

**GROUND JUMPER TESTER**

**MODEL NUMBER JT-200**

**Version 1.1**

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## INTRODUCTION

- The Phenix Technologies JT-200 Ground Jumper Tester is designed to perform In-Service Testing of Temporary Grounding Jumper Assemblies Used on De-Energized Electric Power Lines and Equipment as specified by ASTM Standard 2249-18. Refer to this standard for additional information not included in this manual.
- The test set is equipped with separate voltage sensing leads to avoid problems related to contact resistance between the test set and jumper under test.
- The voltage tables have been developed based on values given in ASTM Standard 2249-18 and the Terman formula for calculating loop inductance. The tables included are based on values given for Class K cable at 20°C. Tables for other class cables and temperatures are available.
- It is possible to test more complex jumper assemblies if the voltage drop at 200A across them is known by adding this number to that obtained from the table.

## TECHNICAL SPECIFICATIONS

**Model:**

JT-200 Grounding Jumper Test Set

**Input:**

120 Volts, 5 Amps, 60 Hz, Single Phase

**Output:**

0-3VAC; 200A

**Instrumentation:**

**Voltmeter:**

Digital, 4 ½ digit resolution

Scale: 0-3VAC. Accuracy:  $\pm 1\%$  Reading  $\pm 5$  counts

**Currentmeter:**

Digital, 3 ½ digit resolution

Scale: 0-200AAC, Range: 0-200AAC. Accuracy:  $\pm 1\%$  Reading  $\pm 5$  counts

**Features:**

Main power circuit breaker

On/Off pushbutton switches

Backup circuit breaker for regulator/transformer protection

Output via interchangeable terminals with voltage sense leads

Zero-start interlock

One copy of instruction manual, parts list, and schematics

**Size:**

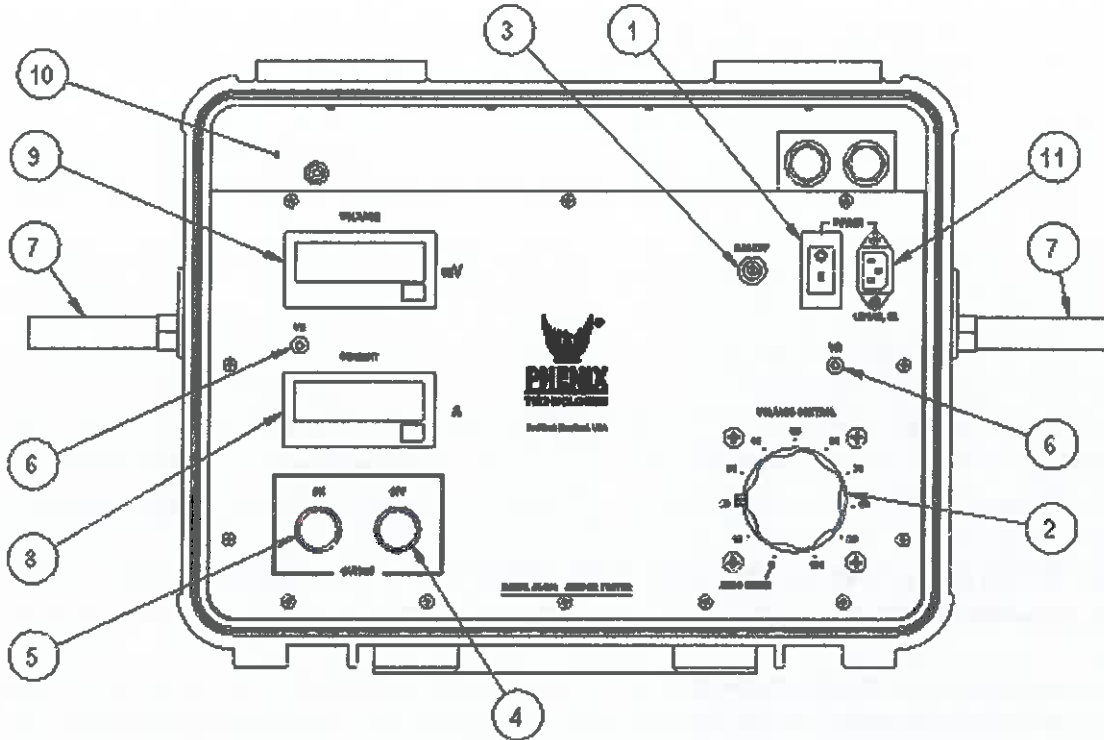
20"L x 16"W x 8"H; 43 lbs.

## CONTROL AND METERING DESCRIPTION

(Key numbers refer to Figure 1)

1. **Main Power Circuit Breaker.** Serves dual function as main switch and provides overload protection for all circuits in test set.
2. **Regulator Knob.** Adjusts voltage and current output levels. Must be returned to zero position to energize output.
3. **Backup Overload Circuit Breaker.** Circuit Breaker will open if output current exceeds safe levels to prevent damage to test set. Press button to reset breaker.
4. **Off Switch.** Press to de-energize output.
5. **On Switch.** Press to energize output. (Regulator must be in zero position.).
6. **Voltmeter Terminals.** Direct voltage measurement connection to jumpers being tested using leads provided.
7. **Output Terminals.** Interchangeable terminals for connection of jumpers being tested.
8. **Digital Currentmeter.** Provides continuous display of AC output current in amperes.
9. **Digital Voltmeter.** Provides continuous display of AC output voltage in millivolts.
10. **Storage.** Area for keeping power cord, voltage sense leads and output terminals.

Figure 1: JT-200 Front Panel



## OPERATION AND CALIBRATION

### OPERATION

1. Install terminals required for test.
2. Verify that main circuit breaker is off.
3. Connect prepared ground jumper to terminals. Refer to jumper preparation section for further information.
4. Connect voltage sensing leads between clamps and jacks on front panel. To avoid erroneous readings **DO NOT CONNECT TO OUTPUT TERMINALS ON SET!**
5. Plug input power cord into standard 120VAC outlet rated for minimum of 5A.
6. Measure the jumper to be tested to the nearest inch from end of wire at each end. Look up maximum voltage for the cable size jumper being tested in the tables.
7. Turn on main circuit breaker switch to power on unit. Note that meter displays come on.
8. Turn regulator knob to zero position and turn on output by pressing ON switch. Slowly raise the output voltage by turning the regulator knob clockwise until 200\*\* amperes is read on the currentmeter while observing voltmeter. If the maximum test voltage is exceeded before reaching 200\*\*A the cable has failed the test. Refer to jumper troubleshooting section for further information. If the voltage is less than 80% of maximum allowed reconfirm measurements and recheck table.
9. Record voltage reading and lower voltage to zero position before pressing OFF.
10. Upon completion of testing, turn off main power by switching off the main breaker before disconnecting the voltage sense leads and jumper under test.
11. To protect terminals from damage, replace in storage location after each use.

**\*\* In special cases [1/0 jumpers longer than 95 feet or 2 Ga jumpers longer than 75 feet] it will be necessary to perform the test at reduced current levels as noted in the tables to remain within the limitations of the test set.**

### **CALIBRATION**

Your JT-200 Ground Jumper Test Set should have the meters calibrated on a periodic basis to verify that test results continue to be valid. Calibration should be performed by qualified technical personnel such as the Phenix Technologies Service Department during a scheduled service appointment.

### **MAINTENANCE**

During the lifetime of your portable power supply, certain items will need replacement. Common replacement parts are listed on page 7-1 under "Recommended Spare Parts."



## JUMPER PREPARATION

1. Prior to testing the jumper should be visually inspected for smooth clamp operation, defective or missing hardware, cable knotting and broken wire strands at ends. Any problems found must be corrected prior to testing and returning to service.
2. Clean clamp contact surfaces with a wire brush.
3. Arrange the jumper on a non-conductive surface in a loop 20" wide. The loop should not cross. Performing the test in proximity to metal, in particular ferrous metal, may affect the results.
4. Install terminals in the JT-200 matching the clamps on the jumpers being tested and tighten securely. Connect the jumper clamps to the terminals and tighten securely.
5. Install the voltage sense leads into the sockets on the front panel and connect the clip end to the clamp. Ensure that there is good contact between the clip and the clamp.

## JUMPER TROUBLESHOOTING

If full current is not reached at the maximum allowed voltage it is generally due to an error in measurement or a bad connection (or connections) in the assembly.

### Measurement

Verify jumper length and cable size to determine correct test voltage.

### Connections

Each place where there are two parts connected is suspect and should be considered as a possible source of trouble. There are several ways to locate bad connections including:

- Visual inspection.
- While current is flowing through the jumper use a voltmeter to check for drops across connections. At 200A, a good connection will have 1-10 millivolts drop across it. If the drop is higher the connection is suspect.
- Bad connections will generate heat that can often be felt or measured. Allow current to flow for a few minutes to see if any hot spots appear.

CIRCUIT DIAGRAM SYMBOLS SYMBOLS POUR SCHEMA DE CIRCUIT SYMBOLE ZU SCHEMA				
REF	SYMBOL	DESCRIPTION	DESCRIPTION	BEMENKUNG
A		Amplifier	Unite d'amplificateur	Verstärker
ARSR		Surge Arrester	Parafoudre	Ueberspannungsableiter
C		Capacitor	Condensateur	Kondensator
BSHG		Bushing	Tranversée	Durchfuehung
C		Electrolytic Capacitor	Condensateur électrol	Elektrolytik kondensator
F		Fuse	Fusible	Sicherung
CT		Current Transformer	Transformateur de Courant	Stromtransformer
CB		Circuit Breaker	Intérupteur	Unterbrecher
K		Relay, Contactor	Relais, Contacteur	Relais, Schütz
L		Inductor	Self	Drossel, Spule
MOT		Motor	Moteur	Motor
MDV		Movistor	Parafoudre	Movistor
NE		Neon	Parafoudre	Ueberspannungsableiter
LP		Lamp, Indicator	Lampe	Meldeleuchte
R		Resistor	Resistance	Widerstand
R		Variable Resistor	Resistance Variable	Widerstand
T		Transformer	Transformateur	Transformer
TB		Terminal Block	Borne	Lösbare Klemme
X		Connector	Prise de Courant	Steckverbindung
K		Relay Contact Normally Open	Contact Normalement Ouvert	Schlierskontakt
K		Relay Contact Normally Closed	Contact Normalement Fermé	Deffnungskontakt
K		Changeover Contact	Contact de Changement	Umschaltkontakt
		Shielded Wire	Cable blindé	Abgeschirmetes Kabel
TR		Transistor	Transisteur	Transistor
M		Meter	Instrument Analogue	Analog Meter
D		Diode	Diode	Diode
Z		Zener	Diode Zener	Zener
SCR		Thyristor	Thyristor	Thyristor
SW		Normally Open Maintained Switch	Interrupteur Normalement Maintenu Ouvert	Schrittschalter (Schliesser)
SW		Normally Closed Maintained Switch	Interrupteur Normalement Maintenu Fermé	Schrittschalter (Deffner)
SW		Normally Closed Momentary Switch	Interrupteur Normalement Fermé Momentanement	Druckschalter (Deffner)
SW		Normally Open Momentary Switch	Interrupteur Normalement Ouvert Momentanement	Druckschalter (Schliesser)
DP		Current Overload Device	Dispositif De Sûr Intensité	UeberstromschutzEinheit

**ELECTRICAL DIAGRAMS**

<b>Drawing Number</b>	<b>Description</b>
1. 9902000	JT-200 Electrical Schematic

**RECOMMENDED SPARE PARTS**

<b>QTY.</b>	<b>PHENIX PART #</b>	<b>DESCRIPTION</b>
2	N/A	Output terminal
1	1861415	Switch contact block, NC
1	1861410	Switch contact block, NO
1	1866005	Switch, roller limit

## **PARTS ORDERING INFORMATION**

Replacement parts are available from Phenix Technologies, Inc.

Changes to Phenix Technologies' products are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest technical improvements developed in our Engineering Department. It is, therefore, important when ordering parts to include the serial number of the unit as well as the part number of the replacement part. When your purchase order is received at our office, a representative of Phenix Technologies will contact you to confirm the current price of the part being ordered. If a part you order has been replaced with a new or improved part, an Applications Engineer will contact you concerning any change in part number.

Your order for replacement parts should be sent to:

Replacement Parts Department  
Phenix Technologies, Inc.  
75 Speicher Drive  
Accident, Maryland 21520

## RETURNED MATERIAL

If for any reason it should become necessary to return this equipment to the factory, the Service Department of Phenix Technologies, Inc. must be given the following information:

Name Plate Information  
Model Number  
Serial Number  
Reason for Return  
Cause of Defect

If Phenix Technologies, Inc. deems return of the part appropriate, it will then issue an "Authorization for Return".

If return is not deemed advisable, other inspection arrangements will be made.

NOTE: Material received at this plant without the proper authorization shall be held as "Customer's Property" with no service until such time as the proper steps have been taken.

Your cooperation is requested in order to ensure prompt service.

# MAXIMUM ALLOWED TEST VOLTAGE - 4/0

CLASS K - 20°C

FEET	1	2	3	4	5	6	7	8	9	10	11	INCHES
3	118	120	122	124	126	128	130	132	134	136	138	139
4	141	143	145	147	149	151	153	155	157	158	160	162
5	164	166	168	170	172	174	176	177	179	181	183	185
6	187	189	191	193	195	196	198	200	202	204	206	208
7	210	212	214	216	217	219	221	223	225	227	229	231
8	233	235	237	238	240	242	244	246	248	250	252	254
9	256	258	260	261	263	265	267	269	271	273	275	277
10	279	281	283	284	286	288	290	292	294	296	298	300
11	302	304	306	307	309	311	313	315	317	319	321	323
12	325	327	329	331	332	334	336	338	340	342	344	346
13	348	350	352	354	356	357	359	361	363	365	367	369
14	371	373	375	377	379	381	383	384	386	388	390	392
15	394	396	398	400	402	404	406	408	409	411	413	415
16	417	419	421	423	425	427	429	431	433	435	436	438
17	440	442	444	446	448	450	452	454	456	458	460	462
18	463	465	467	469	471	473	475	477	479	481	483	485
19	487	489	491	492	494	496	498	500	502	504	506	508
20	510	512	514	516	518	519	521	523	525	527	529	531
21	533	535	537	539	541	543	545	547	548	550	552	554
22	556	558	560	562	564	566	568	570	572	574	576	577
23	579	581	583	585	587	589	591	593	595	597	599	601
24	603	605	606	608	610	612	614	616	618	620	622	624
25	626	628	630	632	634	635	637	639	641	643	645	647
26	649	651	653	655	657	659	661	663	664	666	668	670
27	672	674	676	678	680	682	684	686	688	690	692	693
28	695	697	699	701	703	705	707	709	711	713	715	717
29	719	721	722	724	726	728	730	732	734	736	738	740
30	742	744	746	748	750	751	753	755	757	759	761	763
31	765	767	769	771	773	775	777	779	781	782	784	786
32	788	790	792	794	796	798	800	802	804	806	808	810
33	811	813	815	817	819	821	823	825	827	829	831	833
34	835	837	839	841	842	844	846	848	850	852	854	856
35	858	860	862	864	866	868	870	871	873	875	877	879
36	881	883	885	887	889	891	893	895	897	899	900	902
37	904	906	908	910	912	914	916	918	920	922	924	926
38	928	930	931	933	935	937	939	941	943	945	947	949
39	951	953	955	957	959	961	962	964	966	968	970	972
40	974	976	978	980	982	984	986	988	990	991	993	995
41	997	999	1001	1003	1005	1007	1009	1011	1013	1015	1017	1019
42	1021	1022	1024	1026	1028	1030	1032	1034	1036	1038	1040	1042
43	1044	1046	1048	1050	1052	1053	1055	1057	1059	1061	1063	1065
44	1067	1069	1071	1073	1075	1077	1079	1081	1082	1084	1086	1088
45	1090	1092	1094	1096	1098	1100	1102	1104	1106	1108	1110	1112
46	1113	1115	1117	1119	1121	1123	1125	1127	1129	1131	1133	1135
47	1137	1139	1141	1143	1144	1146	1148	1150	1152	1154	1156	1158
48	1160	1162	1164	1166	1168	1170	1172	1174	1175	1177	1179	1181
49	1183	1185	1187	1189	1191	1193	1195	1197	1199	1201	1203	1204
50	1206	1208	1210	1212	1214	1216	1218	1220	1222	1224	1226	1228



# MAXIMUM ALLOWED TEST VOLTAGE - 4/0

CLASS K - 20°C

FEET	1	2	3	4	5	6	7	8	9	10	11	INCHES
51	1230	1232	1234	1237	1239	1241	1243	1245	1247	1249	1251	
52	1253	1255	1257	1261	1263	1265	1266	1268	1270	1272	1274	
53	1276	1278	1280	1284	1286	1288	1290	1292	1294	1296	1297	
54	1299	1301	1303	1307	1309	1311	1313	1315	1317	1319	1321	
55	1323	1325	1327	1330	1332	1334	1336	1338	1340	1342	1344	
56	1346	1348	1350	1354	1356	1358	1359	1361	1363	1365	1367	
57	1369	1371	1373	1377	1379	1381	1383	1385	1387	1388	1390	
58	1392	1394	1396	1400	1402	1404	1406	1408	1410	1412	1414	
59	1416	1418	1419	1423	1425	1427	1429	1431	1433	1435	1437	
60	1439	1441	1443	1447	1449	1450	1452	1454	1456	1458	1460	
61	1462	1464	1466	1470	1472	1474	1476	1478	1480	1481	1483	
62	1485	1487	1489	1493	1495	1497	1499	1501	1503	1505	1507	
63	1509	1511	1512	1516	1518	1520	1522	1524	1526	1528	1530	
64	1532	1534	1536	1540	1542	1543	1545	1547	1549	1551	1553	
65	1555	1557	1559	1563	1565	1567	1569	1571	1573	1574	1576	
66	1578	1580	1582	1586	1588	1590	1592	1594	1596	1598	1600	
67	1602	1604	1605	1609	1611	1613	1615	1617	1619	1621	1623	
68	1625	1627	1629	1633	1635	1636	1638	1640	1642	1644	1646	
69	1648	1650	1652	1656	1658	1660	1662	1664	1666	1667	1669	
70	1671	1673	1675	1679	1681	1683	1685	1687	1689	1691	1693	
71	1695	1697	1698	1702	1704	1706	1708	1710	1712	1714	1716	
72	1718	1720	1722	1726	1727	1729	1731	1733	1735	1737	1739	
73	1741	1743	1745	1749	1751	1753	1755	1757	1758	1760	1762	
74	1764	1766	1768	1772	1774	1776	1778	1780	1782	1784	1786	
75	1788	1789	1791	1795	1797	1799	1801	1803	1805	1807	1809	
76	1811	1813	1815	1819	1820	1822	1824	1826	1828	1830	1832	
77	1834	1836	1838	1842	1844	1846	1848	1850	1851	1853	1855	
78	1857	1859	1861	1865	1867	1869	1871	1873	1875	1877	1879	
79	1881	1882	1884	1888	1890	1892	1894	1896	1898	1900	1902	
80	1904	1906	1908	1912	1913	1915	1917	1919	1921	1923	1925	
81	1927	1929	1931	1935	1937	1939	1941	1943	1944	1946	1948	
82	1950	1952	1954	1958	1960	1962	1964	1966	1968	1970	1972	
83	1974	1975	1977	1981	1983	1985	1987	1989	1991	1993	1995	
84	1997	1999	2001	2005	2006	2008	2010	2012	2014	2016	2018	
85	2020	2022	2024	2028	2030	2032	2034	2036	2037	2039	2041	
86	2043	2045	2047	2051	2053	2055	2057	2059	2061	2063	2065	
87	2067	2068	2070	2074	2076	2078	2080	2082	2084	2086	2088	
88	2090	2092	2094	2098	2099	2101	2103	2105	2107	2109	2111	
89	2113	2115	2117	2121	2123	2125	2127	2129	2130	2132	2134	
90	2136	2138	2140	2144	2146	2148	2150	2152	2154	2156	2158	
91	2160	2161	2163	2167	2169	2171	2173	2175	2177	2179	2181	
92	2183	2185	2187	2191	2192	2194	2196	2198	2200	2202	2204	
93	2206	2208	2210	2214	2216	2218	2220	2222	2223	2225	2227	
94	2229	2231	2233	2237	2239	2241	2243	2245	2247	2249	2251	
95	2253	2254	2256	2260	2262	2264	2266	2268	2270	2272	2274	
96	2276	2278	2280	2284	2285	2287	2289	2291	2293	2295	2297	
97	2299	2301	2303	2307	2309	2311	2313	2315	2316	2318	2320	
98	2322	2324	2326	2330	2332	2334	2336	2338	2340	2342	2344	
99	2346	2347	2349	2353	2355	2357	2359	2361	2363	2365	2367	
100	2369	2371	2373	2377	2378	2380	2382	2384	2386	2388	2390	

# MAXIMUM ALLOWED TEST VOLTAGE - 2/0

CLASS K - 20°C

FEET	1	2	3	4	5	6	7	8	9	10	11	INCHES
3	137	139	142	144	147	149	151	154	156	158	161	163
4	165	168	170	172	175	177	179	181	184	186	188	191
5	193	195	198	200	202	205	207	209	211	214	216	218
6	221	223	225	228	230	232	234	237	239	241	244	246
7	248	251	253	255	257	260	262	264	267	269	271	274
8	276	278	280	283	285	287	290	292	294	297	299	301
9	304	306	308	310	313	315	317	320	322	324	327	329
10	331	333	336	338	340	343	345	347	350	352	354	356
11	359	361	363	366	368	370	373	375	377	379	382	384
12	386	389	391	393	396	398	400	402	405	407	409	412
13	414	416	419	421	423	426	428	430	432	435	437	439
14	442	444	446	449	451	453	455	458	460	462	465	467
15	469	472	474	476	479	481	483	485	488	490	492	495
16	497	499	502	504	506	508	511	513	515	518	520	522
17	525	527	529	532	534	536	538	541	543	545	548	550
18	552	555	557	559	562	564	566	568	571	573	575	578
19	580	582	585	587	589	592	594	596	598	601	603	605
20	608	610	612	615	617	619	621	624	626	628	631	633
21	635	638	640	642	645	647	649	651	654	656	658	661
22	663	665	668	670	672	675	677	679	681	684	686	688
23	691	693	695	698	700	702	705	707	709	711	714	716
24	718	721	723	725	728	730	732	735	737	739	741	744
25	746	748	751	753	755	758	760	762	764	767	769	771
26	774	776	778	781	783	785	788	790	792	794	797	799
27	801	804	806	808	811	813	815	818	820	822	824	827
28	829	831	834	836	838	841	843	845	848	850	852	854
29	857	859	861	864	866	868	871	873	875	878	880	882
30	884	887	889	891	894	896	898	901	903	905	908	910
31	912	914	917	919	921	924	926	928	931	933	935	938
32	940	942	944	947	949	951	954	956	958	961	963	965
33	968	970	972	974	977	979	981	984	986	988	991	993
34	995	998	1000	1002	1004	1007	1009	1011	1014	1016	1018	1021
35	1023	1025	1028	1030	1032	1034	1037	1039	1041	1044	1046	1048
36	1051	1053	1055	1058	1060	1062	1064	1067	1069	1071	1074	1076
37	1078	1081	1083	1085	1088	1090	1092	1094	1097	1099	1101	1104
38	1106	1108	1111	1113	1115	1118	1120	1122	1124	1127	1129	1131
39	1134	1136	1138	1141	1143	1145	1148	1150	1152	1154	1157	1159
40	1161	1164	1166	1168	1171	1173	1175	1178	1180	1182	1184	1187
41	1189	1191	1194	1196	1198	1201	1203	1205	1208	1210	1212	1214
42	1217	1219	1221	1224	1226	1228	1231	1233	1235	1238	1240	1242
43	1245	1247	1249	1251	1254	1256	1258	1261	1263	1265	1268	1270
44	1272	1275	1277	1279	1281	1284	1286	1288	1291	1293	1295	1298
45	1300	1302	1305	1307	1309	1311	1314	1316	1318	1321	1323	1325
46	1328	1330	1332	1335	1337	1339	1341	1344	1346	1348	1351	1353
47	1355	1358	1360	1362	1365	1367	1369	1371	1374	1376	1378	1381
48	1383	1385	1388	1390	1392	1395	1397	1399	1401	1404	1406	1408
49	1411	1413	1415	1418	1420	1422	1425	1427	1429	1431	1434	1436
50	1438	1441	1443	1445	1448	1450	1452	1455	1457	1459	1461	1464

# MAXIMUM ALLOWED TEST VOLTAGE - 2/0

CLASS K - 20°C

FEET	1	2	3	4	5	6	7	8	9	10	11	INCHES
51	1466	1471	1473	1475	1478	1480	1482	1485	1487	1489	1491	
52	1494	1498	1501	1503	1505	1508	1510	1512	1515	1517	1519	
53	1522	1526	1528	1531	1533	1535	1538	1540	1542	1545	1547	
54	1549	1552	1554	1558	1561	1563	1565	1568	1570	1572	1575	
55	1577	1579	1582	1586	1588	1591	1593	1595	1598	1600	1602	
56	1605	1607	1609	1614	1616	1618	1621	1623	1625	1628	1630	
57	1632	1635	1637	1642	1644	1646	1648	1651	1653	1655	1658	
58	1660	1662	1665	1669	1672	1674	1676	1678	1681	1683	1685	
59	1688	1690	1692	1697	1699	1702	1704	1706	1708	1711	1713	
60	1715	1718	1720	1725	1727	1729	1732	1734	1736	1738	1741	
61	1743	1745	1748	1752	1755	1757	1759	1762	1764	1766	1768	
62	1771	1773	1778	1780	1782	1785	1787	1789	1792	1794	1796	
63	1799	1801	1803	1808	1810	1812	1815	1817	1819	1822	1824	
64	1826	1829	1831	1835	1838	1840	1842	1845	1847	1849	1852	
65	1854	1856	1859	1863	1865	1868	1870	1872	1875	1877	1879	
66	1882	1884	1886	1891	1893	1895	1898	1900	1902	1905	1907	
67	1909	1912	1914	1919	1921	1923	1925	1928	1930	1932	1935	
68	1937	1939	1942	1946	1949	1951	1953	1955	1958	1960	1962	
69	1965	1967	1969	1974	1976	1979	1981	1983	1985	1988	1990	
70	1992	1995	1997	2002	2004	2006	2009	2011	2013	2016	2018	
71	2020	2022	2025	2029	2032	2034	2036	2039	2041	2043	2046	
72	2048	2050	2052	2057	2059	2062	2064	2066	2069	2071	2073	
73	2076	2078	2080	2085	2087	2089	2092	2094	2096	2099	2101	
74	2103	2106	2108	2112	2115	2117	2119	2122	2124	2126	2129	
75	2131	2133	2136	2140	2142	2145	2147	2149	2152	2154	2156	
76	2159	2161	2163	2168	2170	2172	2175	2177	2179	2182	2184	
77	2186	2189	2191	2196	2198	2200	2203	2205	2207	2209	2212	
78	2214	2216	2219	2223	2226	2228	2230	2233	2235	2237	2239	
79	2242	2244	2246	2251	2253	2256	2258	2260	2263	2265	2267	
80	2269	2272	2274	2279	2281	2283	2286	2288	2290	2293	2295	
81	2297	2299	2302	2306	2309	2311	2313	2316	2318	2320	2323	
82	2325	2327	2329	2334	2336	2339	2341	2343	2346	2348	2350	
83	2353	2355	2357	2362	2364	2366	2369	2371	2373	2376	2378	
84	2380	2383	2385	2390	2392	2394	2396	2399	2401	2403	2406	
85	2408	2410	2413	2417	2420	2422	2424	2426	2429	2431	2433	
86	2436	2438	2440	2445	2447	2450	2452	2454	2456	2459	2461	
87	2463	2466	2468	2473	2475	2477	2480	2482	2484	2486	2489	
88	2491	2493	2496	2500	2503	2505	2507	2510	2512	2514	2516	
89	2519	2521	2523	2528	2530	2533	2535	2537	2540	2542	2544	
90	2547	2549	2551	2556	2558	2560	2563	2565	2567	2570	2572	
91	2574	2577	2579	2583	2586	2588	2590	2593	2595	2597	2600	
92	2602	2604	2607	2611	2613	2616	2618	2620	2623	2625	2627	
93	2630	2632	2634	2639	2641	2643	2646	2648	2650	2653	2655	
94	2657	2660	2662	2667	2669	2671	2673	2676	2678	2680	2683	
95	2685	2687	2690	2694	2697	2699	2701	2703	2706	2708	2710	
96	2713	2715	2717	2722	2724	2727	2729	2731	2734	2736	2738	
97	2740	2743	2745	2750	2752	2754	2757	2759	2761	2764	2766	
98	2768	2770	2773	2777	2780	2782	2784	2787	2789	2791	2794	
99	2796	2798	2800	2805	2807	2810	2812	2814	2817	2819	2821	
100	2824	2826	2828	2833	2835	2837	2840	2842	2844	2847	2849	

# MAXIMUM ALLOWED TEST VOLTAGE 1/0

CLASS K - 20°C

FEET	1	2	3	4	5	6	7	8	9	10	11	INCHES
3	149	152	155	157	160	163	165	168	171	173	176	178
4	181	184	186	189	191	194	197	199	202	204	207	210
5	212	215	217	220	223	225	228	230	233	235	238	241
6	243	246	248	251	254	256	259	261	264	266	269	272
7	274	277	279	282	285	287	290	292	295	297	300	303
8	305	308	310	313	315	318	321	323	326	328	331	334
9	336	339	341	344	346	349	352	354	357	359	362	364
10	367	370	372	375	377	380	382	385	388	390	393	395
11	398	401	403	406	408	411	413	416	419	421	424	426
12	429	431	434	437	439	442	444	447	449	452	455	457
13	460	462	465	468	470	473	475	478	480	483	486	488
14	491	493	496	498	501	504	506	509	511	514	517	519
15	522	524	527	529	532	535	537	540	542	545	547	550
16	553	555	558	560	563	565	568	571	573	576	578	581
17	584	586	589	591	594	596	599	602	604	607	609	612
18	614	617	620	622	625	627	630	633	635	638	640	643
19	645	648	651	653	656	658	661	663	666	669	671	674
20	676	679	681	684	687	689	692	694	697	700	702	705
21	707	710	712	715	718	720	723	725	728	730	733	736
22	738	741	743	746	749	751	754	756	759	761	764	767
23	769	772	774	777	779	782	785	787	790	792	795	798
24	800	803	805	808	810	813	816	818	821	823	826	828
25	831	834	836	839	841	844	846	849	852	854	857	859
26	862	865	867	870	872	875	877	880	883	885	888	890
27	893	895	898	901	903	906	908	911	914	916	919	921
28	924	926	929	932	934	937	939	942	944	947	950	952
29	955	957	960	963	965	968	970	973	975	978	981	983
30	986	988	991	993	996	999	1001	1004	1006	1009	1012	1014
31	1017	1019	1022	1024	1027	1030	1032	1035	1037	1040	1042	1045
32	1048	1050	1053	1055	1058	1061	1063	1066	1068	1071	1073	1076
33	1079	1081	1084	1086	1089	1091	1094	1097	1099	1102	1104	1107
34	1110	1112	1115	1117	1120	1122	1125	1128	1130	1133	1135	1138
35	1140	1143	1146	1148	1151	1153	1156	1158	1161	1164	1166	1169
36	1171	1174	1177	1179	1182	1184	1187	1189	1192	1195	1197	1200
37	1202	1205	1207	1210	1213	1215	1218	1220	1223	1226	1228	1231
38	1233	1236	1238	1241	1244	1246	1249	1251	1254	1256	1259	1262
39	1264	1267	1269	1272	1275	1277	1280	1282	1285	1287	1290	1293
40	1295	1298	1300	1303	1305	1308	1311	1313	1316	1318	1321	1324
41	1326	1329	1331	1334	1336	1339	1342	1344	1347	1349	1352	1354
42	1357	1360	1362	1365	1367	1370	1373	1375	1378	1380	1383	1385
43	1388	1391	1393	1396	1398	1401	1403	1406	1409	1411	1414	1416
44	1419	1422	1424	1427	1429	1432	1434	1437	1440	1442	1445	1447
45	1450	1452	1455	1458	1460	1463	1465	1468	1471	1473	1476	1478
46	1481	1483	1486	1489	1491	1494	1496	1499	1501	1504	1507	1509
47	1512	1514	1517	1520	1522	1525	1527	1530	1532	1535	1538	1540
48	1543	1545	1548	1550	1553	1556	1558	1561	1563	1566	1569	1571
49	1574	1576	1579	1581	1584	1587	1589	1592	1594	1597	1599	1602
50	1605	1607	1610	1612	1615	1618	1620	1623	1625	1628	1630	1633

FEET	1	2	3	4	5	6	7	8	9	10	11	INCHES
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51	1636	1638	1641	1643	1646	1648	1651	1654	1656	1659	1661	1664
52	1667	1669	1672	1674	1677	1679	1682	1685	1687	1690	1692	1695
53	1697	1700	1703	1705	1708	1710	1713	1716	1718	1721	1723	1726
54	1728	1731	1734	1736	1739	1741	1744	1746	1749	1752	1754	1757
55	1759	1762	1765	1767	1770	1772	1775	1777	1780	1783	1785	1788
56	1790	1793	1795	1798	1801	1803	1806	1808	1811	1814	1816	1819
57	1821	1824	1826	1829	1832	1834	1837	1839	1842	1844	1847	1850
58	1852	1855	1857	1860	1863	1865	1868	1870	1873	1875	1878	1881
59	1883	1886	1888	1891	1893	1896	1899	1901	1904	1906	1909	1912
60	1914	1917	1919	1922	1924	1927	1930	1932	1935	1937	1940	1942
61	1945	1948	1950	1953	1955	1958	1961	1963	1966	1968	1971	1973
62	1976	1979	1981	1984	1986	1989	1991	1994	1997	1999	2002	2004
63	2007	2010	2012	2015	2017	2020	2022	2025	2028	2030	2033	2035
64	2038	2040	2043	2046	2048	2051	2053	2056	2059	2061	2064	2066
65	2069	2071	2074	2077	2079	2082	2084	2087	2089	2092	2095	2097
66	2100	2102	2105	2108	2110	2113	2115	2118	2120	2123	2126	2128
67	2131	2133	2136	2138	2141	2144	2146	2149	2151	2154	2157	2159
68	2162	2164	2167	2169	2172	2175	2177	2180	2182	2185	2187	2190
69	2193	2195	2198	2200	2203	2206	2208	2211	2213	2216	2218	2221
70	2224	2226	2229	2231	2234	2236	2239	2242	2244	2247	2249	2252
71	2255	2257	2260	2262	2265	2267	2270	2273	2275	2278	2280	2283
72	2286	2288	2291	2293	2296	2298	2301	2304	2306	2309	2311	2314
73	2316	2319	2322	2324	2327	2329	2332	2334	2337	2340	2342	2345
74	2347	2350	2353	2355	2358	2360	2363	2365	2368	2371	2373	2376
75	2378	2381	2384	2386	2389	2391	2394	2396	2399	2402	2404	2407
76	2409	2412	2414	2417	2420	2422	2425	2427	2430	2433	2435	2438
77	2440	2443	2445	2448	2451	2453	2456	2458	2461	2463	2466	2469
78	2471	2474	2476	2479	2482	2484	2487	2489	2492	2494	2497	2500
79	2502	2505	2507	2510	2512	2515	2518	2520	2523	2525	2528	2531
80	2533	2536	2538	2541	2543	2546	2549	2551	2554	2556	2559	2561
81	2564	2567	2569	2572	2574	2577	2580	2582	2585	2587	2590	2592
82	2595	2598	2600	2603	2605	2608	2610	2613	2616	2618	2621	2623
83	2626	2629	2631	2634	2636	2639	2641	2644	2647	2649	2652	2654
84	2657	2659	2662	2665	2667	2670	2672	2675	2678	2680	2683	2685
85	2688	2690	2693	2696	2698	2701	2703	2706	2708	2711	2714	2716
86	2719	2721	2724	2727	2729	2732	2734	2737	2739	2742	2745	2747
87	2750	2752	2755	2757	2760	2763	2765	2768	2770	2773	2776	2778
88	2781	2783	2786	2788	2791	2794	2796	2799	2801	2804	2806	2809
89	2812	2814	2817	2819	2822	2825	2827	2830	2832	2835	2837	2840
90	2843	2845	2848	2850	2853	2855	2858	2861	2863	2866	2868	2871
91	2874	2876	2879	2881	2884	2886	2889	2892	2894	2897	2899	2902
92	2904	2907	2910	2912	2915	2917	2920	2923	2925	2928	2930	2933
93	2935	2938	2941	2943	2946	2948	2951	2953	2956	2959	2961	2964
94	2966	2969	2972	2974	2977	2979	2982	2984	2987	2990	2992	2995
95	2997	3000	3002	3005	3008	3010	3013	3015	3018	3021	3023	3026
96	3028	3031	3033	3036	3039	3041	3044	3046	3049	3051	3054	3057
97	3059	3062	3064	3067	3070	3072	3075	3077	3080	3082	3085	3088
98	3090	3093	3095	3098	3100	3103	3106	3108	3111	3113	3116	3119
99	3121	3124	3126	3129	3131	3134	3137	3139	3142	3144	3147	3149
100	3152	3155	3157	3160	3162	3165	3168	3170	3173	3175	3178	3180

CLASS K - 20°C

1/0 MAXIMUM ALLOWED TEST VOLTAGE

# MAXIMUM ALLOWED TEST VOLTAGE - 2 GA

CLASS K - 20°C

FEET	1	2	3	4	5	6	7	8	9	10	11	INCHES
3	186	189	193	196	200	203	207	211	214	218	221	225
4	228	232	235	239	242	246	249	253	256	260	263	267
5	270	274	277	281	284	288	291	295	298	302	305	308
6	312	315	319	322	326	329	333	336	340	343	347	350
7	354	357	361	364	368	371	374	378	381	385	388	392
8	395	399	402	406	413	416	420	427	430	427	430	433
9	437	440	444	447	451	454	458	461	465	468	472	475
10	479	482	485	489	492	496	499	503	506	510	513	517
11	520	524	527	530	534	537	541	544	548	551	555	558
12	562	565	569	572	575	579	582	586	589	593	596	600
13	603	607	610	614	617	621	624	627	631	634	638	641
14	645	648	652	655	659	662	666	669	672	676	679	683
15	686	690	693	697	700	704	707	711	714	717	721	724
16	728	731	735	738	742	745	749	752	756	759	762	766
17	769	773	776	780	783	787	790	794	797	801	804	807
18	811	814	818	821	825	828	832	835	839	842	846	849
19	852	856	859	863	866	870	873	877	880	884	887	891
20	894	897	901	904	908	911	915	918	922	925	929	932
21	936	939	942	946	949	953	956	960	963	967	970	974
22	977	981	984	987	991	994	998	1001	1005	1008	1012	1015
23	1019	1022	1026	1029	1032	1036	1039	1043	1046	1050	1053	1057
24	1060	1064	1067	1071	1074	1077	1081	1084	1088	1091	1095	1098
25	1102	1105	1109	1112	1116	1119	1122	1126	1129	1133	1136	1140
26	1143	1147	1150	1154	1157	1161	1164	1167	1171	1174	1178	1181
27	1185	1188	1192	1195	1199	1202	1206	1209	1212	1216	1219	1223
28	1226	1230	1233	1237	1240	1244	1247	1251	1254	1257	1261	1264
29	1268	1271	1275	1278	1282	1285	1289	1292	1295	1299	1302	1306
30	1309	1313	1316	1320	1323	1327	1330	1334	1337	1340	1344	1347
31	1351	1354	1358	1361	1365	1368	1372	1375	1379	1382	1385	1389
32	1392	1396	1399	1403	1406	1410	1413	1417	1420	1424	1427	1430
33	1434	1437	1441	1444	1448	1451	1455	1458	1462	1465	1469	1472
34	1475	1479	1482	1486	1489	1493	1496	1500	1503	1507	1510	1514
35	1517	1520	1524	1527	1531	1534	1538	1541	1545	1548	1552	1555
36	1559	1562	1565	1569	1572	1576	1579	1583	1586	1590	1593	1597
37	1600	1604	1607	1610	1614	1617	1621	1624	1628	1631	1635	1638
38	1642	1645	1649	1652	1655	1659	1662	1666	1669	1673	1676	1680
39	1683	1687	1690	1694	1697	1700	1704	1707	1711	1714	1718	1721
40	1725	1728	1732	1735	1738	1742	1745	1749	1752	1756	1759	1763
41	1766	1770	1773	1777	1780	1783	1787	1790	1794	1797	1801	1804
42	1808	1811	1815	1818	1822	1825	1828	1832	1835	1839	1842	1846
43	1849	1853	1856	1860	1863	1867	1870	1873	1877	1880	1884	1887
44	1891	1894	1898	1901	1905	1908	1912	1915	1918	1922	1925	1929
45	1932	1936	1939	1943	1946	1950	1953	1957	1960	1963	1967	1970
46	1974	1977	1981	1984	1988	1991	1995	1998	2002	2005	2008	2012
47	2015	2019	2022	2026	2029	2033	2036	2040	2043	2047	2050	2053
48	2057	2060	2064	2067	2071	2074	2078	2081	2085	2088	2091	2095
49	2098	2102	2105	2109	2112	2116	2119	2123	2126	2130	2133	2136
50	2140	2143	2147	2150	2154	2157	2161	2164	2168	2171	2175	2178

# MAXIMUM ALLOWED TEST VOLTAGE - 2 GA

CLASS K - 20°C

FEEET	1	2	3	4	5	6	7	8	9	10	11	INCHES
51	2181	2185	2188	2192	2195	2199	2202	2206	2209	2213	2216	2220
52	2223	2226	2230	2233	2237	2240	2244	2247	2251	2254	2258	2261
53	2265	2268	2271	2275	2278	2282	2285	2289	2292	2296	2299	2303
54	2306	2310	2313	2316	2320	2323	2327	2330	2334	2337	2341	2344
55	2348	2351	2355	2358	2361	2365	2368	2372	2375	2379	2382	2386
56	2389	2393	2396	2400	2403	2406	2410	2413	2417	2420	2424	2427
57	2431	2434	2438	2441	2444	2448	2451	2455	2458	2462	2465	2469
58	2472	2476	2479	2483	2486	2489	2493	2496	2500	2503	2507	2510
59	2514	2517	2521	2524	2528	2531	2534	2538	2541	2545	2548	2552
60	2555	2559	2562	2566	2569	2573	2576	2579	2583	2586	2590	2593
61	2597	2600	2604	2607	2611	2614	2618	2621	2624	2628	2631	2635
62	2638	2642	2645	2649	2652	2656	2659	2663	2666	2669	2673	2676
63	2680	2683	2687	2690	2694	2697	2701	2704	2708	2711	2714	2718
64	2721	2725	2728	2732	2735	2739	2742	2746	2749	2752	2756	2759
65	2763	2766	2770	2773	2777	2780	2784	2787	2791	2794	2797	2801
66	2804	2808	2811	2815	2818	2822	2825	2829	2832	2836	2839	2842
67	2846	2849	2853	2856	2860	2863	2867	2870	2874	2877	2881	2884
68	2887	2891	2894	2898	2901	2905	2908	2912	2915	2919	2922	2926
69	2929	2932	2936	2939	2943	2946	2950	2953	2957	2960	2964	2967
70	2971	2974	2977	2981	2984	2988	2991	2995	2998	3002	3005	3009
71	3012	3016	3019	3022	3026	3029	3033	3036	3040	3043	3047	3050
72	3054	3057	3061	3064	3067	3071	3074	3078	3081	3085	3088	3092
73	3095	3099	3102	3105	3109	3112	3116	3119	3123	3126	3130	3133
74	3137	3140	3144	3147	3150	3154	3157	3161	3164	3168	3171	3175
75	3178	3182	3185	3189	3192	3195	3199	3202	3206	3209	3213	3216
76	3220	3223	3227	3230	3234	3237	3240	3244	3247	3251	3254	3258
77	3261	3265	3268	3272	3275	3279	3282	3285	3289	3292	3296	3299
78	3303	3306	3310	3313	3317	3320	3324	3327	3330	3334	3337	3341
79	3344	3348	3351	3355	3358	3362	3365	3369	3372	3375	3379	3382
80	3386	3389	3393	3396	3400	3403	3407	3410	3413	3417	3420	3424
81	3427	3431	3434	3438	3441	3445	3448	3452	3455	3458	3462	3465
82	3469	3472	3476	3479	3483	3486	3490	3493	3497	3500	3503	3507
83	3510	3514	3517	3521	3524	3528	3531	3535	3538	3542	3545	3548
84	3552	3555	3559	3562	3566	3569	3573	3576	3580	3583	3587	3590
85	3593	3597	3600	3604	3607	3611	3614	3618	3621	3625	3628	3632
86	3635	3638	3642	3645	3649	3652	3656	3659	3663	3666	3670	3673
87	3677	3680	3683	3687	3690	3694	3697	3701	3704	3708	3711	3715
88	3718	3722	3725	3728	3732	3735	3739	3742	3746	3749	3753	3756
89	3760	3763	3766	3770	3773	3777	3780	3784	3787	3791	3794	3798
90	3801	3805	3808	3811	3815	3818	3822	3825	3829	3832	3836	3839
91	3843	3846	3850	3853	3856	3860	3863	3867	3870	3874	3877	3881
92	3884	3888	3891	3895	3898	3901	3905	3908	3912	3915	3919	3922
93	3926	3929	3933	3936	3940	3943	3946	3950	3953	3957	3960	3964
94	3967	3971	3974	3978	3981	3985	3988	3991	3995	3998	4002	4005
95	4009	4012	4016	4019	4023	4026	4030	4033	4036	4040	4043	4047
96	4050	4054	4057	4061	4064	4068	4071	4074	4078	4081	4085	4088
97	4092	4095	4099	4102	4106	4109	4113	4116	4119	4123	4126	4130
98	4133	4137	4140	4144	4147	4151	4154	4158	4161	4164	4168	4171
99	4175	4178	4182	4185	4189	4192	4196	4199	4203	4206	4209	4213
100	4216	4220	4223	4227	4230	4234	4237	4241	4244	4248	4251	4254