

STRAPS AND CROSS CONNECTIONS SOLDERLESS WRAPPED CONNECTIONS METHOD OF PLACING

1. GENERAL

1.01 This section covers general information relative to placing straps and cross connections on terminal strips with punched type and wire drawn terminals without notches or perforations and arranged for solderless wrapped connections.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 Detailed requirements for placing and removing wrapped connections and use of the tools required are covered in Section 069-132-811.

1.04 Information relative to type wire used for placing straps and cross connections is found on the appropriate ED-drawings. Bare wire straps should be No. 22 or No. 24 gauge wire.

2. TOOLS AND MATERIALS

2.01 List of Tools and Materials

Code or Spec. No.	Description
Tools	
KS-6320	Orange Stick
	Wire Wrapping Tools as Required
	6-1/2-inch P-Long-Nose Pliers
	5-inch V-Notch Diagonal Pliers
Materials	
Wire	No. 22 and No. 24 gauge as required (See 1.03)

3. METHOD OF PLACING STRAPS

3.01 Adjacent Terminals: Bare wire straps should be used for connecting adjacent terminals. Where three or more adjacent terminals are to be strapped together the individual straps should be placed as shown in Fig. 1. The order in which the straps are placed is indicated by the letters (A), (B), (C), and (D). Straps

placed in this manner will facilitate making future changes in the grouping of terminals. In placing bare wire straps it is essential that bowing of the strap between the terminals be kept to

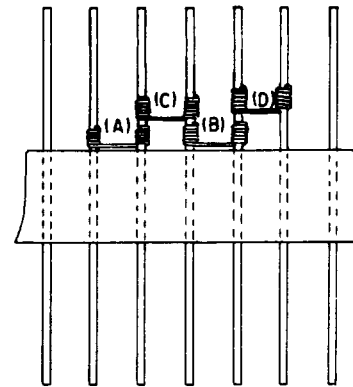


Fig. 1

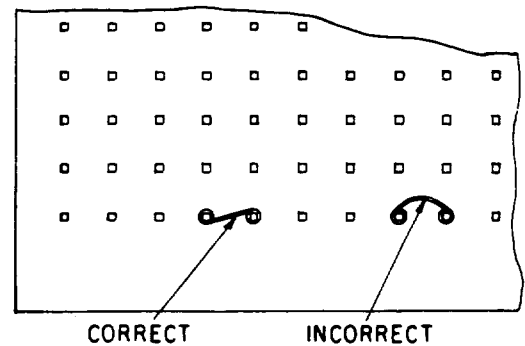


Fig. 2

the minimum to avoid the possibility of crosses with other bare wire straps or with adjacent terminals. See Fig. 2. Since wrapping is always clockwise, the desired result may be obtained by placing the strap from right to left, top to bottom, or back to front terminal in respect to the position in which the terminal strip is mounted. In preparing to wrap the connection on the second (B) of two adjacent terminals, the strap wire should be bent at an angle of 90 degrees so that it lies parallel to the terminal and extends 1-5/8 inches above the surface of the terminal strip. See Fig. 3. The KS-6320 orange stick may be used for forming the strap wire into the angle

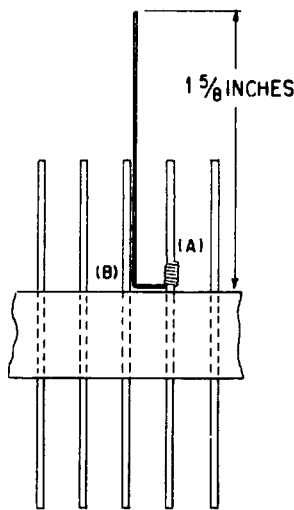


Fig. 3

described. With the parts in this relationship the wrapping tool is applied in the usual manner.

Note 1: It is essential that the course of the bare strap wire between adjacent terminals (A) and (B) in Fig. 3 be such that there is no tendency to cause unwrapping of the first turn of the wrapped connection on terminal (A).

Note 2: Where the first or last terminal of a series of strapped terminals is also used to terminate a cross connection, that connection which is least subject to change should be placed first i.e. on the lowest position on the terminal.

3.02 Nonadjacent Terminals: Insulated No. 22 or No. 24 gauge wire as determined in 1.03 should be used. These straps should be placed with appreciable slack. In cases where the straps are dressed between rows of terminals on relatively close spacing, as is usually the case on terminal strips, the straps may touch other terminals. In no case however, should any straps be dressed across the edges of other terminals so tightly as to result in pressure between the wire and the terminal.

D-Type Terminal Strips

3.03 Straps on the rear (wiring side) are placed as shown in Fig. 4. Straps should not obstruct the wire throat of the terminal strip. Straps on the front (apparatus side) may be made with loop leads as shown in Fig. 4 (A). Where no switchboard cable wires are connected to the terminal strip and/or due to congestion, the straps may be run vertically between the rows of terminals, horizontally above or below the top or bottom rows and vertically over the space between the terminal strip and adjacent apparatus, as shown in Fig. 4 (B).

Note: Since the terminals on these terminal strips are placed on close centers, care must be exercised in placing additional connections to avoid damage to connections already in place.

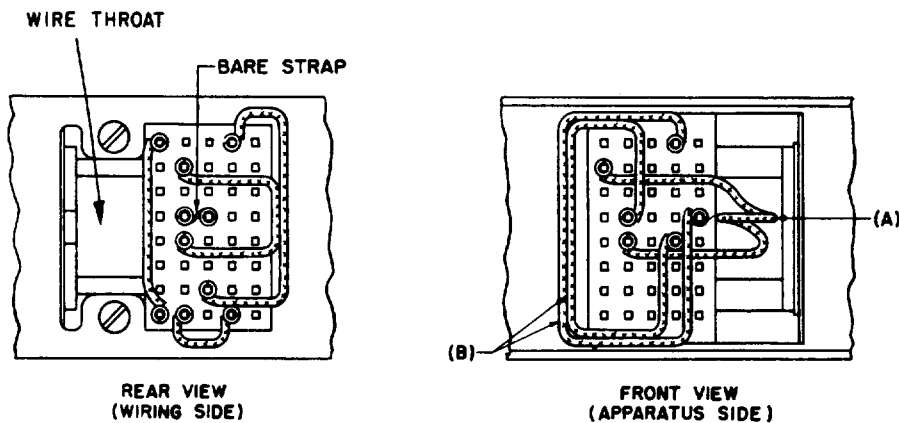


Fig. 4

224-Type Terminal Strip

3.04 The method of placing straps is shown in Fig. 5. Straps on the switchboard cable side should be placed in the same manner as on the local cable side.

Note: Since the terminals on these terminal strips are placed on close centers, care must be exercised in placing additional connections to avoid damage to connections already in place.

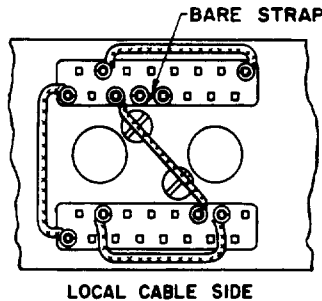


Fig. 5

251-, 252-, and Similar-type Terminal Strips

3.05 *Nonadjacent Terminals in Same Row Perpendicular to Fanning Strip:* Straps shall be run directly between terminals as shown in Fig. 6 (A).

3.06 *Nonadjacent Terminals in Different Rows:* Straps shall be run directly between terminals as shown in Fig. 6 (B). If interference with regular wiring would result from direct

strapping, loop the straps through the inner fanning strip holes as shown in Fig. 6 (C). When the capacity of the inner fanning strip holes is exceeded, it is permissible to use the outer holes for the excess loops.

3.07 In general, the requirements for placing insulated straps on terminal strips designed for solderless wrapped connections, are the same as for terminal strips using soldered connections.

4. METHOD OF PLACING CROSS CONNECTIONS

D-Type Terminal Strips

4.01 *Running Cross Connections:* Cross connections at D-type terminal strips shall be run and connected on the front (apparatus side) of the terminal strip.

4.02 *Cross Connections Between Terminals on Same Terminal Strip:* When cross connections are required between terminals on the same terminal strip, run them between the vertical rows of terminals and then horizontally above the top row and below the bottom row of terminals. Between the top and bottom rows of terminals, run the cross connections vertically and to the left side of the terminal strip over the area between adjacent terminal strips. See Fig. 7 (A). If there is insufficient space between adjacent terminal strips to permit running cross connections as indicated in example (A), the cross connections may be run as indicated in Fig. 7 (B).

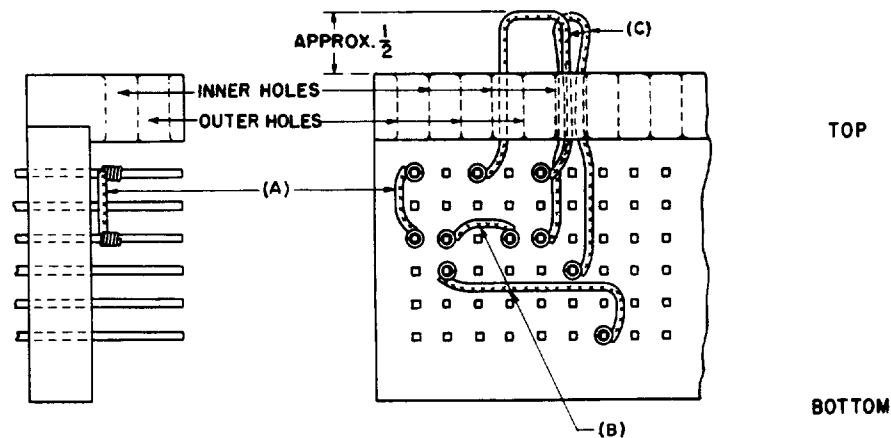


Fig. 6

4.03 Cross Connections Between Terminal Strips on Same Mounting Plate: When cross connections are required between terminals on different terminal strips on the same mounting plate, run the cross connections horizontally above the top or below the bottom rows of terminals between terminal strips and then vertically between the terminals to the desired terminals. See Fig. 7 (C).

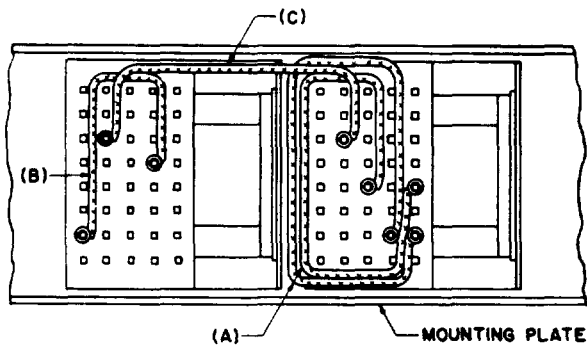


Fig. 7 — Cross Connections — D-type Terminal Strips on Same Mounting Plate

4.04 Cross Connections Between Terminal Strips on Different Mounting Plates: When cross connections are required between terminal strips on different mounting plates, run the cross connections horizontally above the top or below the bottom row of terminals to the terminal strip in the position nearest the frame upright. At this point, the cross-connection wire is run around the wire guide and then run vertically to the mounting plate on which the other terminal strip is located. The cross-connection wire is then run around the wire guide on the terminal strip nearest the frame upright and run horizontally above the top or below the bottom row of terminals to the terminal strip on which the cross connection is terminated. Weave the cross-connection wire only through the wire guide slots of the terminal strips located near the frame upright at the top and bottom of the vertical run, as shown in Fig. 8.

251-, 252-, and Similar-type Terminal Strips

4.05 When two or more terminals in a row perpendicular to the fanning strip are connected together and served by a single cross connection, the cross connection should be connected to the terminal closest to the fanning strip in the group. See example (A) in Fig. 9 and 11.

When the terminals to be connected are parallel to the fanning strip, connect as in Fig. 9 (B). It is preferable to connect the cross-connection wire between terminal strips before connecting the cross connections within the same strip.

Cross Connections Between Terminals on Same Terminal Strip

4.06 Adjacent Terminals in Same Row Perpendicular to Fanning Strip: Connect together with No. 24 gauge bare wire. To connect four or more terminals together, make the connections as shown in Fig. 9 (C).

4.07 Adjacent Terminals in Same Row Parallel to Fanning Strip: Run insulated cross-connection wire through the inner fanning strip holes with a loop extending approximately 1/2 inch beyond the outside edge of the fanning strip. See Fig. 10 (A). When the capacity of the inner fanning strip holes is exceeded, it is permissible to use the outer holes for the excess loops.

4.08 Nonadjacent Terminals in Same Row Perpendicular to Fanning Strip: Run No. 24 gauge, black, type "BU" wire directly between the terminals. Provide sufficient length of wire to insure that wire is not drawn tightly over the intermediate terminals to which it is not connected. See Fig. 10 (C).

4.09 Nonadjacent Terminals in Same or Different Rows Parallel to Fanning Strip: Loop insulated cross-connection wire through inner fanning strip holes with the loop extending approximately 1/2 inch beyond the outside edge of the fanning strip. See Fig. 10 (B). When the capacity of the inner fanning strip holes is exceeded, it is permissible to use the outer holes for the excess loops.

Cross Connections Between Terminals on Different Terminal Strips

4.10 Cross Connections Between Terminal Strips Mounted Horizontally on Same Mounting Bar: Loop insulated cross-connection wire through the fanning strip holes associated with the rows in which the terminals are located with the loop extending approximately 1/2 inch beyond the outside of the terminal strip at each end of the wire. See Fig. 12(B).

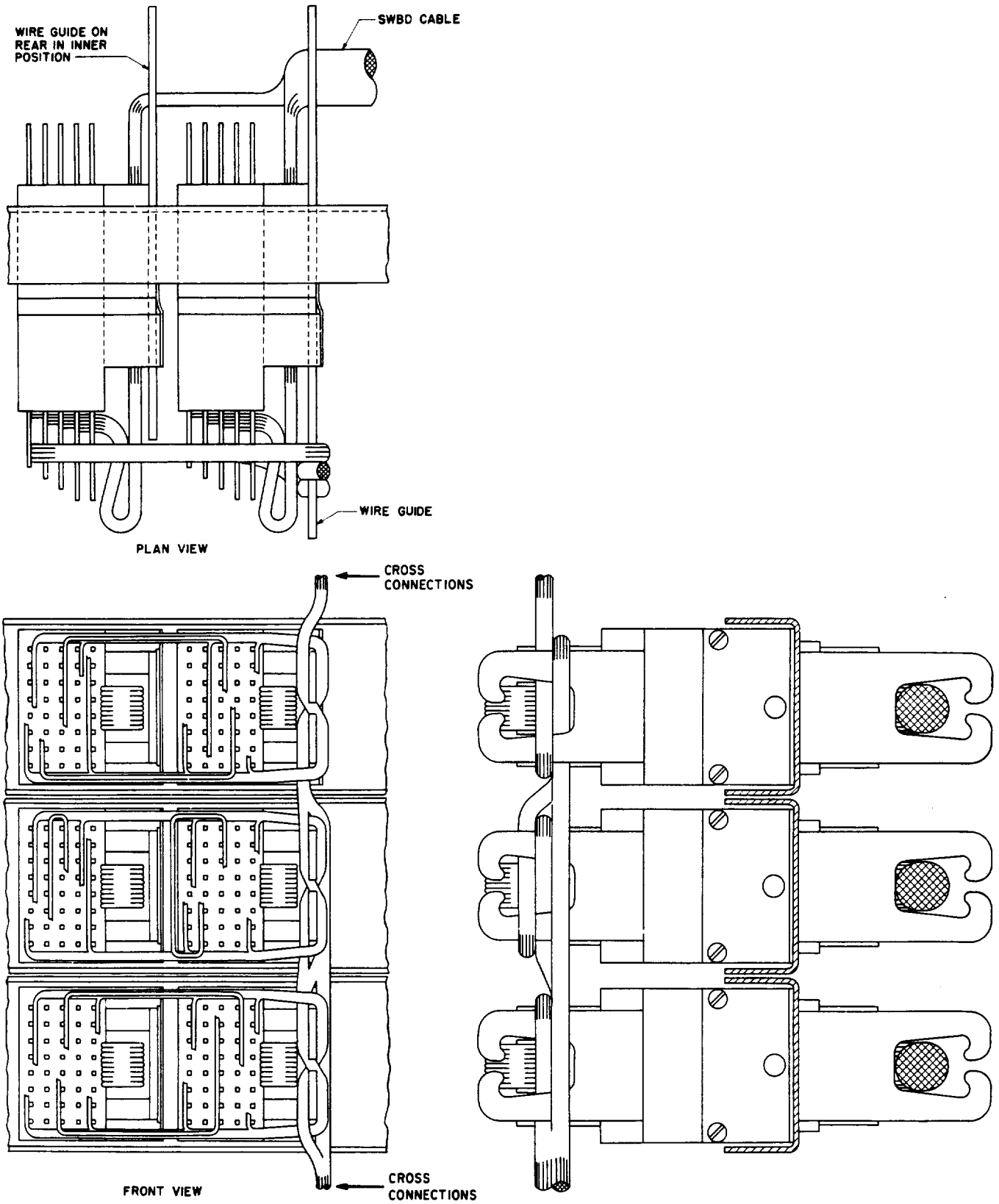


Fig. 8 — Cross Connections Between D-Type Terminal Strips on Different Mounting Plates

4.11 Cross Connections Between Terminal Strips Mounted on Horizontal Bars One Above the Other, or Mounted on Vertical Bars Opposite Each Other: In either case, run the cross connections directly between the terminal strips as shown in Fig. 12(A). When fanning rings or wire retainers are provided for the cross connections, use the fanning strip holes associated with the rows in which the terminals are located. In placing these cross connections the amount of slack introduced should be sufficient to prevent strain on the terminals but should not exceed that consistent with proper dress.

4.12 When cross-connection terminal strips are arranged in several tiers and fanning rings or wire retainers are provided to permit cross connections to bypass one or more tiers, distribute the cross connections through rings or retainers, as specified on the frame drawings.

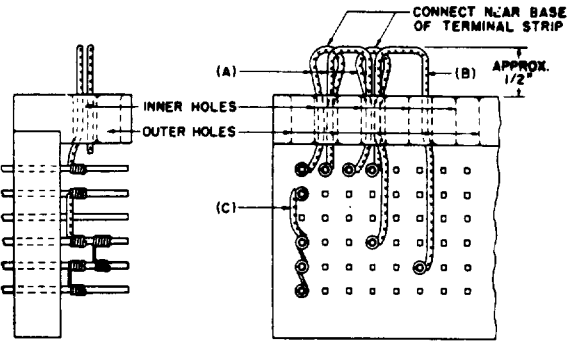


Fig. 10 — Cross Connections — 251-, 252-, and Similar-type Terminal Strips — On Same Terminal Strip

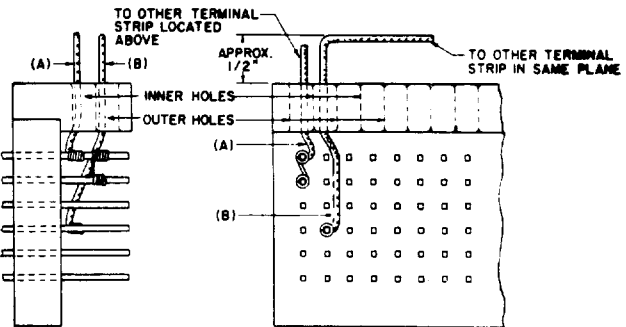


Fig. 11 — Cross Connections — 251-, 252-, and Similar-type Terminal Strips — On Different Terminal Strips

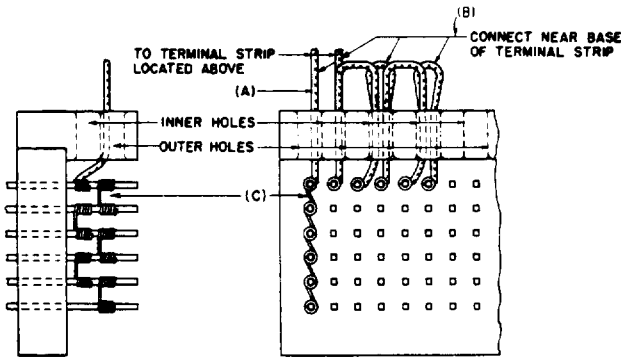


Fig. 9 — Cross Connections — 251-, 252-, and Similar-type Terminal Strips

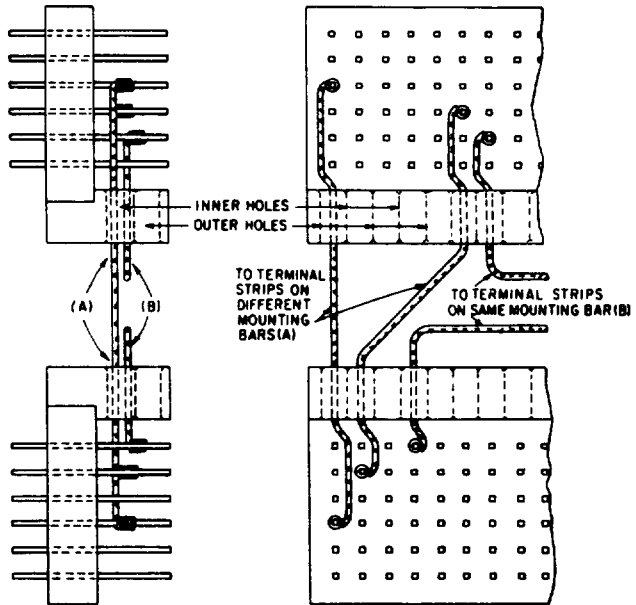


Fig. 12 — Cross Connections — 251-, 252-, and Similar-type Terminal Strips — On Adjacent Terminal Strips