



D/DX/DU SERIES DIGITAL CLOCK WIRE CALCULATIONS

D/DX/DU Series Digital Clock Wire Calculations

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Appendix

This manual identifies a few wiring layout schemes only. The use of other wiring layout schemes can be employed; however, manual mathematic calculation would be required.

Although the wire run tables indicate distances greater than 4000 feet, National Time and Signal does not recommended clock wire runs in excess of 4000 feet.

Although care was taken to provide accurate wiring distances National Time and Signal resumes no responsibility for errors or omissions.

D/DX/DU Series Digital Clock Wire Calculations

1 D/DX/DU Series Wiring Installation Distance Charts

1.1 Identifying Parameters for Appropriate D Series Wire Charts Selection

A series of parameters must be identified before selecting the appropriate wire chart. These parameters are identified in this section.

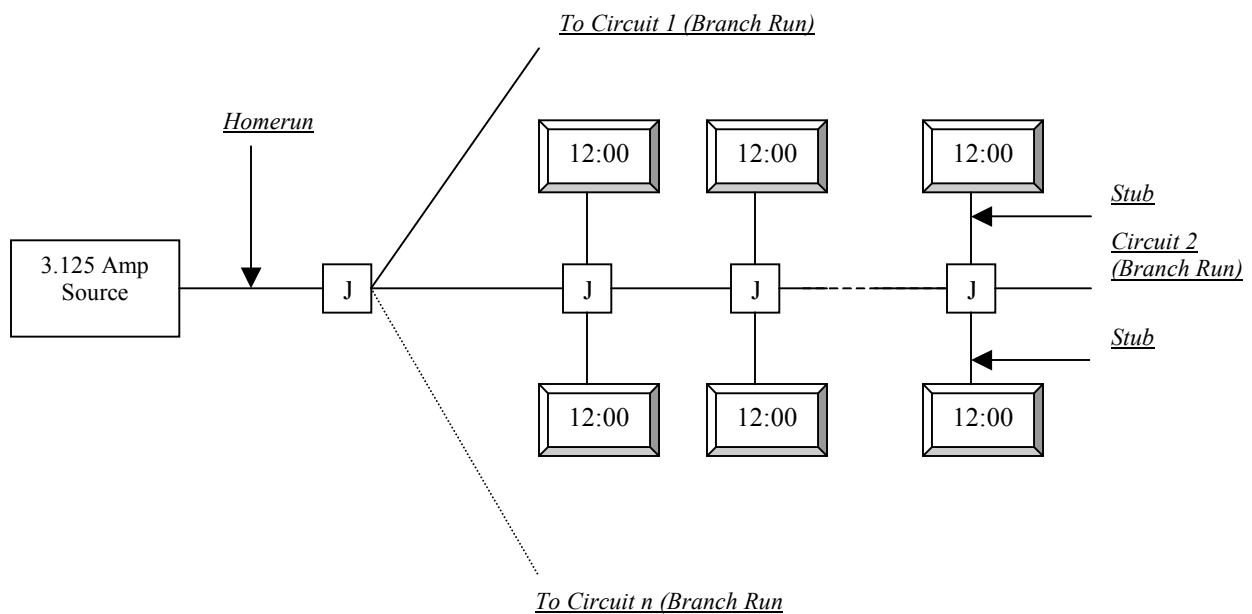


Figure 1 - Composite D Series Wiring Installation Layout

1.1.1 Identify the location of the D Series Power Source

The D Series wire run charts requires a dedicated 3.125 Amp power source powering one or more Branch Run circuits of D Series clocks. Each D Series chart identifies the maximum number of clocks that can be power from the dedicated 3.125 Amp source.

1.1.2 Identify the Start of the Branch Run circuits for the D Series clocks

The D Series wire run charts requires that the D Series clocks be evenly distributed on the Branch Run circuit.

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1.1.3 Identify if a Homerun Circuit Calculation is required

If the Branch Run circuits originate at the power source, then a Homerun circuit calculation is not required.

If the Branch Run circuits originate at a Terminal Junction Box or junction point away from power source, then a Homerun circuit calculation is required.

1.1.4 Identify the number and type of D Series clocks on the Branch Run

To determine the appropriate chart and chart parameters, identify the number and type of D Series clocks that are on the Branch Run.

1.1.5 Identify the Stub length for the D Series clocks

The Stub wire distance is the distance the D Series clock is from the Branch Run. The charts assume that a maximum of two D Series singles can be wired on the Stub Wire run. Count two D Series for corridor clocks.

1.2 How to use the Wire Chart

Information identified in section 1.1 allows for proper Wire chart selection. Wire chart selection is based D Series clock type and if a Homerun is required. The Branch Run wire charts assume that the D Series clocks are evenly distributed.

1.2.1 Branch Run(s) Originate at the Power Source (Homerun Not Required)

Step 1: Determine each Branch Run length, accounting for any extra routing requirements (i.e. around duct work).

Step 2: Select Branch Run wiring chart that does not identify a Homerun Circuit for the D Series clocks on the Branch Run.

Step 3: From the Branch Run chart select from the left hand column the number of (single face) D Series clocks on the Branch Run. Then at the top of the chart select the number of double face D Series clocks (or equivalent) on the Branch Run. At the intersection of the column and row is identified the total Branch Run distance for the various wire gauges.

Step 4: Determine each stub length, accounting for any extra routing requirements (i.e. around duct work).

Step 5: Determine the number of clocks on each Stub. (Count 2 clocks for double face clocks.)

Step 6: From the Stub wire run chart select from the left hand column the number of D Series clocks on each Stub. At the intersection of the clock count and various wire gauges is the maximum Stub distance for each wire gauge.

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1.2.2 Branch Run Originate at the Terminal Junction Box (Homerun Required)

- Step 1:** Determine the total Homerun length, accounting for any extra routing requirements (i.e. around duct work).
- Step 2:** Select the Homerun wiring chart for the D Series clocks on the associated Branch Run circuits connected to the Homerun.
- Step 3:** From the Homerun wire run chart select from the left hand column the number of D Series clocks connected to the Homerun. At the intersection of the clock count and various wire gauges is the maximum Homerun distance for each wire gauge.
- Step 4:** Determine the total Branch Run length, accounting for any extra routing requirements (i.e. around duct work).
- Step 5:** Select Branch Run wiring chart that identifies a Homerun Circuit for the D Series clocks on the Branch Run.
- Step 6:** From the Branch Run chart select from the left hand column the number of (single face) D Series clocks on the Branch Run. Then at the top of the chart select the number of double face D Series clocks (or equivalent) on the Branch Run. At the intersection of the column and row is identified the total Branch Run distance for the various wire gauges.
- Step 7:** Determine each stub length, accounting for any extra routing requirements (i.e. around duct work).
- Step 8:** Determine the number of clocks on each Stub. (Count 2 clocks for double face clocks.)
- Step 9:** From the Stub wire run chart select from the left hand column the number of D Series clocks on the Stub. (Count 2 clocks for double face clocks.) At the intersection of the clock count and various wire gauges is the maximum Stub distance for each wire gauge.

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1.3 An example, on how to use the D225 Series Charts.

A school hallway has 15 classrooms on each side of the hallway (i.e. 30 classrooms in total). Each classroom is 30 feet in length. There is a D225 clock in each room. The PS-3 clock power supply (or 3.125 Amp circuit) is located at the start of the hallway. What is the recommended clock-wiring layout? What gauge wire can be used?

There is a couple of scenarios available depending on the building structure (i.e. drop ceilings, walls etc). Below describes a few possible Layout scenarios, including how to determine wire run distance and wire gauge.

1.3.1 D225 Installation Layout Scenario 1

- Hallway branch run with classroom wire stubs
- D225 clocks in front of classroom

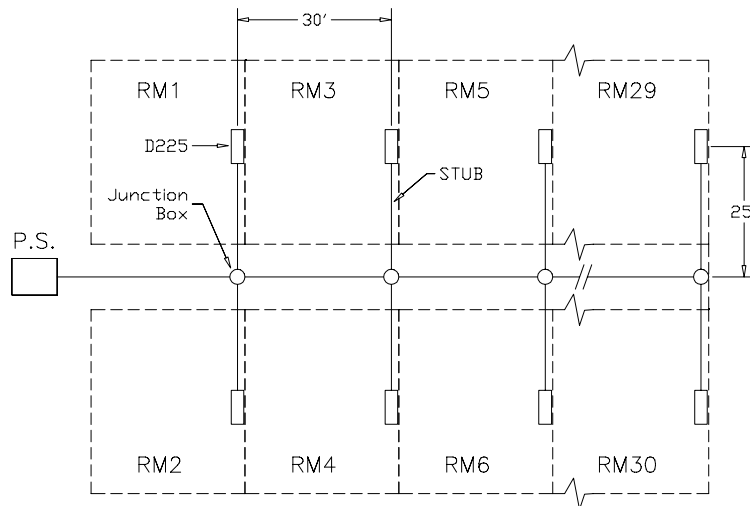


Figure 2 - Scenario 1 Wire Run Layout

D/DX/DU Series Digital Clock Wire Calculations

1.3.1.1 Determining Wire and Wire Gauge for Layout 1

Step 1

Determine where the branch run of the circuit can be installed. In this example, the wire can be installed above the hallway ceiling. Determine the total branch run length of the circuit. The total branch run is (15 classrooms x 30 feet) 450 feet. In this example, the branch run has to route around ductwork and a drop in the hallway ceiling, this adds 20 feet to the branch run. Therefore, the installed branch run is (450 feet + 20 feet) 470 feet in length.

Step 2

Select the appropriate Table, in this example Table 1 is used.

Step 3

Using the D225 wire run table, find the following: Find the range of D225 clocks that fall into 30 clocks used on this hallway branch run. In this example, the field wiring is arranged as if 15 corridor clocks existed, therefore use 15 corridor clock count number. Find the column that indicates zero D225 (single) clocks used. **From the D225 chart, 18-gauge wire (562 feet) will allow the branch run to meet the total branch run requirement of 470 feet.**

Step 4

Determine the wire run distance of wire stub. In this example, the D225 is located in the middle of the classroom at the front of the classroom. The stub runs a total distance 25 feet from junction box to the D225 clock.

Step 5

Determine the number of clocks on each wire run stub. In this example, a wire stub will have one D225 clock on each stub originating from the junction box in the hallway between the two classrooms.

Step 6

Using the D225 Stub wire run table, (Table 2) finds the following: Find the row that represents the number of D225 clocks on the stub. In this example, use the 1-clock count number. **From the D225 stub wire chart, 18-gauge wire (244 feet) will allow the stub wire run to meet the total stub wire run requirement of 25 feet.**

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1.3.2 D225 Installation Layout Scenario 2a

- One circuit (branch run) is used. The (branch run) circuit runs through the center of the classroom on one side of the hallway and returns down the center of the classroom on the other side of the hallway.
- The (branch run) circuit is above the classroom ceiling with stubs down to D225 classroom clock
- D225 clocks in front of classroom

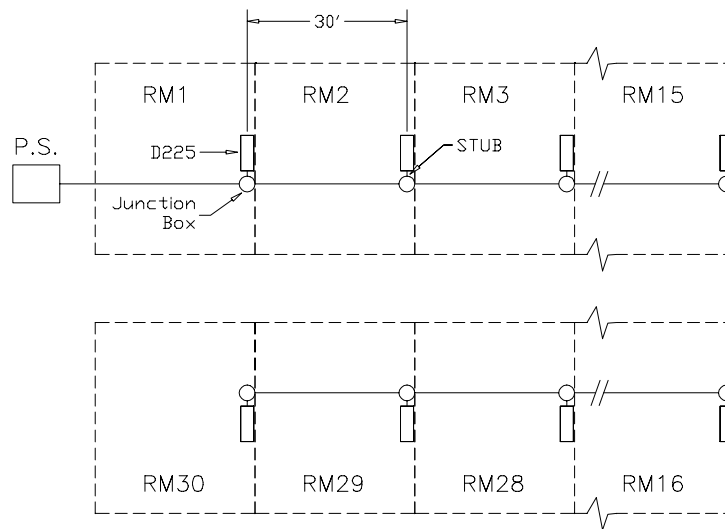


Figure 3 - Scenario 2a Wire Run Layout

1.3.2.1 Determining Wire and Wire Gauge for Layout 2a

Step 1

Determine where the branch run of the circuit can be installed. In this example, the wire can be installed above the classroom ceiling through the 30 classrooms. There will be one circuit used. The circuit will run down the center of all classrooms on one side of the hallway and back up the center of the classrooms on the other side of the hallway. Determine the total branch run length of the circuit. The total branch run is (30 classrooms x 30 feet) 900 feet. In this example, the branch run has to route around ductwork, across the end of the hallway and a drop in the hallway ceiling, this adds 50 feet to the branch run. Therefore, the installed branch run is (900 feet + 50 feet) 950 feet in length.

Step 2

Select the appropriate Table, in this example Table 1 is used.

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Step 3

Using the D225 wire run table (Table 1), find the following: Find the range of D225 clocks that fall into 30 clocks used on each branch run. In this example, use the 30-clock count number. Find the column that indicates zero D225 corridor clocks used. In this example, there are no D225 corridors clocks used. **From the D225 chart, 16-gauge wire (950 feet) will allow the branch run to meet the total branch run requirement of 950 feet.**

Step 4

In this example, the D225 is located in the middle of the classroom at the front of the classroom two feet from the top of the ceiling. This stub distance is 2 feet.

Step 5

Determine the number of clocks on each wire run stub. In this example, a wire stub will have one D225 clock on each stub originating from the junction box above the classroom ceiling.

Step 6

Using the D225 Stub wire run table (Table 2), finds the following: Find the row that represents the number of D225 clocks on the stub. In this example, use the 1-clock count number. **From the D225 stub wire chart, 18-gauge wire (244 feet) will allow the stub wire run to meet the total stub run requirement of 2 feet.**

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1.3.3 D225 Installation Layout Scenario 2b

- Figure 2b is a simple deviation from the wiring layout of Figure 2a. In Figure 2b, two circuits originate from the power supply as opposed to a single circuit loop used in Figure 2a. In this Figure 2b scenario, the branch run circuit wire gauge can be further reduced to 18 gauge.
- Two circuits are used, one Branch Run circuit for each side of the hallway.
- The Branch Run is above the classroom ceiling with stubs down to D225 classroom clock
- D225 clocks in front of classroom

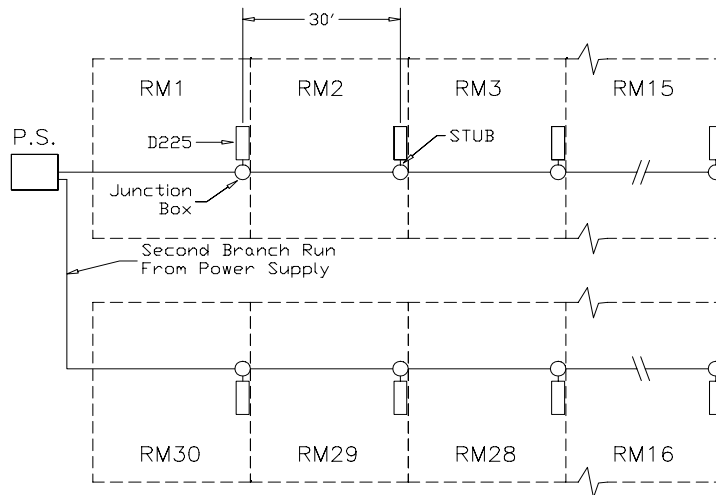


Figure 4 - Scenario 2b Wire Run Layout

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1.3.3.1 Determining Wire and Wire Gauge for Layout 2b

Step 1

•
•
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Step 2

Using the D225 wire run table (Table 1), find the following: Find the range of D225 clocks that fall into 15 clocks used on each branch run. In this example, use the 15-clock count number. Find the column that indicates zero D225 corridor clocks used. This example uses no D225 corridors clocks used. **From the D225 chart, 18-gauge wire (1124 feet) will allow the branch run to meet the total branch run requirement of 470 feet.**

•
•
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Step 6

Using the D225 Stub wire run table (Table 2), finds the following: Find the row that represents the number of D225 clocks on the stub. In this example, use the 1-clock count number. **From the D225 stub wire chart, 18-gauge wire (244 feet) will allow the stub wire run to meet the total stub run requirement of 2 feet.**

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1.4 An example, on how to use the D225 Series Charts with a Homerun.

A school hallway has 15 classrooms on each side of the hallway (i.e. 30 classrooms in total). Each classroom is 30 feet in length. There is a D225 clock in each room. The PS-3 clock power supply (or 3.125 Amp circuit) is located 175 feet from the start of the hallway. What is the recommended clock-wiring layout? What gauge wire can be used?

There is a couple of scenarios available depending on the building structure (i.e. drop ceilings, walls etc). Below describes the recommended Layout scenario, including how to determine wire run distance and wire gauge.

1.4.1 D225 Installation Layout Scenario with a Homerun Circuit

- PS-3 clock power supply is located at the National Time Master Clock Control Panel in the Maintenance Office.
- At the start of the hallway, two Branch Run circuits are installed, one Branch Run circuit for each side of the hallway.
- The Branch Run is above the classroom ceiling with stubs down to D225 classroom clock
- D225 clocks in front of classroom

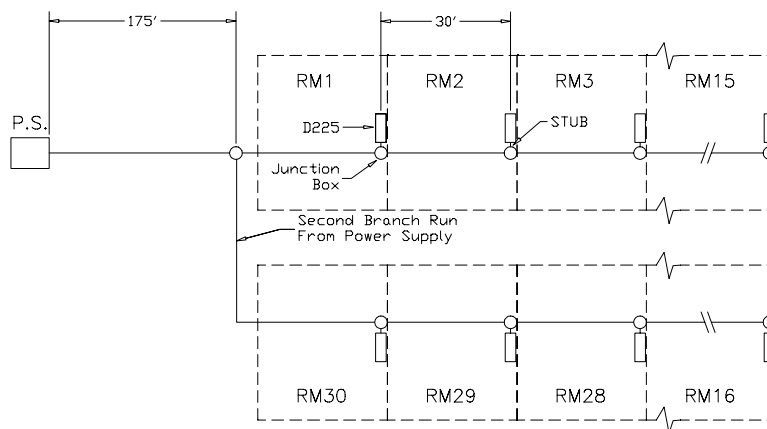


Figure 5- Layout Scenario c/w Homerun

D/DX/DU Series Digital Clock Wire Calculations

1.4.1.1 Determining Wire and Wire Gauge for Layout with a Homerun

Step 1

Determine where the Homerun circuit can be installed. In this example, the Homerun wire travels from the Maintenance Office, through the Maintenance shop and the Boiler room to the start of the hallway where the Classroom clocks are located. This covers a total distance of 175 feet.

Step 2

Select the appropriate Homerun Table, in this example Table 9 is used.

Step 3

The number of D225 clocks connected to the Homerun is 30 clocks. **From the D225 Homerun chart, 16-gauge wire (189 feet) will allow the Homerun to meet the total Homerun requirement of 175 feet.**

Step 4

Determine where the branch run of the circuit can be installed. In this example, the Branch run wire will be installed above the classroom ceiling on each side of the hallway. There will be two circuits used. The circuit will run down the center of all classrooms on one side of the hallway and the other Branch run circuit will run down the center of the classrooms on the other side of the hallway. Determine the total branch run length of each circuit. The total branch run is (15 classrooms x 30 feet) 450 feet. In this example, the branch run has to route around ductwork and a drop in the hallway ceiling, this adds 20 feet to each branch run. Therefore, the installed branch run is (450 feet + 20 feet) 470 feet in length.

Step 5

Table 10 identifies Branch Run wiring distance when D225 Series clocks are used.

Step 6

Using the D225 wire run table (Table 10), find the following: Find the range of D225 clocks that fall into 15 clocks used on each branch run. In this example, use the 15-clock count number. Find the column that indicates zero D225 corridor clocks used. This example uses no D225 corridors clocks used. **From the D225 chart, 18-gauge wire (663 feet) will allow the branch run to meet the total branch run requirement of 470 feet.**

Step 7

The stub wire runs 3 feet from the Branch Run above the classroom ceiling to the D225 clock mount two feet from the ceiling.

Step 8

There is a single D225 clock on the wiring stub in this example.

Step 9

Using the D225 Stub wire run table (Table 11), finds the following: Find the row that represents the number of D225 clocks on the stub. In this example, use the 1-clock count number. **From the D225 stub wire chart, 18-gauge wire (244 feet) will allow the stub wire run to meet the total stub run requirement of 3 feet.**

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1.5 D Series Wire Chart Tables

No. Of D225 Clocks on Circuit	Number of D225 Double Face or D400 Single Face Clocks on a circuit							
	20	15	10	5	2	1	0	
45	-	-	-	-	-	-	1617	12 Gauge
	-	-	-	-	-	-	1035	14 Gauge
	-	-	-	-	-	-	647	16 Gauge
	-	-	-	-	-	-	404	18 Gauge
40	-	-	-	-	1541	1659	1809	12 Gauge
	-	-	-	-	986	1062	1158	14 Gauge
	-	-	-	-	616	664	724	16 Gauge
	-	-	-	-	385	415	452	18 Gauge
35	-	-	-	1430	1719	1863	2057	12 Gauge
	-	-	-	915	1100	1192	1316	14 Gauge
	-	-	-	572	688	745	823	16 Gauge
	-	-	-	358	430	466	514	18 Gauge
30	-	-	-	1590	1938	2119	2374	12 Gauge
	-	-	-	1018	1240	1356	1519	14 Gauge
	-	-	-	636	775	847	950	16 Gauge
	-	-	-	398	484	530	594	18 Gauge
25	-	-	1388	1785	2246	2483	2818	12 Gauge
	-	-	888	1142	1437	1589	1804	14 Gauge
	-	-	555	714	898	993	1127	16 Gauge
	-	-	347	446	561	621	705	18 Gauge
20	-	-	1562	2057	2634	2960	3447	12 Gauge
	-	-	999	1316	1686	1895	2206	14 Gauge
	-	-	625	823	1054	1184	1379	16 Gauge
	-	-	390	514	659	740	862	18 Gauge
15	-	1430	1785	2575	3247	3741	4494	12 Gauge
	-	915	1142	1648	2078	2394	2876	14 Gauge
	-	572	714	1030	1299	1497	1798	16 Gauge
	-	358	446	644	812	935	1124	18 Gauge
10	-	1638	2120	2990	4162	4919	6360	12 Gauge
	-	1048	1357	1913	2664	3148	4071	14 Gauge
	-	655	848	1196	1665	1968	2544	16 Gauge
	-	409	530	747	1041	1230	1590	18 Gauge
5	1532	1915	2575	3986	6136	7726	11426	12 Gauge
	980	1226	1648	2551	3927	4945	7313	14 Gauge
	613	766	1030	1595	2454	3090	4570	16 Gauge
	383	479	644	997	1534	1932	2856	18 Gauge
2	1687	2178	3047	5078	8633	11426	19043	12 Gauge
	1079	1394	1950	3250	5525	7313	12188	14 Gauge
	675	871	1219	2031	3453	4570	7617	16 Gauge
	422	545	762	1270	2158	2856	4761	18 Gauge
1	1728	2248	3192	5540	10359	15234	38086	12 Gauge
	1106	1439	2043	3545	6630	9750	24375	14 Gauge
	691	899	1277	2216	4144	6094	15234	16 Gauge
	432	562	798	1385	2590	3809	9521	18 Gauge
0	1723	2247	3180	5713	9521	19043	-	12 Gauge
	1103	1438	2035	3656	6094	12188	-	14 Gauge
	689	899	1272	2285	3809	7617	-	16 Gauge
	431	562	795	1428	2380	4761	-	18 Gauge

Table 1 - D225 Branch Run Wire Chart (Feet)

Number of D225 Clocks on Stub	18 Gauge	16 Gauge	14 Gauge	12 Gauge
2	146	234	375	586
1	244	391	625	977

Table 2 - D225 Stub Wire Chart (Feet)

Notes:

- The maximum number of D225 clocks on a PS-3 Series Power supply is 45.
- Other power supplies may be used, however, the maximum number of D225 clocks on a circuit must not exceed 45 per above tables. Forty-five D225 clocks require a minimum of 3.125 Amps of 24 VAC power per circuit.
- The above table reflects evenly distributed D225 Series clocks.

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Number of DX225 Clocks on Circuit	Number of DX/DU225 Double Face Clocks on Circuit						
	15	10	5	2	1	0	
35	-	-	-	-	-	1595	12 Gauge
	-	-	-	-	-	1021	14 Gauge
	-	-	-	-	-	638	16 Gauge
	-	-	-	-	-	399	18 Gauge
30	-	-	-	1503	1643	1842	12 Gauge
	-	-	-	962	1052	1179	14 Gauge
	-	-	-	601	657	737	16 Gauge
	-	-	-	376	411	460	18 Gauge
25	-	-	1384	1742	1926	2186	12 Gauge
	-	-	886	1115	1233	1399	14 Gauge
	-	-	554	697	770	875	16 Gauge
	-	-	346	436	481	547	18 Gauge
20	-	-	1595	2044	2296	2674	12 Gauge
	-	-	1021	1308	1470	1711	14 Gauge
	-	-	638	817	919	1070	16 Gauge
	-	-	399	511	574	668	18 Gauge
15	-	1384	1891	2519	2902	3486	12 Gauge
	-	886	1210	1612	1858	2231	14 Gauge
	-	554	756	1008	1161	1395	16 Gauge
	-	346	473	630	726	872	18 Gauge
10	-	1645	2319	3229	3816	4934	12 Gauge
	-	1053	1484	2066	2442	3158	14 Gauge
	-	658	928	1292	1527	1974	16 Gauge
	-	411	580	807	954	1234	18 Gauge
5	1486	1997	3092	4760	5994	8864	12 Gauge
	951	1278	1979	3046	3836	5673	14 Gauge
	594	799	1237	1904	2397	3545	16 Gauge
	371	499	773	1190	1498	2216	18 Gauge
2	1690	2364	3939	6697	8864	14773	12 Gauge
	1081	1513	2521	4286	5673	9455	14 Gauge
	676	945	1576	2679	3545	5909	16 Gauge
	422	591	985	1674	2216	3693	18 Gauge
1	1744	2476	4298	8036	11818	29545	12 Gauge
	1116	1585	2750	5143	7564	18909	14 Gauge
	698	990	1791	3215	4727	11818	16 Gauge
	436	619	1074	2009	2955	3693	18 Gauge
0	1743	2467	4432	7386	14773	-	12 Gauge
	1116	1579	2836	4727	9455	-	14 Gauge
	697	987	1773	2955	5909	-	16 Gauge
	436	617	1108	1847	3693	-	18 Gauge

Table 3 - DX/DU225 Branch Run Wire Chart (Feet)

Number of DX225/DU225 Clocks on Stub	18 Gauge	16 Gauge	14 Gauge	12 Gauge
2	95	152	242	379
1	189	303	485	758

Table 4 - DX225/DU225 Stub Wire Distance Chart (Feet)

Notes:

- The maximum number of DX/DU225 clocks on a PS-3 Series Power supply is 35.
- The DX/DU225 are factory set for a brightness level of 4. The above table reflects an average field adjusted brightness level of 6, for evenly distributed DX/DU225 Series clocks.
- If the DX/DU225 brightness level settings is not being altered from the factory setting and hence, the DX/DU225 series is only being used for 3 or 4 wire operation (DU225 only) or for the auto-dim feature, then the D225 wire chart can be used.
- The DU225 supports 3 and 4 wire operation and hence a reset circuit feed.

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No. Of D400 Clocks on Circuit	Number of D400 Double Face Clocks on Circuit					
	10	5	2	1	0	
25	-	-	-	-	1841	12 Gauge
	-	-	-	-	1178	14 Gauge
	-	-	-	-	736	16 Gauge
	-	-	-	-	460	18 Gauge
20	-	-	1720	1933	2251	12 Gauge
	-	-	1101	1237	1441	14 Gauge
	-	-	688	773	900	16 Gauge
	-	-	430	483	563	18 Gauge
15	-	1681	2121	2443	2935	12 Gauge
	-	1076	1357	1564	1878	14 Gauge
	-	673	848	977	1174	16 Gauge
	-	420	530	611	734	18 Gauge
10	-	1952	1990	2085	4154	12 Gauge
	-	1250	1273	1334	2658	14 Gauge
	-	781	796	834	1661	16 Gauge
	-	488	497	521	1038	18 Gauge
5	1681	2603	4007	5046	7462	12 Gauge
	1076	1666	2565	3229	4776	14 Gauge
	673	1041	1603	2018	2985	16 Gauge
	420	651	1002	1261	1865	18 Gauge
2	1990	3316	5638	7462	12436	12 Gauge
	1273	2122	3608	4776	7959	14 Gauge
	796	1327	2255	2985	4974	16 Gauge
	497	829	1409	1865	3109	18 Gauge
1	2085	3618	6765	9949	24872	12 Gauge
	1334	2315	4330	6367	15918	14 Gauge
	834	1447	2706	3980	9949	16 Gauge
	521	904	1691	2487	6218	18 Gauge
0	2077	3731	6218	12436	-	12 Gauge
	1329	2388	3980	7959	-	14 Gauge
	831	1492	2487	4974	-	16 Gauge
	519	933	1555	3109	-	18 Gauge

Table 5 - D400 Branch Run Wire Chart (Feet)

Number of D400 Clocks on Stub	18 Gauge	16 Gauge	14 Gauge	12 Gauge
2	40	64	102	159
1	80	128	204	319

Table 6 - D400 Stub Wire Chart (Feet)

Notes:

- The maximum number of D400 clocks on a PS-3 Series Power supply is 25.
- Other power supplies may be used, however, the maximum number of D400 clocks on a circuit must not exceed 25 per above tables. Twenty-five D400 clocks require a minimum of 3.125 Amps of 24 VAC power per circuit.
- The above table reflects evenly distributed D400 Series clocks.

D/DX/DU Series Digital Clock Wire Calculations

No. Of DX/DU400 Clocks on Circuit	No. of DX/DU400 Double Face Clocks on Circuit					
	10	5	2	1	0	
20	-	-	-	-	1697	12 Gauge
	-	-	-	-	1086	14 Gauge
	-	-	-	-	679	16 Gauge
	-	-	-	-	424	18 Gauge
15	-	-	1599	1842	2213	12 Gauge
	-	-	1023	1179	1416	14 Gauge
	-	-	639	737	885	16 Gauge
	-	-	400	460	553	18 Gauge
10	-	1472	2049	2422	3131	12 Gauge
	-	942	1311	1550	2004	14 Gauge
	-	589	820	969	1253	16 Gauge
	-	368	512	605	783	18 Gauge
5	-	1963	3021	3804	5625	12 Gauge
	-	1256	1933	2434	3600	14 Gauge
	-	785	1208	1521	2250	16 Gauge
	-	491	755	951	1406	18 Gauge
2	-	2500	4250	5625	9375	12 Gauge
	-	1600	2720	3600	6000	14 Gauge
	-	1000	1700	2250	3750	16 Gauge
	-	625	1063	1406	2344	18 Gauge
1	-	2727	5100	7500	18750	12 Gauge
	-	1745	3264	4800	12000	14 Gauge
	-	1091	2040	3000	7500	16 Gauge
	-	682	1275	1875	4688	18 Gauge
0	1566	2813	4688	9375	-	12 Gauge
	1002	1800	3000	6000	-	14 Gauge
	626	1125	1875	3750	-	16 Gauge
	391	703	1172	2344	-	18 Gauge

Table 7 - DX/DU400 Branch Run Wire Chart (Feet)

Number of DX/DU400 Clocks on Stub	18 Gauge	16 Gauge	14 Gauge	12 Gauge
2	30	48	77	120
1	60	96	154	240

Table 8 - DX/DU400 Stub Wire Chart (Feet)

Notes:

- The maximum number of DX/DU400 clocks on a PS-3 Series Power supply is 20.
- The DX/DU400 are factory set for a brightness level of 4. The above table reflects an average field adjusted brightness level of 6, for evenly distributed DX/DU400 Series clocks.
- If the DX/DU400 brightness level settings is not being altered from the factory setting and hence, the DX/DU400 series is only being used for 3 or 4 wire operation (DU400 only) or for the auto-dim feature, then the D400 wire chart can be used.
- The DU400 supports 3 and 4 wire operation and hence a reset circuit feed.

D/DX/DU Series Digital Clock Wire Calculations

1.6 D Series Wire Chart Tables Utilizing Homerun Wiring

No. Of D225Clocks connected to Home Run Circuit	Home Run Distance	
45	505	10 Gauge
	316	12 Gauge
	202	14 Gauge
	126	16 Gauge
	79	18 Gauge
40	568	10 Gauge
	355	12 Gauge
	227	14 Gauge
	142	16 Gauge
	89	18 Gauge
35	649	10 Gauge
	406	12 Gauge
	260	14 Gauge
	162	16 Gauge
	101	18 Gauge
30	758	10 Gauge
	473	12 Gauge
	303	14 Gauge
	189	16 Gauge
	118	18 Gauge
25	909	10 Gauge
	568	12 Gauge
	364	14 Gauge
	227	16 Gauge
	142	18 Gauge
20	1136	10 Gauge
	710	12 Gauge
	455	14 Gauge
	284	16 Gauge
	178	18 Gauge
15	1515	10 Gauge
	947	12 Gauge
	606	14 Gauge
	379	16 Gauge
	237	18 Gauge
10	2273	10 Gauge
	1420	12 Gauge
	909	14 Gauge
	568	16 Gauge
	355	18 Gauge
5	4545	10 Gauge
	2841	12 Gauge
	1818	14 Gauge
	1136	16 Gauge
	710	18 Gauge

Table 9 - D225 Homerun Wire Chart for Circuit (Feet)

Note:

- The maximum number of D225 clocks on a PS-3 Series Power supply is 45.
- Other power supplies may be used, however, the maximum number of D225 clocks on a circuit must not exceed 45 per above tables. Forty-five D225 clocks require a minimum of 3.125 Amps of 24 VAC power per circuit.

D/DX/DU Series Digital Clock Wire Calculations

Number of D225 Clocks on Circuit	No. of D225 Double Face or D400 Single Face Clocks on Circuit							
	20	15	10	5	2	1	0	
45	-	-	-	-	-	-	953	12 Gauge
	-	-	-	-	-	-	610	14 Gauge
	-	-	-	-	-	-	381	16 Gauge
	-	-	-	-	-	-	238	18 Gauge
40	-	-	-	-	909	979	1067	12 Gauge
	-	-	-	-	582	626	683	14 Gauge
	-	-	-	-	363	391	427	16 Gauge
	-	-	-	-	227	245	267	18 Gauge
35	-	-	-	938	1014	1099	1213	12 Gauge
	-	-	-	600	649	703	776	14 Gauge
	-	-	-	375	405	440	485	16 Gauge
	-	-	-	234	253	275	303	18 Gauge
30	-	-	-	938	1143	1249	1400	12 Gauge
	-	-	-	600	731	800	896	14 Gauge
	-	-	-	375	457	500	560	16 Gauge
	-	-	-	234	286	312	350	18 Gauge
25	-	-	819	1052	1324	1464	1662	12 Gauge
	-	-	524	674	848	937	1064	14 Gauge
	-	-	327	421	530	586	665	16 Gauge
	-	-	205	263	331	366	416	18 Gauge
20	-	-	921	1213	1554	1746	2033	12 Gauge
	-	-	589	776	994	1117	1301	14 Gauge
	-	-	368	485	621	698	813	16 Gauge
	-	-	230	303	388	436	508	18 Gauge
15	-	844	1052	1518	1915	2206	2650	12 Gauge
	-	540	674	972	1226	1412	1696	14 Gauge
	-	337	421	607	766	883	1060	16 Gauge
	-	211	263	380	479	552	663	18 Gauge
10	-	966	1250	1763	2455	2901	3751	12 Gauge
	-	618	800	1128	1571	1857	2401	14 Gauge
	-	386	500	705	982	1160	1500	16 Gauge
	-	241	313	441	614	725	938	18 Gauge
5	903	1129	1518	2351	3619	4556	6738	12 Gauge
	578	723	972	1505	2316	2916	4313	14 Gauge
	361	452	607	940	1447	1823	2695	16 Gauge
	226	282	380	588	905	1139	1685	18 Gauge
2	995	1284	1797	2995	5091	6738	11230	12 Gauge
	637	822	1150	1917	3258	4313	7188	14 Gauge
	398	514	719	1198	2036	2695	4492	16 Gauge
	249	321	449	749	1273	1685	2808	18 Gauge
1	1019	1326	1882	2995	5091	8984	22461	12 Gauge
	652	849	1205	1917	3258	5750	14375	14 Gauge
	408	530	753	1198	2036	3594	8984	16 Gauge
	255	331	471	749	1273	2246	5615	18 Gauge
0	1016	1325	1875	3369	5615	11230	-	12 Gauge
	650	848	1200	2156	3594	7188	-	14 Gauge
	407	530	750	1348	2246	4492	-	16 Gauge
	254	331	469	842	1404	2808	-	18 Gauge

Table 10 - D225 Branch Run Wire Chart when a Homerun is used (Feet)

Number of D225 Clocks on Stub	18 Gauge	16 Gauge	14 Gauge	12 Gauge
2	146	234	375	586
1	244	391	625	977

Table 11 - D225 Stub Wire Chart when a Homerun is used (Feet)

Notes:

- The above table reflects evenly distributed D225 Series clocks.

D/DX/DU Series Digital Clock Wire Calculations

No. of DX/DU225Clocks connected to Home Run Circuit	Home Run Distance	
35	504	10 Gauge
	315	12 Gauge
	201	14 Gauge
	126	16 Gauge
	79	18 Gauge
30	588	10 Gauge
	367	12 Gauge
	235	14 Gauge
	147	16 Gauge
	92	18 Gauge
25	705	10 Gauge
	441	12 Gauge
	282	14 Gauge
	176	16 Gauge
	110	18 Gauge
20	882	10 Gauge
	551	12 Gauge
	353	14 Gauge
	220	16 Gauge
	138	18 Gauge
15	1175	10 Gauge
	735	12 Gauge
	470	14 Gauge
	294	16 Gauge
	184	18 Gauge
10	1763	10 Gauge
	1102	12 Gauge
	705	14 Gauge
	441	16 Gauge
	275	18 Gauge
5	3526	10 Gauge
	2204	12 Gauge
	1410	14 Gauge
	882	16 Gauge
	551	18 Gauge

Table 12 - DX/DU225 Homerun Wire Distance Chart(Feet)

Notes:

- The maximum number of DX/DU225 clocks on a PS-3 Series Power supply is 35.
- The DX/DU225 are factory set for a brightness level of 4. The above table reflects an average field adjusted brightness level of 6.
- If the DX/DU225 brightness level settings is not being altered from the factory setting and hence, the DX/DU225 series is only being used for 3 or 4 wire operation (DU225 only) or for the auto-dim feature, then the D225 Homerun wire chart can be used.
- The DU225 supports 3 and 4 wire operation and hence a reset circuit feed.

D/DX/DU Series Digital Clock Wire Calculations

Number Of DX225 Clocks on Circuit	Number of DX/DU225 Double Face Clocks on Circuit						
	15	10	5	2	1	0	
35	-	-	-	-	-	941	12 Gauge
	-	-	-	-	-	602	14 Gauge
	-	-	-	-	-	376	16 Gauge
	-	-	-	-	-	235	18 Gauge
30	-	-	-	887	969	1086	12 Gauge
	-	-	-	567	620	695	14 Gauge
	-	-	-	355	388	434	16 Gauge
	-	-	-	222	242	272	18 Gauge
25	-	-	816	1027	1136	1289	12 Gauge
	-	-	523	658	727	825	14 Gauge
	-	-	327	411	454	516	16 Gauge
	-	-	204	257	284	322	18 Gauge
20	-	-	941	1205	1354	1577	12 Gauge
	-	-	602	771	867	1009	14 Gauge
	-	-	376	482	542	631	16 Gauge
	-	-	235	301	339	394	18 Gauge
15	-	816	1115	1486	1712	2056	12 Gauge
	-	523	714	951	1095	1316	14 Gauge
	-	327	446	594	685	822	16 Gauge
	-	204	279	371	428	514	18 Gauge
10	-	970	1368	1904	2251	2910	12 Gauge
	-	621	875	1219	1440	1862	14 Gauge
	-	388	547	762	900	1164	16 Gauge
	-	242	342	476	563	727	18 Gauge
5	876	1178	1824	2807	3535	5227	12 Gauge
	561	754	1167	1797	2262	3345	14 Gauge
	350	471	729	1123	1414	2091	16 Gauge
	219	294	456	702	884	1307	18 Gauge
2	996	1394	2323	3949	5227	8712	12 Gauge
	638	892	1487	2528	3345	5576	14 Gauge
	399	558	929	1580	2091	3485	16 Gauge
	249	348	581	987	1307	2178	18 Gauge
1	1029	1460	2534	4739	6970	17424	12 Gauge
	658	935	1622	3033	4461	11152	14 Gauge
	411	584	1014	1896	2788	6970	16 Gauge
	257	365	634	1185	1742	4356	18 Gauge
0	1028	1455	2614	4356	8712	-	12 Gauge
	658	931	1673	2788	5576	-	14 Gauge
	411	582	1045	1742	3485	-	16 Gauge
	257	364	653	1089	2178	-	18 Gauge

Table 13 - DX/DU225 Branch Run Wire Chart when a Homerun is used (Feet)

Number of DX225/DU225 Clocks on Stub	18 Gauge	16 Gauge	14 Gauge	12 Gauge
2	95	152	242	379
1	189	303	485	758

Table 14 - DX225/DU225 Stub Wire Chart when a Homerun is used (Feet)

Notes:

- The maximum number of DX/DU225 clocks on a PS-3 Series Power supply is 35.
- The DX/DU225 are factory set for a brightness level of 4. The above table reflects an average field adjusted brightness level of 6, for evenly distributed DX/DU225 Series clocks.
- If the DX/DU225 brightness level settings is not being altered from the factory setting and hence, the DX/DU225 series is only being used for 3 or 4 wire operation (DU225 only) or for the auto-dim feature, then the D225 wire chart (Table 1) can be used.
- The DU225 supports 3 and 4 wire operation and hence a reset circuit feed.

D/DX/DU Series Digital Clock Wire Calculations

No. of D400Clocks connected to Home Run Circuit	Home Run Distance	
25	594	10 Gauge
	371	12 Gauge
	237	14 Gauge
	148	16 Gauge
	93	18 Gauge
20	742	10 Gauge
	464	12 Gauge
	297	14 Gauge
	186	16 Gauge
	116	18 Gauge
15	989	10 Gauge
	618	12 Gauge
	396	14 Gauge
	247	16 Gauge
	155	18 Gauge
10	1484	10 Gauge
	928	12 Gauge
	594	14 Gauge
	371	16 Gauge
	232	18 Gauge
5	2968	10 Gauge
	1855	12 Gauge
	1187	14 Gauge
	742	16 Gauge
	464	18 Gauge

Table 15 - D400 Home Run Wire Chart(Feet)

Notes:

- The maximum number of D400 clocks on a PS-3 Series Power supply is 25.
- Other power supplies may be used, however, the maximum number of D400 clocks on a circuit must not exceed 25 per above tables. Twenty-five D400 clocks require a minimum of 3.125 Amps of 24 VAC power per circuit.

D/DX/DU Series Digital Clock Wire Calculations

Number of D400 Clocks on Circuit	Number of D400 Double Face Clocks on Circuit					
	10	5	2	1	0	
25	-	-	-	-	1085	12 Gauge
	-	-	-	-	695	14 Gauge
	-	-	-	-	434	16 Gauge
	-	-	-	-	271	18 Gauge
20	-	-	1015	1140	1327	12 Gauge
	-	-	649	730	850	14 Gauge
	-	-	406	456	531	16 Gauge
	-	-	254	285	332	18 Gauge
15	-	992	1251	1441	1731	12 Gauge
	-	635	800	922	1108	14 Gauge
	-	397	500	576	692	16 Gauge
	-	248	313	360	433	18 Gauge
10	-	1151	1603	1895	2450	12 Gauge
	-	737	1026	1213	1568	14 Gauge
	-	461	641	758	980	16 Gauge
	-	288	401	474	612	18 Gauge
5	992	1535	2363	2976	4401	12 Gauge
	635	983	1512	1904	2816	14 Gauge
	397	614	945	1190	1760	16 Gauge
	248	384	591	744	1100	18 Gauge
2	1173	1956	3325	4401	7334	12 Gauge
	751	1252	2128	2816	4694	14 Gauge
	469	782	1330	1760	2934	16 Gauge
	293	489	831	1100	1834	18 Gauge
1	1229	2134	3990	5867	14668	12 Gauge
	787	1365	2553	3755	9388	14 Gauge
	492	853	1596	2347	5867	16 Gauge
	307	533	997	1467	3667	18 Gauge
0	1225	2200	3667	7334	-	12 Gauge
	784	1408	2347	4694	-	14 Gauge
	490	880	1467	2934	-	16 Gauge
	306	550	917	1834	-	18 Gauge

Table 16 - D400 Branch Run Wire Chart when a Homerun is used (Feet)

Number of D400 Clocks on Stub	18 Gauge	16 Gauge	14 Gauge	12 Gauge
2	40	64	102	159
1	80	128	204	319

Table 17 - D400 Stub Wire Chart a Homerun is used (Feet)

Notes:

- The maximum number of D400 clocks on a PS-3 Series Power supply is 25.
- Other power supplies may be used, however, the maximum number of D400 clocks on a circuit must not exceed 25 per above tables. Twenty-five D400 clocks require a minimum of 3.125 Amps of 24 VAC power per circuit.
- The above table reflects evenly distributed D400 Series clocks.

D/DX/DU Series Digital Clock Wire Calculations

No. of D400Clocks connected to Home Run Circuit	Home Run Distance	
20	559	10 Gauge
	350	12 Gauge
	224	14 Gauge
	140	16 Gauge
	87	18 Gauge
15	746	10 Gauge
	466	12 Gauge
	298	14 Gauge
	186	16 Gauge
	117	18 Gauge
10	1119	10 Gauge
	699	12 Gauge
	448	14 Gauge
	280	16 Gauge
	175	18 Gauge
5	2238	10 Gauge
	1399	12 Gauge
	895	14 Gauge
	559	16 Gauge
	350	18 Gauge

Table 18 - DX/DU400 Home Run Wire Chart (Feet)

Notes:

- The maximum number of DX/DU400 clocks on a PS-3 Series Power supply is 20.
- The DX/DU400 are factory set for a brightness level of 4. The above table reflects an average field adjusted brightness level of 6.
- If the DX/DU400 brightness level settings is not being altered from the factory setting and hence, the DX/DU400 series is only being used for 3 or 4 wire operation (DU400 only) or for the auto-dim feature, then the D400 Homerun wire chart can be used.

D/DX/DU Series Digital Clock Wire Calculations

No. Of DX/DU400 Clocks on Circuit	No. of DX/DU400 Double Face Clocks on Circuit					
	10	5	2	1	0	
20	-	-	-	-	1001	12 Gauge
	-	-	-	-	640	14 Gauge
	-	-	-	-	400	16 Gauge
	-	-	-	-	250	18 Gauge
15	-	-	943	1086	1305	12 Gauge
	-	-	603	695	835	14 Gauge
	-	-	377	435	522	16 Gauge
	-	-	236	272	326	18 Gauge
10	-	868	1208	1428	1847	12 Gauge
	-	556	773	914	1182	14 Gauge
	-	347	483	571	739	16 Gauge
	-	217	302	357	462	18 Gauge
5	-	1157	1782	2243	3317	12 Gauge
	-	741	1140	1436	2123	14 Gauge
	-	463	713	897	1327	16 Gauge
	-	289	445	561	829	18 Gauge
2	-	1474	2506	3317	5529	12 Gauge
	-	944	1604	2123	3538	14 Gauge
	-	590	1003	1327	2212	16 Gauge
	-	369	627	829	1382	18 Gauge
1	-	1608	3008	4423	11058	12 Gauge
	-	1029	1925	2831	7077	14 Gauge
	-	643	1203	1769	4423	16 Gauge
	-	402	752	1106	2764	18 Gauge
0	923	1659	2764	5529	-	12 Gauge
	591	1062	1769	3538	-	14 Gauge
	369	663	1106	2212	-	16 Gauge
	231	415	691	1382	-	18 Gauge

Table 19 - DX/DU400 Branch Run Wire Chart when a Homerun is used (Feet)

Number of DX/DU400 Clocks on Stub	18 Gauge	16 Gauge	14 Gauge	12 Gauge
2	30	48	77	120
1	60	96	154	240

Table 20 - DX/DU400 Stub Wire Chart when a Homerun is used (Feet)

Notes:

- The maximum number of DX/DU400 clocks on a PS-3 Series Power supply is 20.
- The DX/DU400 are factory set for a brightness level of 4. The above table reflects an average field adjusted brightness level of 6, for evenly distributed DX/DU400 Series clocks.
- If the DX/DU400 brightness level settings is not being altered from the factory setting and hence, the DX/DU400 series is only being used for 3 or 4 wire operation (DU400 only) or for the auto-dim feature, then the D400 wire chart (Table 5) can be used.
- The DU400 supports 3 and 4 wire operation and hence a reset circuit feed.

D/DX/DU Series Digital Clock Wire Calculations

2 D Series Electrical Specifications

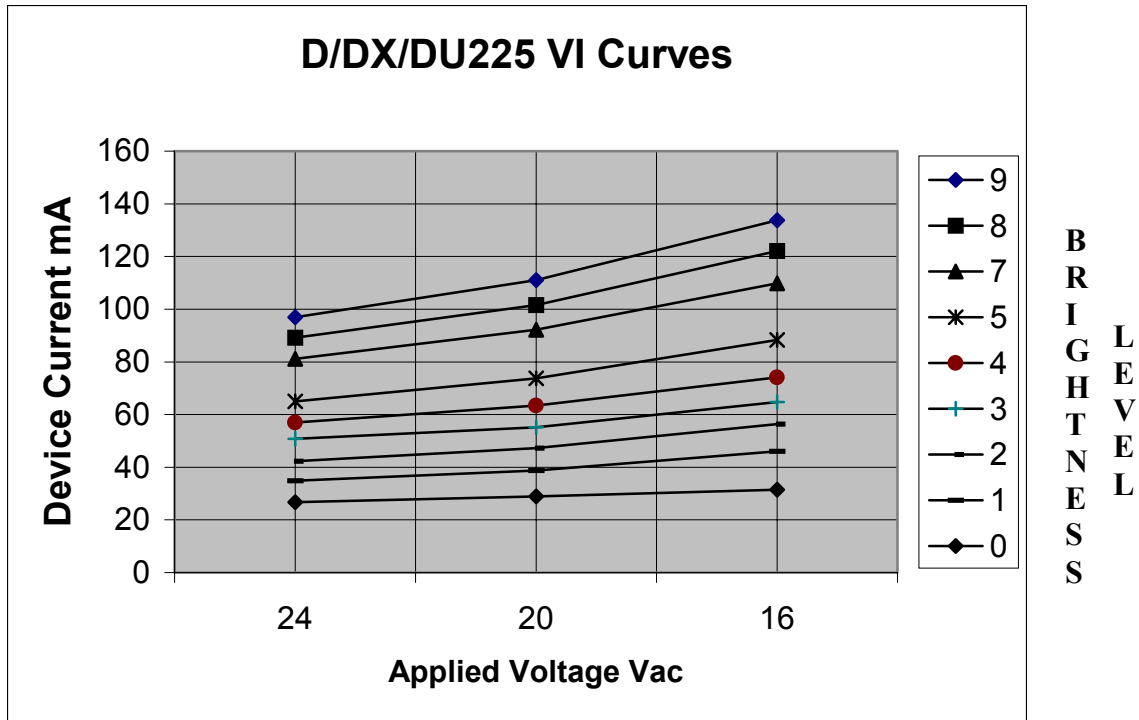


Figure 6 – D/DX/DU225 VI Curves

Note:

- D225 Series clocks Brightness Level is set factory set at 4.
- DX225 and DU225 Series clocks Brightness Level is set factory set at 4, however, they can be adjusted for Brightness Level between 1 and 9.

D/DX/DU Series Digital Clock Wire Calculations

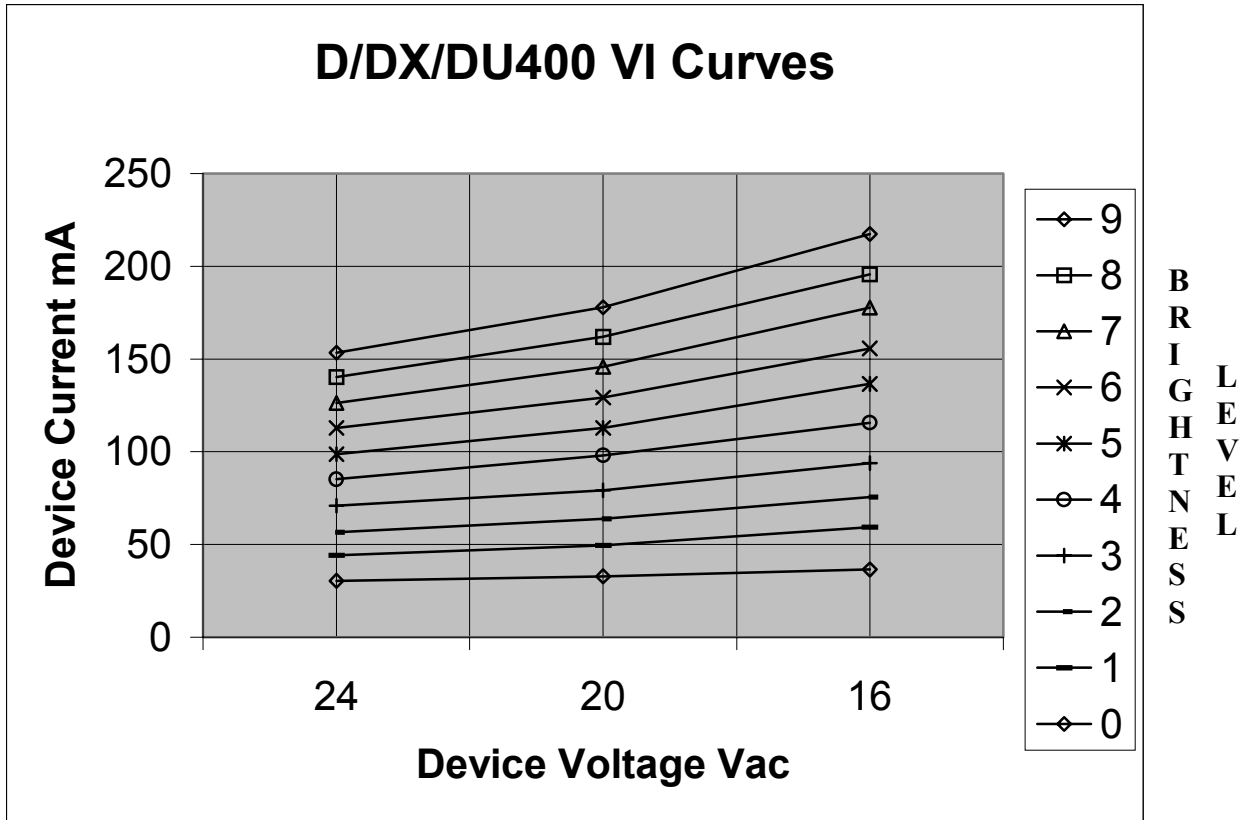


Figure 7 – D/DX/DU400 VI Curves

Note:

- D400 Series clocks Brightness Level is set factory set at 4.
- DX400 and DU400 Series clocks Brightness Level is set factory set at 4, however, they can be adjusted for Brightness Level between 1 and 9.

3 Revision

Revision Number	Originator	Date	Comments
A	LM	09/22/03	Original draft
B	LM	10/12/03	Add tables