

### 1. INTRODUCTION

This instruction sheet provides "Instructions" on product application and a "Maintenance and Inspection Procedure" for:

#### INSULATION PIERCING COPALUM \* TERMINAL AND SPLICE CRIMPING DIES (USED IN CRIMPING HEAD NUMBER 69082)

68129 MOD. A

#### INSULATION PIERCING COPALUM TERMINAL AND SPLICE CRIMPING DIES (USED IN CRIMPING HEAD NUMBER 69099)

|              |              |              |
|--------------|--------------|--------------|
| 68084 MOD. C | 68130 MOD. A | 68133 MOD. A |
| 68085 MOD. C | 68131 MOD. A |              |
| 68086 MOD. A | 68132 MOD. A |              |

These dies are used to crimp:

- COPALUM terminals and splices on No. 8 thru 4/0 film insulated solid aluminum or copper wire or stranded copper wire.

NOTE: *Do not use stranded aluminum wire.*

Basic instructions on the use of the dies, die insertion and removal, etc., are provided in Section 2, "Instructions". Section 3 features a terminal or splice "Crimp Inspection" procedure. Section 4 contains a "Maintenance and Inspection Procedure" which will enable you to establish and maintain a *die certification program*.

Dies are coated with preservative to prevent rust and corrosion. Wipe this preservative from dies, particularly from crimping areas.

For further instructions relative to the hydraulic power unit and hydraulic crimping head, refer to the instructions packaged with these tools.

### 2. INSTRUCTIONS

Crimping head No. 69099 is illustrated throughout this publication, however, die insertion, die removal and crimping instructions are the same for 69099 and 69082 crimping heads.

#### 2.1 DIE INSERTION

WARNING: AVOID PERSONAL INJURY. EXERCISE CAUTION TO AVOID ACCIDENTALLY DEPRESSING FOOT PEDALS OR TRIGGER CONTROL WHEN CHANGING DIES.

- Select the correct die for the tool and wire size being used. See Figure 3.
- Remove locking screw and loosen retaining screw in top section of crimping head. See Figure 1.
- Insert shank of stationary die into top section of crimping head and tighten retaining screw. Insert locking screw and tighten. See Figure 1.

NOTE: *Ensure that the dies are inserted "fully" and that the "flats" on shanks are facing the set screws.*

- Activate power unit to advance ram until set screw is visible.

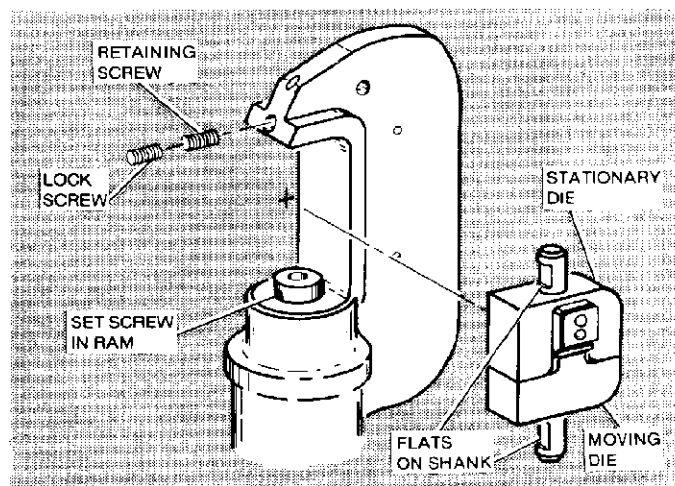


Figure 1

- Loosen set screw and insert shank of moving die into ram well. Tighten set screw. See Figure 1.
- Activate power unit to complete cycle and allow ram to return to "DOWN" position.

#### 2.2 DIE REMOVAL

- Remove locking screw and loosen retaining screw in top section of crimping head and remove die. Replace locking screw.
- Raise ram to full "UP" position. Loosen set screw in ram and remove die.

#### 2.3 WIRE SELECTION AND 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.*

Condition 1 - See Figure 2, Detail A.

Maximum CMA fill for copper conductor should not exceed 40% of total CMA. Example:

6 No. 14 solid aluminum (24M) plus 1 No. 8 stranded copper (16M) equals 40M. The 1 No. 8 stranded copper conductor is approximately 40% of total CMA (40M) being crimped.

Condition 2 - See Figure 2, Detail B.

A maximum of 10 equal size round conductors may be crimped without removing film insulation.

Condition 3 - See Figure 2, Detail C.

A maximum of 6 equal size square conductors may be crimped without removing film insulation.

Condition 4 - See Figure 2, Detail D.

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

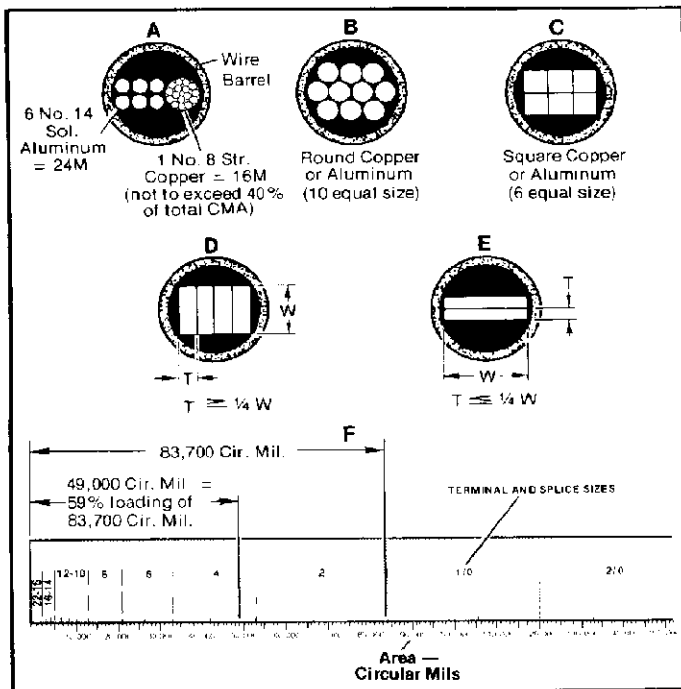


Figure 2

Condition 5 - See Figure 2, Detail E.

2 identical rectangular conductors, where thickness of one conductor is equal to or less than  $\frac{1}{4}$  of the width of one conductor, may be crimped without removing film insulation.

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 7 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:

12 No. 14 solid conductors equal about 49,000 circular mils. This falls within the CMA range of a No. 4 size terminal or splice accepting a maximum CMA of 52,600 circular mils. However, it may not be possible to insert all twelve conductors into the recommended terminal or splice. It is possible to insert all twelve conductors into a No. 2 size terminal or splice accepting a CMA range of 52,600 - 83,700 circular mils. The 49,000 circular mils amounts to 59% loading of the maximum CMA for No. 2 size terminals or splices. Therefore, No. 2 size terminals or splices may be used.

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  $\frac{1}{2}$  wire gage.)

## 2.4 WIRE PREPARATION

NOTE: Do not use stranded aluminum wire.

- Select the proper terminal or splice wire range and die set combination for the wire size being used. See Figure 3.
- Determine correct terminal or splice wire loading by referring to paragraph 2.3, and CMA range listed in Figure 3.
- Strip stranded copper wire to dimension indicated in Figure 3.

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

| CRIMPING HEAD NUMBER | DIE SET NO.  | WIRE SIZE | CMA RANGE          | WIRE STRIP LENGTH ▲ |        |
|----------------------|--------------|-----------|--------------------|---------------------|--------|
|                      |              |           |                    | Min.                | Max.   |
| 69099                | 68084 MOD. C | 8         | 13,100 TO 20,800   | 13/32"              | 15/32" |
|                      | 68085 MOD. C | 6         | 20,800 TO 33,100   |                     |        |
|                      | 68086 MOD. A | 4         | 33,100 TO 52,600   | 9/16"               | 5/8"   |
|                      | 68130 MOD. A | 2         | 52,600 TO 83,700   |                     |        |
|                      | 68131 MOD. A | 1/0       | 83,700 TO 119,500  | 23/32"              | 25/32" |
|                      | 68132 MOD. A | 2/0       | 119,500 TO 150,500 |                     |        |
|                      | 68133 MOD. A | 3/0       | 150,500 TO 190,000 |                     |        |
| 69082                | 68129 MOD. A | 4/0       | 190,000 TO 231,000 | 3/4"                | 13/16" |

▲ Stranded copper wire only.

Figure 3

## 2.5 CRIMPING PROCEDURE

WARNING: AVOID PERSONAL INJURY. WHEN OPERATING POWER UNIT, EXERCISE CAUTION WHILE HOLDING TERMINALS, SPLICES OR WIRE NEAR CRIMPING AREA.

### 2.5.1 Terminals

- Ensure that the wire size stamped on the terminal corresponds with the wire size stamped on the dies.
- Position terminal wire barrel between locators of stationary die as shown in Figure 4, Detail A. Back of terminal tongue must face moving die.
- Activate power unit so that moving die advances and holds terminal in place. Do not deform terminal wire barrel.
- Insert wire all the way into terminal wire barrel.
- Activate power unit to complete crimp.
- Refer to paragraph 3 and Figure 5 for crimp inspection.

### 2.5.2 Butt Splices

- Position butt splice in stationary die so that end of splice butts against locator as shown in Figure 4, Detail B. View port in splice faces stationary die.
- Activate power unit so that moving die advances and holds splice in place. Do not deform splice wire barrel.

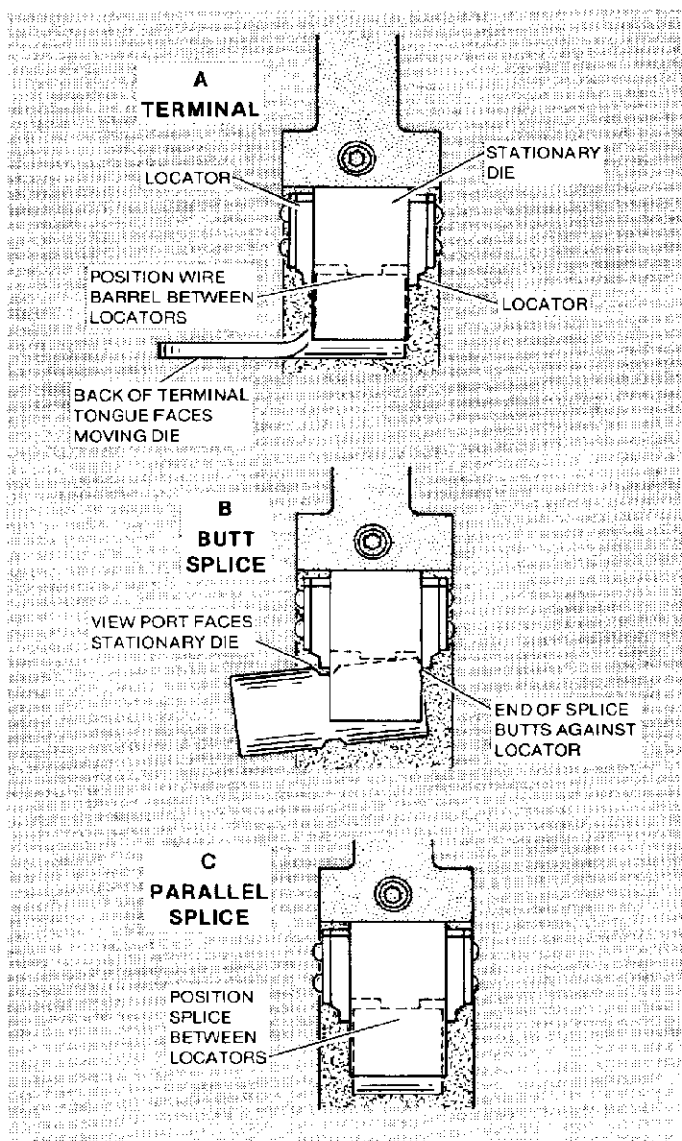


Figure 4

- (c) Insert wire all the way into splice wire barrel.
- (d) Activate power unit to complete crimp.
- (e) To crimp other half of butt splice, remove it and reposition uncrimped half in stationary die 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 (e). If this bending is objectional, use the following crimp procedure:*
- (f) To crimp other half of butt splice, remove and rotate splice 180° end over end. Reposition uncrimped half in stationary die as described in step (a). If splice cannot be rotated, rotate tool. Insert wire and then crimp the splice.
- (g) Refer to paragraph 3 and Figure 5 for crimp inspection.

### 2.5.3 Parallel Splices

- (a) Position splice between locators as shown in Figure 4, Detail C.
- (b) Activate power unit so that moving die advances and holds splice in place. Do not deform the splice.

- (c) Insert wires all the way into splice.
- (d) Activate power unit to complete the crimp.
- (e) Refer to paragraph 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 the terminals and splices that meet the conditions shown in the "ACCEPT" column.

"REJECT" terminals and splices can be avoided through careful use of instructions and charts in Section 2, and by performing regular die maintenance as instructed in Section 4.

## 4. MAINTENANCE/INSPECTION PROCEDURE

AMP recommends that a maintenance/inspection program be performed periodically to ensure dependable and uniform terminations. Dies 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:

1. The care, amount of use, and handling of the dies.
2. The type and size of the products crimped.
3. The degree of operator skill.
4. The presence of abnormal amounts of dust and dirt.
5. Your own established standards.

All AMP ★ dies are thoroughly inspected before shipping. Since there is a possibility of die damage in shipment, new dies should be inspected in accordance with the following instructions when received in your plant.

### 4.1 CLEANING

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 dies should be wiped clean frequently with a clean cloth.

### 4.2 VISUAL INSPECTION

Visually inspect the die closure surfaces for broken, pitted, or chipped areas. 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 DIE CLOSURE INSPECTION

Every AMP die set is inspected and tested for proper die closure before shipping. 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. AMP 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.

- (a) Clean oil or dirt from die closure areas, and plug gage members.

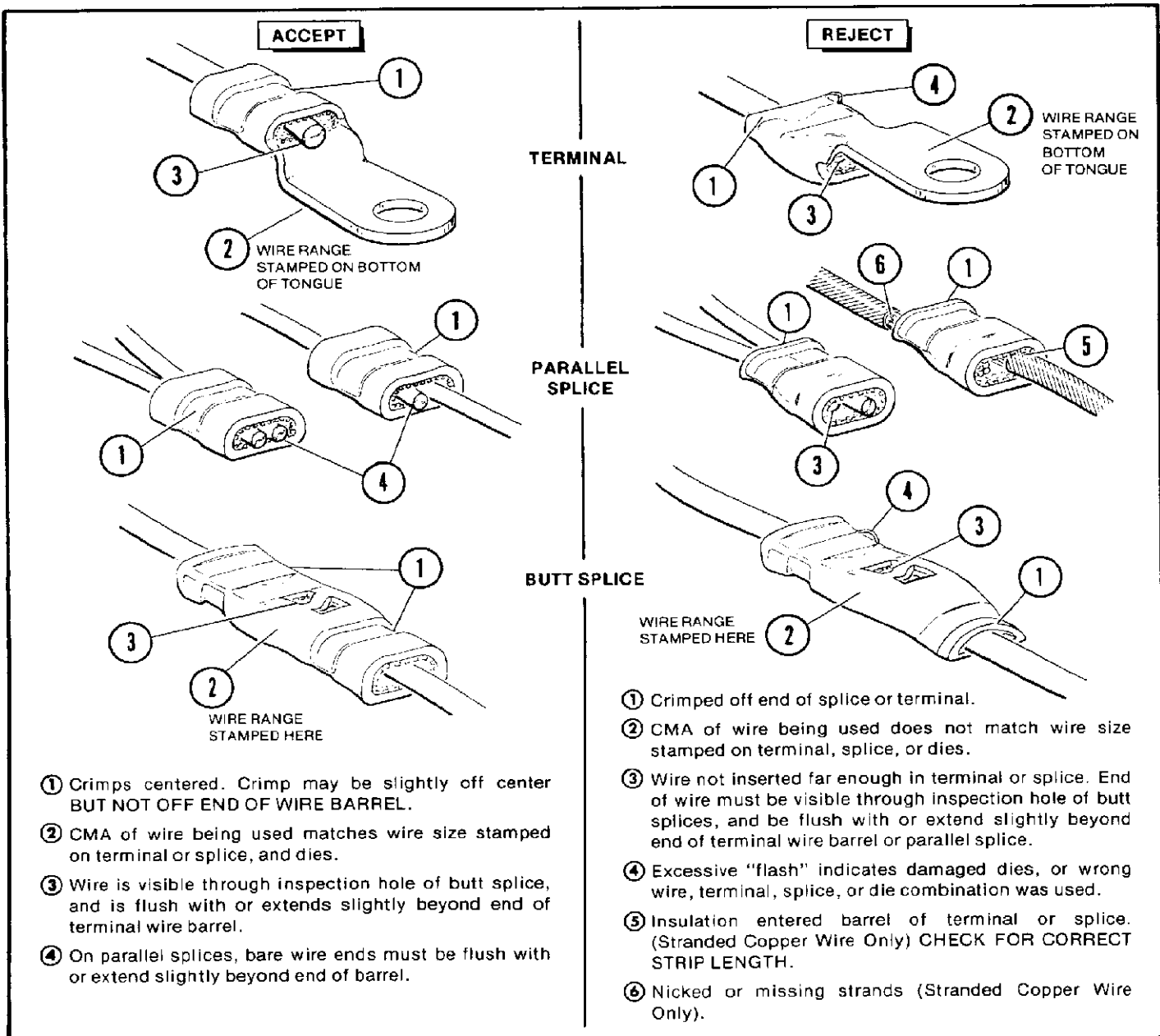


Figure 5

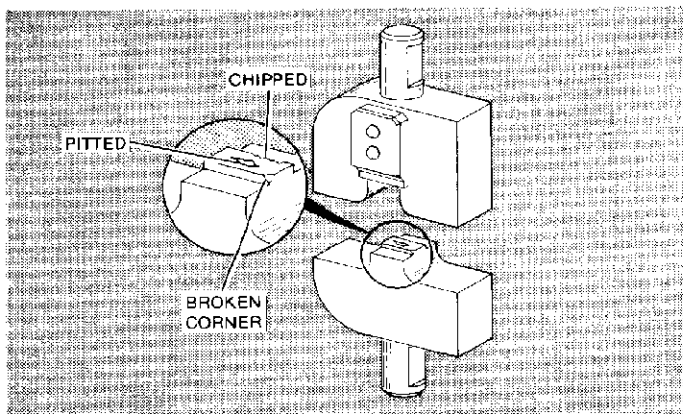
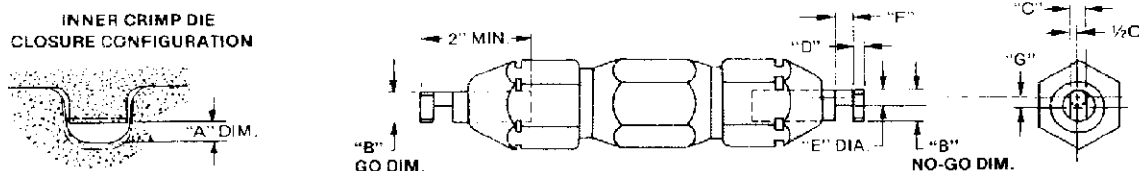


Figure 6

- Select the proper GO gage. Position gage member in inner crimp closure of stationary die so that locator is in notch of gage member. See Figure 9, Detail A.
- Mate the stationary and moving dies until they are bottomed but not under pressure.
- To meet the GO gage conditions, the plug gage must be able to be rotated freely in either direction as shown in Figure 9, Detail A.
- Select the proper NO-GO gage. Position gage member in inner crimp closure of stationary die so that locator is in notch of gage member. See Figure 9, Detail B.
- Mate the stationary and moving dies so that inner crimp surfaces are seated on the NO-GO gage member.

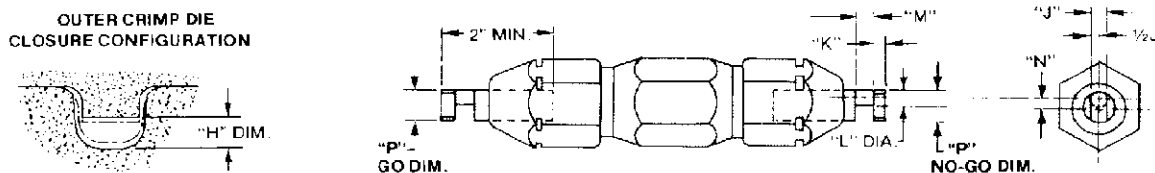
## SUGGESTED PLUG GAGE DESIGN — INNER CRIMP

INNER CRIMP DIE  
CLOSURE CONFIGURATION

| DIE SET<br>NUMBER | DIE CLOS. DIM'S. "A" |       | GAGE MEMBER† DIM'S. "B" DIA. |             | "C"  | "D"  | "E" DIA. | "F" | "G"  |
|-------------------|----------------------|-------|------------------------------|-------------|------|------|----------|-----|------|
|                   | GO‡                  | NO-GO | GO                           | NO-GO       |      |      |          |     |      |
| 68084 MOD. C      | .1180                | .1280 | .1180-.1183                  | .1279-.1280 | .065 | .290 | .065     | .31 | .024 |
| 68085 MOD. C      | .1290                | .1390 | .1290-.1293                  | .1389-.1390 | .075 | .300 | .075     | .35 | .024 |
| 68086 MOD. A      | .1540                | .1640 | .1540-.1543                  | .1639-.1640 | .080 | .400 | .080     | .48 | .033 |
| 68129 MOD. A      | .3100                | .3200 | .3100-.3103                  | .3199-.3200 | .180 | .530 | .180     | .48 | .058 |
| 68130 MOD. A      | .1800                | .1900 | .1800-.1803                  | .1899-.1900 | .100 | .200 | .100     | .48 | .036 |
| 68131 MOD. A      | .2160                | .2260 | .2160-.2163                  | .2259-.2260 | .130 | .400 | .130     | .48 | .042 |
| 68132 MOD. A      | .2430                | .2530 | .2430-.2433                  | .2529-.2530 | .140 | .400 | .140     | .48 | .047 |
| 68133 MOD. A      | .2690                | .2790 | .2690-.2693                  | .2789-.2790 | .160 | .400 | .160     | .48 | .053 |

Figure 7

## SUGGESTED PLUG GAGE DESIGN — OUTER CRIMP

OUTER CRIMP DIE  
CLOSURE CONFIGURATION

| DIE SET<br>NUMBER | DIE CLOS. DIM'S. "H" |       | GAGE MEMBER† DIM'S. "P" DIA. |             | "J"  | "K"  | "L" DIA. | "M" | "N"  |
|-------------------|----------------------|-------|------------------------------|-------------|------|------|----------|-----|------|
|                   | GO‡                  | NO-GO | GO                           | NO-GO       |      |      |          |     |      |
| 68084 MOD. C      | .1750                | .1890 | .1750-.1753                  | .1889-.1890 | .090 | .130 | .090     | .31 | .045 |
| 68085 MOD. C      | .1950                | .2090 | .1950-.1953                  | .2089-.2090 | .100 | .130 | .100     | .35 | .045 |
| 68086 MOD. A      | .2350                | .2490 | .2350-.2353                  | .2489-.2490 | .110 | .160 | .110     | .48 | .059 |
| 68129 MOD. A      | .4500                | .4640 | .4500-.4503                  | .4639-.4640 | .250 | .200 | .250     | .48 | .097 |
| 68130 MOD. A      | .2700                | .2840 | .2700-.2703                  | .2839-.2840 | .135 | .200 | .135     | .48 | .065 |
| 68131 MOD. A      | .3220                | .3360 | .3220-.3223                  | .3359-.3360 | .165 | .200 | .165     | .48 | .074 |
| 68132 MOD. A      | .3580                | .3720 | .3580-.3583                  | .3719-.3720 | .180 | .200 | .180     | .48 | .080 |
| 68133 MOD. A      | .3980                | .4120 | .3980-.3983                  | .4119-.4120 | .205 | .200 | .205     | .48 | .090 |

Figure 8

‡ "GO" dimensions apply when dies are bottomed but not under pressure.

† Material — Tool Steel

- To meet the NO-GO gage conditions, die 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.
- Inspect the right and left outer crimp closures in the same manner as steps (b) thru (g). See Figure 9, Details C and D.
- 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 crimping die closures do not conform with the GO NO-GO gage conditions, contact your local AMP field representative.

## 4.4 REPLACEMENT PARTS

Refer to Figure 10 for die set numbers and moving and stationary die numbers. Replacement dies can be purchased from AMP Incorporated, Harrisburg, Pa. 17105, or a wholly owned subsidiary of AMP Incorporated.

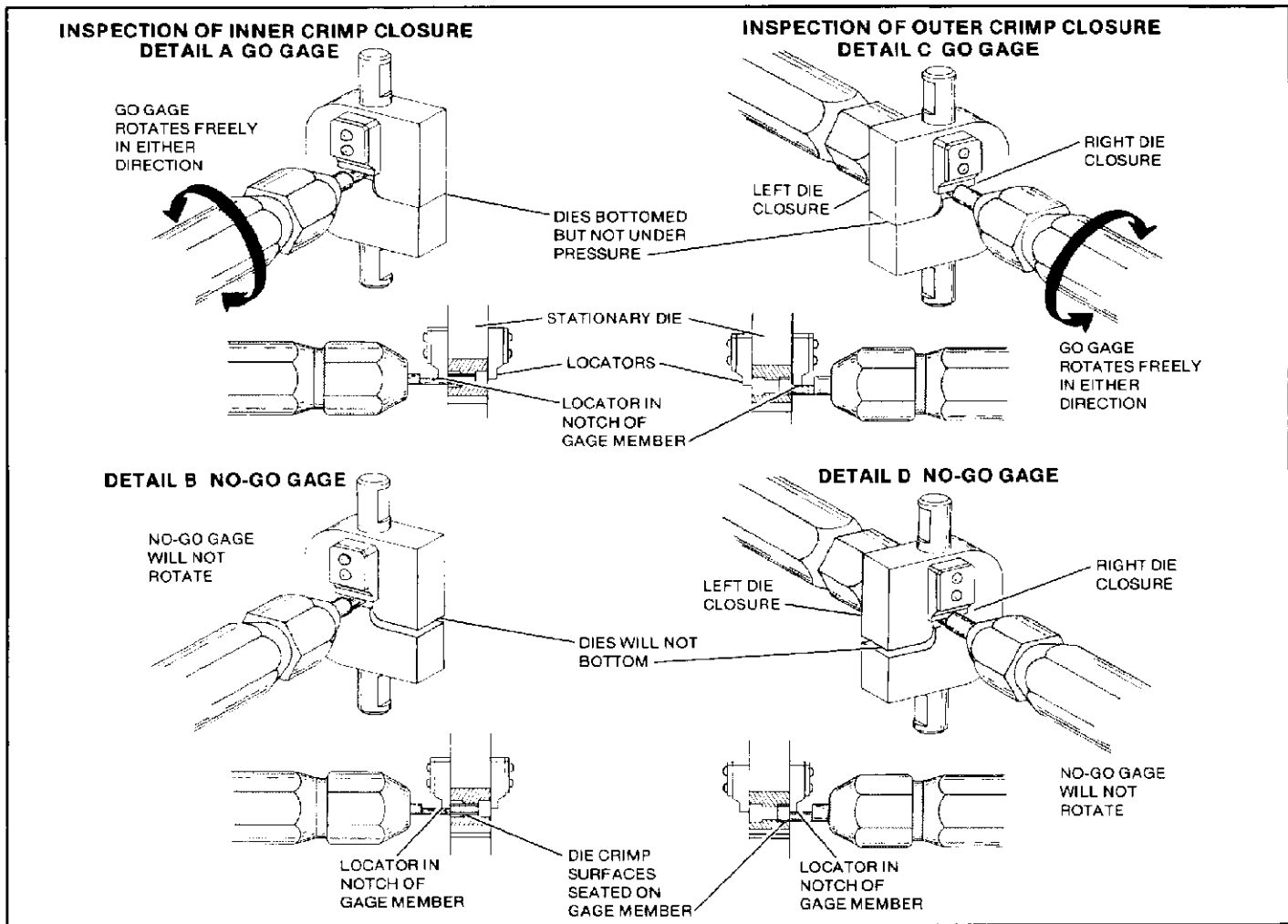


Figure 9

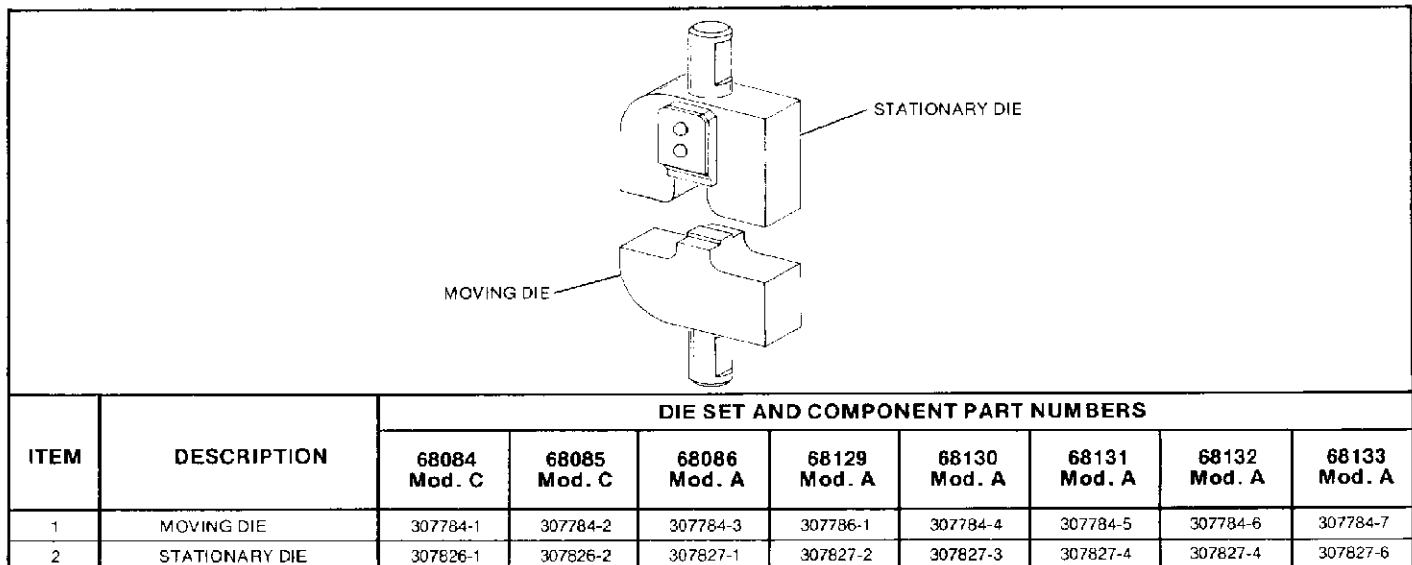


Figure 10

| REL. DATE | REV. DATE | APPROVALS                 |                        |
|-----------|-----------|---------------------------|------------------------|
| 8-14-72   | 10-24-74  | ENG. <i>James J. Ball</i> | PUB. <i>Paul Felty</i> |