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## 1. INTRODUCTION

This instruction sheet provides instructions on product application and Maintenance and Inspection for Insulation Piercing COPALUM Terminal and Splice Crimping Heads (68081 and 68082) used in Pneumatic Tool 69015. These crimping heads are used to crimp COPALUM Terminals and Splices on No. 8 thru 6 film insulated solid aluminum or copper wire or stranded copper wire.

**NOTE**

*Do not use stranded aluminum wire.*



Basic instructions on the use of these heads, wire preparation, etc. are provided in Section 2, INSTRUCTIONS. Section 3 features terminal or splice Crimp Inspection Procedure. Section 4 contains a Maintenance and Inspection Procedure which will enable you to establish a tool certification program.

Crimping heads are coated with preservative to prevent rust and corrosion. Wipe this preservative from heads, particularly from the crimping areas. For further instructions relative to the 69015 tool, refer to the instructions packaged with the tool.

**NOTE**

*All dimensions in this document are in millimeters [with inches in brackets]. Figures and Illustrations are for reference only and are not drawn to scale.*



Reasons for reissue are provided in Section 5, REVISION SUMMARY.

## 2. INSTRUCTIONS

**DANGER**

*Avoid personal injury. Always keep fingers clear of crimping jaws when actuating air tool. Do NOT operate tool without having head installed and latched in place.*



### 2.1. Crimping Head Installation

**CAUTION**

*Disconnect tool from air supply.*



1. Select the correct crimping head for the wire size being used. Wire size and the insulation piercing crimp symbol (▲) appear on one jaw as shown in Figure 1.

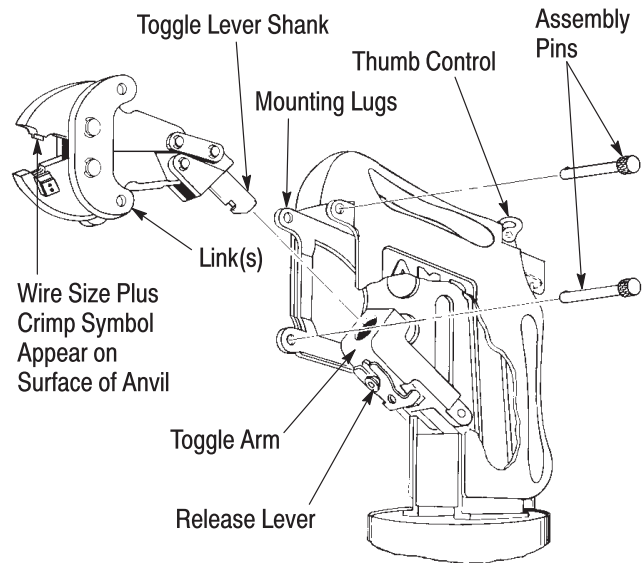


Figure 1

2. Remove assembly pins from mounting lugs as shown in Figure 1.
3. Pull toggle arm forward and insert toggle lever shank of crimping head all the way into hole in toggle arm until toggle lever snaps in place. See Figure 1.
4. Align holes in crimping head links with holes in mounting lugs.
5. Insert assembly pins.
6. Connect air supply to tool 586 to 689 kPa [85 to 11 psi].
7. Tool is now ready for operation.

### 2.2. Crimping Head Removal

**CAUTION**

*Disconnect tool from air supply.*



1. Remove assembly pins.
2. Lower head away from mounting lugs, twist head 90° and remove from toggle arm.
3. Reinstall assembly pins.

### 2.3. Wire Selection/Loading

Solid aluminum or copper (or a combination of both) and stranded copper conductors may be crimped in the same wire barrel under the following conditions:

**NOTE**

Conductors must always be within CMA limits of wire barrel.



**A. Condition 1**

See Figure 2, Detail A

Maximum CMA fill for copper conductor should not exceed 40% of total CMA. For example, six No. 14 solid aluminum 12.14 mm<sup>2</sup> [24,000] Cir Mil plus one No. 8 stranded copper 8.10 mm<sup>2</sup> [16,000] Cir Mil equals 40,000 Cir Mil. The one No. 8 stranded copper conductor is approximately 40% of total CMA 20.24 mm<sup>2</sup> [40,000] Cir Mil being crimped.

**D. Condition 4**

See Figure 2, Detail D

Four identical rectangular conductors, where one conductor thickness is equal to or greater than 1/4 the width of one conductor, may be crimped without removing film insulation.

**E. Condition 5**

See Figure 2, Detail E

Two identical rectangular conductors, where thickness of one conductor is equal to or less than 1/4 of the width of one conductor, may be crimped without removing film insulation.

**F. Condition 6**

See Figure 2, Detail F

In some instances, it may not be possible to fit a particular CMA loading into the normally recommended terminal or splice. In these cases, where seven or more equal round, or a combination of solid aluminum and stranded copper conductors are used, and the total CMA is at least 50% of maximum CMA of the next larger size terminal or splice, the larger size may be used. Example: three No. 14 solid conductors equal about 6.07 mm<sup>2</sup> [12,000] Cir Mils. This falls within the CMA range of a 12–10 terminal or splice accepting a maximum CMA of 6.63 mm<sup>2</sup> [13,100] circular mils. However, it may not be possible to insert all three conductors into the recommended terminal or splice. It is possible to insert all three conductors into a No. 8 size terminal or splice accepting a CMA range of 6.63–10.52 mm<sup>2</sup> [13,100–20,800] circular mils. The 6.07 mm<sup>2</sup> [12,000] circular mils amounts to 59% loading of the maximum CMA for No. 8 size terminal or splices. Therefore, No. 8 size terminals or splices may be used.

**G. Condition 7**

When using a variety of solid conductor sizes, none of the conductors should vary more than one (1) wire gage. (Ideally not more than 1/2 wire gage.)

**2.4. Wire Preparation**

**NOTE**

Do not use stranded aluminum wire.



1. Select the proper terminal or splice wire size and crimping head combination for the wire size being used. See Figure 3.
2. Determine correct terminal or splice wire loading by referring to Paragraph 2.3, and CMA range listed in Figure 3.
3. Strip stranded copper wire to dimension indicated in Figure 3.

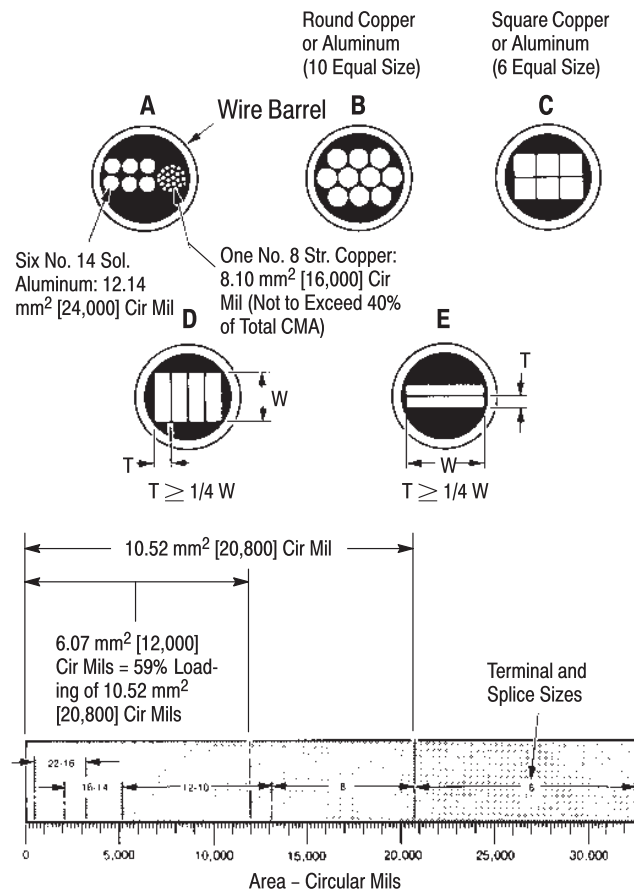


Figure 2

**B. Condition 2**

See Figure 2, Detail B

A maximum of ten equal size round conductors may be crimped without removing film insulation.

**C. Condition 3**

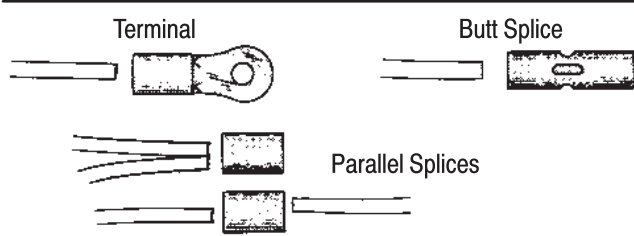
See Figure 2, Detail C

A maximum of six equal size square conductors may be crimped without removing film insulation.

**NOTE**



*It is not necessary to strip film insulated aluminum or copper wires.*



| HEAD  | WIRE SIZE | CMA RANGE                                      | WIRE STRIP LENGTH |                 |
|-------|-----------|--|-------------------|-----------------|
|       |           |  | MIN.              | MAX.            |
| 68081 | 8         | 6.63-10.52 mm <sup>2</sup><br>[13,100-20,800]  | 10.31<br>[.406]   | 11.91<br>[.469] |
| 68082 | 6         | 10.52-16.75 mm <sup>2</sup><br>[20,800-33,100] |                   |                 |

Figure 3

**2.5. Crimping Procedure**

**DANGER**



*Avoid personal injury. When operating air tool, exercise caution when holding terminals, splices, or wire near crimping area.*

**A. Terminals**

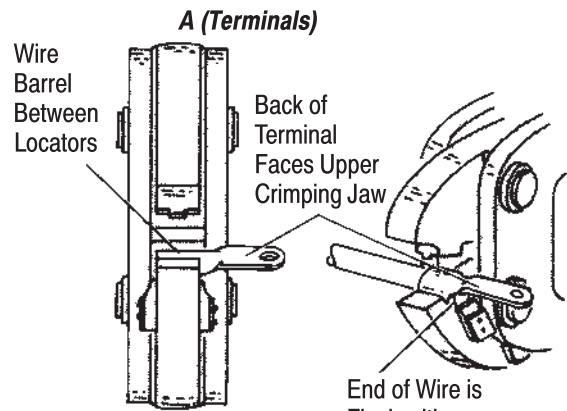
Ensure that the wire size stamped on the terminal corresponds with the wire size stamped on the crimping head link.

1. Position terminal wire barrel between locators of lower jaw as shown in Figure 4A. Back of terminal tongue must face upper jaw.
2. Insert wire into terminal wire barrel until end of wire is flush with or extended slightly beyond end of wire barrel. Hold terminal in place, press thumb control and hold it down until crimping stroke is completed.
3. Release thumb control and remove crimped terminal.
4. Refer to Section 3 and Figure 5 for crimp inspection.

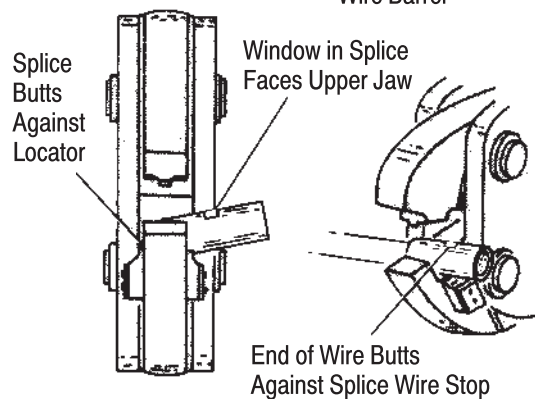
**B. Butt Splices**

Ensure that wire size stamped on the splice corresponds with the wire size stamped on the crimping head link.

1. Position butt splice in lower jaw so that end of splice butts against locator and window in splice faces upper jaw. See Figure 4B.



**B (Butt Splices)**



**C (Parallel Splices)**

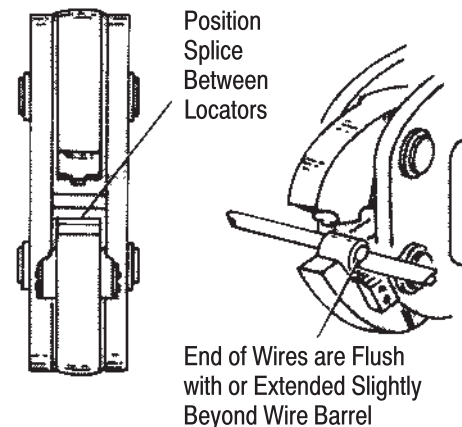


Figure 4

2. Insert wire into place until it butts against splice wire stop. Hold splice in place, press thumb control and hold it down until crimping stroke is completed.
3. Release thumb control and remove crimped splice.
4. To crimp other half of butt splice, remove it and reposition uncrimped half in crimping jaws and follow same procedure used to crimp first half of splice. If splice cannot be turned, turn tool around.

**NOTE**



Butt splices may be slightly bent when crimped as instructed in step (4). If this bending is objectionable, use the following crimping procedure:

5. To crimp other half of butt splice, remove and rotate splice 180° end over end. Reposition uncrimped half in lower jaw as described in step (1). If splice cannot be rotated, rotate tool. Insert wire and then crimp the splice.

6. Refer to Section 3 and Figure 5 for crimp inspection.

**C. Parallel Splices**

Ensure that wire size stamped on the splice corresponds with the wire size stamped on the crimping head link.

1. Position splice between locators as shown in Figure 4C.

2. Insert wires into splice until ends of wires are flush with or extended slightly beyond wire barrel. Hold splice in place, press thumb control and hold it down until crimping stroke is completed.

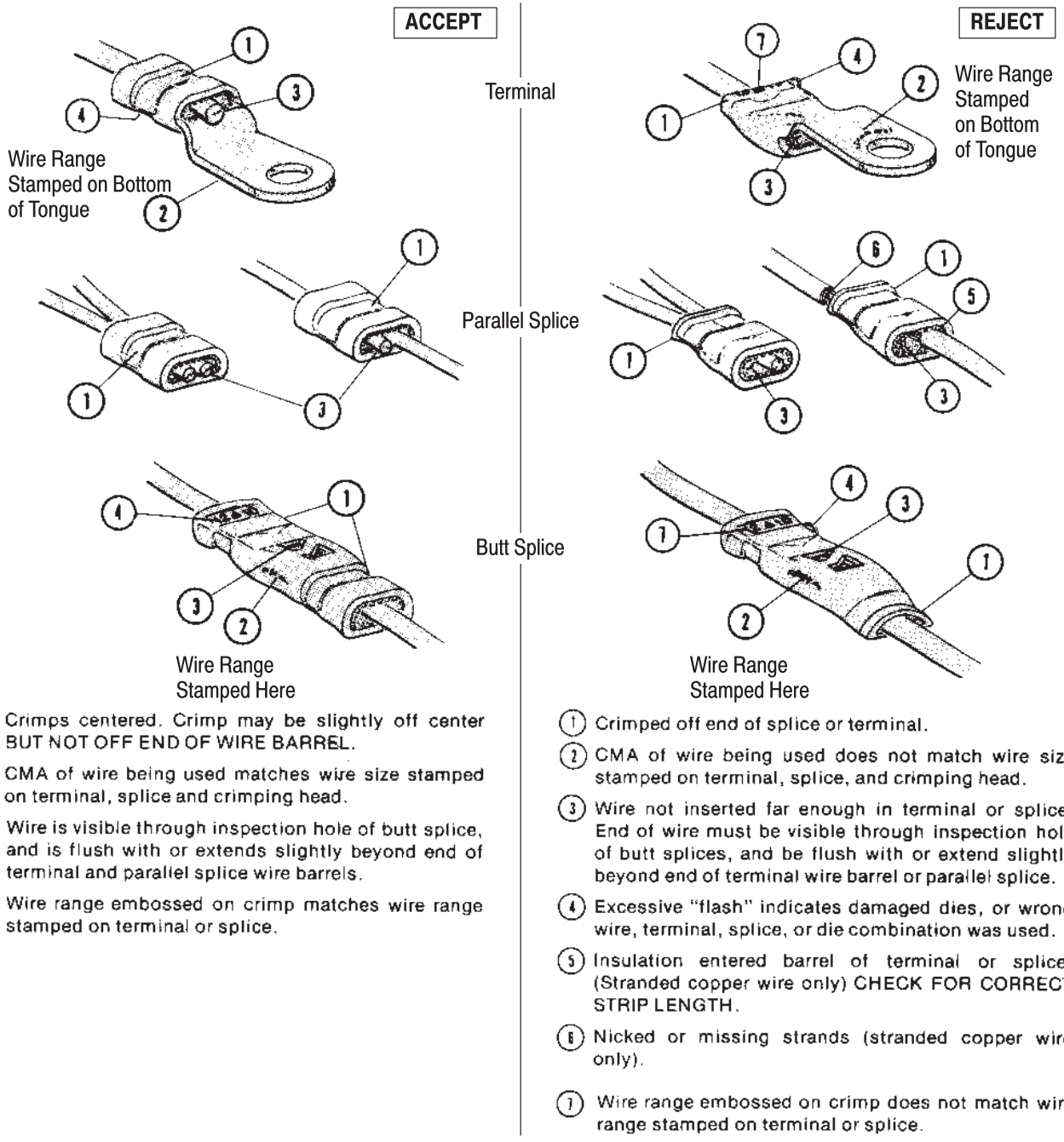


Figure 5

3. Release thumb control and remove crimped splice.
4. Refer to Section 3 and Figure 5 for crimp inspection.

**NOTE**

*If COPALUM Terminal or Splice sticks in die after crimping, apply a rocking action to remove from die.*

### 3. CRIMP INSPECTION

Inspect crimped terminals and splices by checking the features described in Figure 5.

Use only terminals and splices meeting the conditions shown in the "ACCEPT" column. "REJECT" terminals and splices can be avoided through careful use of instructions in Section 2, and by performing regular crimping head maintenance as provided in Section 4.

### 4. MAINTENANCE/INSPECTION PROCEDURE

Tyco Electronics recommends that a maintenance/inspection program be performed periodically to ensure dependable and uniform terminations. Crimping heads should be inspected at least once a month. Frequency of inspection may be adjusted to suit your requirements through experience. Frequency of inspection is dependent upon:

- The care, amount of use, and handling of the head.
- The type and size of the products crimped.
- The degree of operator skill.
- The presence of abnormal amounts of dust and dirt.
- Your own established standards.

All crimping heads are thoroughly inspected before packaging. Since there is a possibility of damage in shipment, new heads should be inspected in accordance with the following instructions when received in your plant.

#### 4.1. Cleaning

**CAUTION**

*Do not allow deposits of dirt, grease and foreign matter to accumulate on the die closure surfaces. These deposits may cause excessive wear, thereby affecting the quality of the crimp.*

The crimping head should be immersed in a reliable commercial de-greasing compound to remove accumulated dirt, grease and foreign matter. Remove remaining de-greasing compound with a lint-free cloth. When de-greasing compounds are not available, head may be wiped clean with a lint-free

cloth. Re-lubricate head as instructed in Paragraph 4.3 before placing it back in service.

#### 4.2. Visual Inspection

1. Visually inspect the crimping head for missing pins or retaining rings. If parts are missing or defective, refer to Figure 10 for customer replaceable parts.

2. Inspect the die closure surfaces of the head for broken, pitted, or chipped conditions. Although dies may gage within permissible limits, worn or damaged die closure surfaces are objectionable and can affect the quality of the crimp. Examples of possible damaged die closure surfaces are shown in Figure 6.

#### 4.3. Lubrication

Lubricate all pins, pivot points, and bearing surfaces with a good grade S.A.E. No. 20 motor oil as follows:

- Heads used in daily production – Lubricate daily
- Heads used daily (occasional) – Lubricate weekly
- Heads used weekly – Lubricate monthly

Wipe excess oil from head, particularly from crimping area. Oil transferred from the crimping area onto certain terminations may affect the electrical characteristics of an application.

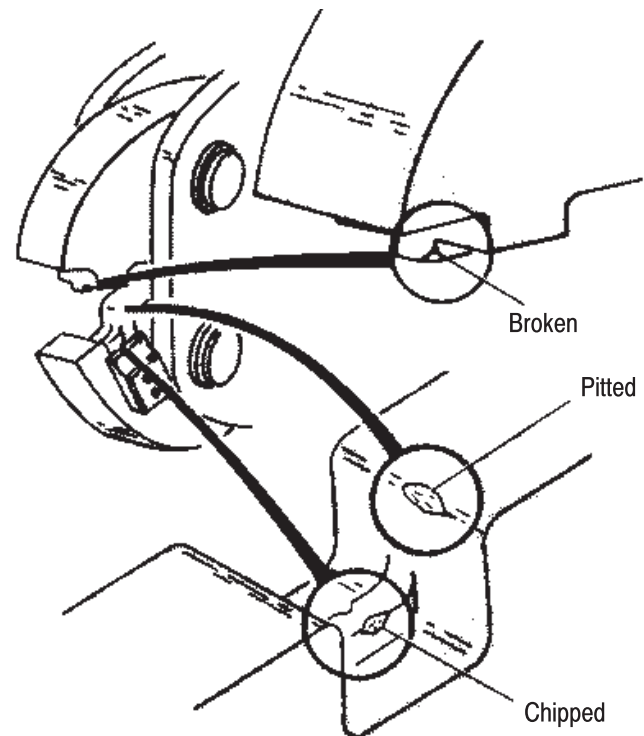


Figure 6

**4.4. Die Closure Inspection**

Every crimping head is inspected for proper die closure before packaging. An inspection should be performed periodically to check the die closure for excessive wear. The die closure inspection is accomplished using the GO NO-GO plug gages. Tyco Electronics neither manufactures nor sells plug gages. A suggested plug gage design and the GO NO-GO dimensions of the plug gage members are listed in Figures 7 and 8. the following procedure is recommended for inspecting the die closures.

1. Clean oil or dirt from die closure areas, and plug gage members.
2. Select the proper GO gage. Position gage member in lower jaw inner crimp closure so that

locator is in notch of gage member. See Figure 9, Detail A.

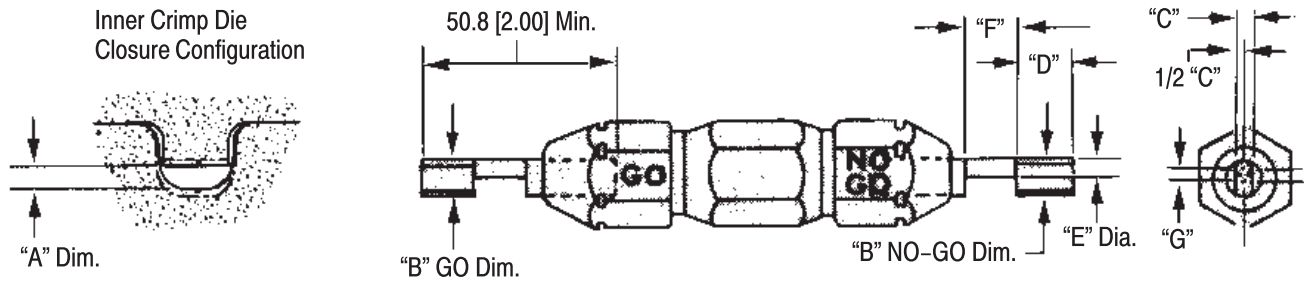
3. Close the crimping jaws until they are bottomed but not under pressure.

4. To meet the GO gage conditions, the plug gage must be free to rotate in either direction as shown in Figure 9, Detail A.

5. Select the proper NO-GO gage. Position gage member in lower jaw inner crimp closure so that locator is in notch of gage member. See Figure 9, Detail B.

6. Close the crimping jaws so that inner crimp surfaces are seated on the NO-GO member.

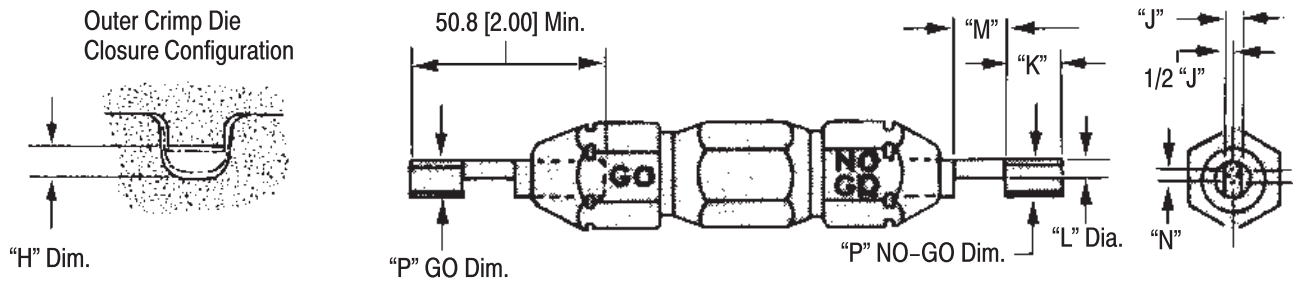
**SUGGESTED PLUG GAGE DESIGN - INNER CRIMP**



| HEAD  | DIE CLOS. DIM'S. "A" |                 | GAGE MEMBER† DIM'S. "B" DIA. |                              | "C"         | "D"         | "E" DIA.    | "F"         | "G"         |
|-------|----------------------|-----------------|------------------------------|------------------------------|-------------|-------------|-------------|-------------|-------------|
|       | GO‡                  | NO-GO           | GO                           | NO-GO                        |             |             |             |             |             |
| 68081 | 2.30<br>[.1180]      | 3.25<br>[.1280] | 2.997-3.005<br>[.1180-.1183] | 3.249-3.251<br>[.1279-.1280] | 1.65 [.065] | 7.37 [.290] | 1.65 [.065] | 7.87 [.310] | 0.61 [.024] |
| 68082 | 3.28<br>[.1290]      | 3.53<br>[.1390] | 3.277-3.284<br>[.1290-.1293] | 3.528-3.531<br>[.1389-.1390] | 1.90 [.075] | 7.62 [.300] | 1.90 [.075] | 8.89 [.350] | 0.61 [.024] |

Figure 7

**SUGGESTED PLUG GAGE DESIGN - OUTER CRIMP**



| HEAD  | DIE CLOS. DIM'S. "H" |                  | GAGE MEMBER† DIM'S. "P" DIA. |                              | "J"         | "K"         | "L" DIA.    | "M"         | "N"         |
|-------|----------------------|------------------|------------------------------|------------------------------|-------------|-------------|-------------|-------------|-------------|
|       | GO‡                  | NO-GO            | GO                           | NO-GO                        |             |             |             |             |             |
| 68081 | 4.445<br>[.1750]     | 4.801<br>[.1890] | 4.445-4.453<br>[.1750-.1753] | 4.798-4.801<br>[.1889-.1890] | 2.29 [.090] | 3.30 [.130] | 2.29 [.090] | 7.87 [.310] | 1.14 [.045] |
| 68082 | 4.953<br>[.1950]     | 5.309<br>[.2090] | 4.953-4.961<br>[.1950-.1953] | 5.306-5.309<br>[.2089-.2090] | 2.54 [.100] | 3.30 [.130] | 2.54 [.100] | 8.89 [.350] | 1.50 [.059] |

†Material - Tool Steel; ‡"GO" die closure dimensions apply when jaws are bottomed, but not under pressure

Figure 8

**INSPECTION OF INNER CRIMP CLOSURE**

**INSPECTION OF OUTER CRIMP CLOSURE**

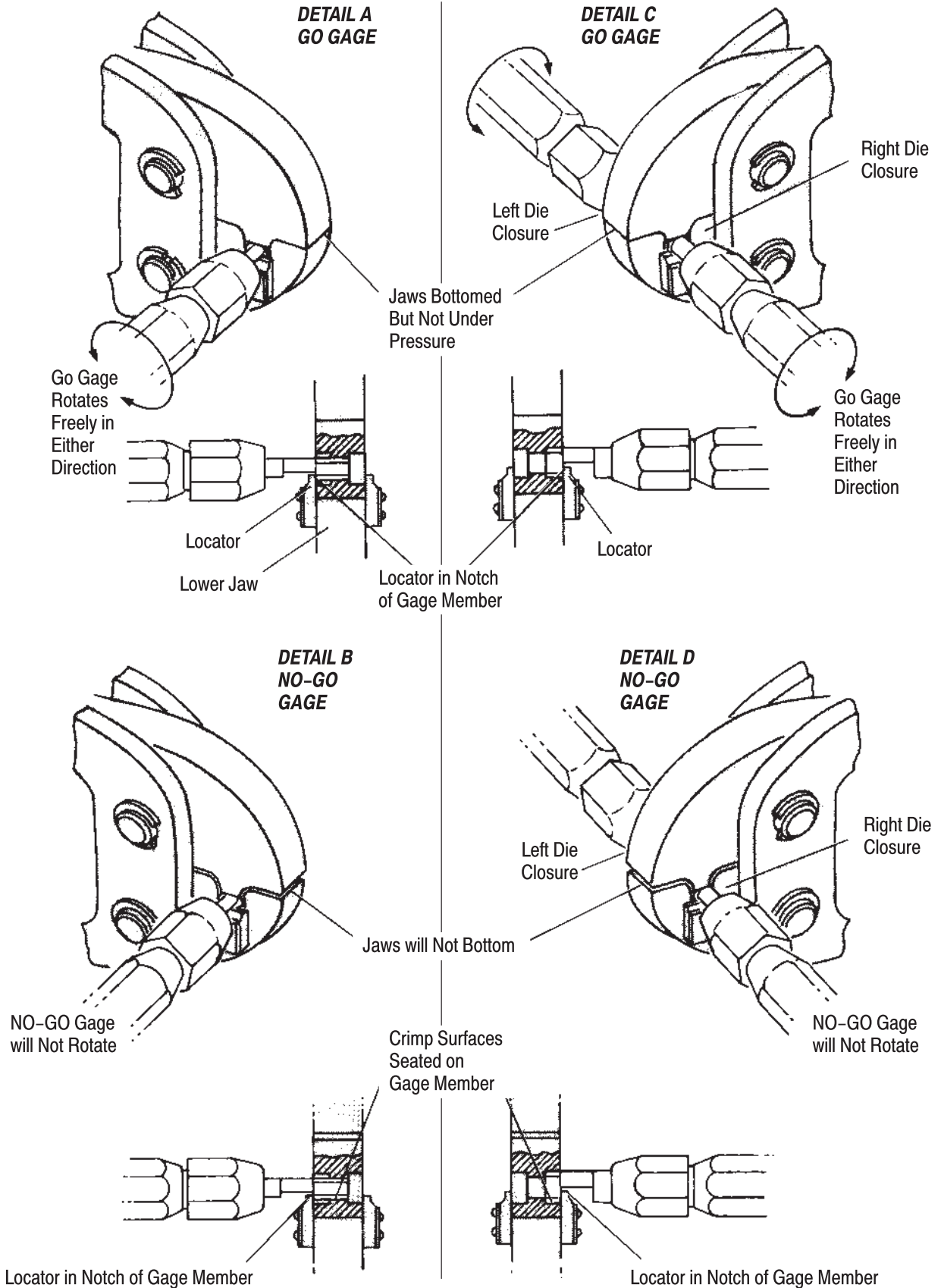


Figure 9

7. To meet the NO-GO gage conditions, jaw bottoming surfaces will NOT bottom, and NO-GO gage member will be held stationary (will not rotate) by the dies. See Figure 9, Detail B.

8. Inspect the right and left outer crimp closures in the same manner as steps (2) thru (7). See Figure 9, Details C and D.

9. If both the inner crimp and the outer crimp closures meet the GO NO-GO gage conditions, the die closures may be considered dimensionally correct. If you find that the die closures do not conform with the GO NO-GO gage conditions, contact your local Tyco Electronics Representative.

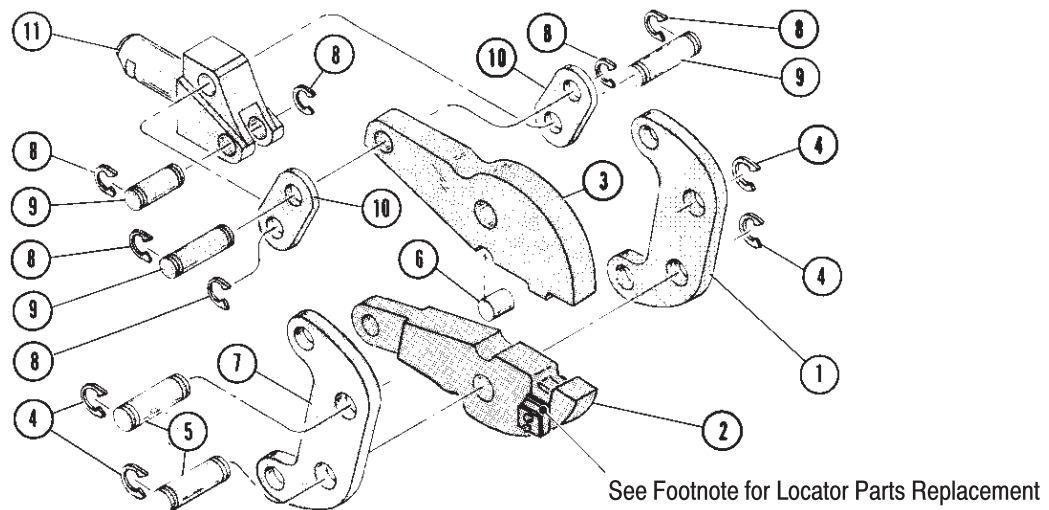
**4.5. Replacement Parts**

It may be advantageous to stock certain replaceable parts to prevent loss of production time. Figure 10 lists the customer replaceable parts that can be purchased from Tyco Electronics. Order replacements through your Tyco Electronics Representative, or call 1-800-526-5142, or send a facsimile of your purchase order to 717-986-7605, or write to:

CUSTOMER SERVICE (038-035)  
 TYCO ELECTRONICS CORPORATION  
 P.O. BOX 3608  
 HARRISBURG, PA 17105-3608

**5. REVISION SUMMARY**

- Updated document to corporate requirements
- New format



| ITEM | DESCRIPTION              | QTY | TOOL NUMBERS |           |
|------|--------------------------|-----|--------------|-----------|
|      |                          |     | 68081        | 68082     |
| 1    | LINK                     | 1   | 1-59649-9    | 2-59649-0 |
| 2    | LOWER JAW, with Locators | 1   | 307829-1     | 307829-2  |
| 3    | UPPER JAW                | 1   | 307792-1     | 307792-2  |
| 4    | RING, Retaining          | 4   | 1-21048-6    | 1-21048-6 |
| 5    | PIN, Retaining           | 2   | 300042       | 300042    |
| 6    | PIN, Pivot               | 1   | 300115       | 300115    |
| 7    | LINK                     | 1   | 300114       | 300114    |
| 8    | RING, Retaining          | 6   | 300102       | 300102    |
| 9    | PIN, Retaining           | 3   | 302563       | 302563    |
| 10   | LINK, Toggle             | 2   | 302562       | 302562    |
| 11   | LEVER, Toggle            | 1   | 302561       | 302561    |
| •    | RIVET                    | 2   | 1-59573-5    | 1-59573-5 |
|      | PLATE, Locator           | 2   | 308134-1     | 308134-1  |
|      | LOCATOR                  | 2   | 308132-1     | 308132-1  |

• If locators are worn and need replacement, order parts from this area of table.

Figure 10