

**COMBINATION TYPE "B" COMPOSITE SIGNALING,  
REPEATING COIL, AND CX SET EQUIPMENT UNITS  
FOR TRANSMITTING AND RECEIVING SUPERVISORY AND DIAL PULSES  
EQUIPMENT DESIGN REQUIREMENTS  
COMMON SYSTEMS**

**1. GENERAL**

**Scope**

1.01 This specification, together with the supplementary information listed herein, covers the equipment design requirements for the framework, equipment, and circuits to be used in the manufacture and installation of type "B" composite signaling units.

1.02 This specification is reissued:

- (a) To rate list 3 of J98604C and J98604D "Mfr Disc."
- (b) To add J98604G.
- (c) To make general changes throughout to bring the specification up to date.

**Description**

1.03 The equipment covered herein covers a design of composite signaling equipment, designated type "B," arranged to send and receive supervisory or dialing signals over cable, open wire, or combination open wire and cable facilities. It differs from the older or type "A" composite signaling equipment in that the CX relays are biased locally instead of over the ground potential compensation leg with battery connected at one end and ground at the other end. This permits identical equipment at both ends of any circuit and leaves the fourth leg free to be used only for ground potential compensation when this feature is required, as a fourth CX signaling channel or for a telegraph channel. This equipment will operate with trunks which were installed to operate with type "A" signaling equipment by making minor modifications in the trunk equipment.

1.04 The J98604A unit is a shop-wired unit complete with repeating coils, CX sets, and relay equipment for one phantom group. This unit will be used only on circuits without voice-frequency repeaters. Since balancing between the line and net sides of a repeater is not involved, the smaller 149-type inductor is used in the CX sets in place of the more stable and closer limit 158A inductor. This unit is equipped with 500-volt breakdown capacitors. Terminal strips are provided primarily for isolating the CX relays for test purposes by removing straps on the front of the strip, though when required, access to the CX relay test leads may be gained with the use of the CX jack circuit per J98604G. All transmission wiring from the outside of the unit is wired directly to apparatus terminals but the signaling and battery supply leads connect through the terminal strips. All internal wiring is of the surface type. The unit occupies the space of seven 1-3/4-inch mounting plates.

1.05 The J98604B unit is the same as the J98604A unit except that it is equipped with 1000-volt instead of 500-volt breakdown capacitors and mounts in a space of eight 1-3/4-inch mounting plates. The equipment layout differs from the J98604A unit only in the rearrangement of CX set and series line capacitors and the addition of one mounting plate to accommodate the larger capacitors.

1.06 The J98604C unit is a shop-wired unit complete with a repeating coil, CX set, and relay equipment for composite signaling on a single physical circuit. For use as a fourth circuit in a phantom group, list 1 only shall be specified. This unit will be used only on circuits without voice-frequency repeaters. Since balancing between the line and net sides of a repeater is not involved, the smaller 149 type inductor is used in

the CX sets in place of the more stable and closer limit 158A inductor. This unit is equipped with 500-volt breakdown capacitors. A terminal strip is provided primarily for isolating the CX relay for test purposes by removing straps on the front of the strip, though when required, access to the CX relay test leads may be gained with the use of the CX jack circuit per J98604G. All transmission wiring from the outside of the unit is wired directly to apparatus terminals but the signaling and battery supply leads connect through the terminal strip. All internal wiring is of the surface type. The unit occupies the space of two or three 1-3/4-inch mounting plates.

**1.07** The J98604D unit is the same as the J98604C unit except that it is equipped with 1000-volt instead of 500-volt breakdown capacitors and mounts in a space of three or four 1-3/4-inch mounting plates. The equipment layout differs from the J98604C unit only in the rearrangement of CX set and series line capacitors and the addition of one mounting plate to accommodate the larger capacitors.

**1.08** The J98604E unit is a shop-wired unit complete with repeating coil, CX set, and relay equipment for compositing a phantom circuit. This unit will be used only on circuits without voice-frequency repeaters. Since balancing between the line and net sides of a repeater is not involved, the smaller 149 type inductor is used in the CX sets in place of the more stable and closer limit 158A inductor. This unit is equipped with 500-volt breakdown capacitors. A terminal strip is provided primarily for isolating the CX relay for test purposes by removing straps on the front of the strip. All transmission wiring from the outside of the unit is wired directly to apparatus terminals but the signaling and battery supply leads connect through the terminal strip. All internal wiring is of the surface type. The unit occupies the space of two or three 1-3/4-inch mounting plates.

**1.09** The J98604F unit is the same as the J98604E unit except that it is equipped with 1000-volt instead of 500-volt breakdown capacitors and mounts in a space of three or four 1-3/4-inch mounting plates. The equipment layout differs from the J98604E unit only in the rearrangement of CX set and series line capacitors and the addition of one mounting plate to accommodate the larger capacitors.

**1.10** Unit wiring consists of "SW1" surface wiring using No. 24 gauge type "BG" single wire for intra-unit connection of the pieces of apparatus to each other and to the terminal strip, and also for strapping. This type of wiring is not sewed into cable forms, but is run loose and dressed back against the mounting plate in horizontal and perpendicular paths as determined by the layout of apparatus.

## 2. SUPPLEMENTARY INFORMATION

800-600-000 — List of General Equipment Requirement Sections

801-000-000 — Equipment Design and General Requirements and Engineering Information — Common Systems

J97013 — Relay Racks — I-beam

J97014 — Relay Racks — Channel

J99220 — Grounding Methods

Floor Plan Data —

Section 3.3,

Sheet 11 — I-beam Relay Rack

Section 3.3,

Sheet 11 — Channel Relay Rack

## 3. DRAWINGS

### Circuits

SD-95032-01 — Combination Type "B" CX Signaling, Repeating Coil, and CX Set Circuit for 2-way Signaling and 2-way Dialing Over Short-haul Cable or Open-wire Circuits

SD-95058-01 — Type "B" Composite Signaling, CX Set, and Phantom Repeating Coil Circuit — 2-way Signaling and Dialing Over Nonrepeated Short-haul Compositing Phantom Circuits

### Framework

ED-90671-01 — Relay Rack Framework — I-beam

ED-90672-01 — Relay Rack Framework — Channel

ED-90782-01 — Relay Rack Unit Framework

### Equipment

ED-91541-01 — Type "B" Composite Signaling, For Single Circuit, Fourth Circuit

in a Phantom Group or Compositing a Phantom Circuit — 2-way Signaling and Dialing

ED-95032-01 — Combination Type “B” CX Signaling, Phantom Group Unit — 2-way Signaling and 2-way Dialing

**Wiring and Cabling**

ED-90976-01 — Switchboard Bay Cabling Plan

**4. EQUIPMENT**

*J98604A — AT&T Co Std — Combination Type “B” CX Signaling, Repeating Coil, and CX Set Phantom Group Unit Equipment — 2-way Signaling and Dialing Over Short Haul Open Wire or Cable — Equipped With 500-volt Breakdown Capacitors — Occupies Space of Seven 1-3/4-inch Mounting Plates (See Note F)*

Equipment — ED-95032-01, Fig. 1

*List 1* — Framework, assembly, wiring, and common equipment for one phantom group unit.

WIRE EQUIP NOTES

Framework, ED-90782-01, Fig. 1		1	
Test Resistances, SD-95032-01, Fig. 6 & 7	1	1	E

*List 2* — Wiring and equipment per SD-95032-01, Fig. 16 and 20, all optional apparatus, and Fig. 10, less “L” apparatus for S1 and SD-95032-01. Fig. 17 and 20, all optional apparatus, and Fig. 11 for S2 required in addition to list 1 for two side circuits. (See notes A, B, C, and D.)

*List 3* — Wiring and equipment per SD-95032-01, Fig. 18 and 20, all optional apparatus, required in addition to lists 1 and 2 for one phantom circuit PH. (See notes A, B, C, and D.)

*List 4* — Wiring and equipment per SD-95032-01, Fig. 5 for one 1-mf dc blocking capacitor. One required for each side circuit and one required for each phantom circuit.

*List 5* — Wiring and equipment per SD-95032-01, Fig. 5 for one 4-mf dc blocking capacitor required for each side circuit and one required for each phantom circuit.

*List 6* — Wiring and equipment per SD-95032-01, Fig. 10, “L” apparatus, required in addition to lists 1 and 2 for one CX set telegraph capacitor when fourth, ground potential compensation, leg is used for telegraph.

**Notes**

- A. “M” apparatus for side circuit only operation is furnished on all units but “M” or “N” and “W” or “V” wiring for side only or phantom group operation, respectively, must be applied to meet job requirements.
- B. Codes and wiring for repeating coils per SD-95032-01, Fig. 2, 8, and 9 must be specified in addition to lists 2 and 3 in accordance with tables and notes on the circuit drawing.
- C. “S” apparatus, 2-mf capacity per SD-95032-01, Fig. 20 is furnished on all units but must be connected for 1 mf, “R” wiring or 2 mf, “S” wiring, in accordance with information on the circuit drawing to meet job requirements.
- D. The network resistors N3, N4, N5, and N7 should be strapped as required to meet job requirements.
- E. The make-busy C resistor should be connected to ground or battery, “A” or “B” wiring, as required to meet job conditions.
- F. When the ground potential compensation leg is to be used as a fourth CX signaling channel, CX signaling equipment per J98604C, List 1 shall be specified.
- G. “YA” and “YB” wiring shall be initially provided on the unit terminal strip.

*J98604B — AT&T Co Std — Combination Type “B” CX Signaling, Repeating Coil, and CX Set Phantom Group Unit Equipment — 2-way Signaling and Dialing Over Short Haul Open Wire Or Cable — Equipped With 1000-volt*

**Breakdown Capacitors — Occupies Space of Eight 1-3/4-inch Mounting Plates (See Note F)**

Equipment — ED-95032-01, Fig. 2

**List 1** — Framework, assembly, wiring, and common equipment for one phantom group unit.

	WIRE	EQUIP	NOTES
Framework, ED-90782-01, Fig. 1		1	
Test Resistances, SD-95032-01, Fig. 6 & 7	1	1	E

**List 2** — Wiring and equipment per SD-95032-01, Fig. 16 and 20, all optional apparatus, and Fig. 10, less "L" apparatus, for S1 and SD-95032-01, Fig. 17 and 20, all optional apparatus, and Fig. 11 for S2 required in addition to list 1 for two side circuits. (See notes A, B, C, and D.)

**List 3** — Wiring and equipment per SD-95032-01, Fig. 18 and 20, all optional apparatus, required in addition to lists 1 and 2 for one phantom circuit PH. (See notes A, B, C, and D.)

**List 4** — Wiring and equipment per SD-95032-01, Fig. 5 for one 1-mf dc blocking capacitor. One required for each side circuit and one required for each phantom circuit.

**List 5** — Wiring and equipment per SD-95032-01, Fig. 5 for one 4-mf dc blocking capacitor required for each side circuit and one required for each phantom circuit.

**List 6** — Wiring and equipment per SD-95032-01, Fig. 10, "L" apparatus, required in addition to lists 1 and 2 for one CX set telegraph capacitor when fourth, ground potential compensation, leg is used for telegraph.

**Notes**

A. "M" apparatus for side circuit only operation is furnished on all units but "M" or "N" and "W" or "V" wiring for side only or phantom group operation, respectively, must be applied to meet job requirements.

B. Codes and wiring for repeating coils per SD-95032-01, Fig. 2, 8, and 9 must be speci-

fied in addition to lists 2 and 3 in accordance with table and notes on the circuit drawing.

C. "S" apparatus, 2-mf capacity per SD-95032-01, Fig. 20 is furnished on all units but must be connected for 1 mf, "R" wiring or 2 mf, "S" wiring, in accordance with information on the circuit drawing to meet job requirements.

D. The network resistors N3, N4, N5, and N7 should be strapped as required to meet job requirements.

E. The make-busy C resistor should be connected to ground or battery, "A" or "B" wiring, as required to meet job conditions.

F. When the ground potential compensation leg is to be used as a fourth CX signaling channel, CX signaling equipment per J98604C, List 1 shall be specified.

G. "YA" and "YB" wiring shall be initially provided on the unit terminal strip.

**J98604C — AT&T Co Std — Combination Type "B" CX Signaling, Type "D" CX Set and Repeating Coil Unit Equipment — 2-way Signaling and Dialing Over Short Cable or Open Wire — For Use as a Fourth CX Circuit in a Phantom Group or as a Single Circuit — Equipped With 500-volt Breakdown Capacitors — Two or Three 1-3/4- by 19-inch Mounting Plates — Surface-wired**

Equipment — ED-91541-01, Fig. 2 and 3

**List 1** — Framework, wiring, and equipment for one CX signaling circuit per SD-95032-01, Fig. 6 and 19 and 20 when used for signaling over a fourth circuit in a phantom group or over a single physical circuit. (See notes B, C, and E.)

**List 2** — Wiring and equipment per SD-95032-01, Fig. 10, less "L" apparatus, required in addition to list 1 to obtain a composite set for use on a single physical circuit. (See note D.)

- List 4** — Wiring and equipment per SD-95032-01, Fig. 5, "J" apparatus, required in addition to list 2 for one 1-mf dc blocking capacitor.
- List 5** — Wiring and equipment per SD-95032-01, Fig. 5, "K" apparatus, required in addition to list 2 for one 4-mf dc blocking capacitor.
- List 6** — Wiring and equipment per SD-95032-01, Fig. 10, "L" apparatus, required in addition to list 2 when the ground potential compensation leg is used for telegraph. (See note D.)

#### Notes

- A. Codes and wiring for repeating coils, per SD-95032-01, Fig. 8 must be specified in addition to list 2 in accordance with tables and notes on the circuit drawing.
- B. Provide strapping for resistors B, N3, N4, N5, and N7 per SD-95032-01, Fig. 20 as required to meet job conditions.
- C. Provide "A" or "B" wiring per SD-95032-01, Fig. 6 as required.
- D. Provide "H," "K," or "L" wiring per SD-95032-01, Fig. 10 as required.
- E. "S" apparatus, 2-mf capacity, per SD-95032-01, Fig. 20 is furnished on all units but shall be connected for 1 mf, "R" wiring or 2 mf, "S" wiring, as required to meet job conditions.
- F. "YB" wiring shall be initially provided on the unit terminal strip.

**J98604D** — *AT&T Co Std — Combination Type "B" CX Signaling, Type "D" CX Set, and Repeating Coil Unit Equipment — 2-way Signaling and Dialing Over Short Cable or Open Wire — For Use as a Fourth CX Circuit in a Phantom Group or as a Single Circuit — Equipped With 1000-volt Breakdown Capacitors — Three or Four 1-3/4- by 19-inch Mounting Plates — Surface-wired*

Equipment — ED-91541-01, Fig. 2 and 4

- List 1** — Framework, wiring, and equipment for one CX signaling circuit per SD-95032-01, Fig. 6 and 19 and 20 when used for signaling over a fourth circuit in a phantom group or over a single physical circuit. (See notes B, C, and E.)
- List 2** — Wiring and equipment per SD-95032-01, Fig. 10, less "L" apparatus, required in addition to list 1 to obtain a composite set for use on a single physical circuit. (See note D.)
- List 4** — Wiring and equipment per SD-95032-01, Fig. 5, "J" apparatus, required in addition to list 2 for one 1-mf dc blocking capacitor.
- List 5** — Wiring and equipment per SD-95032-01, Fig. 5, "K" apparatus, required in addition to list 2 for one 4-mf dc blocking capacitor.
- List 6** — Wiring and equipment per SD-95032-01, Fig. 10, "L" apparatus, required in addition to list 2 when the ground potential compensation leg is used for telegraph. (See note D.)

#### Notes

- A. Codes and wiring for repeat coils, per SD-95032-01, Fig. 8 must be specified in addition to list 2 in accordance with tables and notes on the circuit drawing.
- B. Provide strapping for resistors B, N3, N4, N5, and N7 per SD-95032-01, Fig. 20 as required to meet job conditions.
- C. Provide "A" or "B" wiring per SD-95032-01, Fig. 6 as required.
- D. Provide "H," "K," or "L" wiring per SD-95032-01, Fig. 10 as required.
- E. "S" apparatus, 2-mf capacity, per SD-95032-01, Fig. 20 is furnished on all units but shall be connected for 1 mf, "R" wiring or 2 mf, "S" wiring, as required to meet job conditions.
- F. "YB" wiring shall be initially provided on the unit terminal strip.

**J98604E** — *AT&T Co Std — Combination Type "B" CX Signaling, Type "D" CX Set, and Repeating Coil Unit Equipment*

— *2-way Signaling, 2-way Dialing Over Short Cable or Open Wire — For Compositing A Phantom Circuit — Equipped With 500-volt Break-down Capacitors — Two or Three 1-3/4- by 19-inch Mounting Plates — Surface-wired*

Equipment — ED-91541-01, Fig. 3 and 5

- List 1** — Framework, wiring, and equipment for one CX signaling circuit per SD-95058-01, Fig. 1, and Fig. 5 for compositing a phantom circuit. (See notes B, C, and E.)
- List 2** — Wiring and equipment per SD-95058-01, Fig. 3 and 4, less "N" apparatus, required in addition to list 1 for one composite set. (See note D.)
- List 3** — Wiring and equipment per SD-95058-01, Fig. 2 required in addition to list 2 for one repeating coil. (See note A.)
- List 4** — Wiring and equipment per SD-95058-01, Fig. D, "ZA" apparatus, required in addition to list 3 for one 1-mf dc blocking capacitor.
- List 5** — Wiring and equipment per SD-95058-01, Fig. D, "ZB" apparatus, required in addition to list 3 for one 4-mf dc blocking capacitor.
- List 6** — Wiring and equipment per SD-95058-01, Fig. 4, "N" apparatus, required in addition to list 2 when the ground potential compensation leg is used for telegraph. (See note D.)

#### Notes

- A. Codes and wiring for repeating coils shall be specified in accordance with the tables and notes on the circuit drawing.
- B. Provide strapping for resistors N2, N3, and N4 per SD-95058-01, Fig. 1 as required to meet job conditions.
- C. Provide "A" or "B" wiring per SD-95058-01, Fig. 5 as required.
- D. Provide "M" or "N" wiring per SD-95058-01, Fig. 4 as required.
- E. Provide "X," "Y," or "Z" wiring in accordance with the circuit notes.

**J98604F** — *AT&T Co Std — Combination Type "B" CX Signaling, Type "D" CX Set, and Repeating Coil Unit Equipment — 2-way Signaling, 2-way Dialing Over Short Cable or Open Wire — For Compositing A Phantom Circuit — Equipped With 1000-volt Break-down Capacitors — Three or Four 1-3/4- by 19-inch Mounting Plates — Surface-wired*

Equipment — ED-91541-01, Fig. 4 and 5

- List 1** — Framework, wiring, and equipment for one CX signaling circuit per SD-95058-01, Fig. 1, and Fig. 5 for compositing a phantom circuit. (See notes B, C, and E.)
- List 2** — Wiring and equipment per SD-95058-01, Fig. 3 and 4, less "N" apparatus, required in addition to list 1 for one composite set. (See note D.)
- List 3** — Wiring and equipment per SD-95058-01, Fig. 2 required in addition to list 2 for one repeating coil. (See note A.)
- List 4** — Wiring and equipment per SD-95058-01, Fig. D, "ZA" apparatus, required in addition to list 3 for one 1-mf dc blocking capacitor.
- List 5** — Wiring and equipment per SD-95058-01, Fig. D, "ZB" apparatus, required in addition to list 3 for one 4-mf dc blocking capacitor.
- List 6** — Wiring and equipment per SD-95058-01, Fig. 4 "N" apparatus, required in addition to list 2 when the ground potential compensation leg is used for telegraph. (See note D.)

#### Notes

- A. Codes and wiring for repeating coils shall be specified in accordance with the tables and notes on the circuit drawing.
- B. Provide strapping for resistors N2, N3, and N4 per SD-95058-01, Fig. 1 as required to meet job conditions.
- C. Provide "A" or "B" wiring per SD-95058-01, Fig. 5 as required.
- D. Provide "M" or "N" wiring per SD-95058-01, Fig. 4 as required.

E. Provide "X," "Y," or "Z" wiring in accordance with the circuit notes.

group or each signaling circuit of a physical circuit.

**J98604G — AT&T Co Std — Type "B" Composite Signaling — Test Jack Unit Equipment — Occupies Space of One 1-3/4-inch Mounting Plate**

**Note**

A. Provide "M" or "N" wiring per SD-95032-01, Fig. A as required.

Equipment — ED-95032-01, Fig. 3  
ED-91541-01, Fig. 6

**5. GENERAL NOTES**

**List of A&M Only and Mfr Disc. Equipment**

**List 1** — Framework, wiring, and equipment for three CX signaling jack circuits per SD-95032-01, three Fig. A, for use with phantom group arrangements. (See note A.)

EQUIPMENT	RATING	DETAILS LAST SHOWN IN ISSUE	REPLACING EQUIPMENT
J98604C,L3	Mfr Disc.	4	—
J98604D,L3	Mfr Disc.	4	—

**List 2** — Framework, wiring, and equipment for one CX signaling jack circuit per SD-95032-01, Fig. E, for use with the fourth signaling circuit of a phantom

The above equipment has been replaced as indicated. Where "A&M Only" items appear, the issue numbers shown are those of the issue in which the rating was first applied.

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