DISCONNECTING AND REQUIREMENTS SOLDERLESS WRAPPED CONNECTIONS

CONTENTS

1. GENERAL

1.1 Scope of Section

1.1.1 This section covers the methods and requirements for disconnecting and/or reconnecting soldered and solderless wire wrapped connections on terminals designed for wire wrapped connections.

1.2 Precautions

1.2.1 General precautions are covered in Handbook 0 and are to be observed at all times as they apply to particular operations to be performed.

1.2.2 Precautions to be taken against personal injury, to prevent damage to equipment and tools and to prevent service interruptions are covered in this section with the associated operations.

1.3 Verification

1.3.1 Items for the verification of equipment installed by the operations covered in this section are listed under Paragraph 6.

1.3.2 The items under Paragraph 6 may also be used as a self-check guide when performing operations covered in this section.

1.4 Sequence of Disconnecting

1.4.1 If there are 2 connections on a terminal and the inner connection is to be removed, remove the outer connection first to gain access to the inner one. Similarly, if there are 3 connections on a terminal and the innermost connection is to be removed, first remove the other 2 connections.

1.4.2 In some cases where there are 2 or 3 connections on a terminal and the innermost connection must be removed, it may be expedient to avoid splicing wires to cut the lead (use the R-4128 or R-6433 Diagonal Cutters) at a point adjacent to the helix, provided the lead is accessible and can be cut without damaging adjacent wiring. To avoid crosses with adjacent terminals, cut the lead as close as possible to the connection.

1.4.3 When the connection to be removed is a cross-connection or a surface wire, whether bare wire or insulated, the helix of the wire should be removed from the terminal.

1.4.4 Do not attempt to pull the connection from the terminal by pulling on the skinner. The wire may break and leave the helix on the terminal, making it more difficult to remove.

1.4.5 When using the R-4086 (Electric) or the R-4347 Pneumatic Unwrapping Gun on wire spring relay twisted and coined terminals or other twisted and coined terminals, extreme care should be exercised to avoid twisting or breaking the terminal from which the lead is being removed.

1.4.6 Do not use the R-4086 (Electric) or R-4347 (Pneumatic Unwrapping Tools to remove connections from the very thin .009 embossed terminals of the crossbar switch, cross-point terminals, step-by-step relays, etc. The R-4187 Unrapping Tool (.070 end) or R-4569A Tool removes the wire helix from these terminals effectively.

2. INSTALLING EQUIPMENT

2.1 See Table A

3. DISCONNECTING WRAPPED CONNECTIONS

3.1 Manual Tools & Methods

3.1.1 R-4187 - Solderless wrapped connections on the small crossbar switch terminals (CF-type) may be removed by unwinding the wire helix with the R-4187 Unwrapping Tool. The (.052) end of the R-4187 Tool should be used to remove the wire helix from the cross-point terminals, while the (.070) end of the R-4187 Tool should be used to remove the wire helix from the hold and select magnet terminals.

NOTE: THE CROSS-POINT TERMINALS OF THE (CF-TYPE) SWITCH ARE VERY FLEXIBLE, SMALL IN DIAMETER, TWISTED AND COINED WIRES. REMOVING WIRES FROM THESE TERMINALS SHOULD ONLY BE DONE USING THE R-4187 (.052 END) TOOL. THE USE OF THE (.070) END OF THE R-4187 OR THE KS20827 L1 TOOL MAY CAUSE SNAGGING OF THE TWISTED AND COINED TERMINAL AND MAY CAUSE EXCESSIVE TWISTING OR POSSIBLE BREAKAGE OF THE TERMINALS.

3.1.1.1 To unwrap a connection, place the appropriate end of the R-4187 tool on the terminal and rotate counterclockwise until the tool tooth engages the first turn of the connection.

3.1.1.2 Maintaining light pressure on the tool toward the terminal, continue to rotate the tool counterclockwise until the connection is loose.

3.1.1.3 Remove the connection from the tool end by rotating the tool in a clockwise direction while holding the wire helix.

3.1.2 R-4569A - When solderless wrapped connections are to be removed from full size (324, 325, and 328 type) crossbar switch-cross point terminals, it is permissible to use the R-4569A "Strip Type" wire wrap removal to remove the leads. When wrapped connections are removed from these .009" embossed terminals all future connections must be soldered; therefore, it is permissible to use a strip type tool.

3.1.2.1 The R-4569A is a "Strip" type tool that shall only be used for removing solderless wire wrapped connections from .009" embossed terminals such as those found on the crosspoints of a full size crossbar switch. This slotted tool should be placed directly behind the connection being removed and then with a quick pull toward the end of the terminal the connection will be removed.

3.1.3 R-4621 - When removing 28 and 30 gauge wire wrapped connections from Multi-Layer Printed Wiring Boards (MLPWB) the R-4621 Wire Unwrapper should be used; however, there are special techniques involved; therefore, refer to Handbook 261, Section 906.

3.1.4 R-5093 - When removing 26 gauge SWC's from 951 or 963K connectors used on Remreed Network Frames the R-5093 Plier Type Tool is to be used. This tool loosens the oval shaped SWC by squeezing it. Special techniques are required to use this tool also; therefore, refer to Handbook 261 Section 315.11.

3.1.5 KS20827 L1 - The KS-20827 L-1 Tool is hand operated to loosen and remove 22, 24, or 26 gauge solderless wrapped connections. This tool consists of an unwrapping bit which is covered with a spring loaded, insulated sleeve to retain the SWC. The bit and sleeve are retained in a yellow screwdriver type handle. This tool is included in the Installer's 168 Kit. This tool can be used on all terminals except those specified in Paragraphs 3.1.1, 3.1.3, and 3.1.4.

3.1.5.1 To unwrap a connection, place the tool on the terminal and slide forward until the bit meets the connection. In this position the inner sleeve will completely cover the connection and the unwrapping bit will engage the first turn of the connection.

3.1.5.2 Maintaining light pressure on the tool toward the terminal, slowly rotate the tool counterclockwise until the connection is loose.

3.1.5.3 If the teeth of the unwrapping bit do not engage the first turn of the connection, push the rear portion of the handle forward until contact is made.

3.1.5.4 Remove the tool and the connection from the terminal. The wire helix can be removed from the tool by grasping the thrust knob between the fingers and pulling the outer sleeve toward the handle which will eject the unwrapped connection.

3.1.5.5 Remove the tool and connection from the terminal.

3.1.5.6 Remove the connection from the tool sleeve by pulling back on the tool or by removing with the fingers. If wire turns remain in the sleeve, they can be ejected by retracting the unwrapping sleeve.

3.2 Power Tools and Methods

3.2.1 R-4086 and R-4347 are electric and pneumatic powered unwrapping guns. These tools are intended for use where a large amount of solderless wrapped connections require removal, such as tear outs, large scale modifications, reuse equipment for "C" stock, etc.

3.2.1.1 The R-4086 (Electric) and R-4347 (Pneumatic) Unwrap Guns are used in conjunction with the R-4157 or R-4456 Unwrap Bits. Because these are power tools, caution should be exercised when removing connections to avoid the possibility of twisting and breaking apparatus terminals. These tools may be used on the twisted and coined terminals

(wire spring relay type) and most other wire wrap terminals, with the exception of the very flimsy (.009) embossed terminals for the removal of 22, 24, and 26 gauge wire connections.

3.2.1.2 Prior to the operator starting a mass removal of solderless wrapped connections, it would be expedient to apply several test connections on an obsolete or scrap piece of apparatus with terminals similar to those from which the connections are to be removed and then remove these connections. For the R-4347, set the air pressure to 60 PSI until the operator gets the "feel" of the tool. Apply several more connections and remove them with the air pressure set at the recommended 80-90 PSI. Continue this method until the operator gets the "feel" of the tool. Apply several more connections and remove them with the air pressure set at the recommended 80-90 PSI. Continue this method until the operator feels capable of removing connection efficiently.

3.2.2 R-4157 is a double ended unwrapping bit (both ends identical) that is used with the R-4086 (Electric) or R-4347 (Pneumatic) Unwrap Guns. This bit is intended for use on large terminals only (such as .040 square used on "D" type term. strips).

3.2.2.1 Following is the procedure that should be applied when removing wire wrapped connections using the R-4157 Unwrap Tool:

1. Place the bit (R-4157) over the terminal (not far enough to touch the connection).
2. With the opposite hand, grasp the leads(s) to be removed with the fingers or the R-2120 Long Nose Pliers. (This eliminates the possibility of the leads wrapping around the bit.)
3. Press the trigger of the tool and slide the tool forward on the terminal until the bit engages the first wrap of the connection.
4. Exert a slight forward pressure as the bit unwinds the wire helix(s). (More than 1 lead on a terminal can be removed at the same time.)
5. When the wire helix(s) becomes completely loose of the terminal, pull the tool and the leads away from the terminal, with the tool continuing to run, pull the lead(s) off the bit. Release the trigger and move to the next terminal for a repeat of the above operations.

NOTE: Exercise caution when exerting a forward pressure with the power unwrapping tools. If the R-4157 bit hits the base of the terminal it may possibly twist or break the apparatus terminal.

3.2.3 R-4456 is a wire wrap removal bit which is used with the R-4086 (Electric) or the R-4347 (Pneumatic) Power Unwrapping Tools. This tool is similar in design and operation to the KS20827 L1 (see Paragraph 3.1.5).

4. DISCONNECTING SOLDERED CONNECTIONS

4.1 Tools and Methods

4.1.1 A soldered wire wrapped connection can be removed using the R-4086 (Electric) or R-4347 (Pneumatic) Unwrap Tool equipped with the R-4157 Bit by following the same operations as those described in Paragraph 3.2.2.1 a through e. However, the removal of a soldered connection requires that a little more forward pressure be exerted on the tool.

NOTE: Do not attempt to remove soldered connections from the (.009) embossed terminals or the twisted and coined terminals using the power unwrapping tools. These tools are too powerful to be used on these flimsy terminals.

4.1.2 Soldered wrapped connections can also be removed by applying a soldering copper to the connection and unwinding the helix with the R-4456 Bit or R-2120 Long Nose Pliers.

4.1.2.1 When using the R-4456 only a momentary application of the soldering copper on the terminal is necessary to melt the solder enough for the tool to remove the helix.

4.1.2.2 If the removed helix sticks in the unwrapping sleeve, eject it by retracting the sleeve. Avoid touching the end of the unwrapping sleeve, which may become very hot from contact with the heated terminal and melted solder.

4.1.3 Before removing any soldered connection, remove excess solder from the terminal to avoid splashing solder. Provide protection in the form of canvas or sheet fiber for adjacent equipment where necessary.

4.1.4 Crossbar switch terminals with soldered wire wrap connections can be cleaned by removing the connections with an R-2733 Soldering Iron equipped with an R-4869 Bifurcated Soldering Iron Tip.

4.1.4.1 The slotted tip of the R-4869 is slipped behind the soldered wrapped connection and removed with a slow steady pull.

NOTE: Adhere to the precautions of Paragraph 4.1.3 when using this tool.

4.1.5 Removing Soldered Wrapped Connectors from SXS switch jacks can be accomplished with the R-2733 Soldering Iron equipped with an R-4872 Bifurcated Soldering

Iron Tip. For use of this tool, refer to Handbook 97, Section 301.1.

5. RECONNECTING WRAPPED CONNECTIONS

5.1 General

5.1.1 Generally, the portion of a wire previously wrapped on a terminal should not be reused. The tensile strength of the wire has been reduced by the first wrapping operation and the wire will not provide a satisfactory solderless wrapped connection. When reconnecting a lead; therefore, the wire should be reskinned and solderless wrapped if length of wire permits.

5.1.2 Succeeding qualified solderless wrapped connections made on a terminal from which a solderless wrapped connection has been unwrapped are not required to be soldered except on .009 terminals on crossbar switches. Succeeding connections made on a terminal from which a soldered connection has been removed must be soldered.]

5.2 Solderless Wrapped Reconnected Wires

5.2.1 When there is sufficient slack in the lead to obtain the proper shiner, cut the previously connected lead back to the insulation, skin and reconnect using a wire wrapping tool. When the lead length does not permit a shiner of the proper length for solderless wrap connecting, refer to Paragraph 5.3.1.

5.2.2 Where an unqualified connection has been applied to a terminal in a highly congested wiring area, and the soldering of this connection may possibly cause shorts, crosses or insulation damage, the preferred method of repair would be to remove the connection, cut back the cable lead about 2", splice according to Handbook 9, Section 370, and reterminate as a qualified solderless wrapped connection.

5.2.3 Cross connections should be treated the same as in Paragraph 5.2.1 except that where there is not sufficient slack a new cross connection should be run.

NOTE: DO NOT ATTEMPT TO REUSE THE HELIX OF WIRE PREVIOUSLY WRAPPED ON A TERMINAL FOR MARKING A NEW SOLDERLESS WRAPPED CONNECTION.

5.3 Wrapped and Soldered Reconnected Wires

5.3.1 Some conditions may require temporary removal of solderless wrapped connections. In reconnecting proceed in accordance with Paragraph 5.2.1. If there is insufficient slack to reskin and solderless wrap the removed wire, the wire may be reconnected using the existing helix (without straightening) but the connection must be soldered. It is preferable to cut 3 turns off the helix before replacing on the terminal.]

5.3.2 On terminals from which a soldered connection has been removed, use a 3 turn connection for reconnected wires if slack can be obtained for a 3/4" shiner. If there is not sufficient slack, skin 3/8" of insulation from the wire and wrap at least 1-1/4 turns of wire on the terminal.

NOTE: When it is necessary to reconnect a 20 gauge wire and a suitable bit and sleeve are not available, the lead should not be wrapped around the terminal with a pair of pliers. The lead should be wrapped around a test terminal removed, placed on the required apparatus terminal, and soldered. The lead can also be wrapped around a nail of suitable diameter, removed, placed on the terminal, and soldered. The foregoing method of wrapping a wire around a test terminal or nail should also be used for 14 gauge wire.

6. VERIFICATION ITEMS

6.1 Where wrapped soldered connections have been removed from a terminal all succeeding connections on that terminal must be soldered. (See Paragraph 5.1.2.)

6.2 Solder connections used in reconnecting the helix of a temporarily removed wrapped connection. (See Paragraph 5.3.1.)

6.3 The R-4569A Tool shall only be used to remove solderless wrapped connections on .009" terminals. (See Paragraph 3.1.2.)

] Indicates information subject to verification.

Engineering Planning Manager
(Installation)

Attachment:
Table A

Reason for Reissue:
To completely revise and update section.

TABLE A. TOOLS FOR DISCONNECTING SWC'S

TOOL CODE	RAMAC NO.	DESCRIPTION	NOTES
UNWRAPPING TOOLS-MANUAL			
R-4187	6766808	Double Ended Probe Type Tool With .052 & .070 Dia. Holes	(Par. 1.4.6 & 3.1.1) For Min. Crossbar, Embossed, Twist, and other Terms.
R-4569A	1625400	"Tee" handle, slotted tool (pull type) for removing SWC's from X-Bar terminals.	Par. 1.4.6, 3.1.2, & 6.3 Reconnects must be soldered.
R-4621	6864165	Single ended Probe Type Tool Right or Left Hand, 30 Gauge Wrapped Connections.	(Par. 3.1.3) For .025 Sq. Terms on ESS* MLPWB Back-planes
R-5093	1618561	Plier type tool to squeeze, flatten, and remove SWC's from 951/963 Remreed Connectors.	Ref. Handbook 261, Section 315.11 and Par. 3.1.4
KS 20827 L1	6851048	Single Ended Probe Type Tool W/Retainer For 168 Kit.	For all Terms. exc. .025 Sq. Par. 3.1.5
UNWRAPPING TOOLS-POWERED			
R-4086	1627760	Electric Unwrap Gun GD 27279AA7, SP 625-2	Par. 3.2.1 and Par. 4.1.1
R-4157	6843920	Double Ended Hex Drive Bit for Solder/Unsoldered SWC's.	Par. 3.2.2 and Par. 4.1.1
R-4347	6844340	Pneumatic Unwrap Gun GD 26570AAD, SP 675	Par. 3.2.1 and Par. 4.1.1
R-4456	6853713	Single Ended Hex Drive Bit W/Sleeve Retainer	For all Terms. exc. .025 Sq. Par. 3.2.3 & 4.1.2
MISCELLANEOUS			
R-4349A	6878496	Flexible Air Hose	Use with R-4347
R-4869	6878504	Bifurcated Soldering Tip for Soldered X-Bar Terms.	Par. 4.1.4
R-4872	1622274	Bifurcated Soldering Tip For Soldered SXS Sw. Jacks	Par. 4.1.5 Handbook 97, Section 301.1

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