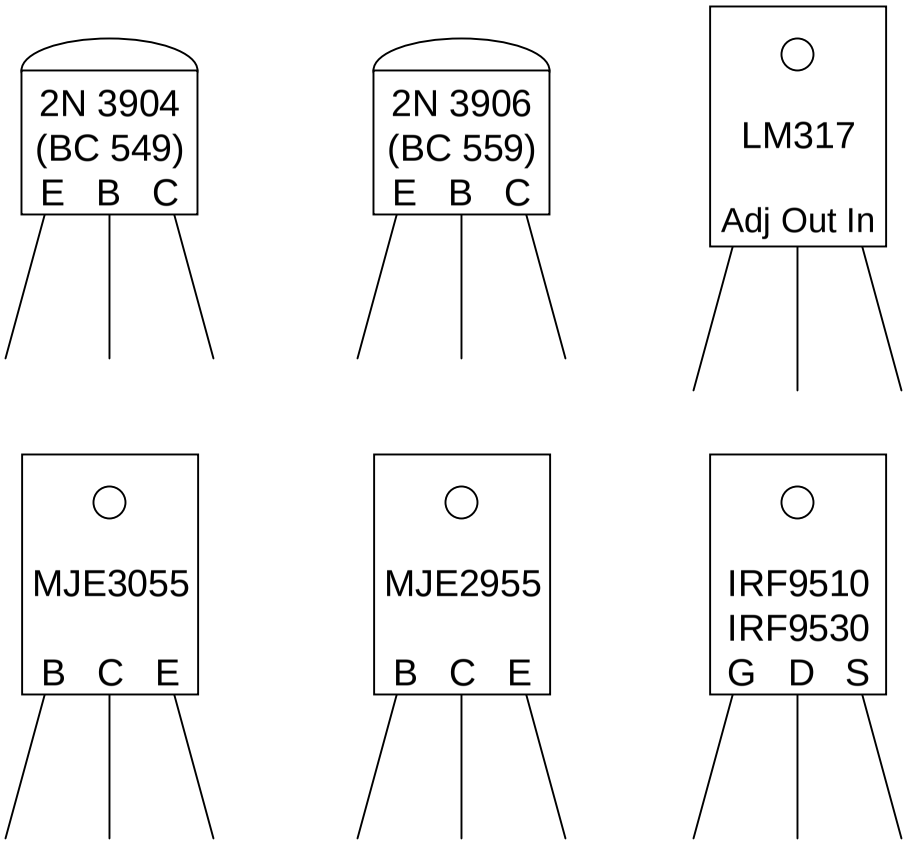
ARTICLE 4, Figure 4



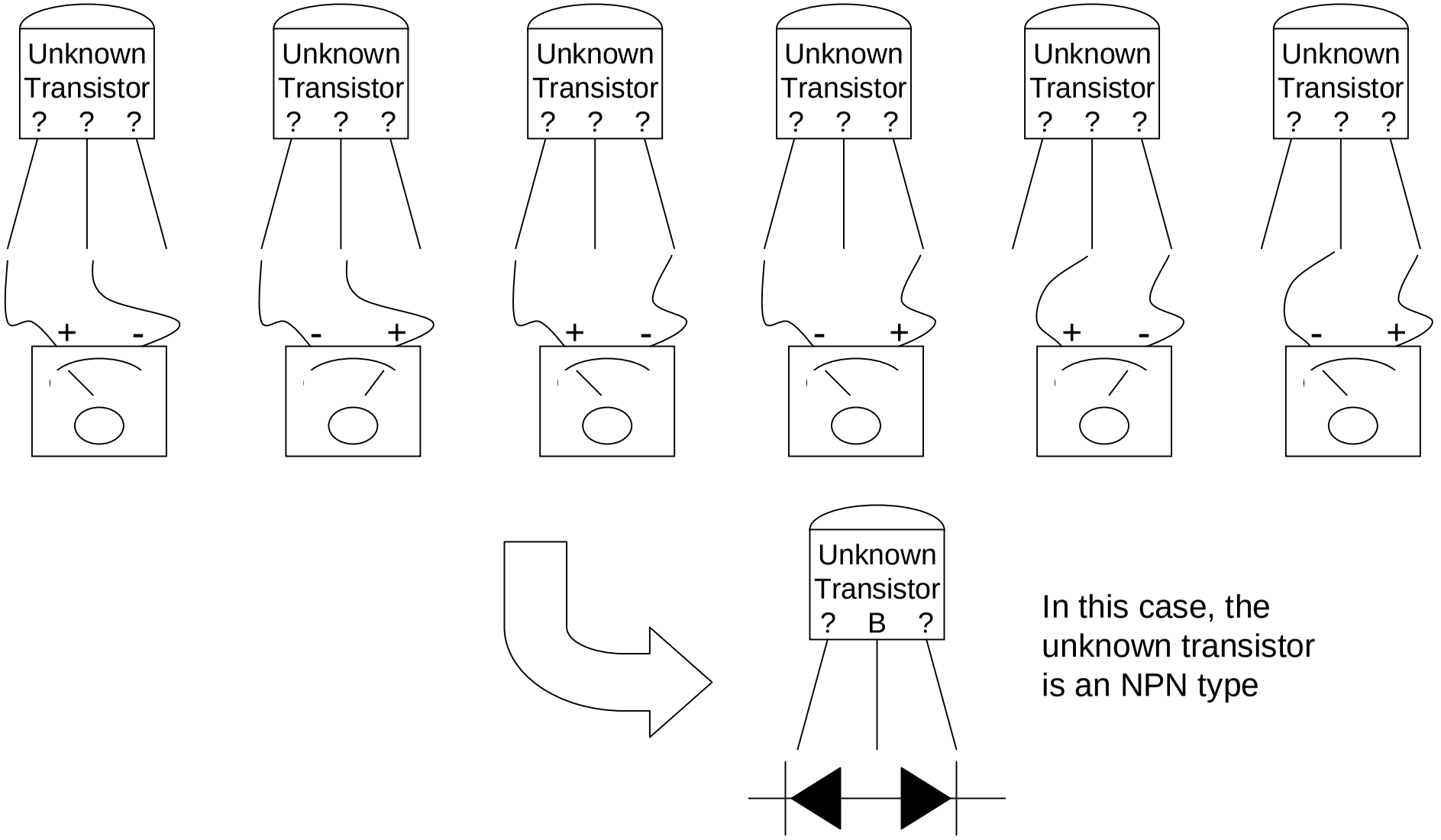
ARTICLE 5, Figure 1



ARTICLE 5, Figure 2

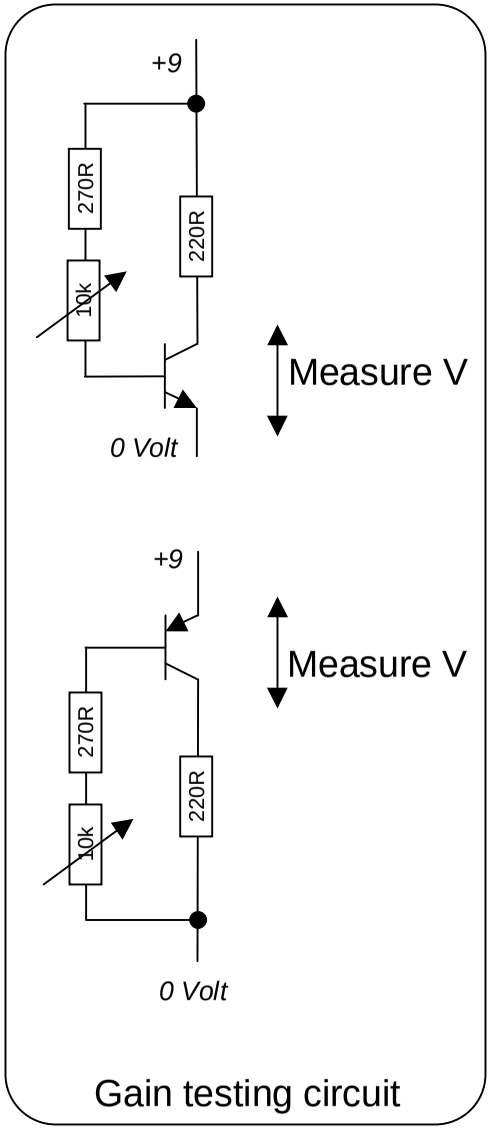


ARTICLE 5, Figure 3

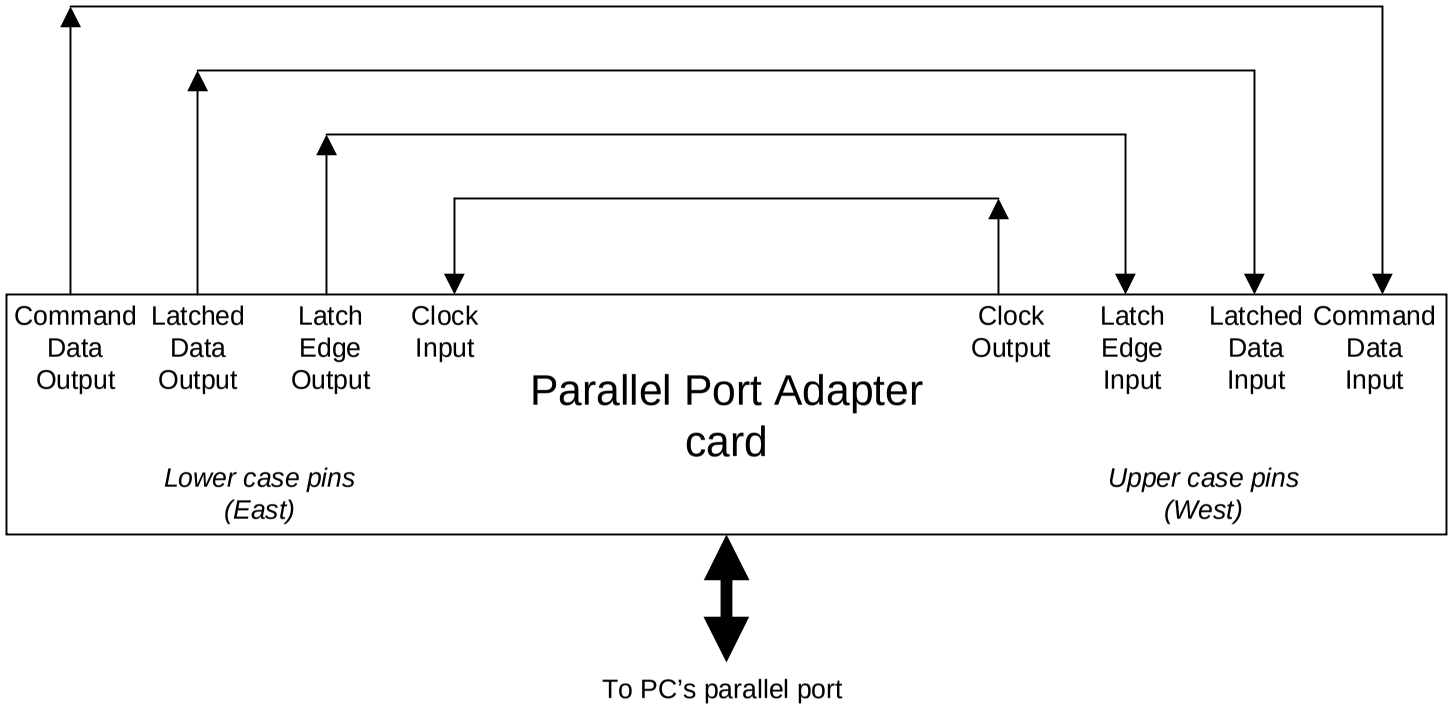


In this case, the unknown transistor is an NPN type

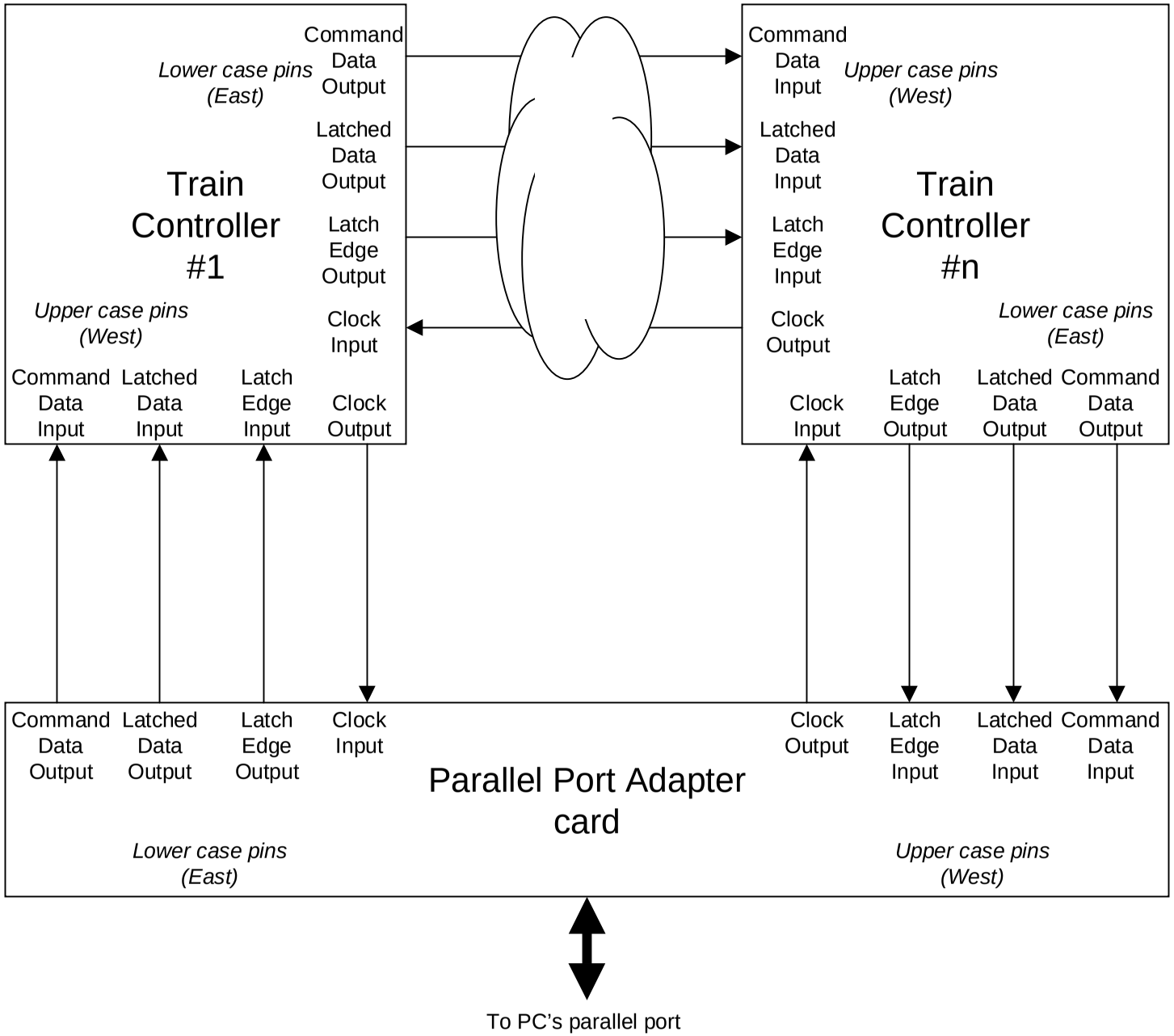
ARTICLE 5, Figure 4



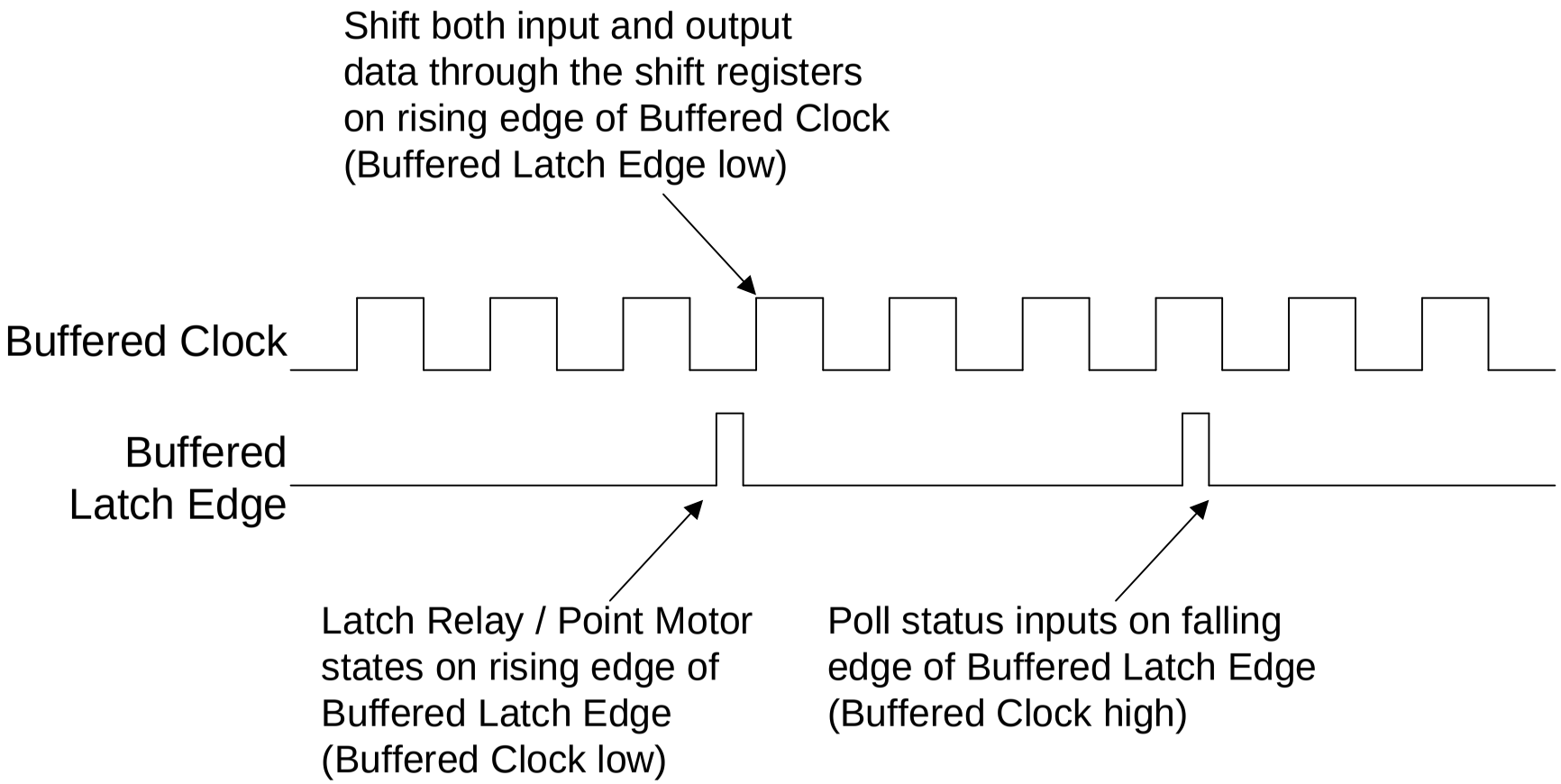
ARTICLE 5, Figure 5



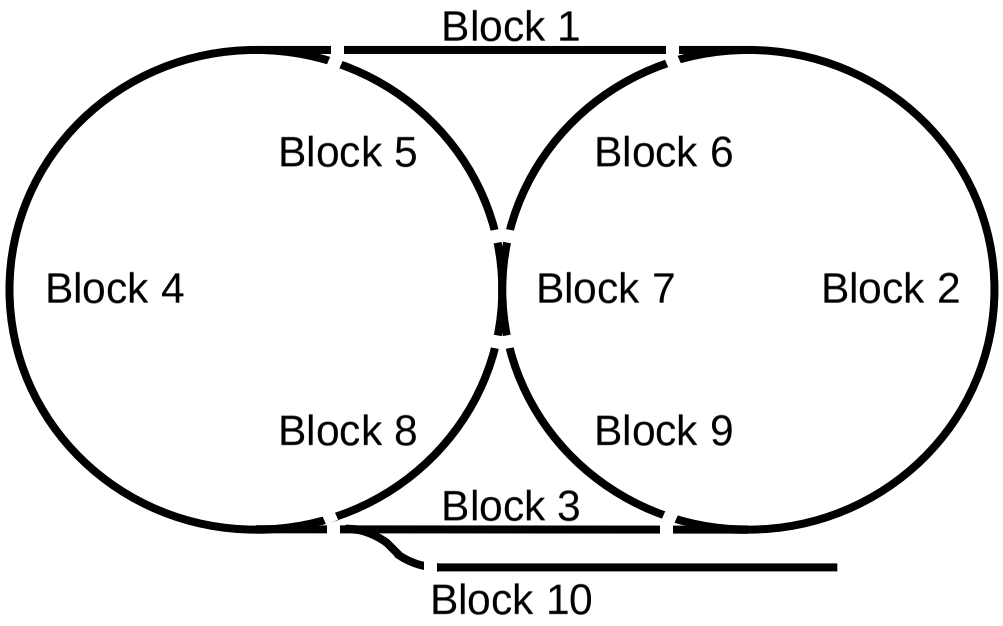
ARTICLE 6, Figure 1

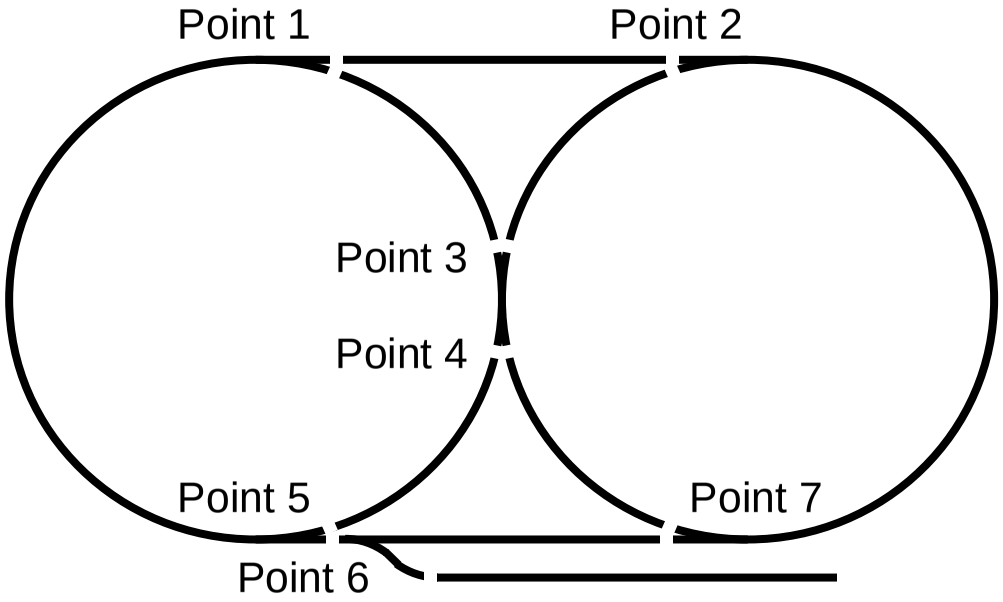


ARTICLE 6, Figure 2

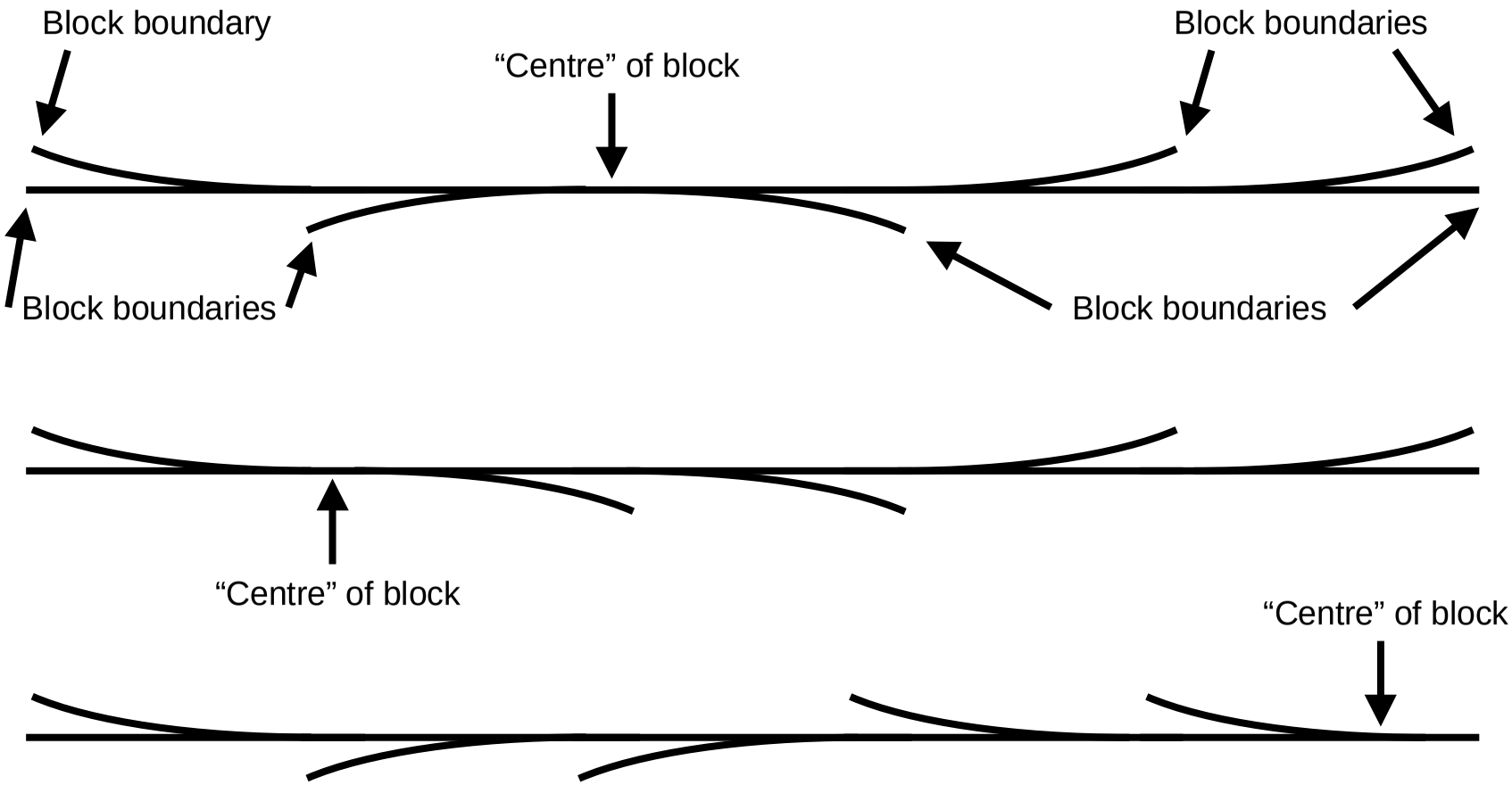


ARTICLE 6, Figure 3

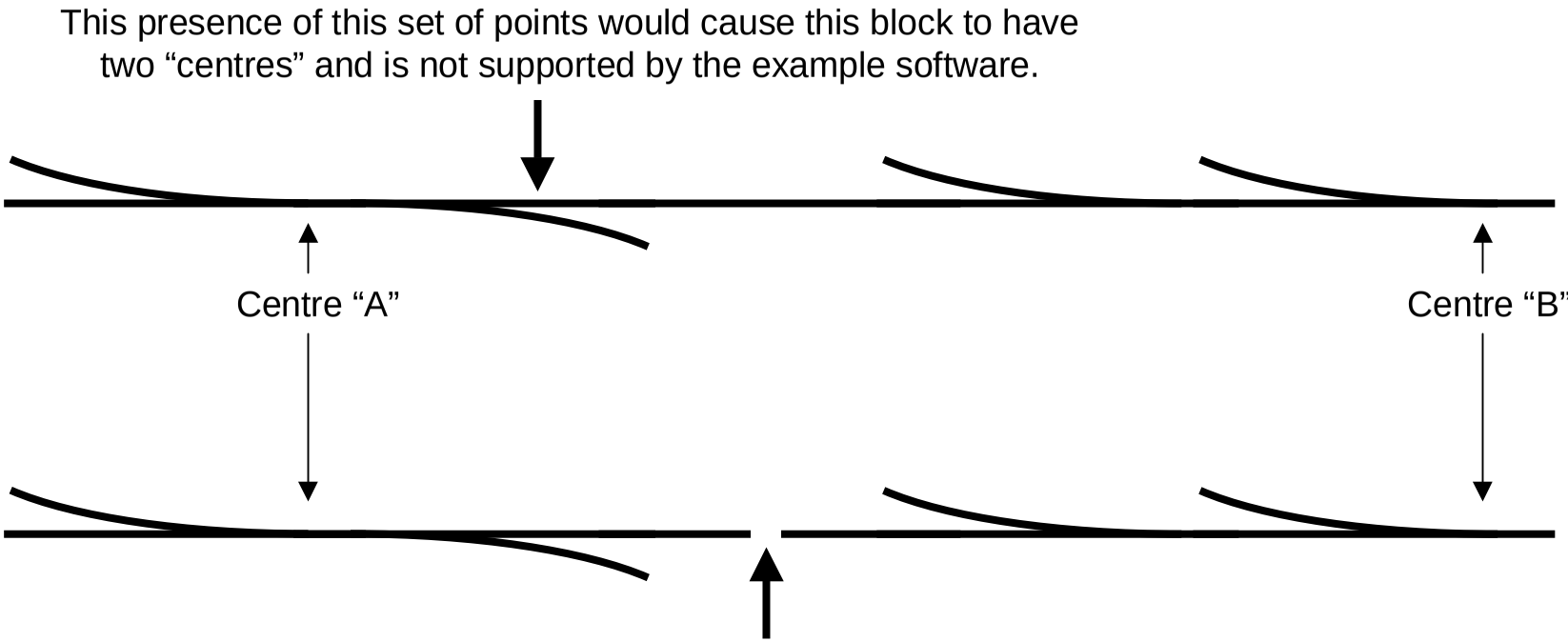




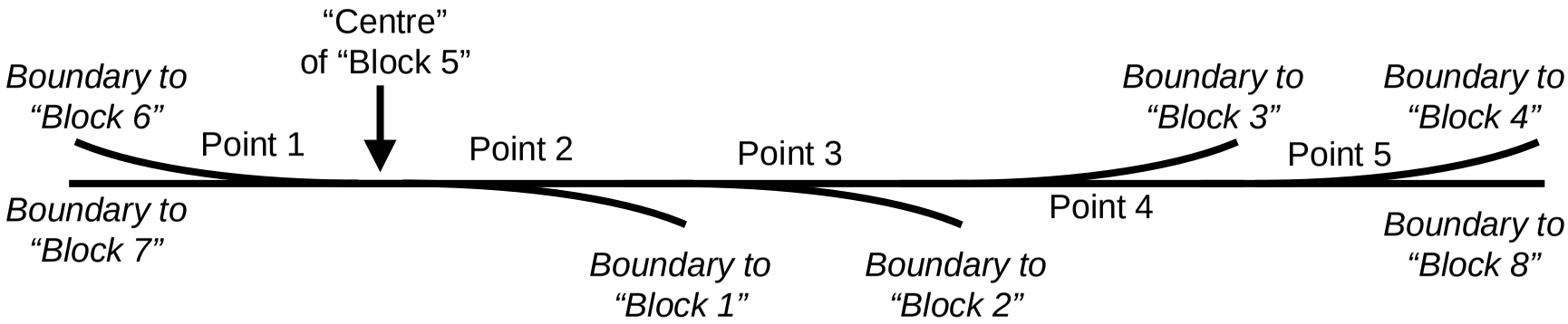
ARTICLE 7, Figure 1



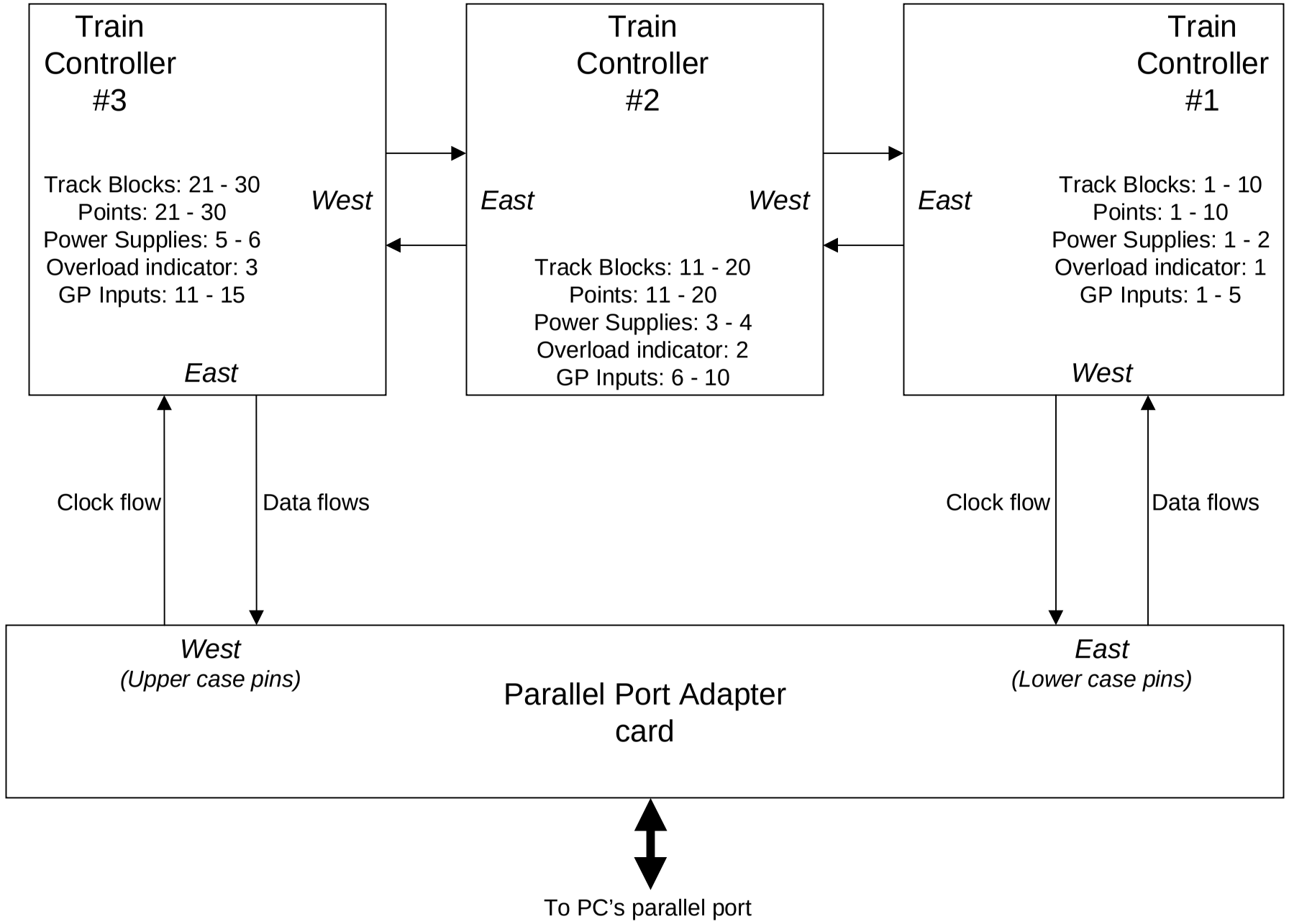
ARTICLE 7, Figure 2



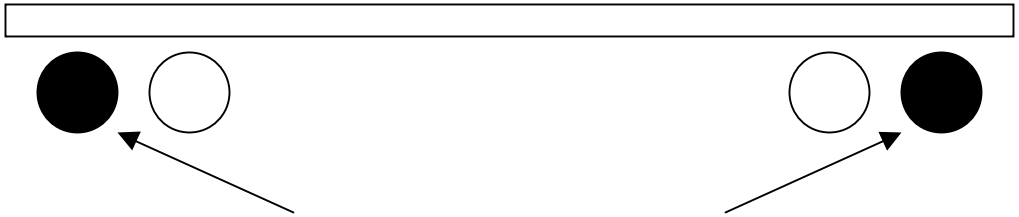
ARTICLE 7, Figure 3



ARTICLE 7, Figure 4

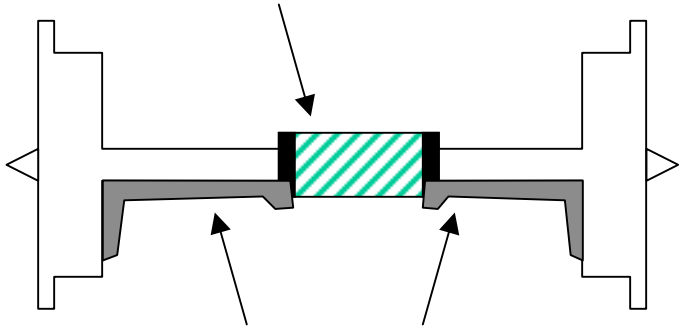


ARTICLE 8, Figure 1



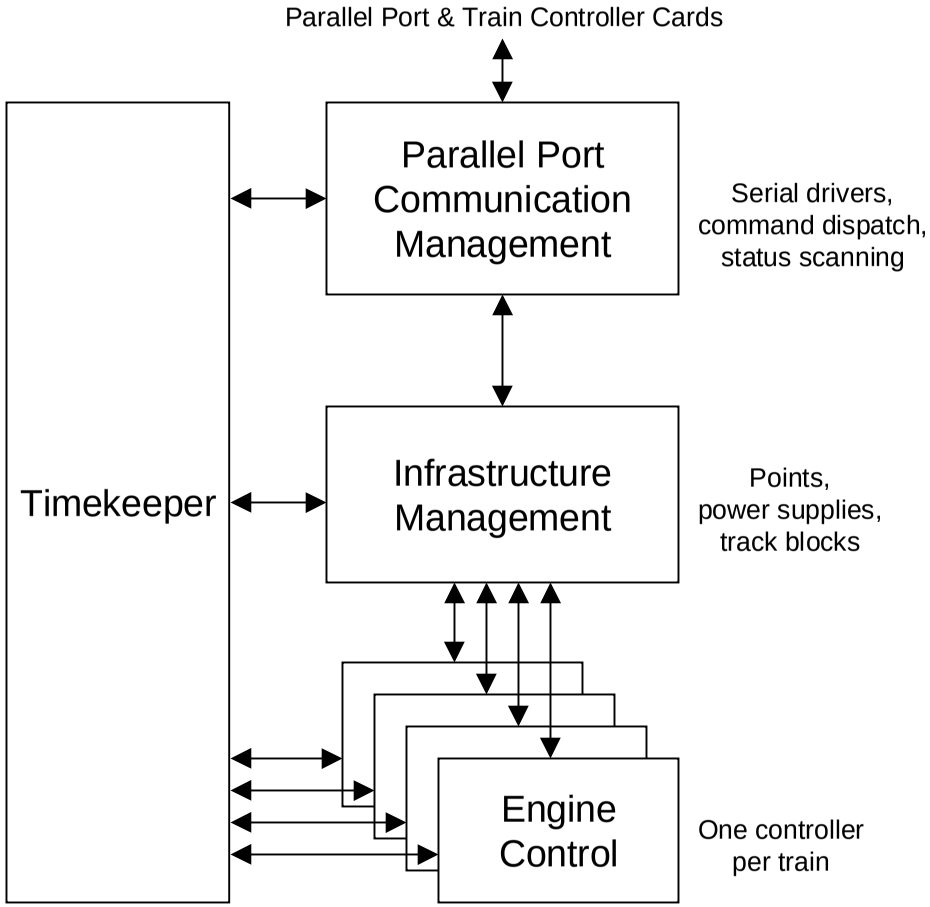
The leading and trailing axles should be fitted with a resistor so that the carriage can be easily detected by the software.

Glue a surface mount resistor (approx 10-20k) to the axle of a Metal Wheel car

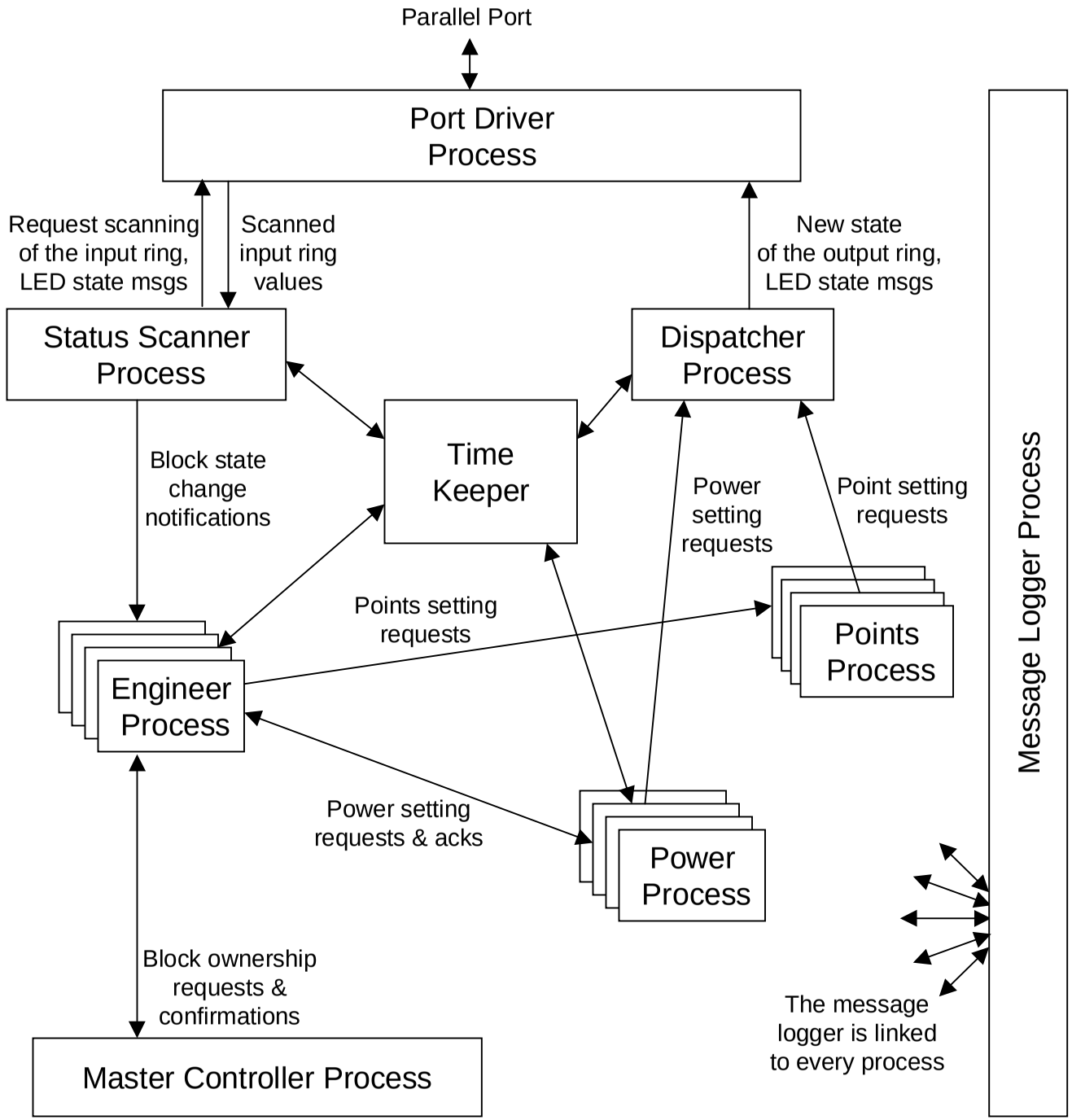


Draw traces of conductive ink between the resistor and the metalic parts of each wheel.

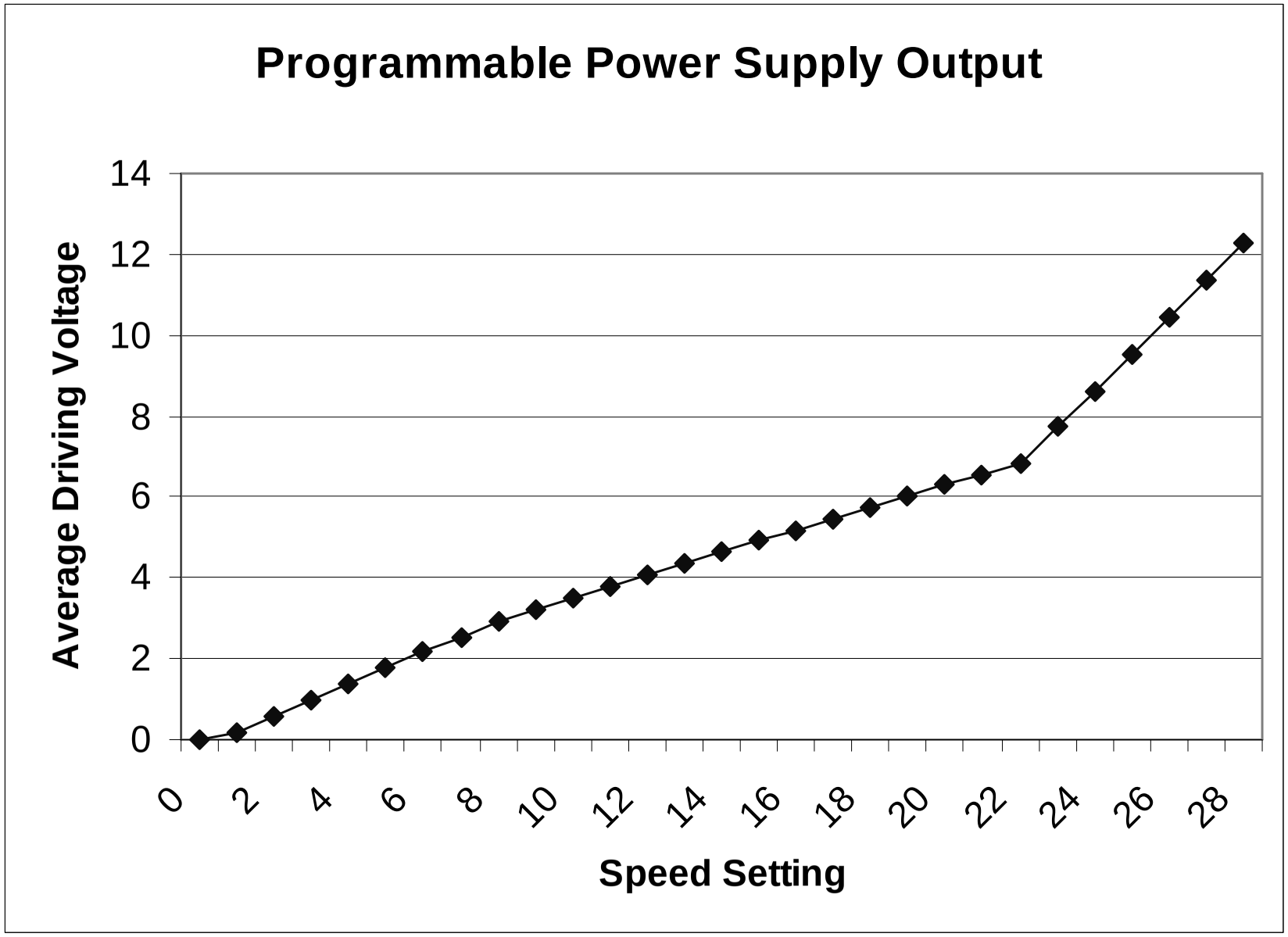
ARTICLE 8, Figure 2



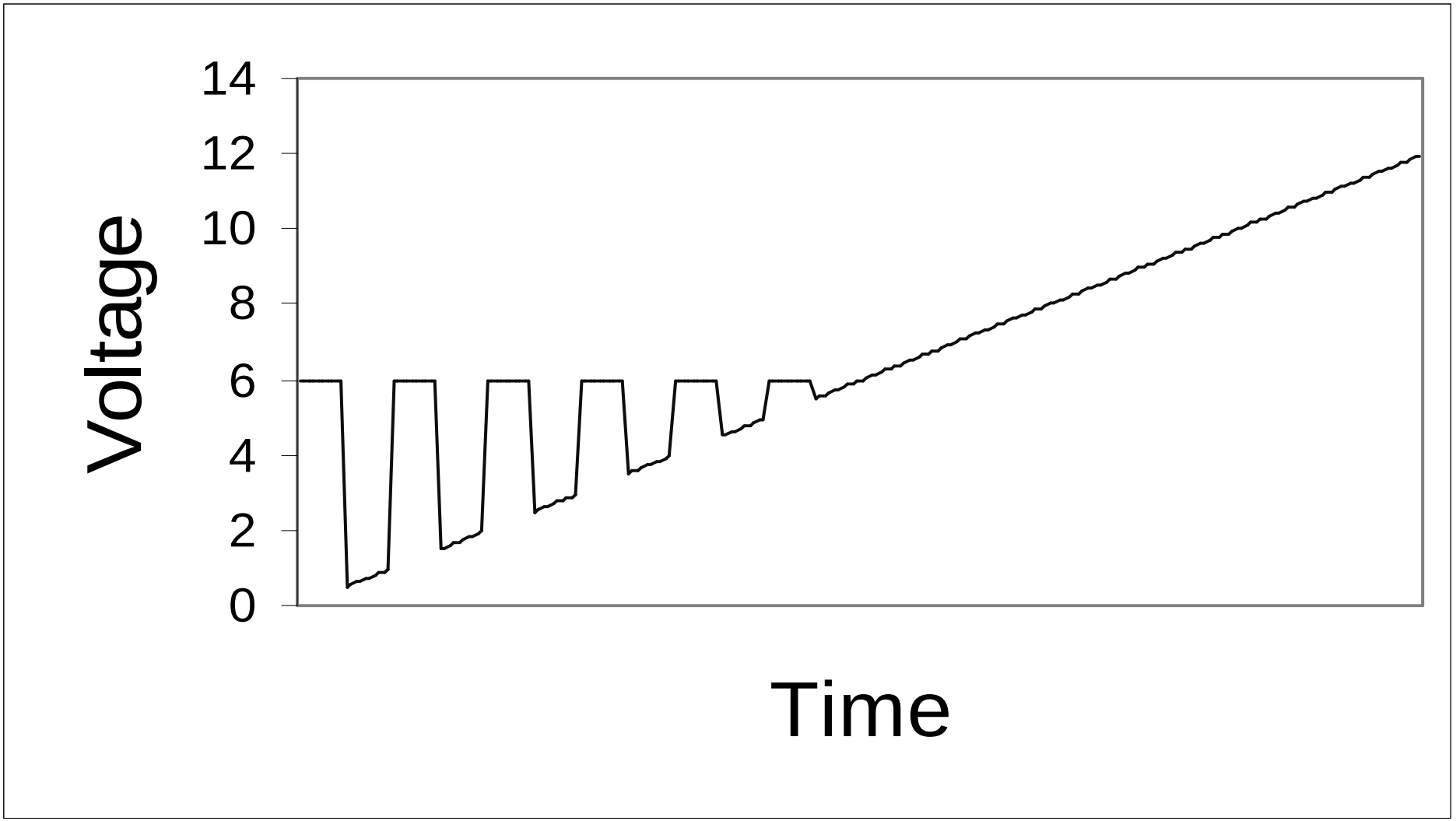
ARTICLE 9, Figure 1



ARTICLE 9, Figure 2



ARTICLE 9, Figure 3



ARTICLE 9, Figure 4