PBX SYSTEMS
RANGE CHART
TRUNK AND STATION CONDUCTOR LOOP RANGES FOR PBXs CONNECTED TO NO. 1 CROSSBAR CENTRAL OFFICES HAVING 1300-OHM SUBSCRIBER CONDUCTOR LOOP 400-OHM TALKING BATTERY FEED CIRCUIT AC-DC OR SUPERIMPOSED RINGING (84-88V AC COMPONENT) OFFICE VOLTAGE OF 48V (FLOATING)

TABLE OF CONTENTS

1. PURPOSE

1.01 The following pages show the permissible trunk and station conductor loop ranges of all commonly used PBXs connected to No. 1 crossbar central offices having an individual subscriber's conductor loop range of 1300 ohms, operating at an office voltage of 48V (floating) and AC-DC or superimposed ringing voltage of 84-88V (AC component) and having 400-ohm talking battery feed circuits. The trunk conductor loop ranges shown are the permissible resistance in ohms of the conductors between the central office main frame and the PBX main frame or terminal. The station conductor loop ranges shown are the permissible resistance in ohms of the conductors between the PBX main frame or terminal and the station telephone connecting block.

1.02 Where the ranges herein must be exceeded, long line equipment will be required. PBX ranges with long line circuits are covered in SD-96328-01, "Range Chart for PBXs for Use in Connection With Long Line Circuits".

1.03 Where PBX stations are provided with No. 1A or 1A1 key telephone systems the station ranges will usually be less than a regular PBX extension telephone. Ranges for these key telephone systems are shown in SD-69228-01,

"Station Systems Range Chart for No. 1A and 1A1 Key Telephone Systems Working Into Dial Central Offices, PBXs and Long Line Circuits in Dial Areas."

1.04 This range chart supersedes the use of data found on SD drawings and CD sheets under the caption "Working Limits" and range information in PBX Key Sheets, for establishing PBX ranges in this 1300 ohm No. 1 crossbar central office.

2. EXPLANATION OF CHARTS

2.01 Range data for each PBX situation is shown in a simple twin column of figures. The left column headed "Trk", contains the trunk conductor loop ranges with the corresponding permissible station conductor loop ranges in the right column headed "Sta." For example, the ranges for a 505- or 506-type cordless PBX powered from a 10-cell local battery are shown as follows:

TRK	STA
0	350
900	350
*	*
990	300
√	√
1290	0

(a) The two top pairs of figures show that 350 ohms is the maximum permissible station range and is satisfactory with any trunk loop between 0 and 900 ohms. When the trunk exceeds 900 ohms, performance of the PBX supervisory relay requires a reduction below 350 ohms of the station range.

(b) The asterisk (*) refers the chart user to an intermediate table for details of ranges as determined by PBX supervision on a trunk call. At 990 ohms trunk and above, PBX performance is not the limiting factor. The ranges here are limited by the central office in a through-dial or night connection. Briefly stated, the sum of the PBX trunk range and the PBX station range cannot exceed the central office subscriber conductor loop ranges less the resistance of the series relay or relays in the PBX. The check mark (√) refers the chart user to a note to this effect. The use of this note and of the intermediate table eliminates any need for interpolation to determine values intermediate to those set down on the basic table.

2.02 There are many of the twin columns under each PBX. These are necessary to provide comprehensive data for all combinations of PBX power supply and arrangements and options in the PBX circuits. Footnotes are employed to cover deviations from the basic range data where required by variations in traffic and circuit conditions.

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)

5. **505C, 506A, AND 506B PBXs**

LOCAL BATTERY								LOCAL RECTIFIER 101G		DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF:					
8 Cells		9 Cells		10 Cells		11 Cells				12 Volts		15 Volts		18 Volts	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	150	0	250	0	350	0	450	0	250	0	50	0	200	0	350
1140	150	1040	250	900	350	770	450	1040	250	1240	50	1090	200	900	350
√	√	√	√	*	*	*	*	√	√	√	√	√	√	*	*
1290	0	1290	0	990	300	990	300	1290	0	1290	0	1290	0	990	300
				√	√	√	√							√	√
				1290	0	1290	0							1290	0

16. √Deduct the known trunk conductor loop resistance from 1290 ohms to obtain the permis-
17. sible station conductor loop resistance. Where the station conductor loop resistance
18. is known, deduct this value from 1290 ohms to obtain the permissible trunk conductor
19. loop resistance.

20. *Find the trunk value nearest the known trunk conductor loop resistance in the Inter-
21. mediate Table and read the corresponding station value. Or, if the station conductor
22. loop resistance is known, find the nearest station value and read the corresponding
23. trunk value.

24. ***INTERMEDIATE TABLE**

Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
770	450	820	410	875	370	930	330
780	440	835	400	885	360	950	320
790	430	845	390	900	350	970	310
805	420	860	380	915	340	990	300

30. **507A AND 507B PBXs**

31. **STATION LINES EQUIPPED WITH K2 LAMPS — NO LINE RELAY**

LOCAL BATTERY						LOCAL RECTIFIER 101G	
9 Cells		10 Cells		11 Cells			
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	90	0	185	0	280	0	90
1190	90	1095	185	1000	280	1190	90
√	√	√	√	√	√	√	√
1280	0	1280	0	1280	0	1280	0

40.

DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF:															
16V		18V		20V		22V		24V		26V		28V		30V		32V	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	90	0	185	0	280	0	375	0	470	0	565	0	660	0	760	0	855
1190	90	1095	185	1000	280	905	375	810	470	715	565	620	660	520	760	425	855
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
1280	0	1280	0	1280	0	1280	0	1280	0	1280	0	1280	0	1280	0	1280	0

47. **STATION LINES EQUIPPED WITH LINE RELAY**

LOCAL BATTERY						LOCAL RECTIFIER 101G		DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF:					
9 Cells		10 Cells		11 Cells				16 Volts		18 Volts		20V and Up	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	695	0	850	0	1005	0	695	0	695	0	850	0	1005
585	695	430	850	275	1005	585	695	585	695	430	850	275	1005
√	√	√	√	√	√	√	√	√	√	√	√	√	√
1280	0	1280	0	1280	0	1280	0	1280	0	1280	0	1280	0

56. √Deduct the known trunk conductor loop resistance from 1280 ohms to obtain the permissible
57. station conductor loop resistance. Where the station conductor loop resistance is known,
58. deduct this value from 1280 ohms to obtain the permissible trunk conductor loop resistance.

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)

5. **550C, 550SC, 551A, 551B AND 551D PBXs WITH B42 (IRON) CORD SUPERVISORY RELAYS**

6. **STATION LINES EQUIPPED WITH SINGLE B2 LAMPS — NO LINE RELAY**

LOCAL BATTERY							
8 Cells		9 Cells		10 Cells		11 Cells	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	105	0	155	0	210	0	265
640	105	530	155	430	210	340	265
*	*	*	*	*	*	*	*
975	0	975	0	975	0	975	0

LOCAL RECTIFIER			
101G		101J	
Trk	Sta	Trk	Sta
0	105	0	155
640	105	530	155
*	*	*	*
975	0	975	0

DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V	
Trk	Sta
0	105
640	105
*	*
975	0

STATION LINES EQUIPPED WITH TWO B2 LAMPS IN MULTIPLE — NO LINE RELAY

LOCAL BATTERY							
8 Cells		9 Cells		10 Cells		11 Cells	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	25	0	65	0	100	0	140
870	25	740	65	650	100	560	140
*	*	*	*	*	*	*	*
975	0	975	0	975	0	975	0

LOCAL RECTIFIER			
101G		101J	
Trk	Sta	Trk	Sta
0	25	0	65
870	25	740	65
*	*	*	*
975	0	975	0

DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V	
Trk	Sta
0	25
870	25
*	*
975	0

STATION LINES EQUIPPED WITH LINE RELAY

LOCAL BATTERY							
8 Cells		9 Cells		10 Cells		11 Cells	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	105	0	155	0	210	0	265
640	105	530	155	425	210	340	265
*	*	*	*	*	*	*	*
975	0	975	0	975	0	975	0

LOCAL RECTIFIER			
101G		101J	
Trk	Sta	Trk	Sta
0	105	0	155
640	105	530	155
*	*	*	*
975	0	975	0

DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V	
Trk	Sta
0	105
640	105
*	*
975	0

STATION LINES EQUIPPED WITH G2 LAMPS — NO LINE RELAY — 8 CELL LOCAL BATTERY ONLY

NUMBER OF G2 LAMPS							
One		Two		Three		Four	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	105	0	80	0	30	0	5
640	105	700	80	845	30	950	5
*	*	*	*	*	*	975	0
975	0	975	0	975	0		

*Find the trunk value nearest the known trunk conductor loop resistance in the Intermediate Table and read the corresponding station value. Or, if the station conductor loop resistance is known, find the nearest station value and read the corresponding trunk value.

***INTERMEDIATE TABLE**

Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
340	265	425	210	520	160	625	110	750	60	890	20
365	250	440	200	540	150	650	100	780	50	910	15
380	240	460	190	560	140	675	90	810	40	930	10
395	230	480	180	580	130	700	80	845	30	950	5
410	220	500	170	600	120	725	70	870	25	975	0

Where central office trunks are equipped with the following ring-up bridges, the maximum trunk conductor loop resistance will be limited to the values shown below.

RING-UP BRIDGES	MAXIMUM TRUNK CONDUCTOR LOOP RESISTANCE
E4 Relay and 1 uf Capacitor	800 ohms
E4 Relay, 1 uf Capacitor and Thermistor	650 ohms
257A Relay, 1 uf Capacitor and Thermistor	750 ohms

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)

5. **551A, 551B, AND 551D PBXs WITH B1088 (PERMALLOY) CORD SUPERVISORY RELAYS**

6. **STATION LINES EQUIPPED WITH SINGLE B2 LAMPS — NO LINE RELAY**

LOCAL BATTERY							
8 Cells		9 Cells		10 Cells		11 Cells	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	165	0	245	0	320	0	395
900	165	710	245	565	320	460	395
*	*	*	*	*	*	*	*
1285	0	1285	0	1285	0	1285	0

LOCAL RECTIFIER			
101G		101J	
Trk	Sta	Trk	Sta
0	165	0	245
900	165	710	245
*	*	*	*
1285	0	1285	0

DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V	
Trk	Sta
0	165
900	165
*	*
1285	0

15. **STATION LINES EQUIPPED WITH TWO B2 LAMPS IN MULTIPLE — NO LINE RELAY**

LOCAL BATTERY							
8 Cells		9 Cells		10 Cells		11 Cells	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	25	0	65	0	100	0	140
1260	25	1220	65	1095	100	965	140
*	*	*	*	*	*	*	*
1285	0	1285	0	1285	0	1285	0

LOCAL RECTIFIER			
101G		101J	
Trk	Sta	Trk	Sta
0	25	0	65
1260	25	1220	65
*	*	*	*
1285	0	1285	0

DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V	
Trk	Sta
0	25
1260	25
*	*
1285	0

24. **STATION LINES EQUIPPED WITH LINE RELAY**

LOCAL BATTERY							
8 Cells		9 Cells		10 Cells		11 Cells	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	260	0	335	0	410	0	485
680	260	540	335	440	410	360	485
*	*	*	*	*	*	*	*
1285	0	1285	0	1285	0	1285	0

LOCAL RECTIFIER			
101G		101J	
Trk	Sta	Trk	Sta
0	260	0	335
680	260	540	335
*	*	*	*
1285	0	1285	0

DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V	
Trk	Sta
0	260
680	260
*	*
1285	0

33. **STATION LINES EQUIPPED WITH G2 LAMPS — NO LINE RELAY — 8 CELL LOCAL BATTERY ONLY**

NUMBER OF G2 LAMPS							
One		Two		Three		Four	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	260	0	80	0	30	0	5
680	260	1160	80	1255	30	1280	5
*	*	*	*	*	*	1285	0
1285	0	1285	0	1285	0		

41. *Find the trunk value nearest the known trunk conductor loop resistance in the Intermediate Table and read the corresponding station value. Or, if the station conductor loop resistance is known, find the nearest station value and read the corresponding trunk value.

44. ***INTERMEDIATE TABLE**

Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
360	485	430	420	520	350	640	280	785	210	965	140	1200	70
365	480	440	410	535	340	660	270	805	200	995	130	1225	60
375	470	455	400	550	330	680	260	830	190	1030	120	1235	50
385	460	465	390	565	320	700	250	855	180	1060	110	1245	40
395	450	480	380	580	310	720	240	880	170	1095	100	1255	30
410	440	495	370	600	300	740	230	910	160	1125	90	1265	20
420	430	505	360	620	290	760	220	935	150	1160	80	1275	10

53. The above ranges are based on a 120-ohm coil in the attendant's dial circuit per Fig. A, SD-66572-01. Where the boards are equipped with 440-ohm coils, the maximum permissible trunk conductor loop resistance is 1060 ohms.

56. For PBXs having the following trunk ring-up bridges, the maximum allowable trunk conductor loop resistance should not exceed 800 ohms for the E4 Relay with 1 uf capacitor; 1000 ohms for the No. 257A relay with 1 uf capacitor; 650 ohms for the E4 relay with 1 uf capacitor and thermistor; 750 ohms for the 257A relay with 1 uf capacitor and thermistor.

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)

5. **552A, 552B, 552D, 552E, AND 605A PBXs**

6. **17 Cell Local Battery**

One 2T Lamp		One K2 Lamp		Two K2 Lamps		Three K2 Lamps		Four K2 Lamps		R603 Line Relay		R1910 Line Relay		EA30 Line Relay	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	10	0	850	0	410	0	235	0	160	0	1180	0	425	0	1180
1270	10	430	850	870	410	1045	235	1120	160	100	1180	855	425	100	1180
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
1280	0	1280	0	1280	0	1280	0	1280	0	1280	0	1280	0	1280	0

7. **18 Cell Local Battery**

One 2T Lamp		One K2 Lamp		Two K2 Lamps		Three K2 Lamps		Four K2 Lamps		R603 Line Relay		R1910 Line Relay		EA30 Line Relay	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	80	0	945	0	455	0	265	0	185	0	1280	0	530	0	1280
1200	80	335	945	825	455	1015	265	1095	185	√	√	750	530	√	√
√	√	√	√	√	√	√	√	√	√	1280	0	√	√	1280	0
1280	0	1280	0	1280	0	1280	0	1280	0			1280	0		

8. **48V Power Plant — Ampere Hour Meter Regulation (44V Minimum)**

One 2Y Lamp		One C2 Lamp		Two C2 Lamps		Three C2 Lamps		Four C2 Lamps		R603 Line Relay		R1910 Line Relay		EA30 Line Relay	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	175	0	960	0	465	0	270	0	190	0	1280	0	940	0	1280
1105	175	320	960	815	465	1010	270	1090	190	√	√	340	940	√	√
√	√	√	√	√	√	√	√	√	√	1280	0	√	√	1280	0
1280	0	1280	0	1280	0	1280	0	1280	0			1280	0		

9. **48V Power Plant — Voltage Regulation (48V Minimum)**

One 2Y Lamp		One C2 Lamp		Two C2 Lamps		Three C2 Lamps		Four C2 Lamps		R603 Line Relay		R1910 Line Relay		EA30 Line Relay	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	325	0	1130	0	550	0	330	0	230	0	1280	0	1145	0	1280
955	325	150	1130	730	550	950	330	1050	230	√	√	135	1145	√	√
√	√	√	√	√	√	√	√	√	√	1280	0	√	√	1280	0
1280	0	1280	0	1280	0	1280	0	1280	0			1280	0		

√Deduct the known trunk conductor loop resistance from 1280 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 1280 ohms to obtain the permissible trunk conductor loop resistance.

The above ranges are based on dial circuit SD-66425-01, Fig. 2, or dial circuit SD-66425-01, Fig. 1 modified per SD-66574-01, Fig. 2 and E. Where boards are equipped with 440-ohm coils per Fig. 1, SD-66425-01, the maximum permissible trunk is 1060 ohms.

These circuits should be modified per SD-66574-01, Fig. 2 and G, by replacing the 18BH resistor by a 500-ohm No. 18AC resistor, and shunting the T1 and R1 capacitors with 100,000-ohm KS-8058 resistors where the trunk loop exceeds 600 ohms.

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)
5. **555 PBX**
6. **STATION LINES EQUIPPED WITH K2 LAMPS — NO LINE RELAY**
7. **Direct Feeders from Central Office or Building Battery Engineered for a Minimum PBX Voltage of:**

16 VOLTS		18 VOLTS		20 VOLTS		22 VOLTS		24 VOLTS	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	90	0	180	0	275	0	370	0	470
1010	90	760	180	570	275	430	370	320	470
*	*	*	*	*	*	*	*	*	*
1265	0	1265	0	1265	0	1265	0	1265	0

16 VOLTS with 100 Ohm Pad Resistor Added #		18 VOLTS with 100 Ohm Pad Resistor Added #		20 VOLTS with 100 Ohm Pad Resistor Added #		22 VOLTS with 200 Ohm Pad Resistor Added #		24 VOLTS with 200 Ohm Pad Resistor Added #	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	90	0	180	0	275	0	370	0	470
1175	90	1085	180	990	275	895	370	795	470
√	√	√	√	√	√	√	√	√	√
1265	0	1265	0	1265	0	1265	0	1265	0

26 VOLTS		28 VOLTS		30 VOLTS		32 VOLTS		34 VOLTS	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	560	0	655	0	750	0	850	0	940
235	560	165	655	105	750	55	850	10	940
*	*	*	*	*	*	*	*	*	*
1265	0	1265	0	1265	0	1265	0	1265	0

26 VOLTS with 200 Ohm Pad Resistor Added #		28 VOLTS with 200 Ohm Pad Resistor Added #		30 VOLTS with 200 Ohm Pad Resistor Added #		32 VOLTS with 200 Ohm Pad Resistor Added #		34 VOLTS with 200 Ohm Pad Resistor Added #	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	560	0	655	0	750	0	850	0	940
705	560	610	655	515	750	415	850	325	940
√	√	√	√	√	√	√	√	√	√
1265	0	1265	0	1265	0	1265	0	1265	0

Powered by Local PBX Power Plant

9 CELL BATTERY		10 CELL BATTERY		11 CELL BATTERY		101G RECTIFIER		KS-15668 RECTIFIER	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	90	0	180	0	275	0	90	0	850
1010	90	760	180	570	275	1010	90	55	850
*	*	*	*	*	*	*	*	*	*
1265	0	1265	0	1265	0	1265	0	1265	0

9 CELL BATTERY with 100 Ohm Pad Resistor Added #		10 CELL BATTERY with 100 Ohm Pad Resistor Added #		11 CELL BATTERY with 100 Ohm Pad Resistor Added #		101G RECTIFIER with 100 Ohm Pad Resistor Added #		KS-15668 RECTIFIER with 200 Ohm Pad Resistor Added #	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	90	0	180	0	275	0	90	0	850
1175	90	1085	180	990	275	1175	90	415	850
√	√	√	√	√	√	√	√	√	√
1265	0	1265	0	1265	0	1265	0	1265	0

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. **555 PBX (Continued)**

2. **STATION LINES EQUIPPED WITH UA97 LINE RELAYS**

3. **Direct Feeders from Central Office or Building Battery Engineered for a Minimum PBX Voltage of:**

16 VOLTS		18 VOLTS		20 VOLTS		22V AND UP	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	475	0	660	0	855	0	965
315	475	160	660	50	855	*	*
*	*	*	*	*	*	1265	0
1265	0	1265	0	1265	0		

16 VOLTS with 200 Ohm Pad Resistor Added #		18 VOLTS with 200 Ohm Pad Resistor Added #		20 VOLTS with 200 Ohm Pad Resistor Added #		22 VOLTS with 200 Ohm Pad Resistor Added #		24 VOLTS with 200 Ohm Pad Resistor Added #		26V AND UP with 200 Ohm Pad Resistor Added #	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	475	0	660	0	855	0	1040	0	1235	0	1265
790	475	605	660	410	855	225	1040	30	1235	√	√
√	√	√	√	√	√	√	√	√	√	1265	0
1265	0	1265	0	1265	0	1265	0	1265	0		

Powered by Local PBX Power Plant

9 CELL BATTERY		10 CELL BATTERY		11 CELL BATTERY		101G RECTIFIER		KS-15668 RECTIFIER	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	475	0	660	0	855	0	475	0	965
315	475	160	660	50	855	315	475	*	*
*	*	*	*	*	*	*	*	1265	0
1265	0	1265	0	1265	0	1265	0		

9 CELL BATTERY with 200 Ohm Pad Resistor Added #		10 CELL BATTERY with 200 Ohm Pad Resistor Added #		11 CELL BATTERY with 200 Ohm Pad Resistor Added #		101G RECTIFIER with 200 Ohm Pad Resistor Added #		KS-15668 RECTIFIER with 200 Ohm Pad Resistor Added #	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	475	0	660	0	855	0	475	0	1265
790	475	605	660	410	855	790	475	√	√
√	√	√	√	√	√	√	√	1265	0
1265	0	1265	0	1265	0	1265	0		

#These columns show the range improvement that can be obtained by connecting a pad resistor in series with the 150-ohm cord bridge. The pad resistor may be either 100 or 200 ohms whichever affords the best over-all range. The 300-ohm pad resistor does not give any further increase in range.

√Deduct the known trunk conductor loop resistance from 1265 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 1265 ohms to obtain the permissible trunk conductor loop resistance.

*Find the trunk value nearest the known trunk conductor loop resistance in the Intermediate Table and read the corresponding station value. Or, if the station conductor loop resistance is known, find the nearest station value and read the corresponding trunk value.

***INTERMEDIATE TABLE**

Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	965	100	760	200	610	300	490	405	390	550	290	740	190	1010	90
10	940	110	745	210	595	310	480	420	380	565	280	760	180	1040	80
20	920	120	730	220	580	320	470	430	370	580	270	785	170	1080	70
30	900	130	710	230	565	330	460	445	360	600	260	810	160	1120	60
40	880	140	695	240	555	340	450	460	350	615	250	835	150	1160	50
50	860	150	680	250	545	350	440	420	340	635	240	860	140	1200	40
60	840	160	665	260	535	360	430	485	330	655	230	890	130	1235	30
70	820	170	650	270	520	370	420	500	320	675	220	920	120	1245	20
80	800	180	635	280	510	380	410	515	310	695	210	950	110	1255	10
90	780	190	620	290	500	390	400	530	300	720	200	980	100	1265	0

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)
5. 48V PBX Power Plant with Voltage Regulation (48V Minimum)

6. **607A PBX**

Trk	Sta
0	975
305	975
√	√
1060	220
1060	0

13. √Deduct the known trunk conductor loop resistance from 1280 ohms to obtain the permis-
14. sible station conductor loop resistances. Where the station conductor loop resist-
15. ance is known, deduct this value from 1280 ohms to obtain the permissible trunk con-
16. ductor loop resistance.

17. **608A PBX**

Line Relay		One K2 Lamp		Two K2 Lamps		Three K2 Lamps		Four K2 Lamps		Five K2 Lamps		Six K2 Lamps	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	1215	0	870	0	380	0	200	0	150	0	100	0	70
65	1215	410	870	900	380	1080	200	1130	150	1180	100	1210	70
√	√	√	√	√	√	√	√	√	√	√	√	√	√
1280	0	1280	0	1280	0	1280	0	1280	0	1280	0	1280	0

25. √Deduct the known trunk conductor loop resistance from 1280 ohms to obtain the permis-
26. sible station conductor loop resistance. Where the station conductor loop resist-
27. ance is known, deduct this value from 1280 ohms to obtain the permissible trunk con-
28. ductor loop resistance.

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)

5. **701A, 701B, OR 740AX PBXs (USED WITH 552A, 552D, 605A, 607A, OR 608A MANUAL SWITCHBOARDS)**
6. **AND 711A AND 711B PBXs**

7. **Dial Station Lines and 2-Way Trunks — Manual and Dial Selected with Toll Diversion**

701A or 711A PBXs							
Amp Hr Meter Reg (44V Min.)				Voltage Reg 48V (Min.)			
Line Relay Adj. "A"		Line Relay Adj. "B"		Line Relay Adj. "A"		Line Relay Adj. "B"	
Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	370	0	495	0	515	0	660
830	370	705	495	685	515	540	660
√	√	√	√	√	√	√	√
1200	0	1200	0	1200	0	1200	0

701B, 711B and 740AX PBXs	
Voltage Reg and Amp Hr Meter Reg	
Trk	Sta
0	885
315	885
√	√
1200	0

17. √Deduct the known trunk conductor loop resistance from 1200 ohms to obtain the permis-
18. sible station conductor loop resistance. Where the station conductor loop resistance
19. is known, deduct this value from 1200 ohms to obtain the permissible trunk conductor
20. loop resistance.

21. **Dial Station Lines and 2-Way Trunks — Manual and Dial Selected (No Toll Diversion)**
22. Add 25 ohms to the above trunk values.

23. **Dial Station Lines and One-Way Outgoing Dial Selected Trunks with Toll Diversion**
24. Add 20 ohms to the above trunk values.

25. **Dial Station Lines and One-Way Outgoing Dial Selected Trunk — No Toll Diversion**
26. Add 45 ohms to the above trunk values.

27. The above ranges apply where trunks per SD-65657-01, SD-66607-01, or SD-66618-01 are
28. used with a capacitive shunt on the "S" relay and where the earth potential at the PBX
29. with respect to the central office does not exceed ±10 volts.

30. Where trunks per SD-66442-01, SD-66443-01, SD-66051-01, SD-66274-01, or SD-66052-01 are
31. used, a ground start resistance of 488 ohms must be used to obtain the trunk ranges
32. shown above at ±10 volts earth potential. Where the 268-ohm ground start resistance
33. is used the above values apply with earth potentials from −10 to +6 volts. With earth
34. potentials of +7 volts or more, the maximum trunk conductor loop resistance, depending
35. upon the type of dial tone coil and pulsing relay used in the central office subscriber's
36. sender is shown below.

Dial Tone Coil		142A	142A	142B	142B
Pulsing Relay		280W	239HE	280W	239HE
Earth Potential (Volts)	+7	1190	1230	1230	—
	+8	1120	1160	1155	1195
	+9	1050	1100	1080	1130
	+10	990	1040	1010	1070

43. When the trunk plus station range is 750 ohms or less, the "S" relay of SD-66442-01,
44. SD-66274-01, SD-66443-01, SD-66051-01 and SD-66052-01 may be shunted by its 40-ohm
45. noninductive winding if the capacitor is not required to reduce the unbalance caused
46. by the "S" relay.

47. **Dial Station Lines with 2-Way Manual Central Office Trunks**
48. Add 80 ohms to the above trunk values.

49. **Manual Station Line with 2-Way Manual Central Trunks**
50. Refer to the appropriate page in this chart for the manual switchboard used.

51. **Manual Station Lines with 2-Way Manual and Dial Selected Trunks**
52. The maximum trunk should not exceed the permissible range as determined by earth po-
53. tential, etc, as noted in lines 27 to 42, inclusive. Otherwise the ranges are the same
54. as for manual station lines with two-way manual central office trunks less 80 ohms if
55. the trunk is arranged for toll diversion or 55 ohms if not so arranged.

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. **701A, 701B AND 740 AX PBXs USED WITH NO. 552A, 552D, 605A OR 607A MANUAL SWITCHBOARDS**
2. **Attendant Dial Circuits and Any Trunk Circuit**
3. The above ranges apply with No. 552A, 552D or 605A switchboards equipped with dial circuit
4. SD-66425-01, Fig. 2; or dial circuits SD-66425-01, Fig. 1 modified per SD-65574-01,
5. Fig. 2 and E. Where the No. 607A switchboard, or a No. 552A, 552D or 605A switchboard having
6. dial circuit per Fig. 1, SD-66425-01, is used, the maximum permissible trunk conductor
7. loop resistance is 1060 ohms with manual central office trunks; 980 ohms with manual
8. and dial selected trunks having toll diversion and 1005 ohms without toll diversion.

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)
5. 48V PBX Power Plant
6. Trunk Circuit SD-66274-01†
7. 0 to ±10 Volts Earth Potential at the PBX with Respect to the Central Office.
8. **740A AND 740B PBXs**
9. **Ampere Hour Meter Regulation and Voltage Regulation**

Trk	Sta
0	885
360	885
√	√
1245	0

√Deduct the known trunk conductor loop resistance from 1245 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known deduct this value from 1245 ohms to obtain the permissible trunk conductor loop resistance.

†For this trunk circuit the above values are applicable when a capacitive shunt is used across the "S" relay. When the trunk plus station range is 750 ohms or less, the "S" relay should be shunted by its 40-ohm noninductive secondary winding if the capacitor is not required to reduce the unbalance caused by the "S" relay.

The above values apply where a 488-ohm ground start resistance is used. Where a 265-ohm ground start resistance is used, the above values apply with earth potentials from −10 to +6 volts. With earth potentials of +7 volts or more, the maximum trunk conductor loop resistance, depending upon the type of dial tone coil and pulsing relay used in the central office subscriber's sender, is shown below.

Dial Tone Coil		142A	142A	142B	142B
Pulsing Relay		280W	239HE	280W	239HE
Earth Potential (Volts)	+7	1190	1230	1230	—
	+8	1120	1160	1155	1195
	+9	1050	1100	1080	1130
	+10	990	1040	1010	1070

Where toll diversion is furnished deduct 25 ohms from the "Trk" values shown.

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)
5. 48V PBX Power Plant with Voltage Regulation (48V Min.)

6. **740E DIAL PBX WITH A NO. 552A, 552D OR 605A MANUAL SWITCHBOARD#**

7. **#Dial Station Lines and 2-Way Trunks — Manual and Dial Selected with Toll Diversion**

Trk	Sta
0	885
315	885
√	√
1200	0

13. √Deduct the known trunk conductor loop resistance from 1200 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 1200 ohms to obtain the permissible trunk conductor loop resistance.

17. **#Dial Station Lines and 2-Way Trunks — Manual and Dial Selected (No Toll Diversion)**
18. Add 25 ohms to the above trunk values.

19. **#Dial Station Lines and One-Way Outgoing Dial Selected Trunks with Toll Diversion**
20. Add 20 ohms to the above trunk values.

21. **#Dial Station Lines and One-Way Outgoing Dial Selected Trunk — No Toll Diversion**
22. Add 45 ohms to the above trunk values.

23. **#Dial Station Lines with 2-Way Manual Central Office Trunks**
24. Add 80 ohms to the above trunk values.

25. **#Manual Station Lines with 2-Way Manual Central Office Trunks**
26. Refer to the appropriate page in this chart for the manual switchboard used.

27. **#Manual Station Lines with 2-Way Manual and Dial Selected Trunks**
28. The ranges are the same as for manual station lines to 2-way manual central office
29. trunks less 80 ohms if the trunk is arranged for toll diversion or 55 ohms if not
30. so arranged.

31. **#Attendant Dial Circuits and Any Trunk Circuit**
32. The above ranges apply where the manual switchboards are equipped with dial circuit
33. SD-66425-01 Fig. 2, or dial circuit SD-66425-01 Fig. 1 modified per SD-66574-01
34. Fig. 2 and E. Where the manual switchboard is equipped with dial circuit per
35. Fig. 1, SD-66425-01, the maximum permissible trunk conductor loop resistance is
36. 1060 ohms with manual central office trunks; 980 ohms with manual and dial selected
37. trunks having toll diversion and 1005 ohms without toll diversion.

38. **740E DIAL PBX WITH ATTENDANT KEY TEL SET OR 101A KEY EQPT SD-65725-01†**

39. **†Dial Station Lines and 2-Way Trunks — Manual and Dial Selected with Toll Diversion**

Trk	Sta
0	885
335	885
√√	√√
1220	0

45. √√Deduct the known trunk conductor loop resistance from 1220 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 1220 ohms to obtain the permissible trunk conductor loop resistance.

49. **†Dial Station Lines and 2-Way Trunks — Manual and Dial Selected (No Toll Diversion)**
50. Add 25 ohms to the above trunk values.

51. For the trunk circuit used the above values are applicable when a capacitive shunt
52. is used across the "S" relay.

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)
5. 48V PBX Power Plant with Voltage Regulation (48V Min.)

6. **740E DIAL PBX WITH A NO. 556 MANUAL SWITCHBOARD**

7. **Dial Station Lines and 2-Way Trunks — Manual and Dial Selected with Toll Diversion**

Trk	Sta
0	885
300	885
√	√
1185	0

13. √Deduct the known trunk conductor loop resistance from 1185 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 1185 ohms to obtain the permissible trunk conductor loop resistance.

17. **Dial Station Lines and 2-Way Trunks — Manual and Dial Selected (No Toll Diversion)**
18. Add 25 ohms to the above trunk values.

19. **Dial Station Lines and One-Way Outgoing Dial Selected Trunks with Toll Diversion**
20. Add 35 ohms to the above trunk values.

21. **Dial Station Lines and One-Way Outgoing Dial Selected Trunk — No Toll Diversion**
22. Add 60 ohms to the above trunk values.

23. **Dial Station Lines with 2-Way Manual Central Office Trunks**
24. Add 80 ohms to the above trunk values.

25. **Manual Station Line with 2-Way Manual Central Office Trunks**

150 Ohm Cord Bridge		Cord Bridge with 200 Ohm Pad Resistor Added #	
Trk	Sta	Trk	Sta
0	965	0	1265
*	*	√√	√√
1265	0	1265	0

31. √√Deduct the known trunk conductor loop resistance from 1265 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 1265 ohms to obtain the permissible trunk conductor loop resistance.

35. # This column shows the range improvement that can be obtained by connecting a 200-ohm pad resistor in series with the 150-ohm cord bridge.

37. *Find the trunk value nearest the known trunk conductor loop resistance in the Intermediate Table and read the corresponding station value. Or, if the station conductor loop resistance is known, find the nearest station value and read the corresponding trunk value.

40. ***INTERMEDIATE TABLE**

Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	965	100	760	200	610	300	490	405	390	550	290	740	190	1010	90
10	940	110	745	210	595	310	480	420	380	565	280	760	180	1040	80
20	920	120	730	220	580	320	470	430	370	580	270	785	170	1080	70
30	900	130	710	230	565	230	460	445	360	600	260	810	160	1120	60
40	880	140	695	240	555	340	450	460	350	615	250	835	150	1160	50
50	860	150	680	250	545	350	440	470	340	635	240	860	140	1200	40
60	840	160	665	260	535	360	430	485	330	655	230	890	130	1235	30
70	820	170	650	270	520	370	420	500	320	675	220	920	120	1245	20
80	800	180	635	280	510	380	410	515	310	695	210	950	110	1255	10
90	780	190	620	290	500	390	400	530	300	720	200	980	100	1265	0

52. **Manual Station Lines with 2-Way Manual and Dial Selected Trunks**
53. The ranges are the same as for manual station lines with 2-way manual central office trunks
54. less 80 ohms if the trunk is arranged for toll diversion or 55 ohms if not so arranged.

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)

5. **750A PBX**

6.

KEYLESS STATION	
Trk	Sta
0	285
965	285
√	√
1250	0

B1 LAMP	
Trk	Sta
0	50
1200	50
√	√
1250	0

552 RELAY AND AC OPERATED 51A LAMP	
Trk	Sta
0	75
1175	75
√	√
1250	0

13. √Deduct the known trunk conductor loop resistance from 1250 ohms to obtain the per-
14. missible station conductor loop resistance. Where the station conductor loop re-
15. sistance is known, deduct this value from 1250 ohms to obtain the permissible trunk
16. conductor loop resistance.

17. **755A PBX**

18.

USING DC OPERATED LAMP					
B2 Lamp		A1 Lamp		51A Lamp	
Trk	Sta	Trk	Sta	Trk	Sta
0	255	0	100	0	100
1025	255	1180	100	1180	100
√√	√√	√√	√√	√√	√√
1280	0	1280	0	1280	0

USING AC OPERATED 51A LAMP			
ST Relay UA16		ST Relay U6046	
Trk	Sta	Trk	Sta
0	310	0	275
970	310	1005	275
√√	√√	√√	√√
1280	0	1280	0

KEYLESS STATION	
U322 Line Relay	
Trk	Sta
0	330
950	330
√√	√√
1280	0

25. √√Deduct the known trunk conductor loop resistance from 1280 ohms to obtain the per-
26. missible station conductor loop resistance. Where the station conductor loop
27. resistance is known deduct this value from 1280 ohms to obtain the permissible
28. trunk conductor loop resistance.

PBX CONDUCTOR LOOP RANGES FOR NO. 1 CROSSBAR OFFICES

1. 1300-ohm Maximum Central Office Subscriber Conductor Loop
2. 48V Minimum Central Office Voltage (Floating)
3. 400-ohm Talking Battery Feed Circuit
4. 84-88 Central Office Ringing Voltage (AC Component)
5. 48V PBX Power Plant with Voltage Regulation (48V Min.)

6. **756A PBX WITH A 700A KEY TELEPHONE SET**

Trk	Sta
0	1240
√	√
1240	0

√Deduct the known conductor loop resistance from 1240 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 1240 ohms to obtain the permissible trunk conductor loop resistance.

15. **756A PBX WITH A NO. 556 MANUAL SWITCHBOARD#**

16. **#Dial Station Lines and One-Way Outgoing Dial Selected Trunks**
17. The ranges are the same as with the 700A key telephone set lines 8-10 above.

18. **#Manual Station Line with Two-Way Manual Central Office Trunks**

150 OHM CORD BRIDGE ONLY		CORD BRIDGE WITH 200-OHM PAD RESISTOR ADDED†	
Trk	Sta	Trk	Sta
0	965	0	1265
*	*	√√	√√
1265	0	1265	0

†This column shows the range improvement that can be obtained by connecting a 200-ohm pad resistor in series with the 150-ohm cord bridge.

√√Deduct the known trunk conductor loop resistance from 1265 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 1265 ohms to obtain the permissible trunk conductor loop resistance.

*Find the trunk value nearest the known trunk conductor loop resistance in the Intermediate Table and read the corresponding station value. Or, if the station conductor loop resistance is known, find the nearest station value and read the corresponding trunk value.

34. ***INTERMEDIATE TABLE**

Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta	Trk	Sta
0	965	100	760	200	610	300	490	405	390	550	290	740	190	1010	90
10	940	110	745	210	595	310	480	420	380	565	280	760	180	1040	80
20	920	120	730	220	580	320	470	430	370	580	270	785	170	1080	70
30	900	130	710	230	565	330	460	445	360	600	260	810	160	1120	60
40	880	140	695	240	555	340	450	460	350	615	250	835	150	1160	50
50	860	150	680	250	545	350	440	470	340	635	240	860	140	1200	40
60	840	160	665	260	535	360	430	485	330	655	230	890	130	1235	30
70	820	170	650	270	520	370	420	500	320	675	220	920	120	1245	20
80	800	180	635	280	510	380	410	515	310	695	210	950	110	1255	10
90	780	190	620	290	500	390	400	530	300	720	200	980	100	1265	0