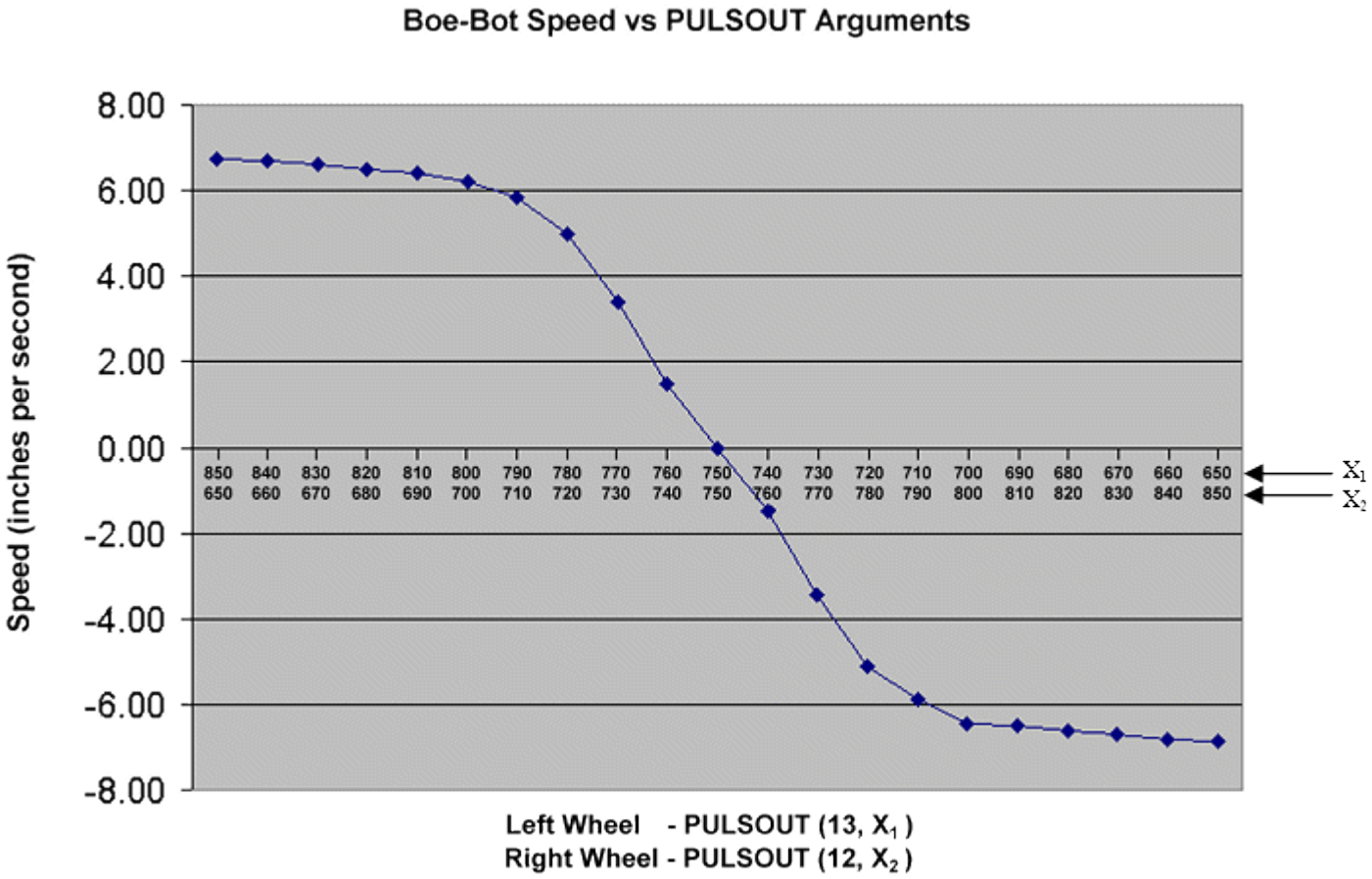
Lesson 4: Ramping Your Servos

The speed of the BOE-bot is modified by changing the frequency values in the **PULSOUT** command in PBASIC. However, both wheels must be synchronized, otherwise, the BOE-bot will not move in a straight line.

To keep both wheels of the BOE-bot synchronized, the **PULSOUT** values must add up to 1500.

The following table and accompanying graph should the result of a BOE-bot speed test for varying values of the **PULSOUT** command:

PULSOUT		distance (5s)	Speed (inch/s)
P13	P12		
850	650	33.75	6.75
840	660	33.50	6.70
830	670	33.00	6.60
820	680	32.50	6.50
810	690	32.00	6.40
800	700	31.00	6.20
790	710	29.25	5.85
780	720	25.00	5.00
770	730	17.00	3.40
760	740	7.50	1.50
750	750	0.00	0.00
740	760	-7.50	-1.50
730	770	-17.25	-3.45
720	780	-25.50	-5.10
710	790	-29.50	-5.90
700	800	-32.25	-6.45
690	810	-32.50	-6.50
680	820	-33.00	-6.60
670	830	-33.50	-6.70
660	840	-34.00	-6.80
650	850	-34.25	-6.85



Ramping

The abrupt starting and stopping motion of the BOE-bots is very hard on both the battery and the servo-motors. A more realistic simulation of vehicle movement must involve gradual acceleration (from a stationary position) and deceleration (from a moving position), much like an automobile. Gradual acceleration and deceleration is known as “ramping”.

Recall that full speed (forward) is achieved at P13 = 850 and P12 = 650, and a full stop is achieved at P13 = P12 = 750. Therefore, a ramping "up" (acceleration) or ramping "down" (deceleration) can be achieved in a simple loop where the loop control variable is added to / subtracted from the appropriate constant values:

```
' {$STAMP BS2}
' {$PBASIC 2.5}
' Ramping up
FOR X = 0 TO 100
  PULSOUT 13,
750 + X
  PULSOUT 12,
750 - X
  PAUSE
20
NEXT
```

```
' {$STAMP BS2}
' {$PBASIC 2.5}
' Ramping down
FOR X = 0 TO 100
  PULSOUT 13,
850 - X
  PULSOUT 12,
650 + X
  PAUSE
20
NEXT
```