

**TABULAR  
WIRING DIAGRAMS  
DESCRIPTION**

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**1. GENERAL**

**1.01** This section contains explanatory information and may be used as an aid in reading tabular wiring diagrams. It is not intended to be used as an instruction on how to prepare this type of wiring diagram. Refer to Section 005-105-101 for description of pictorial type (Airline Method) wiring diagram.

**2. GENERAL DESCRIPTION**

**2.01** In the tabular wiring diagram, the wiring information which is on present pictorial-type (Airline Method) wiring diagrams, is now shown in tabular form. The tabular wiring diagram consists of three sections (A, B, and C) as described in Part 3.

**3. DETAILED DESCRIPTION**

**A. Section A**

**3.01** Section A contains essentially the same information shown on the "A" sheets of the pictorial-type wiring diagram. It contains complete engineering information for the vari-

ous circuit features and the requirements for switchboard and external wiring in pictorial form. This section is prepared manually.

**B. Section B**

**3.02** Section B provides a list of all internally wired components by functional designation in alphabetical and numerical order. Each component entry shows the figure, option, type, and code. Each used terminal and its associated run number (Section C) along with the component location is also shown in Section B. Fig. 1 illustrates a typical portion of Section B.

**3.03** Following the list of wired components in Section B is a listing of all pigtail (PT) components and their connections. While pigtail components are not made part of a run, the indexing and connecting information is made as one entry with a cross-referencing symbol to indicate at which terminations in a run a pigtail component is connected. Some networks mounted across the windings of wire spring relays are listed under classification NET instead of PT SYM. Fig. 2 and 3 illustrate typical portions of this part of Section B.

**3.04** The following information may be read from the pigtail component tabulations shown in Fig. 2.

(a) *PT Sym (AA)*: 185A network, designated (OL), wiring diagram option (2, X), is connected between terminals 2M and 2 of OF relay and located at primary coordinate OA (see 4.02).

(b) *PT Sym (AB)*: KS-19152 L2 resistor, designated R22 with value of 3900 ohms (color code identification, O-W-R-SLVR) is connected between terminal 2 of R21 potentiometer and terminal 4 of terminal TM. Manufacturing note 3, located in Section A of the tabular wiring diagram covers special wire or termination conditions.

3.05 The following information may be read from the network component tabulations shown in Fig. 3.

**Note:** Network symbols NET0, NET1, NET2, etc, are assigned depending upon the relay winding terminals to which the network connects. The assignments are shown in the Table of Conventions under Manufacturing Notes located in Section A of the tabular wiring diagram [see 3.09(b)].

(a) **Net Sym (NET 3):** Each 185A network, schematic Fig. 1B, is connected between terminals 1L and 2L of L3 and T3 relays located at primary coordinate 2G.

(b) **Net Sym (NET 4):** Each 185A network, schematic Fig. 1B, is connected between terminals 1U and 2U of SL3 and R3 relays located at primary coordinate 2G.

**C. Section C**

3.06 Section C contains the detailed run information arranged numerically from Run No. 1 up. A run constitutes all points connected together by internal wiring methods with zero resistance but not through physical contacts.

3.07 A run is constructed as follows. Examining the SD-circuit path illustrated in Fig. 4, four runs are represented in the tabular wiring diagram C Section as illustrated in Fig. 5.

3.08 The four runs as shown in Fig. 5 may be read as follows.

(a) **Run Number 1:** Terminal 1/1B of the T1 inductor is connected to terminal 1M of the A relay by a green surface-wire SW1 lead; terminal 1M of the A relay is connected to terminal L of the MB relay by a blue local cable wire ("X" wiring option, see note). Manufac-

turing note 6, located in Section A of the tabular wiring diagram covers gauge and type of wire information.

**Note:** Run number 1 is furnished only with "X" option; however, the only part of the run that is "X" option is the local cable lead from 1M of the A relay to L of the MB relay. The surface-wire lead from 1/1B of the T1 inductor to 1M of the A relay is furnished all the time. It is repeated in run number 2, however, so that a complete run can be shown for "X" option and for "Y" option.

(b) **Run Number 2:** Terminal 1M of the A relay is connected to terminal 1/1B of the T1 inductor by a green surface-wire SW1 lead; terminal 1/1B of the T1 inductor is connected to terminal 5 of the CH relay by a green surface-wire SW1 lead ["Y" wiring option, see note in (a)].

(c) **Run Number 3:** Terminal 5B of the CH relay is connected to the lower relay winding terminal of the MB relay by a blue local cable wire ("Y" wiring option).

(d) **Run Number 4:** Terminal 12 of the A terminal strip is connected to the upper relay winding terminal of the MB relay by a green surface-wire SW1 lead.

3.09 The following is an explanation of other columns in Section C and their purpose.

(a) **Path (under wire):** This column will be filled in only when the path of a wire is a requirement.

(b) **Wiring Convention Symbol:** Symbols appearing in this column are described in Section A of the tabular wiring diagram under Manufacturing Notes. Examples of wiring convention symbols and their meaning are as follows.

**MANUFACTURING NOTES  
CONVENTIONS**

-  Denotes switchboard cable.
- $\phi$  Installer wiring.
- P Denotes pair, P....., as P101 denotes pair number.
-  Symbol followed by lead designation indicates lead run connection controlled by this circuit to another circuit.

- □ Symbol followed by lead designation indicates lead run connection to this circuit.
- LP Loop lead to be cut and connected when associated option is specified.
- F,R,S Lead is in 1st, 2nd, or 3rd extra stitch progressing toward tip of cable arm.
- NC No connection.
- DU Doubling up terminal.
- AA,AB... Cross-reference symbols identify connection of pigtail components listed in the B section.

| 185A NET | 186A NET | SYMBOL | 185C NET | 186B NET | CONNECTION BETWEEN<br>WIRE SPRING REL TERMS |
|----------|----------|--------|----------|----------|---|
| Net 0    | Net 5    |        | Net 10   | Net 20   | U & L, or 1L & 1U, and 2L & 2U              |
| Net 1    | Net 6    |        | Net 11   | Net 21   | 1L & 2U                                     |
| Net 2    | Net 7    |        | Net 12   | Net 22   | 2L & 1U                                     |
| Net 3    | Net 8    |        | Net 13   | Net 23   | 1L & 2L                                     |
| Net 4    | Net 9    |        | Net 14   | Net 24   | 1U & 2U                                     |

- F Used as a suffix to a terminal number, indicates connection to front of component.
- /-/ Indicates circuit, any one of a group of circuits.
- /0/.../9/ Indicates specific circuit.
- X,Y Comma separating options indicates "Or", as X or Y.
- X & Y Ampersand separating options indicates "And", as X and Y.
- % or / Without, as X%Y indicates X without Y.
- \* Indicates break in continuity of run when option is equipped.
- # Indicates another connection to terminal appears in the run.
- @ A connection point of a multiple-point terminal.
- & A connection point of a multiple-point terminal with another connection appearing in the run.
- / A slash (/) in the terminal column separates the schematic number shown on the left from the identifying number shown to the right of the slash. Identifying numbers locate:
  - Terminals in horizontal rows. Number 1 and up left to right — suffix T, M, or B indicates top, middle, or bottom row.
  - Terminals in vertical rows. Number 1 and up bottom to top — suffix L or R indicates left or right row.
- SW1 Wiring to be **24BW** colored green unless otherwise specified and run as surface wire.
- LC- Wiring to be **24BW** unless otherwise specified colored as shown and run in local cable. Numerical or lettered suffix identifies local cable other than LC.

|     |   |
|-----|---|
| LW  | Wiring to be <b>24BW</b> unless otherwise specified colored as shown and run as loose wire.           |
| LW1 | Wiring to be <b>24BW</b> unless otherwise specified colored as shown and run as preformed loose wire. |
| STP | Designates strap wire to be <b>24BW</b> colored as shown.   |

#### 4. LOCATING INDIVIDUAL COMPONENTS BY COORDINATES

##### 4.01 *Coordinate Number Assignment Plan:*

Each wired component on a frame or unit is assigned a coordinate number which describes its relative location, for example, 2B010. The first two characters (primary ordinates) indicate the vertical location and the last three digits (secondary ordinates) indicate the horizontal position.

**4.02 *Primary (vertical) Ordinates:*** The local cable primary (vertical) ordinates are of 2-inch increments, assigned from the bottom up on the frame regardless of equipment arrangement or location of frame local cable, and consist of a letter and a number. The use of only two characters provides the 120 increments required for a double-bay 11-foot 6-inch frame. Two-inch increments 0-8A (even) to 0-8P (even) are assigned to a single-bay frame and to the right bay (from the rear of frame) of a double-bay frame; increments 1-9A (odd) to 1-9P (odd) are assigned to the left bay (from the rear of frame) of a double-bay frame.

**4.03 *Secondary (horizontal) Ordinates:*** The secondary (horizontal) ordinates are assigned to indicate the number of 1/8-inch increments a stitch is located from the butt end of the local cable arm serving a piece of apparatus. These increments are determined from either the right or left end of the mounting plate, depending upon on which upright the local cable is placed.

**4.04** Fig. 6 and 7 illustrate the application of the coordinate assignment plan. Fig. 6 shows a portion of Section B of the Tabular Wiring Diagram and lists the coordinate locations of the components under column heading Loc. For example, the location of the A terminal strip is 9A157. The first two characters 9A are the primary ordinates and indicate the vertical or mounting plate location (fifth plate from bottom in left hand (odd) bay as viewed from

the rear). The last three digits 157 are the secondary ordinates and indicate the approximate horizontal location of the component on the 9A mounting plate. Fig. 7 shows the relative location of these components on the bay.

#### 5. TERMINAL IDENTIFICATION

**5.01** With the discontinuance of the component symbol, the ability to identify terminals depends upon a recognizable numbering plan. Certain component codes require a form of supplementary information to readily identify terminals without regard to the schematic numbering. This information is furnished by providing identifying numbers in conjunction with the schematic numbering, that is, 11TF/2T. The first number to the left of the slash line is the terminal number shown on the schematic. The second number to the right of the slash is the identifying number that is based on a uniform significant directional and/or numbered sequence and is explained by the following note which appears on the tabular wiring diagram:

A slash line (/) in the terminal column separates the schematic number on the left from the identifying number shown to the right of the slash. Identifying numbers locate:

A. Terminals in horizontal rows. Number 1 and up, left to right — suffix T, M, or B indicates top, middle or bottom row.

B. Terminals in vertical rows. Number 1 and up, bottom to top — suffix L or R indicates left or right row.

**5.02** Fig. 8 and 9 illustrate the significance of the terminal identifying plan. Fig. 8 shows a C-type key mounted vertically in a normal manner (front or code stamping down) as viewed from the wiring side. The same key is shown in Fig. 9 mounted horizontally in other than normal manner (code stamping to the left instead of to the right). As described in 5.01, the identifying terminal numbers for the vertically mounted

key (Fig. 8) follow the "number 1 and up" pattern with left (L) and right (R) suffixes. The horizontally mounted key (Fig. 9) is numbered 1 up left to right with bottom (B) and top (T) suffixes.

**5.03** In general, identifying numbers are assigned for a component for each individual usage and the relationship between the schematic numbering and identifying numbers may vary according to mounting arrangement.

## 6. COORDINATE NUMBERING OF TERMINAL STRIPS

**6.01** All terminal strips are coordinate numbered on both front and rear except those terminal strips which are used for fields of frequently changed maintenance cross-connections. Terminal strips used for maintenance cross-connections are coordinate numbered on the rear and functionally designated on the front. The numbering methods for various commonly used types of terminal strips are covered in 6.02 through 6.07.

**6.02 251- and Similar Types:** 251- and similar-type terminal strips are divided into two sections, each containing ten vertical rows of terminals. The number of horizontal rows depends on the particular code used. Each section is numbered 0 to 9 horizontally (units digits) and 0 and up vertically (tens digits) starting from the lower left terminal (apparatus side). Each section is identified with a single letter designation (A, B, C, etc) progressing from left to right on the terminal strip mounting as viewed from the front of the frame. Rows of terminal strips mounted on frames as frame terminal strips are identified with a double letter designation (AA, AB, AC, etc) stamped on the left end (apparatus side) of the mounting bar, beginning with the row nearest the top of the frame and lettered downward. Rows of terminal strips mounted as unit terminal strips are identified with a single designation (A, B, C, etc) stamped on the left end (apparatus side) of the mounting bar. Fig. 10 illustrates typical stamping of 251- and similar-type terminal strips.

**6.03** Where 251-type terminal strips are used to terminate leads from multicontact relays and BT6A, BU6A, BY6A, or BW6A terminal strips, the 251-type terminal strips are full coordinate numbered instead of numbered to agree with the contact numbers of the multicontact relays or terminal numbers of the terminal strips. However, the pattern used for assigning terminals may agree with the pattern of the associated multicontact relay contacts and terminal strip terminals as illustrated in Fig. 11.

**6.04** Where 251-type terminal strips are used for the miscellaneous circuit in the No. 5 crossbar system, the miscellaneous terminals are assigned to the first section of the topmost row of terminal strips as shown in Fig. 12. This section is stamped on the front with the terminal numbering of the miscellaneous circuit and on the rear with coordinate numbering. Horizontal rows of terminals MISC 40-49, 30-39, 20-29, and 10-19 are associated with "A" section terminals 00-09, 10-19, 20-29, and 30-39. "A" section terminals 40-49 (when provided) are not used. Both the front and rear of the section are stamped "A" 40-99 when these terminals are provided on the terminal strip.

**6.05 D-type terminal strips** are numbered using the existing coordinate numbering system for this terminal strip, 11 to 18, 21 to 28, 31 to 38, etc, in all cases.

**6.06 BU6A, BT6A, and BY6A terminal strips** are numbered (but not stamped unless drawing specifies stamping) using the existing coordinate numbering system for these terminal strips, 0 to 5 horizontally and 0 to 4 vertically.

**6.07 BW6A terminal strips** are numbered (but not stamped unless drawing specifies stamping) in two sections or as a complete strip using the existing coordinate numbering system for these terminal strips, 0 to 5 horizontally and 0 to 4 vertically in each of two sections or 0 to 5 horizontally and 0 to 9 vertically for the complete terminal strip.

| FIG<br>&/OR<br>OPT | COMPONENT      |          |                              |
|--------------------|----------------|----------|------------------------------|
|                    | FUNCT<br>DESIG | TYPE     | CODE                         |
|                    | LOC            | TERMINAL | RUN WITH OPTION              |
| 2                  | LV8<br>8KI28   | REL      | AF77                         |
|                    |                | 1        | 128 / X/,133/Y/ ← SEE NOTE 1 |
|                    |                | IM       | 43                           |
|                    |                | 2        | 136                          |
|                    |                | 2M       | 53                           |
| 2                  | MBE<br>OF 507  | JK       | 280C                         |
|                    |                | 2        | PT / AC / ← SEE NOTE 2       |
|                    |                | 3        | 189                          |
|                    |                | 4        | 228                          |
| 1                  | T1<br>IA101    | INDR     | 1640E                        |
|                    |                | 1/1B     | 32 ← SEE NOTE 3              |

## NOTES:

1. NUMBERS OR LETTERS BETWEEN SLASHES THAT FOLLOW A RUN NUMBER INDICATE OPTIONS ASSOCIATED WITH THAT RUN.
2. WHEN NO OTHER INTERNAL WIRING EXCEPT A PIGTAIL COMPONENT IS CONNECTED TO A TERMINAL, PT (PIGTAIL RUN) IS SHOWN FOR THIS TERMINAL. OPTION AC REFERS TO THE PIGTAIL COMPONENT LISTED IN THE B PIGTAIL SECTION.
3. EACH COMPONENT ENTRY CONTAINS THE NUMBER ASSIGNMENT OF ALL ITS USED TERMINALS. WHEN TWO NUMBERS ARE SHOWN SEPARATED BY A SLASH, THE NUMBER TO THE LEFT OF THE SLASH AGREES WITH THE SCHEMATIC NUMBERING AND THE NUMBER TO THE RIGHT OF THE SLASH IS AN ARBITRARY TERMINAL NUMBER USED ON SHOP ASSISTANCE DRAWINGS.

Fig. 1 – Typical Portion of B Section — Tabular Wiring Diagram

| S<br>P<br>Y<br>M | FIG<br>OR<br>OPT | PT COMPONENT     |             |              |          |                  |            |    | MFR<br>NOTE |            |          |
|------------------|------------------|------------------|-------------|--------------|----------|------------------|------------|----|-------------|------------|----------|
|                  |                  | C<br>O<br>R<br>I | FUNCT DESIG |              | CODE     | C<br>O<br>R<br>I | VALUE      |    |             | COLOR CODE |          |
|                  |                  |                  | TYPE        | FROM         | TERM NBR |                  | TYPE       | TO |             | TERM NBR   | TERM NBR |
|                  |                  |                  | OL          | 185A         | NET      |                  |            |    |             |            |          |
|                  | AA               | 2,X              | OA REL      | OF           | 2M       | OA REL           | OF         |    |             | 2          |          |
|                  | R22              |                  |             | KS -19152,L2 | RES      | 3900 OHMS        | O-W-R-SLVR |    |             |            |          |
|                  | AB               |                  | POT         | R21          | 2        | TERM             | TM         |    |             | 4          | 3        |
|                  | R20              |                  |             | 145A         | RES      | 0.1 MEG          |            |    |             |            |          |
|                  | AC               |                  | ETS         | TM           | 1        | TERM             | TM         |    |             | 4          |          |

NOTE:  
 EACH ENTRY IS ARRANGED IN TWO OR MORE LINES. THE TOP LINE OF EACH ENTRY ① CORRESPONDS TO THE TOP HEADING OF THE CHART, E.G., "OL" IN THE ENTRY FOR PT SYM AA CORRESPONDS TO "FUNCT DESIG" IN THE HEADING. THE BOTTOM ONE OR MORE LINES IN THE ENTRY ② SHOW THE COMPONENTS TO WHICH THE PT COMPONENT IS CONNECTED AND CORRESPONDS TO THE BOTTOM LINES IN THE HEADING, E.G., "POT" IN THE ENTRY FOR PT SYM AB CORRESPONDS TO "TYPE" IN THE HEADING.

Fig. 2 - Typical Portion of Pigtail (PT) Component Listing -  
 Section B - Tabular Wiring Diagram

| PT COMPONENT |               |             |                  |                    |
|--------------|---------------|-------------|------------------|--------------------|
| NET<br>SYM   | FIG OR<br>OPT | NET<br>CODE | C<br>O<br>R<br>I | CONNECTED ON RELAY |
| NET 3        | 1B            | 185A        | 2G               | L3, T3             |
| NET 4        | 1B            | 185A        | 2G               | SL3, R3            |
| NET 3        | 1B            | 185A        | 0G               | T2, L2             |
| NET 4        | 1B            | 185A        | 0G               | SL2, R2            |
| NET 3        | 1A            | 185A        | 6F               | L5, T5             |
| NET 4        | 1A            | 185A        | 6F               | SL5, R5            |
| NET 3        | 1A            | 185A        | 6F               | T4, L4             |
| NET 4        | 1A            | 185A        | 6F               | SL4, R4            |

Fig. 3 - Typical Portion of Network (NET) Component Listing -  
 Section B - Tabular Wiring Diagram

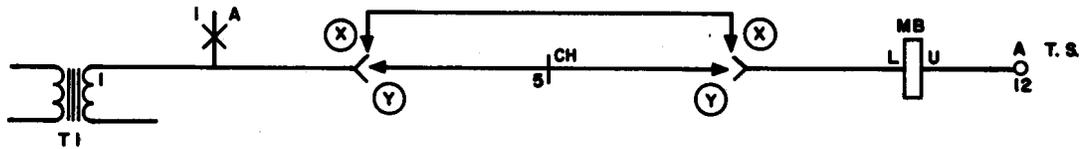


Fig. 4 - Typical Schematic Circuit Path

| RUN NO. | WITH OPTION | COMPONENT |             |         | WRG OPT | MFR NOTE | WIRE |       |      | WRG CONV SYM |
|---------|-------------|-----------|-------------|---------|---------|----------|------|-------|------|--------------|
|         |             | TYPE      | FUNCT DESIG | TERM NO |         |          | METH | COLOR | PATH |              |
| 1       | X           | INDR      | TI          | 1/1B    |         |          | SWI  |       |      |              |
|         |             | REL       | A           | IM      | X       | 6        | LC   | BL    |      |              |
|         |             | REL       | MB          | L       |         |          |      |       |      |              |
| 2       | Y           | REL       | A           | IM      |         |          | SWI  |       |      |              |
|         |             | INDR      | TI          | 1/1B    | Y       |          | SWI  |       |      |              |
|         |             | REL       | CH          | 5       |         |          |      |       |      |              |
| 3       | Y           | REL       | CH          | 5B      | Y       |          | LC   | BL    |      |              |
|         |             | REL       | MB          | L       |         |          |      |       |      |              |
| 4       |             | TS        | A           | 12      |         |          | SWI  |       |      |              |
|         |             | REL       | MB          | U       |         |          |      |       |      |              |

Fig. 5 - Typical Portion of Section C - Tabular Wiring Diagram

| FIG. &/OR OPT | COMPONENT   |          |                 |
|---------------|-------------|----------|-----------------|
|               | FUNCT DESIG | TYP      | CODE            |
|               | LOC         | TERMINAL | RUN WITH OPTION |
| 1             | A           | REL      | AF11            |
|               | 1A012       | IM       | 1/X/,2/Y/       |
| 2             | A           | TS       | D5A             |
|               | 9A157       | 12       | 4               |
| 1             | CH          | REL      | AF17            |
|               | 1A056       | 5        | 2               |
|               |             | 5B       | 3               |
| 2             | MB          | REL      | AF51            |
|               | 5A097       | L        | 1/X/,3/Y/       |
|               |             | U        | 4               |
| 1             | TI          | INDR     | 1640E           |
|               | 1A101       | 1/1B     | 1/X/,2/Y/       |
| 2             | UA          | REL      | AF11            |
|               | 6A062       | IM       | 6               |

Fig. 6 - Typical Portion of Section B Showing Coordinate Locations - Tabular Wiring Diagram





