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PROPER USE GUIDELINES

Cumulative Trauma Disorders can result from the prolonged use of manually powered hand tools. Hand tools are intended for occasional use and low volume applications. A wide selection of powered application equipment for extended-use, production operations is available.

1. INTRODUCTION

This instruction sheet is intended to provide you with instructions on product application and a maintenance and for: TERMASHIELD Ferrule Crimping Dies (Used in Tools 59500 and 69270-1 (Mod. 2):

Tools	Crimping Dies		
59500 69270-1	45061-3	45065-3	45240-2
	45062-3	45066-3	45241-2
	45063-3	45238-2	--
	45064-3	45239-2	--

TERMASHIELD ferrules on single and multiple conductor shielded wires with a primary conductor insulation range of .033" to .270",

Basic instructions on the use of these tools, dies, die insertion and removal, etc., are provided in Section 2,

*For further instructions relative to the pneumatic tool and hand tool, refer to the instructions packaged with these tools.

Section 3 contains a "Maintenance and Inspection Procedure" which will enable you to establish and maintain a die certification program.

These instructions may be used for dies not listed in Figure 1 but accompanied by this 408 series document. For unlisted dies, strip wire and crimp in the same manner as for identical size dies.

2. INSTRUCTIONS

2.1. Selection Data for Dies, Ferrules, and Insulating Caps

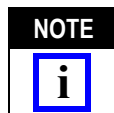
A. Single Conductor Shielded Wire

To determine which dies, ferrule and insulating cap to use with single conductor shielded wire, refer to - Figure 1.



The package numbers shown in Figure 1 are supplied with equal quantities of ferrules and insulating caps, but include only zinc plated ferrules.

1. Determine the outside (insulation) diameter of the primary conductor.
2. Locate this dimension in the appropriate primary conductor insulation range in column 2 of Figure 1. Opposite the insulation range you will find the catalog numbers of the crimping die, ferrule and insulating cap to use.



Crimping dies, ferrules and insulating caps are color coded. For example: Use dies color coded green to crimp a green ferrule. Place a green insulating cap on the green ferrule after ferrule is crimped.

B. Multiple Conductor Shielded Wire

To determine which dies, ferrule and insulating cap to use with shielded wire having two or more conductors, use the following formula: Multiply the outside (insulation) diameter of one primary conductor by the "factor", see Figure 2, listed opposite the total number of conductors in the wire. For example:

1. If you had a 3-conductor shielded wire, you would first find the outside (insulation) diameter of one conductor. In this case, we will use an outer diameter of .082 inches.
2. Opposite the number "3" (the number of primary conductors in the wire) in column one of Figure 2, you will find a multiplying factor of 2.17.
3. Multiply the outer diameter of the one conductor (.082 inches) by this factor (2.17). The result is .177. This figure (.177) is the primary conductor insulation range of the three-conductor shielded wire.
4. Next, refer to column 2 of Figure 1. Opposite the insulation range of .145 to .184, you will find the numbers of the crimping die, ferrule and insulating cap to use.

2.2. Die Insertion Hand Tool No 59500

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

1. (To open tool handles, close handles until CERTI-CRIMP* tool ratchet releases. See Figure 3. Note that once ratchet is engaged, handles cannot be opened until they are fully closed.

Tool	Primary Conductor Insulation Range (Inches)	Crimping Die Number	Ferrule Number			Insulation Cap	Die, Ferrule and Cap Color Code
			Zinc-Plated w/Inspctn Hole	Tin-Plated w/Out Inspctn Hole	Tin-Plated w/ Inspctn Hole		
59500 and 69270-1	.033 Max.	. 45061-3	327192	2-327192- 1	--	327768	GREEN
	.033 -.059	45062-3	323930	2-323930-1	2-32930-2	325009	VIOLET
	.059 -.085	45063-3	323931	2-323931-1	2-323931-2	325010	WHITE ‡
	.085 -.095	45064-3	323932	2-323932-1	2-323932-2	325011	BROWN
	.095 -.115	45065-3	323933	2-323933-1	2-323933-2	325012	ORANGE
	.115 -.130	45066-3	323934	2-323934-1	2-323934-2	325013	GREEN
59500	.130 -.145	45238-2	327137	2-327137-1	2-327137-2	328224	VIOLET
	.145 -.184	45239-2	327138	2-327138-1	2-327138-2	328225	WHITE ‡
	.184 -.220	45240-2	327139	2-327139-1	2-327139-2	328226	BROWN
	.220 -.245	45241-2	327140	2-327140-1	2-327140~2	328227	ORANGE
	.245 -.270	45158-2	327141	2-327141-1	2-327141-2	328228	GREEN


Figure 1

2. Each set of dies consists of a male die and a female die. See Figure 4.

3. Pull female die holding pin out of tool. Close handles until male die holding screw is visible. See Figure 4.

4. Turn die holding screw slot in a vertical position. See Figure 4.

5. Insert male die into head of tool with the color coded groove facing operator.

NOTE  Do not attempt to insert dies into the tool while holding dies together. Dies are inserted into the tool separately.

6. Insert female die into bead of tool. Both color coded grooves should now be facing operator.

7. Turn male die holding screw slot 1/4 sum to left or right.

8. Open the handles slightly and push the female die down so that the hole in the female die lines

up with the hole in the insert. Insert the female die holding pin. See Figure 5.

Conductors in Wire	Multiply Factor	Conductors in Wire	Multiply Factor
2	2.00	14	4.30
3	2.17	15	4.45
4	2.42	16	4.60
5	2.57	17	4.75
6	2.82	18	4.88
7	3.04	19	5.01
8	3.25	20	5.14
9	3.45	21	5.27
10	3.64	22	5.39
11	3.81	23	5.52
12	3.98	24	5.63
13	4.15	25	5.75

Figure 2

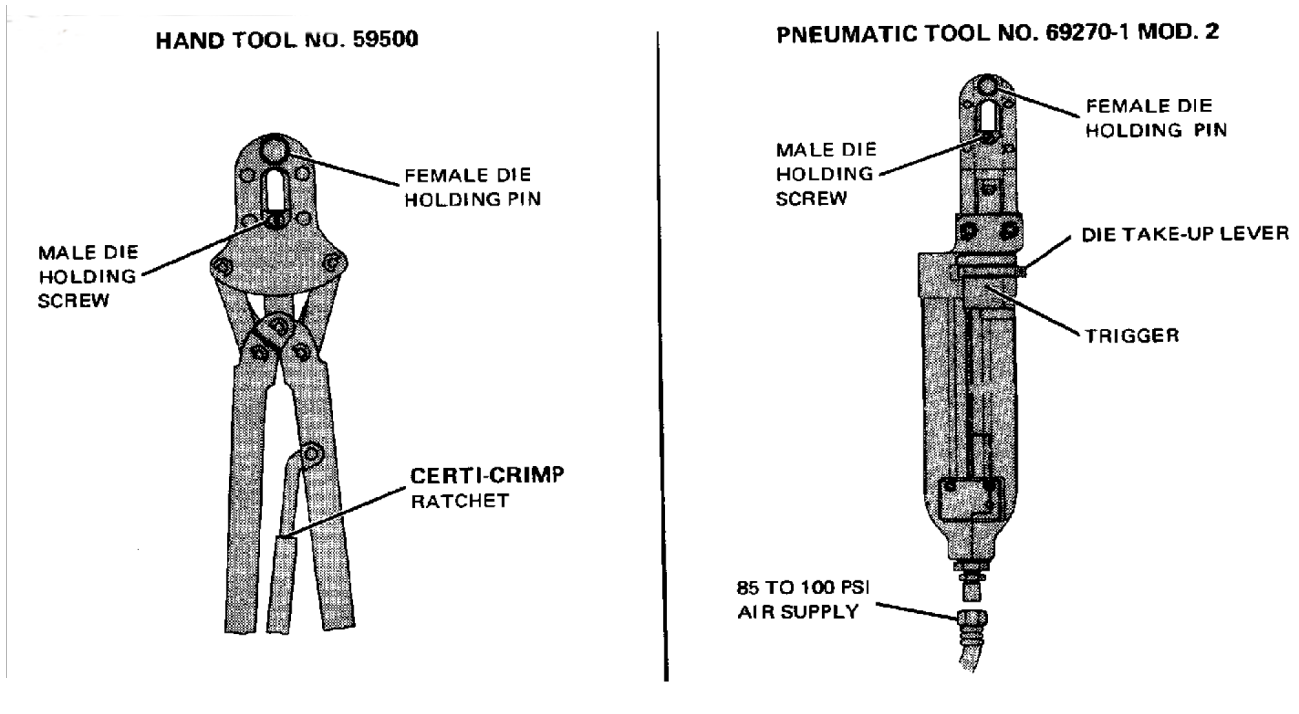


Figure 3

2.3. Die Insertion Pneumatic Tool No. 69270-1 Mod.2

Dies are coated with oil to prevent rust and corrosion. Wipe this oil from dies, particularly from Crimping area.

Pneumatic tool No. 69270-1, Model 2 is equipped with a pneumatic die take-up lever. See Figure 3. This take-up lever is used to hold the ferrule in a proper position prior to crimping.

1. Each set of dies consists of a male die and a female die. See Figure 4.
2. Connect air supply. (85 to 100 P.S.!.)
3. Pull female die holding pin out of tool. Depress take-up lever until male die holding screw is visible, See Figure
4. With take-up lever depressed, turn die holding screw slot in a vertical position. See Figure 4,
5. Insert male die into head of tool with the color coded groove facing operator.

NOTE *Do not attempt to insert dies into the tool while holding the dies together. Dies are inserted into the tool separately.*

6. Insert female die into head of tool. Both color coded groves should now be facing operator.

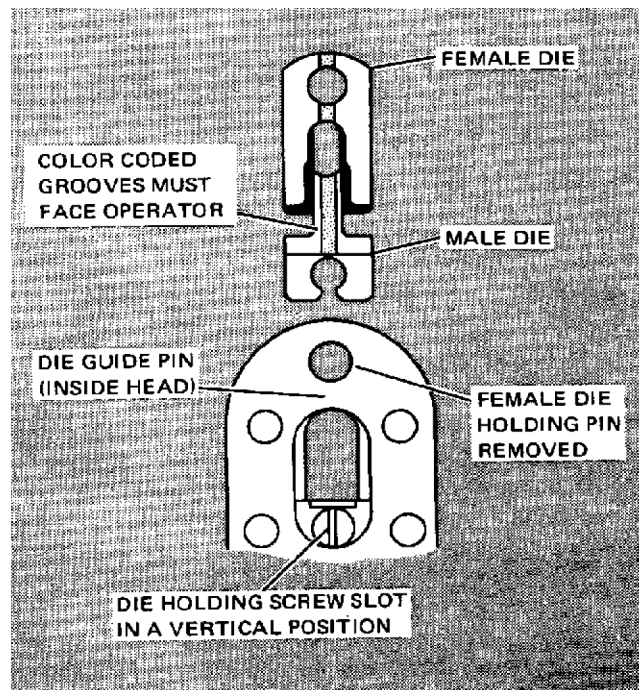


Figure 4

7. Turn male die holding screw slot 1/4 turn to left or right. (horizontal position) See Figure 5.

8. Release take-up lever, then push female die down so that hole in female die lines up with hole

in tool. Insert female die holding pin. See Figure 5.

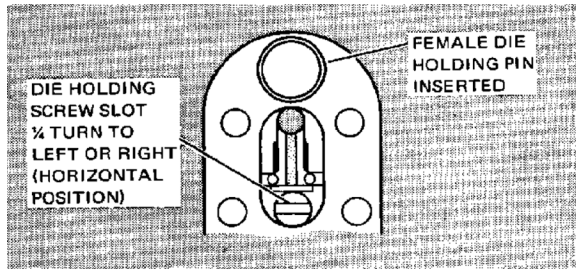


Figure 5

2.4. Die Removal Hand Tool No. 59500

1. Remove female die holding pin.
2. Close handles until male die holding screw is visible. See Figure 6.
3. Turn male die holding screw slot in a vertical position. See Figure 6.
4. Push die set up with a small screwdriver or drift pin just enough to permit female die to be pulled out of tool.
5. Remove male die and insert die holding pin back into tool.

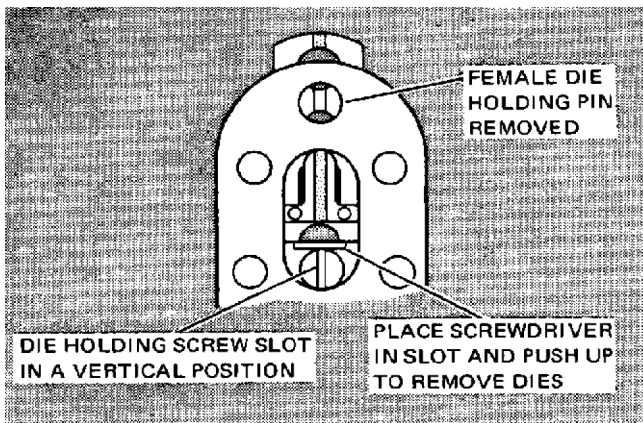


Figure 6

2.5. Die Removal Pneumatic Tool No. 69270-1 Mod. 2

1. Remove female die holding pin.
2. Depress take-up lever until male die holding screw is visible. See Figure 6.
3. With take-up lever depressed, turn male die holding screw slot in a vertical position. See Figure 6.

4. Push die set up with a small screwdriver or drift pin just enough to permit female die to be pulled out of tool.

5. Remove male die and insert die holding pin back into tool.

2.6. Wire Stripping And Crimping Procedures

A. Wire Stripping

1. Strip shielded wire as shown in Figure 7.

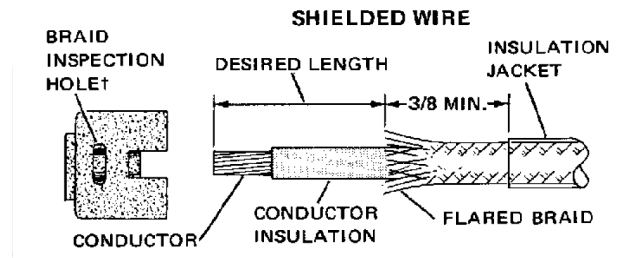


Figure 7

2. Strip ground wire to dimensions given in Figure 8.

Ferrule Number	Recommended Ground		Strip Length
	No. of Wires	Max. Ins Dia	
327192	One # 24	.063	1/4 Inch Min.
	Two # 24	.065	
	One # 22	.068	
323930 thru 323934	One # 20	.078	7/16 Inch Min
	One # 22	.078	
	Two # 22	.068	
327137 thru 327141	One # 18	No Limit on Insul Diameter	7/16 Inch Min
	One # 20		
	Two # 20		
	Two # 22		

Figure 8

B. Crimping Procedures

1. Place ferrule on shielded wire as shown in Figure 9. Flare the braid so that it will pass over and around support sleeve of ferrule.

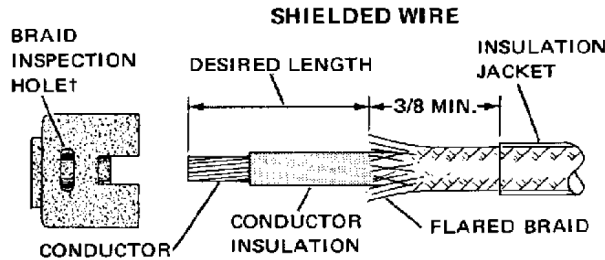


Figure 9

2. Insert ground wire into ferrule. See Figure 10.



NOTE On six smaller ferrules (Part No. 327192 and 323930 through 323934) slide the ground wire insulation under ferrule skirt approximately 1/16 inch. On five larger ferrules (Part No. 327137 through 327141). DO NOT slide the ground wire insulation under ferrule skirt.

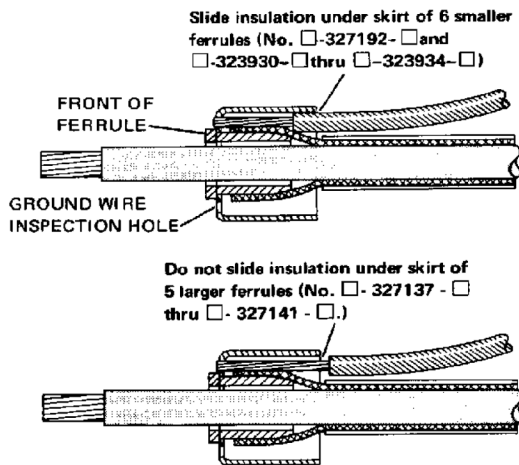


Figure 10

Hand Tool

- a. Open tool handles all the way.
- b. Place ferrule with shielded wire and ground wire attached in lower crimp area of dies. Push ferrule all the way into tool. See Figure 11.
- c. Hold ground wire and shielded wire in position and close handles until CERTI-CRIMP tool ratchet releases. Open handles and remove crimped ferrule. Pneumatic Tool

Pneumatic Tool

- a. Place ferrule, with shielded wire and ground wire attached, in lower crimp area of dies. Push ferrule all the way into tool. See Figure 11
- b. Hold ground wire and shielded wire in position and depress take-up lever to hold ferrule in place.
- c. Simultaneously release take-up lever and depress trigger to complete crimp. Release trigger and remove crimped ferrule.

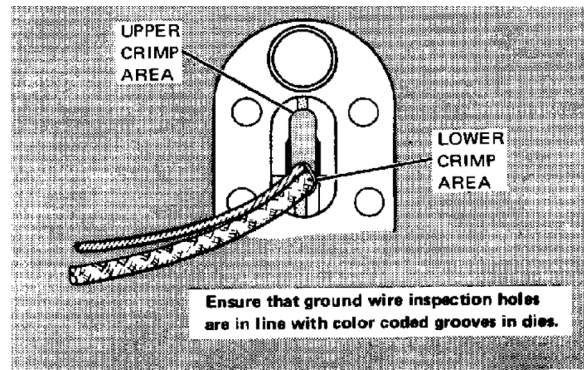


Figure 11

C. Ferrule Insulating Caps

1. Place insulating cap on ferrule as shown in Figure 12.
2. Insulating caps are color coded for easy matching with ferrule. To select correct insulating cap, refer to Figure 1.

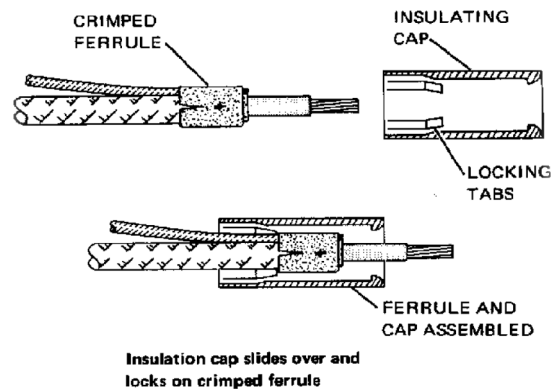


Figure 12

3. MAINTENANCE/INSPECTION PROCEDURE

Tyco Electronics recommends that a maintenance-inspection program be performed periodically. This is necessary to assure that continued use of the dies will result in the same dependable and uniform terminations for which the dies were designed.

We recommend an initial frequency of inspection of once a month. This frequency may be adjusted to suit your requirements through experience. The frequency of an inspection is dependent upon:

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

With proper maintenance and inspection, these dies will give years -of satisfactory service.

All Tyco Electronics dies are thoroughly inspected before being shipped from the factory, however, since there is a possibility of die damage in shipment, it is recommended that new dies be inspected in accordance with Section 3 when received in your plant.

3.1. Cleaning

Do not allow deposits of dirt, grease and foreign matter to accumulate in the die closure area and on the bottoming surfaces of the dies. These deposits may prevent the dies from bottoming fully and may also cause excessive wear in the die closure surfaces, thereby affecting the quality of the crimp. The dies should be wiped clean frequently with a clean cloth.

3.2. Visual Inspection

Visually inspect the die closure surfaces for broken 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 surfaces are shown in Figure 13.

3.3. Die Closure Inspection

Every Tyco Electronics die set is inspected and tested for proper die closure before being shipped from the factory. An inspection should, however, be performed periodically to measure the die closure.

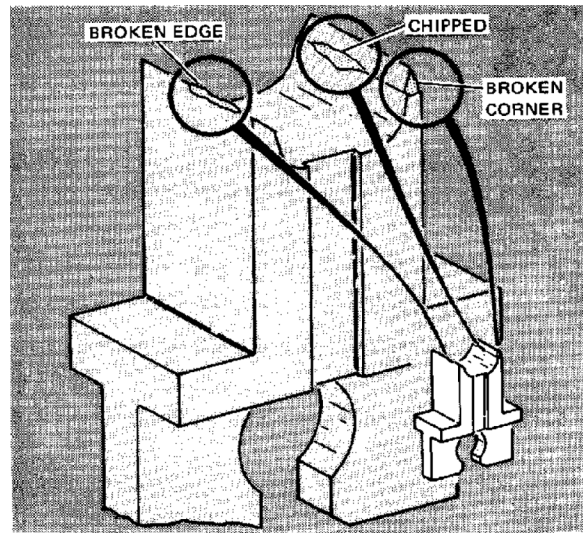
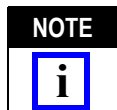


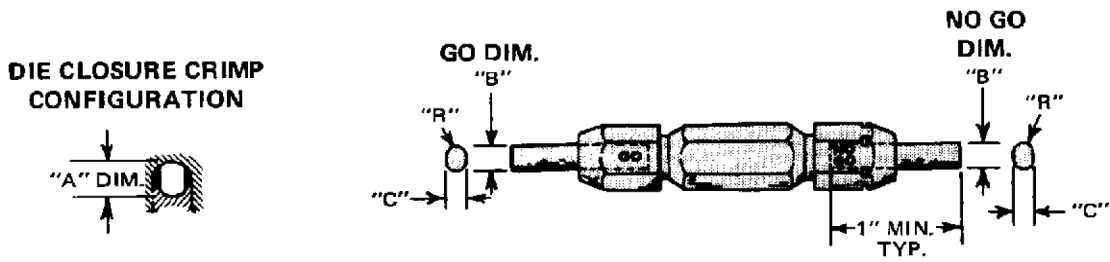
Figure 13

The die closure inspection is accomplished using GO NO-GO plug gages. Tyco Electronics neither manufactures nor sells plug gages, however, a suggested plug gage design and the GO NO-GO dimensions of the plug gage members are listed in Figure 14. The following procedure is recommended for measuring the die closures.



Refer to 408 -7424 for ordering information and for information concerning the GO NO-GO gages.

1. Remove traces of oil or dirt from die crimping area and plug gage members.
2. Insert dies in tool.
3. When using hand tool, close handles of tool until dies bottom. Do not apply additional pressure to tool handles.
4. When using pneumatic tool, reduce air supply pressure to a range between 15-20 p.s.i. Depress trigger to bottom dies.
5. With crimping dies bottomed, check the die closure using the proper plug gage. Hold gage in straight alignment with the die closure and carefully try to insert without forcing, the GO member, and then the NO-GO member. See Figure14. The GO member must pass completely through the die closure.



Die Set	Die Set Die Closure Dimensions "A" ‡		Gage Member ‡‡ Dimensions "B"		"C" Max	"R" Max
	GO	NO-GO	GO	NO-GO		
45158-2	.3770	.3830	.3770-.3773	.3829-.3830	.374	.187
45238-2	.2850	.2910	.2850-.2853	.2909-.2910	.170	.085
.45239-2	.3070	.3130	.3070-.3073	.3129-.3130	.180	.090
.45240-2	.3310	.3370	.3310-.3313	.3369-.3370	.220	.110
.45241-2	.3550	.3610	.3550-.3553	.3609-.3610	.280	.140
.45061-3	.1220	.1280	.1220-.1223	.1279-.1280	.100	.050
.45062-3	.1490	.1550	.1490-.1493	.1549-.1550	.090	.045
.45063-3	.1740	.1800	.1740-.1743	.1799-.1800	.090	.045
.45064-3	.1920	.1980	.1920-.1923	.1979-.1980	.160	.060
.45065-3	.2190	.2250	.2190-.2193	.2249-.2250	.110	.055
45066-3	.2340	.2400	.2340-.2343	.2399-.2400	.090	.045

‡ Plug gage dimensions apply when dies are bottomed, but not under pressure.

‡‡ Material -- Tool Steel

Figure 14

6. The NO-GO member may enter partially, but must not pass completely through the die closure.

7. If the die closures meet the GO NO-GO gage conditions, the dies 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 field service representative.

3.4. CERTI-CRIMP Tool Ratchet Inspection

The CERTI-Crimp tool ratchet feature on Tyco Electronics hand tools should be checked to make certain that the ratchet does not release prematurely allowing dies to open before they have fully bottomed.

To check ratchet feature:

1. Make a test crimp using ferrule, shielded wire and ground wire as outlined in Paragraph 2.6,B. When this crimp is made, close handles until the ratchet is free, however, DO NOT RELAX PRESSURE ON TOOL HANDLES.

2. If a .001 or smaller shim can be inserted between the bottoming surfaces of the dies. or if there is no opening whatever, the ratchet is considered satisfactory.

3. If the clearance between the bottoming surfaces of the dies is greater than .001, the dies are considered as not bottoming. Contact your local Tyco Electronics field service representative.

3.5. Replacement Parts

It may be advantageous to stock replacement dies to prevent loss of production time. Figure 16 lists the

replacement die inserts that can be purchased from Tyco Electronics Corporation.

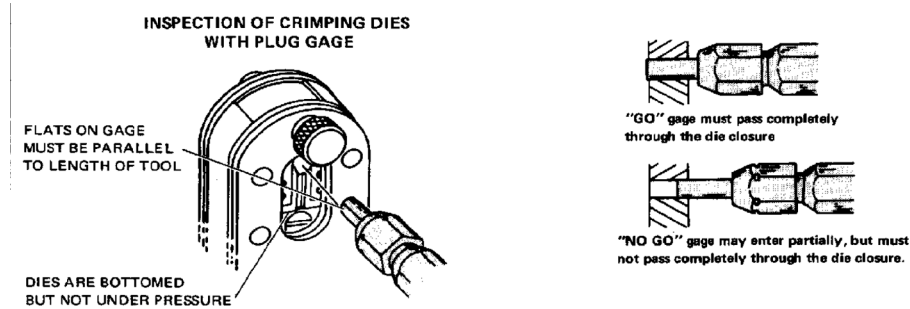


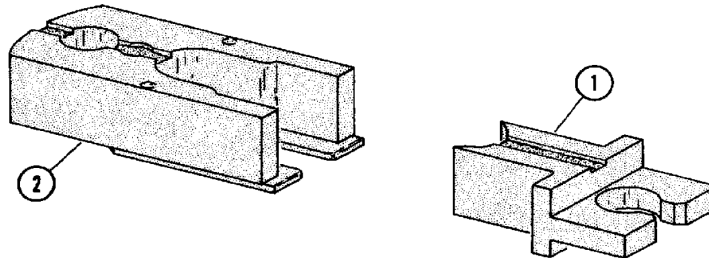
Figure 15

For customer spares, refer to:

CUSTOMER SERVICE (038-035)
 TYCO ELECTRONICS CORPORATION
 PO BOX 3608
 HARRISBURG PA 17105-3608

4. REVISION SUMMARY

- Applied the TE logo
- Changed values in Figure 14



Item	Description	Die Set Numbers					
		45158-2	45238-2	45239-2	45240-2	45241-2	45061-3
1	Male Die	2-2306144-6	2-306144-2	2-306144-3	2-306144-5	2-306144-4	4-306144-1
2	Female Die	304803-6	45250-2	45251-2	45252-2	45252-2	304803-7

Item	Description	Die Set Numbers				
		45062-3	45063-3	45064-3	45065-3	45066-3
1	Male Die	2-306144-5	4-306144-1	45902-8	45902-9	1-45902-0
2	Female Die	45253-2	304803-7	59656	596	59656-2

Figure 16