

LEICH 900-SERIES MAGNETO TELEPHONE SET
DESCRIPTION AND INSTALLATION

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1. GENERAL		1.03 As an example of a complete code, the marking NL-12842-C indicates a Code 911D instrument, with hookswitch latch, generator-grounding pushbutton and 2500 Ω -equivalent biased ringer. Under the former coding arrangement,
1.01 This section provides information concerning the 900 series of local battery magneto telephone instruments originated by the former		

Table 1. Stocklist Codes for 900-Series Telephone Sets.

Leich Number	A.E. Co. Number	Catalog Code	Features
012707	NL-12707	901	Standard service
012806	NL-12806	911	Hookswitch latch
012841	NL-12841	901D	Generator-grounding pushbutton
012842	NL-12842	911D	Generator-grounding button and latch
013353		970	Without generator or ringer
013354		972	Without generator, ringer or coil
014907	NL-14907	901D Spl.	Generator-simplexing pushbutton
Suffix Letter		Ringer	
A		1000 Ω -equivalent, biased movement	
B		1600 Ω -equivalent, biased movement	
C		2500 Ω -equivalent, biased movement	
D		1000 Ω -equivalent for pulsating ringing	
E		1600 Ω -equivalent for pulsating ringing	
F		2500 Ω -equivalent for pulsating ringing	



Figure 1. Code 911-Telephone Set for Desk Use or Wall Mounting.

the same set would have been stamped 911D-2500-KK, the final suffix indicating use of a retractile cord which is presently standard.

2. DESCRIPTION

2.01 The 900 series of magneto telephone instruments provides a sidetone-type local battery circuit in a self-contained unit. The housing is arranged so that the handset operates the hookswitch whether the instrument is wall mounted or placed upon a desk (see Figure 1). Models for hookswitch latch service have a spring-loaded plunger located at the right rear of the cradle (desk position) to release the latch. Sets arranged for grounded or simplex generator have a smaller pushbutton located at the left rear of the cradle to switch from the normal loop connection of the generator. The housing is removed from the base by loosening the mounting screw at the rear and then pulling up on the housing. Line and handset cords emerge at the rear.

2.02 Early models used a pressed-steel base, but later sets were built on a black phenolic base. The steel base has a 5/8" hole, plugged by a removable closure button, through which the station wire may be routed for wall installation. The phenolic base has a thin-walled knockout area for the same purpose. A closure button is used in the knockout hole when reconverting to desk service. Either base is supported by four circular feet (grommets) provided with holes to accommodate the screws used in wall mounting.

2.03 The majority of sets in service are equipped with a Code 110 handset, arranged to accommodate the W.E. Co. F1 transmitter and HA1 receiver units, or equivalent, but some have been assembled with a late version of the A.E. Co. Type 41 handset equipped with Type 81 transmitter and receiver units. Extreme service

conditions may require that the transmitter and receiver units in the Code 110 handset be replaced by W.E. Co. F2 and HA2 units designed specifically for local battery service. When the Type 41 (81-component) handset is used, the transmission battery must be limited to two cells (3 volts) because of the low resistance of the transmitter unit. If extreme service conditions require use of a three-cell (4-1/2-volt) battery, the Type 81 transmitter unit should be replaced with a Type 810 transmitter unit.

2.04 The Code 28 local battery induction coil is a three-winding type, mounted on, and with two windings connected by, studs in the center of the terminal panel. The transmitter winding is terminated in two spade-tipped leads. The leads from the two-section transmission capacitor are similarly terminated. The terminal panel provides a means of making necessary wiring changes for various service conditions using only a screwdriver.

2.05 Instruments from early production were equipped with fabric-covered line and handset cords, but later sets used neoprene cordage and offered a retractile handset cord as an option. PVC jacketing and retractile cord are now standard. Figures 3 through 9 show the conductor color assignment for the majority of sets in use; see Table 2 for exceptions covering certain retractile cords. Strain relief at the set end is by means of an S-hook on both line and handset cords, as well as at the block end of the line cord. The 39-M connecting block originally supplied with the set (see Figure 1) had provision for fastening this hook beneath a mounting screw. The Type 14 connecting block presently supplied has no provision for S-hook retention; for installation, use a 39-M or 42A connecting block recovered from prior service.

Table 2. Handset Cord Conductor Color Assignments.

Handset and Cord Type	Transmitter	Common	Receiver
Code 110 handset with straight cord, and most common retractile cords (neoprene and PVC)	Y	R	G
Code 110 handset with alternate neoprene retractile cord	Bk	R	W
Type 41 handset with PVC retractile cord	R	G	Y

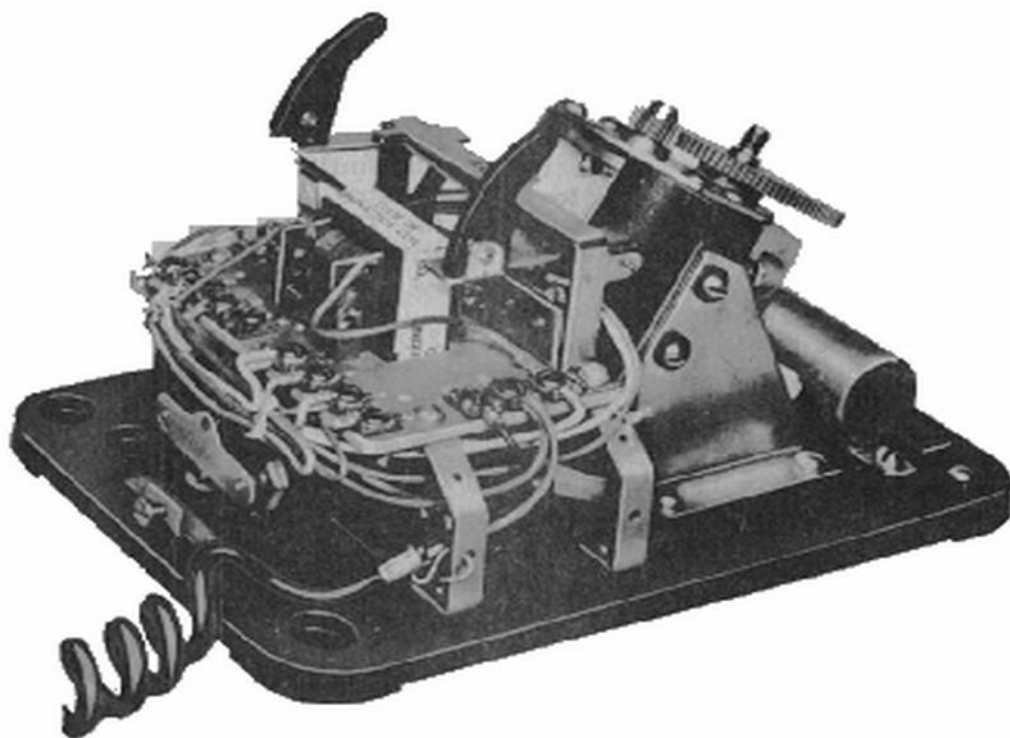


Figure 2. Interior View of Code 911 Telephone Set.

2.06 The basic structure of the 900-series set is identical to that of the 600-series common battery instrument, including the housing. A shallow, oval cup is inverted over the dial opening to provide clearance for a compact magneto generator, which is mounted to the base of the set by means of two angle brackets (see Figure 2). The generator magnet is a tunnel-shaped Alnico V casting which provides a field strength equivalent to that of a conventional five-bar, tall horseshoe assembly. Shaft-actuated contacts short-circuit the armature while at rest and connect the output to the line during operation. The shaft protrudes through an opening in the cup-shaped generator cover and is threaded to accept a crank arranged with a circular hub to which the number plate escutcheon is affixed. The escutcheon and number disc are arranged for two-point mounting on the centerline of the hub, so they may be reversed when converting from desk to wall service. An index point molded at the top (desk use) of the crank stroke on the surface of the generator cover serves to remind the user to align the crank (and thereby, the number disc) at the end of each ring.

2.07 Suffixes A, B and C shown in Table 1 indicate three options of Code 32 ringer, bias-adjusted for straight line ringing, while suffixes D, E and F denote the same mechanism with its bias adjusted for pulsating ringing and listed as Code 33, manufacture of which has been discontinued. The values assigned to the three coil options refer to the d-c resistance of the coils of earlier Leich Code 1A ringers which have an approximately equal 20-Hz impedance. This permits substituting sets equipped with the 32- and 33-series ringers for apparatus including Code 1A ringers more readily. It is necessary only to note the resistance of the older ringer in the subset being retired from service, and provide a similarly-designated unit of the newer type in the 900-series combined set being installed. The replacement instrument will then provide the proper impedance to match other stations on a party line. The actual d-c resistance of the low-impedance ringer is 2100Ω ; of the intermediate-impedance ringer, 3200Ω ; and of the high-impedance ringer, 4200Ω .

2.08 The hookswitch is a direct-acting, four-spring type with bar contacts. The first-acting pair of contacts as the handset is lifted energizes the transmitter, and the second pair closes the line. To permit a party-line or extension user to monitor the line before calling and thereby determine whether it is idle, a mechanical latch may be arranged to halt the travel of the hookswitch actuating arm after the first contact pair has closed but while the second pair remains open. Depressing the plunger in the housing releases the latch and allows the arm to rise to its full stroke. Latch-equipped sets are wired so that the first-acting pair of contacts closes the line, and the second pair energizes the transmitter after latch release.

2.09 The Code 970 and 972 telephone sets, manufacture of which has been discontinued, are arranged for local battery service in conjunction with subsets containing a generator and ringer and (in the case of the Code 972) an induction coil (see Figures 7 and 8). Certain instruments sometimes referred to as modified 900-series sets, manufactured per drawing SK-1906, are actually 630- and 640-series models and are described in the section of these practices covering 600-series sets. 900-series magneto sets may be converted to common battery manual or automatic service, but this feature no longer has significance in General System operations and is not covered in this section.

3. **INSTALLATION**

Location and Wiring

3.01 In locating the telephone set, the installer should be guided by the customer's wishes insofar as installation requirements and other provisions of these practices permit. If the customer's wishes cannot be followed, explain the reason to the customer.

3.02 After the location has been determined, run station wire from the protector to that point as explained in other sections of these practices. If installation is to be made as a desk set, mount a 39-M or 42A connecting block where it will be inconspicuous and allow ample line cord length. If installation is to be made as a wall set, run the station wire to a point which will lie behind the set after the latter has been mounted.

3.03 Mount the battery box in an inconspicuous place near the location of the set, preferably along the baseboard in a corner or wall

recess. If the customer suggests a closet or other out-of-sight location, be guided by the customer's wishes, but avoid positions near pipes, registers or radiators where high temperatures may shorten battery life. Run station wire from the battery box to the set or block location. If no out-of-sight location is available, and the protector or station wire entry point is in the basement, mount the battery box in the basement along the route of the station wire. If grounded or simplex generator service is to be provided, install a Type 14 connecting block adjacent to the battery box, with station wire run between the protector and that block, and between that block and the instrument location. The latter run will require a total of four conductors. A short length of station wire between the Type 14 connecting block and the battery box will provide the battery connection. Where no ground is required at the set, the fourth conductor is not required in the run to the instrument. In this case the yellow conductor is not connected to the protector ground post.

3.04 If the instrument as drawn from the store-room is not wired for the proper choice of features for this installation, make the necessary changes before connecting the line cord (desk use) or mounting the base (wall use). Remove the generator crank from its shaft by rotating it counter-clockwise. Remove the housing from the base by loosening the lock screw at the rear and disengaging the lug at the front from the lip of the base (steel type) or from the brass insert in the base (phenolic type).

3.05 Where a wall installation is to be made, remove the line cord and snap the closure button from the hole in the base. On an initial wall installation (phenolic base), break out the thin-walled section of the knockout area to provide a hole for entrance of the station wire. If a retractile handset cord is provided and the trim length permits, disengage the S-hook strain relief from its hole in the left rear terminal panel bracket, and move it to the corresponding hole in the right rear bracket, so that the cord can emerge from the hole usually used in desk service for the line cord. This makes a neater-appearing installation.

3.06 In private-line applications the stations are sometimes arranged for grounded ringing. In this case, move that green ringer lead which is normally connected at terminal 10 to terminal 12. If the generator of a non-suffix Code 901 or 911 set (see Figures 3 and 4) is also to be

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permanently wired for grounded output, move the yellow generator lead from terminal 2 to terminal 12.

3.07 To silence the local ringer when the generator is cranked for metallic ringing on the line (or when ringer and generator are both wired for permanent grounded ringing), move that green ringer lead which is normally connected at terminal 10 or 12 to terminal 13. In this case, the generator contacts short-circuit the ringer during cranking.

3.08 In some exchanges the station ringers are wired for metallic ringing, but the switchboard drops are wired to ground so they do not respond to calls between stations. This application requires Code 901D or 911D telephone sets at the stations (see Figures 5 and 6). To call another party on the line, the customer merely cranks the generator in the usual way. In this case, the ringing potential is applied to the line on the metallic basis, sounding the ringers at all other stations (and at the calling station, unless wired in accordance with the preceding paragraph). The switchboard drop is unaffected by the call. To call the operator from any station on the line, the customer lifts the handset from its cradle and depresses the pushbutton at the left rear of the cradle while cranking. In this case, the ringing potential is applied from line to ground, no ringer sounds at any station, but the switchboard drop is released to signal the operator. The 014907 version of the Code 901D set (see Figure 9) is further arranged to extend the loop range over which this feature is possible by connecting the generator in simplex (from ground to both line conductors simultaneously) when the pushbutton is depressed. If used on a short loop where single-conductor grounded ringing is adequate, the set may be converted to that service by removing the blue pushbutton lead from terminal 5 and taping the spade terminal.

Connection and Tests

3.09 After any necessary changes in wiring have been made, complete the installation by terminating the line cord on the connecting block (desk) or by mounting the base of the set (wall). In the latter case, use four #8 wood screws with 3/8" or larger washers and insert them through the rubber feet (grommets), which should not be removed from the base. Draw the station wire through the hole in the base, tighten the mounting screws solidly (but not so far as to distort the rubber feet), and make the appropriate terminal panel connections.

3.10 If the battery box is located near the instrument, connect the red conductor of the battery wire to terminal R of the connecting block (desk) or terminal 2 of the panel (wall), together with the red conductor of the line wire. The yellow conductor of the battery wire should be wired to connecting block terminal B or panel terminal 3. In desk service, verify that the black line cord conductor from connecting block terminal B is connected at panel terminal 3, and the yellow line cord conductor from connecting block terminal Y is connected at panel terminal 12. Correct these connections if necessary, to maintain standard color coding.

3.11 If the battery box is located near the protector, connect the red conductor of the battery wire to the red conductor of the line wire, either at the protector terminal or the intermediate connecting block. The yellow conductor of the battery wire should be spliced to the yellow conductor of the line wire inside the protector housing in those cases where the generator and ringer are both to be connected on the metallic basis. Where grounded ringing is involved, connect the yellow conductor of the battery wire to the black conductor of the line wire at terminal 3 of the intermediate connecting block. At the line cord connecting block in desk service, connect the line cord conductors and the station wire conductors on a color-for-color basis. Within the set, verify that the black line cord conductor is connected at panel terminal 3, and the yellow at panel terminal 12. Correct these connections if necessary, to maintain standard color coding.

3.12 Install two 1-1/2 V dry cells in the battery box, and connect the center terminal of one to the outer terminal of the other with a short piece of wire. Connect the red conductor of the battery wire to the vacant outer (negative) terminal of the first cell, and the yellow conductor to the vacant center (positive) terminal of the second cell.

3.13 Screw the generator crank onto its shaft and, with the hookswitch lever depressed, ring the code assigned to this station. Check that the ringer sounds or remains silent, as desired, while cranking. If the operator answers (drops wired for metallic ringing), check transmission and request a ringback for test; otherwise ring the operator for the same purpose after again depressing the hookswitch lever (non-suffix sets) or while holding down the grounding pushbutton (suffix D sets). Check for proper ringer operation when the incoming call is received, lift the handset and (on Code 911 sets)

check for absence of sidetone until the hookswitch latch release button is pressed. Check transmission with the operator, and turn the generator crank slightly off normal several times to verify that it restores properly and disconnects the armature from the line when released. Dismiss the operator and, on a Code 911 set, place the hookswitch lever on the latch.

3.14 If loop length or non-latch station loading requires an increase in the transmit level, install an additional dry cell to provide a total battery potential of 4-1/2 V. On the standard Leich Code 110 handset shown in Figure 1, remove the transmitter and receiver units and install a W.E. Co. F2 transmitter unit and KA2 receiver unit. If the set is equipped with an A.E. Co. Type 41 handset provided with Type 81 components, remove the Type 81 transmitter unit and install a Type 810 transmitter unit. Repeat the transmission check.

3.15 If the instrument is being installed as an extension and the customer desires that the ringer be silenced, disconnect one ringer lead and move it to the same terminal as the other ringer lead.

3.16 Before replacing the housing on the base, check to be sure that the ringer leads do not interfere with the hookswitch, and that the cords are positioned near the point where they will emerge when the housing is installed.

3.17 Unscrew the generator crank from its shaft, and assemble the housing to the base by engaging the lug at its front edge in the lip of the base (steel type) or in the metal insert in the base (phenolic type). Arrange the cords in the slots in the housing and lower the slotted lug at the rear over the mounting screw in the base. Hold the housing firmly in place and tighten the screw securely. Screw the generator crank tightly on the shaft and index it at the top (desk) or bottom (wall) of its stroke.

3.18 Using the pre-printed station number disc supplied for this installation, or one imprinted on the job as required, mount the disc in the number plate escutcheon and snap the assembly in place on the hub of the generator crank.

3.19 Instruct the customer in the proper operation and use of the instrument, and leave the installation area clean and orderly.

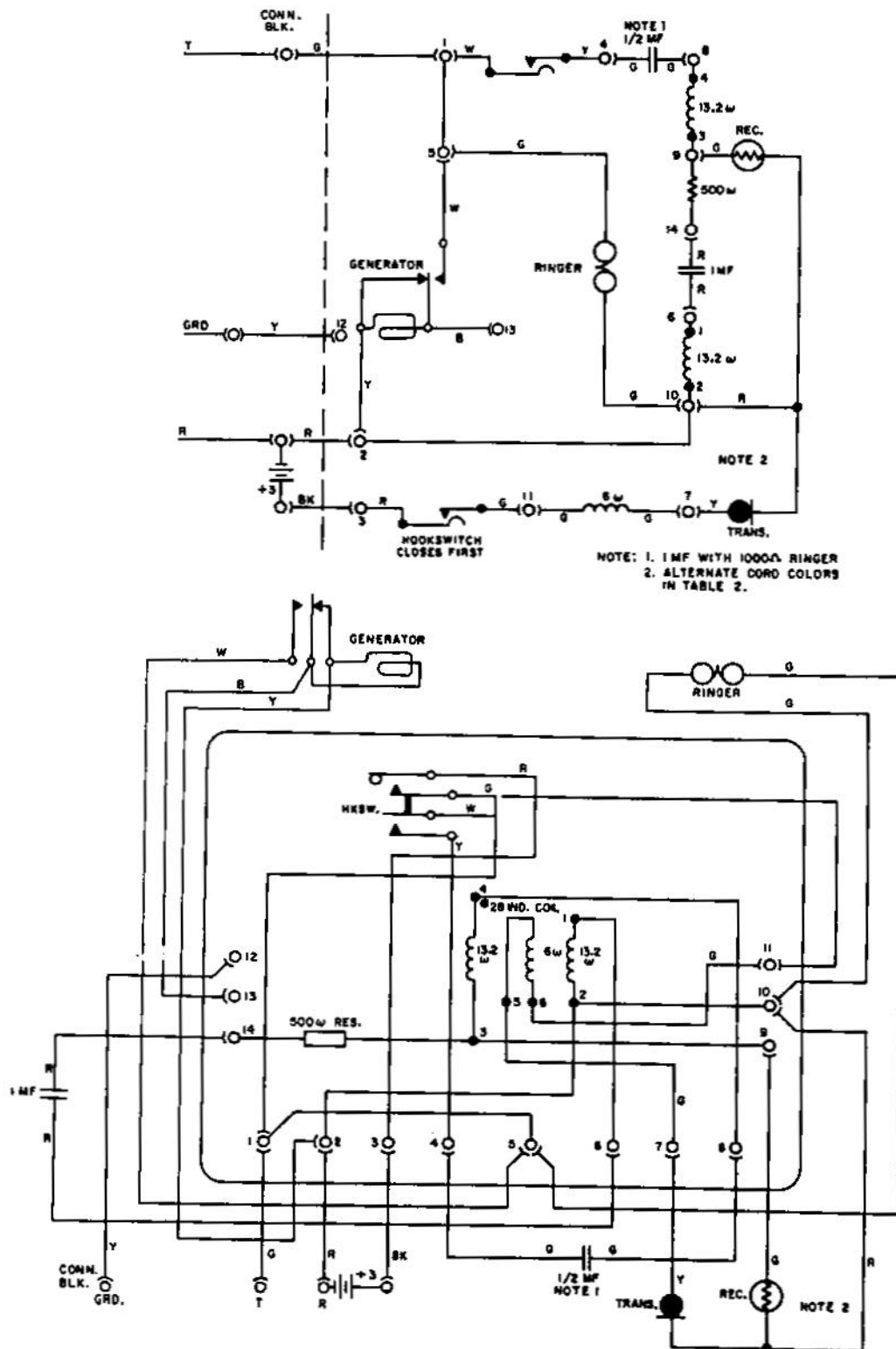


Figure 3. Schematic and Wiring Diagram, Code 901 Telephone Set.

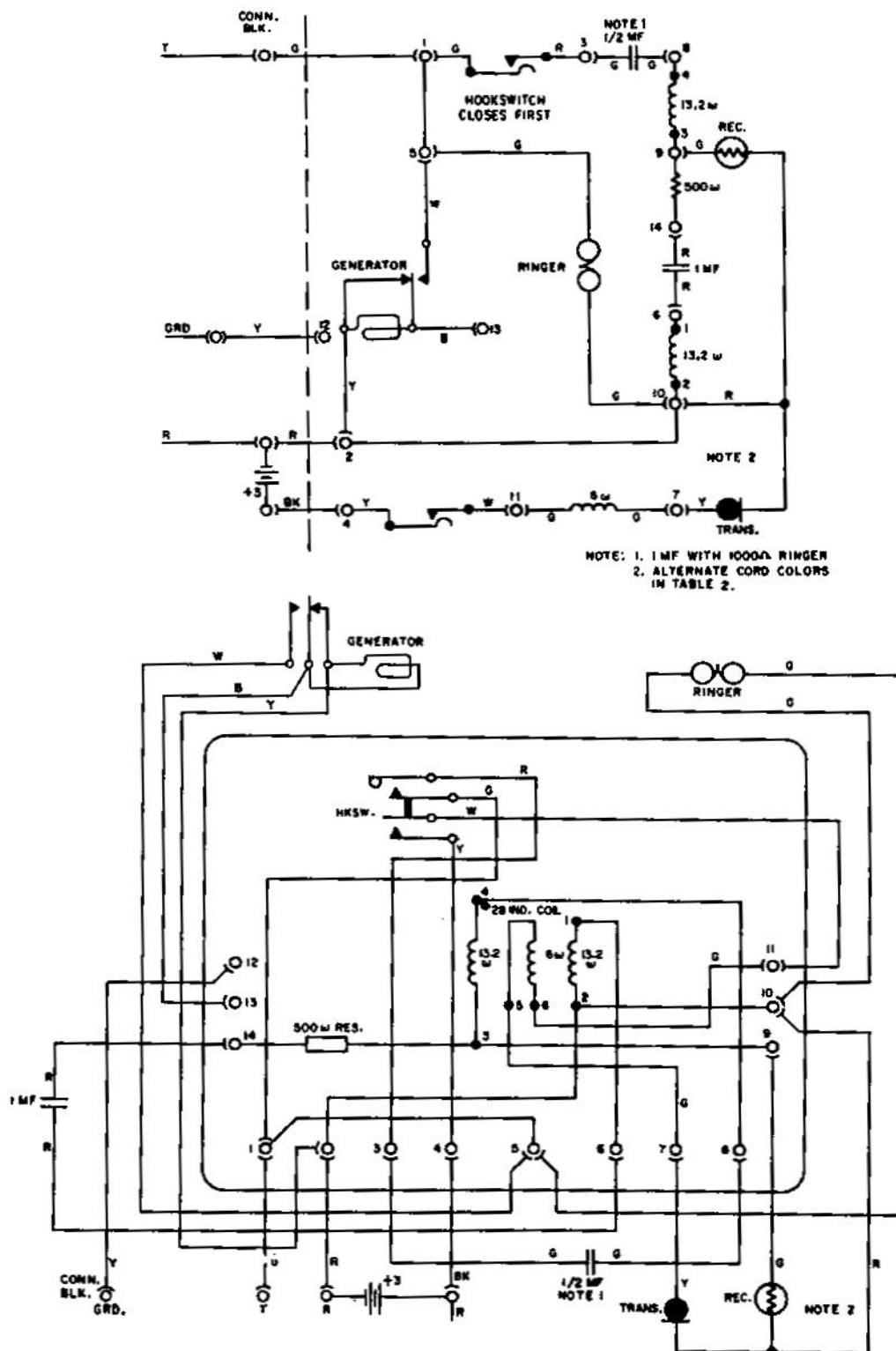


Figure 4. Schematic and Wiring Diagram, Code 911 Telephone Set.

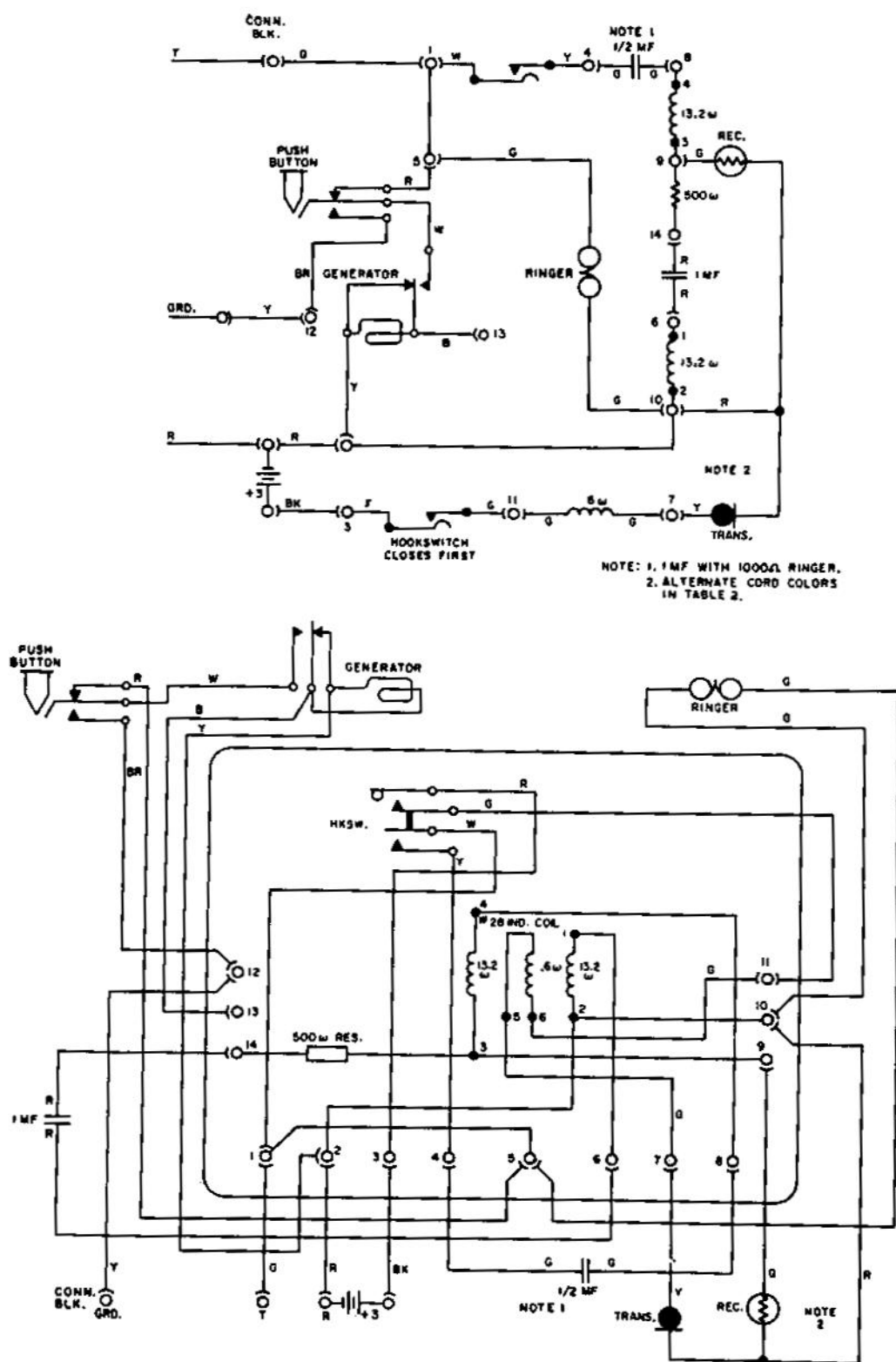


Figure 5. Schematic and Wiring Diagram, Code 901D (NL-12841) Telephone Set.

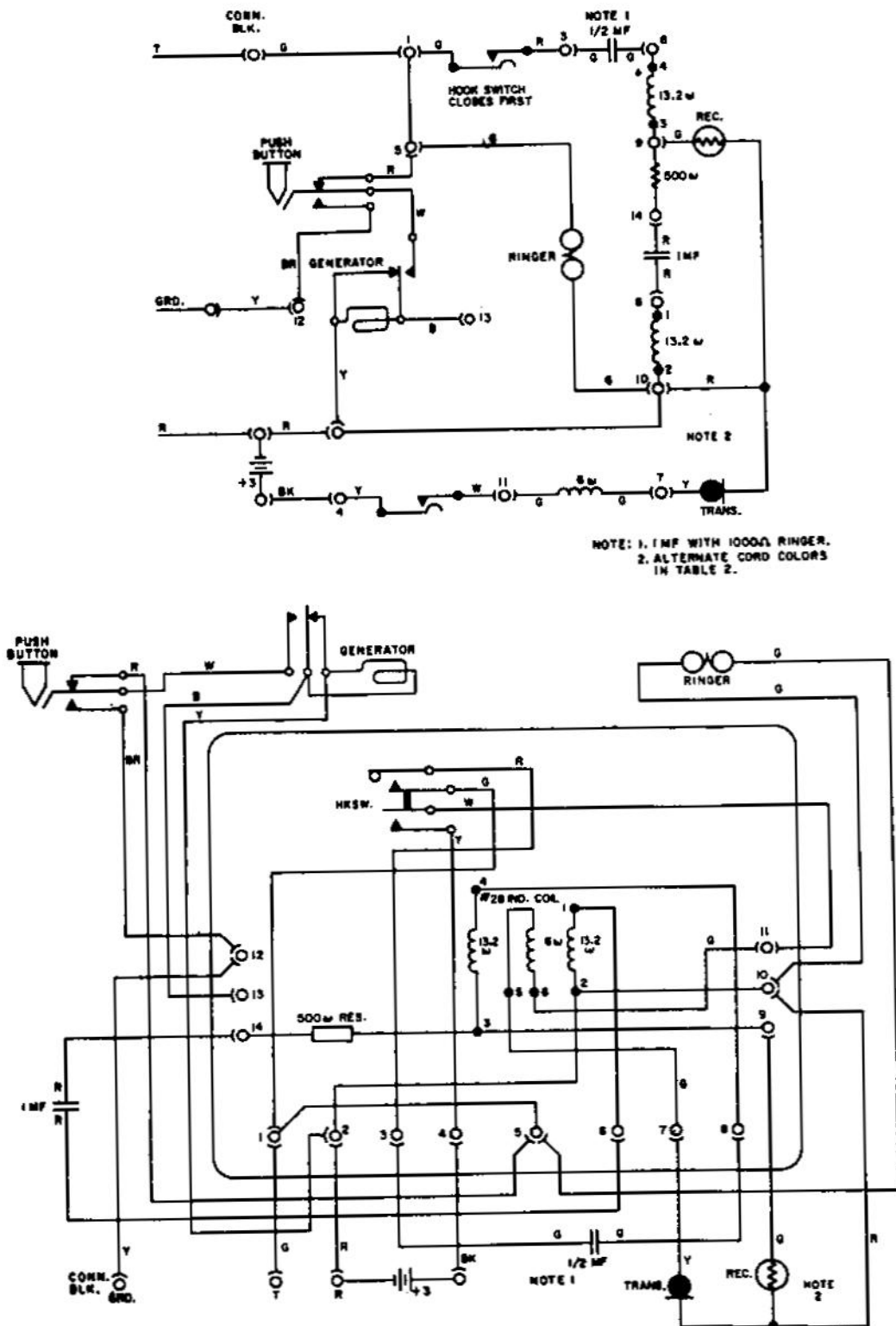


Figure 6. Schematic and Wiring Diagram, Code 911D Telephone Set.

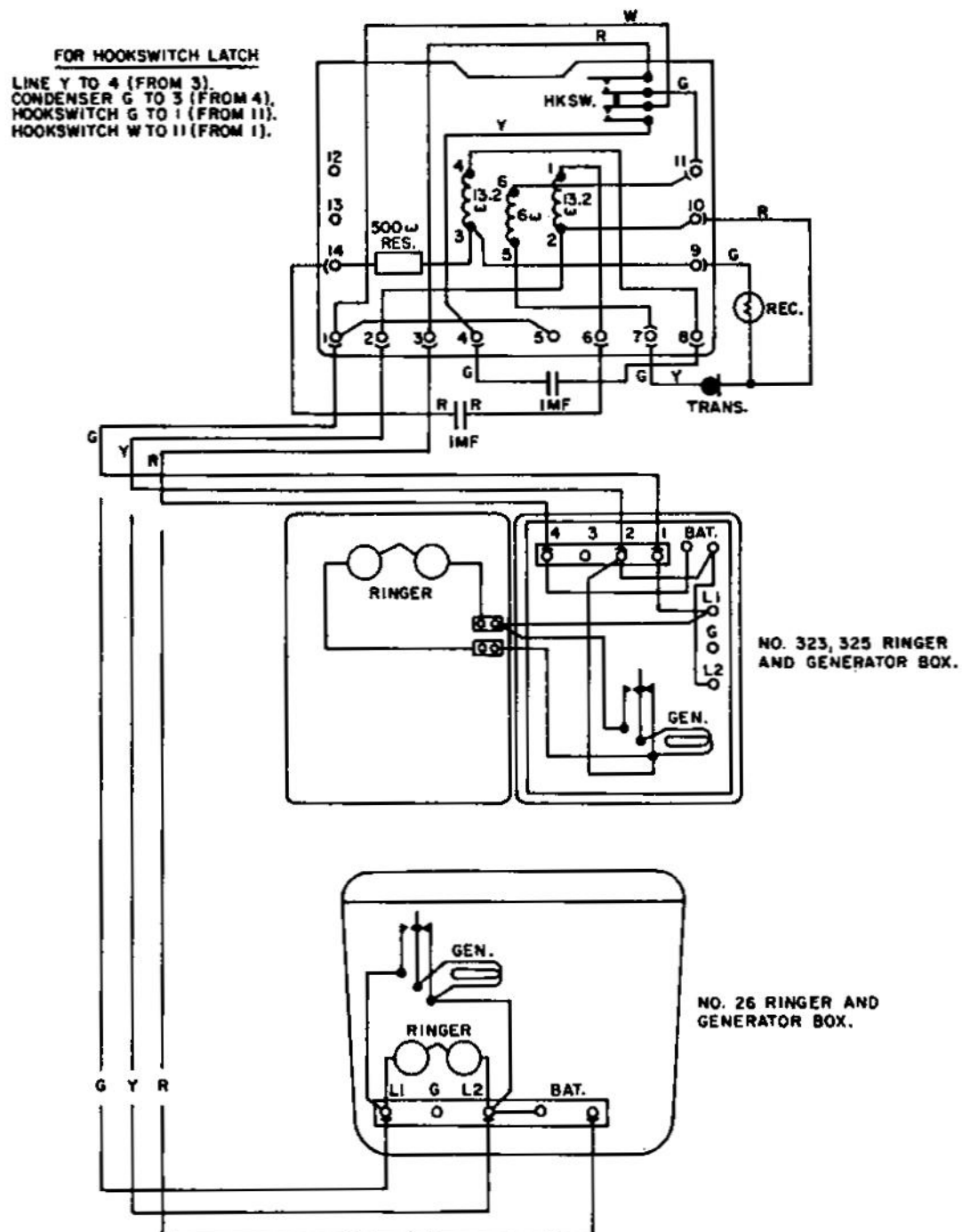
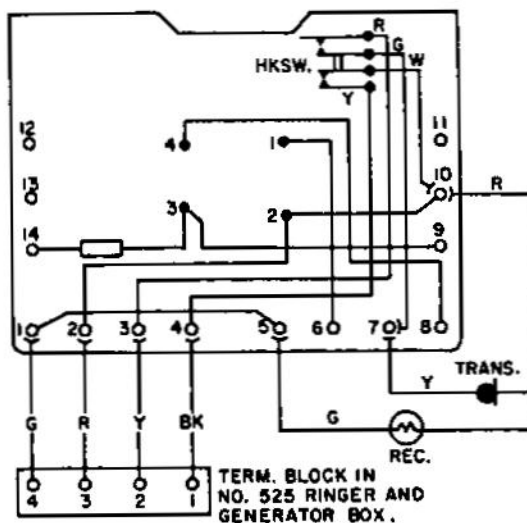


Figure 7. Wiring Diagram, Code 970 Telephone Set.

FOR HOOKSWITCH LATCH

CONNECT LINE Y TO 4 (FROM 3).
CONNECT LINE BK TO 3 (FROM 4).
HOOKSWITCH W TO 7 (FROM 10).
HOOKSWITCH G TO 10 (FROM 7).



FOR HOOKSWITCH LATCH

CONNECT LINE G TO 1 (FROM 4).
CONNECT LINE Y TO 4 (FROM 1).
CONNECT HANDSET G TO 5 (FROM 7).
CONNECT HANDSET Y TO 7 (FROM 5).

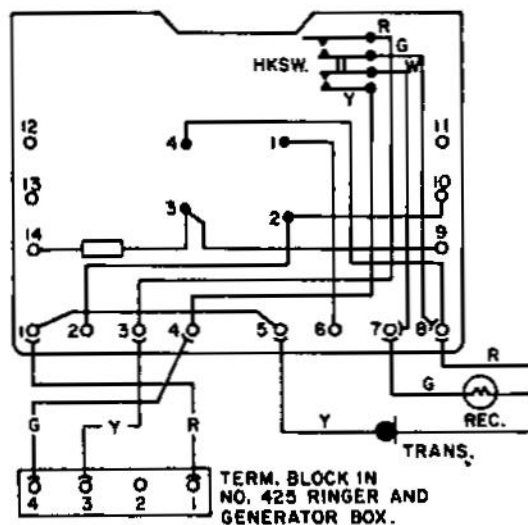


Figure 8. Wiring Diagram, Code 972 Telephone Set.

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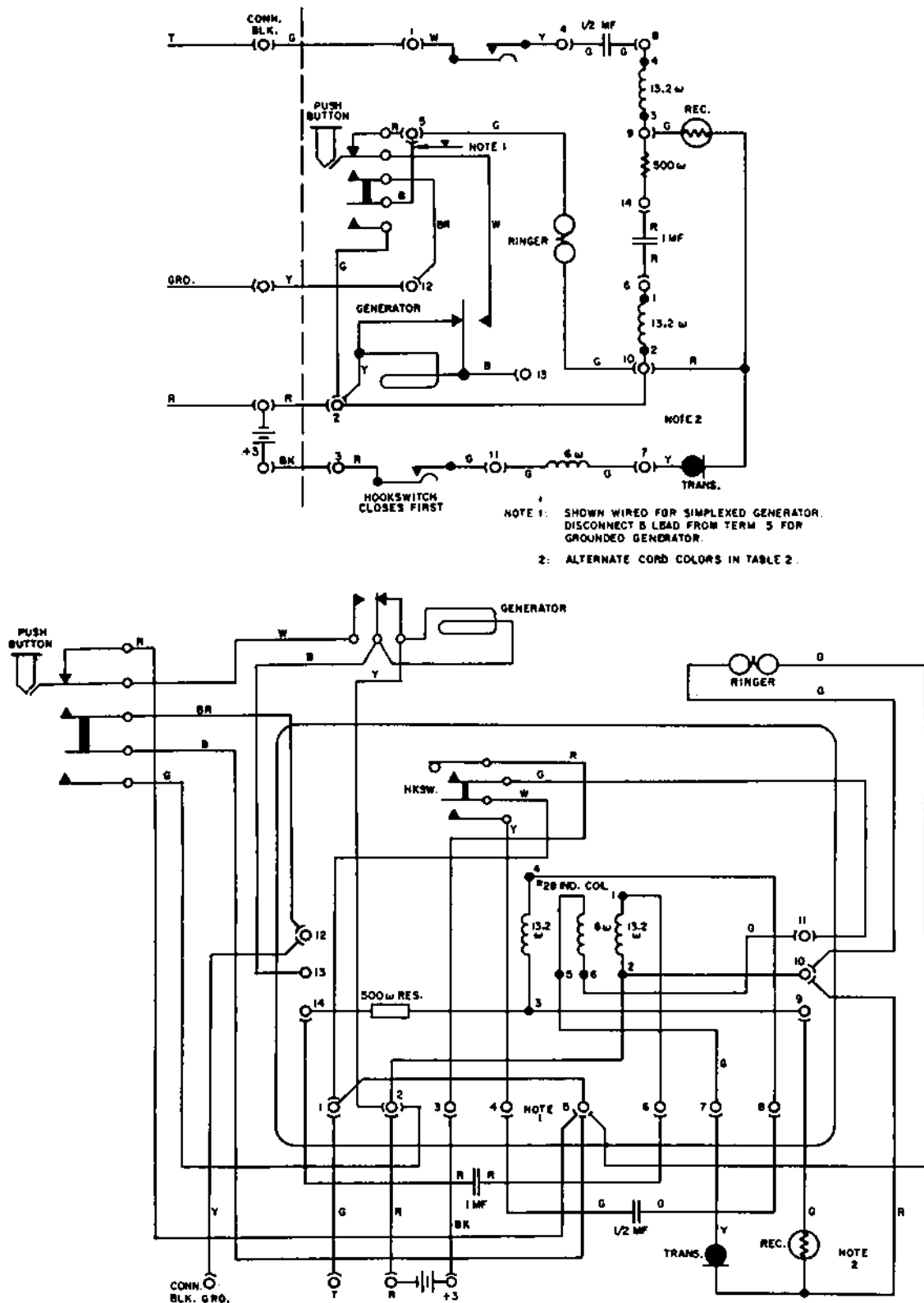


Figure 9. Schematic and Wiring Diagram, Code 901D (NL-14907) Telephone Set.