12 GA Voltage Drop EXAMPLE Using a 24 volt Multitap Transformer

CABLE LENGTH IN FEET

WATTAGE LOAD	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	120'	140'	160'	180'	200'	250'	300'
5	0.01	0.02	0.03	0.04	0.06	0.07	0.08	0.09	0.10	0.11	0.13	0.16	0.18	0.20	0.22	0.28	0.33
10	0.02	0.04	0.07	0.09	0.11	0.13	0.16	0.18	0.20	0.22	0.27	0.31	0.36	**0.40**	**0.44**	**0.56**	**0.67**
15	0.03	0.07	0.10	0.13	0.17	0.20	0.23	0.27	0.30	0.33	0.40	**0.47**	**0.53**	**0.60**	**0.67**	**0.83**	**1.00**
20	0.04	0.09	0.13	0.18	0.22	0.27	0.31	0.36	0.40	0.44	**0.53**	**0.62**	**0.71**	**0.80**	**0.89**	**1.11**	**1.33**
25	0.06	0.11	0.17	0.22	0.28	0.33	0.39	0.44	**0.50**	**0.56**	**0.67**	**0.78**	**0.89**	**1.00**	**1.11**	**1.39**	**1.67**
30	0.07	0.13	0.20	0.27	0.33	0.40	0.47	**0.53**	**0.60**	**0.67**	**0.80**	**0.93**	**1.07**	**1.20**	**1.33**	**1.67**	**2.00**
35	0.08	0.16	0.23	0.31	0.39	0.47	**0.54**	**0.62**	**0.70**	**0.78**	**0.93**	**1.09**	**1.24**	**1.40**	**1.56**	**1.94**	**2.33**
40	0.09	0.18	0.27	0.36	0.44	**0.53**	**0.62**	**0.71**	**0.80**	**0.89**	**1.07**	**1.24**	**1.42**	**1.60**	**1.78**	**2.22**	2.67
45	0.10	0.20	0.30	0.40	**0.50**	**0.60**	**0.70**	**0.80**	**0.90**	**1.00**	**1.20**	**1.40**	**1.60**	**1.80**	**2.00**	**2.50**	3.00
50	0.11	0.22	0.33	0.44	**0.56**	**0.67**	**0.78**	**0.89**	**1.00**	**1.11**	**1.33**	**1.56**	**1.78**	**2.00**	**2.22**	2.78	3.33
55	0.12	0.24	0.37	0.49	**0.61**	**0.73**	**0.86**	**0.98**	**1.10**	**1.22**	**1.47**	**1.71**	**1.96**	**2.20**	**2.44**	3.06	3.67
60	0.13	0.27	0.40	**0.53**	**0.67**	**0.80**	**0.93**	**1.07**	**1.20**	**1.33**	**1.60**	**1.87**	**2.13**	**2.40**	**2.67**	3.33	4.00
65	0.14	0.29	0.43	**0.58**	**0.72**	**0.87**	**1.01**	**1.16**	**1.30**	**1.44**	**1.73**	**2.02**	**2.31**	2.60	**2.89**	3.61	4.33
70	0.16	0.31	0.47	**0.62**	**0.78**	**0.93**	**1.09**	**1.24**	**1.40**	**1.56**	**1.87**	**2.18**	**2.49**	2.80	**3.11**	3.89	4.67
75	0.17	0.33	**0.50**	**0.67**	**0.83**	**1.00**	**1.17**	**1.33**	**1.50**	**1.67**	**2.00**	**2.33**	2.67	3.00	**3.33**	4.17	5.00
80	0.18	0.36	**0.53**	**0.71**	**0.89**	**1.07**	**1.24**	**1.42**	**1.60**	**1.78**	**2.13**	**2.49**	2.84	3.20	**3.56**	4.44	5.33
85	0.19	0.38	**0.57**	**0.76**	**0.94**	**1.13**	**1.32**	**1.51**	**1.70**	**1.89**	**2.27**	2.64	3.02	3.40	**3.78**	4.72	5.67
90	0.20	0.40	**0.60**	**0.80**	**1.00**	**1.20**	**1.40**	**1.60**	**1.80**	**2.00**	**2.40**	2.80	3.20	3.60	**4.00**	5.00	6.00
95	0.21	0.42	**0.63**	**0.84**	**1.06**	**1.27**	**1.48**	**1.69**	**1.90**	**2.11**	**2.53**	2.96	3.38	3.80	**4.22**	5.28	6.33
100	0.22	0.44	**0.67**	**0.89**	**1.11**	**1.33**	**1.56**	**1.78**	**2.00**	**2.22**	2.67	3.11	3.56	4.00	**4.44**	5.56	6.67
110	0.24	**0.49**	**0.73**	**0.98**	**1.22**	**1.47**	**1.71**	**1.96**	**2.20**	**2.44**	2.93	3.42	3.91	4.40	**4.89**	6.11	7.33
120	0.27	**0.53**	**0.80**	**1.07**	**1.33**	**1.60**	**1.87**	**2.13**	**2.40**	2.67	3.20	3.73	4.27	4.80	**5.33**	6.67	8.00
130	0.29	**0.58**	**0.87**	**1.16**	**1.44**	**1.73**	**2.02**	**2.31**	2.60	2.89	3.47	4.04	4.62	5.20	**5.78**	7.22	8.67
140	0.31	**0.62**	**0.93**	**1.24**	**1.56**	**1.87**	**2.18**	**2.49**	2.80	3.11	3.73	4.36	4.98	5.60	**6.22**	7.78	9.33
150	0.33	**0.67**	**1.00**	**1.33**	**1.67**	**2.00**	**2.33**	2.67	3.00	3.33	4.00	4.67	5.33	6.00	**6.67**	8.33	10.00
160	0.36	**0.71**	**1.07**	**1.42**	**1.78**	**2.13**	**2.49**	2.84	3.20	3.56	4.27	4.98	5.69	6.40	**7.11**	8.89	10.67
170	0.38	**0.76**	**1.13**	**1.51**	**1.89**	**2.27**	2.64	3.02	3.40	3.78	4.53	5.29	6.04	6.80	**7.56**	9.44	11.33
180	0.40	**0.80**	**1.20**	**1.60**	**2.00**	**2.40**	2.80	3.20	3.60	4.00	4.80	5.60	6.40	7.20	**8.00**	10.00	12.00
190	0.42	**0.84**	**1.27**	**1.69**	**2.11**	**2.53**	2.96	3.38	3.80	4.22	5.07	5.91	6.76	7.60	**8.44**	10.56	12.67
200	0.44	**0.89**	**1.33**	**1.78**	**2.22**	2.67	3.11	3.56	4.00	4.44	5.33	6.22	7.11	8.00	**8.89**	11.11	13.33
250	0.56	**1.11**	**1.67**	**2.22**	2.78	3.33	3.89	4.44	5.00	5.56	6.67	7.78	8.89	10.00	**11.11**	13.89	16.67
300	0.67	**1.33**	**2.00**	2.67	3.33	4.00	4.67	5.33	6.00	6.67	8.00	9.33	10.67	12.00	**13.33**	16.67	20.00

3.) This is what the voltage loss will be when all of the lamps have burned out except the last 20 watt fixture. If you started out on a 24 volt tap initially to compensate for the voltage loss incurred by the 300 watt initial load the you now have around 23 volts at the last lamp! The FX fixture line is not rated to run at over 12 volts because of the risk of fire.

2.) Use this column to see how the voltage drop decreases as the lamp load decreases thereby increasing the voltage to the remaining lamps on the line. Ex: At this point there is 80 watts of lamps left operating so 24-3.56=20.44 volts is being supplied to the remaining lamps!!

1.) In this example we start out with a 300 watt load with a 200' run. In order to compensate for the excessive voltage load there are some who would suggest instead of lowering the load per cable or upsizing the cable simply use an excessive voltage transformer such as a 24 volt mutitap model. In this example a 24 volt tap is used (24-13.33= 10.67 volts) This is a very bad idea because as the lamps burn out the remaining lamps receive increased voltage causing the remaining lamps to burn out quickly further increasing the voltage on the run. At some point the fixtures might overheat and start a fire because they are receiving far in excess of their design voltage.

- How to use this Matrix: Find the load and length of the planned run. In the intersecting box is the voltage drop for that section of cable.
- To find the total voltage drop of a run, add up the individual sections voltage drop (from transformer to 1st lite + 1st lite to 2nd lite + 2nd to 3rd + etc).
- The goal is to have the voltage drop at any light on the run be within the white zone — you should loose at least .50 volts but no more than 2.50 volts to have the system perform safely and properly. Low voltage lamps are designed to operate between 10.5 - 11.5 volts. Use the voltage tap on the PX transformer that will provide each lamp 10.5 - 11.5 volts.

NOTE: Shaded Areas Not Recommended. Use Next Gauge Cable Size or Increase/Reduce Load.