

**PBX SYSTEMS
RANGE CHART
TRUNK AND STATION CONDUCTOR LOOP RANGES FOR
PBXs CONNECTED TO
PANEL CENTRAL OFFICES
HAVING 635-OHM SUBSCRIBER CONDUCTOR LOOP
50-OHM TALKING BATTERY FEED CIRCUIT
AC-DC OR SUPERIMPOSED RINGING
(72, 80, OR 84 VOLTS MINIMUM AC COMPONENT)
MINIMUM OFFICE VOLTAGE OF 21V (FLOATING)**

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central offices having an individual subscriber conductor loop range of 635 ohms, operating at a minimum office voltage of 21V (floating) and AC-DC or superimposed ringing voltage of 72, 80, or 84 volts (AC component) and having a 50-ohm talking battery feed circuit. 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 The ranges herein are based on 10 pulses-per-second dials. Where dials are 20 pulses per second, the maximum trunk conductor loop resistance is 450 ohms.

1. PURPOSE

1.01 The following pages show the permissible trunk and station conductor loop ranges of all commonly used PBXs connected to panel

1.05 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 635-ohm panel 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 cordless-type PBX powered from a 10-cell local battery are shown as follows.

| TRK | STA |
|-----|-----|
| 0 | 350 |
| 275 | 350 |
| √ | √ |
| 510 | 115 |
| 510 | 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 275 ohms. When the

trunk exceeds 275 ohms, 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 last two pairs of figures show that 510 ohms is the maximum permissible trunk range and is satisfactory with any station loop between 0 and 115 ohms.

(b) In the case of 550 or 551 PBXs with B42 cord supervisory relays, performance of the PBX supervisory relay is the limiting range factor. The asterisk (*) refers the chart user to an intermediate table for details of ranges as determined by PBX supervision on a trunk call. The use of the notes under the check mark (√) and asterisk (*) 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 635-OHM PANEL OFFICES**

1. 635-ohm Maximum Central Office Subscriber Conductor Loop
2. 21V Minimum Central Office Voltage (Floating)
3. 50-ohm Talking Battery Feed Circuit
4. 72, 80, or 84 Minimum Central Office Ringing Voltage (AC Component)
5. **505C, 506A, AND 506B PBXs**

| LOCAL BATTERY | | | | | | | | | LOCAL RECTIFIER | | DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF: | | | | | |
|---------------|-----|---------|-----|----------|-----|----------|-----|------|-----------------|----------|---|----------|-----|----------|-----|--|
| 8 Cells | | 9 Cells | | 10 Cells | | 11 Cells | | 101G | | 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 | |
| 475 | 150 | 375 | 250 | 275 | 350 | 175 | 450 | 375 | 250 | 510 | 50 | 425 | 200 | 275 | 350 | |
| √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | 510 | 0 | √ | √ | √ | √ | |
| 510 | 115 | 510 | 115 | 510 | 115 | 510 | 115 | 510 | 115 | 510 | 115 | 510 | 115 | 510 | 115 | |
| 510 | 0 | 510 | 0 | 510 | 0 | 510 | 0 | 510 | 0 | 510 | 0 | 510 | 0 | 510 | 0 | |

15. √Deduct the known trunk conductor loop resistance from 625 ohms to obtain the permissible trunk conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 625 ohms to obtain the permissible trunk conductor loop resistance.
16. Where adjustment "B" is used on the B-456 or B-207 relays in the central office battery feed circuit, the maximum trunk conductor loop resistance is 200 ohms.

21. **507A AND 507B PBXs**

STATION LINES EQUIPPED WITH K2 LAMPS — NO LINE RELAY

| LOCAL BATTERY | | | | | | LOCAL RECTIFIER | |
|---------------|-----|----------|-----|----------|-----|-----------------|-----|
| 9 Cells | | 10 Cells | | 11 Cells | | 101G | |
| Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta |
| 0 | 90 | 0 | 185 | 0 | 280 | 0 | 90 |
| 525 | 90 | 430 | 185 | 335 | 280 | 525 | 90 |
| √ | √ | √ | √ | √ | √ | √ | √ |
| 615 | 0 | 615 | 0 | 615 | 0 | 615 | 0 |

| 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 | | 26 Volts | | 28 Volts and Up | |
| 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 | 615 |
| 525 | 90 | 430 | 185 | 335 | 280 | 240 | 375 | 145 | 470 | 50 | 565 | √ | √ |
| √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | 615 | 0 |
| 615 | 0 | 615 | 0 | 615 | 0 | 615 | 0 | 615 | 0 | 615 | 0 | 615 | 0 |

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

| LOCAL BATTERY | | LOCAL RECTIFIER | | DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF: | | | |
|----------------|-----|-----------------|-----|---|--|-----|--|
| 9 Cells and Up | | 101G | | 16 Volts and Up | | | |
| Trk | Sta | Trk | Sta | Trk | | Sta | |
| 0 | 615 | 0 | 615 | 0 | | 615 | |
| √ | √ | √ | √ | √ | | √ | |
| 615 | 0 | 615 | 0 | 615 | | 0 | |

45. √Deduct the known trunk conductor loop resistance from 615 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 615 ohms to obtain the permissible trunk conductor loop resistance.
49. Where a trunk holding bridge consists of a No. 313A varistor in series with a 50-ohm inductor and adjustment "B" is used on the B-456 or B-207 relays in the central office battery feed circuit, the maximum allowable trunk conductor loop resistance is 400 ohms.

**PBX CONDUCTOR LOOP RANGES
FOR 635-OHM PANEL OFFICES**

1. 635-ohm Maximum Central Office Subscriber Conductor Loop
2. 21V Minimum Central Office Voltage (Floating)
3. 50-ohm Talking Battery Feed Circuit
4. 72, 80, or 84 Minimum Central Office Ringing Voltage (AC Component)
5. **550C, 550SC, 551A, 551B, AND 551D PBXs WITH B42 (IRON) CORD SUPERVISORY RELAYS**

STATION LINES EQUIPPED WITH SINGLE B2 LAMPS — NO LINE RELAY

| LOCAL BATTERY | | | | | | | | LOCAL RECTIFIER | | | | DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V | |
|---------------|-----|---------|-----|----------|-----|----------|-----|-----------------|-----|------|-----|--|-----|
| 8 Cells | | 9 Cells | | 10 Cells | | 11 Cells | | 101G | | 101J | | Trk | Sta |
| Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | | |
| 0 | 105 | 0 | 155 | 0 | 210 | 0 | 265 | 0 | 105 | 0 | 155 | 0 | 105 |
| 345 | 105 | 285 | 155 | 240 | 210 | 200 | 265 | 345 | 105 | 285 | 155 | 345 | 105 |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 495 | 0 | 495 | 0 | 495 | 0 | 495 | 0 | 495 | 0 | 495 | 0 | 495 | 0 |

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

| LOCAL BATTERY | | | | | | | | LOCAL RECTIFIER | | | | DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V | |
|---------------|-----|---------|-----|----------|-----|----------|-----|-----------------|-----|------|-----|--|-----|
| 8 Cells | | 9 Cells | | 10 Cells | | 11 Cells | | 101G | | 101J | | Trk | Sta |
| Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | | |
| 0 | 25 | 0 | 65 | 0 | 100 | 0 | 140 | 0 | 25 | 0 | 65 | 0 | 25 |
| 450 | 25 | 390 | 65 | 350 | 100 | 300 | 140 | 450 | 25 | 390 | 65 | 450 | 25 |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 495 | 0 | 495 | 0 | 495 | 0 | 495 | 0 | 495 | 0 | 495 | 0 | 495 | 0 |

STATION LINES EQUIPPED WITH LINE RELAY

| LOCAL BATTERY | | | | | | | | LOCAL RECTIFIER | | | | DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V | |
|---------------|-----|---------|-----|----------|-----|----------|-----|-----------------|-----|------|-----|--|-----|
| 8 Cells | | 9 Cells | | 10 Cells | | 11 Cells | | 101G | | 101J | | Trk | Sta |
| Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | | |
| 0 | 105 | 0 | 155 | 0 | 210 | 0 | 265 | 0 | 105 | 0 | 155 | 0 | 105 |
| 345 | 105 | 285 | 155 | 240 | 210 | 200 | 265 | 345 | 105 | 285 | 155 | 345 | 105 |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 495 | 0 | 495 | 0 | 495 | 0 | 495 | 0 | 495 | 0 | 495 | 0 | 495 | 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 |
| 345 | 105 | 370 | 80 | 445 | 30 | 485 | 5 |
| * | * | * | * | * | * | 495 | 0 |
| 495 | 0 | 495 | 0 | 495 | 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
42. loop resistance is known, find the nearest station value and read the corresponding
43. trunk value.

***INTERMEDIATE TABLE**

| Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 200 | 265 | 255 | 190 | 300 | 140 | 350 | 100 | 400 | 60 | 460 | 20 |
| 210 | 250 | 270 | 170 | 310 | 130 | 360 | 90 | 415 | 50 | 475 | 10 |
| 225 | 230 | 280 | 160 | 325 | 120 | 370 | 80 | 430 | 40 | 485 | 5 |
| 240 | 210 | 290 | 150 | 340 | 110 | 385 | 70 | 445 | 30 | 495 | 0 |

51. The No. 54B coils in early No. 550C dial circuits with E-type relays, and No. 17F coils in early
52. No. 550SC dial circuits with 206- and 207-type relays, shall be replaced by No. 54AA or 274AA
53. coils per SD-66501-01.
54. The above ranges are based on a 120-ohm coil in the attendant dial circuit per
55. Fig. A, SD-66572-01 or Fig. C, SD-66573-01. Where boards are equipped with 440-ohm
56. coils the maximum permissible trunk conductor loop resistance is 350 ohms.
57. Where the AC component of the central office ringing voltage is 72-80 volts, the
58. maximum allowable trunk conductor loop resistance for a trunk ring-up bridge consisting
59. of an E4 relay with a 1 uf capacitor and thermistor is 400 ohms; 450 ohms for a
60. bridge consisting of a No. 257A relay with a 1 uf capacitor and thermistor.

**PBX CONDUCTOR LOOP RANGES
FOR 635-OHM PANEL OFFICES**

1. 635-ohm Maximum Central Office Subscriber Conductor Loop
2. 21V Minimum Central Office Voltage (Floating)
3. 50-ohm Talking Battery Feed Circuit
4. 72, 80, or 84 Minimum 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 | | | | | | | | LOCAL RECTIFIER | | | | DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V | |
|---------------|-----|---------|-----|----------|-----|----------|-----|-----------------|-----|------|-----|--|-----|
| 8 Cells | | 9 Cells | | 10 Cells | | 11 Cells | | 101G | | 101J | | Trk | Sta |
| Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta |
| 0 | 165 | 0 | 245 | 0 | 320 | 0 | 395 | 0 | 165 | 0 | 245 | 0 | 165 |
| 455 | 165 | 375 | 245 | 300 | 320 | 225 | 395 | 455 | 165 | 375 | 245 | 455 | 165 |
| √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| 620 | 0 | 620 | 0 | 620 | 0 | 620 | 0 | 620 | 0 | 620 | 0 | 620 | 0 |

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

| LOCAL BATTERY | | | | | | | | LOCAL RECTIFIER | | | | DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V | |
|---------------|-----|---------|-----|----------|-----|----------|-----|-----------------|-----|------|-----|--|-----|
| 8 Cells | | 9 Cells | | 10 Cells | | 11 Cells | | 101G | | 101J | | Trk | Sta |
| Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta |
| 0 | 25 | 0 | 65 | 0 | 100 | 0 | 140 | 0 | 25 | 0 | 65 | 0 | 25 |
| 595 | 25 | 555 | 65 | 520 | 100 | 480 | 140 | 595 | 25 | 555 | 65 | 595 | 25 |
| √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| 620 | 0 | 620 | 0 | 620 | 0 | 620 | 0 | 620 | 0 | 620 | 0 | 620 | 0 |

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

| LOCAL BATTERY | | | | | | | | LOCAL RECTIFIER | | | | DIRECT FEEDERS FROM CENTRAL OFFICE OR BUILDING BATTERY ENGINEERED FOR A MINIMUM PBX VOLTAGE OF 14V | |
|---------------|-----|---------|-----|----------|-----|----------|-----|-----------------|-----|------|-----|--|-----|
| 8 Cells | | 9 Cells | | 10 Cells | | 11 Cells | | 101G | | 101J | | Trk | Sta |
| Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta |
| 0 | 260 | 0 | 335 | 0 | 410 | 0 | 485 | 0 | 260 | 0 | 335 | 0 | 260 |
| 360 | 260 | 285 | 335 | 210 | 410 | 135 | 485 | 360 | 260 | 285 | 335 | 360 | 260 |
| √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| 620 | 0 | 620 | 0 | 620 | 0 | 620 | 0 | 620 | 0 | 620 | 0 | 620 | 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 |
| 360 | 260 | 540 | 80 | 590 | 30 | 615 | 5 |
| √ | √ | √ | √ | √ | √ | 620 | 0 |
| 620 | 0 | 620 | 0 | 620 | 0 | | |

41. √ Deduct the known trunk conductor loop resistance from 620 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 620 ohms to obtain the permissible trunk conductor loop resistance.

45. The above ranges are based on a 120-ohm coil in the attendant dial circuit per Fig. A, SD-66572-01. Where boards are equipped with 440-ohm coils, the maximum permissible trunk conductor loop resistance is 350 ohms.

48. Where the AC component of the central office ringing voltage is 72-80 volts, the maximum trunk conductor loop resistance for a trunk ring-up bridge consisting of an E4 relay with a 1 uf capacitor and thermistor is 400 ohms; 450 ohms for a bridge consisting of a No. 257A relay with a 1 uf capacitor and thermistor; 550 ohms for a bridge consisting of an E4 relay with a 1 uf capacitor.

**PBX CONDUCTOR LOOP RANGES
FOR 635-OHM PANEL OFFICES**

1. 635-ohm Maximum Central Office Subscriber Conductor Loop
2. 21V Minimum Central Office Voltage (Floating)
3. 50-ohm Talking Battery Feed Circuit
4. 72, 80, or 84 Minimum 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 |
| 7. | 0 | 10 | 0 | 615 | 0 | 410 | 0 | 235 | 0 | 160 | 0 | 615 | 0 | 425 | 0 | 615 |
| 8. | 555 | 10 | ✓ | ✓ | 205 | 410 | 380 | 235 | 455 | 160 | ✓ | ✓ | 190 | 425 | ✓ | ✓ |
| 9. | 555 | 0 | 555 | 60 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 555 | 60 | ✓ | ✓ | 555 | 60 |
| 10. | | | 555 | 0 | 555 | 60 | 555 | 60 | 555 | 60 | 555 | 0 | 555 | 60 | 555 | 0 |
| 11. | | | | | 555 | 0 | 555 | 0 | 555 | 0 | | | 555 | 0 | | |

15. **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 |
| 16. | 0 | 80 | 0 | 615 | 0 | 455 | 0 | 265 | 0 | 185 | 0 | 615 | 0 | 530 | 0 | 615 |
| 17. | 535 | 80 | ✓ | ✓ | 160 | 455 | 350 | 265 | 430 | 185 | ✓ | ✓ | 85 | 530 | ✓ | ✓ |
| 18. | ✓ | ✓ | 555 | 60 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 555 | 60 | ✓ | ✓ | 555 | 60 |
| 19. | 555 | 60 | 555 | 0 | 555 | 60 | 555 | 60 | 555 | 60 | 555 | 0 | 555 | 60 | 555 | 0 |
| 20. | 555 | 0 | | | 555 | 0 | 555 | 0 | 555 | 0 | | | 555 | 0 | | |

24. **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 |
| 25. | 0 | 175 | 0 | 615 | 0 | 465 | 0 | 270 | 0 | 190 | 0 | 615 | 0 | 615 | 0 | 615 |
| 26. | 440 | 175 | ✓ | ✓ | 150 | 465 | 345 | 270 | 425 | 190 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 27. | ✓ | ✓ | 555 | 60 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 555 | 60 | 555 | 60 | 555 | 60 |
| 28. | 555 | 60 | 555 | 0 | 555 | 60 | 555 | 60 | 555 | 60 | 555 | 0 | 555 | 0 | 555 | 0 |
| 29. | 555 | 0 | | | 555 | 0 | 555 | 0 | 555 | 0 | | | 555 | 0 | | |

33. **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 |
| 34. | 0 | 325 | 0 | 615 | 0 | 550 | 0 | 330 | 0 | 230 | 0 | 615 | 0 | 615 | 0 | 615 |
| 35. | 290 | 325 | ✓ | ✓ | 65 | 550 | 285 | 330 | 385 | 230 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 36. | ✓ | ✓ | 555 | 60 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 555 | 60 | 555 | 60 | 555 | 60 |
| 37. | 555 | 60 | 555 | 0 | 555 | 60 | 555 | 60 | 555 | 60 | 555 | 0 | 555 | 0 | 555 | 0 |
| 38. | 555 | 0 | | | 555 | 0 | 555 | 0 | 555 | 0 | | | 555 | 0 | | |

42. ✓Deduct the known trunk conductor loop resistance from 615 ohms to obtain the permis-
43. sible station conductor loop resistance. Where the station conductor loop resistance
44. is known, deduct this value from 615 ohms to obtain the permissible trunk conductor
45. loop resistance.

46. The above ranges are based on dial circuit SD-66425-01, Fig. 2, or dial circuit
47. SD-66425-01, Fig. 1 modified per SD-66574-01, Fig. 2 and E. Where boards are equipped
48. with 440-ohm coils per Fig. 1, SD-66425-01, the maximum permissible trunk conductor
49. loop resistance is 350 ohms.

**PBX CONDUCTOR LOOP RANGES
FOR 635-OHM PANEL OFFICES**

1. 635-ohm Maximum Central Office Subscriber Conductor Loop
2. 21V Minimum Central Office Voltage (Floating)
3. 50-ohm Talking Battery Feed Circuit
4. 72, 80, or 84 Minimum 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 | | 26 VOLTS | | 28V AND UP | |
|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|------------|-----|
| Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta |
| 0 | 90 | 0 | 180 | 0 | 275 | 0 | 370 | 0 | 470 | 0 | 560 | 0 | 600 |
| 510 | 90 | 420 | 180 | 325 | 275 | 230 | 370 | 130 | 470 | 40 | 560 | ✓ | ✓ |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 600 | 0 |
| 600 | 0 | 600 | 0 | 600 | 0 | 600 | 0 | 600 | 0 | 600 | 0 | | |

14.

Powered by Local PBX Power Plant

15.

16.

17.

18.

19.

20.

21.

| 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 | 600 |
| 510 | 90 | 420 | 180 | 325 | 275 | 510 | 90 | ✓ | ✓ |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 600 | 0 |
| 600 | 0 | 600 | 0 | 600 | 0 | 600 | 0 | | |

22.

STATION LINES EQUIPPED WITH UA97 LINE RELAY

- 23.
- Direct Feeders from Central Office or Building Battery Engineered for a Minimum PBX Voltage of:**

24.

25.

26.

27.

28.

29.

| 16 VOLTS | | 18V AND UP | |
|----------|-----|------------|-----|
| Trk | Sta | Trk | Sta |
| 0 | 475 | 0 | 600 |
| 125 | 475 | ✓ | ✓ |
| ✓ | ✓ | 600 | 0 |
| 600 | 0 | | |

30.

Powered by Local PBX Power Plant

31.

32.

33.

34.

35.

36.

37.

| 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 | 600 | 0 | 600 | 0 | 475 | 0 | 600 |
| 125 | 475 | ✓ | ✓ | ✓ | ✓ | 125 | 475 | ✓ | ✓ |
| ✓ | ✓ | 600 | 0 | 600 | 0 | ✓ | ✓ | 600 | 0 |
| 600 | 0 | | | | | 600 | 0 | | |

38. ✓Deduct the known trunk conductor loop resistance from 600 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is
39. known, deduct this value from 600 ohms to obtain the permissible trunk conductor loop
40. resistance.
- 41.

**PBX CONDUCTOR LOOP RANGES
FOR 635-OHM PANEL OFFICES**

1. 635-ohm Maximum Central Office Subscriber Conductor Loop
2. 21V Minimum Central Office Voltage (Floating)
3. 50-ohm Talking Battery Feed Circuit
4. 72, 80, or 84 Minimum Central Office Ringing Voltage (AC Component)
5. 48V PBX Power Plant with Voltage Regulation (48V Minimum)

6. **607A PBX**

| | | |
|-----|-----|-----|
| 7. | Trk | Sta |
| 8. | 0 | 615 |
| 9. | √ | √ |
| 10. | 350 | 265 |
| 11. | 350 | 0 |

12. √Deduct the known trunk conductor loop resistance from 615 ohms to obtain the permis-
13. sible station conductor loop resistances. Where the station conductor loop resist-
14. ance is known, deduct this value from 615 ohms to obtain the permissible trunk con-
15. ductor loop resistance.

16. **608A PBX**

| 17. 18. | 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 |
| 20. | 0 | 615 | 0 | 615 | 0 | 380 | 0 | 200 | 0 | 150 | 0 | 100 | 0 | 70 |
| 21. | √ | √ | √ | √ | 235 | 380 | 415 | 200 | 465 | 150 | 515 | 100 | 545 | 70 |
| 22. | 615 | 0 | 615 | 0 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| 23. | | | | | 615 | 0 | 615 | 0 | 615 | 0 | 615 | 0 | 615 | 0 |

24. √Deduct the known trunk conductor loop resistance from 615 ohms to obtain the permis-
25. sible station conductor loop resistance. Where the station conductor loop resist-
26. ance is known, deduct this value from 615 ohms to obtain the permissible trunk con-
27. ductor loop resistance.

**PBX CONDUCTOR LOOP RANGES
FOR 635-OHM PANEL OFFICES**

1. 635-ohm Maximum Central Office Subscriber Conductor Loop
2. 21V Minimum Central Office Voltage (Floating)
3. 50-ohm Talking Battery Feed Circuit
4. 72, 80, or 84 Minimum Central Office Ringing Voltage (AC Component)
5. **701A, 701B, OR 740AX PBXs (USED WITH NO. 552A, 552B, 605A, 607A, OR 608A MANUAL SWITCH-BOARDS) AND 711A AND 711B PBXs**

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

| 701A or 711A PBXs | | | | | | | | 701B, 711B, and 740AX PBXs | |
|-----------------------------|-----|--------------------|-----|------------------------|-----|--------------------|-----|----------------------------------|-----|
| Amp Hr Meter Reg (44V Min.) | | | | Voltage Reg (48V Min.) | | | | Voltage Reg and Amp Hr Meter Reg | |
| Line Relay Adj "A" | | Line Relay Adj "B" | | Line Relay Adj "A" | | Line Relay Adj "B" | | Trk | Sta |
| Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | | |
| 0 | 370 | 0 | 495 | 0 | 515 | 0 | 535 | 0 | 535 |
| 165 | 370 | 40 | 495 | 20 | 515 | √ | √ | 535 | 0 |
| √ | √ | √ | √ | √ | √ | 535 | 0 | | |
| 535 | 0 | 535 | 0 | 535 | 0 | | | | |

17. √Deduct the known trunk conductor loop resistance from 535 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 535 ohms to obtain the permissible trunk conductor 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. **Dial Station Lines with 2-way Manual Central Office Trunks**
28. Add 80 ohms to the above trunk values.

29. **Manual Station Line with 2-way Manual Central Office Trunks**
30. Refer to the appropriate page in this chart for the manual switchboard used.

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

35. **Attendant Dial Circuits and any Trunk Circuit**
36. The above ranges apply with No. 552A, 552D, or 605A switchboard equipped with 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 the No. 607A switchboard, or a No. 552A, 552D, or 605A switchboard having dial circuit per Fig. 1, SD-66425-01, is used, the maximum permissible trunk conductor loop resistance is 350 ohms with manual central office trunks; 270 ohms with manual and dial selected trunks having toll diversion and 295 ohms without toll diversion.

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

45. The "S" relay of SD-66442-01, SD-66274-01, SD-66443-01, SD-66051-01, and SD-66052-01 may be shunted by its 40-ohm noninductive winding if the capacitor is not required to reduce the unbalance caused by the "S" relay.

**PBX CONDUCTOR LOOP RANGES
FOR 635-OHM PANEL OFFICES**

1. 635-ohm Maximum Central Office Subscriber Conductor Loop
2. 21V Minimum Central Office Voltage (Floating)
3. 50-ohm Talking Battery Feed Circuit
4. 72, 80, or 84 Minimum 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.
- 10.
- 11.
- 12.

| Trk | Sta |
|-----|-----|
| 0 | 580 |
| √ | √ |
| 580 | 0 |

13. √Deduct the known trunk conductor loop resistance from 580 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance
14. is known, deduct this value from 580 ohms to obtain the permissible trunk conductor
15. loop resistance.
- 16.
17. #For this trunk circuit the "S" relay may be shunted by its 40-ohm noninductive
18. secondary winding if the capacitor is not required to reduce the unbalance caused by
19. the "S" relay.
20. Where toll diversion is furnished deduct 25 ohms from the "Trk" values shown.

**PBX CONDUCTOR LOOP RANGES
FOR 635-OHM PANEL OFFICES**

1. 635-ohm Maximum Central Office Subscriber Conductor Loop
2. 21V Minimum Central Office Voltage (Floating)
3. 50-ohm Talking Battery Feed Circuit
4. 72, 80, or 84 Minimum Central Office Ringing Voltage (AC Component)
5. 48V PBX Power Plant with Voltage Regulation (48V Minimum)
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**
- 8.
9.

| Trk | Sta |
|-----|-----|
| 0 | 535 |
| √ | √ |
| 535 | 0 |
- 10.
- 11.
12. √Deduct the known trunk conductor loop resistance from 535 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 535 ohms to obtain the permissible trunk conductor loop resistance.
- 13.
- 14.
- 15.
16. **#Dial Station Lines and 2-way Trunks — Manual and Dial Selected (No Toll Diversion)**
17. Add 25 ohms to the above trunk values.
18. **#Dial Station Lines and One-way Outgoing Dial Selected Trunks with Toll Diversion**
19. Add 20 ohms to the above trunk values.
20. **#Dial Station Lines and One-way Outgoing Dial Selected Trunk — No Toll Diversion**
21. Add 45 ohms to the above trunk values.
22. **#Dial Station Lines with 2-way Manual Central Office Trunks**
23. Add 80 ohms to the above trunk values.
24. **#Manual Station Lines with 2-way Manual Central Office Trunks**
25. Refer to the appropriate page in this chart for the manual switchboard used.
26. **#Manual Station Lines with 2-way Manual and Dial Selected Trunks**
27. The ranges are the same as for manual station lines with 2-way manual central office trunks less 80 ohms if the trunk is arranged for toll diversion or 55 ohms if not so arranged.
- 28.
- 29.
30. **#Attendant Dial Circuits and Any Trunk Circuit**
31. The above ranges apply where the manual switchboards are equipped with 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 the manual switchboard is equipped with dial circuit per Fig. 1, SD-66425-01, the maximum permissible trunk conductor loop resistance is 350 ohms with manual central office trunks; 270 ohms with manual and dial selected trunks having toll diversion and 295 ohms without toll diversion.
- 32.
- 33.
- 34.
- 35.
- 36.
37. **740E DIAL PBX WITH ATTENDANT KEY TEL SET OR NO. 101A KEY EQPT SD-65725-01†**
38. **†Dial Station Lines and 2-way Trunks — Manual and Dial Selected with Toll Diversion**
- 39.
40.

| Trk | Sta |
|-----|-----|
| 0 | 555 |
| √√ | √√ |
| 555 | 0 |
- 41.
- 42.
43. √√Deduct the known trunk conductor loop resistance from 555 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance is known, deduct this value from 555 ohms to obtain the permissible trunk conductor loop resistance.
- 44.
- 45.
- 46.
47. **†Dial Station Lines and 2-way Trunks — Manual and Dial Selected (No Toll Diversion)**
48. Add 25 ohms to the above trunk values.
49. For the trunk circuit used the above values are applicable when a capacitive shunt is used across the "S" relay.
- 50.

**PBX CONDUCTOR LOOP RANGES
FOR 635-OHM PANEL OFFICES**

1. 635-ohm Maximum Central Office Subscriber Conductor Loop
2. 21V Minimum Central Office Voltage (Floating)
3. 50-ohm Talking Battery Feed Circuit
4. 72, 80, or 84 Minimum Central Office Ringing Voltage (AC Component)
5. 48V PBX Power Plant with Voltage Regulation (48V Minimum)
6. **740E DIAL PBX WITH A NO. 556A MANUAL SWITCHBOARD**
7. **Dial Station Lines and 2-way Trunks — Manual and Dial Selected with Toll Diversion**

| Trk | Sta |
|-----|-----|
| 0 | 520 |
| √ | √ |
| 520 | 0 |

- 8.
- 9.
- 10.
- 11.
12. √Deduct the known trunk conductor loop resistance from 520 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance
13. is known, deduct this value from 520 ohms to obtain the permissible trunk conductor
14. loop resistance.
- 15.
16. **Dial Station Lines and 2-way Trunks — Manual and Dial Selected (No Toll Diversion)**
17. Add 25 ohms to the above trunk values.
18. **Dial Station Lines and One-way Outgoing Dial Selected Trunks with Toll Diversion**
19. Add 35 ohms to the above trunk values.
20. **Dial Station Lines and One-way Outgoing Dial Selected Trunk — No Toll Diversion**
21. Add 60 ohms to the above trunk values.
22. **Dial Station Lines with 2-way Manual Central Office Trunks**
23. Add 80 ohms to the above trunk values.

24. **Manual Station Line with 2-way Manual Central Office Trunks**

| Trk | Sta |
|-----|-----|
| 0 | 600 |
| √√ | √√ |
| 600 | 0 |

- 25.
- 26.
- 27.
- 28.
29. √√Deduct the known trunk conductor loop resistance from 600 ohms to obtain the permissible trunk conductor loop resistance. Where the station conductor loop resistance
30. is known, deduct this value from 600 ohms to obtain the permissible trunk
31. conductor loop resistance.
- 32.
33. **Manual Station Lines with 2-way Manual and Dial Selected Trunks**
34. The ranges are the same as for manual station lines with 2-way manual central
35. office trunks less 80 ohms if the trunk is arranged for toll diversion, or 55 ohms
36. if not so arranged.
37. For the trunk circuit used the above values are applicable when a capacitive shunt
38. is used across the "S" relay.

**PBX CONDUCTOR LOOP RANGES
FOR 635-OHM PANEL OFFICES**

1. 635-ohm Maximum Central Office Subscriber Conductor Loop
2. 21V Minimum Central Office Voltage (Floating)
3. 50-ohm Talking Battery Feed Circuit
4. 72, 80, or 84 Minimum Central Office Ringing Voltage (AC Component)

5. **750A PBX**

| KEYLESS STATION | B1 LAMP | 552 RELAY AND AC OPERATED NO. 51A LAMP |
|-----------------|---------|--|
| Trk Sta | Trk Sta | Trk Sta |
| 0 285 | 0 50 | 0 75 |
| 300 285 | 535 50 | 510 75 |
| √ √ | √ √ | √ √ |
| 585 0 | 585 0 | 585 0 |

- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
12. √Deduct the known trunk conductor loop resistance from 585 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance
13. is known, deduct this value from 585 ohms to obtain the permissible trunk conductor
14. loop resistance.
- 15.

16. **755A PBX**

| USING DC-OPERATED LAMP | | | | | | USING AC-OPERATED NO. 51A LAMP | | | | KEYLESS STATION | |
|------------------------|-----|---------|-----|----------|-----|--------------------------------|-----|----------------|-----|-----------------|-----|
| B2 Lamp | | A1 Lamp | | 51A Lamp | | ST Relay UA 16 | | ST Relay U6046 | | U322 Line Relay | |
| Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta | Trk | Sta |
| 0 | 255 | 0 | 100 | 0 | 100 | 0 | 310 | 0 | 275 | 0 | 330 |
| 360 | 255 | 515 | 100 | 515 | 100 | 305 | 310 | 340 | 275 | 285 | 330 |
| √√ | √√ | √√ | √√ | √√ | √√ | √√ | √√ | √√ | √√ | √√ | √√ |
| 615 | 0 | 615 | 0 | 615 | 0 | 615 | 0 | 615 | 0 | 615 | 0 |

- 17.
- 18.
- 19.
- 20.
- 21.
- 22.
- 23.
24. √√Deduct the known trunk conductor loop resistance from 615 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance
25. is known, deduct this value from 615 ohms to obtain the permissible trunk
26. conductor loop resistance.
- 27.

28. **756A PBX**

29. **756A PBX WITH A NO. 700A KEY TELEPHONE SET**

| Trk | Sta |
|-----|-----|
| 0 | 575 |
| √√√ | √√√ |
| 575 | 0 |

- 30.
- 31.
- 32.
- 33.
34. √√√Deduct the known trunk conductor loop resistance from 575 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop resistance
35. is known, deduct this value from 575 ohms to obtain the permissible trunk
36. conductor loop resistance.
- 37.

38. **756A PBX WITH A NO. 556A MANUAL SWITCHBOARD #**

39. **#Dial Station Lines and One-way Outgoing Dial Selected Trunks**

40. The ranges are the same as with the No. 700A key telephone set lines 31 through 33 above.

41. **#Manual Station Line with 2-way Manual Central Office Trunks**

| Trk | Sta |
|------|------|
| 0 | 600 |
| √√√√ | √√√√ |
| 600 | 0 |

- 42.
- 43.
- 44.
- 45.
46. √√√√Deduct the known trunk conductor loop resistance from 600 ohms to obtain the permissible station conductor loop resistance. Where the station conductor loop
47. resistance is known, deduct this value from 600 ohms to obtain the permissible
48. trunk conductor loop resistance.
- 49.