

COMMON SYSTEMS
"V3" TELEPHONE REPEATER
BATTERY SUPPLY AND
CONNECTING CKTS
FOR ONE OR MORE VF AMPLIFIERS

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

- 1.1 This circuit provides means for connecting one or more J68647A voice-frequency amplifier sockets to various battery supply potentials encountered in repeater offices.
- 1.2 Provides a combination fuse panel and battery supply circuit for 24-volt filament and 130-volt plate regulated battery.
- 1.3 Provides equipment, amplifiers, and monitoring jacks.
- 1.4 Provides information for connecting:
 - (a) One voice-frequency amplifier socket to external circuit.
 - (b) Two amplifier sockets associated as for a V3 repeater with or without jacks to external circuits.

SECTION II - DETAILED DESCRIPTION

1. J68647A VOICE-FREQUENCY AMPLIFIER SOCKET, Fig. 1

1.1 This shows the amplifier socket for the plugged-in J68647A amplifier unit and necessary wiring to associate it with the proper battery supply figures and the necessary connecting circuits.

2. INPUT OR OUTPUT REPEATER EQUIPMENT JACK CIRCUIT, Fig. 2, AND MONITORING JACKS, Fig. 3.

2.1 Fig. 2 shows tip and ring jacks which are employed at the input and output sides of a pair of Fig. 1. Fig. 3 shows tip and ring jacks which are also employed with a pair of Fig. 1. The jacks in Fig. 2 and 3 are optional, as is demonstrated in Fig. 101. When jacks are specified, they shall be furnished in both sides of the repeater and designated as in Fig. 101.

3. FUSE PANEL FOR AMPLIFIERS USING 24-VOLT AND 130-VOLT BATTERY SUPPLIES, Fig. 4, (TEN OR MORE AMPLIFIERS)

3.1 This fuse panel and battery supply circuit is for use in 24-volt filament and 130-volt plate regulated battery offices.

It will accommodate anywhere from 5 to 110 V3 repeaters or from 10 to 220 J68647A plug-in type voice-frequency amplifiers. Each filament and plate fuse furnishes heater and plate power to operate up to ten amplifiers or five V3 repeaters. Suitable resistance strappings for resistors (A) to (M), which are arranged in 1-ohm steps from 12 ohms to 0 ohms, can be used to reduce the filament voltage by completing the straps (B) to (N), respectively.

3.2 Two options are supplied for fine control of the electron tube heater voltage. In option "ZA", now rated "Mfr Disc.", two 2.5-ohm rheostats (R1A) and (R1B) are connected in parallel and mounted on a single control shaft. The combined resistance of the two rheostats connected in parallel will give fine steps from 0 to 1.25 ohms. The resistance value of the rheostat decreases with clockwise rotation of the control shaft.

3.3 In option "ZB", now standard, one tapped resistor (R1), having a maximum resistance of 1.15 ohms, is used to obtain fine control of the heater voltage applied to the electron tubes. Resistance values of 0.05, 0.1, 0.2, 0.4, and 0.4 ohm may be strapped in any combination to secure the proper voltage.

3.4 Electron Heater Circuit Adjustment, Fig. 4

3.41 On panels equipped with option "ZA", now rated "Mfr Disc.", rheostats (R1A) and (R1B) are initially set in their approximate midposition. Plug the normal load of J68647A amplifiers into their associated sockets and fuse all heater circuits to be used. Measure the dc voltage to ground from the drop side of any filament fuse. With reference voltage conditions, complete the straps, beginning with resistor (B) and proceeding towards resistor (M) until the voltmeter reading is approximately between 20.0 and 20.50 volts. Then adjust rheostats (R1A) and (R1B) for a potential of 20.0 ± 0.25 volts. When the reference voltage or amplifier load changes result in departures exceeding 0.3 volt, the circuit resistors and rheostats shall be readjusted to meet a requirement of 20.00 ± 0.25 volts. Changes in the fixed resistance strapping resistors (B) to (N) shall always proceed from the last completed strap.

3.5 On panels equipped with option "ZB", resistor (R1) is left entirely in the circuit, no straps connected to any taps. Plug the normal load of J68647A amplifiers into their associated sockets and fuse all heater circuits in use. Measure the dc voltage to ground from the drop side of any filament fuse. With reference voltage conditions, complete the straps beginning with resistor (B) and proceeding towards (N) until the voltmeter reading just exceeds 20.0 volts. Disconnect the final strap and adjust the taps on variable resistor (R1) for a voltmeter reading of 20.0 ± 0.25 volts. When the reference voltage or repeater load changes result in departures exceeding 0.3 volt, circuit resistors (B) to (N) and (R1) shall be readjusted to 20.0 ± 0.25 volts. Changes in fixed resistance strappings shall always proceed from the last strap completed.

4. NOMINAL 24-VOLT FILAMENT, 130-VOLT PLATE POWER SUPPLY, Fig. 5

4.1 This battery supply circuit is suitable for nominal 24-volt filament and 130-volt plate where it is desired to accommodate up to ten amplifiers for five V3 repeaters. Normal strapping procedure can be followed in adjusting heater voltage to 20 ± 0.25 volts with reference voltage conditions.

5. NOMINAL 48-VOLT FILAMENT, 130-VOLT PLATE POWER SUPPLY, Fig. 6

5.1 This battery supply circuit is suitable for nominal 48-volt filament, 130-volt plate offices to accommodate up to ten amplifiers or five V3 repeaters if all heaters are operated in parallel, wiring "Y" or up to 20 amplifiers, ten V3 repeaters if two such blocks of amplifiers are connected in series, wiring "Z". Normal strapping procedure can be followed in adjusting heaters to 20 ± 0.25 volts with reference voltage conditions.

6. RESISTOR CIRCUIT FOR 152-VOLT COMBINED, Fig. 7

6.1 This circuit provides means in 152 volts with (21.7-volt taps) combined battery offices for adjusting voltage applied to the heater to 20.0 ± 0.25 volts.

7. FUSE PANEL FOR AMPLIFIERS USING 48-VOLT AND 130-VOLT BATTERY SUPPLIES, Fig. 8, (TEN OR MORE AMPLIFIERS)

7.1 This fuse panel and battery supply circuit is for use in 48-volt filament and 130-volt plate regulated battery offices. It will accommodate anywhere from 5 to 110 V3 repeaters or from 10 to 220 J68647A plug-in voice-frequency amplifiers. The heater circuits of each pair of amplifiers (ODD) and (EVEN) are connected in series and arranged to work across the 48-volt office

battery. Each filament and plate fuse furnishes heater and plate power to operate up to ten amplifiers or five V3 repeaters. Suitable resistance strapping for resistors (A) to (Y), which are arranged in 1-ohm steps, 40 to 0 ohms, can be used to reduce the filament voltage by completing the straps (B) to (Z), respectively.

7.2 Two options are supplied for fine control of the electron tube heater voltage. In option "ZC", now rated "Mfr Disc.", one 0- to 2.5-ohm rheostat (R1B) is connected in series with resistors (A) to (Y) for adjusting the heater voltage. The resistance value of the rheostat decreases with clockwise rotation of the control shaft.

7.3 In option "ZD", now standard, one multitapped resistor (R1), having a maximum resistance of 3.0 ohms, is used to obtain fine control of the heater voltage applied to the electron tubes. Resistance values of 0.2, 0.4, 0.8 1.6, and 3.0 ohms may be strapped in any combination to secure the proper voltage.

7.4 Electron Heater Circuit Adjustments, Fig. 8

7.4.1 On panels equipped with option "ZC", now rated "Mfr Disc.", rheostat (R1B) is initially set in its approximate mid-position. Plug the normal load of J68647A amplifiers into their associated sockets and fuse all heater circuits to be used. Measure the dc voltage to ground from the drop side of any filament fuse. With reference voltage conditions, complete the straps beginning with resistor (B) and proceeding towards resistor (Y) until the voltmeter reading is approximately between 40.0 to 41.0 volts. Then adjust rheostat (R1B) for a potential of 40.0 ± 0.25 volts. If the reference voltage or amplifier load changes result in departures exceeding 0.6 volt, the circuit resistors and rheostat shall be readjusted. Changes in the fixed resistance strapping resistors (B) to (Y) shall always proceed from the last complete strap.

7.5 On panels equipped with option "ZD", resistor (R1) is left entirely in the circuit, no straps connected to any taps. Plug the normal load of J68647A amplifiers into their associated sockets and fuse all heater circuits in use. Measure the dc voltage to ground from the drop side of any filament fuse. With reference voltage conditions, complete the straps beginning with resistor (B) and proceeding towards resistor (Y) until the voltmeter reading just exceeds 40.0 volts. Disconnect the final strap and adjust the taps on variable resistor (R1) for a voltmeter reading of 40.0 ± 0.5 volts. When the reference voltage or amplifier load changes result in

departures exceeding 0.75 volt, the circuit resistors shall be readjusted to meet a requirement of 40.0 ± 0.5 volts. Changes in the fixed resistor strappings (B) to (Z) shall always proceed from the last completed strap.

8. AC POWER SUPPLY, Fig. 9 and 10

8.1 Fig. 9 shows the wiring and options required to operate one to six J68647A voice-frequency amplifiers from an ac power supply.

8.2 An ac power supply that will furnish heater and plate power for operating one to six amplifiers is shown in Fig. 10.

9. V3 TELEPHONE REPEATER, Fig. 101

9.1 This circuit is an information figure when two amplifiers are employed as a V3 repeater.

10. SINGLE VOICE-FREQUENCY AMPLIFIER

10.1 Fig. 102 is an information figure showing the connections for one J68647A amplifier.

11. TABLE A

11.1 This table incorporates all connecting circuit information required for employing the J68647A voice amplifiers.

12. TABLE B

12.1 This table provides means for ordering the circuit figures shown on drawing.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.1 None.

2. FUNCTIONS

2.1 The J68647A voice-frequency amplifier socket in this circuit, together with a plugged-in voice amplifier unit, provides means for inserting gain:

(a) In a one-way circuit.

(b) Between line equipment in either 2-wire or 4-wire circuits. In this case, a pair of sockets and a pair of associated amplifiers are employed as a V3 repeater.

2.2 The input, output, and monitoring jack arrangements are optional. Their normal use is for circuit or repeater testing and for monitoring.

3. CONNECTING CIRCUITS

3.01 Cutoff Relay - SD-55393-01

3.02 Cable Gas Pressure Alarm - SD-55211-01

3.03 Order Wire - SD-64413-01

3.04 Order Wire - SD-64610-01

3.05 Order-wire Application - SD-55385-01

3.06 Order-wire Bridging Arrangement - SD-59046-01

3.07 4W Echo Suppressor - SD-62430-04

3.08 Toll Conference - SD-55334-01

3.09 Pad and Repeater Switching - SD-68004-01

3.10 4W Terminating - SD-64304-01

3.11 1A Echo Suppressor - SD-59035-01

3.12 General Voice-Frequency Telegraph or Carrier Ckts

3.13 4W Repeating Coil - SD-55497-01

3.14 Toll SW System No. 4 Ringdown Signal - 20 Cycles - SD-68000-01

3.15 Toll SW System No. 4 Ringdown Signal - 135 Cycles - SD-68002-01

3.16 Order-wire Signaling Ckt - 600-cycle to 1500-cycle Signal - SD-55320-01

3.17 152-volt Single Battery Supply - SD-59001-01

3.18 V1 Line and Balancing for Cable SD-64903-01

3.19 V1 Line and Balancing for Open Wire SD-64903-03

3.20 Regulating Network and Transfer - SD-64937-01

3.21 H1 Carrier Telephone - Application Schematic - SD-64083-01

3.22 130-volt, 0.18-ampere Battery Supply - SD-81082-01

3.23 Transmission Measuring Auxiliary Test - SD-95116-01

- 3.24 AC VI Repeater - SD-59002-01
- 3.25 24-volt, 1.5-ampere Battery Supply - SD-81081-01
- 3.26 C5 Carrier Terminal - Application Schematic - SD-64360-01
- 3.27 TDM Patching Jack and Cord - SD-55248-01
- 3.28 Single 2-wire Bridging for C1 Alarm and Control - SD-56229-01
- 3.29 1600 or 2000 Single-Frequency Signal - SD-55954-01
- 3.30 Min 4-wire Terminating Set - SD-95137-01
- 3.31 "V3" Line & Balancing - Application Schematic - SD-95144-01
- 3.32 "N" Order Wire & Alarm - SD-95142-01
- 3.33 "N" Voice-Frequency Alarm Ckt - SD-95143-01
- 3.34 Signal Order Wire - SD-56227-01
- 3.35 Signal Order Wire - SD-56228-01
- 3.36 Equalizer and Repeater - Application Schematic - SD-59225-01

SECTION IV - REASONS FOR REISSUE

CHANGES

B. CHANGES IN APPARATUS

B.1 Superseded	Superseded by
In Fig. 4	
2 - Rheostats (R1A) and (R1B) Ward Leonard K42014 0 to 2.5 ohms, 100 watts	1 - Adjustable Resistor (R1) KS-16907, List 1 0 to 1.15 ohms, 200 watts for operation on 24-volt battery
In Fig. 8	
2 - Rheostats (R1A) and (R1B) Ward Leonard K42014 0 to 2.5 ohms, 100 watts	1 - Adjustable Resistor (R1) KS-16907, List 2 0 to 3 ohms, 200 watts for operation on 48-volt battery

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Rheostats (R1A) and (R1B) in Fig. 4 and 8 were replaced by multitapped resistors (R1) to provide a more stable control of the electron tube heater currents.

D.2 Note 106 was rated "Mfr Disc."

All other headings under Changes, no change.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 2161-JOS-LP