# DATA SET 109H-TYPE USED IN A DATA LINE CONCENTRATOR SYSTEM INSTALLATION AND CONNECTIONS

CONTENTS



## 1. GENERAL

**1.01** This practice provides information on the installation and connection procedures required when providing service in a Data Line Concentrator System using the Data Set 109H-type (Fig. 1).

**1.02** Installation of the Data Set 109H-type consists of connecting the line to the data set, adjusting the line pads, verification of the

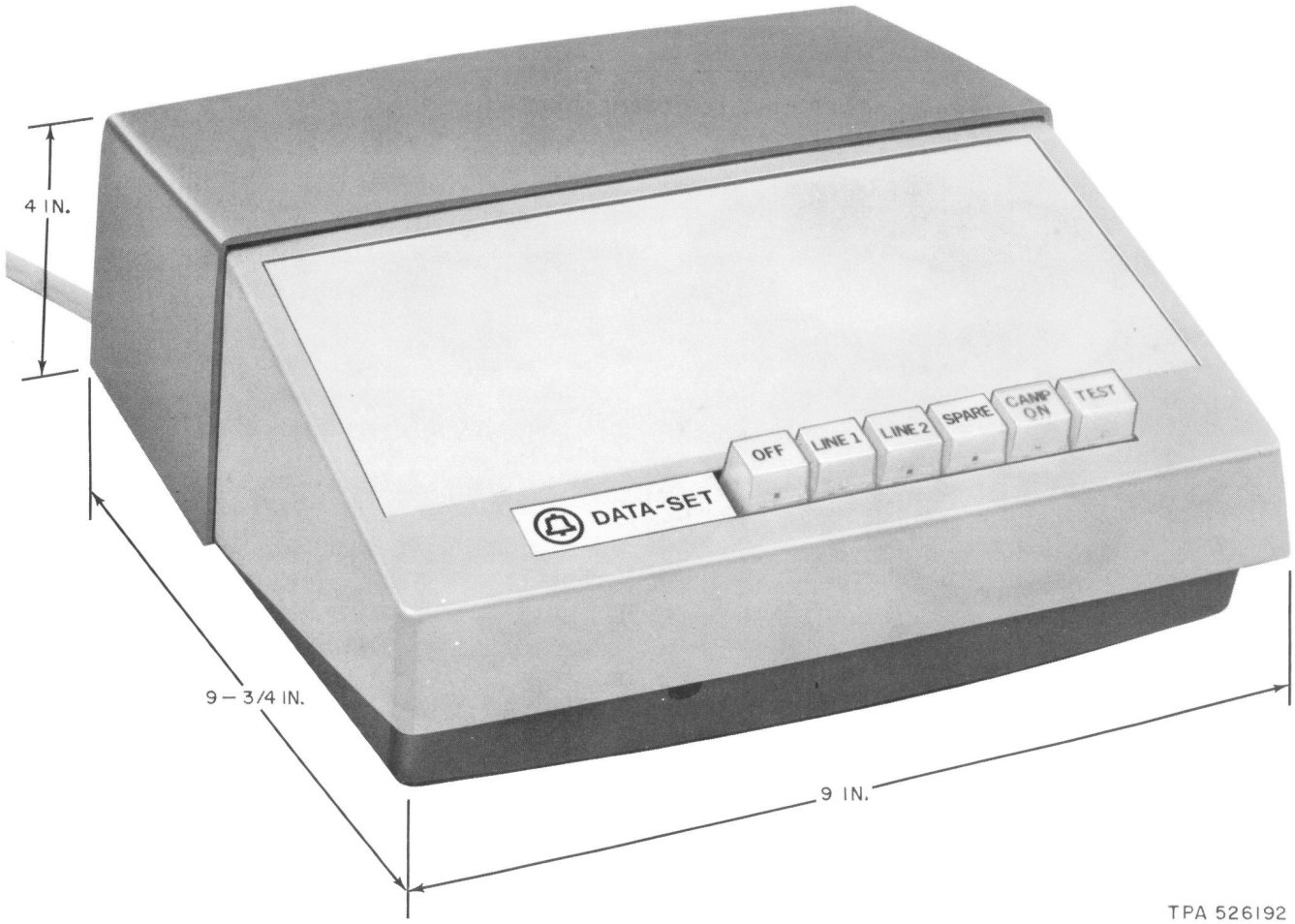



**Fig. 1 — Data Set 109H-L1**

options to be used, providing power, and connecting the data set to the terminal equipment via the EIA interface connector (Fig. 2).

**1.03** The cord and connector required for connecting the terminal equipment to the Data Set 109H-type are supplied by the customer.

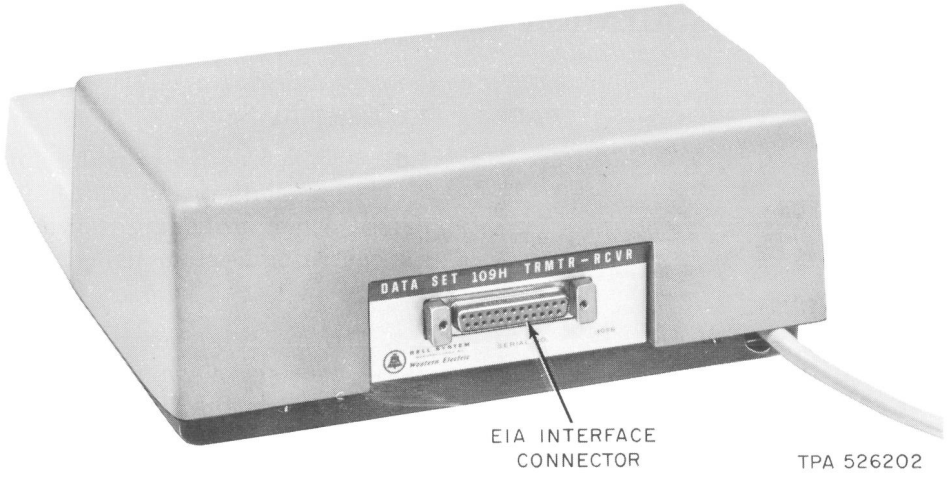



**Fig. 2 — Data Set 109H-Type — Rear View**

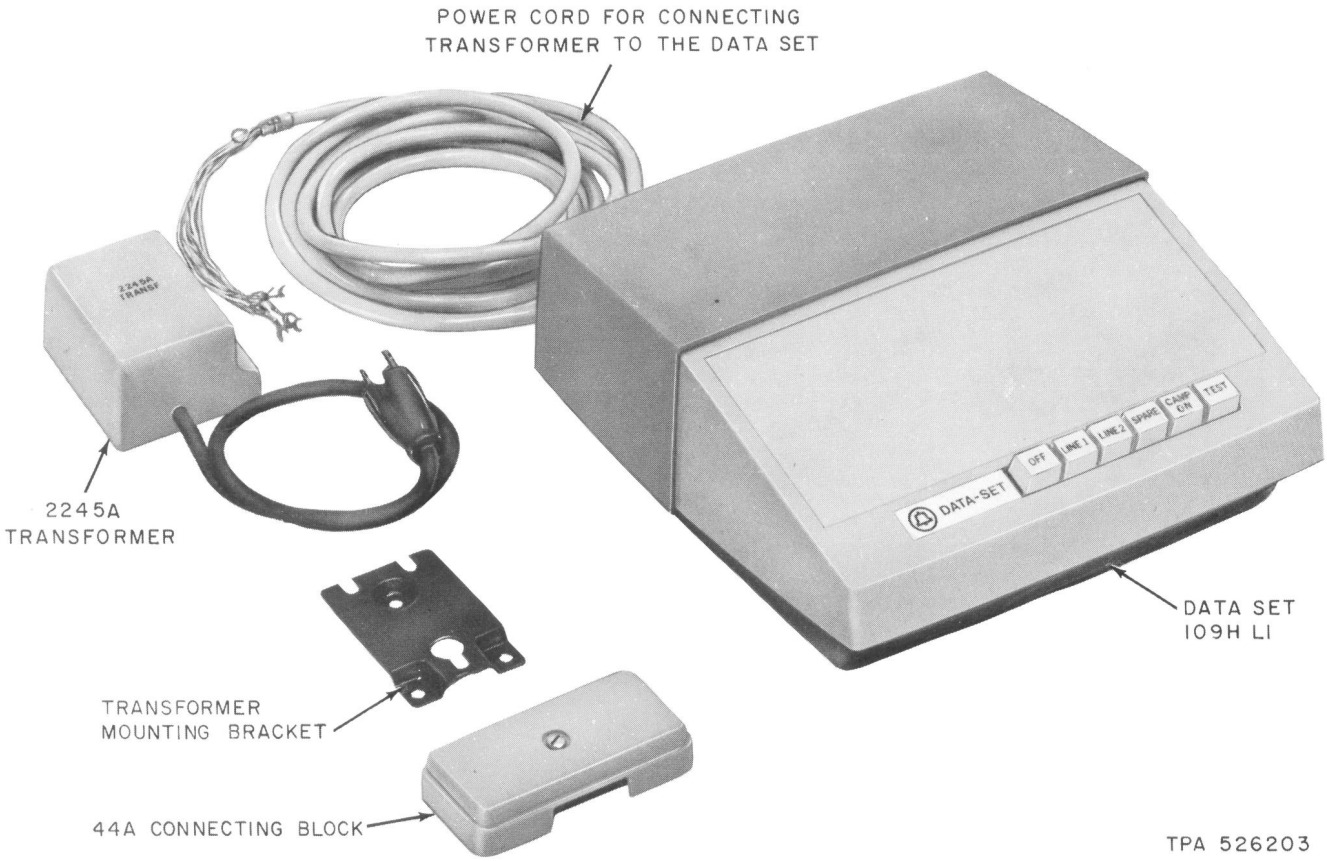



**Fig. 3 — Data Set 109H-L1 — Showing Transformer Power Cords and Connecting Block**

This cord should not exceed 50 feet in length and must be equipped with a plug to mate with a KS-19087-L2 connector on the data set.

**1.04** The customer must furnish a 117-volt 60-Hz, 3-wire grounding type power receptacle that is not under control of a switch. The data set power is supplied by a 2245A transformer and cord that is plugged into the customer-supplied power receptacle. Figure 3 shows the 2245A transformer, transformer mounting bracket, 44A connecting block, and Data Set 109H-L1.

## 2. TOOLS AND APPARATUS

**2.01** When the Data Set 109H-type is installed, a KS-14510-L5 volt-ohm–milliammeter, or equivalent, may be required to set the data set pads to the proper value. No other special equipment is required when installing the Data Set 109H-type.

## 3. OPTION CONNECTIONS

**3.01** Before starting installation of the data set, a check should be made to determine that the data set has been equipped with the required features and options. The service order should indicate the features and options that are required for this specific installation.

**3.02** The options provided by the Data Set 109H-type are given in Table A which shows the letter designation of each option and the connections or action required to install the option.

*Note:* The screw switches and terminals used to install the options are located on GA1 CP. For information on gaining access to GA1 CP, refer to the cover removal part of the section entitled Data Set 109H-Type — Used in a Data Line Concentrator System — Maintenance (591-037-301).

**3.03** The additional features that are provided by the Data Set 109H-type are indicated by the list numbers associated with the data set. Table B indicates the orderable list numbers, the applicable wiring table (C through R), the associated wiring diagram (Fig. 4 through 19), and the snap-on circuit packs required in addition to GA1 CP. The table covers local and remote service using a Data Line Concentrator.

**3.04** Verify that the features and options specified on the service order are provided by performing the following operations. The screw terminals and spade-ended leads referred to in the figures, text, and tables can be located and identified by Fig. 20 through 23.

(a) Remove the cover from the data set. Refer to the section entitled Data Set 109H-Type — Used in a Data Line Concentrator System — Maintenance (591-037-301).

(b) Refer to Table B to determine the applicable wiring table, associated wiring diagram, and required circuit packs.

(c) Check to ensure that the snap-on circuit packs required to provide the specified list number have been mounted in the data set.

(d) Using the applicable wiring table and wiring diagram, check the data set and circuit pack connectors.

(e) Use Table A to check and verify the option connections specified by the service order.

*Note:* Do not reinstall the cover on the data set at this time since the data set line pads must be set before completing the station installation.

## 4. INSTALLATION PROCEDURES

### GENERAL

**4.01** Install the mounting bracket for the 2245A power transformer. This bracket must be mounted within 15 inches of the customer-supplied power receptacle so the power cord from the transformer will reach the receptacle.

*Note:* The customer must furnish a 3-wire, 117-volt 60-Hz power receptacle that is not under control of a switch.

**4.02** Install the 44A connecting block (shown as TS-1 on wiring diagrams and tables) in a convenient location near the data set. The

44A connecting block (TS-1) must be located within 9 feet of the data set so the D10R-61 (designated CA5) can reach the data set.

**4.03** Use D-type station wire to connect the transformer terminals to the 44A connecting block terminals as indicated by the applicable wiring diagram and wiring table.

*Note:* The length of the station wire between the transformer and the connecting block must not exceed 50 feet.

**4.04** The 2245A transformer can now be installed on the mounting bracket; however, the power cord must not be plugged in at this time.

**4.05** Install the D10R-61 (CA5 cord) by making the required connections to the data set and the 44A connecting block (TS-1) terminals. Refer to the applicable wiring table and wiring diagram for information on making these connections.

## TABLE A

## OPTIONS

| DESIGNATION | | REQUIRED CONNECTIONS TO INSTALL OPTION | | | | OPTION AVAILABILITY |
|---|---|---|---|---|---|---|
| FEATURE | OPTION | LOOSEN SCREW | TIGHTEN SCREW | SPADE-ENDED LEAD DESIG | CONN TO GA1 CP TERM. | |
| Space crossover shift | Z | S6 | S7 | | | 1 per data set |
| Mark crossover shift | Y | S7 | S6 | | | |
| No crossover shift | X | S6, S7 | — | | | |
| Frame GRD to SIG GRD | W | — | S5 | | | 1 per data set |
| Isolated signal ground | V | S5 | — | | | |
| CB lead open | M | | | BK-BL (CA3 cord) | Insulate and store | 1 per data set |
| CB looped to CA | K | | | | 17 | |
| CB common to CC | J | | | | Conn to same term as CC lead | |
| CC lead — data in test mode | H | | | W-BL (CA3 cord) | 34 | 1 per data set |
| CC lead — no data in test mode | G | | | | 16 | |
| CC lead — steady ON | F | | | | 15 | |
| CF lead — data in test mode | B | | | BK-G (CA3 cord) | 34 | 1 per data set L1/5 and L1/4/5 See Note |
| CF lead — no data in test mode | A | | | | 16 | |
| CF lead — steady ON | ZA | | | | 15 | |
| Transmit space on disconnect (remote service) | S | | | For 109H-L1 & -L1/5, use CA4 BL-R lead. | 35 | Remote service only 1 per data set |
| Transmit mark on disconnect (remote service) | T | | | For 109H-L1/4 & -L1/4/5 use CP-ET3 SEL 84 | 36 | |

*Note:* Refer to Tables Q and R for BK-G wire connection required when the Data Set 109H-L1/5 and L1/4/5 are used in remote service arrangements. Options A, B, and ZA cannot be provided for remote service arrangements.

**TABLE B**

**DATA SET WIRING DIAGRAMS AND LIST OF FIGURES**

| LIST NO. DESIGNATION | WIRING TABLE DESIGNATION | WIRING DIAGRAM FIGURE NUMBER | ADDITIONAL CIRCUIT PACKS REQUIRED TO PROVIDE LIST NO. |
|---|---|---|---|
| LOCAL SERVICE: | | | |
| 109H-L1 | C | 4 | — |
| 109H-L1/2 | D | 5 | — |
| 109H-L1/3 | E | 6 | ET-2 |
| 109H-L1/4 | F | 7 | ET-3 |
| 109H-L1/2/4 | G | 8 | ET-3 |
| 109H-L1/3/4 | H | 9 | ET-2<br>ET-3 |
| 109H-L1/5 | I | 10 | GR-1 |
| 109H-L1/2/5 | J | 11 | GR-1 |
| 109H-L1/3/5 | K | 12 | ET-2<br>GR-1 |
| 109H-L1/4/5 | L | 13 | ET-3<br>GR-1 |
| 109H-L/2/4/5 | M | 14 | ET-3<br>GR-1 |
| 109H-L-/3/4/5 | N | 15 | ET-2, ET-3<br>GR-1 |
| REMOTE SERVICE: | | | |
| 109H-L1 | O | 16 | — |
| 109H-L1/4 | P | 17 | ET-3 |
| 109H-L1/5 | Q | 18 | GR-1 |
| 109H-L1/4/5 | R | 19 | ET-3<br>GR-1 |

*Note:* The line must be connected to the data set so that the marking voltages are series aiding. When a connection to a far-end data set can be established, the polarity of the line can be determined and the data set connected as indicated in the following text.

**4.06** Connect the telephone line to the 44A connecting block (TS-1). When the line polarity can be established, the negative side of the line will be connected to terminal TS1-10 and the positive side to TS1-9. When the far-end data set has not been connected, the polarity cannot be established. In this case, the line is connected to terminals 9 and 10 and the far-end station will have to be correctly polled with respect to this station.

**Determination of Loop Resistance**

**4.07** In order to ensure proper operation of a system that uses Data Sets 109-type, the total resistance must be set as indicated in the following text.

(a) When full-duplex (FDX) operation is provided, the resistance must be limited to a nominal 2000 ohms.

(b) When half-duplex (HDX) operation is provided, an extended range of 2500 ohms and up to 1$\mu$f is possible however, the optimum value is 2000 ohms.

**4.08** The total resistance for either a local or remote Data Line Concentrator installation can be broken down into several components as shown by Fig. 24. The data set pad (shown as A by Fig. 24) must be set as indicated by Fig. 24, Notes 2 and 3.

*Note:* The resistance value for the concentrator, trunk facility, and trunk-side data set (Fig. 24 C+D+E) can be obtained from the service order. When the line resistance (B) is not known, the line will have to be shorted and the resistance measured using a KS-14510 meter. When remote service (see Fig. 24) is provided, the resistance provided by the far-end data set (if any) will be given by the service order. The line facility can be shorted and measured to determine the line resistance.

**4.09** After determining the resistance that must be provided by the data set, refer to Table S for the line pad screw switch settings required. The location and identification of these screw switches are shown by Fig. 25.

**4.10** Set the screw switches as indicated by Table S.

*Note:* The Data Set 109H-type screw switches are designated S1, S2, S4, and S8 for each side of the line. These switches are always closed and opened in pairs, ie, both the S1A and S1B, etc, are opened and closed so that the resistance in both sides of the line will always be equal. (Example: If 788 ohms is to be added to the total circuit resistance, S2A, S2B, S4A, and S4B are open; all other switches are closed as indicated in Table S.)

## ALTERNATE METHOD OF ADJUSTING LOOP RESISTANCE

**4.11** The following procedure can be used to determine the screw switch settings required to adjust the loop resistance when an operative Data Set 109H-type is connected to the far end. This procedure may also be used for local Data Line Concentrator installations when a connection can be made through the concentrator to an operative trunk-side data set.

*Note:* When setting the data set pads by measuring the line current, make sure the data set is connected. If the camp-on current in a Data Line Concentrator installation is mistaken for a data set connection, the resistance pads will not be set correctly; therefore, care should be taken to make sure the data set is connected at all times during these procedures.

(1) Supply power to the data set by plugging in the power cord of the 2245A transformer.

(2) Connect the KS-14510-L5 volt-ohm-milliammeter in series with the line-side data station and set it to measure in the milliamp current range.

(3) When the measured current is greater than 3 mA, additional resistance will have to be added to the circuit by opening one or more of the screw switches in each side of the line. If the measured current is less than 3 mA, the screw switches will have to remove some of the pad resistance.

(4) The screw switches are designated as S1, S2, S4, and S8 for each side of the line. These switches are always closed and opened in pairs, ie, both of the S1 switches, S2 switches, etc, are opened and closed so that the resistance will always be equal in both sides of the line. The location of these switches is shown by Fig. 25. Table S gives the resistance provided by these switches.

*Note:* The S1 screw switches can be thought of as representing a basic unit of resistance and the opening of this screw switch, in each side of the line, will add resistance to the line. Therefore, opening the S2 screw switches adds twice as much resistance as S1, opening the S4 screw switches adds four times the resistance of S1, and opening the S8 screw switches adds eight times the resistance value of S1. Closing the screw switches, of course, removes the resistance in the same

increments. The adjustment procedure may be started with S8 open in both sides of the line and S1, S2, and S4 closed in both sides of the line.

(5) In order to adjust the line current within the range of 3.0 and 3.2 mA, observe the line current and open or close the S1, S2, S4, or S8 screw switch. By observing the change in the current, the amount of resistance that is required can be judged. This trial and erorr method can be repeated until a current level between 3.0 and 3.2 mA is obtained. This method provides a quick way of adjusting the loop current when a connection to a far-end data set can be made.

*Note:* It may be necessary or desirable to split the resistance being added to the loop between the two data sets. When this is the case, the screw switch settings can be made in the same manner to provide only the part of the resistance at one installation; however, the method of determining the resistance required at each end is the same as previously given.

**4.12** Reinstall the cover on the data set. Refer to the section entitled Data Set 109H-Type — Used in a Data Line Concentrator System — Maintenance Procedures (591-037-301) for information on reinstalling the data set cover.

**4.13** If power has not previously been supplied, provide power for the data set by plugging in the power cord of the 2245A transformer.

**4.14** Connect the customer-provided EIA interface connector to the data set. An operational test of the data set can now be made. The Data Set 109H-type operation can be verified by testing in accordance with the procedures outlined in the section entitled Data Set 109H-Type — Used in a Data Line Concentrator System — Test Procedures (591-037-501). When an operational test of the data set indicates that the set is performing properly, the installation is considered completed and no additional testing is required.

## TABLE C

## DATA SET 109H-L1 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|
| CA1 Cord | S-Y | 37 | |
| CA3 Cord | BK-BL | Connect to same term. as BL-W (J) wire | |
| | | Insulate and store (M) | |
| | | 17 (K) | |
| | BK-G | 15 (ZA) | |
| | | 16 (A) | |
| | | 34 (B) | |
| | W-BL | 15 (F) | |
| | | 16 (G) | |
| | | 34 (H) | |
| CA4 Cord | BL-R | 4 | |
| | R-BL | 30 | |
| | O-R | 1 | |
| | R-O | 3 | |
| | BR-W | 2 | |
| | G-W | 46 | |
| | BL-W | 36 | |
| | S-W | 35 | |
| | G-R | 34 | |
| CA5 Cord (D10R-61) | W-BR | 10 | 6 |
| | BR-W | 11 | 4 |
| | W-G | 5 | 5 |
| | G-W | 6 | 3 |
| | W-O | 7 | 2 |
| | O-W | 8 | 1 |
| CA5 Cord | W-BL<br>BL-W | 46<br>4 | 9<br>10 |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 28 | |

**TABLE C (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|
| Line Facility | | | 10<br>9 |
| 2245A Transformer<br>(See Note 5) | T1<br>T2<br>T3<br>T4<br>T5 | | 1<br>2<br>3<br>4<br>5 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

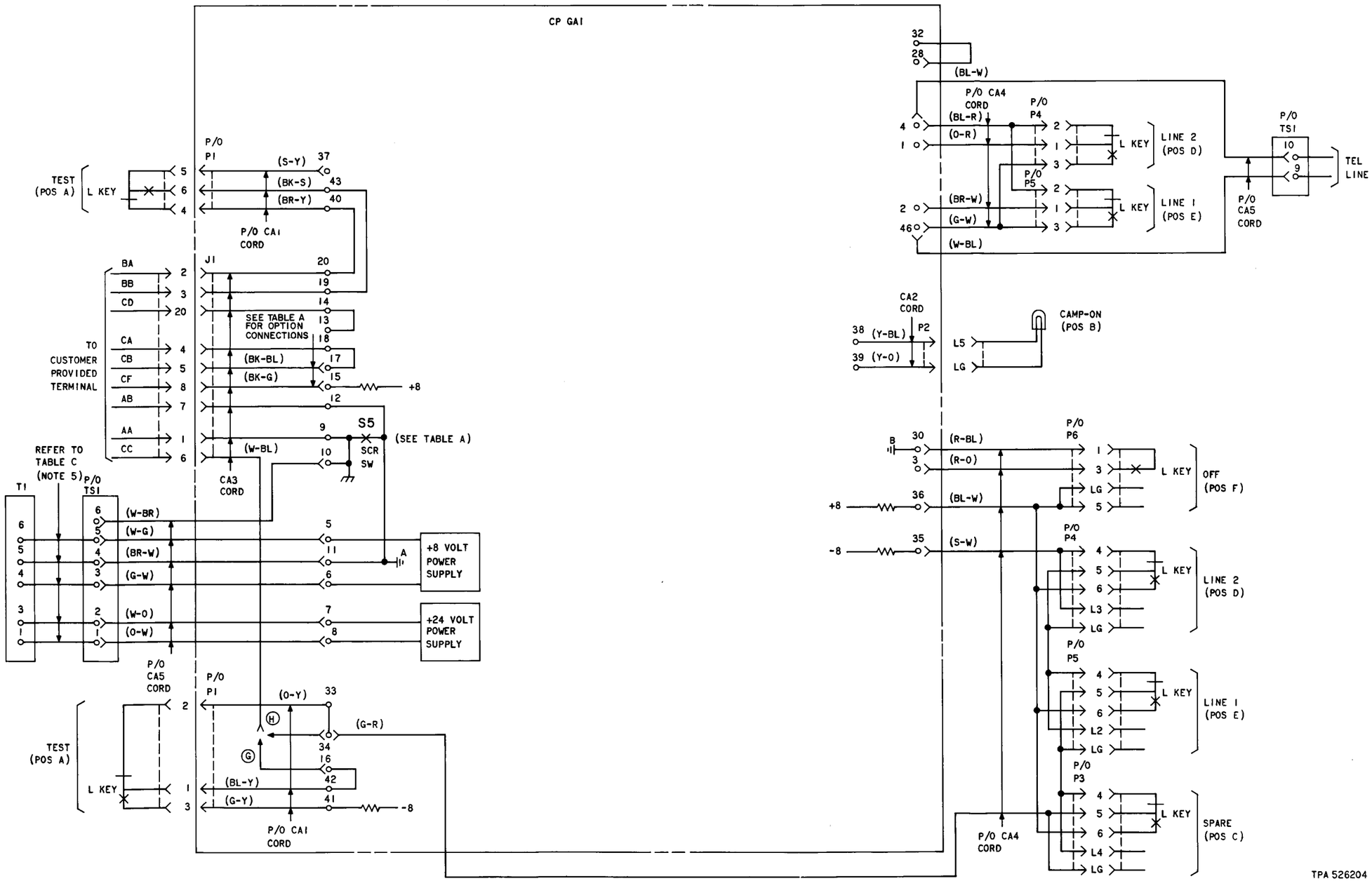



**Fig. 4 — Data Set 109H-L1 — Arrangement Wiring Diagram**

## TABLE D

## DATA SET 109H-L1/2 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|
| CA1 Cord | S-Y | 37 | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL (J) wire | |
| | | Insulate and (M) store | |
| | | 17 (K) | |
| | BK-G | 15 (ZA) | |
| | | 16 (A) | |
| | | 34 (B) | |
| | W-BL | 15 (F) | |
| | | 16 (G) | |
| | | 34 (H) | |
| CA4 Cord | BL-R | 4 | |
| | O-R | 1 | |
| | BR-W | 45 | |
| | G-W | 46 | |
| | R-BL | 30 | |
| | R-O | 3 | |
| | BL-W | 36 | |
| | S-W | 35 | |
| | G-R | 34 | |
| CA5 Cord (D10R-61) | BL-W | 4 | 10 |
| | W-BL | 46 | 9 |
| | W-BR | 10 | 6 |
| | W-G | 5 | 5 |
| | BR-W | 11 | 4 |
| | G-W | 6 | 3 |

**TABLE D (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|
| CA5 Cord | W-O<br>O-W | 7<br>8 | 2<br>1 |
| Dial and Receiver | G | 31 | |
| | BL | 28 | |
| | Y | 2 | |
| | W (RCVR) | 2 | |
| | W (RCVR) | 44 | |
| | Y | 44 | |
| 2245A Transformer (See Note 5) | T1 | | 1 |
| | T2 | | 2 |
| | T3 | | 3 |
| | T4 | | 4 |
| | T5 | | 5 |
| Line Facility | | | 10 |
| | | | 9 |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 31 | |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

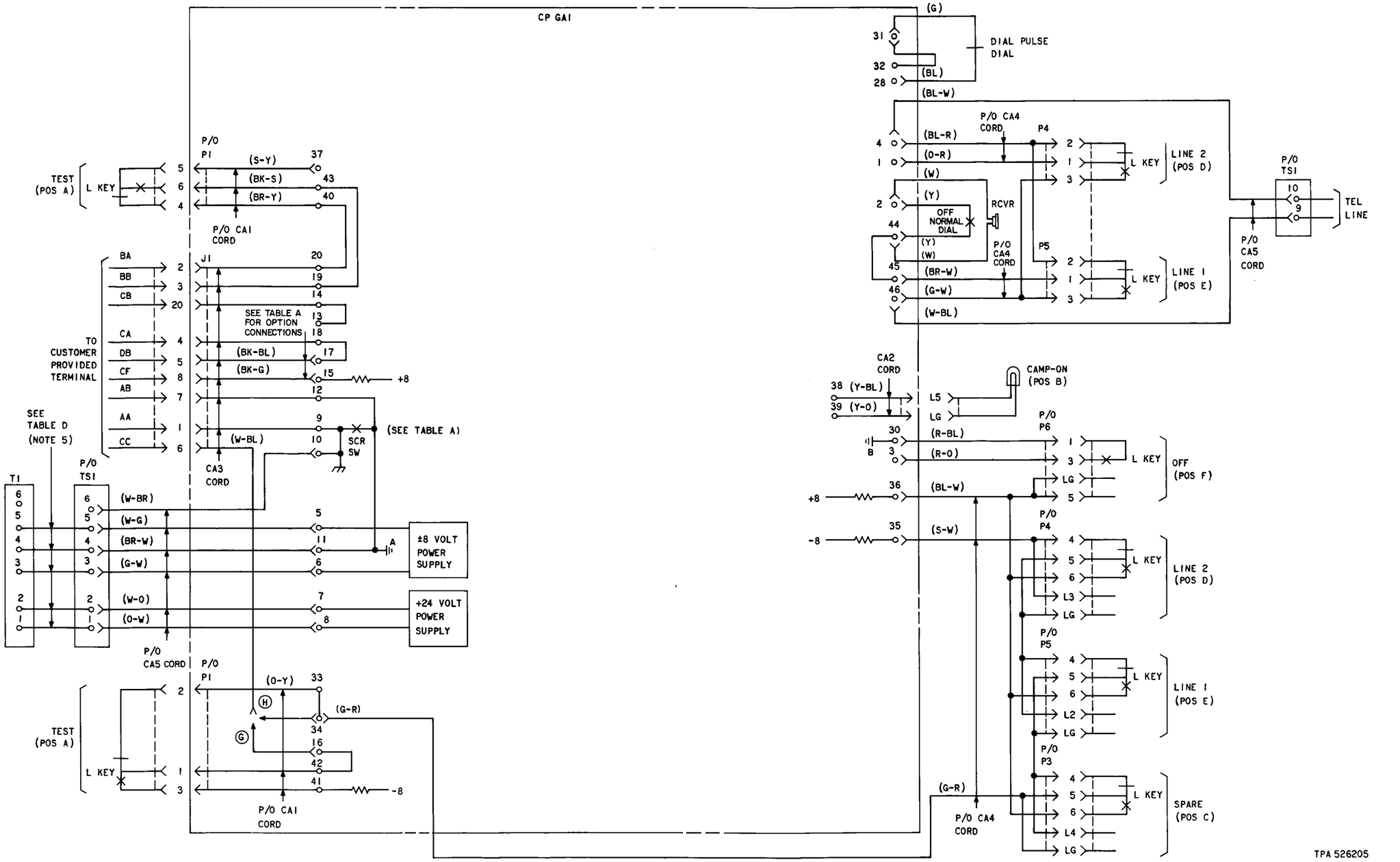



**Fig. 5 — Data Set 109H-L1/2 — Arrangement Wiring Diagram**

## TABLE E

## DATA SET 109H-L1/3 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| CA1 Cord | S-Y | 37 | | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL (J) | | |
| | | Insulate and store (M) | | |
| | | 17 (K) | | |
| | BK-G | 15 (ZA) | | |
| | | 16 (A) | | |
| | | 34 (B) | | |
| | W-BL | 15 (F) | | |
| | | 16 (G) | | |
| | | 34 (H) | | |
| CA4 Cord | BL-R | 4 | | |
| | O-R | 1 | | |
| | BR-W | 2 | | |
| | G-W | 24 | | |
| | R-BL | 30 | | |
| | R-O | 3 | | |
| | BL-W | 36 | | |
| | S-W | 35 | | |
| | G-R | 34 | | |
| CA5 Cord (D10R-61) | BL-W | 4 | | 10 |
| | W-BL | 25 | | 9 |
| | W-BR | 10 | | 6 |
| | W-G | 5 | | 5 |
| CA5 Cord (D10R-61) | BR-W | 11 | | 4 |
| | G-W | 6 | | 3 |
| | W-O | 7 | | 2 |
| | O-W | 8 | | 1 |

**TABLE E (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| Spade-Ended Lead From Circuit Pack GA1 | 32 | | 64 | |
| Spade-Ended leads From ET2 | 61 | | Store on 51 | |
| | 62 | 21 | | |
| | 63 | 30 | | |
| | 65 | 28 | | |
| | 66 | 24 | | |
| | 67 | 25 | | |
| | 68 | | Store on 59 | |
| TOUCH-TONE dial 35C3A and Receiver | G | 53 | | |
| | R-G | 52 | | |
| | R | 55 | | |
| | O-BK | 56 | | |
| | BL | 57 | | |
| | BK | 54 | | |
| | W | 58 | | |
| | W (RCVR) | 69 | | |
| | W (RCVR) | 60 | | |
| | W-BL | 60 | | |
| | G-W | 59 | | |
| | V | 51 | | |
| | O | Insulate and store | | |

**TABLE E (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| 2245A Transformer (See Note 5) | T1 | | | 1 |
| | T2 | | | 2 |
| | T3 | | | 3 |
| | T4 | | | 4 |
| | T5 | | | 5 |
| Line Facility | | | | 9 |
| | | | | 10 |

***Note 1:*** When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

***Note 2:*** All unused spade-ended leads shall be individually insulated and stored.

***Note 3:*** Refer to Table A for information on installing options.

***Note 4:*** A circled letter indicates the connection is required to install the option indicated by the letter.

***Note 5:*** The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

***Note 6:*** Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

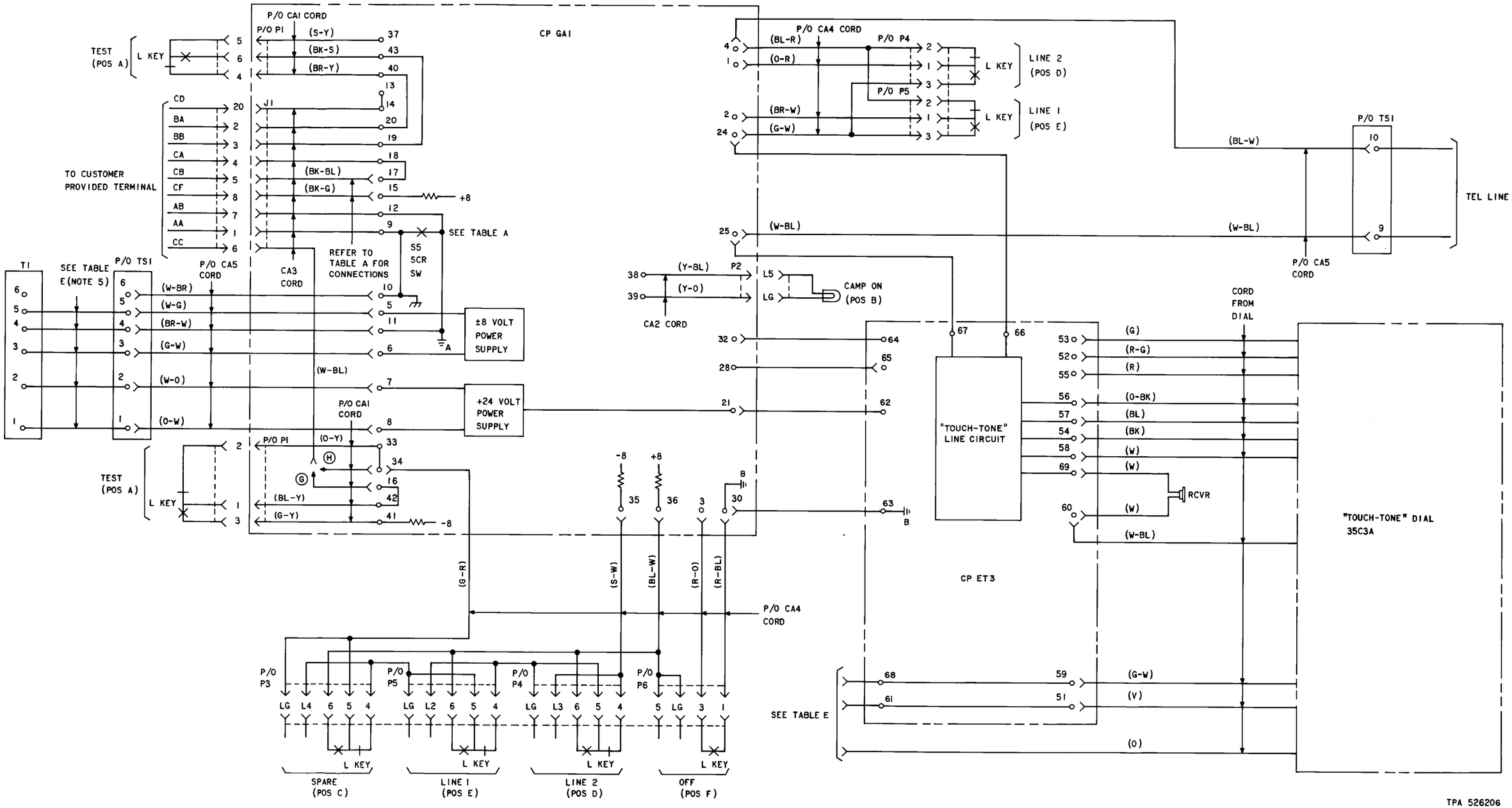



Fig. 6 — Data Set 109H-L1/3 — Arrangement Wiring Diagram

## TABLE F

### DATA SET 109H-L1/4 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| CA1 Cord | S-Y | 37 | | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL (J) | | |
| | | Insulate and store (M) | | |
| | | 17 (K) | | |
| | BK-G | 15 (ZA) | | |
| | | 16 (A) | | |
| | | 34 (B) | | |
| | W-BL | 15 (F) | | |
| | | 16 (G) | | |
| | | 34 (H) | | |
| CA4 Cord | BL-R | 4 | | |
| | O-R | 1 | | |
| | BR-W | 2 | | |
| | G-W | 46 | | |
| | R-C | | 73 | |
| | BL-BK | | 72 | |
| | R-BL | | 71 | |
| | R-O | | 70 | |
| CA5 Cord (D10R-61) | BL-W | | 74 | 10 |
| | W-BL | 46 | | 9 |
| | W-BR | 10 | | 6 |
| | W-G | 5 | | 5 |
| | BR-W | 11 | | 4 |

**TABLE F (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| | G-W | 6 | | 3 |
| | W-O | 7 | | 2 |
| | O-W | 8 | | 1 |
| Spade-Ended Leads From Circuit Pack ET3 | 77 | 23 | | |
| | 78 | 13 | | |
| | 79 | 11 | | |
| | 80 | 21 | | |
| | 81 | 22 | | |
| | 82 | 3 | | |
| | 83 | 30 | | |
| | 84 | 46 | | |
| | 85 | 4 | | |
| | 86 | 34 | | |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 28 | | |
| 2245A Transformer (See Note 5) | T1 | | | 1 |
| | T2 | | | 2 |
| | T3 | | | 3 |
| | T4 | | | 4 |
| | T5 | | | 5 |
| Line Facility | | | | 10 |
| | | | | 9 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

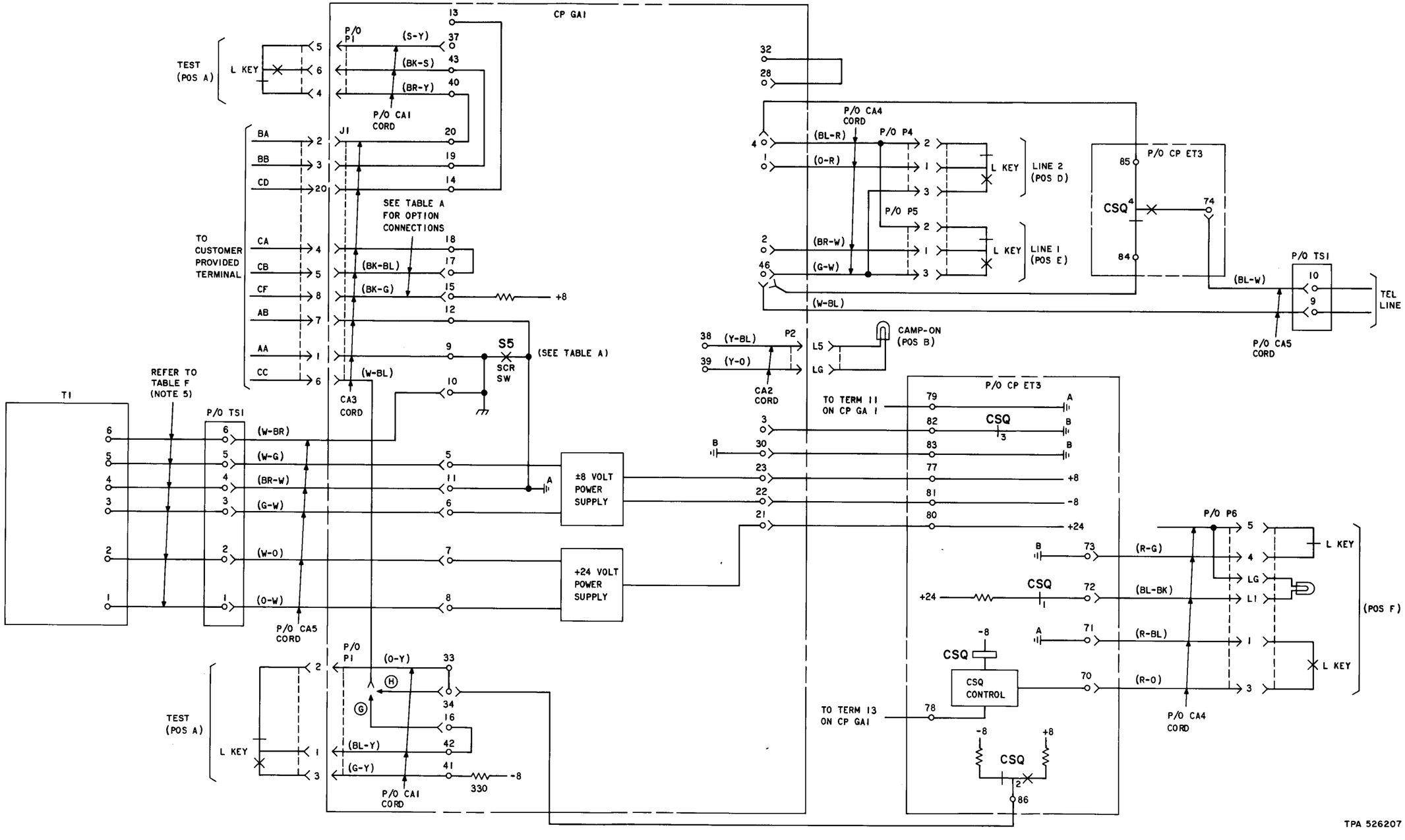
*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.




TPA 526207

**Fig. 7 — Data Set 109H-L1/4 — Arrangement Wiring Diagram**

## TABLE G

## DATA SET 109H-L1/2/4 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| CA1 Cord | S-Y | 37 | | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL(J) wire | | |
| | | Insulate and store (M) | | |
| | | 1 (K) | | |
| | BK-G | 15 (ZA) | | |
| | | 16 (A) | | |
| | | 34 (B) | | |
| | W-BL | 15 (F) | | |
| | | 16 (G) | | |
| | | 34 (H) | | |
| CA4 Cord | BL-R | 4 | | |
| | O-R | 1 | | |
| | BR-W | 45 | | |
| | G-W | 46 | | |
| | R-G | | 73 | |
| | BL-BK | | 72 | |
| | R-BL | | 71 | |
| | R-O | | 70 | |
| CA5 Cord (D10R-61) | BL-W | | 74 | 10 |
| | W-BL | 46 | | 9 |
| | W-BR | 10 | | 6 |
| | W-G | 5 | | 5 |
| | BR-W | 11 | | 4 |

**TABLE G (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| | G-W | 6 | | 3 |
| | W-O | 7 | | 2 |
| | O-W | 8 | | 1 |
| Spade-Ended Leads From Circuit Pack ET3 | 77 | 23 | | |
| | 78 | 13 | | |
| | 79 | 11 | | |
| | 80 | 21 | | |
| | 81 | 22 | | |
| | 82 | 3 | | |
| | 83 | 30 | | |
| | 84 | 46 | | |
| | 85 | 4 | | |
| | 86 | 34 | | |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 31 | | |
| Dial and Receiver | G | 31 | | |
| | BL | 28 | | |
| | Y | 2 | | |
| | W (RCVR) | 2 | | |
| | W (RCVR) | 44 | | |
| | Y | 44 | | |
| 2245A Transformer (See Note 5) | T1 | | | 1 |
| | T2 | | | 2 |
| | T3 | | | 3 |
| | T4 | | | 4 |
| | T5 | | | 5 |
| Line Facility | | | | 9 |
| | | | | 10 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

**TABLE G (Cont)**

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

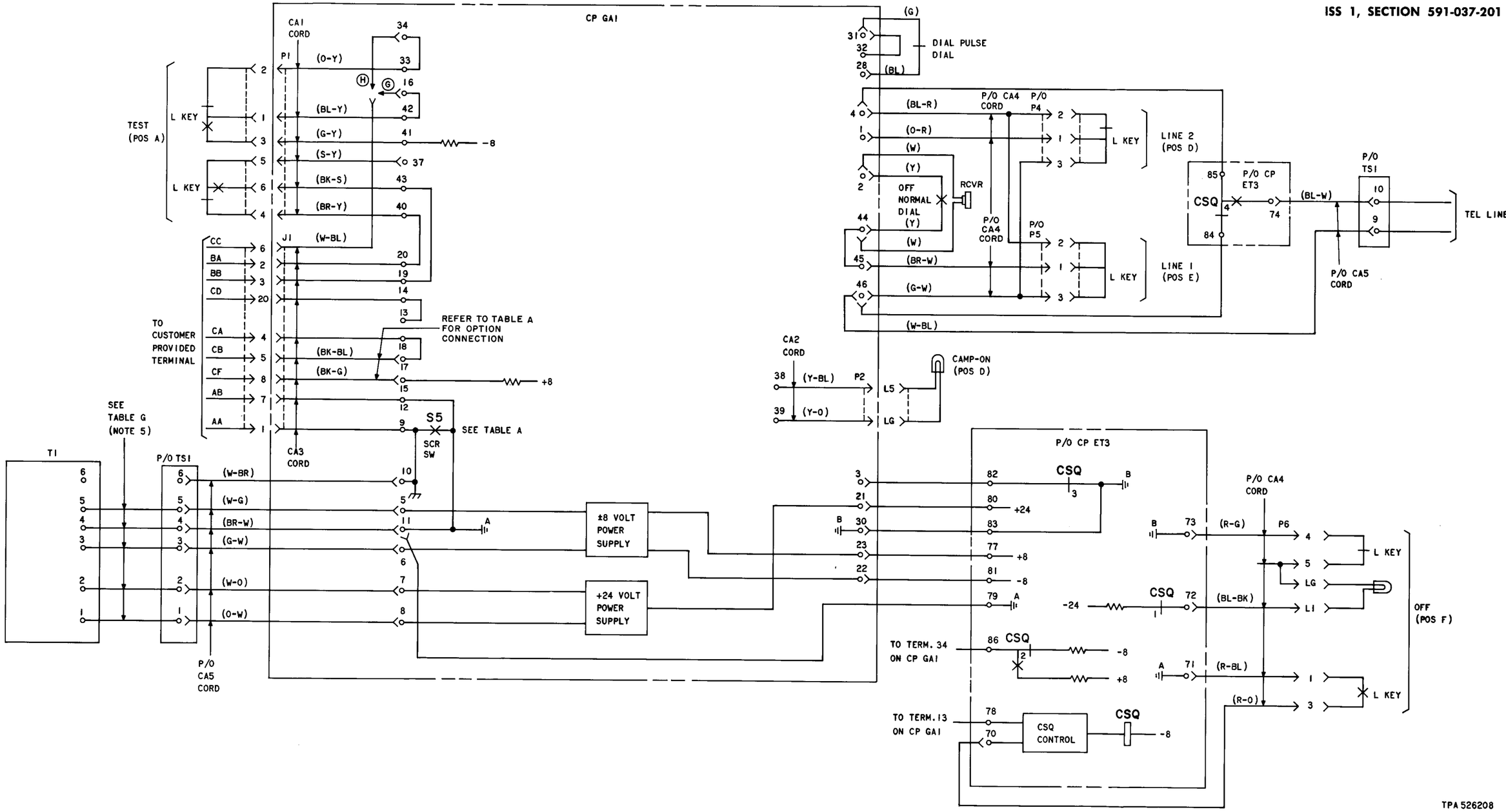



Fig. 8 — Data Set 109H-L1/2/4 — Arrangement Wiring Diagram

## TABLE H

## DATA SET 109H-L1/3/4 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | CIRCUIT PACK ET3 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| CA1 Cord | S-Y | 37 | | | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL (J) wire | | | |
| | | Insulate and store (M) | | | |
| | | 17 (K) | | | |
| | BK-G | 15 (ZA) | | | |
| | | 16 (A) | | | |
| | | 34 (B) | | | |
| | W-BL | 15 (F) | | | |
| | | 16 (G) | | | |
| | | 34 (H) | | | |
| CA4 Cord | BL-R | 4 | | | |
| | O-R | 1 | | | |
| | BR-W | 2 | | | |
| | G-W | 24 | | | |
| | R-G | | | 73 | |
| | BL-BK | | | 72 | |
| | R-BL | | | 71 | |
| | R-O | | | 70 | |
| CA5 Cord (D10R-61) | BL-W | | | 74 | 10 |
| | W-BL | 25 | | | 9 |
| | W-BR | 10 | | | 6 |
| | W-G | 5 | | | 5 |
| | BR-W | 11 | | | 4 |
| | G-W | 6 | | | 3 |
| | W-O | 7 | | | 2 |
| | O-W | 8 | | | 1 |

**TABLE H (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | CIRCUIT PACK ET3 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| Spade-Ended Leads From Circuit Pack ET2 | 61 | | Store on 51 | | |
| | 62 | 21 | | | |
| | 63 | 30 | | | |
| | 65 | 28 | | | |
| | 66 | 24 | | | |
| | 67 | 25 | | | |
| | 68 | | Store on 59 | | |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | | 64 | | |
| Spade-Ended Leads From Circuit Pack ET3 | 77 | 23 | | | |
| | 78 | 13 | | | |
| | 79 | 11 | | | |
| | 80 | 21 | | | |
| | 81 | 22 | | | |
| | 82 | 3 | | | |
| | 83 | 30 | | | |
| | 84 | 25 | | | |
| | 85 | 4 | | | |
| TOUCH-TONE Dial 35C3A | G | | 53 | | |
| | R-G | | 52 | | |
| | R | | 55 | | |
| | O-BK | | 56 | | |
| | BL | | 57 | | |
| | BK | | 54 | | |
| | W | | 58 | | |
| | W (RCVR) | | 69 | | |
| | W (RCVR) | | 60 | | |

**TABLE H (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | CIRCUIT PACK ET3 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| TOUCH-TONE Dial 35C3A and Receiver | W-BL | | 60 | | |
| | G-W | | 59 | | |
| | V | | 51 | | |
| | O | Insulate and store | | | |
| 2245A Transformer (see Note 5) | T5 | | | | 5 |
| | T4 | | | | 4 |
| | T3 | | | | 3 |
| | T2 | | | | 2 |
| | T1 | | | | 1 |
| Line Facility | | | | | 9 |
| | | | | | 10 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

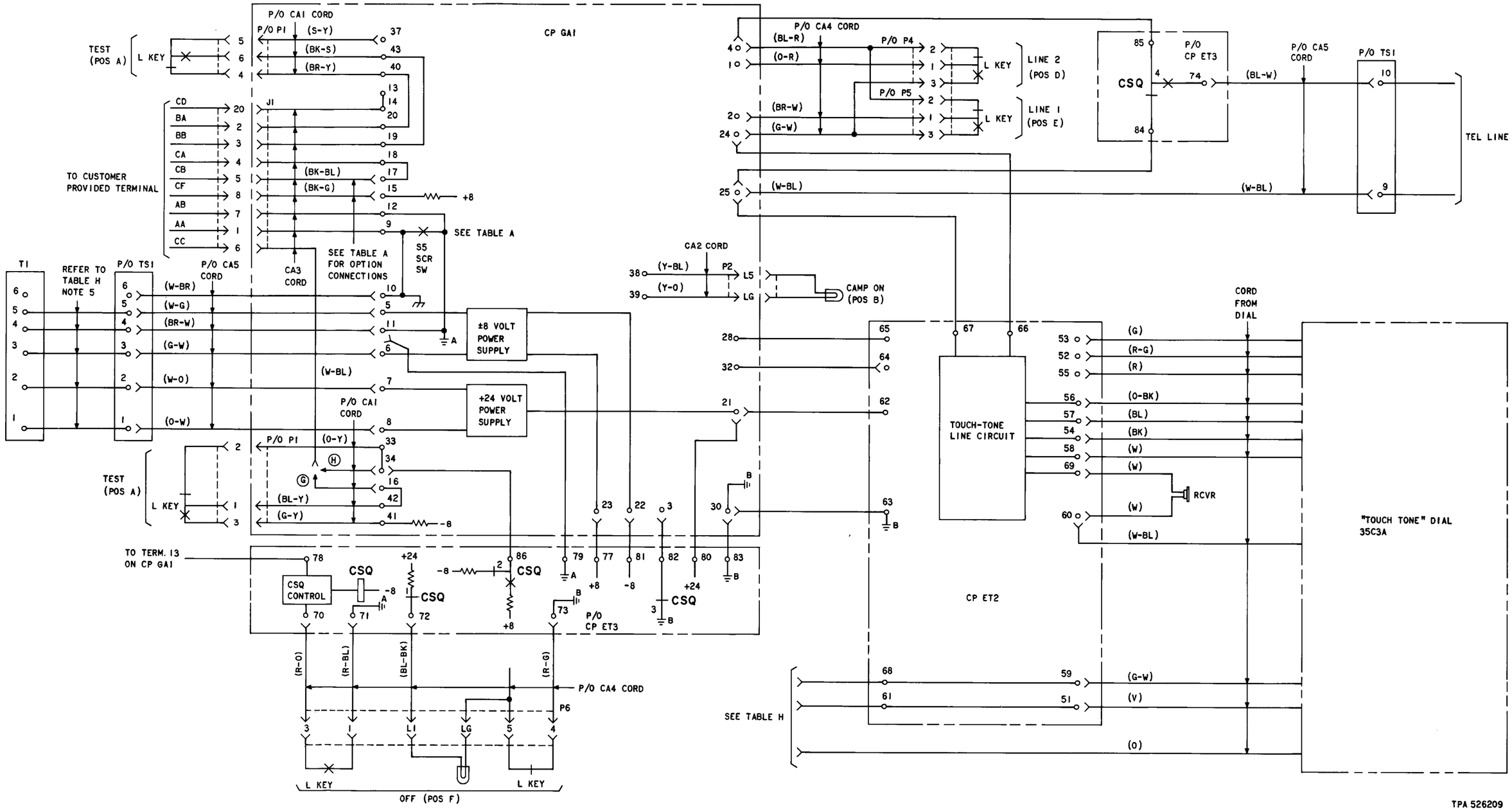



Fig. 9 — Data Set 109H-L1/3/4 — Arrangement Wiring Diagram

## TABLE I

## DATA SET 109H-L1/5 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GAI TERMINAL | CIRCUIT PACK GRI TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| CA1 Cord | S-Y | 37 | | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL (J) wire | | |
| | | Insulate and store (M) | | |
| | | 17 (K) | | |
| | BK-G | 15 (ZA) | | |
| | | 16 (A) | | |
| | | 34 (B) | | |
| | W-BL | 15 (F) | | |
| | | 16 (G) | | |
| | | 34 (H) | | |
| CA4 Cord | BL-R | 4 | | |
| | O-R | 1 | | |
| | BR-W | 2 | | |
| | G-W | 46 | | |
| | R-BL | 30 | | |
| | R-O | 3 | | |
| | BL-W | 36 | | |
| | S-W | 35 | | |
| | G-R | | 106 | |
| CA5 Cord (D10R-61) | BL-W | | 104 | 10 |
| | W-BL | 46 | | 9 |
| | W-BR | 10 | | 6 |
| | W-G | 5 | | 5 |
| | BR-W | 11 | | 4 |
| | G-W | 6 | | 3 |

**TABLE I (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| CA5 Cord | W-O | 7 | | 2 |
| | O-W | 8 | | 1 |
| Spade-Ended Leads From Circuit Pack GR1 | 90 | 26 | | |
| | 91 | 27 | | |
| | 93 | 30 | | |
| | 95 | 23 | | |
| | 96 | 22 | | |
| | 100 | 4 | | |
| | 101 | 3 | | |
| | 102 | 34 | | |
| | 108 | 21 | | |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 28 | | |
| 2245A Transformer (See Note 5) | T1 | | | 1 |
| | T2 | | | 2 |
| | T3 | | | 3 |
| | T4 | | | 4 |
| | T5 | | | 5 |
| Line Facility | | | | 9 |
| | | | | 10 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

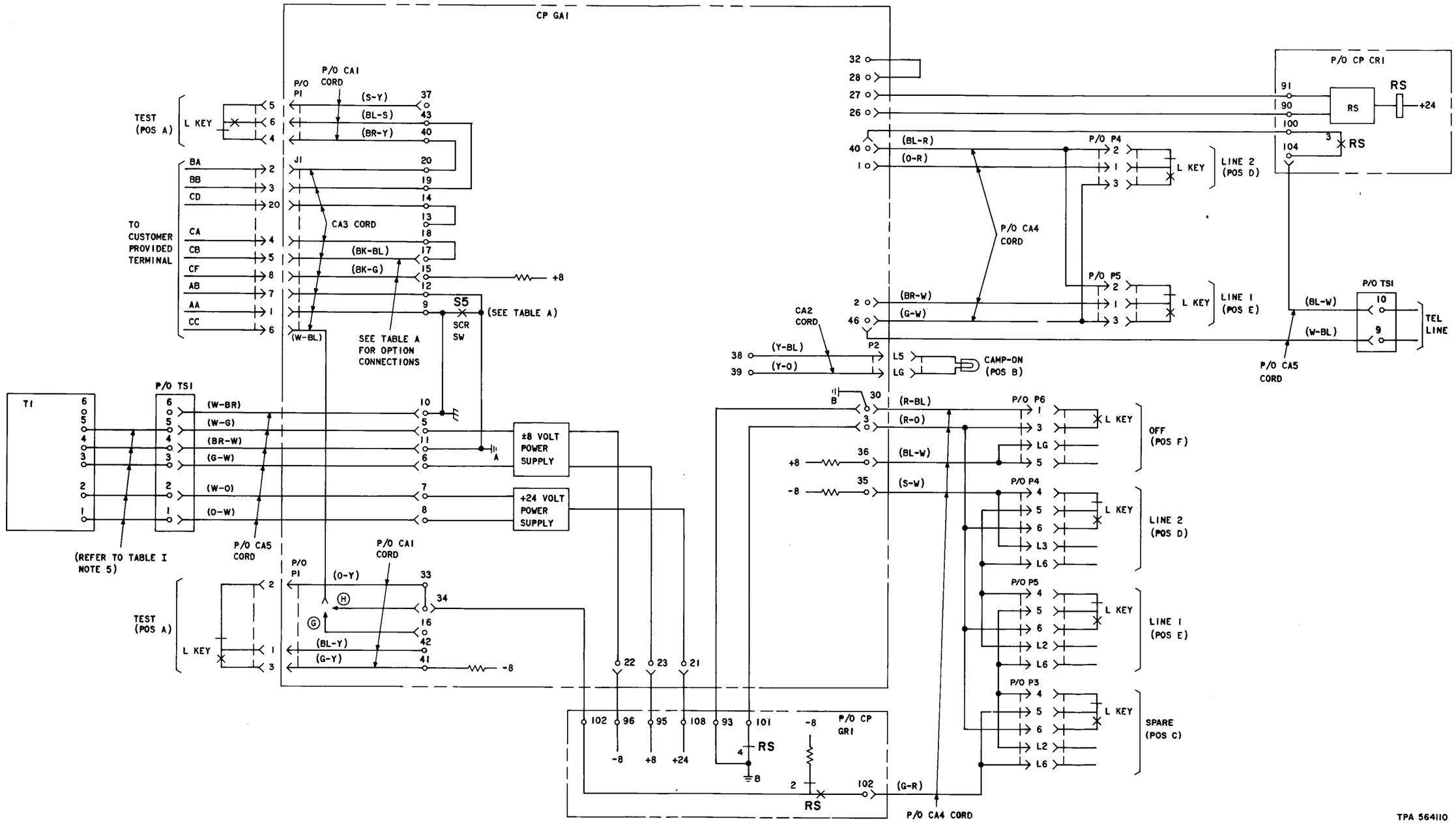



Fig. 10 — Data Set 109H — L1/5 — Arrangement Wiring Diagram

## TABLE J

## DATA SET 109H-L1/2/5 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| CA1 Cord | S-Y | 37 | | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL (J) wire | | |
| | | Insulate and store (M) | | |
| | | 17 (K) | | |
| | BK-G | 15 (ZA) | | |
| | | 16 (A) | | |
| | | 34 (B) | | |
| | W-BL | 15 (F) | | |
| | | 16 (G) | | |
| | | 34 (H) | | |
| CA4 Cord | BL-R | 4 | | |
| | O-R | 1 | | |
| | BR-W | 45 | | |
| | G-W | 46 | | |
| | R-BL | 30 | | |
| | R-O | 3 | | |
| | BL-W | 36 | | |
| | S-W | 35 | | |
| | G-R | | 106 | |
| CA5 Cord (DIOR-61) | BL-W | | 104 | 10 |
| | W-BL | 46 | | 9 |
| | W-BR | 10 | | 6 |
| | W-G | 5 | | 5 |
| | BR-W | 11 | | 4 |
| | G-W | 6 | | 3 |
| CA5 Cord | W-O | 7 | | 2 |
| | O-W | 8 | | 1 |

**TABLE J (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| Spade-Ended Leads From Circuit Pack GR1 | 90 | 26 | | |
| | 91 | 27 | | |
| | 93 | 30 | | |
| | 95 | 23 | | |
| | 96 | 22 | | |
| | 100 | 4 | | |
| | 101 | 3 | | |
| | 102 | 34 | | |
| | 108 | 21 | | |
| Dial and Receiver | G | 31 | | |
| | BL | 28 | | |
| | Y | 2 | | |
| | W (RCVR) | 2 | | |
| | W (RCVR) | 44 | | |
| | Y | 44 | | |
| 2245A Transformer (See Note 5) | T1 | | | 1 |
| | T2 | | | 2 |
| | T3 | | | 3 |
| | T4 | | | 4 |
| | T5 | | | 5 |
| Line Facility | | | | 9 |
| | | | | 10 |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 31 | | |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

**TABLE J (Cont)**

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

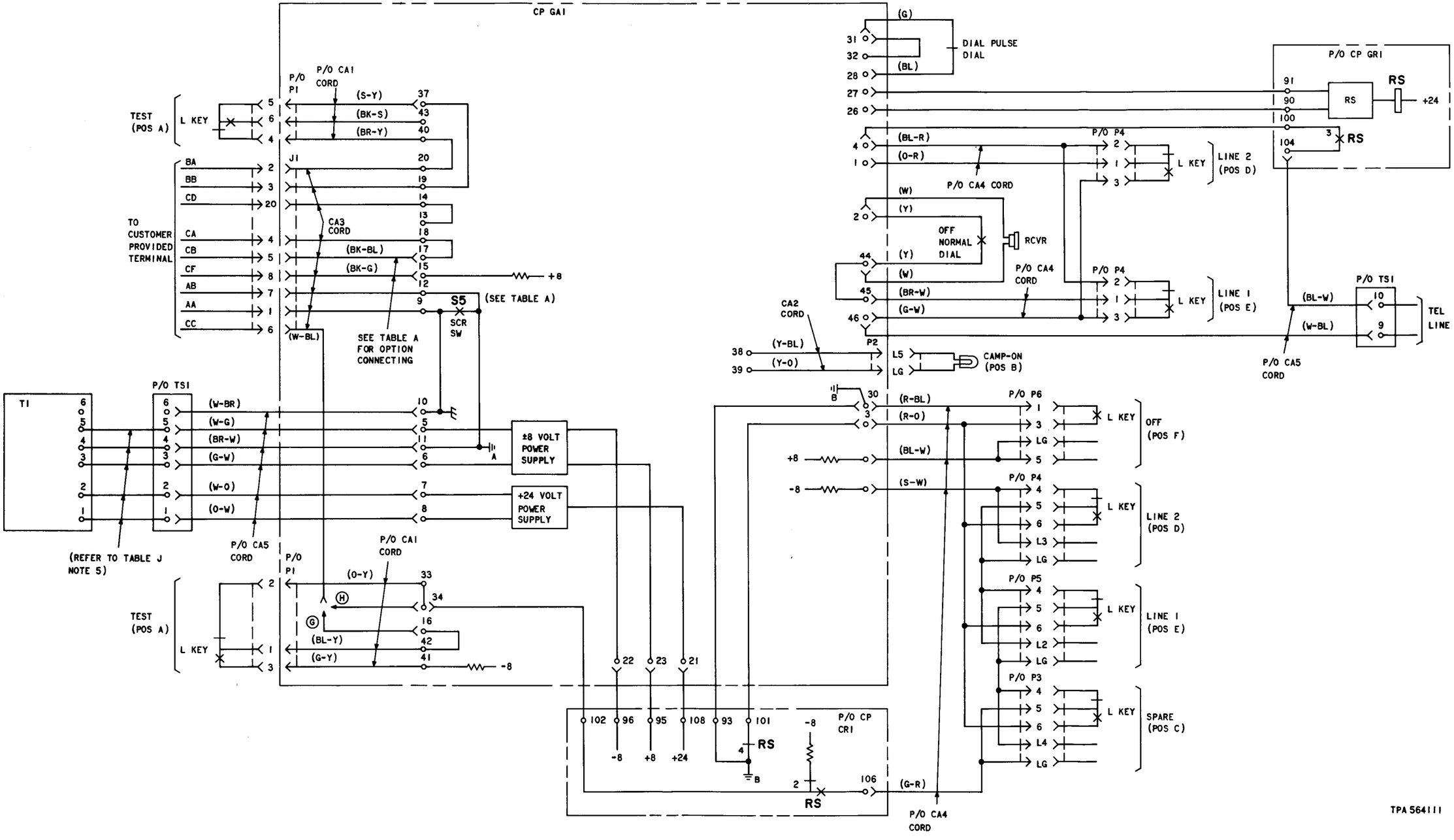



Fig. 11 — Data Set 109H — L1/2/5 — Arrangement Wiring Diagram

## TABLE K

## DATA SET 109H-L1/3/5 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| CA1 Cord | S-Y | 37 | | | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL (J) wire | | | |
| | | Insulate and store (M) | | | |
| | | 17 (K) | | | |
| | BK-G | 15 (ZA) | | | |
| | | 16 (A) | | | |
| | | 34 (B) | | | |
| | W-BL | 15 (F) | | | |
| | | 16 (G) | | | |
| | | 34 (H) | | | |
| CA4 Cord | BL-R | 4 | | | |
| | O-R | 1 | | | |
| | BR-W | 2 | | | |
| | G-W | 24 | | | |
| | G-R | | | 106 | |
| | S-W | 35 | | | |
| | BL-W | 36 | | | |
| | R-O | 3 | | | |
| | R-BL | 30 | | | |
| CA5 Cord (D10R-61) | BL-W | | | 104 | 10 |
| | W-BL | 46 | | | 9 |
| | W-BR | 10 | | | 6 |
| | W-G | 5 | | | 5 |
| | BR-W | 11 | | | 4 |
| | G-W | 6 | | | 3 |
| CA5 Cord | W-O | 7 | | | 2 |
| | O-W | 8 | | | 1 |

TABLE K (Cont)

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| Spade-Ended Leads From Circuit Pack ET2 | 61 | | Store on 51 | | |
| | 62 | 21 | | | |
| | 63 | | | 92 | |
| | 65 | 28 | | | |
| | 66 | 24 | | | |
| | 67 | 46 | | | |
| | 68 | | Store on 59 | | |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | | 64 | | |
| Spade-Ended Leads From Circuit Pack GR1 | 90 | 26 | | | |
| | 91 | 27 | | | |
| | 93 | 30 | | | |
| | 95 | 23 | | | |
| | 96 | 22 | | | |
| | 100 | 4 | | | |
| | 101 | 3 | | | |
| | 102 | 34 | | | |
| | 108 | 21 | | | |
| TOUCH-TONE Dial 35C3A and Receiver | G | | 53 | | |
| | R-G | | 52 | | |
| | R | | 55 | | |
| | O-BK | | 56 | | |
| | BL | | 57 | | |
| | BK | | 54 | | |
| TOUCH-TONE Dial 35C3A | W | | 58 | | |
| | W (RCVR) | | 69 | | |
| | W (RCVR) | | 60 | | |
| | W-BL | | 60 | | |
| | G-W | | 59 | | |
| | V | | 51 | | |
| | O | Insulate and store | | | |

**TABLE K (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| 2245A Transformer (Note 5) | T1 | | | | 1 |
| | T2 | | | | 2 |
| | T3 | | | | 3 |
| | T4 | | | | 4 |
| | T5 | | | | 5 |
| Line Facility | | | | | 9 |
| | | | | | 10 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

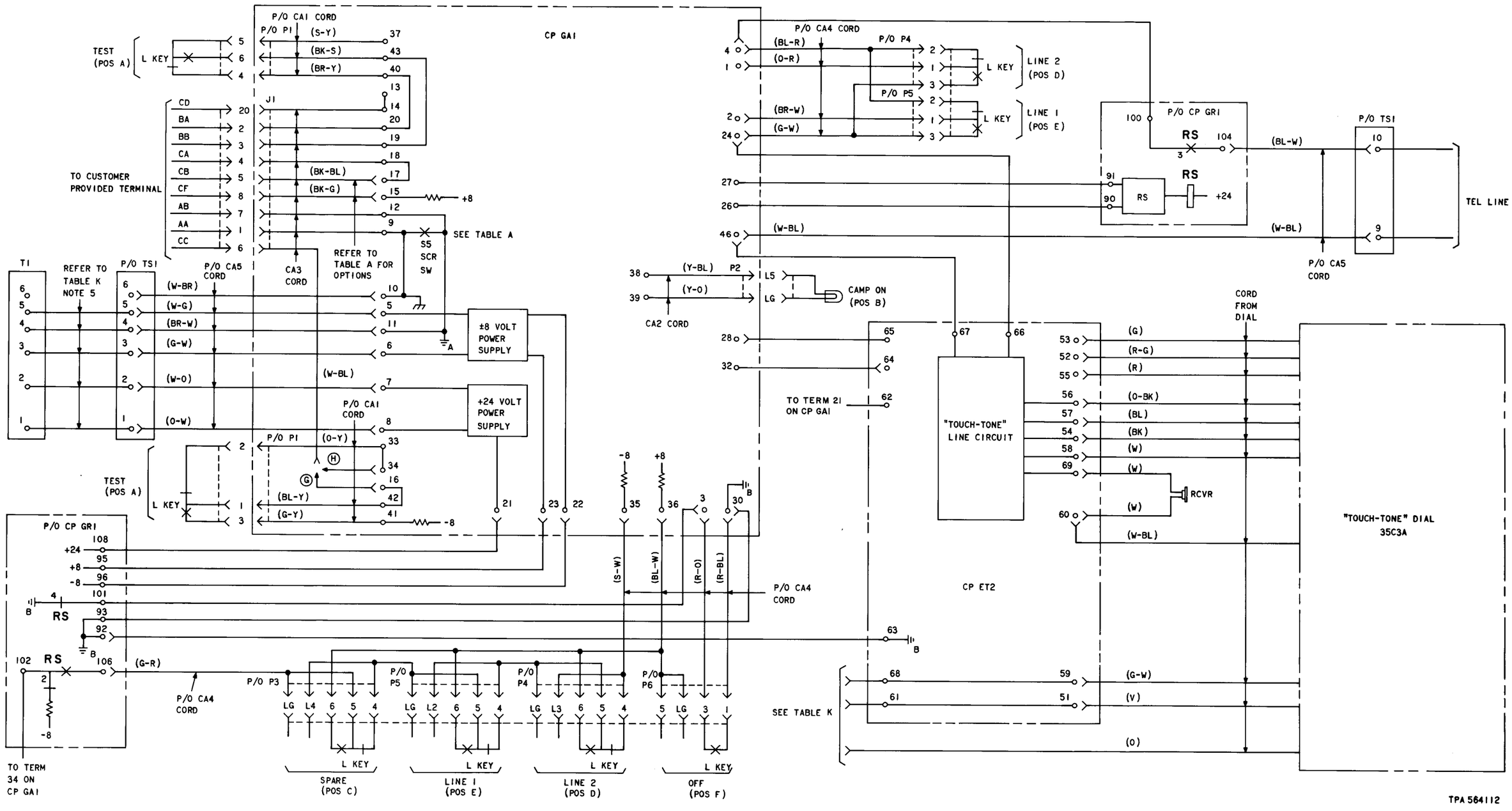



Fig. 12 — Data Set 109H — L1/3/5 — Arrangement Wiring Diagram

## TABLE L

## DATA SET 109H-L1/4/5 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| CA1 Cord | S-Y | 37 | | | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL (J) wire | | | |
| | | Insulate and store (M) | | | |
| | | (K) | | | |
| | BK-G | 15 (ZA) | | | |
| | | 16 (A) | | | |
| | | 34 (B) | | | |
| | W-BL | 15 (F) | | | |
| | | 16 (G) | | | |
| | | 34 (H) | | | |
| CA4 Cord | BL-W | Insulate and store | | | |
| | BL-R | 4 | | | |
| | O-R | 1 | | | |
| | BR-W | 2 | | | |
| | G-W | 46 | | | |
| | R-BL | | 71 | | |
| | BL-BK | | 72 | | |
| | R-O | | 70 | | |
| | R-G | | 73 | | |
| CA5 Cord (D10R-61) | BL-W | | | 104 | 10 |
| | W-BL | 46 | | | 9 |
| | W-BR | 10 | | | 6 |
| | W-G | 5 | | | 5 |
| | BR-W | 11 | | | 4 |
| | G-W | 6 | | | 3 |
| | W-O | 7 | | | 2 |
| | O-W | 8 | | | 1 |

TABLE L (Cont)

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| Spade-Ended Leads From Circuit Pack ET3 | 77 | | | | 94 |
| | 78 | 13 | | | |
| | 79 | 11 | | | |
| | 80 | | | | 107 |
| | 81 | | | | 97 |
| | 82 | 3 | | | |
| | 83 | | | | 92 |
| | 84 | 46 | | | |
| | 85 | 4 | | | |
| | 86 | | | | 106 |
| Spade-Ended Leads From Circuit Pack GR1 | 90 | 26 | | | |
| | 91 | 27 | | | |
| | 93 | 30 | | | |
| | 95 | 23 | | | |
| | 96 | 22 | | | |
| | 100 | | 74 | | |
| | 101 | 3 | | | |
| | 102 | 34 | | | |
| | 108 | 21 | | | |
| 2245A Transformer (See Note 5) | T1 | | | | 1 |
| | T2 | | | | 2 |
| | T3 | | | | 3 |
| | T4 | | | | 4 |
| | T5 | | | | 5 |
| Line Facility | | | | | 10 |
| | | | | | 9 |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 28 | | | |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

**TABLE L (Cont)**

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.
*Note 3:* Refer to Table A for information on installing options.
*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.
*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.
*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

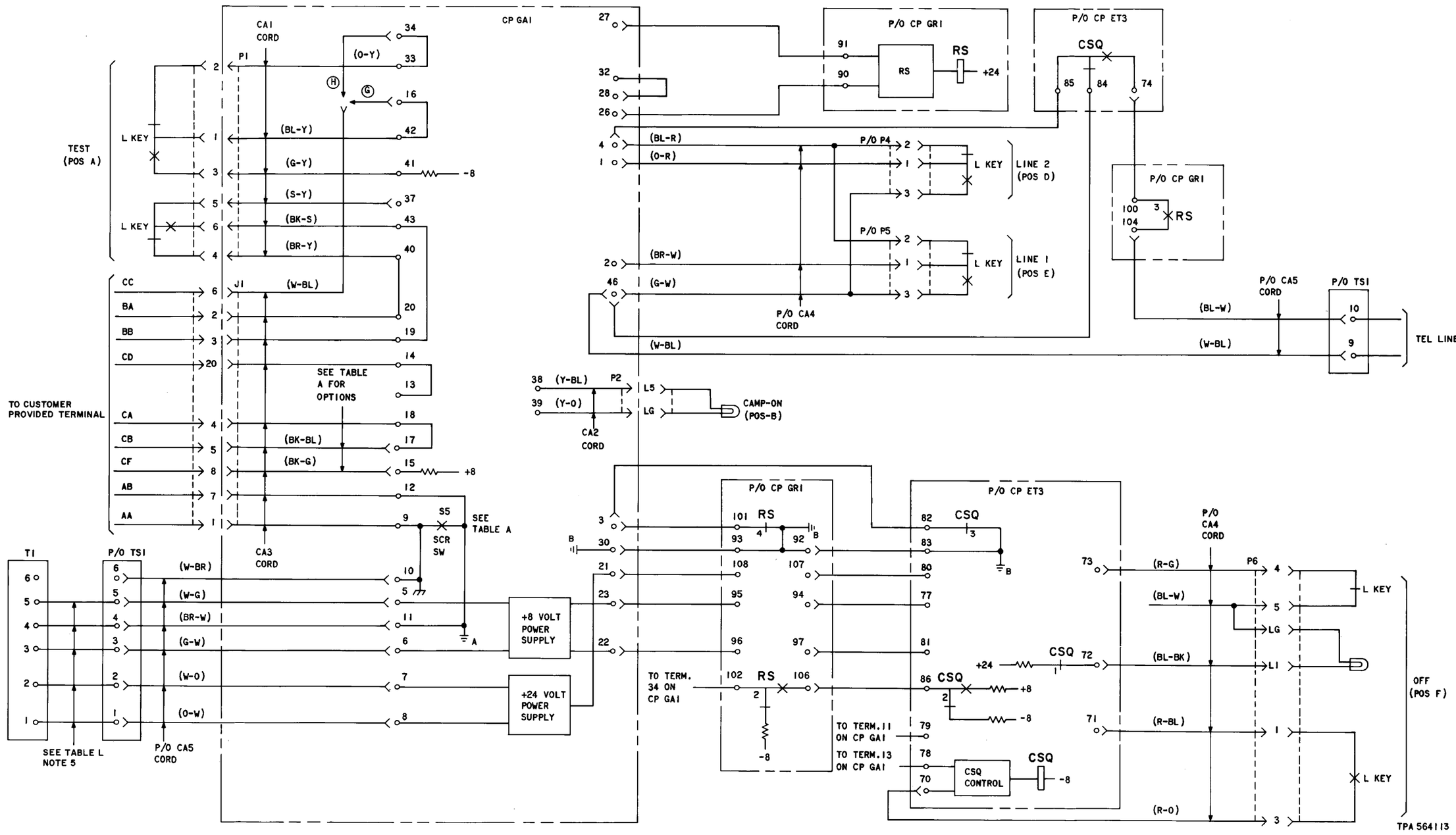



Fig. 13 — Data Set 109H — L1/4/5 — Arrangement Wiring Diagram

## TABLE M

## DATA SET 109H-L1/2/4/5 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| CA1 Cord | S-Y | 37 | | | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL (J) wire | | | |
| | | Insulate and store (M) | | | |
| | | (K) | | | |
| | BK-G | 15 (ZA) | | | |
| | | 16 (A) | | | |
| | | 34 (B) | | | |
| | W-BL | 15 (F) | | | |
| | | 16 (G) | | | |
| | | 34 (H) | | | |
| CA4 Cord | R-G | | 73 | | |
| | BL-W | Insulate and store | | | |
| | BL-BK | | 72 | | |
| | R-BL | | 71 | | |
| | R-O | | 70 | | |
| | O-R | 1 | | | |
| | BL-R | 4 | | | |
| | BR-W | 45 | | | |
| | G-W | 46 | | | |
| CA5 Cord (D10R-61) | W-BL | 46 | | | 9 |
| | BL-W | | | 104 | 10 |
| | O-W | 8 | | | 1 |
| | W-O | 7 | | | 2 |
| | G-W | 6 | | | 3 |
| | BR-W | 11 | | | 4 |

TABLE M (Cont)

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| CA5 Cord | W-G | 5 | | | 5 |
| | W-BR | 10 | | | 6 |
| Spade-Ended Leads From Circuit Pack ET3 | 77 | | | 94 | |
| | 78 | 13 | | | |
| | 79 | 11 | | | |
| | 80 | | | 107 | |
| | 81 | | | 97 | |
| | 82 | 3 | | | |
| | 83 | | | 92 | |
| | 84 | 46 | | | |
| | 85 | 4 | | | |
| | 86 | | | 106 | |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 31 | | | |
| Spade-Ended Leads From Circuit Pack GR1 | 90 | 26 | | | |
| | 91 | 27 | | | |
| | 93 | 30 | | | |
| | 95 | 23 | | | |
| | 96 | 22 | | | |
| | 100 | | 74 | | |
| | 101 | 3 | | | |
| | 102 | 34 | | | |
| | 108 | 21 | | | |
| Dial and Receiver | G | 31 | | | |
| | BL | 28 | | | |
| | W (RCVR) | 2 | | | |
| | W (RCVR) | 44 | | | |
| | Y | 2 | | | |
| | Y | 44 | | | |
| 2245A Transformer (See Note 5) | T1 | | | | 1 |
| | T2 | | | | 2 |
| | T3 | | | | 3 |
| | T4 | | | | 4 |
| | T5 | | | | 5 |

**TABLE M (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| Line Facility | | | | | 10 |
| | | | | | 9 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

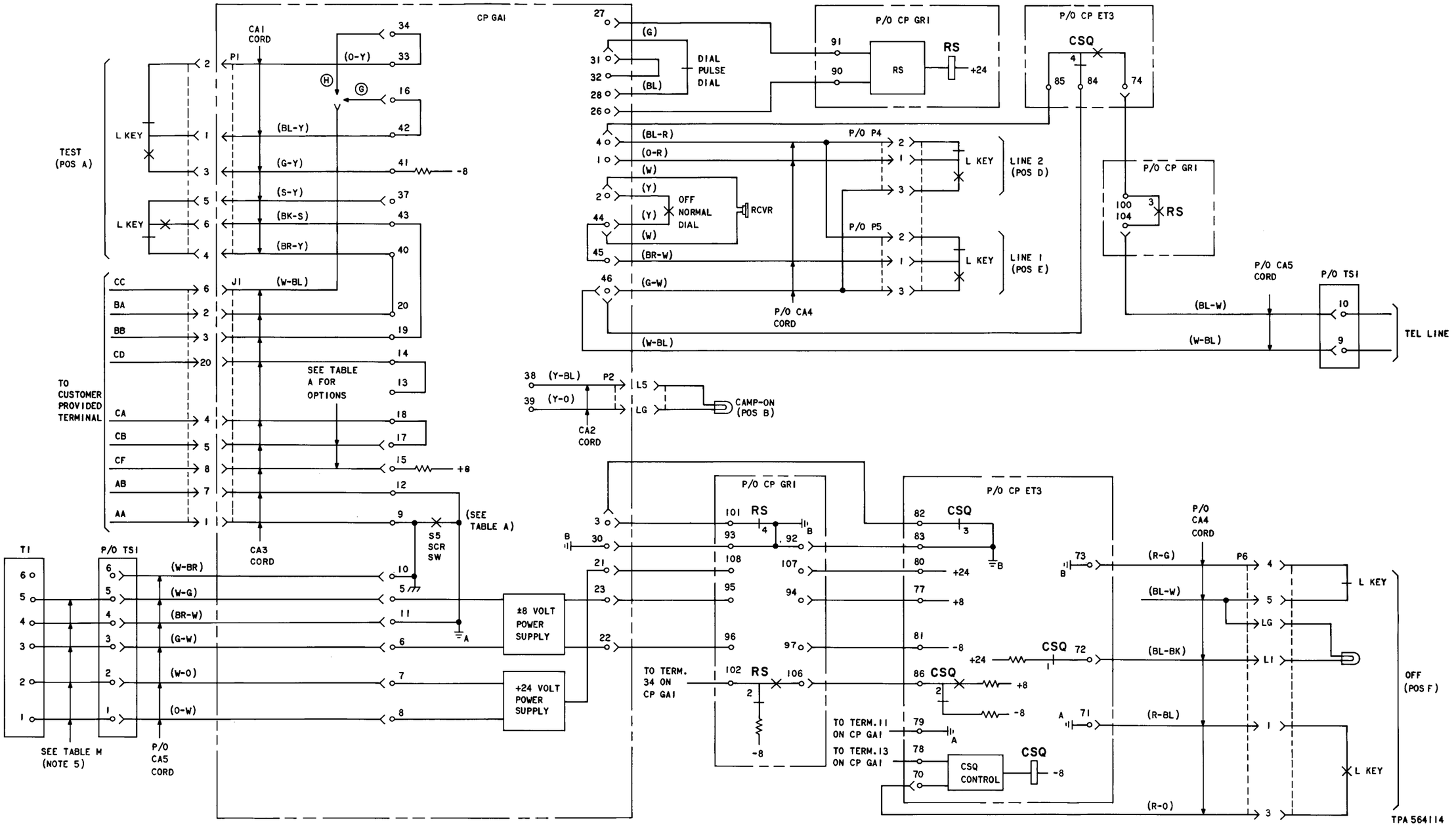



Fig. 14 — Data Set 109H-L1/2/4/5 — Arrangement Wiring Diagram

## TABLE N

## DATA SET 109H-L1/3/4/5 — ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | CIRCUIT PACK ET3 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|---|
| CA1 Cord | S-Y | 37 | | | | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL (J) wire | | | | |
| | | Insulate and store (M) | | | | |
| | | 17 (K) | | | | |
| | BK-G | 15 (ZA) | | | | |
| | | 16 (A) | | | | |
| | | 34 (B) | | | | |
| | W-BL | 15 (F) | | | | |
| | | 16 (G) | | | | |
| | | 34 (H) | | | | |
| CA4 Cord | R-O | | | 70 | | |
| | O-R | 1 | | | | |
| | R-BL | | | 71 | | |
| | BL-R | 4 | | | | |
| | BL-BK | | | 72 | | |
| | R-G | | | 73 | | |
| | BL-W | Insulate and store | | | | |
| | BR-W | 2 | | | | |
| | G-W | 24 | | | | |
| CA5 Cord (D10R-61) | W-BR | 10 | | | | 6 |
| | BR-W | 11 | | | | 4 |
| | W-G | 5 | | | | 5 |
| | G-W | 6 | | | | 3 |
| | W-O | 7 | | | | 2 |
| | O-W | 8 | | | | 1 |

**TABLE N (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | CIRCUIT PACK ET3 CIRCUIT | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|---|
| CA5 Cord | BL-W | | | | 104 | 10 |
| | W-BL | 46 | | | | 9 |
| Spade-Ended Leads From Circuit Pack ET2 | 61 | | Store on 51 | | | |
| | 62 | 21 | | | | |
| | 63 | 30 | | | | |
| | 65 | 28 | | | | |
| | 66 | 24 | | | | |
| | 67 | 46 | | | | |
| | 68 | | Store on 59 | | | |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | | 64 | | | |
| Spade-Ended Leads From Circuit Pack ET3 | 77 | | | | 94 | |
| | 78 | 13 | | | | |
| | 79 | 11 | | | | |
| | 80 | | | | 107 | |
| | 81 | | | | 97 | |
| | 82 | 3 | | | | |
| | 83 | | | | 92 | |
| | 84 | 24 | | | | |
| | 85 | 4 | | | | |
| | 86 | | | | 106 | |
| Spade-Ended Leads From Circuit Pack GR1 | 90 | 26 | | | | |
| | 91 | 27 | | | | |
| | 93 | 30 | | | | |
| | 95 | 23 | | | | |
| | 96 | 22 | | | | |
| | 100 | | 74 | | | |
| | 101 | 3 | | | | |

**TABLE N (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET2 TERMINAL | TERMINAL PACK ET3 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|---|
| Spade-Ended Leads From Circuit Pack GR1 | 102 | 34 | | | | |
| | 108 | 21 | | | | |
| TOUCH-TONE 35C3A Dial and Receiver | 0 | Insulate and store | | | | |
| | V | 51 | | | | |
| | G-W | 59 | | | | |
| | W-BL | 60 | | | | |
| | W (RCVR) | 60 | | | | |
| | W (RCVR) | 69 | | | | |
| | W | 58 | | | | |
| | BK | 54 | | | | |
| | BL | 57 | | | | |
| | O-BK | 56 | | | | |
| | R | 55 | | | | |
| | R-G | 52 | | | | |
| | G | 53 | | | | |
| 2245A Transformer (See Note 5) | T5 | | | | | 5 |
| | T4 | | | | | 4 |
| | T3 | | | | | 3 |
| | T2 | | | | | 2 |
| | T1 | | | | | 1 |
| Line Facility | | | | | | 10 |
| | | | | | | 9 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

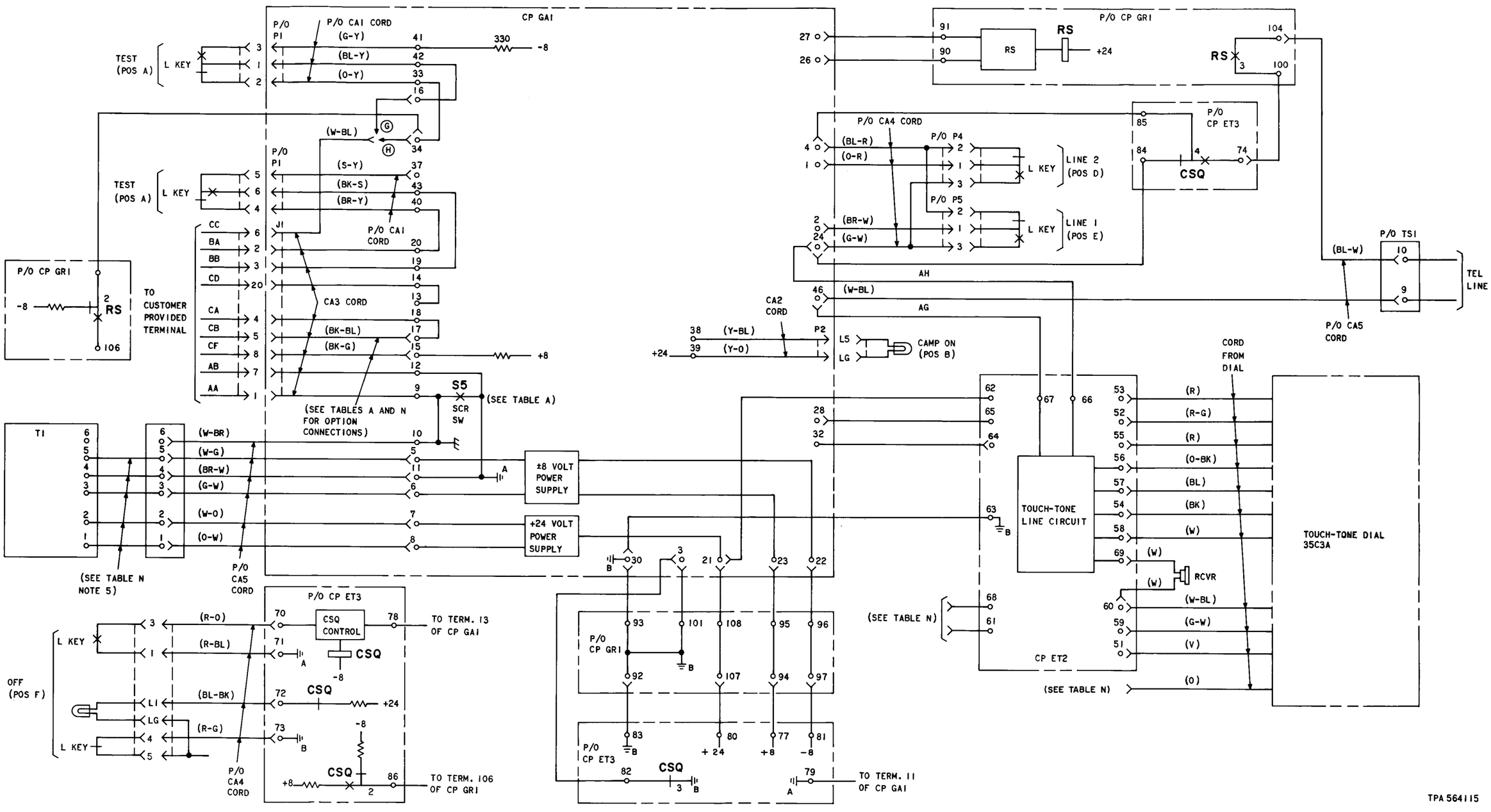



Fig. 15 — Data Set 109H — L1/3/4/5 — Arrangement Wiring Diagram

## TABLE O

## DATA SET 109H-L1 — REMOTE SERVICE ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|
| CA1 Cord | S-Y | 46 | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL (J) wire | |
| | | Insulate and store (M) | |
| | | 17 (K) | |
| | BK-G | 15 (ZA) | |
| | | 16 (A) | |
| | | 34 (B) | |
| | W-BL | 15 (F) | |
| | | 16 (G) | |
| | | 34 (H) | |
| CA4 Cord | BR-W | 37 | |
| | G-W | 46 | |
| | G-R | 34 | |
| | R-BL | 30 | |
| | R-O | 3 | |
| | BL-W | 36 | |
| | S-W | 35 | |
| | BL-R | 35 (S) | |
| | | 36 (T) | |
| CA5 Cord (D10R-61) | BL-W | 1 | 10 |
| | W-BL | 2 | 9 |
| | W-BR | 10 | 6 |
| | W-G | 5 | 5 |
| | BR-W | 11 | 4 |
| CA5 Cord | G-W | 6 | 3 |
| | W-O | 7 | 2 |
| | O-W | 8 | 1 |

**TABLE O (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 28 | |
| 2245A Transformer (See Note 5) | T5 | | 5 |
| | T4 | | 4 |
| | T3 | | 3 |
| | T2 | | 2 |
| | T1 | | 1 |
| Line Facility | | | 9 |
| | | | 10 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

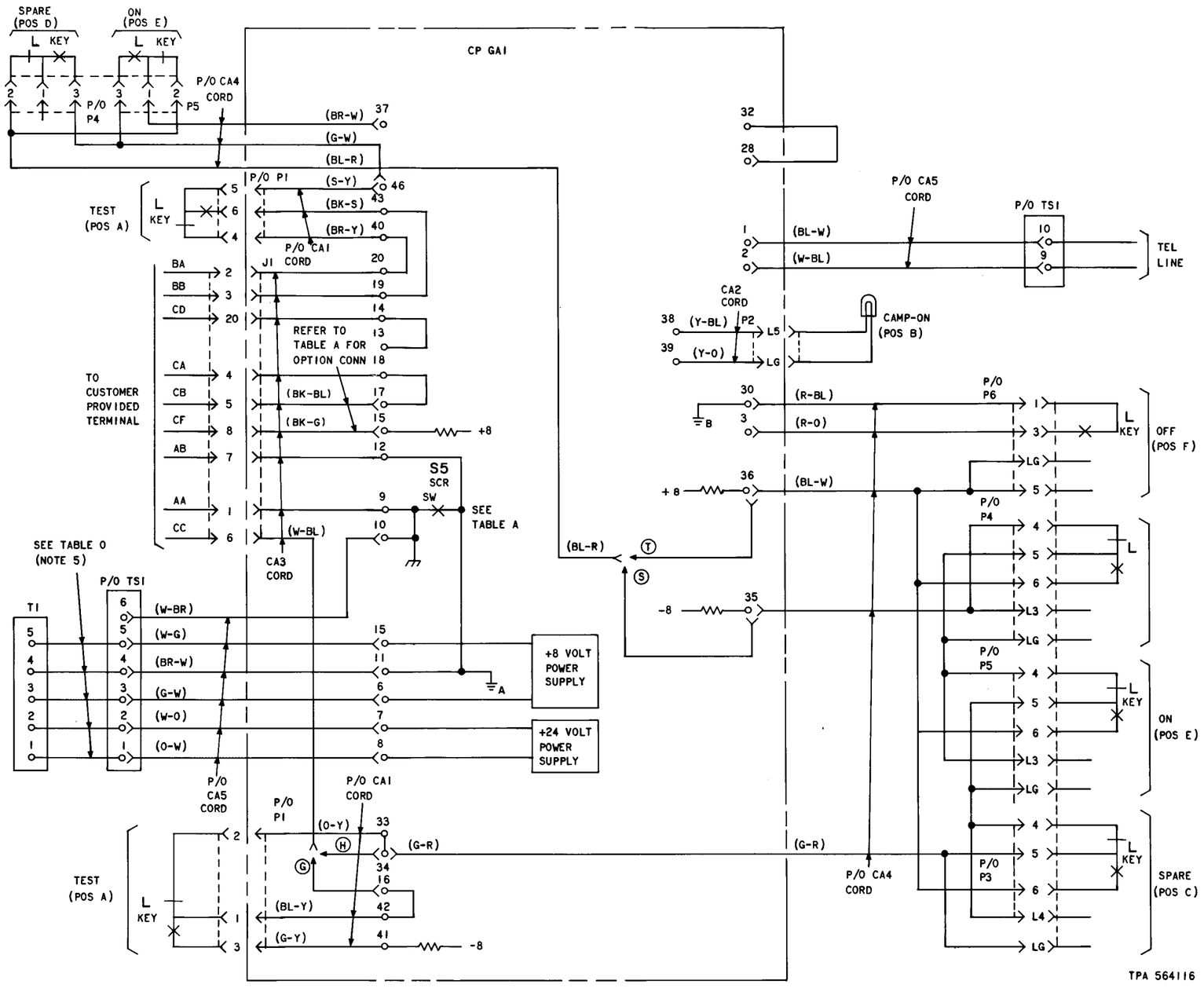



Fig. 16 — Data Set 109H-L1 — Remote Service Arrangement Wiring Diagram

## TABLE P

### DATA SET 109H-L1/4 — REMOTE SERVICE ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| CA1 Cord | S-Y | | 74 | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL wire (J) | | |
| | | Insulate and store (M) | | |
| | | 17 (K) | | |
| | BK-G | 15 (ZA) | | |
| | | 16 (A) | | |
| | | 34 (B) | | |
| | W-BL | 15 (F) | | |
| | | 16 (G) | | |
| | | 34 (H) | | |
| CA4 Cord (See Note 2) | R-G | | 73 | |
| | BL-BK | | 72 | |
| | BR-W | | 71 | |
| | BL-R | | 70 | |
| CA5 Cord (D10R-61) | BL-W | 1 | | 10 |
| | W-BL | 2 | | 9 |
| | W-BR | 10 | | 6 |
| | W-G | 5 | | 5 |
| | BR-W | 11 | | 4 |
| | G-W | 6 | | 3 |
| | W-O | 7 | | 2 |
| | O-W | 8 | | 1 |

**TABLE P (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| Spade-Ended Leads From Circuit Pack ET3 | 77 | 23 | | |
| | 78 | 13 | | |
| | 79 | 11 | | |
| | 80 | 21 | | |
| Spade-Ended Leads From Circuit Pack ET3 | 81 | 22 | | |
| | 82 | 3 | | |
| | 83 | 30 | | |
| | 84 | 35 (S) | | |
| | | 36 (T) | | |
| | 85 | 37 | | |
| | 86 | 34 | | |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 28 | | |
| 2245A Transformer (See Note 5) | T1 | | | 1 |
| | T2 | | | 2 |
| | T3 | | | 3 |
| | T4 | | | 4 |
| | T5 | | | 5 |
| Line Facility | | | | 10 |
| | | | | 9 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

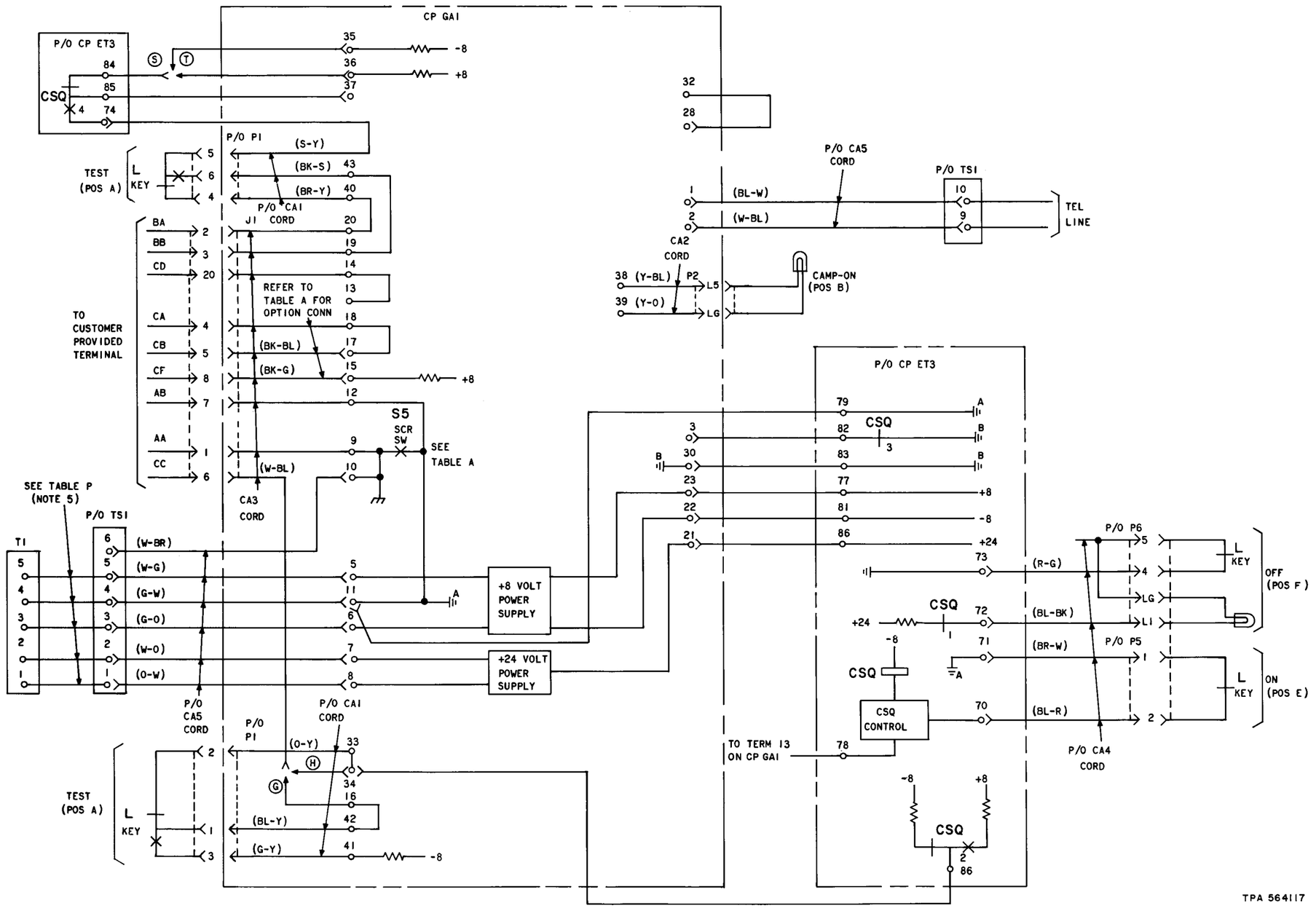



**Fig. 17 — Data Set 109H-L1/4 — Remote Service Arrangement Wiring Diagram**

## TABLE Q

## DATA SET 109H-L1/5 — REMOTE SERVICE ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| CA1 Cord | S-Y | 46 | | |
| CA3 Cord | BK-BL | Connect to same term. as W-BL wire (J) | | |
| | | Insulate and store (M) | | |
| | | 17 (K) | | |
| | BK-G | | 98 | |
| | W-BL | 15 (F) | | |
| | | 16 (G) | | |
| | | 34 (H) | | |
| CA4 Cord | BL-R | 35 (S) | | |
| | | 36 (T) | | |
| | BR-W | 37 | | |
| | G-W | 46 | | |
| | R-BL | 30 | | |
| | R-O | 3 | | |
| | BL-W | 36 | | |
| | S-W | 35 | | |
| | G-R | | 106 | |
| CA5 Cord (D10R-61) | BL-W | 1 | | 10 |
| | W-BL | 2 | | 9 |
| | W-BR | 10 | | 6 |
| | W-G | 5 | | 5 |
| | BR-W | 11 | | 4 |
| | G-W | 6 | | 3 |
| | W-O | 7 | | 2 |
| | O-W | 8 | | 1 |

**TABLE Q (Cont)**

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|
| Spade-Ended Leads From Circuit Pack GR1 | 90 | 26 | | |
| | 91 | 27 | | |
| | 93 | 30 | | |
| | 95 | 23 | | |
| | 96 | 22 | | |
| | 101 | 3 | | |
| | 102 | 34 | | |
| | 108 | 21 | | |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 28 | | |
| 2245A Transformer (See Note 5) | T1 | | | 1 |
| | T2 | | | 2 |
| | T3 | | | 3 |
| | T4 | | | 4 |
| | T5 | | | 5 |
| Line Facility | | | | 10 |
| | | | | 9 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

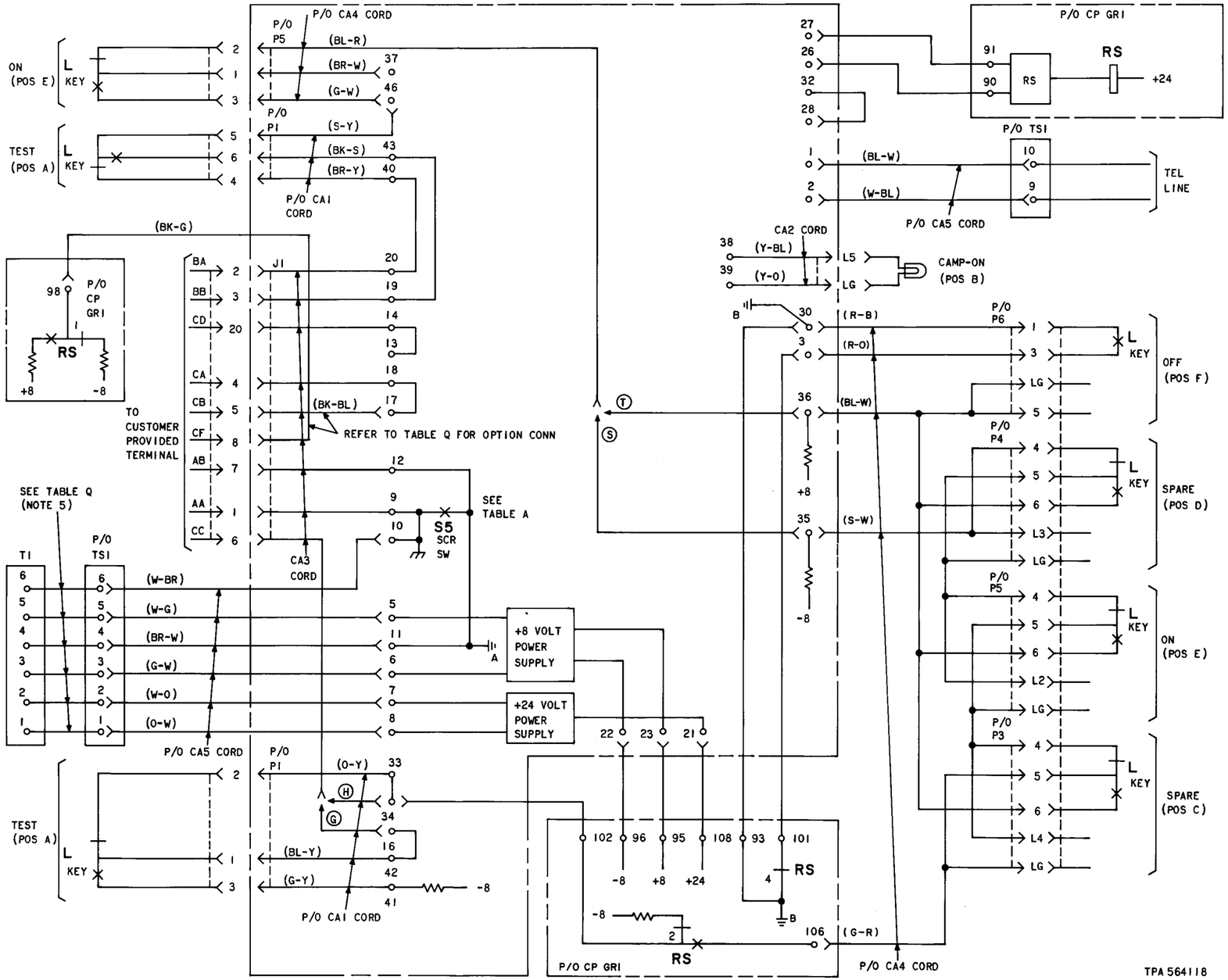



Fig. 18 — Data Set 109H-L1/5 — Remote Service Arrangement Wiring Diagram

## TABLE R

## DATA SET 109H-L1/4/5 — REMOTE SERVICE ARRANGEMENT — WIRING

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| CA1 Cord | S-Y | | 74 | | |
| | BK-BL | Connect to same term. as W-BL (J) wire | | | |
| | | Insulate and store (M) | | | |
| | | 17 (K) | | | |
| | BK-G | | | 98 | |
| | W-BL | 15 (F) | | | |
| | | 16 (G) | | | |
| | | 34 (H) | | | |
| CA4 Cord (See Note 2) | R-G | 73 | | | |
| | BL-BK | 72 | | | |
| | BR-W | 71 | | | |
| | BL-R | 70 | | | |
| CA5 Cord (D10R-61) | BL-W | 1 | | | 10 |
| | W-BL | 2 | | | 9 |
| | W-BR | 10 | | | 6 |
| | W-G | 5 | | | 5 |
| | BR-W | 11 | | | 4 |
| | G-W | 6 | | | 3 |
| | W-O | 7 | | | 2 |
| | O-W | 8 | | | 1 |
| Spade-Ended Leads From Circuit Pack ET3 | 77 | | | 94 | |
| | 78 | 13 | | | |
| | 79 | 11 | | | |
| | 80 | | | 107 | |
| | 81 | | | 97 | |
| | 82 | 3 | | | |

TABLE R (Cont)

| CORD OR COMPONENT | LEAD | CIRCUIT PACK GA1 TERMINAL | CIRCUIT PACK ET3 TERMINAL | CIRCUIT PACK GR1 TERMINAL | TS-1 TERMINAL |
|---|---|---|---|---|---|
| Spade-Ended Leads From ET3 Circuit Pack | 83 | | | 92 | |
| | 84 | 35 (S) | | | |
| | | 36 (T) | | | |
| | 85 | 37 | | | |
| | 86 | | | 106 | |
| Spade-Ended Lead From Circuit Pack GA1 | 32 | 28 | | | |
| Spade-Ended Leads From Circuit Pack GR1 | 90 | 26 | | | |
| | 91 | 27 | | | |
| | 93 | 30 | | | |
| | 95 | 23 | | | |
| | 96 | 22 | | | |
| | 101 | 3 | | | |
| | 102 | 34 | | | |
| | 108 | 21 | | | |
| 2245A Transformer (See Note 5) | T1 | | | | 1 |
| | T2 | | | | 2 |
| 2245A Transformer (See Note 5) | T3 | | | | 3 |
| | T4 | | | | 4 |
| | T5 | | | | 5 |
| Line Facility | | | | | 9 |
| | | | | | 10 |

*Note 1:* When both ends of a cord are to be connected, two terminal numbers will be shown for each designated lead.

*Note 2:* All unused spade-ended leads shall be individually insulated and stored.

*Note 3:* Refer to Table A for information on installing options.

*Note 4:* A circled letter indicates the connection is required to install the option indicated by the letter.

*Note 5:* The ends of these wires must be stripped and wrapped around the screw terminals of the transformer and connecting block.

*Note 6:* Each end of the S-W and W-S lead of cord CA5 shall be insulated and stored.

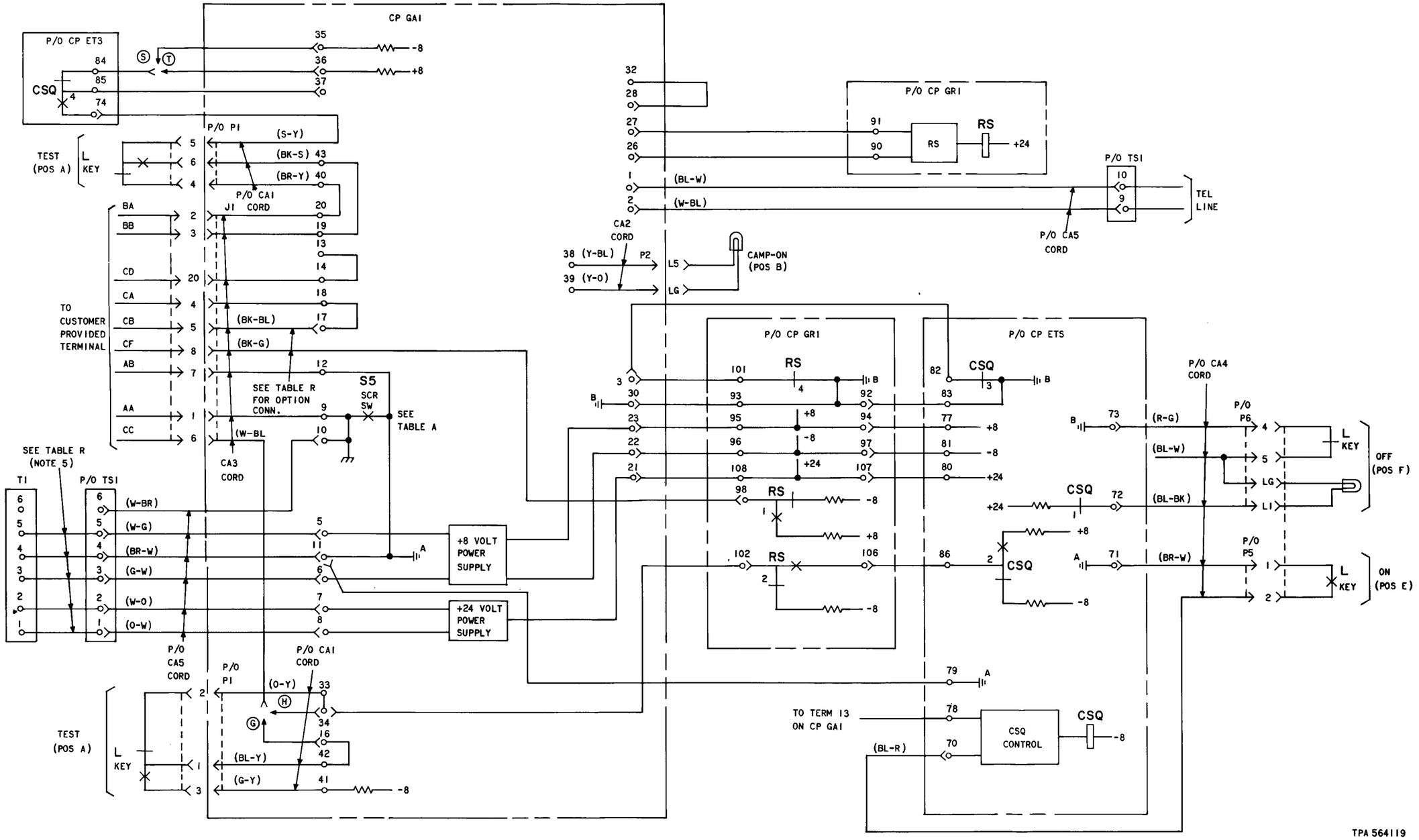



**Fig. 19 — Data Set 109H-L1/4/5 — Remote Service Arrangement Wiring Diagram**

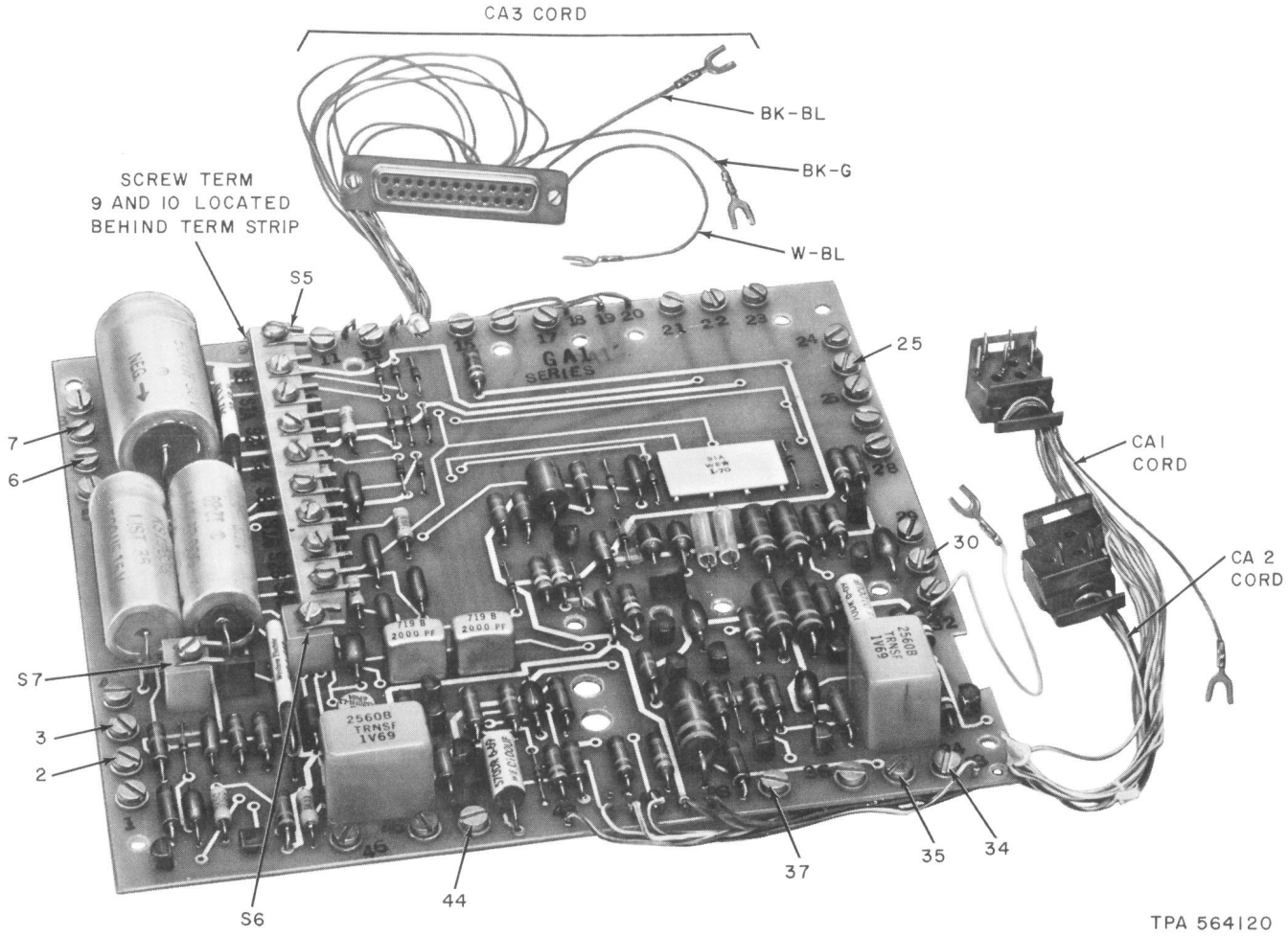



**Fig. 20 — GA1 Circuit Pack — Location and Identification of Terminals and Spade-Ended Leads**

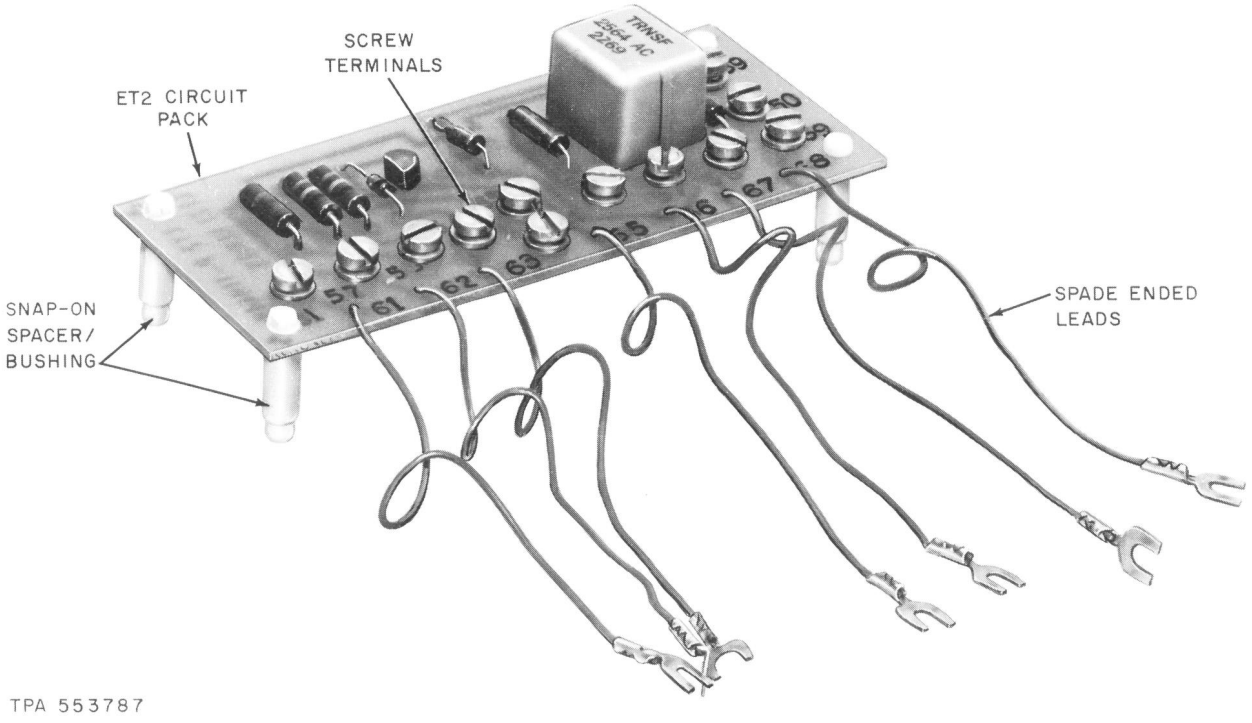



**Fig. 21 — ET2 Circuit Pack — Location and Identification of Terminals and Spade-Ended Leads**

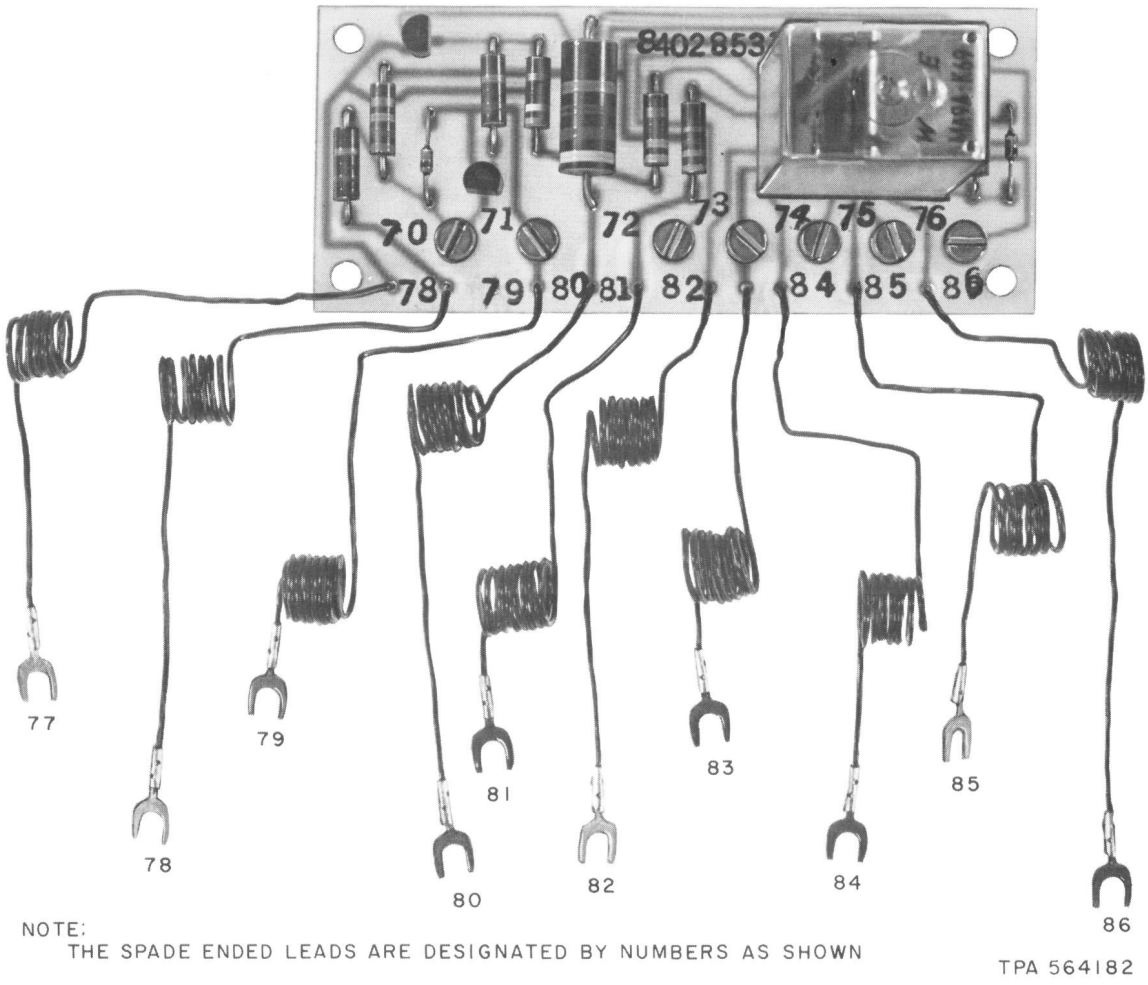
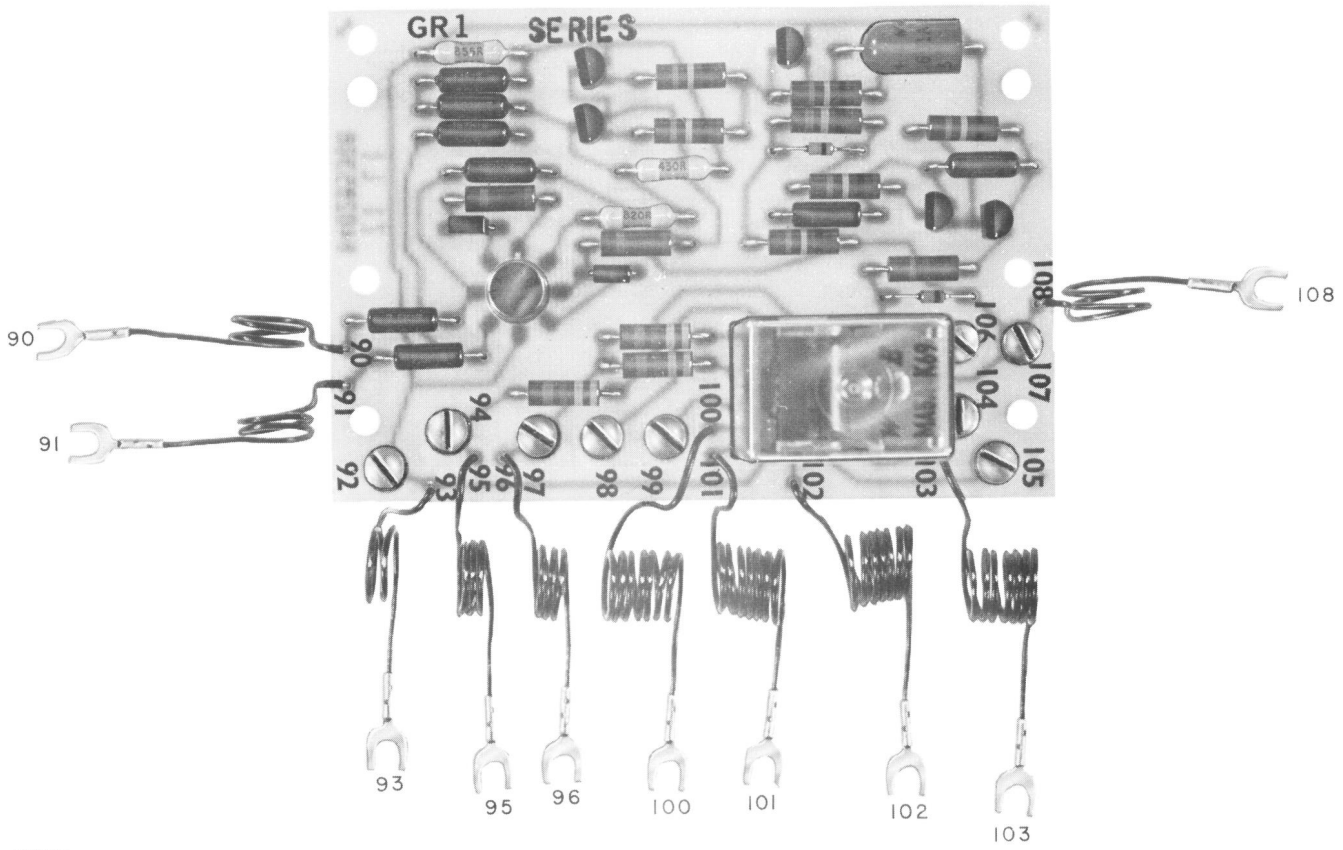



**Fig. 22 — ET3 Circuit Pack — Location and Identification of Terminals and Spade-Ended Leads**




NOTE:
SPADE ENDED LEADS ARE DESIGNATED BY NUMBERS AS SHOWN.

TPA 564183

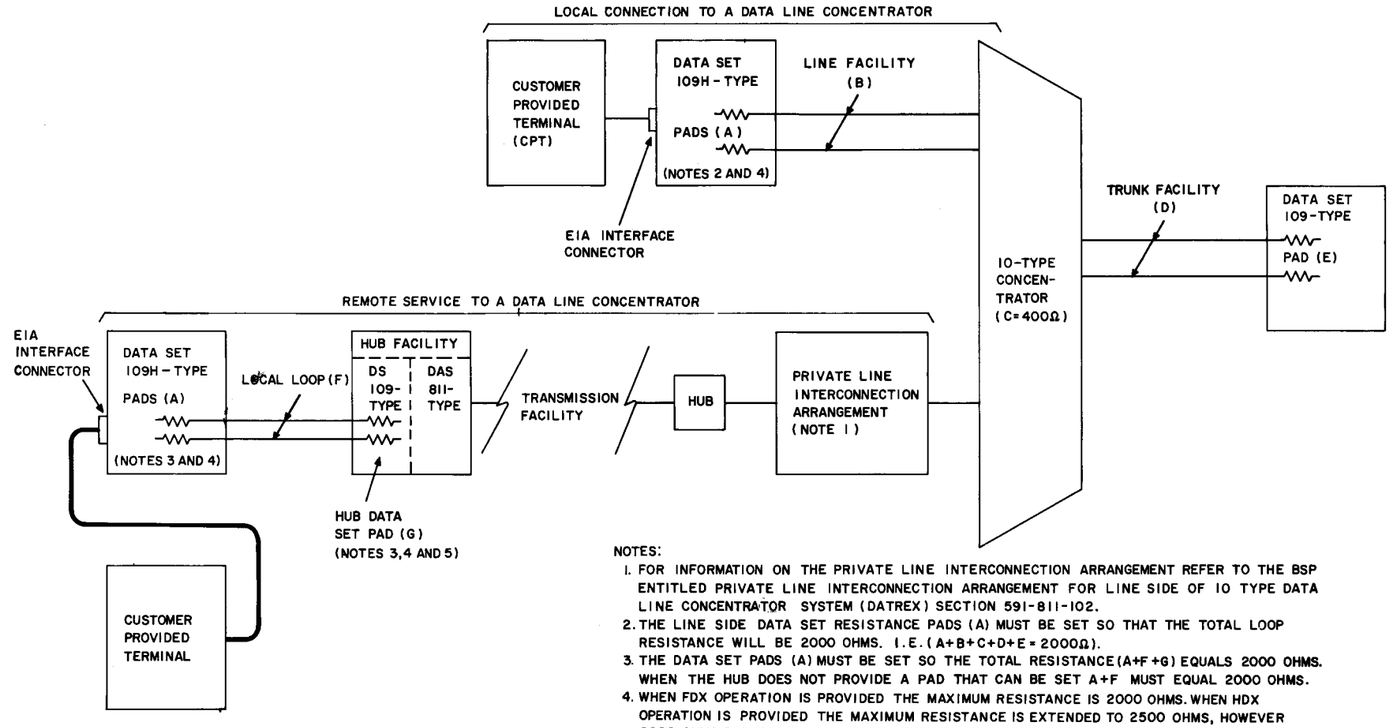
**Fig. 23 — GR1 Circuit Pack — Location and Identification of Terminals and Spade-Ended Leads**

## TABLE S

## VALUE OF SCREW SWITCH RESISTORS AND RESISTANCE VALUE FOR ALL SWITCH POSITION COMBINATIONS

| RESISTANCE VALUE (A) (OHMS) | SWITCH CONDITION | | | |
|---|---|---|---|---|
| | S1 (A & B) 136.2 OHMS* | S2 (A & B) 266 OHMS* | S4 (A & B) 522 OHMS* | S8 (A & B) 1022 OHMS* |
| 0 | Closed | Closed | Closed | Closed |
| 136.2 | Open | Closed | Closed | Closed |
| 266 | Closed | Open | Closed | Closed |
| 402.2 | Open | Open | Closed | Closed |
| 522 | Closed | Closed | Open | Closed |
| 658.2 | Open | Closed | Open | Closed |
| 788 | Closed | Open | Open | Closed |
| 924.2 | Open | Open | Open | Closed |
| 1022 | Closed | Closed | Closed | Open |
| 1158.2 | Open | Closed | Closed | Open |
| 1288 | Closed | Open | Closed | Open |
| 1424.2 | Open | Open | Closed | Open |
| 1544 | Closed | Closed | Open | Open |
| 1680.2 | Open | Closed | Open | Open |
| 1810 | Closed | Open | Open | Open |
| 1946.2 | Open | Open | Open | Open |

* The A designated screw switches are located in one side of the line, and the B switches are located in the other side of the line. In order to keep the resistances equal in each side of the line, the A and corresponding B switch should be operated as a pair and both either opened or closed. The values given in this table show the total resistance of both switches and a closed or open indication means that both the A and B switches are in the condition indicated.




NOTES:

1. FOR INFORMATION ON THE PRIVATE LINE INTERCONNECTION ARRANGEMENT REFER TO THE BSP ENTITLED PRIVATE LINE INTERCONNECTION ARRANGEMENT FOR LINE SIDE OF 10 TYPE DATA LINE CONCENTRATOR SYSTEM (DATREX) SECTION 591-811-102.
2. THE LINE SIDE DATA SET RESISTANCE PADS (A) MUST BE SET SO THAT THE TOTAL LOOP RESISTANCE WILL BE 2000 OHMS. I.E. (A+B+C+D+E = 2000Ω).
3. THE DATA SET PADS (A) MUST BE SET SO THE TOTAL RESISTANCE (A+F+G) EQUALS 2000 OHMS. WHEN THE HUB DOES NOT PROVIDE A PAD THAT CAN BE SET A+F MUST EQUAL 2000 OHMS.
4. WHEN FDX OPERATION IS PROVIDED THE MAXIMUM RESISTANCE IS 2000 OHMS. WHEN HDX OPERATION IS PROVIDED THE MAXIMUM RESISTANCE IS EXTENDED TO 2500 OHMS, HOWEVER 2000 OHMS REMAINS THE OPTIMUM VALUE.
5. DATA SET 109B DOES NOT PROVIDE DATA PAD AS PART OF THE DATA SET. PADS FOR THE 109B ARE SUPPLIED BY AN EXTERNALLY MOUNTED PANEL

TPA 553574

**Fig. 24 — Data Line Concentrator System — Block Diagram**

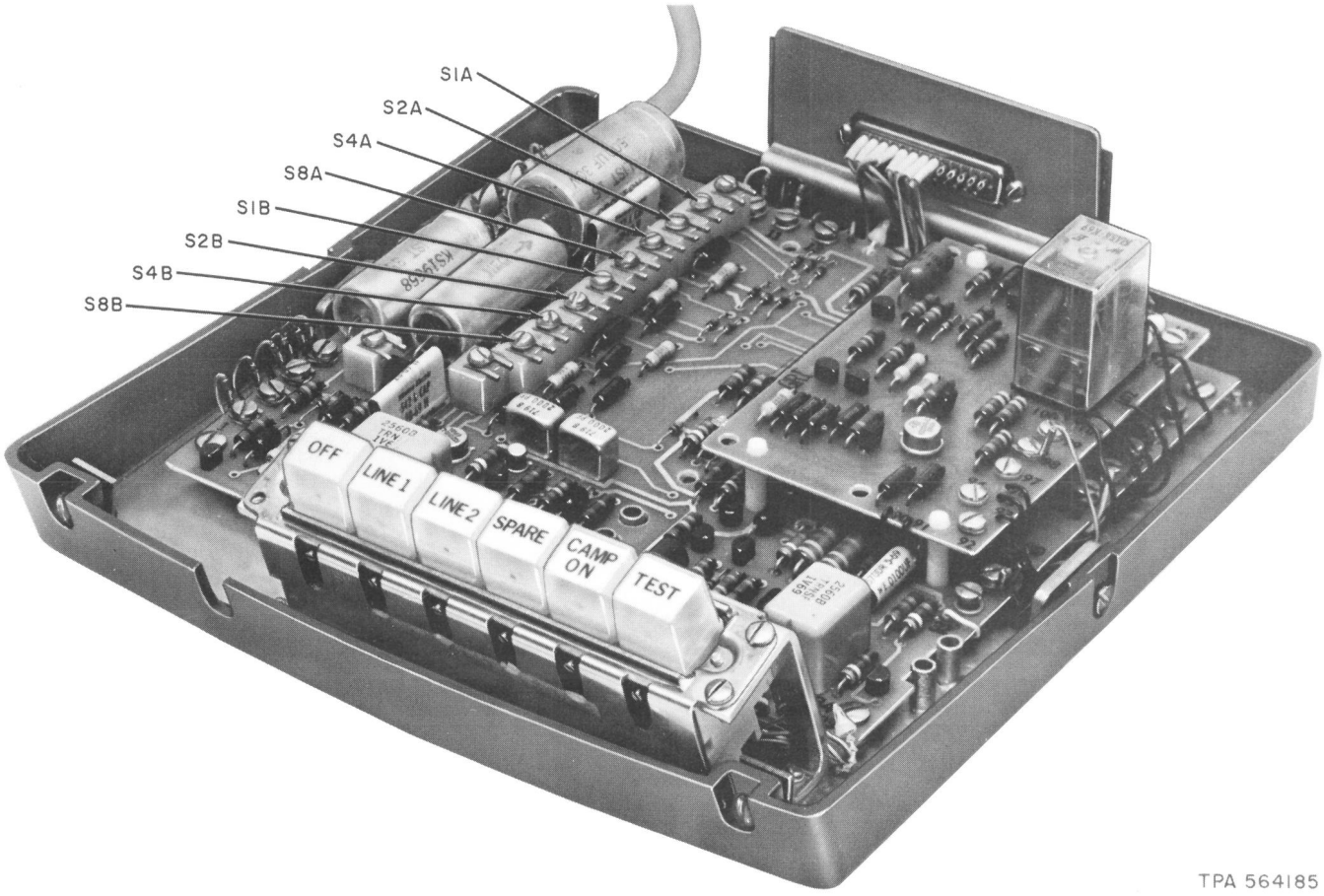



**Fig. 25 — Identification and Location of Line Pad Screw Switches**