USE OF NYLON CABLE TIES

CONTENTS

1. GENERAL

1.1 Scope of Section

1.11 This section covers the methods, requirements and tools needed for installing nylon cable ties.

1.12 The requirements covered in this section shall be followed except as modified by applicable specification or drawing.

1.13 Each figure in this section illustrates respectively only the condition to which reference is made in the text and is not to be considered as covering the requirements for other conditions that may be illustrated.

1.2 Precautions

1.21 General precautions to be taken against personal injury, equipment damage, and service interruptions are covered in Handbook 0 and are to be observed at all times, as they apply to operations being performed. Specific precautions, when applicable, are included with the associated method.

1.3 Reference

1.31 The following is a list of handbook sections followed by their titles where reference has been made to various applications of nylon cable ties. This should provide a quick reference for locating questionable nylon tie applications.

HB-8, SEC. 340 - Securing Cable and Wire from Rack to Butt Location

HB-9, SEC. 210 - Fanned Forms, Common Methods and Requirements

HB-9 SEC. 220 - Sewed Forms - sewing information, Methods and Requirements

HB-9 SEC. 225 - Sewed Forms - Superimposing, Securing, Protecting, and Supporting

HB-261, SEC. 200 - Cabling (ESS)

2. INSTALLING EQUIPMENT

2.1 Tools

R-4827 Tool, Fastening, Cable Tie (variable setting)

R-4266 Tool, Fastening, Cable Tie (fixed setting) MFR DISC

R-4370 Holder, Nylon Cable Tie

→ R-4411-L1 Tool, Wire Banding, Pneumatic (order as TS-822-L1) MFR DISC

R-4411-L2 Tool, Wire Banding, Pneumatic (order as TS-822-L2

R-4443 Plastic Pick

R-4441 Gauge, Pull Tension

2.2 Supplies

R-4265 Cable Tie, Nylon, Miniature

List 1 For Banding Forms of 1 1/4" Maximum Diameter

R-4265 Cable Tie, Nylon, Intermediate

List 2 For Forms of 2" Maximum Diameter

List 3 For Forms of 3" Maximum Diameter

List 4 For Forms of 4" Maximum Diameter

R-4412 Tape, Nylon (1000' spool) (use with R-4411-L1 Tool)

R-4412A Closure Blocks (1000/box - 20 tubes) (use with R-4411-L1 Tool)

R-4412B Cartridge, Cable Ties (1000 Ties - 20 Cartridges) (use with R-4411-L2 Tool)

R-3126 Silicon Grease, Tube

R-4021 Oil, SAE #10

3. REQUIREMENTS AND METHODS (R-4265)

3.1 General Information

3.11 The R-4265 Nylon Cable Ties may be used, where practicable, in place of twine for general banding purposes, the banding of cables or cable forms, superimposing forms, securing at cable brackets and other types of frame wiring supports. Methods and applications are covered later in this section.

3.12 Pneumatically applied nylon ties may be used, where practicable, in place of twine or R-4265 Cable Ties for the banding of cable arms, loose wire forms, or cable forms of 7/8" or less in diameter. Requirements, methods, and tools are covered later in this section.

3.13 The R-4265 List 4 (max.) Nylon Cable Ties will accommodate the banding of forms up to 4" in diameter. However, it may be necessary to band or superimpose leads to forms over 4" in diameter. In these cases, it is permissible to link two nylon ties together providing both tail ends are cut off using the → R-4827 Fastening Tool. However, it is not permissible to use more than two nylon ties linked together on any banding application.

3.14 The R-4265 Nylon Cable Ties are available in four different sizes:

List 1 Miniature, for banding of forms up to 1 1/4" diameter

List 2 Intermediate, for banding and securing wire or cable up to 2" in diameter

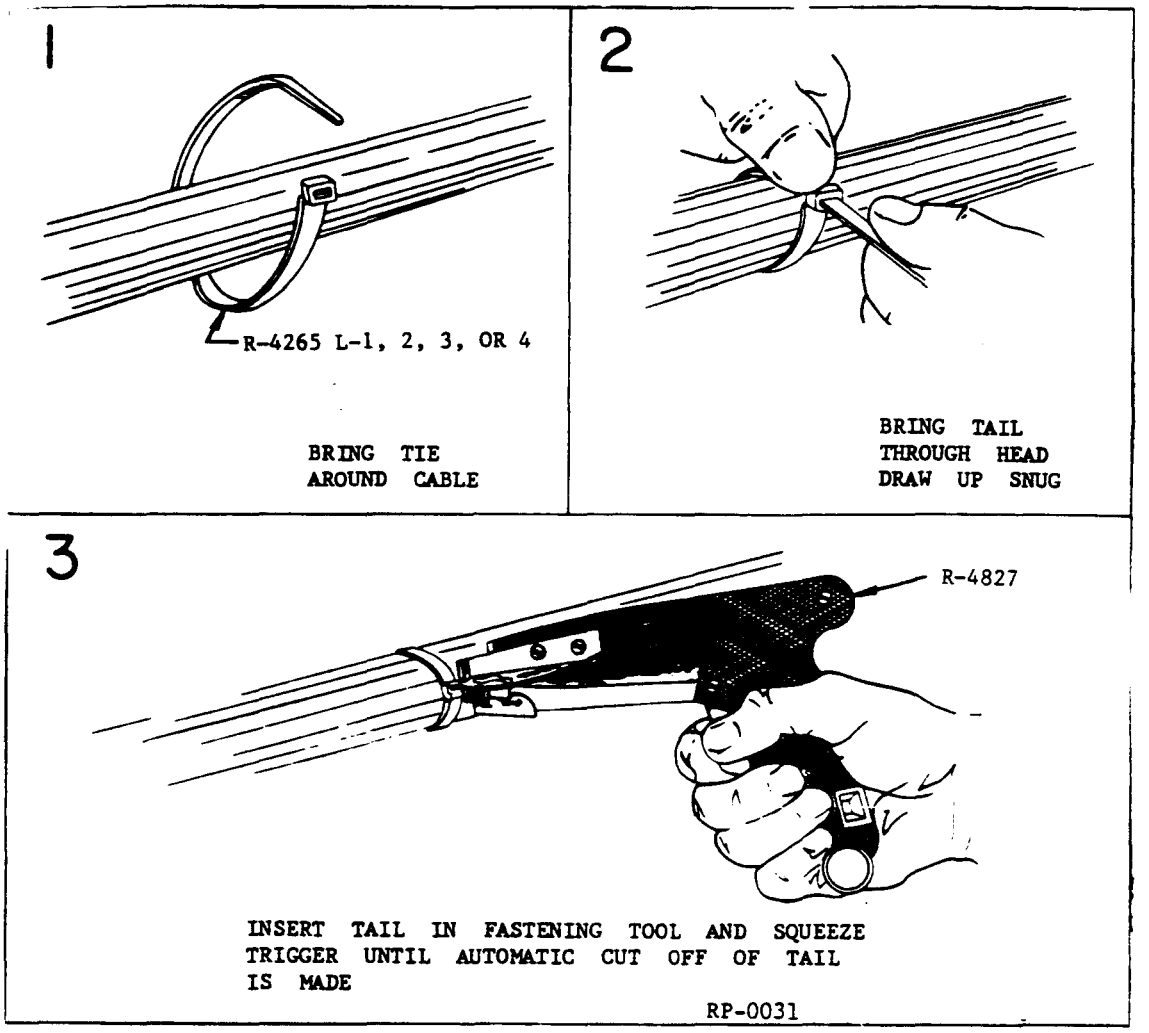


FIG. 1 INSTALLING NYLON CABLE TIES (PARS. 3.15)

List 3 Intermediate, for banding and securing wire or cable up to 3" in diameter

List 4 Intermediate, for banding and securing wire or cable up to 4" in diameter

The Miniature Tie (List 1) is narrower in width than the intermediate ties (Lists 2 to 4) and therefore should be used at locations where the intermediate ties cannot be used, i.e., 951 connectors, etc.

3.15 To install the R-4265 Cable Tie, first loop the tie around the form with the serrated or strippled side facing inward, place the end of the tie through the head and pull up snug by hand at the desired location. Position the head in a convenient location for the final fastening and cutting off process with the R-4827 Variable Setting Tool for Miniature and Intermediate Ties or the R-4266 (MFR DISC) Tool for Intermediate Ties only. See illustrated procedure in FIG. 1.

3.2 Application Requirements

3.201 The application of the R-4265 Nylon Ties shall be completed using the R-4827 Cable Tie Fastening Tool. This tool has a variable tension setting and should be set by the Installer in accordance with the following:

Nylon Cable Tie	Tool Tension Pounds - Maximum
R-4265 L-1 (Miniature)	12
R-4265 L2, 3, 4 (Intermediate)	18

*The tension indicators on the R-4827 Tools (i.e., "1" to "8") do not indicate the tension in pounds. However, the tools are generally designed to provide lower tensions at the lower indicator settings, "1", "2", etc., and higher tensions at the higher indicator settings. See label on tool for specific indicator settings.

The existing preset R-4266 Tools shall be used for applying the intermediate ties (R-4265 List 2 to 3). However, this tool shall not be used for applying the miniature ties (R-4265 List 1) since this may cause excessive damage to wire insulation.

3.202 Installer shall test the tension setting of the R-4827 prior to using the miniature or intermediate ties as follows:

1. Cable ties banded around wire or cable shall be capable of being rotated with a slight to moderate pressure applied with the thumb to the head of the tie. Twisting of the wires or cables under and/or adjacent to the tie when rotating the tie is an indication that the tie is applied too tightly. Decrease tension by turning knob counterclockwise.

2. To test if the cable tie is too loose, apply slight pressure at the portion of the tie entering the head. If the tail moves further into the head, leaving an excess of 1/32" projecting out of the head, the tie is applied too loose (see FIG. 2). Increase tension by turning knob clockwise.

3.203 After cutoff with the tool, the tail of the tie should, in general, be flush with or slightly below the head. However, in no case shall the tail extend more than 1/32" maximum beyond the head (see FIG. 2).

CAUTION:	THE USE OF DIAGONALS AND AND OTHER NON-APPROVED CUTTING DEVICES WILL LEAVE TAIL ENDS WITH VERY SHARP EDGES. THESE EDGES ARE CONSIDERED DANGEROUS AND HARMFUL TO PERSONNEL WORKING IN THE VICINITY. USE ONLY THE PROPER TOOL (R-4827).

3.204 Nylon ties shall not be placed over starting stitches or other knots of twine or other nylon ties.

3.205 The nylon ties shall be tensioned around wire or cable forms tightly enough to hold the wiring securely together and/or properly positioned on the equipment framework, but not so tightly or at such an angle as to cause possible damage to the insulation of the wire or cable. (Refer to FIG. 2).

3.206 The locking head of the nylon tie shall be positioned so as not to interfere with the superimposing of additional wires or cable forms, such as at the side of the form where skinners or arms break out.

3.207 Where loose wire, local cable, or sewed forms are secured to cable brackets, the head of the tie shall be positioned on the side of the bracket opposite the side on which the wiring is run. (Refer to FIG. 3).

3.208 When using cable ties to secure forms or cables to cable brackets or other wiring supports, the ties shall always be applied with the crossover (X) in the rear as shown in FIG. 3.

3.209 Cables shall be secured to cable brackets and other wiring supports, in a compact neat appearing manner.

3.210 Where the diameter of the form or the number of cables is too great to

be accommodated by the largest (single) cable tie, it is permissible to secure the form using two or more ties applied in a crisscross (X) fashion. Or, they may be secured with approved twine in the normal manner. (Refer to FIG. 3 and Handbook 8, Section 340). When securing power wiring or armored cable to cable brackets or other similar-type supports, it is only permissible to use one intermediate size cable tie applied in accordance with Figure 3.

3.3 Banding Applications

3.31 The R-4265 Nylon Cable Ties are approved for the following banding applications:

(a) Banding together loose wiring or surface wiring where a simple tie of twine would normally be used for this purpose.

(b) Banding together installer-run vertical loose wiring to existing vertical wiring. (See PAR. 3.511).

(c) Banding of horizontal run loose wire to existing horizontal wiring including local cable forms, or to towel bars and similar horizontal wiring supports.

(d) Banding horizontal arms of sewed cable forms to horizontal towel bars and similar type horizontal supports.

(e) Superimposing horizontal arms of sewed cable forms to horizontal arms of main local cables which are secured to equipment framework.

(f) Banding cable arm breakout locations on main forms.

(g) Banding instead of sewing installer-made cable forms which are 1" or less in diameter, in banding such forms, 3" maximum spacing between ties is permissible.

(h) Banding together of coaxial and twin conductor shielded office cables except for the KS-21112, KS-19689 and similar type coaxial cable having very soft dielectrics. (See note below).

NOTE: All types of coaxial cable should be imbedded into the center of the cable form where practicable, to avoid contact with the nylon cable ties or twine. However, the soft dielectric type coaxial cable shall not make physical contact with the ties or twine. Band these cables with one and one-half turns (min.) of Gray PVC Tape, or apply protection in accordance with Section 225.

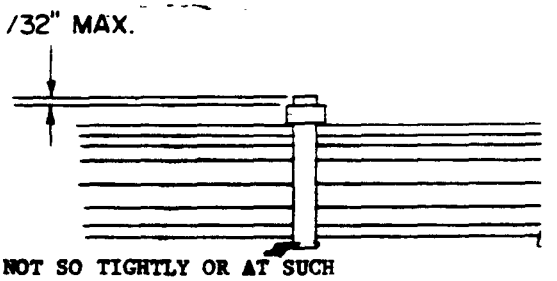


FIG. 2 PROPERLY INSTALLED CABLE TIE (PAR. 3.202, 3.203)

(i) Banding together of cables where cables break off the cable rack or other similar cable banding operations (no banding on cable racks).

(j) For banding ESS power cables in the cable rack. For this application refer to Handbook 261, Section 200.

(k) Rubber or neoprene insulated flexible cordage such as KS-15141, KS-15143 and KS-20195 types may be banded together, however they shall be protected against contact with both the cable bracket and cable tie (or sewing twine) by using 1/64" gray sheet fiber wrapped around the cables at the banding point.

(l) For power cable strain relief ties. (Refer to Handbook 18, Section 7D).

(m) For banding the 14 gauge fire detection wire (does not include the red solder type FD wire) to cable racks, auxiliary framing bars, transverse arms, etc. However, the tie heads must avoid contact with the cables on the rack.

(n) The banding together of armored cables at cable rack break off points and in between cable brackets.

(o) The banding of the vertical portion of a superimposed local cable form to an existing local cable form or switchboard cable form. (See note below).

NOTE: When the additional weight of a superimposed form appears to be a problem, the form shall be secured at the top and bottom to retain the form in place. Nylon ties may be used to band the form at points in between the twine ties.

(p) The banding of fiber protection of insulators to the cross straps or stringer bars of a cable rack; however, the cable tie heads shall be positioned so they avoid contact with the cables.

3.4 Securing Applications

3.41 The R-4265 Nylon Cable Ties are approved for securing to brackets, towel bars, etc., as follows:

(a) Securing installer-run loose wiring or sewed wiring totaling 1/2" or more in diameter, which is dressed vertically from the butt of the switchboard cable to cable brackets.

(b) Securing installer-run vertical switchboard cable, shielded wiring or twin conductor shielded office cable totaling 1/2" or more in diameter to cable brackets or other wiring supports except at cable butt locations, and at the top cable bracket of a frame.

(c) Securing installer-run switchboard cable to the transverse arms of distributing frames. They may also be used to replace N-Type clips for securing the horizontal run portion of the switchboard cable to the transverse arms. (Refer to Handbook 8, Section 340).

(d) To secure forms to AP reinforcement wire when run parallel to each other.

(e) To secure wiring to L, U or similar type brackets or to other cable forms.

(f) Non-locking nylon ties (840245211) (normally furnished in Bay Stocklist) can be used to secure loose wire run in the duct of an unequal flange duct type bay (ED-97170-50).

(g) To secure keyshelf local cable forms to keyshelf brackets (protection is required between ties and cable form).

(h) For securing small bus cables (ESS Frames) at cable drop off locations (refer to Handbook 261, Section 200).

(i) Rubber or neoprene insulated wires such as KS-15141, KS-15143 and KS-20195 types may be secured to cable brackets, towel bars, etc. However they must be protected with 1/64" gray fiber wrapped around the cables at the securing point.

(j) Textile jacketed power cables such as KS-5482 and KS-20189, hypalon insulated cables such as KS-20921 and KS-21155 types and armored cable such as KS-5497 and KS-20785 types may be secured to cable brackets, towel bars, etc. with nylon cable ties. These cables do not require any protection from contact with the brackets or cable ties.

(k) When power wiring is to be secured to cable brackets, towel bars, etc., the following minimum-maximum diameter of cables placed under one cable tie must be adhered to:

1 - 3/8-inch minimum for power wire No. 6 gauge or larger.

2 - 1/2-inch minimum for power wire Nos. 8, 12 and 14 gauge and for loose wires or switchboards cables.

3 - 1-inch maximum for power wires.

4 - 2-inch maximum for loose wires or switchboard cables.

(l) Power wiring or armored cable entering a power equipment bay from an overhead cable rack must be secured with twine at the top cable bracket. (No cable ties at top bracket.)

(m) The tensioning and cut-off operation for securing nylon cable ties retaining power wiring and armored cable must be done with the R-4827 Tool Set at approximately 18 pounds pressure (tool set on No. 5).

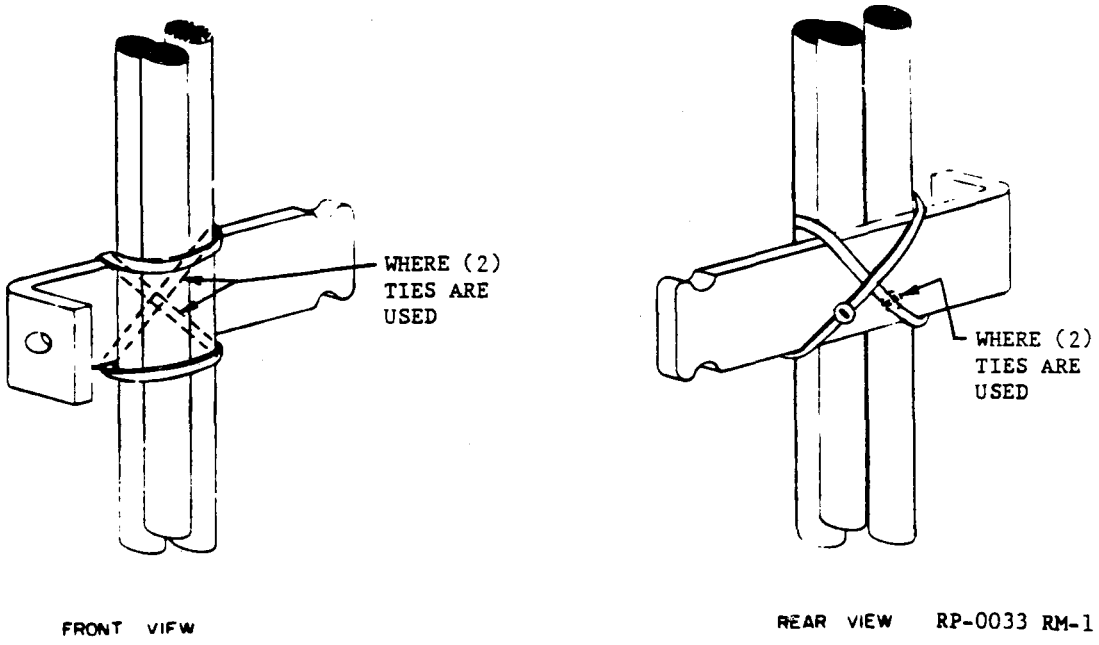


FIG. 3 SECURING AT CABLE BRACKETS
(PAR. 3.206, 3.208)

3.5 Non-Approved Applications

3.51 The R-4265 Nylon Cable Ties are not approved for the following applications:

(a) The securing of coaxial cables to cable brackets, or similar type wiring supports without the use of sheet fiber protection between the nylon tie and the cables.

(b) The banding together or securing of cables and/or wire on cable racks.

(c) The securing of switchboard cables and/or wiring to the top cable bracket (generally the cable butt location) on the equipment frame.

(d) The securing of a cable butt location to a cable bracket regardless of the location of the bracket on the framework.

(e) The securing of vertically run loose wire, shielded wire, or twin conductor shielded office cable totaling less than 1/2" in diameter to cable brackets or other wiring supports.

(f) The securing of the vertical portion of local cable forms, shop run loose wire, or shop run switchboard cable to cable brackets, wiring supports or to other wire or cable forms.

(g) The securing of vertical wiring to horizontal wiring or to horizontal towel bars or similar type horizontal wiring devices, or at any location where wiring and/or cables intersect.

(h) The banding of flexible cords, such as rubber, neoprene, etc., without the use of protection between the ties and cords.

3.6 Use of Tool

3.61 Final tightening and cutting off of the R-4265 Cable Tie end must be done using the R-4266 Fastening Tool for intermediate ties only or the R-4827 Tool for either the miniature or intermediate ties. Do not grab the cable tie end with the tool and pull. Let the tool do the work. Refer to Paragraph 3.202 for proper tensioning of tool.

3.62 After the tie has been placed around the cable or wire form, the final securing should be done as follows:

3.621 Place the tail of the cable tie into the nose slot at the side of the tool.

3.622 Slide the tool up close to the head of the tie.

CAUTION:	BE SURE TO APPLY THE TOOL FLUSH AGAINST THE TIE HEAD, ANY ANGULAR APPLICATION OF THE TOOL MAY RESULT IN LEAVING A "SHARP EDGE" ON THE TAIL END.

3.623 Squeeze the trigger portion of the handle until the tail feels snug, release the trigger and squeeze again until the tie is finally cut off. Cable ties that are loosely placed may require a number of trigger squeezes to produce final cut off.

PRECAUTION:	CARE SHOULD BE TAKEN TO SEE THAT THE CABLE TIE TAILS DO NOT FALL INTO WORKING EQUIPMENT.

4. REQUIREMENTS AND METHODS (R-4411)

4.1 General

4.11 The R-4411-L1 (MFR DISC), and L2 Pneumatic Wire Banding Tools may be used at locations where the present procedure requires sewing or banding, such as the sewing of cable forms, switchboard multiple cables, job local cables or for superimposing local cable forms to existing forms (where the combined diameters permit usage).

4.12 The spacing requirements of the pneumatically applied nylon bands shall be the same as those for sewing with twine. Refer to Sections 220 through 224 and 233 through 235 of this handbook for those requirements.

4.13 When loose wire or local cables are being superimposed on an existing form which has been previously banded with nylon ties, rotate the tie heads to the rear (closest side to apparatus prior to superimposing new leads.

4.14 It is permissible to use penumatically applied ties on forms that require a parallel reinforcing wire used for form bracing. They may also be used for superimposing local cables and loose wire leads to existing forms of working equipment. However, these tools should always be used by experienced operators that have developed a good operating technique in applying nylon ties. Due to the "rear pulling" action of the R-4411-L1 Tool, extreme caution should be exercised when used on working equipment.

4.2 Restrictions

4.21 The pneumatically applied nylon ties shall not be used under any circumstances for securing or banding of cables on horizontal or vertical types of cable rack.

4.22 The R-4411 Tools shall not be used to band shielded or coaxial cables unless these cables can be completely embedded into the center of a form where there is no actual contact with the nylon band.

4.23 The pneumatically applied ties shall not be used to secure cables, cable forms, etc., to cable brackets, towel bars, or other supports except as indicated in Paragraph 4.14.

4.3 Cautions and Notes

4.31 The following is a list of cautions and notes that should be observed at all times when using the pneumatic wire banding tools. The cautions cover items that will prevent possible personal injuries while the notes are intended to prevent tool damage.

4.311 Cautions

(a) These tools are not exceptionally heavy; however, they are slightly bulky. Therefore, when using these tools on rolling ladders, be sure to apply the ladder brakes or set the ladder blocks in place under the wheels.

(b) Do not place hands or fingers between the forming hooks (jaws) of the tool.

(c) Keep face out of direct path of the cable tie discharge chute of the R-4411-L2. Plastic catcher should always be on the tool.

4.312 Notes

(a) Air pressures of over 90 pounds and 80 pounds at the R-4411-L1 and L2 Tools, respectively, may damage the tools. Regulators should be used.

(b) Do not force objects into or through openings at either end of the tools.

(c) Do not drop or throw tool on the floor, bench, etc.

(d) Store the R-4411-L2 Tool with the cartridge pressure arm lever in the unlocked position (downward).

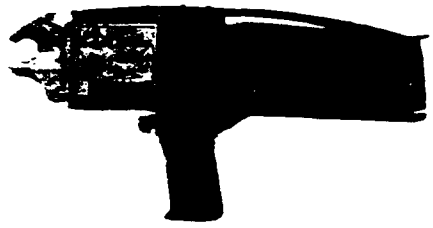
5. PNEUMATIC BANDING TOOL (R-4411-L1)

5.1 Description

5.11 The R-4411-L1 (Gardner-Denver, Model 14-090A) is a portable, relatively lightweight (4-1/2 lbs), high speed operating (1 sec/tie) tool that is capable of banding bundles of wire up to 7/8" in diameter. This tool automatically adjusts the tension, attaches the closure blocks (tie heads) and cuts off the nylon tape with virtually no waste(refer to FIG. 4).

5.2 Operating Instructions (Gardner-Denver, Model 14-090A)

5.21 Air Pressure - To insure efficient operation of the R-4411-L1 Tool, it is recommended that a line pressure of 80-90 pounds be maintained at the tool. Pressures outside these limits may cause malfunctions, tool damage or apply the ties improperly.



RP-0281 RM-1

FIG. 4 R-4411-L1, PNEUMATIC BANDING TOOL (PAR. 5.11)

5.22 Air Line - The 822-L1 Tool Set is furnished with a 3/16 I.D., 20' long (R-4349) Air Hose. Under no circumstance should an air line or connector under 1/8" I.D. be used. All air lines should be clean inside before attaching tool, purge, if uncertain of this condition.

5.3 Tape Tension Adjustment

5.31 When the banding tool begins to apply the ties too loose, too tight, or erratically, the operation should immediately check the tension on the tape using the following procedure:

(a) Cut off about 3' of R-4412 Tape and insert about 18" of tape into the feed slot of the tool.

(b) Push the quick release lever down into the locked position.

(c) Tie the R-4441 Tension Pull Gauge to the opposite end of the inserted tape.

(d) Hold the pneumatic tool in one hand and grasp the unattached end of the tension gauge and pull away from the tool. Apply a steady pull and watch the tension gauge. A reading of 8 to 10 pounds should be attained before tape begins to slip from the pad tension.

(e) When reading exceeds 10 pounds, turn adjustment nut counterclockwise at 1/8 turn increments until a reading of 8 to 10 pounds is reached.

(f) When reading is lower than 8 pounds, turn adjustment nut clockwise at 1/8 turn increments until an allowable reading is reached.

5.4 Preventative Maintenance

5.4 Preventative Maintenance - The following maintenance procedures shall be applied to the R-4411-1L Banding Tool to insure efficient operation and to avoid mechanical breakdown.

5.41 Once a week two drops of SAE #10 Oil (R-4021) shall be placed into the male end quick disconnect fitting of the tool just prior to using.

5.42 Once a month the two guide rods of the R-4411-L1 Pneumatic Wire Banding Tool should be lubricated. Use the following procedure (air line disconnected):

(a) Loosen up the six screws that hold the rear cover in place.

(b) Remove the rear cover.

(c) Apply a light coat of R-3126 Silicon Grease to the two guide rods (see FIG. 5).

(d) Replace the rear cover and tighten up the six holding screws.

5.43 Once a month (minimum),or as often as required, the drag and pressure pads should be cleaned using the following procedure (air line disconnected). (Refer to FIG. 11).

(a) Loosen up the six screws that hold the rear cover in place.

(b) Remove the rear cover.

(c) Remove the adjustment nut with the tension adjustment wrench.

(d) Remove the adjustment nut and washer.

(e) Lift up the quick release lever to remove the solid type Urethane spring.

(f) In the horizontal position, turn the handle upward to remove the drag and pressure pads.

(g) Clean the two pads using a clean rag.

(h) Replace the drag pad in the tool first, placing the curvature side (rounded) down. Use the wedge end of the R-4443 Plastic Pick for positioning pad.

(i) Place the pressure pad in the tool next with the channel side facing upward. Position with pick.

(j) With the quick release lever in the "locked down" position, place over the stud.

(k) Place the Urethane spring, washer and adjustment nut, respectively, over the stud.

(l) Using the tension adjustment wrench, tighten the nut until two threads of the stud show.

(m) Replace the rear cover and secure the six screws in place.

(n) Load tape per Paragraph 5.5 through 5.55 and check tension adjustment per Paragraph 5.31.

5.5 (R-4412) Tape Loading - The nylon tape is furnished in rolls of 1000' and should be loaded into the R-4411-L1 Tool in the following manner:

5.51 The tape should be removed from the carton being very sure the tape end is secured to the roll. Then cut a 1/2" wide slot up on side about 3-1/2" long. Carefully release the tape end from the spool and feed it through the slot. Replace the spool in the carton and seal it closed.

5.52 Prepare the end of the tape by cutting to a two sided point with the R-6433 Diagonal Cutters or similar tool. Be sure the cutting edges of the tool are sharp enough to avoid burring the tape edges (refer to FIG. 6).

5.53 Bend the last 1/2" of tape in the reverse direction of its natural curvature, causing it to straighten out.

5.54 Turn off the air to the tool. The tape channel will remain closed until the air is shut off.

5.55 Flip up the tape quick release lever and insert the prepared tape end into the beveled hole in the rear of the tool with the natural curvature of the tape positioned down. When the point reaches the inside of the twister slot (FIG. 7), it may be necessary to work the tape in and out a few times to thread it into the slot. It is not necessary to remove the closure blocks when tape loading.

5.56 Push 2" or 3" of tape through the slot and return the quick release lever to its original position.

5.57 Apply air to the tool. The tape extending through the front will automatically be cut off.

NOTE: Do not allow the end of the tape (end of R-4412 Roll) to enter the tool. A knot should be applied to the end of the roll to prevent entry. Removal of tape end will require disassembly of the tool.

5.6 (R-4412A) Closure Block Loading

5.61 The closure blocks should be loaded into the R-4411-L1 Tool as follows:

5.62 Tip the tool up on end with the jaws down.

5.63 Slide the moveable tab protruding from the side of the tool all the way to the rear, allowing the roller bearing to properly seat in the detent groove provided in the end of the tool (refer to FIG. 8).

5.64 Press the end of the loaded closure tube into the rectangular opening at the rear of the tool, allowing the slit in the tube to be split by the protruding pin in the sliding block. When the pin spreads the tube, gravity will feed the blocks down into the open channel loading the tool.

5.65 Discard the empty tube and move the tab around the corner of the tool which positions the roller bearing in the slide channel.

5.66 Visually check the rectangular opening in the front of the tool to be sure a block is in the proper position.

5.7 (R-4411-L1) Closure Block Removal

5.71 When the tool has been loaded with closure blocks, they should not be removed unless absolutely necessary. However, use the following procedure when necessary:

5.72 Slide the moveable tab (FIG. 8) located on the side of the tool all the way to the rear allowing it to seat in the detent.

5.73 Turn tool up on end with jaw pointed up. This will allow closures to fall out of the tool. (DO NOT ATTEMPT TO REUSE THESE CLOSURES.)

5.74 When closure feed block is empty, slide the moveable tab forward by hand. DO NOT ALLOW THIS TAB TO SNAP FORWARD. THIS MAY CAUSE DAMAGE TO THE TOOL.

5.8 Twister Slot Obstructions

5.81 The following procedure should be followed to clear plastic particles or foreign material from the twist slots of the tool (refer to FIG. 10).

(a) With air pressure applied to the tool, pull the moveable tab (see FIG. 8) slightly toward the rear of the tool and maintain at that location - this relieves all pressure on the closure blocks contained in the tool.

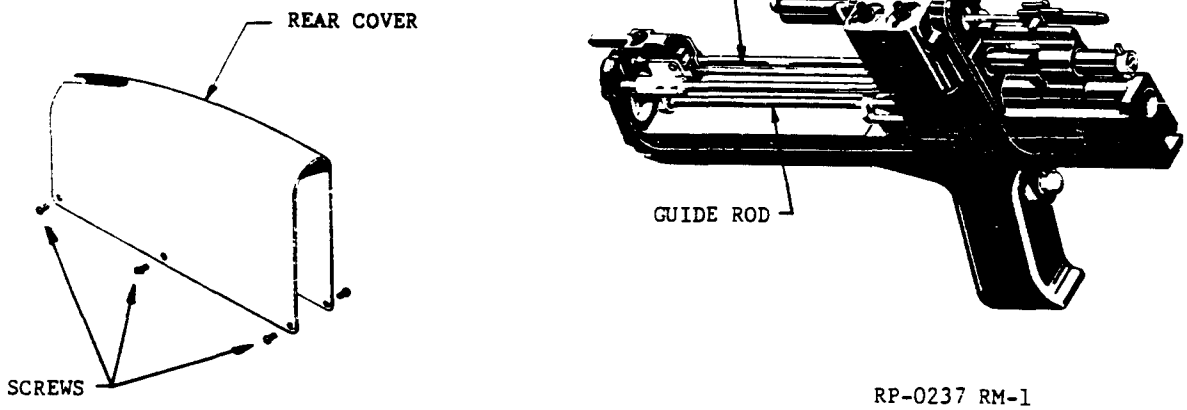


FIG. 5 R-4411 L1 REAR COVER REMOVED
(PAR. 5.42(e))

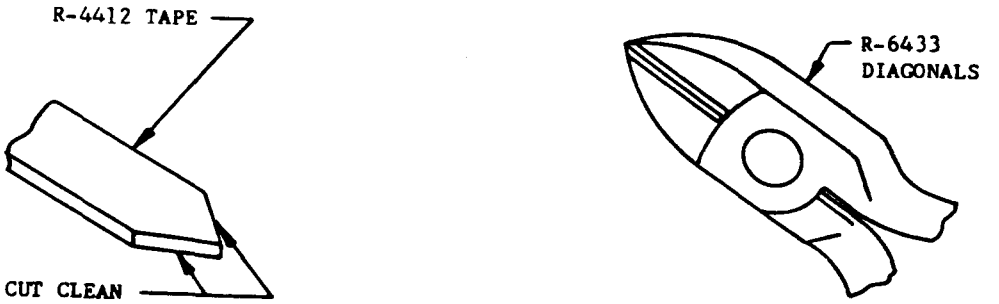


FIG. 6 PREPARING TAPE FOR LOADING
(PAR. 5.52)

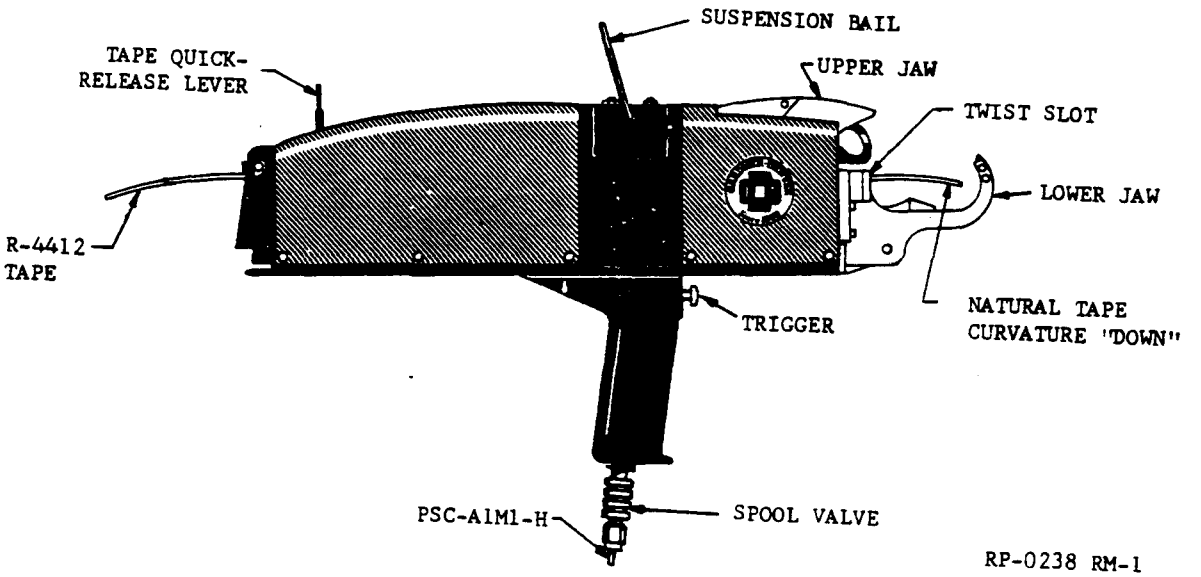


FIG. 7 R-4411 L1 PNEUMATIC BANDING TOOL
(PAR. 5.55)

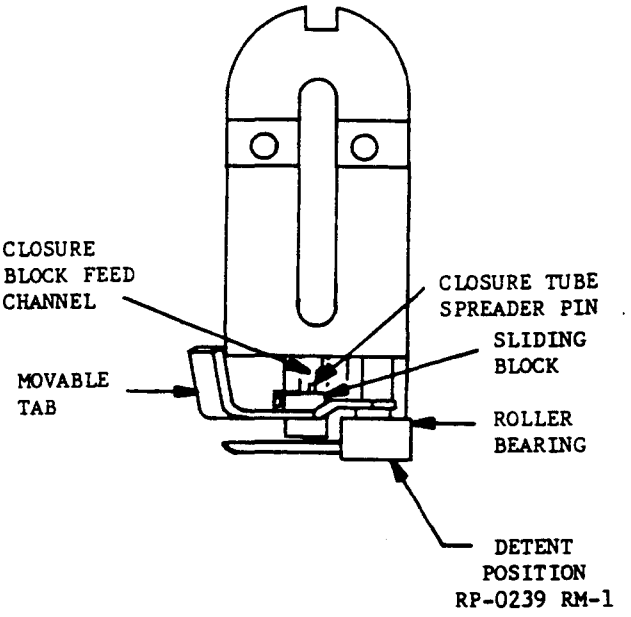


FIG. 8 REAR VIEW OF R-4411 L1
(PARS. 5.63, 5.72, 5.81(a))

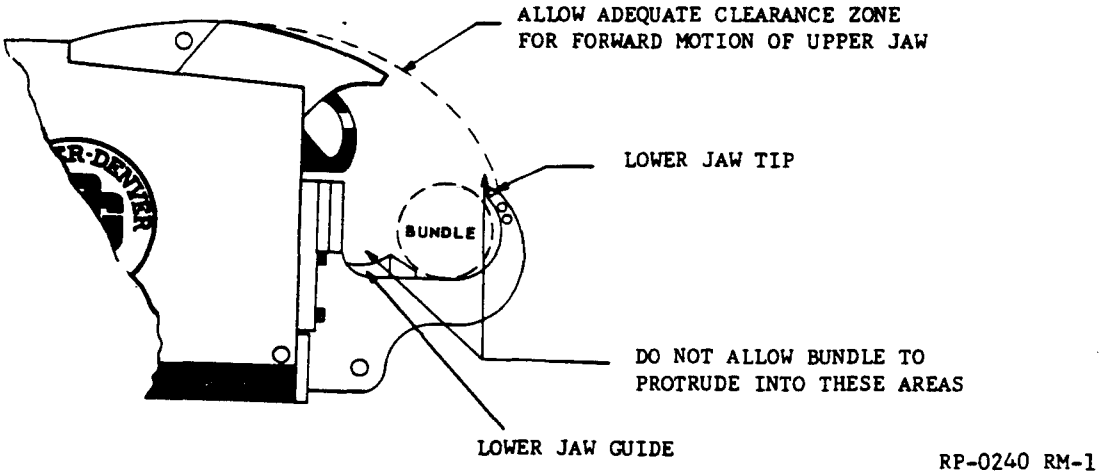


FIG. 9 SIDE VIEW OF R-4411 L1
(PAR. 5.92)

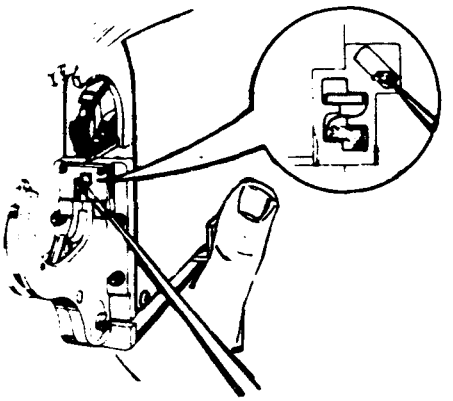


FIG. 10 TWISTER SLOT OBSTRUCTIONS (PAR. 5.81

(b) Use the R-4443 Plastic Pick to remove any closure blocks from the opening in the face of the tool.

(c) Examine the twist slots in the twist plate. Then using the R-4443 Plastic Pick, remove any tape or foreign material in the slots - Do not allow material to fall back into the channel.

(d) After removing foreign material, release the moveable tab to apply pressure against the closure blocks in the channel.

(e) Check to be sure the next closure block is properly positioned in the lower jaw opening.

5.9 Operating Errors

5.91 Proper operator technique is required to prevent damage to the R-4411-L1 Tool, eliminate malfunctions and prevent poor quality ties. Following is a list of common errors which should be avoided.

5.92 The bundle of wires must be positioned between the lower jaw's tape guide and tip (FIG. 9) in order to be completely encircled by the tape while the tie is being made.

5.93 A tight tie will not be made unless the wire bundle is pressed against the lower jaw face when slack tape is taken up during tightening.

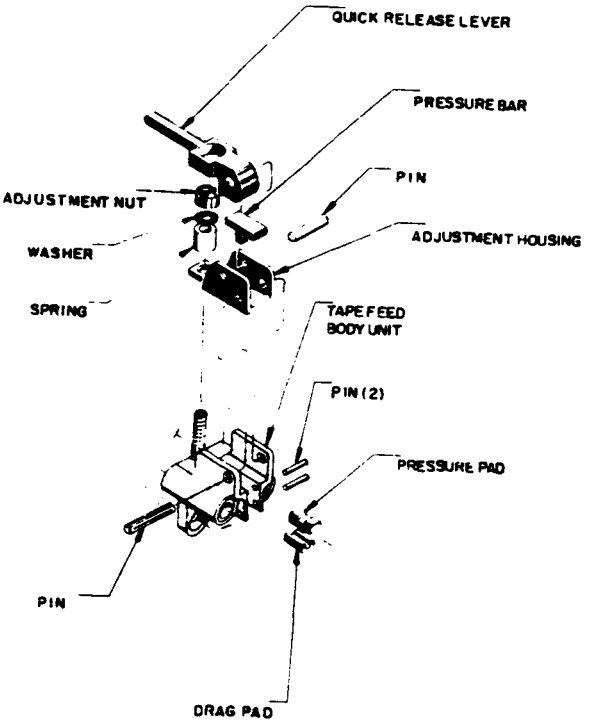


FIG. 11 PAD ASSEMBLY (PAR. 5.43)

5.94 A short pause is required after depressing the trigger to allow the tape end time enough to feed around the tape track in the jaws and into the twist slot.

5.95 After the completion of a tie, the tie and block should be removed from the tool with a firm smooth pulling action. A slow hesitant removal may result in a tool malfunction when the next tie is applied.

5.96 The tool should not be cycled without a bundle of wire in position. However, if this does happen, use the R-4443 Plastic Pick to remove the tie from the face of the tool. Do not recycle the tool again until the block is removed.

6. PNEUMATIC BANDING TOOL R-4411-L2

6.1 Description

6.11 The R-4411-L2 (Thomas & Betts, Model TR-300) is a lightweight (3 lbs.) high speed operating (less than 1 sec/tie) tool that is capable of banding bundles of wire up to 5/8" in diameter. This tool automatically applies a nylon tie around the wire bundle, applies the tension, cuts off the tie and ejects the cut off portion of the tie out the rear of the tool into the plastic catcher (refer to FIG. 12).

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FIG. 12 R-4411-L2 PNEUMATIC BANDING TOOL (PAR. 6.11)

6.2 Operating Instructions (Thomas & Betts, Model TR-300)

6.21 Air Pressure - To insure efficient operation of the R-4411-L2 Tool, it is recommended that a line pressure of 65-80 pounds be maintained at the tool. Pressures outside these limits may cause malfunctions or tool damage.

6.22 Air Line - The 822-L2 Tool Set is furnished with a 3/16" I.D. (R-4349 Air Hose. Under no circumstances should an air line under 1/8" I.D. be used. All air lines should be clean inside before attaching tool. Purge, if uncertain of this condition.

6.3 Preventative Maintenance - The following maintenance procedures shall be applied to the R-4411-L2 Banding Tool to insure efficient operation and to avoid mechanical breakdown.

6.31 Two drops of SAE #10 Oil (R-4021) shall be placed into the male end quick disconnect fitting of the tool just prior to every 8 hours of use.

6.4 Operating Cycle - After the R-4412B Cartridge has been loaded into the tool, it will then be ready to apply cable ties around wire bundles. Place the wire bundle between the jaws of the tool, depress the trigger (1st cycle). This will automatically pick up the cable tie from the cartridge and feed it around the wire bundle and back into the cable tie head. Then the trigger must be released (2nd cycle). This will pull the tie until the proper tension is applied and will then cut off the excess cable tie flush with the head. The first cycle of the next tie application will eject the previously cutoff cable tie end.

6.5 R-4412B Cartridge Loading

6.51 The R-4412B Cable Tie Cartridge (50 ties) should be loaded on the R-4411-L2 Tool (1) in the following manner: (Refer to FIG. 13) Set the tool in a horizontal position with the cartridge holder (4) to the right side and the handle (13) toward the operator.

6.52 Push cartridge arm lever (7) into locked position and lock it in place with the pressure arm lock (6) .

6.53 Push plug hole lever (10) into open position (towards body of tool).

6.54 Remove a cartridge (12) from the blister pack which contains five cartridges.

6.55 Insert cartridge pressure are (7) into the black end (14) of the cartridge (12) . DO NOT REMOVE THE BLACK PLUG.

6.56 Slide protruding tails of cable ties (15) into the cartridge holder (4) and feed white plug (16) into the plug hole (9).

6.57 Push cartridge into the tool until it seats and cartridge lock (8) is engaged. Cartridge must be seated and locked for proper feeding.

6.58 Pull the white plug (16) out of the tool and close plug hole lever (10) . Lever must be closed for proper tool operation.

6.59 Disengage cartridge pressure arm lock (6) to release pressure arm (7) .

6.6 R-4412B Cartridge Removal

6.61 To remove an empty cartridge, simply release the cartridge lock (8) and lift the empty cartridge out of the tool. (Refer to FIG. 13). Follow the cartridge loading procedure when reloading.

6.7 Operating Errors

6.71 Proper operator technique is required to prevent damage to the R-4411-L2 Tool, eliminate malfunctions, and prevent poor quality ties. Following is a list of common errors which should be avoided:

6.72 The tool should not be operated without a wire bundle or similar object placed between the forming hooks.

6.73 Do not use wire bundles exceeding 5/8" in diameter, tool will malfunction.

6.74 Do not block ejection hole at the rear of tool. Tool will jam if ejection of tie tails is prevented. (Plastic catcher should be in place.)

6.75 Always wait for cycle of tool to complete before depressing trigger again.

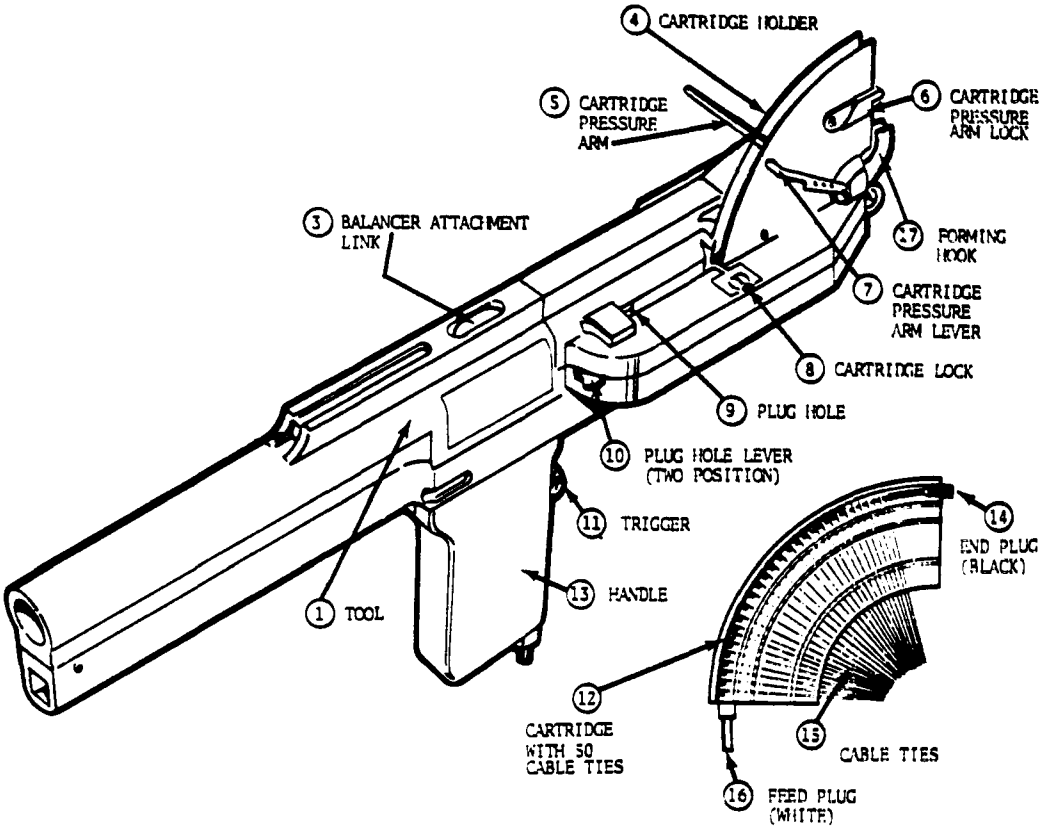

FIG. 13 R-4412 L2 PNEUMATIC BANDING TOOL (PAR. 6.51, 6.61)

7. VERIFICATION ITEMS

	VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS	REFERENCE PAR. NO.	REFERENCE FIG. NO.
7.1	Application Requirements		
7.101	R-4266 Tool shall not be used for applying miniature nylon ties (R-4265 L-1)	3.201	
7.102	Test Tension of R-4827 Tool	3.202	
7.103	Use R-4266 or R-4827 Tool to apply ties - no sharp tie ends	3.61	
7.104	Tail Flush with head-max protrusion 1/32"	3.203	2
7.105	Ties not to be placed over starting stitches or other knots of twine or other nylon ties	3.204	
7.106	Ties secured tightly enough, but not so tight so as to cause wire insulation damage	3.205	2
7.107	Tie head positioned so as not to interfere with superimposing forms or wiring	3.206	
7.108	Tie heads positioned on opposite side of wiring when securing to brackets, etc.	3.207	3

	VERIFICATION ITEMS AND BRIEF STATEMENT OR REQUIREMENTS	REFERENCE	
		PAR. NO.	FIG. NO.
7.109	Ties applied with crossover (X) in rear.	3.208	3
7.110	Secured in neat compact manner.	3.209	
7.2	Non-Approved Applications	3.51	
7.201	The securing of coaxial cables to brackets, etc. without use of sheet fiber protection.	3.51a	
7.202	Securing cable or wire on cable racks.	3.51b	
7.203	Banding cable or wire on cable racks.	3.51b	
7.204	Securing cable or wire to the top cable bracket of a frame	3.51c	
7.205	The securing of cable butt locations regardless of location.	3.51d	
7.206	The securing of vertically run loose wire, shielded wire, etc. totalling less than 1/2" diameter.	3.51e	
7.207	The securing of vertical run local cable forms, shop run LW or shop run cables to cable brackets, wiring supports etc.	3.51f	
7.208	The securing of vertical wiring to horizontal wiring, towel bars or similar horizontal wiring devices - intersect points.	3.51g	
7.209	The banding of flexible cords without protection.	3.51h	
7.210	When banding 14ga. F.D. wire or fiber protection to stringer bars, aux. bars, etc., tie heads to avoid contact with cables.	3.31m 3.31p	
7.211	No more than (2) ties linked together for banding - use R-4827 Tool for cut-off.	3.13	
7.3	Requirements and Methods (R-4411)		
7.31	General	4.1	
7.311	Spacing requirements shall be the same as those used for stitching with twine. Tie heads at rear when superimposing.	4.12 4.13	
7.312	The R-4411-L1 shall not be used on horizontal or vertical cable racks.	4.21	
7.313	Shall not be used for banding twin shielded or coaxial cables unless the cables are completely embedded into the center of the form.	4.22	
7.314	The pneumatically applied ties shall not be used on brackets, towel bars, etc., (exception PAR. 4.14)	4.23	

8. TROUBLE SHOOTING GUIDE

8.1 (R-4411-L1) Gardner-Denver - During the operation of this tool certain malfunctions may occur which may be corrected by the Installer. For tool malfunctions other than those listed below, return the tool to the Service Center for repair. Abbreviations listed below indicate the following: (Sy) Symptom, (Pc) Probable cause, and (Co) Correction.

8.101 (Sy) Difficult Tape Loading - Will not enter the rear of the tool, will not feed out the front of the tool, or drags when passing through the tool.

- A-(Pc) Air is applied to the tool.
- A-(Co) Disconnect air line.
- B-(Pc) Tape not pointed or bent properly.
- B-(Co) Repoint and rebend tape, reload.
- C-(Pc) Oversize tape.
- C-(Co) Remove section of tape and reload.
- D-(Pc) Dirty drag pads.
- D-(Co) Remove drag pads and clean (refer to PAR. 5.43A through o). Also, reset tension on tape per PAR. 5.31A through F).

8.102 (Sy) Tape hangs up on lower jaw tip or jumps out of jaw track.

- (Pc) Bad section of tape.
- (Co) Remove tape and cut off a section, reverse curvature of tape and reload.

8.103 (Sy) Tape feeds too slowly around jaw track.

- (Pc) Inadequate air supply.
- (Co) Increase air pressure at tool (minimum 80 pounds), or check for pinched or plugged air line.

8.104 (Sy) Tape jams (feeds partially around jaw track).

- A-(Pc) Poor operator technique.
- A-(Co) Pull trigger with quicker action.
- B-(Pc) Oversize tape.
- B-(Co) Cut off a section of tape and reload.

8.105 (Sy) Tape does not feed back into the tool far enough to complete tie.

- A-(Pc) Poor operator technique.
- A-(Co) Let tape feed all the way forward before releasing the trigger.
- B-(Pc) Obstruction in front of tape feed cylinder.
- B-(Co) Check for obstruction in the lower jaw track.

8.106 (Sy) Tape hits the face of the block but does not enter the block.

- A-(Pc) Excessive tape curvature.
- A-(Co) Remove tape from the tool and reverse the curvature, reload.
- B-(Pc) Upper jaws not coming down far enough in the forward position.
- B-(Co) Possibly a chip laying in the upper guide plat slot, remove with pick end of the R-4443 Plastic Pick.

8.107 (Sy) When tape slack is being taken up, it appears to be jerky.

- A-(Pc) Air pressure too low.
- A-(Co) Increase air pressure at tool (minimum 80 pounds).
- B-(Pc) Tape furface contaminated.
- B-(Co) Wipe tape clean before entering the tool.

8.108 (Sy) Slow or no tape cut off.

- (Pc) Inadequate air pressure at tool (minimum 80 pounds) and check for pinched or plugged air line.

8.109 (Sy) Tool applying loose ties.

- A-(Pc) Operator technique.
- A-(Co) The wire bundle is probably not butting against the lower jaw.
- B-(Pc) Insufficient drag tension.
- B-(Co) Check drag tension (8 to 10 pounds) and, if necessary, reset per PAR 5.31A through F.

8.110 (Sy) Tool applying ties erratically, some loose, some tight.

A-(Pc) Tape of poor quality, has erratic thickness or poor surface condition.
A-(Co) Remove the tape from the tool, feel tape for uneven thickness and poor surface, cut off poor section and reload; if still working erratic, use new roll of tape.
B-(Pc) Contaminated drag pads
B-(Co) Remove drag pads and clean per PAR. 5.43A through 0). Also reset drag tension, 8 to 10 pounds, according to PAR. 5.31A through F.

8.111 (Sy) Ties being applied excessively tight.

A-(Pc) Contaminated tape surface.
A-(Co) Wipe tape clean before it enters tool.
B-(Pc) Excessive drag tension.
B-(Co) Check drag tension (8 to 10 pounds) and reset per PAR. 5.31A through F, if necessary.

8.112 (Sy) Blocks (tie heads) not positioning properly.

(Pc) Possible chips in lower jaw.
(Co) Clear chips with pick end of R-1102 Plastic Spudger.

8.2 (R-4411 L2) Thomas & Betts - During the operation of this tool certain malfunctions may occur which may be corrected by the Installer. For tool malfunctions other than those listed below, return to the Service Center for repair. Abbreviations listed below indicate the following: (Sy) Symptom, (Pc) Probable cause, and (Co) Correction.

8.21 (Sy) Tool does not complete cycle, forming hooks do not close.

(Pc) Cable tie not being fed from cartridge.
(Co) Follow sequence below until the tool operates.

8.211 Pull out trigger and recycle, be sure something like a pencil, piece of cable, etc., is between jaws.

8.212 Check for proper cartridge seating, gently tap the cartridge with the fingers and pull the cartridge lever arm up and release it. If the ties do not move freely, replace the cartridge, be sure cartridge is properly seated.

8.213 Turn tool upside down to see that a cable tie is not wedged in the plug hole.

8.214 Check to be sure plug hole lever is in closed position.

8.215 Check for correct air pressure (65 to 80 pounds).

8.216 Set tool on its side (cartridge in horizontal position and to the right).

(a) Push pressure arm lever into locked position and lock in place with pressure arm lock.

(b) Remove cartridge.

(c) Replace the white plug back into its original position.

(d) Check groove in which the cable tie is fed, remove any cable ties or foreign particles.

(e) Cycle tool without cable ties. Keep trigger depressed and check for cable tie in the threading block face. (If so, remove the R-4411, Det. 3, Dental Pick.)

8.217 The following check shall be performed only by an experienced operator and in the following sequence:

(a) Disconnect air line to the tool.

(b) Remove the top cover assembly by releasing the rear lock pin (A) (pull to the rear and down) and depressing lock buttons (B) and (C) (Refer to FIG. 14), then gently lift the cover assembly from the tool body.

(c) Check for foreign objects such as cable tie made without an object between the forming hooks, cut off pieces of cable ties, or other foreign objects.

(d) Replace the top cover assembly by aligning the guide pins of the cover with the main body then depressing lock buttons (B) and (C). The cover will then drop into position, release the buttons and engage rear lock pin (A) by pushing up and forward.

8.22 (Sy) Forming hooks remain closed during cycle.

(Pc) Air pressure too low (under 65 pounds) or a piece of cable tie is trapped inside the tool.

(Co) 1 Increase air pressure at the tool to 65 to 80 pounds.
2 Repeat PAR. 8.217 operation. Be sure air line is disconnected.

8.23 (Sy) Cable tie feeds, but does not follow the channel around the bundle.

(Pc) Defective cable tie.

(Co) 1 - Remove cable tie cartridge.
2 - Clear any cable ties remaining in the tool.
3 - Recycle tool without cable ties.
4 - Replace cartridge from new pack.

→Indicates new or changed information.

[Vertical lines at side of paragraph indicate requirements.

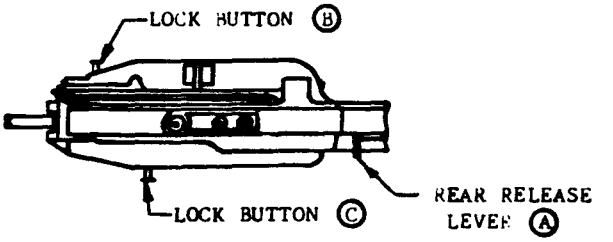

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FIG. 14 R-4411 L2 - PARTIAL TOP VIEW (PAR. 8.217(b)

8.24 (Sy) Cable tie feeds, follows channel, but does not thread into the head.

(Pc) Tied cable tie already in the tool head.

(Co) 1 - Remove the cartridge.
2 - Depress and hold the trigger.
3 - Remove cable tie head from the tool by using the R-4411, Det. 3, Dental Pick.
4 - Replace cartridge and cycle tool. (Be sure pencil, piece of cable, etc., is between jaws.)

Engineering Planning Manager
(Installation)

Reason for Reissue:
Revise Paragraphs 3.210, 3.31k, 3.51b
Add Paragraphs 3.41i, 3.41j, 3.41k, 3.41l, 3.41m
Delete Paragraph 3.51i