

BELL SYSTEM PRACTICES
Private Branch Exchange
Installation and Maintenance

SECTION B502.009
Issue 2, June, 1959
AT&T Co Standard

MAKING AND REMOVING WRAPPED CONNECTIONS ON PUNCHED-TYPE OR WIRE-TYPE TERMINALS NOT HAVING NOTCHES OR PERFORATIONS

Contents	Page
1. GENERAL	2
2. TYPES OF TERMINALS APPROVED FOR WRAPPED CONNECTIONS	2
3. POSITIONING OF WRAPPED CONNECTIONS ON TERMINALS	4
4. SOLDERLESS WRAPPED CONNECTIONS	6
5. SOLDERED WRAPPED CONNECTIONS....	6
6. FACTORS GOVERNING APPLICATION OF SOLDERLESS AND SOLDERED CONNECTIONS	7
7. LIST OF TOOLS AND MATERIALS	8
8. DESCRIPTION OF TOOLS	8
9. APPLICATION OF TOOLS	13
10. MAKING WRAPPED CONNECTIONS USING THE KS-16363 HAND GRIP WIRE WRAP- PING TOOL	15
11. MAKING WRAPPED CONNECTIONS USING THE NO. 635A TOOL	18
12. MAKING WRAPPED CONNECTIONS WITH P-LONG-NOSE PLIERS	19
13. SOLDERING WRAPPED CONNECTIONS .	19
14. METHOD OF DRESSING WIRE	20
15. REMOVING WRAPPED CONNECTIONS ..	21

1. GENERAL

1.01 This section covers methods of making and removing wrapped connections on punched-type and wire-type terminals not having notches or perforations.

1.02 The section is reissued to add reference to sections covering maintenance information for the KS-16363 hand grip wire wrapping tool, to add a caution on handling of this tool and the KS-16492 wire unwrapping tool, and to revise requirements on solderless and soldered wrapped connections. Detailed reasons for reissue are given at the end of the section.

1.03 Wrapped connections for the purpose of this section are connections made with the KS-16363 or No. 635A wire wrapping tool and, in certain cases, connections made with P-long-nose pliers. Connections made with the KS-16363 wire wrapping tool may be either solderless or soldered. Connections made with the No. 635A tool or the pliers are always soldered. Maintenance information on the KS-16363 hand grip wire wrapping tool is given in Sections B438.988 and A509.992.

1.04 **Make-busy Information:** Make the circuit busy in accordance with approved procedures.

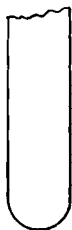
1.05 **A solderless wrapped connection** is a connection made with the KS-16363 wire wrapping tool on a terminal approved for this type of connection as described in Part 2 in conformance with the requirements covered in Part 4.

1.06 **A soldered wrapped connection** is a connection made with a wire wrapping tool or with pliers and then soldered in conformance with the requirements covered in Part 5.

1.07 The KS-16363 wire wrapping tool and the KS-16492 wire unwrapping tool are precision-type tools and therefore should be handled with care.

2. TYPES OF TERMINALS APPROVED FOR WRAPPED CONNECTIONS

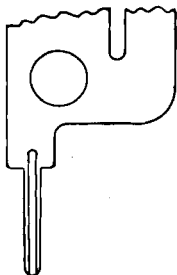
2.01 The types of terminals approved for solderless wrapped connections are illustrated in Fig. 1. A and B are punched terminals, C is a drawn wire terminal, and D and E are wire-spring terminals. Terminal D is a single wire, serrated on one side to give the cross section shown. Terminal E consists of twin wires twisted together, after which their surfaces are coined. Wire-type terminals are less rigid than punched type and therefore greater care must be taken not to distort the terminal while making or removing a connection. It is particularly important to avoid starting the wrapped connection on the offset portion of this type of terminal.



(A) RECTANGULAR



(C) DRAWN WIRE



(B) EMBOSSED



(D) SINGLE SERRATED TRAPEZOID

SECT. A-A



(E) TWISTED AND COINED TRAPEZOID

PUNCHED TERMINALS

WIRE TERMINALS

Fig. 1—Punched- and Wire-type Terminals for Wrapped Connections

2.02 The sizes of wire authorized for solderless wrapping on terminals of the type shown in Fig. 1 are listed below.

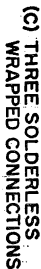
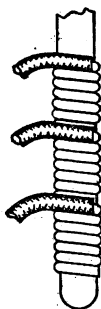
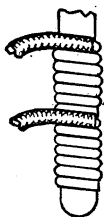
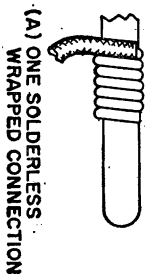
(1) Punched Terminals		Gauge Wire
Shape of Terminal	Terminal Thickness	No.
Flat—Fig. 1(A)	0.025 to 0.029 thick	24
Flat—Fig. 1(A)	0.030 inch and over	22 and 24
Embossed—Fig. 1(B)	0.010 to 0.024 inch	24
(2) Drawn Wire Terminal		
	Fig. 1(C) 0.045 by 0.045 inch	22 and 24
(3) Wire Spring Terminal		
	Fig. 1(D) and (E)	24

3. POSITIONING OF WRAPPED CONNECTIONS ON TERMINALS

3.01 Fig. 2 shows the positioning of typical wrapped connections on terminals. A, B, and C in the figure show one, two, and three solderless wrapped connections on a terminal. A solderless wrapped connection requires approximately 1/4 inch of terminal length. The first connection, whether solderless or soldered, should be made as far back on the terminal as practicable even if only a single connection is to be made at the time. This will provide space for additional connections if these are required later. Each additional connection should be made within 1/32 inch of the preceding connection in order to permit the application of three solderless wrapped connections on terminals of sufficient length. Failure to follow this procedure may result in the necessity for making the third connection of one and a quarter turns as shown in D and E. Such connections should be avoided whenever possible for the following reasons.

- (1) All of the connections on the terminal must be soldered.
- (2) All subsequent connections on the terminal must be soldered.

If the length of the terminal is not sufficient for three solderless wrapped connections, the third connection is made as shown in D or E. In D, the third connection consists of at least one and a quarter wrapped turns near the outer end of the terminal. In E, there is not sufficient space at the outer end of the terminal to make the connection shown in D. In this case, the third connection is made by winding at least one and a quarter turns of wire over the outer wrapped connection using pliers. All connections shown in D and E must be soldered to the terminal using the method covered in Part 13 of this section.



MAKING AND REMOVING WRAPPED CONNECTIONS
ON PUNCHED-TYPE OR WIRE-TYPE TERMINALS
NOT HAVING NOTCHES OR PERFORATIONS

Fig. 2—Positioning of Typical Wrapped Connections on Terminals (Punched-type Terminals Shown)

4. SOLDERLESS WRAPPED CONNECTIONS

4.01 Solderless wrapped connections shall be made with the KS-16363 hand grip wire wrapping tool. A solderless wrapped connection shall be made only on a terminal approved for this type of connection with the size of wire approved for solderless wrapping on this terminal. The terminal shall not previously have had a soldered connection on it. The connection shall consist of minimum six successive nonoverlapping turns of bare No. 24 gauge tinned copper wire or minimum of five successive nonoverlapping turns of bare No. 22 gauge tinned copper wire. Overlapping turns before the start and after the end of the count of the minimum number of successive turns are permissible.

4.02 The separation at four of the turns (not necessarily adjacent) on any one side of the terminal at the closest point may be no greater than 0.005 inch, gauged by eye.

4.03 While it is not a requirement that the end of the wire lie flat against the terminal, there shall be a clearance of at least 1/64 inch between a projecting end of wire and an adjacent terminal or wire and in no case shall a wire project more than 1/8 inch.

4.04 The bare portion of a wire between the point of connection to a terminal and the insulation of the wire shall not be longer than the clearance between adjacent terminals at that point and no longer than 1/8 inch.

4.05 The wire shall be dressed to conform with the associated wiring. There shall be at least 1/64-inch clearance between the bare wire and connections on adjacent terminals.

4.06 The portion of a wire previously used for a solderless wrapped connection shall not be re-used for subsequent solderless wrapped connections. This portion must be cut off if the wire is to be reconnected by solderless wrapping. It will be necessary to splice the wire if there is not sufficient slack to provide the number of turns required for a solderless wrapped connection.

5. SOLDERED WRAPPED CONNECTIONS

5.01 Wrapped connections shall be soldered if any of the following conditions exist.

- (1) If there is insufficient space on the terminal for six turns of No. 24 gauge wire or five turns of No. 22 gauge wire.
- (2) If the terminal previously had a soldered connection.
- (3) If the length of wire is not sufficient for six turns of No. 24 gauge wire or five turns of No. 22 gauge wire.

(4) If the separation at more than four turns is greater than 0.005 inch.

(5) If the connection is obviously loose on the terminal.

(6) If enameled wire is used.

(7) If one connection on a terminal is soldered, all connections on that terminal shall be soldered.

5.02 All turns of the connection shall be soldered to the terminal if practicable, but in every case, at least two adjacent turns shall be soldered to the terminal.

6. FACTORS GOVERNING APPLICATION OF SOLDERLESS AND SOLDERED CONNECTIONS

6.01 **General:** In some cases, consideration must be given to the relative desirability of using a solderless wrapped or a soldered wrapped connection. If a wire is of sufficient length, and space on the terminal and a suitable wire wrapping tool are available, the solderless wrapped connection should be used. There are cases, such as those covered in 6.02 and 6.03, where it may be expedient to use a soldered connection. It should be noted as covered in 5.01(2), that the use of solder on a terminal prevents all future use of solderless wrapped connections on this terminal.

6.02 **Slack in Wire:** If the wire to be connected is part of a sewed cable and the slack in the wire is insufficient to provide the number of turns required for a solderless wrapped connection, consideration should be given to splicing the wire to provide for the solderless wrapped connection. It may, however, in certain cases be expedient to use a soldered connection. In the case of surface wiring it may be preferable to rerun the wire and apply a solderless wrapped connection.

6.03 **Accessibility of Wrapped Connection:** If there are two or three solderless wrapped connections on a terminal and the inside connection must be changed or repaired, unwrapping this connection would necessitate first unwrapping the outer connections. In such a case, it may be expedient to cut the lead to the inside connection provided the lead can be readily identified and is sufficiently accessible to be cut without damage to adjacent wiring. Then a new soldered connection to the terminal would be made and the remaining original connections also soldered.

7. LIST OF TOOLS AND MATERIALS

Code or Spec No.	Description
Tools	
635A	Wire Wrapping Tool (Manually Rotated Type)
KS-6320	Orange Stick
KS-16346, List 2 or replaced List 1	Soldering Iron (Includes KS-16368 Transformer)
KS-16363, List 1	Hand Grip Wire Wrapping Tool (Does Not Include Wrapping Bit or Station- ary Sleeve)
KS-16363, List 30	Stationary Sleeve (For No. 24 Gauge Wire)
KS-16363, List 31	Stationary Sleeve (For No. 22 Gauge Wire)
KS-16492, List 2 or replaced List 1	Wire Unwrapping Tool for Solderless← Connections
KS-16522, List 1	Wrapping Bit (For No. 24 Gauge Wire)
KS-16548, List 1	Wrapping Bit (For No. 22 Gauge Wire)
R-1102	Spudger
—	Modified No. 625 Wiss Cutting Pliers (See 7.01)
—	P-Long-nose Pliers
—	4-inch Regular Screwdriver

Materials

KS-14666 Cloth

7.01 In order to have the jaws of the Wiss cutting pliers closed when the pliers are not in use, manually remove the spring from between the handles of the pliers and discard the spring.

8. DESCRIPTION OF TOOLS

8.01 KS-16363, List 1 Hand Grip Wire Wrapping Tool

(1) The KS-16363, List 1 hand grip wire wrapping tool with wrapping bit and stationary sleeve shown in Fig. 3 is manually operated for making solderless wrapped connections of No. 22 and 24 gauge wire on terminals, respectively, approved for this type of connection. The tool is operated by a hand grip which drives the wrapping bit through a train of gears enclosed in the housing of the tool.



Fig. 3—KS-16363, List 1 Hand Grip Wire Wrapping Tool With Wrapping Bit and Stationary Sleeve

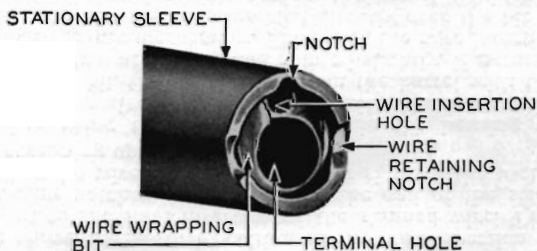


Fig. 4—End View of Stationary Sleeve and Wrapping Bit

(2) Referring to Fig. 3, the stationary sleeve extending from the barrel of the tool encloses the wire wrapping bit and holds the bit in engagement with the driving member.

As shown in Fig. 4, the bit has a large hole which fits over the terminal on which the wire is to be wrapped and a smaller hole into which the skinned end of the wire is inserted. When the hand grip is in its unoperated position, the wire insertion hole is at the top, as shown in Fig. 4. The hole in the bit for the terminal is tapered outward to facilitate placing the bit on the terminal and the end of the sleeve is notched just above the normal position of the wire insertion hole in the bit to facilitate insertion of the skinned wire. Two wire retaining notches are provided in the end of the sleeve for holding the wire either at the left or right of the tool during the wrapping operation.

(3) Loosening the clamping screw in the housing permits withdrawal of the sleeve and bit. When mounting the sleeve and bit, the bit is inserted in the barrel with the wire insertion hole at the top and rotated slightly, if necessary, to engage the driving member. Then with the wire insertion hole at the top, the sleeve is inserted directly over the bit so that the sleeve shoulder seats against the barrel. Tightening the clamping screw holds the wrapping bit and sleeve in position.

8.02 No. 635A Wire Wrapping Tool

(1) The No. 635A wire wrapping tool is shown in Fig. 5 and 6. This small manually operated tool is intended for making wrapped connections of No. 22 and 24 gauge wire which are to be soldered. The tool is intended for use when only a few soldered wrapped connections are to be made or where connections are to be repaired.

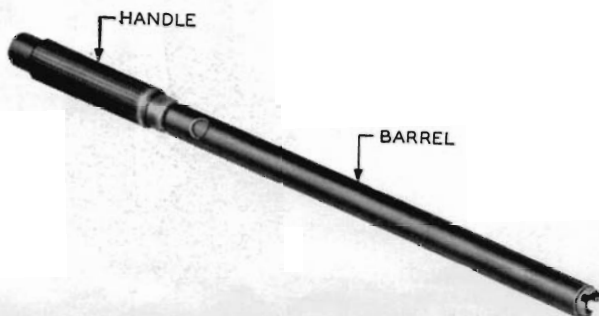


Fig. 5—No. 635A Wire Wrapping Tool

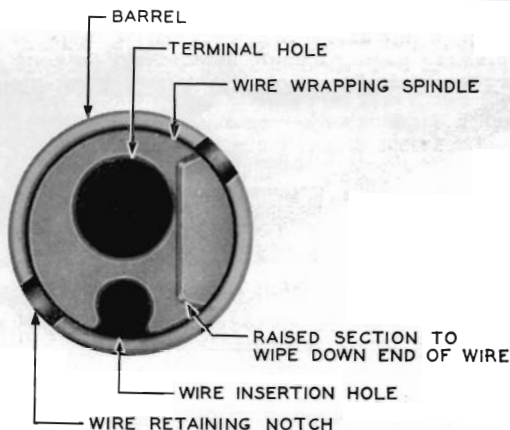


Fig. 6—End View of No. 635A Wire Wrapping Tool

8.03 KS-16492, List 2 Wire Unwrapping Tool (Solderless← Wrapped Connections)

(1) The KS-16492, List 2 wire unwrapping tool shown in←
Fig. 7 and 8 is provided for loosening and removing
solderless wrapped connections of both No. 22 and 24 gauge
wire from terminals. The tool consists essentially of the fol-
lowing parts which are designated in the figures.

(2) **Unwrapping Spindle:** This is a hollow spindle which fits
over the terminal and which has three teeth extending
axially from its outer end. These teeth engage the first turn
of the wrapped connection to be removed from the terminal.
Counterclockwise rotation of the spindle expands each turn of
the connection until it is loosened from the terminal.

(3) **Inner Sleeve:** The inner sleeve is threaded on the inside
and encloses the unwrapping spindle. The threads engage
and hold the turns of wire being unwrapped from the ter-
minal. The unwrapped wire is released from the tool by
pushing the rear portion of the handle forward.

(4) **Outer Sleeve:** The outer sleeve is insulated and has two↵
rectangular 0.050-inch wide by 0.060-inch deep notches
at its outer end to hold the lead stationary during the↵

unwrapping operation. This sleeve turns with the unwrapping spindle and the inner sleeve through a friction clutch until the lead to the wrapped turns being removed is engaged by one of the notches. The sleeve is then held stationary during the unwrapping operation. The outer sleeve slides for a short distance into the front portion of the handle as the tool is moved forward for the unwrapping operation.

(5) **Handle:** The handle consists of two parts as shown in Fig. 7. The rear portion of the handle (plunger) slides into the front portion to move the unwrapping spindle forward in the inner sleeve for ejecting the unwrapped connection and for reaching a connection not accessible to the spindle in its normal position.

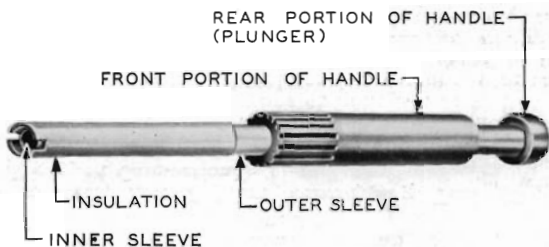


Fig. 7—KS-16492, List 2 Wire Unwrapping Tool (For Removing Solderless Wrapped Connections)



Fig. 8—KS-16492, List 2 Wire Unwrapping Tool—End View Showing Unwrapping Spindle Pushed Forward to End of Inner Sleeve and Outer Sleeve Pulled Back to Expose Inner Sleeve

8.04 KS-16346, List 2 Soldering Iron

(1) A soldering iron suitable for soldering wrapped connections is shown in Fig. 9. This iron is designed for use on closely spaced terminals without damaging the insulation of the wiring. A 6-volt heater unit in the iron is connected to power through a KS-16368 transformer at the end of the cord of the iron. The transformer is plugged into a suitable power outlet. If the transformer has a centering prong, remove and discard the prong.

9. APPLICATION OF TOOLS

9.01 Table A lists the applications which may be made of tools covered in this section in making or removing wrapped connections on terminals arranged for this type of connection.

TABLE A

Tool	Recommended Application
KS-16363 Hand Grip Wire Wrapping Tool	General use for making wrapped connections.
No. 635A Wrapping Tool (Manually Rotated Type)	General use for making wrapped connections subsequently to be soldered, particularly when only a few connections are to be made. For repairing wrapped connections, particularly where space on terminal is not available or where there is insufficient wire for wrapping six full turns. These connections are subsequently soldered.
KS-16492 Wire Unwrapping Tool	For general use in removing solderless wrapped connections.
KS-16346 Soldering Iron	For general use in soldering wrapped connections or other connections in congested areas.
P-Long-nose Pliers	For making soldered wrapped connections where wrapping tool is not used.



Fig. 9—KS-16346, List 2 Soldering Iron and KS-16368 Transformer

10. MAKING WRAPPED CONNECTIONS USING THE KS-16363 HAND GRIP WIRE WRAPPING TOOL

10.01 General: Wrapped connections made with the KS-16363 hand grip wire wrapping tool should not be soldered unless they fail to meet the requirements covered in Part 4. Before making any connections, the size of the wire should be determined and the proper wrapping bit and stationary sleeve placed in the tool. Make sure that the wrapping tool meets the requirements in Section B438.988.

Caution: Under no circumstances should a wrapping bit and sleeve be used other than those specified for the size of wire being used.

Single or First Connection on Terminal

10.02 Skin the wire in an approved manner with a skinned length of 1-5/8 inch except for trapezoidal terminals, in which case, the skinned length should be 1-1/2 inch. This will provide at least six nonoverlapping turns of No. 24 gauge wire or five nonoverlapping turns of No. 22 gauge wire on the terminal.

Note 1: Do not distort the skinned portion of the wire since it is difficult to insert a bent wire into the wire insertion hole in the tool.

Note 2: Exercise care not to nick the wire.

10.03 Hold the tool so that the wire wrapping bit faces the end of the terminal on which the wire is to be wrapped and insert the skinned wire in the wire insertion hole as far as the insulation on the wire permits.

Caution: Failure to fully insert the skinned portion of the wire will result in the skinned wire extending beyond the terminal after the connection has been made.

10.04 Bend the wire through one of the wire retaining notches in the stationary sleeve and hold the wire taut.

10.05 While holding the wire taut, position the wrapping tool so that the terminal on which the wire is to be wrapped enters the terminal hole in the bit as far as possible. Hold the tool in line with the terminal as shown in Fig. 10, so that the spindle can rotate freely around the terminal during the wrapping operation and so that when wire is being applied to a terminal of rectangular cross section, the hand grip of the tool is parallel to the wide face of the terminal. Exert a light inward pressure during the wrapping operation to insure closely spaced turns of the connection. Do not exert excessive pressure on the tool as this may cause the turns of wire to overlap as they are being wrapped on the terminal. If light pressure is not

exerted or if the tool is pulled away during the wrapping operation, excessive space between turns will result.

Caution: While making a wrapped connection on an offset wire-type terminal, make sure that the connection is started on the straight portion of the terminal.

10.06 Squeeze the hand grip to its fully operated position with a smooth rapid motion. Operation of the hand grip with a slow or jerky movement will produce a poorly wrapped connection. Hold the hand grip in the operated position and withdraw the tool from the terminal. Do not release the hand grip until the tool is free of the terminal.

10.07 Check the wrapped connection for the requirements covered in Part 4. Dress the wiring as covered in Part 14.

Caution: Do not apply the wrapping tool over a wrapped connection to tighten the connection and do not push separated turns together in order to meet requirements covered in Part 4.

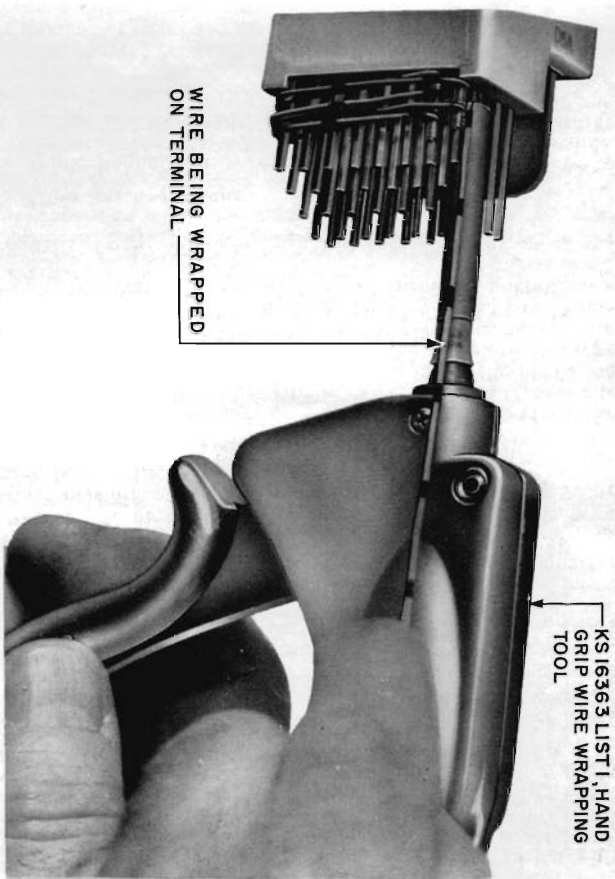
More Than One Connection on Terminal

10.08 Make the second and third connections, successively, in front of the first connection following the procedures covered in 10.02 to 10.07. Dress the wiring as covered in Part 14.

10.09 If three connections are required and there is not sufficient space for wrapping the required number of turns for the third connection, proceed as follows. If there is sufficient space at the outer end of the terminal for at least one and a quarter turns of the wire on the terminal, wrap the turns on the terminal using either the KS-16363 or No. 635A wire wrapping tool or the P-long-nose pliers after skinning the wire in the approved manner with a skinned length of $\frac{3}{8}$ inch. When using the No. 635A tool or the P-long-nose pliers, make sure that the wire is applied in a clockwise direction. Then solder all connections on the terminal as covered in Part 13 and dress the wiring as covered in Part 14.

10.10 If there is insufficient space at the outer end of the terminal for at least one and a quarter turns of wire, skin the wire in an approved manner with a skinned length of $\frac{3}{8}$ inch. Make the third connection by winding one and a quarter turns in a clockwise direction over the outer wrapped connection as near the outer end of the terminal as possible,

Fig. 10—Making Solderless Wrapped Connection Using KS-16363 Wire Wrapping Tool



using the P-long-nose pliers. Solder all connections on the terminal as covered in Part 13 and dress the wiring as covered in Part 14.

11. MAKING WRAPPED CONNECTIONS USING THE No. 635A TOOL

General

11.01 Wrapped connections made with the No. 635A tool must be soldered. Procedures for soldering the connections are covered in Part 13.

11.02 While the use of the No. 635A tool as covered below is preferable if a soldered wrapped connection is to be made on a light terminal, the use of P-long-nose pliers as covered in 12.01 is preferable if a soldered wrapped connection is to be made on a heavy terminal.

Single or First Connection on Terminal

11.03 Skin the wire in the approved manner with a skinned length of $\frac{3}{8}$ inch which will provide one and a quarter turns on the terminal.

Note 1: Do not distort the skinned portion of the wire since it is difficult to insert a bent wire into the wire insertion hole of the tool.

Note 2: Exercise care not to nick the wire.

11.04 Hold the tool so the wire wrapping spindle faces the terminal on which the wire is to be wrapped. Insert the skinned wire into the wire insertion hole as far as the insulation on the wire permits. Turn the handle of the tool until the wire insertion hole is adjacent to one of the retaining notches in the barrel of the tool. While holding the wire in the wire insertion hole, turn back the wire so that the insulated portion is in the notch.

Caution: Failure to fully insert the wire will result in the skinned wire extending beyond the terminal after the connection has been made.

11.05 While holding the wire taut, place the terminal hole of the wrapping tool over the terminal as far as possible. Still holding the wire taut, firmly press the tool against the

terminal and turn the handle in a clockwise direction a sufficient number of times so that all of the skinned wire is wrapped on the terminal. This can be determined by freedom of movement of the wrapping tool. Hold the barrel of the tool firmly during this procedure.

11.06 Solder the connection as covered in Part 13, and dress the wiring as covered in Part 14.

More Than One Connection on Terminal

11.07 Make the second connection in front of the first connection following the procedures covered in 11.03 to 11.05. Only two wrapped connections can be made on a terminal with the No. 635A tool. If a third connection is to be made, wrap at least one and a quarter turns of wire on the terminal with the pliers and solder all connections as covered in Part 13. If there is less than 1/8-inch terminal length available in front of the outer connection, apply one and a quarter turns of the wire over the outer connection with the pliers as covered in Part 12. Dress the wiring as covered in Part 14.

12. MAKING WRAPPED CONNECTIONS WITH P-LONG-NOSE PLIERS

12.01 Skin the wire in an approved manner with a skinned length of 3/8 inch. If there is sufficient space at the end of the terminal for one and a quarter turns, wind the wire on the terminal in a clockwise direction with the P-long-nose pliers. Then solder all connections on the terminal as covered in Part 13. If there is insufficient space at the end of the terminal for one and a quarter turns, wind the wire in a clockwise direction over the outer connection as near the outer end of the terminal as possible with the pliers. Solder all connections on the terminal as covered in Part 13. Dress the wiring as covered in Part 14.

13. SOLDERING WRAPPED CONNECTIONS

13.01 **General:** Wrapped connections made with the KS-16363 wire wrapping tool should be soldered only when the requirements for solderless wrapped connections covered in Part 4 cannot be met. All wrapped connections made with the No. 635A tool should be soldered. All connections made with pliers should be soldered. The use of solder on a terminal prevents all future use of solderless wrapped connections on this terminal.

13.02 Place a KS-14666 cloth below the apparatus being worked on to protect the equipment below.

13.03 Connect the transformer on the soldering iron cord to the source of power. Hold the KS-16346 soldering iron along the right side of the wrapped connection and feed the solder from the top. Flow the solder over all of the turns of the connection, if practicable. Make sure that solder covers at least two adjacent turns. To avoid damaging insulation on the wire being soldered and on the adjacent wires, do not hold the iron against the wire any longer than necessary to make a good connection. A good connection can be made by applying the KS-16346 iron for approximately 1 second. Take care that the soldering iron does not come in contact with the insulation on any of the wiring. Solder any other connections on the same terminal that have not been previously soldered.

14. METHOD OF DRESSING WIRE

14.01 Dress the wire to conform with the associated wiring.

Make sure that there is at least 1/64-inch clearance between the bare wire and connections on adjacent terminals. Examine the connection and make sure that no ends of wire interfere with adjacent wiring. If necessary, bend these ends of wire against the terminal using two KS-6320 orange sticks as shown in Fig. 11, exercising care not to press against the turns of any of the connections. Do not, under any circumstance, attempt to tighten solderless connections with the pliers or wrapping tool. Remove any excess solder which might interfere with proper clearance between terminals. If any wires which are applied over wrapped connections become loose when removing excess solder, resolder such connections. Bend terminals slightly, if necessary, to insure proper clearance. When bending terminals, do not touch turns of solderless wrapped connections.

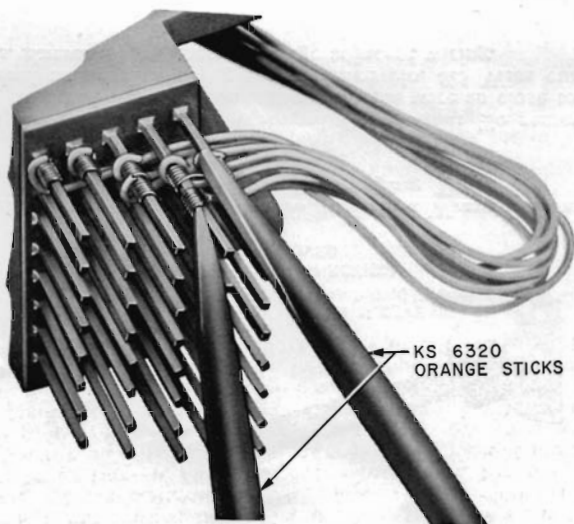


Fig. 11—Method of Bending End of Wire Against Terminal

15. REMOVING WRAPPED CONNECTIONS

General

15.01 If there are two connections on a terminal and it is necessary to remove the inner connection, the recommended procedure is to remove the one at the outer end in order to gain access to the inner connection. Likewise, if there are three connections on a terminal and it is necessary to remove the one nearest the base of the terminal, the recommended procedure is to first remove the other two connections. However, there may be cases as covered in Part 6 where it is expedient in order to avoid splicing wires, to cut the lead at an inner connection. This may be done with the modified Wiss cutting pliers provided the lead can be readily identified and is accessible for cutting without damage to adjacent wiring.

15.02 In general, the portion of the wire previously wrapped on a terminal should not be re-used. However, in the case of temporary removal of solderless wrapped connections using the KS-16492 wire unwrapping tool, in order to avoid

rerunning or splicing wires, it may be expedient to place the wrapped connection back on the terminal. In this case, the connection must be soldered.

Caution: Do not attempt to re-use the portion of wire previously wrapped on the terminal for making a solderless wrapped connection.

15.03 Removing Solderless Wrapped Connection Using the KS-16492 Wire Unwrapping Tool: Referring to Fig. 12, place the tool on the terminal so that one of the notches in the outer sleeve engages the lead of the connection, the inner sleeve completely covers the wrapped connection, and the end of the unwrapping spindle engages the first turn of the connection. Maintain light pressure on the tool toward the terminal and slowly rotate the tool counterclockwise until the connection is loose on the terminal. Where a connection is being removed from a wire-type terminal or other light terminal, exercise care not to twist the terminal. Remove the tool with the turns of the unwrapped connection from the terminal. Eject the turns of wire from the tool by pushing the rear portion of the handle toward the front portion or by rotating the handle clockwise.

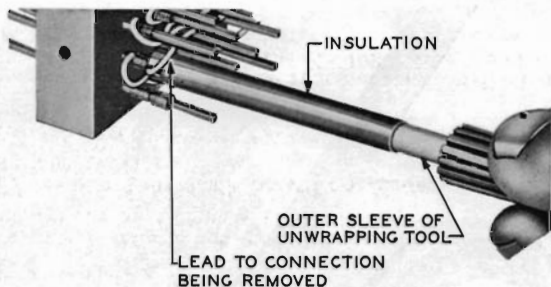


Fig. 12—Removing Outer of Two Solderless Wrapped Connections Using KS-16492 Unwrapping Tool

15.04 Removing Soldered Wrapped Connection: To remove a soldered wrapped connection, cut the wire as close to the terminal as possible using the modified No. 625 Wiss cutting pliers. Exercise care not to damage adjacent wiring.

REASONS FOR REISSUE

1. To add reference to BSP sections covering maintenance information (1.03).
2. To add caution in regard to handling of the KS-16363 wire wrapping tool and KS-16492 wire unwrapping tool (1.07).
3. To revise description of terminals approved for solderless wrapping to include embossed terminals, and to add information on gauge of wire to be used with particular terminals (2.01 and 2.02).
4. To revise Fig. 4.
5. To revise information covering positioning of wrapped connections on terminals (3.01).
6. To revise requirements covering solderless wrapped connections (4.01).
7. To revise requirements covering soldered wrapped connections (5.01).
8. To revise the list of tools to substitute the KS-16492, List 2 wire unwrapping tool for the KS-16492, List 1 tool in tool list and throughout the section.