Voltage Drop Calculation - Method Comparison and Validation

End Loaded Scenario **14 AWG wire**

n= 5 Sum (0 to n)= 15

Notification Appliance	Current (amperes) per cutsheets
Synch Module	0.025
15 cd strobe	0.06
30 cd strobe	0.095
75 cd strobe	0.157
75 cd strobe/horn	0.2
110 cd strobe/horn	0.23
Total:	0.767
Actual total:	**628 mA**

Circuit length from source to 1st device:	499 feet
Circuit length from 1st to last device:	1 feet
Resistance per 1000' per NEC:	3.07 ohms
Actual resistance per 1000':	3.2 ohms

Voltage drop (NFAC handbook):	**2.35469 volts DC**

Voltage drop (proposed formula):	**2.352806 volts DC**		
Panel voltage:	24.04 volts DC		**Measured Voltage Drop**
Actual voltage drop:	22.49 volts DC	Low to High Device Order	**1.55**
	22.87 volts DC	High to Low Device Order	**1.17**

Front Loaded Scenario **14 AWG wire**

n= 5 Sum (0 to n)= 15

Notification Appliance	Current (amperes) per cutsheets
Synch Module	0.025
15 cd strobe	0.06
30 cd strobe	0.095
75 cd strobe	0.157
75 cd strobe/horn	0.2
110 cd strobe/horn	0.23
Total:	0.767
Actual total:	**628 mA**

Circuit length from source to 1st device:	50 feet
Circuit length from 1st to last device:	450 feet
Resistance per 1000' per NEC:	3.07 ohms
Actual resistance per 1000':	3.2 ohms

Voltage drop per NFAC handbook:	**2.35469 volts DC**

Voltage drop per proposed formula:	**1.507002 volts DC**		
Panel voltage:	24.04 volts DC		**Measured Voltage Drop**
Actual voltage drop:	23.48 volts DC	Low to High Device Order	**0.56**
	23.78 volts DC	High to Low Device Order	**0.26**

Even Loaded Scenario **14 AWG wire**

n= 5 Sum (0 to n)= 15

Notification Appliance	Current (amperes) per cutsheets
Synch Module	0.025
15 cd strobe	0.06
30 cd strobe	0.095
75 cd strobe	0.157
75 cd strobe/horn	0.2
110 cd strobe/horn	0.23
Total:	0.767
Actual total:	**628mA**

Circuit length from source to 1st device:	100 feet
Circuit length from 1st to last device:	400 feet
Resistance per 1000' per NEC:	3.07 ohms
Actual resistance per 1000':	3.2 ohms

Voltage drop per NFAC handbook:	**2.35469 volts DC**

Voltage drop per proposed formula:	**1.601189 volts DC**		
Panel voltage:	24.04 volts DC		**Measured Voltage Drop**
Actual voltage drop:	22.93 volts DC	Low to High Device Order	**1.11**
	23.27 volts DC	High to Low Device Order	**0.77**

Middle Loaded Scenario **14 AWG wire**

n= 5 Sum (0 to n)= 15

Notification Appliance	Current (amperes) per cutsheets
Synch Module	0.025
15 cd strobe	0.06
30 cd strobe	0.095
75 cd strobe	0.157
75 cd strobe/horn	0.2
110 cd strobe/horn	0.23
Total:	0.767
Actual total:	**628 mA**

Circuit length from source to 1st device:	150 feet
Circuit length from 1st to last device:	350 feet
Resistance per 1000' per NEC:	3.07 ohms
Actual resistance per 1000':	3.2 ohms

Voltage drop per NFAC handbook:	**2.35469 volts DC**

Voltage drop per proposed formula:	**1.695377 volts DC**		
Panel voltage:	24.04 volts DC		**Measured Voltage Drop**
Actual voltage drop:	23.16 volts DC	Low to High Device Order	**0.88**
	23.42 volts DC	High to Low Device Order	**0.62**

Sum	n
1	1
3	2
6	3
10	4

15	5
21	6
28	7
36	8
45	9
55	10
66	11
78	12
91	13
105	14
120	15
136	16
153	17
171	18
190	19
210	20
231	21
253	22
276	23
300	24
325	25
351	26
378	27
406	28
435	29
465	30