

CRIMPING DIE ASSEMBLY	TOOL OR HEAD NUMBER
	<u>Head Number</u>
1490555-1	1901821-1
1490556-1	1976230-1 ●
1490557-1	
	<u>Hydraulic Hand Tool Number</u>
	1490749-1

●Crimping Head 1976230-1 CANNOT Crimp Splices

Figure 1

## 1. INTRODUCTION

This instruction sheet covers the use of the Crimping Die Assemblies listed in Figure 1, which are used to crimp COPALUM Sealed Terminals and Splices.

The crimping die assemblies are used in the crimping tools shown in the table in Figure 1. Refer to the instruction sheet packaged with the crimping tool for information concerning general performance of the tool.

See Section 7, REVISION SUMMARY, for revision information.

Read these instructions thoroughly before using the die assemblies.

### NOTE



All dimensions on this document are in metric units [with U.S. customary units in brackets]. Figures and illustrations are for identification only and are not drawn to scale.

## 2. DESCRIPTION (Figure 1)

### CAUTION

Never operate the tool with the dies removed.



The die assemblies consist of stationary dies (nests) and moving dies (anvils). The dies are retained in the crimp tool by retainer pins. Refer to the table in Figure 3 to ensure the compatibility of die assemblies, crimping tools, and terminals and splices.

### 2.1. Die Installation

### DANGER

To avoid personal injury, be sure to exercise extreme caution when using the power unit. Avoid depressing the foot-switch or trigger control when installing or removing dies.



The retainer pin grooves on the moving and stationary dies are offset, and there are alignment dots on the FRONT surface of the dies. The retainer pin grooves of the dies must be offset to the same surface and the dots must be aligned, and face the operator, in order to achieve proper mating of the dies.

### CAUTION

Do NOT mix die components from different die sets.



1. Actuate the upper die release button located in the "C"-head or closed head.
2. Slide the nest into place in "C"-head or closed head. See Figure 2.

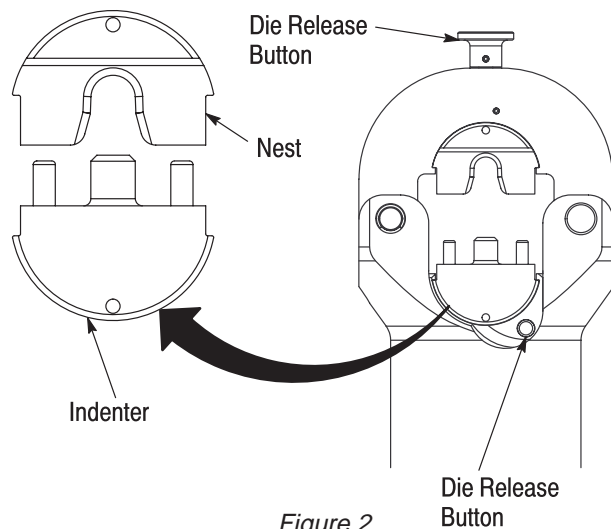


Figure 2

3. Release the button and rock the die back and forth until the nest snaps into position.
4. Activate the power unit until the lower die release button located in the ram is exposed.
5. Depress the release button.
6. Slide the indenter into position in the ram. See Figure 2.
7. Release the button and rock the indenter back and forth until the die snaps into position.
8. Return ram to the down position.

3. Depress the die release button and slide the indenter out of the ram.

**2.3. Wire, Terminal, and Splice Selection** (Figure 3)

Refer to the table in Figure 3 and select the appropriate wire, die assembly, and terminal or splice. Strip the wire to the length indicated in the table.



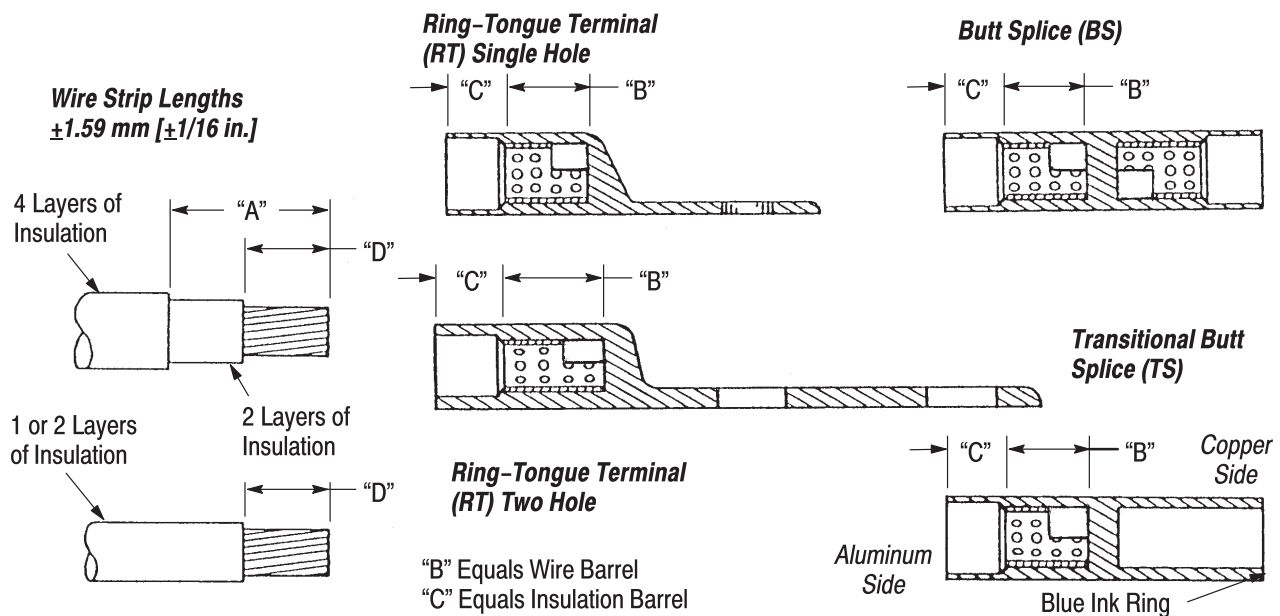
**CAUTION** DO NOT nick or cut the wire strands.



**NOTE** For aluminum-to-aluminum application, butt splices will accept the same wire size at either end. However, for aluminum-to-copper applications, the size of the copper wire must be decreased to a smaller size to compensate for differences in the electrical properties of copper and aluminum. It is also necessary to use a smaller wire size when using copper wire in a terminal. Refer to CMA range listed with each wire size in Figure 3.

**2.2. Die Removal**

1. Actuate the upper release button located in the “C”-head or closed head and slide the nest out of the head.
2. Activate the power unit until the lower die release button (located in the ram) is exposed.



TERMINALS (RT)		BUTT SPLICES (BS)	ALUMINUM		COPPER		STRIP LENGTH		DIE SET NUMBER	HEAD NUMBER
SINGLE HOLE	DOUBLE HOLE		mm <sup>2</sup> and (CMA)●	AWG ▲	mm <sup>2</sup> and (CMA)●	AWG ■	A INSUL	D COND		
277147-[ ]	---	277156-[ ]	8.60 (16,564)	8	4.80 (9,354)	10	22.23 [7/8]	11.11 [7/16]	1490555-1	1901821-1 1976230-1 ▼ 1490749-1
277148-[ ]	55832-[ ]	277157-[ ]	14.60 (28,280)	6	8.80 (16,983)	8	22.23 [7/8]	12.70 [1/2]	1490556-1	
277149-[ ]	55833-[ ] 55834-[ ]■	277158-[ ]	21.90 (42,420)	4	13.80 (26,818)	6	25.40 [1]	17.45 [11/16]	1490557-1	

●Circular Mill Area; ▲See Military Specification, MIL-W-7072 for Specific Wire Requirements; ■See Military Specification, MIL-W-22759E for Specific Wire Requirements; ■High Temperature Silver Plated; ▼Crimping Head 1976230-1 CANNOT Crimp Splices

Figure 3 (cont'd)


TERMINALS (RT)		BUTT SPLICES (BS)	ALUMINUM		COPPER†		STRIP LENGTH		DIE SET NUMBER	HEAD NUMBER
SINGLE HOLE	DOUBLE HOLE		mm <sup>2</sup> and (CMA)●	AWG ▲	mm <sup>2</sup> and (CMA)●	AWG ■	A INSUL	D COND		
<b>TRANSITIONAL BUTT SPLICES (TS)</b>										
277164-[]			21.90 (42,420)	4	8.80 (16,983)	8	25.40 [1]	17.45 [11/16]	1490557-1	1901821-1 1490749-1
277165-[]			21.90 (42,420)	4	22.00 (42,615)	4	25.40 [1]	17.45 [11/16]	1490557-1	
<b>TERMINALS AND SPLICES FOR USE WITH BOEING BMS13-78 WIRE</b>										
696866-[]	696804-[]	696852-[]	8.60 (16,564)	8	4.80 (9,354)	10	---	11.11 [7/16]	1490555-1	1901821-1 1976230-1 ▼ 1490749-1
696869-[]	696999-[] 696887-[] 696951-[] 696953-[]	696847-[]	14.60 (28,280)	6	8.80 (16,983)	8	---	12.70 [1/2]	1490556-1	
696872-[]	696834-[]	696854-[]	21.90 (42,420)	4	13.80 (26,818)	6	---	15.88 [5/8]	1490557-1	

●Circular Mill Area; ▲See Military Specification, MIL-W-7072 for Specific Wire Requirements; ■See Military Specification, MIL-W-22759E for Specific Wire Requirements; †Only applies to splices (not terminals); ▼Crimping Head 1976230-1 CANNOT Crimp Splices

Figure 3 (end)

**3. CRIMPING PROCEDURE** (Figures 4, 5, and 6)


There are two approved methods for crimping the connectors with these hydraulic tools, on both terminals and splices.

**DANGER**  To avoid personal injury, be sure to exercise extreme caution while holding terminals, splices, or wire near the crimping area of the crimping heads.


**3.1. Terminals**

The preferred (first) method is:

1. Insert properly stripped wire fully into terminal.

**CAUTION**  Do NOT turn or twist the wire/terminal during insertion.

2. Position terminal in stationary die (nest) with back of tongue resting against die, with yoke closed and pin inserted.

**NOTE**  Make certain that terminal is positioned so that wire barrel crimper on moving die (anvil) will crimp wire barrel of terminal. See Figure 4.

3. Holding wire in place, and fully inserted, activate power unit to complete crimp.

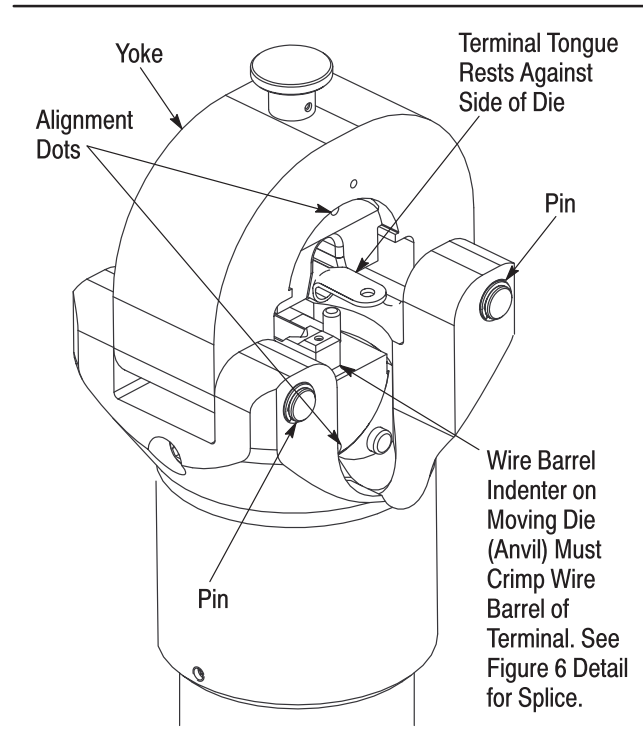


Figure 4

4. Remove crimped terminal from the die assembly. Refer to Figure 5 on where to grip breakaway terminals when removing them from the die assembly.

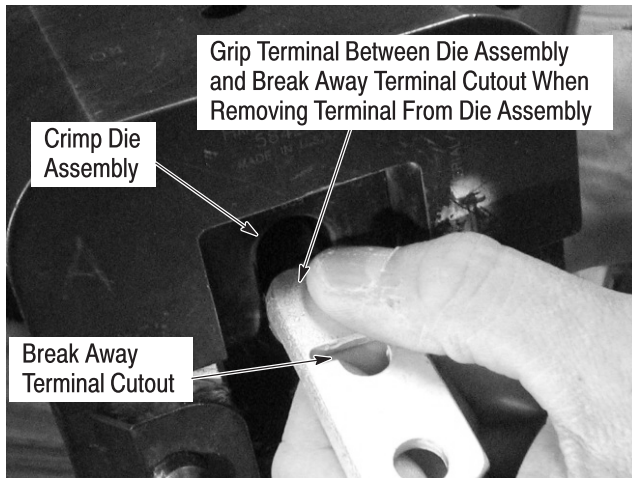


Figure 5

**NOTE**

If terminal sticks in die after crimping, apply a rocking action to remove it from the die. Wipe light oil on dies to prevent sticking, or use spray dry lubricant.

The alternate second method is:

1. Position terminal in stationary die (nest) with back of tongue resting against die.

**NOTE**

Make certain that terminal is positioned so that wire barrel crimper on moving die (anvil) will crimp wire barrel of terminal. See Figure 4.

2. The wire is not inserted into the terminal. Instead, Jog to advance the ram to hold the terminal. This is difficult to do; If the terminal barrel is deformed, the wire may not be inserted properly.

3. Insert properly stripped wire fully into terminal.

**CAUTION**

Do NOT turn or twist the wire/terminal during insertion.

4. Holding wire in place, activate power unit to complete crimp.
5. Remove crimped terminal from the die assembly. See Figure 5 for information on where to grip break away terminals when removing them from the die assembly.

**NOTE**

If terminal sticks in die after crimping, apply a rocking action to remove it from the die. Wipe light oil on dies to prevent sticking, or use spray dry lubricant.

**3.2. Splices**

The preferred (first) method is:

**NOTE**

Crimping head 1976230-1 CANNOT crimp splices.

1. Insert properly stripped wire fully into splice.

**CAUTION**

Do NOT turn or twist the wire/splice during insertion.

**NOTE**

Make sure splice is properly aligned in stationary die so that moving die will crimp wire barrel of splice.

2. Position splice in die assembly so that edge of die is within width of splice crimp mark. The stripe marking on splice must be inside die, facing up, and in alignment with dot on nest. See Figure 6.

**NOTE**

When using splices with a color coded band around end of splice, use correct copper conductors in the color coded end.

3. Holding wire in place, activate power unit to complete first splice crimp.
4. When crimp is completed, remove the splice.

**NOTE**

If splice sticks in die after crimping, apply a rocking action to remove it from the die. Wipe light oil on dies to reduce sticking, or use spray dry lubricant.

5. To crimp other half of splice, rotate the splice/tool 180°, making sure the stripe marking on the splice is inside the assembly, facing up, and in alignment with dot on nest. See Figure 6. Follow the same procedure used to crimp first side of splice (steps 1 through 4).

The alternate (second) method is slightly different, but very important. The difference is in preceding Step 1.

1. Position splice in die assembly so that edge of die is within width of splice crimp mark. The stripe marking on splice must be inside die, facing up, and in alignment with dot on nest. See Figure 6.
2. Do NOT insert wire into splice, instead, jog to advance the ram to hold the splice. This is difficult to do; If the splice is deformed, the wire may not be inserted properly.
3. Insert properly stripped wire fully into splice wire barrel.

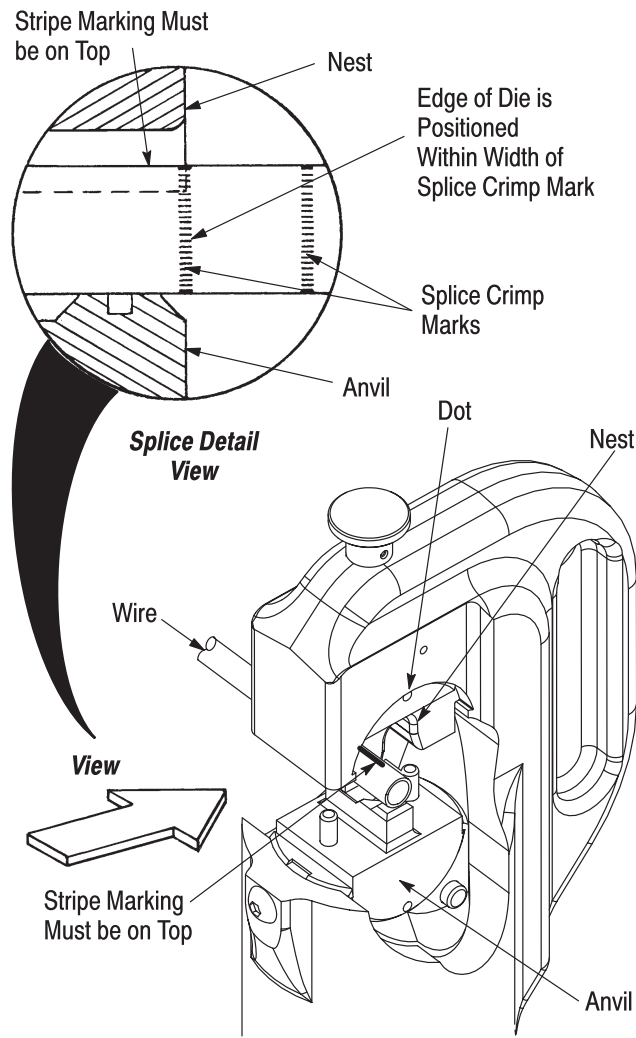


Figure 6

6. To crimp other half of splice, rotate the splice/tool 180°, making sure the stripe marking on splice is inside the assembly, facing up, and in alignment with dot on nest. See Figure 6. Follow the same procedure used to crimp first side of splice (Steps 1 through 5).

**4. CRIMP INSPECTION MARK**

A crimp inspection mark is featured on each crimped terminal or splice. The mark consists of a dimple on the face of a cylinder which is embossed in the primary crimp area of the terminal or splice. The inspection mark must appear as shown in the artwork presented in Section 3.5 of Application Specification 114-2134.

The inspection mark must appear as indicated in Application Specification 114-2134, in order to qualify the terminal or splice as an acceptable termination. The terminal or splice is unacceptable and should be rejected if the identification mark is deformed.

If the mark is deformed, refer to Figure 3 of this instruction sheet to verify proper wire CMA and terminal/die combination.

Verify that crimping dies fully bottom during crimp cycle. Also, determine if dies are in proper configuration by gaging the crimp chamber specified in Paragraph 5.2.B.

**5. MAINTENANCE/INSPECTION**



*To avoid personal injury, always disconnect electrical and/or air supply to power unit before performing, adjustments, inspections, and repairs.*



**CAUTION** Do NOT turn or twist the wire/splice during insertion.



**NOTE** When using splices with a color coded band around end of splice, use correct copper conductors in the color coded end.

4. Holding wire in place, activate power unit again to complete crimp.

5. When crimp is completed, remove the splice.

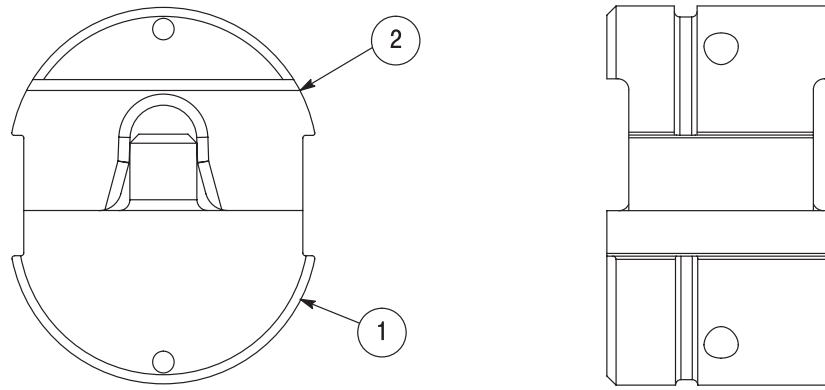


**NOTE** If splice sticks in die after crimping, apply a rocking action to remove it from the die. Wipe light oil on dies to reduce sticking, or use spray dry lubricant.

These instructions have been approved by Tyco Electronics Design, Production, and Quality Control Engineers to provide documented maintenance and inspection procedures. Through Tyco Electronics test laboratories and the inspection of production assembly, the procedures described herein have been established to ensure the quality and reliability of crimping die assemblies.

Customer-replaceable parts are listed in Figure 7. A complete inventory should be stocked and controlled to prevent lost time when replacement of parts is necessary.

Die assemblies are inspected before shipment. It is recommended that the die assembly be inspected immediately upon arrival at your facility to ensure that it has not been damaged during shipment.



**REPLACEMENT PARTS**

ITEM	DIE NUMBER			DESCRIPTION	QTY PER ASSY
	1490555-1	1490556-1	1490557-1		
1	1490553-1	1490553-2	1490553-3	Anvil	1
2	1490554-1	1490554-2	1490554-3	Nest	1

Figure 7

**5.1. Daily Maintenance**

It is recommended that each operator of the dies be made aware of — and responsible for — the following three steps of daily maintenance.

1. Remove dust, dirt, and other contaminants with a clean brush, or a soft, lint-free cloth. DO NOT use objects that could damage the dies.
2. Make certain the dies are protected with a thin coat of any good SAE 20 motor oil. DO NOT OIL EXCESSIVELY.
3. When the dies are not in use, mate them and store in a clean dry area.

**5.2. Periodic Inspection**

Regular inspections should be performed by quality control personnel. A record of scheduled inspections should remain with the dies and/or be supplied to supervisory personnel responsible for the dies. Though recommendations call for at least one inspection a month, the inspection frequency should be based on the amount of use, ambient working conditions, operator training and skill, and established company standards. These inspections should be performed in the following sequence:

**A. Visual Inspection**

1. Remove all lubrication and accumulated film by immersing the die assembly in a suitable commercial degreaser that will not affect the painted alignment dots.
2. Inspect the crimp area for flattened, chipped, cracked, worn, or broken areas. If damage is evident, the dies must be replaced or repaired. If

desired, you may return them for evaluation and repair (see Section 6, REPLACEMENT AND REPAIR).

**B. Gaging the Crimping Chamber**

This inspection requires the use of a plug gage conforming to the measurements provided in Figure 8 and in Figure 9. Tyco Electronics does not manufacture or market these gages. Gages may, however, be purchased from:

Pennoyer-Dodge Company  
6650-T San Fernando Road  
Glendale, CA 91221-1017

Instructions for gaging apply to both Figures 8 and 9. For alignment of the GO and NO-GO elements, refer to Figure 8. Proceed as follows:

1. Mate the dies until it is evident that they have bottomed. Hold the dies in this position.
2. Align the GO element of the gage with the crimping chamber. Push the element straight into the chamber without using force. The GO element must pass completely through the crimping chamber without using force, as shown in Figure 8.
3. Align the NO-GO element with the crimping chamber and try to insert it straight into the chamber. The NO-GO element may start entry but must not pass completely through, as shown in Figure 8.

If the crimping chamber conforms to the gage inspection, the dies are considered dimensionally correct and should be lubricated with a thin coat of any good SAE 20 motor oil. If not, the dies must be replaced or repaired before returning them to service.

For additional information concerning the use of the plug gage, refer to Instruction Sheet 408-7424.

**6. REPLACEMENT AND REPAIR**

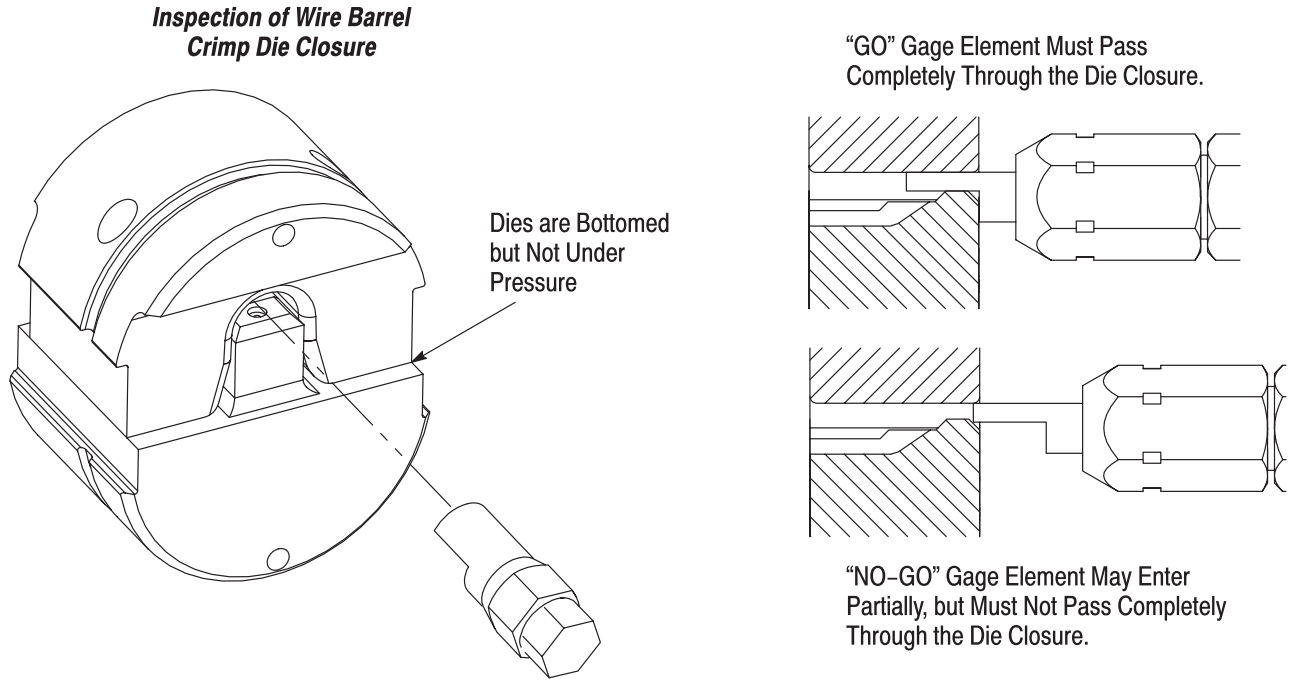
The parts listed in Figure 7 are customer-replaceable. A complete inventory can be stocked and controlled to prevent lost time when replacement of parts is necessary. Order replacement parts through your representative, or call 1-800-526-5142, or send a facsimile of your purchase order to 1-717-986-7605, or write to:

CUSTOMER SERVICE (38-35)  
 TYCO ELECTRONICS CORPORATION  
 P.O. BOX 3608  
 HARRISBURG, PA 17105-3608

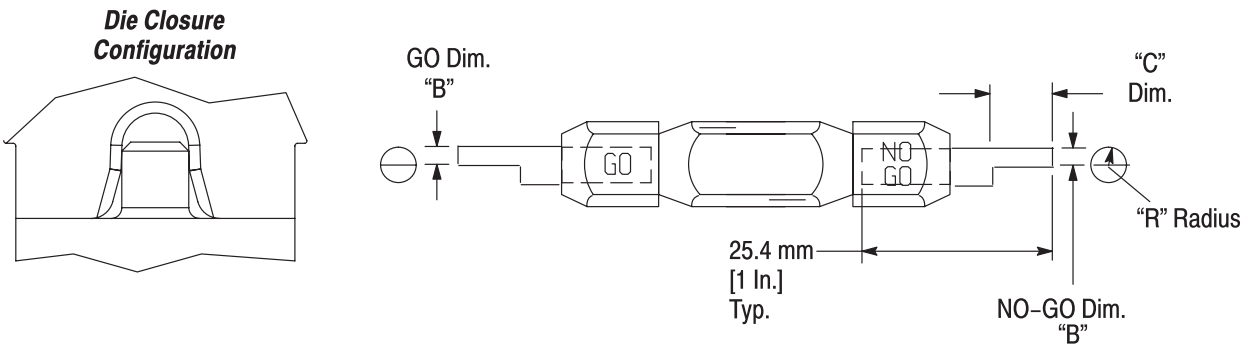
Dies may also be returned for evaluation and repair. For die repair service, contact a representative at 1-800-526-5136.

**7. REVISION SUMMARY**

- Initial release of document

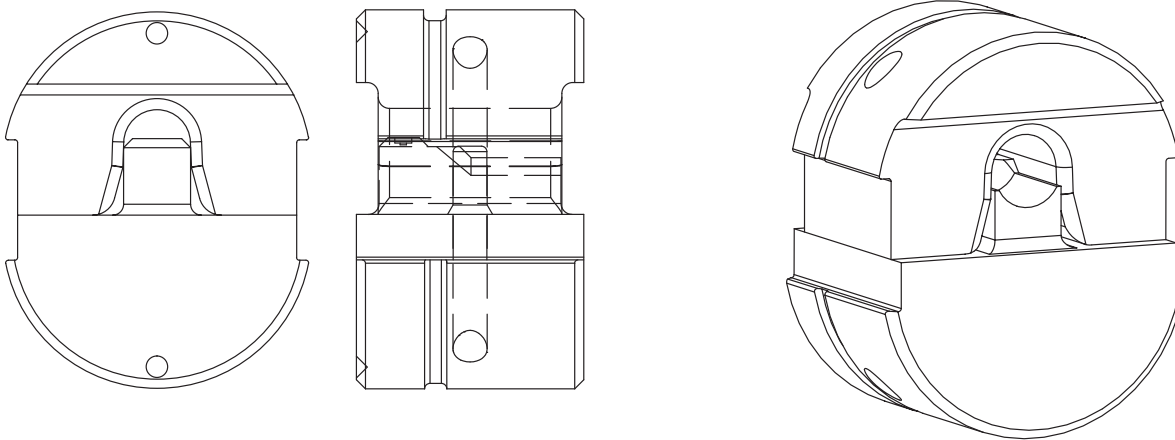


**SUGGESTED PLUG GAGE DESIGN — WIRE BARREL CRIMP**

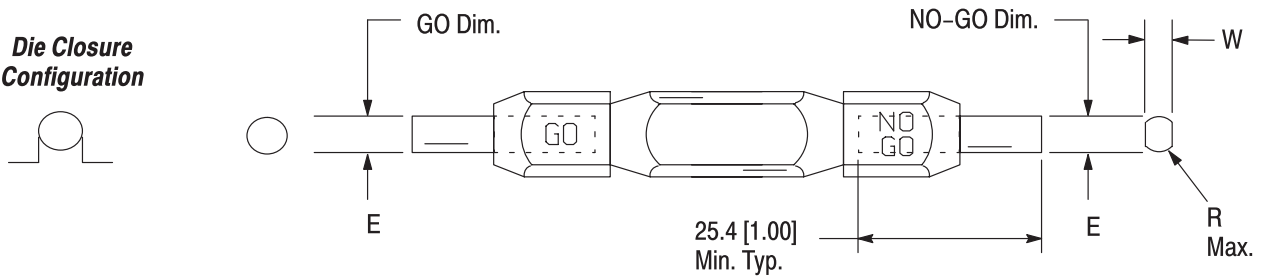


DIE SET NUMBER	GAGE ELEMENT DIMENSION "B"		"R" RADIUS (Max.)	"C" DIM.
	GO	NO-GO		
1490555-1	2.870-2.877 [.1130-.1133]	3.045-3.048 [.1199-.1200]	3.16 [.125]	6.35 [.250]
1490556-1	3.200-3.208 [.1260-.1263]	3.375-3.378 [.1329-.1330]	3.556 [.140]	6.35 [.250]
1490557-1	3.937-3.944 [.1550-.1553]	4.112-4.114 [.1619-.1620]	4.34 [.171]	6.35 [.250]

Figure 8



**Die Closure Configuration**



**SUGGESTED PLUG GAGE DESIGN FOR INSULATION SEALING CRIMP SECTION**

DIE SET NUMBER	GAGE ELEMENT DIMENSION "E"		"W" MAX	RADIUS "R" MAX
	GO	NO-GO		
1490555-1	6.248-6.256 [.2460-.2463]	6.652-6.665 [.2619-.2620]	6.20 [.244]	3.10 [.122]
1490556-1	7.518-7.526 [.2960-.2963]	7.922-7.925 [.3119-.3120]	7.47 [.294]	3.73 [.147]
1490557-1	9.195-9.202 [.3620-.3623]	9.599-9.601 [.3779-.3780]	9.14 [.360]	4.57 [.180]

Figure 9