customer manual

SAFETY PRECAUTIONS AVOID INJURY

Safeguards are designed into this application equipment to protect operators and maintenance personnel from most hazards during equipment operation. However, certain safety precautions must be taken by the operator and repair personnel to avoid personal injury, as well as damage to the equipment. For best results, application equipment must be operated in a dry, dust–free environment. Do not operate equipment in a gaseous or hazardous environment.

Carefully observe the following safety precautions before and during operation of the equipment:

- ALWAYS wear appropriate ear protection.
- ALWAYS wear approved eye protection when operating powered equipment.
- ALWAYS keep guard(s) in place during normal operation.
- ALWAYS insert power plug into a properly grounded receptacle to avoid electrical shock.
- ALWAYS turn off the main power switch and disconnect electrical cord from the power source when performing maintenance on the equipment.
- NEVER wear loose clothing or jewelry that may catch in moving parts of the application equipment.
- NEVER insert hands into installed application equipment.
- NEVER alter, modify, or misuse the application equipment.

TOOLING ASSISTANCE CENTER

CALL TOLL FREE 1–800–722–1111 (CONTINENTAL UNITED STATES AND PUERTO RICO ONLY)

The **Tooling Assistance Center** offers a means of providing technical assistance when required.

In addition, Field Service Specialists are available to provide assistance in the adjustment or repair of the application equipment when problems arise which your maintenance personnel are unable to correct.

INFORMATION REQUIRED WHEN CONTACTING THE TOOLING ASSISTANCE CENTER

When calling the Tooling Assistance Center regarding service to equipment, it is suggested that a person familiar with the device be present with a copy of the manual (and drawings) to receive instructions. Many difficulties can be avoided in this manner.

When calling the Tooling Assistance Center, be ready with the following information:

1. Customer name
2. Customer address
3. Person to contact (name, title, telephone number, and extension)
4. Person calling
5. Equipment number (and serial number if applicable)
6. Product part number (and serial number if applicable)
7. Urgency of request
8. Nature of problem
9. Description of inoperative component(s)
10. Additional information/comments that may be helpful

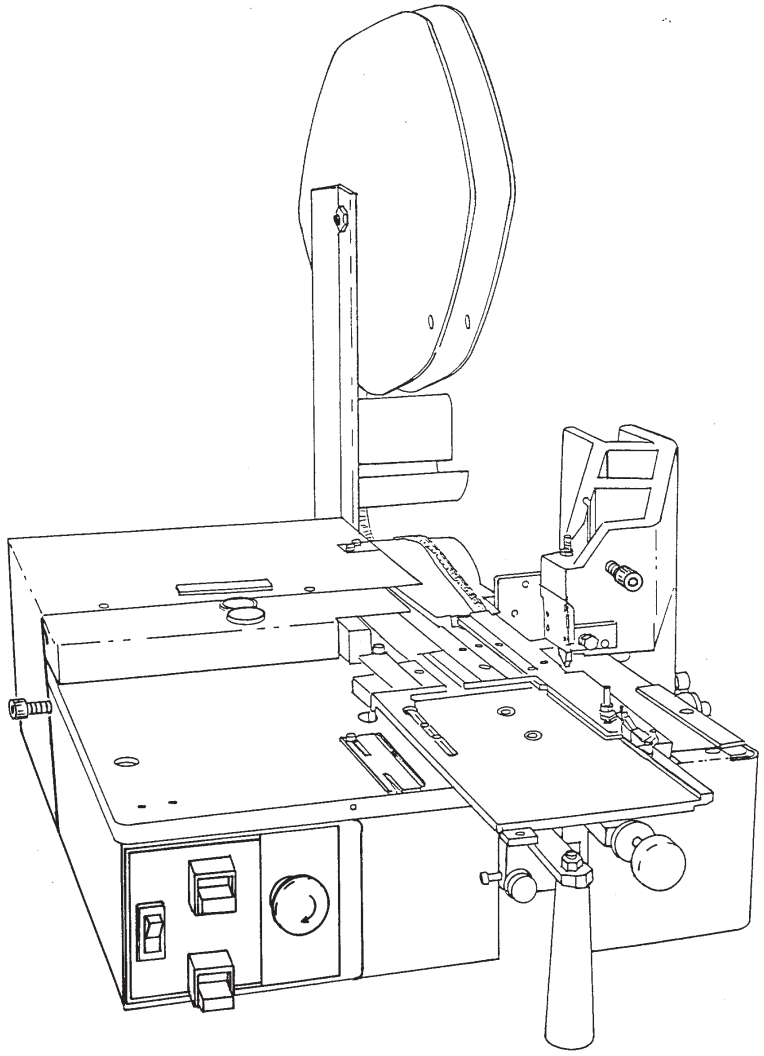


Figure 1

1. INTRODUCTION

NOTE

Dimensions are in metric units [with U.S. customary units in brackets].

This manual provides information on setup, operation, and maintenance for the Flexible Flat Cable (FFC) Terminating Machines 224910–[ ] and 318619–[ ] (see Figure 1). The terminating machines are designed to crimp a variety of Multiple–Crimp and ARINC type contacts onto cables with the following configuration:

1.27 mm [.050 in.] centerlines, from 4 to 70 conductors;
2.54 mm [.100 in.] centerlines, from 2 to 35 conductors;
5.08 mm [.200 in.] centerlines, from 2 to 17 conductors; and
7.62 mm [.300 in.] centerlines, from 2 to 11 conductors.

The cable may be solid copper–conductive Flexible Flat Cable, Flat Etched Circuitry (FEC) Cable, Flexible Printed Wire (FPW) Cable, or Conductive Ink Circuitry Cable. See Figure 2 for product, cable, and power requirements.

FLEXIBLE FLAT CABLE TERMINATING MACHINE (Without Programmer Kit)	FLEXIBLE FLAT CABLE TERMINATING MACHINE (With Programmer Kit)	ELECTRICAL REQUIREMENTS	CONTACT TYPE AND MAXIMUM QUANTITY	CONDUCTORS	
				CENTERLINES mm [in.]	WIDTH mm [in.]
224910–1	318619–1	120 Vac 60 Hz	Multiple–Crimp 35	2.54 [.100]	1.19–1.35 [.047–.053]
			Multiple–Crimp 17	5.08 [.200]	
			Multiple–Crimp 11	7.62 [.300]	
224910–2	318619–2	240 Vac 50 Hz	Multiple–Crimp 35	2.54 [.100]	1.19–1.35 [.047–.053]
			Multiple–Crimp 17	5.08 [.200]	
			Multiple–Crimp 11	7.62 [.300]	
224910–3	318619–3	120 Vac 60 Hz	ARINC 35	2.54 [.100	1.19–1.35 [.047–.053]
			ARINC 17	5.08 [.200]	
			ARINC 11	7.62 [.300]	1.50–1.65 [.059–.065]
224910–4	318619–4	120 Vac 60 Hz	Multiple–Crimp 55	1.27 [.050]	0.61–0.71 [.024–.028]
224910–6	318619–6	240 Vac 50 Hz	Multiple–Crimp 55	1.27 [.050]	0.61–0.71 [.024–.028]

Figure 2

A Programmer Kit 356484–1 can be ordered separately and added to the 224910 series machines. Refer to Customer Manual 409–5880 for details concerning the use and operation of Programmer Kit 356484–1.

NOTE

Programmer Kit 356484–1 enables the FFC Terminating Machine to skip any combination of conductors when inserting the contacts. The programmer will store up to 150 different skip patterns in memory.

Product Specifications and cable requirements are available in Application Specifications 114–16008 for 1.27 mm [.050–in.] centerline cable, and 114–16015 for 2.54 mm [.100–in.] centerline cable. Product Specifications 108–40002 and 108–9024 provide performance tests for the FFC product line. Quality Specification 102–16050 provides information on crimp height dimensions.

The sections in this manual are arranged in an order convenient for setup, operating, and maintenance personnel. Installation personnel should follow carefully the procedure in Section 3, RECEIVING INSPECTION AND INSTALLATION. Setup and operating personnel should carefully follow the procedures in Sections 4 and 5, as any attempt to operate the machine without proper setup could result in damage and unnecessary downtime. Maintenance personnel will find, in addition to Section 8, PREVENTIVE MAINTENANCE, necessary and helpful information in Section 7, TROUBLESHOOTING. For information beyond the scope of this manual, contact your local Tyco Electronics Field Service Specialist or Tyco Electronics Applications Engineer.

Reasons for reissue are in Section 10, REVISION SUMMARY.

When reading this manual, pay particular attention to DANGER, CAUTION, and NOTE statements.

DANGER

Denotes an imminent hazard which may result in moderate or severe injury.

CAUTION

Denotes a condition which may result in product or equipment damage.

NOTE

Highlights special or important information.

2. DESCRIPTION

2.1. Physical Description (Figure 3)

Each machine is designed as a standard bench–type machine, weighing approximately 45 kg [100 lbs], and powered by a 1/6–horsepower gear head motor that requires a single–phase power source with separate ground. The machines are configured to operate on 120 Vac, 60 Hz (machines 224910–1, –3, and –4, and 318619–1, –3, and –4), or 240 Vac, 50 Hz (machines 224910–2 and –6, and 318619–2 and 6). The machine dimensions are 540 mm wide x 457 mm high x 698 mm long [20.50 in. wide x 18 in. high x 27.50 in. long] (with reel support installed).

NOTE

The overall dimensions will vary according to the reel size being used during termination.

The terminating machine is operated using the switches on the control panel (see Figure 3). The control panel consists of a PWR ON toggle switch (S1) with an internal indicator light, a MOTOR ON switch (S2B) ; MOTOR OFF switch (S6), a CRIMP START switch (S5); CRIMP STOP switch (S7), and an EMERGENCY STOP (S3).

The power supply switches are keyed to the electrical schematic in Figure 5 and described in Paragraph 2.3, Electrical System Description. The timing of the machine is preset and cannot be re–adjusted.

NOTE

Programmer Kit 356484–1 can be purchased separately and used with the 224910 series machines (it is included with the 318619 series machines). For details concerning the installation and operation of the programmer kit , refer to Customer Manual 409–5880.

The motor (located at the back of the machine) drives the machine driveshaft through a roller chain, to a solenoid operated clutch on the drive shaft. The drive shaft has three cams: one cam controls the movement of the crimper and contact strip feed finger, the second cam controls the movement of the crimp fingers, and the third cam controls the movement of the slide assembly during the crimping process. A hand knob, attached to the drive shaft, is provided to manually cycle the machine during setup and when making adjustments.

The crimping section consists of an anvil, a crimper, two crimp fingers, and a shear plate, The anvil (located above the contact strip) is stationary. See Figure 14. The crimper (not shown) and crimp fingers are raised during each cycle of the machine to hold and crimp the contacts to the cable. See Figure 17.

The product guide is used as a cable locator to aid in positioning the cable onto the slide assembly. The square–cut end of the cable or circuitry is positioned against the shoulder of the sighting block, as shown in Figure 13. For details concerning setup and adjustments, refer to Section 4, MACHINE SETUP ADJUSTMENTS, and Section 5, PRODUCTION ADJUSTMENTS.

The product clamp (padded to prevent damage to the cable) secures the position of the cable on the slide assembly. The first insertion adjustment knob sets the slide assembly stop for first insertion position, based on the number of conductors in the cable. To set the stop, the knob is rotated to align the pointer with the respective number on the cable position indicator.

The drag release handle releases the drag and feed finger which enables the slide assembly to be pushed forward against the rear stop (not shown). (See Figure 7 for position of slide assembly against rear stop.) The remote crimp stop switch bearing plate adjustment, when properly set, will stop the crimping operation when the last contact is crimped.

NOTE

All adjustments must be secured after being set. See Section 4, MACHINE SETUP ADJUSTMENTS.

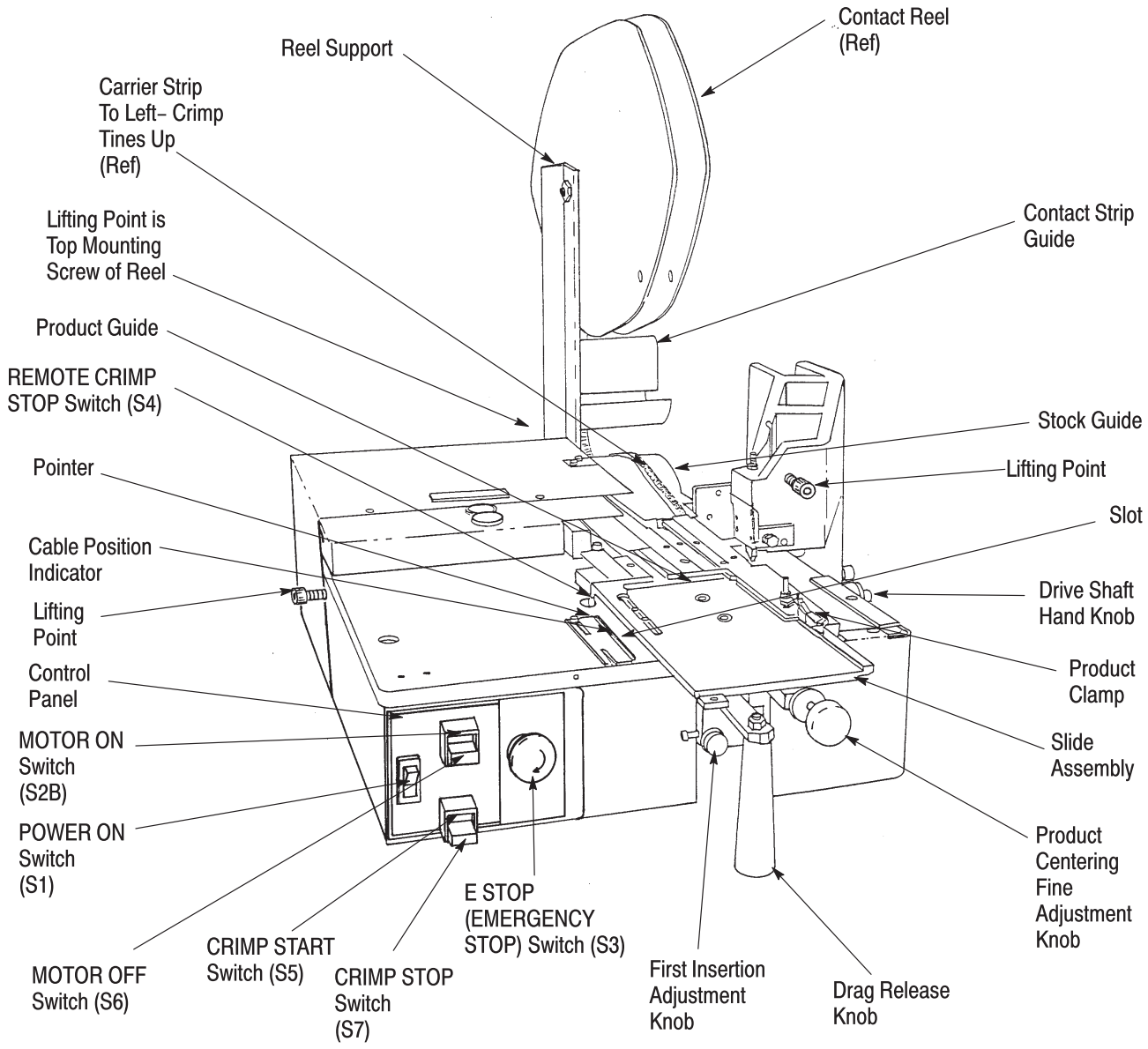


Figure 3

The reel support holds the reel of contacts during the crimping operation. The contact strip rotates off the contact reel from the front, feeds around the back of the contact strip guide, and enters the strip guide tooling with the crimp tines facing upward and the carrier strips positioned toward the reel support. See Figure 3.

2.2. Functional Description

NOTE

The functional description is keyed to the electrical schematic to aid maintenance personnel in diagnosing problems which may arise during operation.

For this description it shall be assumed that the machine has been properly setup, connected to electrical power, the PWR ON and MOTOR ON switches (S1 and S2B) are “on,” and the motor (B1) is running.

When the drag release handle is pushed to the right, the drag and feed finger are released, which allows the slide assembly to be pushed forward against the rear stop. Moving the slide assembly against the rear stop actuates the REMOTE CRIMP STOP switch (S4) “closed.” With the CRIMP START button (S5) depressed, the clutch solenoid is energized, actuating the clutch and rotating the drive shaft. The drive shaft continues to rotate, performing one cycle per revolution.

NOTE

During each revolution, the contact strip and slide assembly advance one position, aligning the contact and conductor between the anvil and the crimper.

The crimp fingers rise to hold the contact in position; then the crimper rises to shear the contact from the strip, piercing the cable with the contact. The legs of the contact are rolled inward by the anvil, displacing the insulation about the conductor to form a positive connection between the contact and the conductor. See Figure 4.

The crimper drops down slightly, relieving the crimp pressure. To complete the crimp cycle, the crimp fingers drop completely and then the crimper releases the crimped contact.

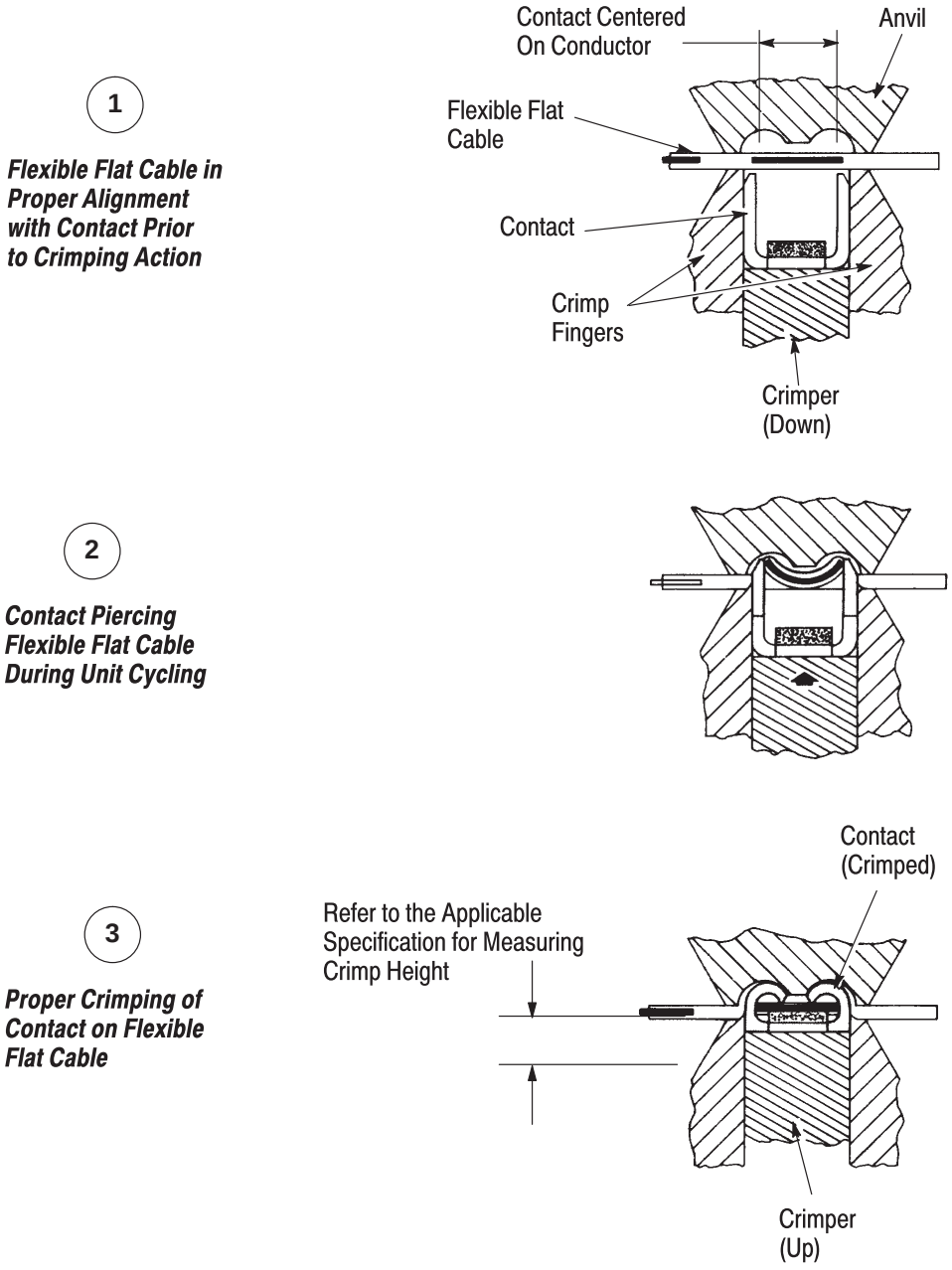


Figure 4

NOTE

Should it be necessary to stop the crimping operation, the STOP switch (S7) or the EMERGENCY STOP switch (S3) can be depressed to disengage the clutch and stop rotation of the drive shaft at the completion of that termination cycle. Depressing the EMERGENCY STOP switch (S3) will also stop the motor.

During the crimping of the last contact, the remote CRIMP STOP switch (S4) is de–actuated (opened) to prevent further cycling of the machine. The motor continues to run. Release the drag release handle and pull the slide assembly forward until it rests against the forward stop. The product clamp is released, and the terminated cable is removed from the machine.

2.3. Electrical System Description (Figure 5)

When the electrical plug (J1) is connected to an electrical outlet (120 Vac) with a separate ground, 120 Vac power is supplied through the circuit breaker / PWR ON switch (S1). On 224910–2, –6 and 318619–2, –6 machines, a step–down transformer converts 240 Vac to 120 Vac. When the PWR ON switch (S1) is “on,” the power switch indicator lamp and the alignment lamps (DS4 and DS5) are lighted and power is supplied to the normally closed EMERGENCY STOP switch (S3) and the MOTOR OFF switch (S6). When the MOTOR ON switch (S2B) is depressed to “on,” the motor (B1) starts and runs continuously.

When the slide assembly is pushed forward against the rear stop, the REMOTE CRIMP STOP switch (S4) is mechanically “closed” to supply power to the solenoid coil (L1).

When the START switch is momentarily depressed, power is supplied to posts 14 of relay (K2) which energizes the relay coil and “closes” the circuit between posts 9 and 5, holding the coil energized after release of START switch (S5). At the same time, clutch solenoid (L1) is energized to allow continuos cycling of the machine until either REMOTE CRIMP STOP switch (S4) opens during the last table index, the CRIMP STOP switch (S7) is depressed, or the E–STOP switch (S3) is depressed.

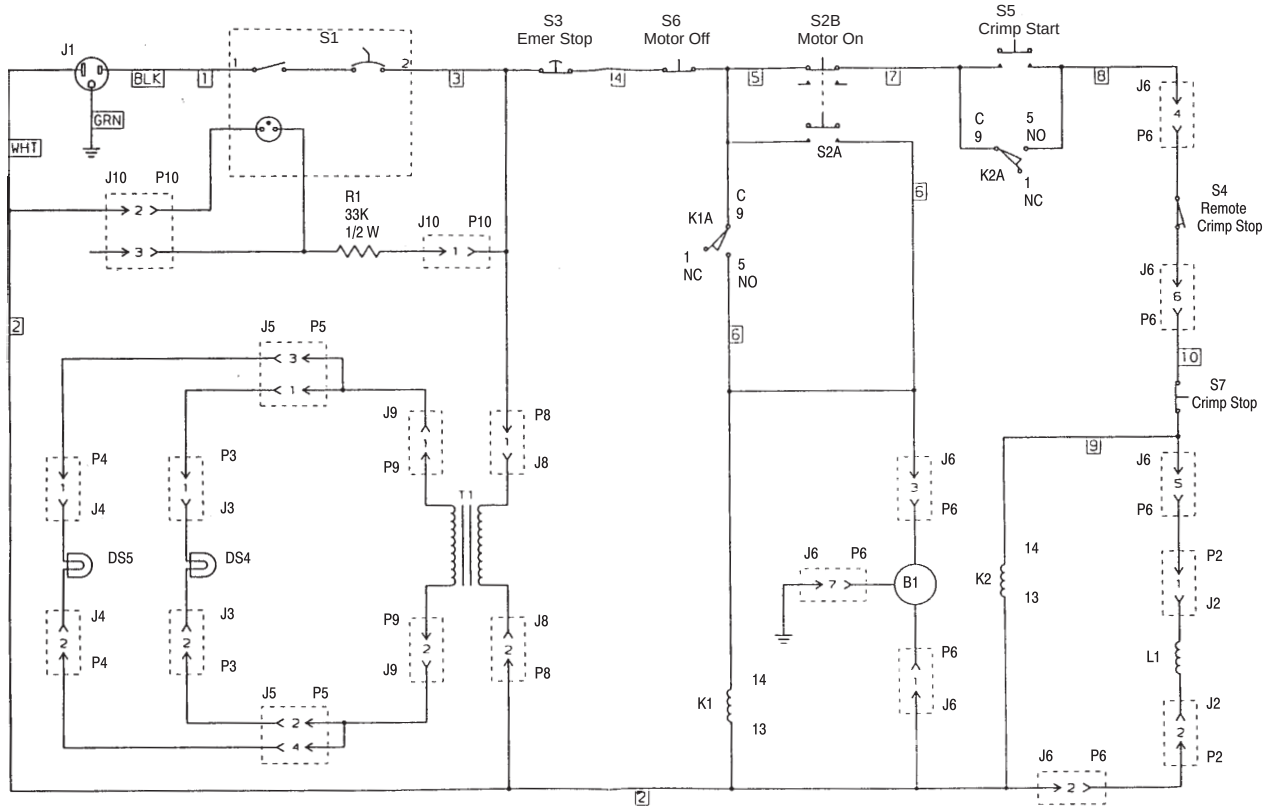


Figure 5

3. RECEIVING INSPECTION AND INSTALLATION

3.1. Receiving Inspection

The machines are thoroughly inspected during and after assembly. A final series of inspections is made to ensure the proper functioning of each machine before packaging and shipping. While the machine should require no adjustments before placing it in operation, the following inspection should be performed as a safeguard against potential problems generated in transit.

1. Carefully uncrate the machine and place it on a sturdy bench where there is sufficient light to permit a careful examination.

2. Thoroughly inspect the entire machine for evidence of damage that may have occurred in transit. If the machine is damaged in any way, file a claim against the carrier and notify Tyco Electronics immediately.

3. Check all components and parts to be sure they are secure.

4. Check all wiring for loose connections, cuts, or other damage.

Keep this manual with the machine for the benefit of personnel responsible for installation, operation, and maintenance. In addition, be sure to keep any other documents or samples with the machine.

3.2. Factors Affecting Machine Placement

The location of the machine in relation to the operator is essential to both safety and efficiency. Studies have repeatedly shown that fatigue will be reduced and efficiency increased if particular attention is paid to the bench, the location of the machine on the bench, and the operator's chair.

— Bench (Figure 6)

A sturdy bench 710 to 760 mm [28 to 30 in.] high aids comfort by allowing the operator's feet to rest on the floor and the weight and leg position to be easily shifted. The bench should have rubber mounts to reduce noise. An open area under the bench should allow the chair to slide far enough in for the operator's back to be straight and supported by the chair's backrest.

— Machine Location on the Bench (Figure 6)

The machine should be located near the front of the bench and securely bolted to remain stationary. The target area (tooling area where the terminal is applied) should be 150 to 200 mm [6 to 8 in.] from the front edge. This eliminates unnecessary operator motion and helps prevent back strain and fatigue. The target area should face the front of the bench and be parallel to the edge. (Access to the back of the machine must also be provided.)

— Operator's Chair

The operator's chair should swivel, and the seat and backrest should be padded and independently adjustable. The backrest should be large enough to support the back both above and below the waist. In use, the chair should be pulled far enough under the bench so that the operator's back is straight and supported by the backrest.

3.3. Installation

After the machine is removed from the carton, and the securing bolts are removed from the pallet:

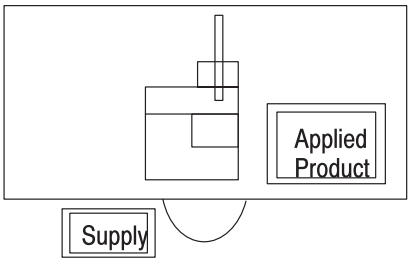
1. Select a location with adequate lighting and a power source, 120 Vac, 60 Hz, or 240 Vac, 50 Hz, depending on machine, with single phase current with a separate ground. A transformer is supplied with 224910–2, –6 and 318619–2, –6 machines to convert 240 Vac to 120 Vac.

2. Place the machine on a bench according to the information in Paragraph 3.2, Factors Affecting Machine Placement, by using the specified lifting points in Figure 3.

Improper lifting can cause personal injury.

Proper Position, Adjustment, and Locations

The figure shows the physical considerations as recommended, and the operator in a desirable position. Note that the chair height and back–rest are properly adjusted, and that the chair is properly located in respect to the bench. Thus, the operator's back is straight, and supported by the chair. Note also that the operator's upper arms are in a direct line with the torso.



Materials Locations: Plan View

The plan view identifies typical locations for "supply" and "applied product," and serves as an aid in visualizing the convenience in materials handling afforded by proper setup and correct operator position.

Figure 6

3. Install reel support onto back of machine (See Figure 3).
4. Perform machine checkout as described in Paragraph 3.4, Machine Operation Check.

3.4. Machine Operation Check

After the machine has been installed, check the mechanical and electrical operation as follows:

To avoid personal injury, do not attempt to operate machine without guards. Keep hands clear of crimp area.

Remove terminal strip from machine.

1. Insert electrical plug (P1) in the electrical outlet.
2. Depress PWR ON switch (S1). Indicator lamp (DS4) in the pushbutton switch should light.

To avoid personal injury, do NOT attempt Steps 3, 4, 5, and 6 with the motor running.

3. Push drag release handle to the right and push back slide assembly against the rear stop. This will "close" CRIMP STOP switch (S4).
4. Depress START switch (S5). This will energize clutch solenoid (L1) and relay (K2). DO NOT depress the MOTOR ON pushbutton switch (S2B) to start the motor (B1) at this time.
5. Hand–cycle the machine through several crimping cycles by rotating the hand knob CLOCKWISE as viewed from the right side of the machine. Observe operation of the crimp fingers, and advancement of slide assembly. See Figure 12.

6. Depress the CRIMP STOP switch (S7). This will de–energize the clutch solenoid (L1) and relay (K2).

7. Repeat Step 3, then depress the MOTOR ON switch (S2B). Motor (B1) should start and run continuously. Observe motor operation for smoothness and security.

Keep hands clear of drive shaft when the motor is running.

8. Depress CRIMP START switch (S5). The machine should start and continue to cycle until the REMOTE CRIMP STOP switch (S4) is mechanically released by the switch bearing plate on the slide assembly. During cycling, observe operation of crimp fingers, crimpers, and advancement of slide assembly.

9. After checkout is completed, depress MOTOR OFF and POWER OFF switches (S6 and S1).

At the completion of machine operation, both the MOTOR OFF and POWER OFF switches (S6 and S1) should be depressed to turn "off" the machine, and the electrical plug should be disconnected.

4. MACHINE SETUP ADJUSTMENTS

This section contains procedures for setting up the FFC terminating machine (*without* a programmer kit) after it has been properly installed and checked out, as described in Section 3, RECEIVING INSPECTION AND INSTALLATION. For installation, additional setup, and operation procedures for FFC machines *with* a programmer kit, refer to Customer Manual 409–5880 (packaged with Programmer Kit 356484–1).

Machine setup procedures for the FFC product line and ARINC–type contacts are identical.

Disconnect machine from power supply before loading contact reel onto the machine.

The setup procedure should be performed in the proposed sequence to avoid damage to the machine.

4.1. Loading Contacts (Figure 3)

1. Install contact reel onto reel support and secure with flange.

2. Feed contact strip around the contact strip guide, over the stock guide, and into the strip guide tooling section. Release the drag by lifting strip drag lever against the compression spring, and feed contact strip through the strip guide tooling until it passes through the shear plate and under the anvil. Allow approximately fifteen contacts to pass beyond the anvil. Center a contact under the anvil.

The contact carrier will exit from the bottom front of the machine and, because of sharp edges on the carrier, should exit directly into a container.

The contact strip MUST unreel from the front of the contact reel so that the contacts enter the strip guide tooling with the crimp tines facing upward and the carrier strip positioned toward the left. Refer to Figures 3 and 15.

If the end of the contact strip is deformed or broken, cut off the damaged area before inserting the contact strip into the machine.

4.2. Checking Contacts for Proper Configuration

1. Insert a piece of paper (reel paper) into crimping section and align it with the anvil.

2. Connect electrical plug (P1) to power supply.

DANGER

To avoid personal injury, do NOT attempt to operate machine without guards in place.

DANGER

KEEP HANDS CLEAR of crimping section at all times.

3. Depress POWER ON switch (S1).

4. Depress CRIMP START switch (S5) and hold. Do NOT depress the MOTOR ON switch (S2B) to start the motor (B1) at this time.

5. Depress the REMOTE CRIMP STOP switch (S4), and hold. Release the CRIMP START switch. See Figure 12.

6. Hand–cycle the machine through a crimping cycle by rotating the drive shaft hand knob CLOCKWISE one full revolution.

NOTE

The REMOTE CRIMP STOP switch may be released after partial rotation of the hand knob.

7. Remove crimped contact and check for proper crimp height, width, and position.

NOTE

The sight block may require adjustment. Center the sight block as described in Paragraph 5.3.

4.3. Crimp Stop Switch Bearing Plate Adjustment (Figure 7)

NOTE

This adjustment should only be done once and should not be re–adjusted when changing cables or contacts.

1. Push drag release handle to the right to release the drag and feed finger. Maintain position of the handle and push slide assembly rearward (toward the rear stop) until the next to the last conductor to be crimped is aligned with the anvil. Release the handle when the slide assembly is properly positioned.

NOTE

The last conductor is the one farthest from the operator.

2. Loosen the three button head capscrews which secure the CRIMP STOP switch bearing plate to the slide assembly. Adjust plate so that the switch (S4) will actuate (OPEN) on the next table index. Retighten screws when plate is properly adjusted.

DANGER

DISCONNECT MACHINE from electrical outlet before performing adjustments.

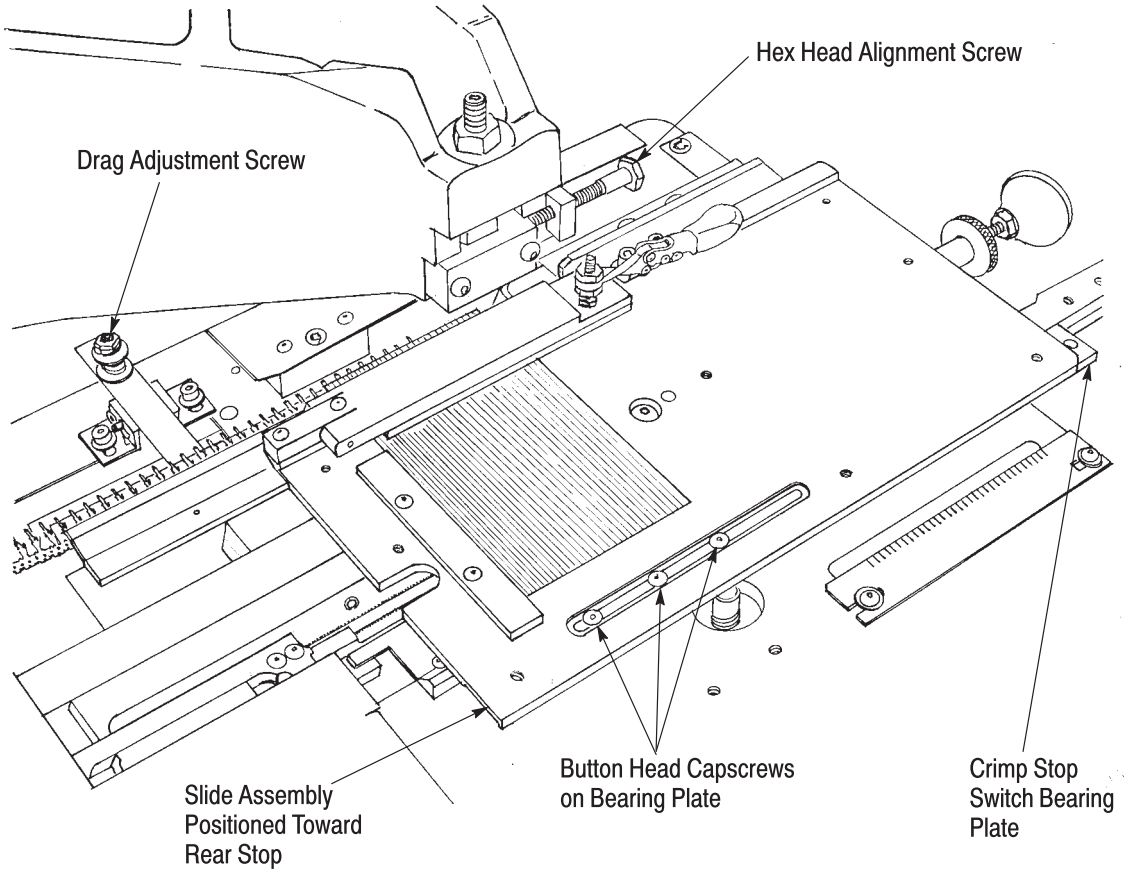


Figure 7

4.4. Centerline Adjustments

To convert terminating machines 224910–1, –2, –4, and –6 and 318619–1, –2, and –4 to crimp on conductor centerlines shown in Figure 8, follow these instructions:

CONDUCTOR CENTERLINE	HOLE IN TAPE FEED ARM (From the Top)	HOLE IN PIVOT BLOCK (From the Top)
1.27 mm [.050 in.] (Ref)	First	First
2.54 mm [.100 in.]	Second	Second
5.08 mm [.200 in.]	Third	Third
7.52 mm [.300 in.]	Fourth	Fourth

Figure 8

1. Remove cover (682470–1) and top cover (682612–1).
2. Remove Item 187, Cable Support Plate (682596–1), from slide assembly (two button head screws).
3. Remove all of feed guide assembly," (Figure 9, see box detail, Item 17, Part Number 854924–1) (one socket head capscrew).

NOTE

Compression spring will be free.

4. Remove Item 11, pivot block, with the tape feed arm attached. See Figure 9 (one socket head capscrew).

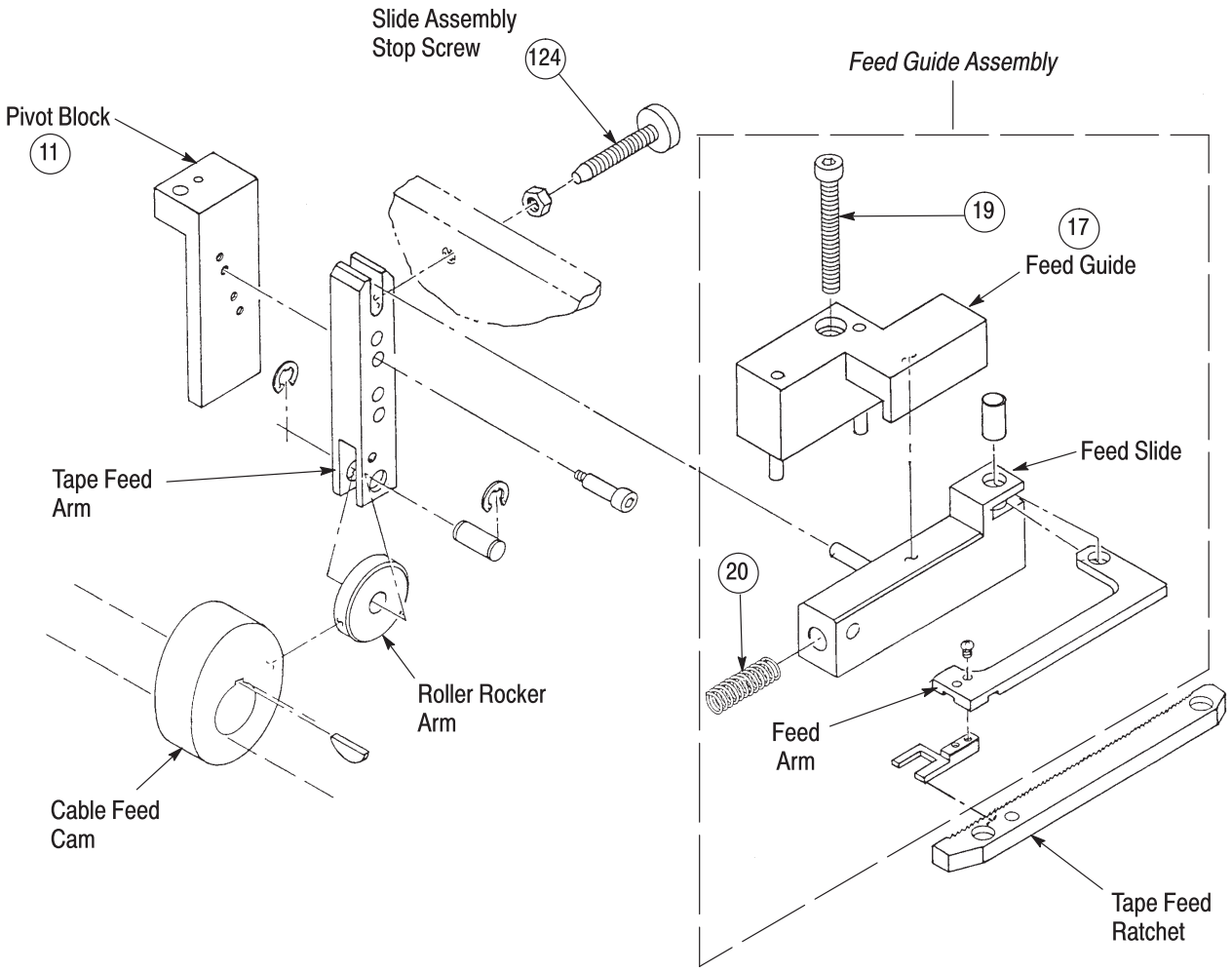


Figure 9

NOTE

Turn pivot block COUNTERCLOCKWISE to pass through table opening.

5. Insert the shoulder screw into the appropriate holes in the tape feed arm and pivot block as specified in the following table.

CAUTION

Because of tooling requirements, product specified for 1.27 mm [.050 in.] centerline conductors cannot be run in machines equipped for 2.54 mm [.100 in.] product. Also, 2.54 mm [.100 in.] product cannot be run in machines equipped for 1.27 mm [.050 in.] product.

6. Remount pivot block (852120–1) with tape feed arm attached.

7. Remount feed guide with compression spring (2–22280–1).

8. Adjust slide assembly stop screw (see Figure 9) when running 5.08 mm [.200 in.] or 7.62 mm [.300 in.] conductor centerline. Hand–cycle the machine to ensure table is indexing correctly.

9. Re–install support plate and guards.

Conversion complete; proceed with table fine adjustment and terminal feed adjustment, as required.

4.5. Contact Strip Feed Finger Extension and Retraction Adjustments

A. Feed Finger Extension Adjustment

During a machine cycle, the contact feed adjustment screw (see Figure 10) controls the forward position of the contact in the crimping section. If the contact is over or under fed, the crimp fingers will touch the contact as they raise to contain it during the cycle. To check for contact position and to adjust the contact strip feed finger. Proceed as follows:

1. Load contact strip into machine, if necessary; then hand–cycle the machine (3.4, Machine Operation Check), until a contact is advanced into the crimping section.

2. To perform a *fine* feed adjustment, loosen locknut on contact feed adjusting screw. Turn the adjusting screw CLOCKWISE to move terminal position FORWARD (toward the operator) or COUNTERCLOCKWISE to move terminal position REARWARD. When the contact is centered with the crimp fingers, tighten the locknut on the adjusting screw.

3. To perform a *coarse* feed adjustment, loosen the pivot block locking screw and rotate the pivot block adjustment screw COUNTERCLOCKWISE to move the feed finger REARWARD, or CLOCKWISE to move the feed finger FORWARD (toward the operator). Tighten the pivot block locking screw when contact strip is in approximate position and use the fine feed adjustment screw to position the contact strip.

NOTE

Repositioning the pivot block changes the back stroke of the feed finger and may require an adjustment to the contact strip feed finger stop screw.

CAUTION

There are three settings for the pivot on the pivot arm. The shoulder screw pivot in the upper hole will produce a nominal feed of 2.54 mm [.100 in.] for 1.27 mm [.050 in.] centerline product; in the middle hole , 5.08 mm [.200 in.] for 2.54 mm [.100 in.] centerline product; and in the lower hole, 8.38 mm [.330 in.] for ARINC product. This is NOT a terminal feed adjustment, but a setting based on the machine assembly number and should not be changed.

NOTE

The contact feed finger has two possible mounting positions on the feed finger arm. To feed contacts on 5.08 mm [.200 in.] centerlines, secure feed finger to feed finger arm with pin in finger hole No. 2. See Figure 11, Detail A. To feed contacts on 8.38 mm [.330 in.] centerlines, secure feed finger to feed finger arm with pin in finger hole No. 1. See Figure 11, Detail B. Refer to sheet 5 of 5 of drawing 224910, view L–L.

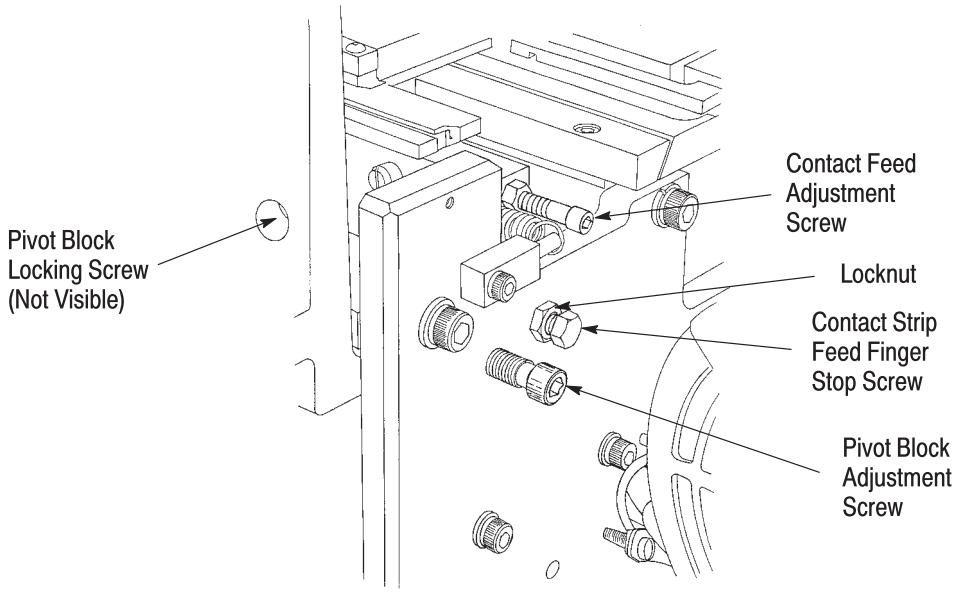
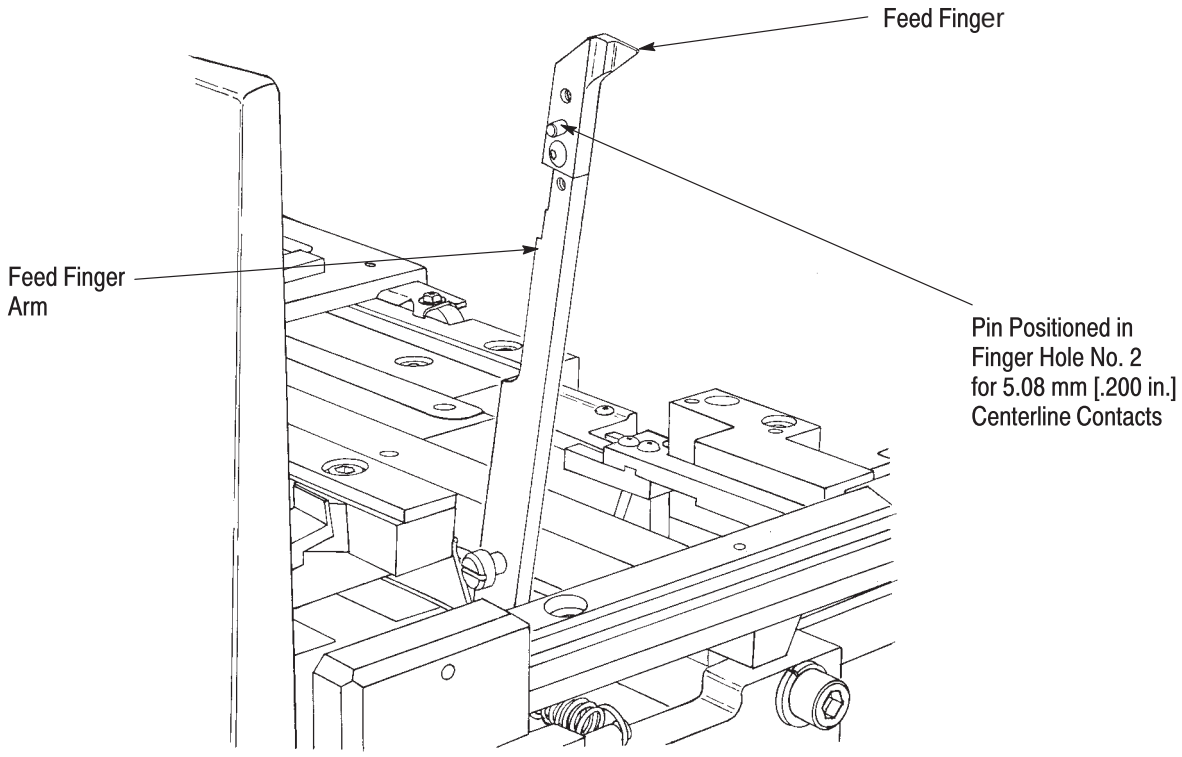
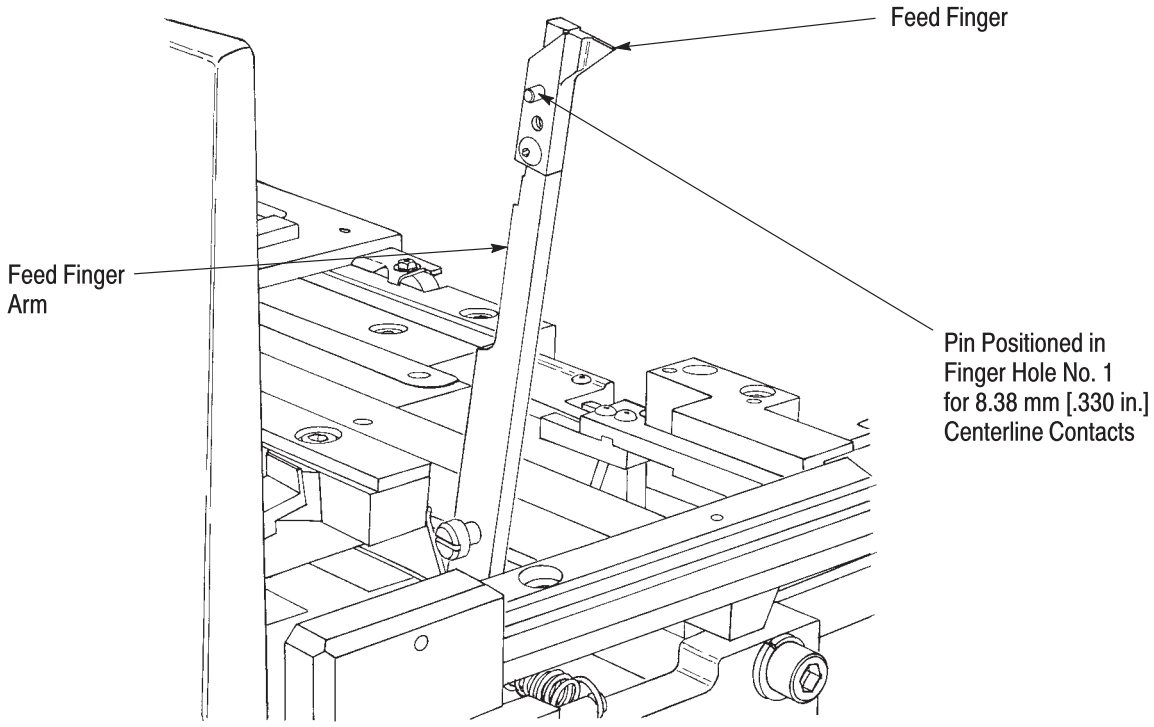


Figure 10



***Detail A** 5.08 mm [.200 in.] Centerline Spacing*



***Detail B** 8.38 mm [.330 in.] Centerline Spacing*

Figure 11

B. Feed Finger Retraction Adjustment

The contact strip feed finger stop screw (see Figure 10) limits the feed finger retraction during a machine cycle, allowing the feed finger to pick up the appropriate hole in the strip. If the feed indexes more than one contact or less than one contact, perform the following adjustments:

1. Load contact strip into machine, if necessary; then hand–cycle the machine until a contact is advanced into the crimping section to see if a contact is fed less than or more than one contact feed.

2. Turn the contact strip feed finger stop screw (see Figure 10) COUNTERCLOCKWISE to allow more backstroke, CLOCKWISE to allow less backstroke.

NOTE

The feed finger should retract slightly beyond the correct pick–up hole when the contact strip is being fed consistently.

5. PRODUCTION ADJUSTMENTS

The following procedures are primarily associated with adjustments required during production to set up the machine for different types and sizes of cable. Following these procedures will ensure that the adjustments are correct to produce the proper crimp height for the type of contact and cable being used. These adjustments should be checked in the following sequence and adjusted if necessary. It is recommended that Tyco Electonics Field Service Specialists be consulted if any adjustments are required other than those covered in this section.

5.1. First Insertion Adjustment

Unlock first insertion adjustment knob by loosening the socket head cap screw. See Figure 12. Turn first insertion adjustment knob CLOCKWISE or COUNTERCLOCKWISE to align pointer with the appropriate number on the cable position indicator. The number on the cable indicator must correspond with the number of the last conductor being crimped. Retighten socket head cap screw after the first insertion adjustment knob is properly set.

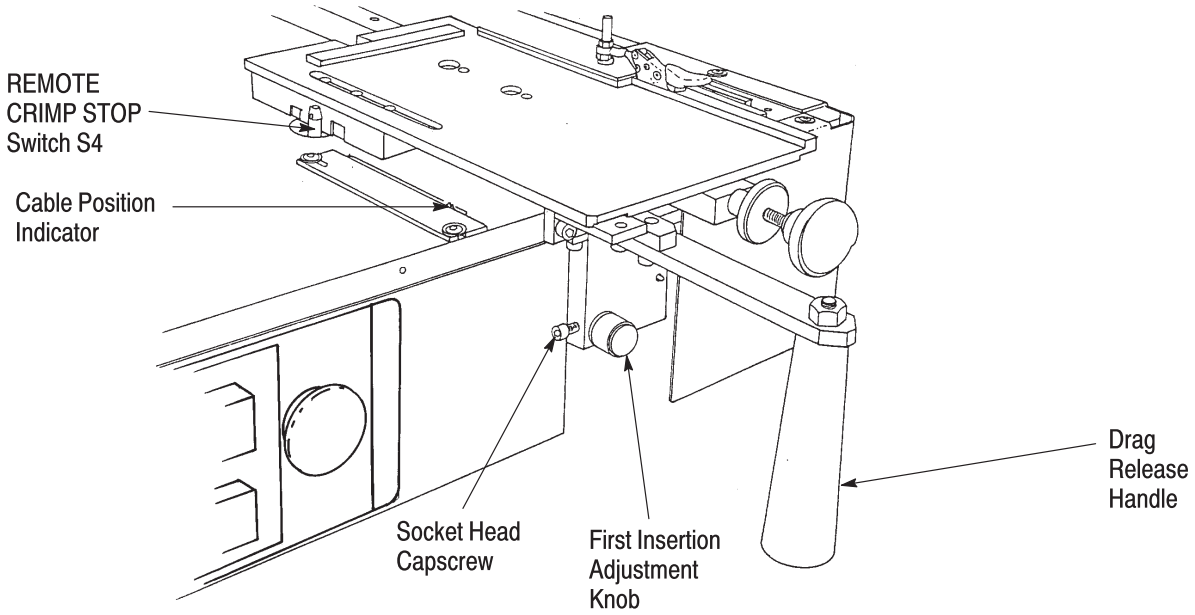


Figure 12

NOTE

To eliminate backlash in the adjusting lead screw (when going from a lower number on to a higher number on the cable indicator), position pointer on one number higher than the required setting, then back to the required setting. For example, to position the pointer from 9 to 19, go to 20, then back to 19.

NOTE

To ensure the correct position of the contact relative to the conductor, perform Product Centering Fine Adjustment, Paragraph 5.2.

5.2. Product Centering Fine Adjustment

DANGER

Keep hands clear of crimping section at all times.

1. Position slide assembly against the forward stop, as shown in Figure 13; then depress the PWR ON switch (S1), to light the alignment lamp on the sighting block.

2. Release and lift product clamp; then position cable against product guide with the square–cut end of the cable or circuitry against the shoulder of the sighting block. Secure product clamp when cable is properly positioned.

3. Release drag release handle and push slide assembly toward back of machine until it rests against the rear stop.

4. Hand–cycle machine through a crimping cycle by depressing START switch, then rotate the hand knob CLOCKWISE (one–half revolution) until the table stops its forward movement.

5. Observe the relationship of the conductor under the anvil. To center the conductor under the anvil, loosen the thumbnut (see Figure 13**)** and rotate the product centering fine adjustment knob. Rotate CLOCKWISE to move the slide assembly toward the back of the machine, COUNTERCLOCKWISE to move it toward the front of the machine. One revolution moves the slide assembly approximately 0.25 mm [.010 in.]

6. Depress STOP switch (S7) before completion of first cycle.

7. Continue hand–cycling machine until first cycle is complete and terminal is crimped on cable.

8. Push drag release handle to the right; then pull back slide assembly until it rests against the forward stop.

9. Release product clamp and remove crimped cable.

10. Inspect cable to ensure contact is centered on the conductor and is properly crimped. Refer to Application Specifications 114–16008 and 114–16015.

11. If contacts are not centered on the conductors, re–adjust product centering fine adjustment knob as described in Step 5 of this procedure and perform First Insertion Adjustment, Paragraph 5.1.

12. Tighten thumbnut.

NOTE

To ensure all contacts are centered to the conductors, perform CRIMPING PROCEDURE, Section 6, and inspect all contacts.

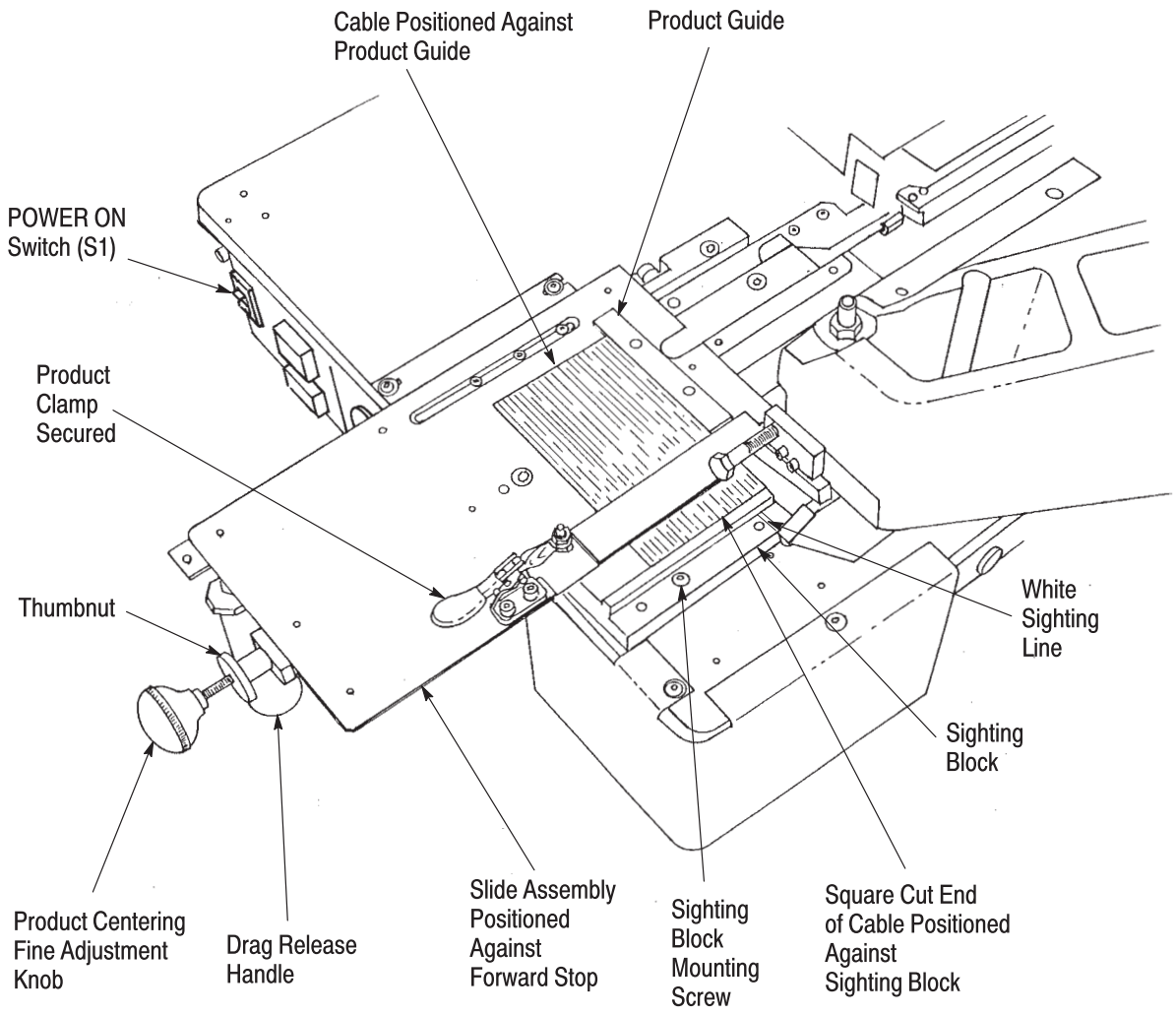


Figure 13

5.3. Sight Block Adjustment

NOTE

After product has been centered on conductors, as described in Paragraph 5.2, the sighting block may be adjusted so that it can be used to locate subsequent cables to be terminated on the slide.

1. With the slide assembly pulled against the forward stop (as shown in Figure 13) and a cable clamped in position in the slide assembly, loosen the mounting screw on the sighting block and adjust the block so that one of the locating lights is in a position centered between two conductors or under one conductor and symmetrically “eclipses” it.
2. Tighten the mounting screw.

NOTE

As an alternative to the locating lights, the sight block contains a while sighting line which may be used to locate cables for termination. Both the white sighting line and the locating lights must be set to a consistent reference feature of the cable conductors to be terminated.

5.4. Anvil and Shear Plate Adjustment (Figure 14)

DANGER

Disconnect machine from electrical outlet before performing the following steps.

1. If necessary, unload contact strip from machine.

2. Measure gap between anvil and shear plate using a thickness gage. The dimension should be 0.94 to 0.99 mm [.037 to .039 in.] for 1.27 mm [.050 in.] centerline cable/product and 1.12 to 1.17 mm [.044 to .046 in.] for 2.54 mm [.100 in.] and 5.08 mm [.200 in.] centerline cable/product. See Figure 14**,** Detail A; and Figures 15 and 16.

CAUTION

The gap should not require adjustment unless the anvil is replaced. Any adjustment to the anvil will require that the anvil alignment be rechecked with the crimper and crimp fingers.

3. If the anvil requires adjustment, loosen the two button head capscrews so that there is a slight pressure on the anvil. Loosen locknut on anvil height setscrew. See Figure 14**.** While holding anvil, turn setscrew until the required gap dimension is obtained. Refer to Step 2. When anvil is properly adjusted, retighten button head capscrews and locknut on the setscrew.

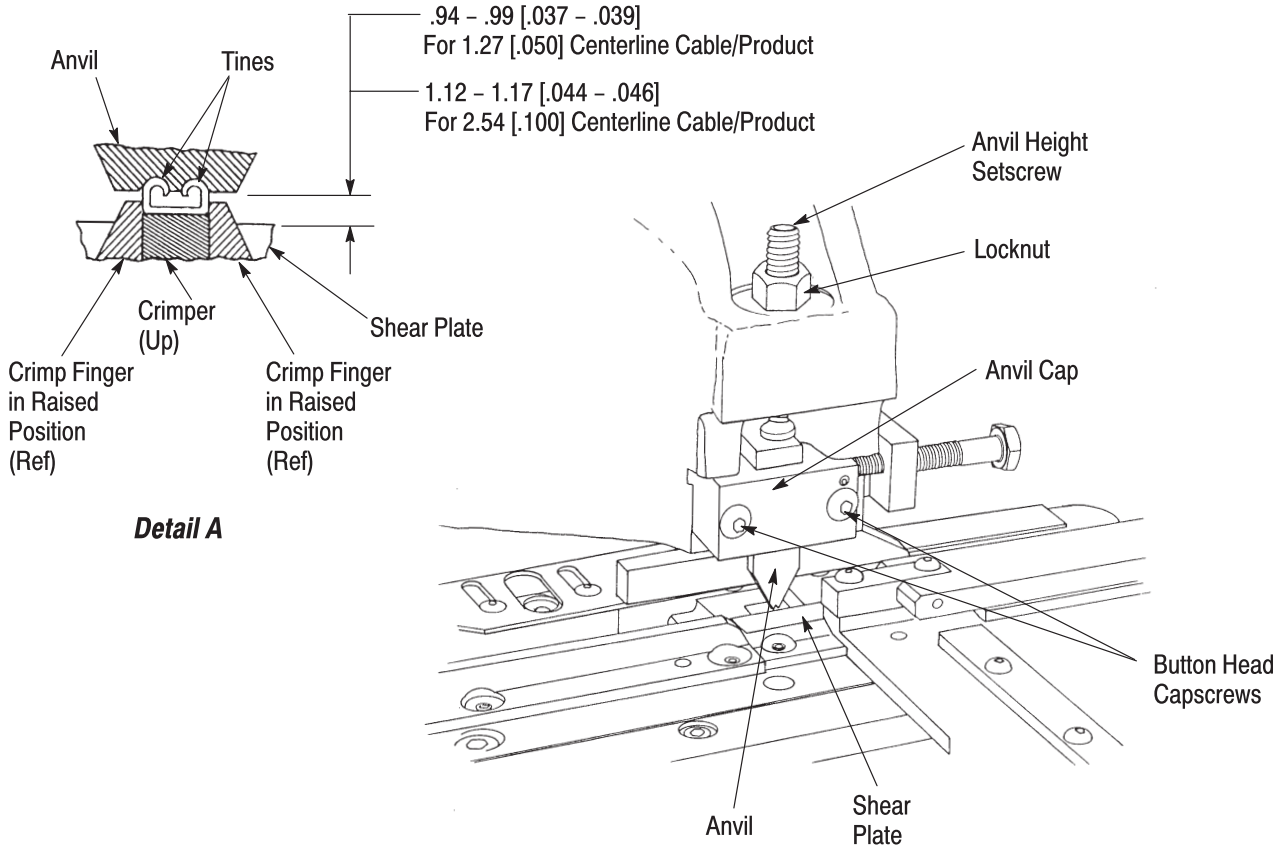


Figure 14

5.5. Anvil and Crimper Alignment (Figure 15 and 16)

DANGER

Be sure hands are clear of crimping section before connecting plug (P1) to power supply.

1. Make sure anvil is properly aligned with the crimper. To check for misalignment, hand cycle the machine. Proceed as follows:

   a. Depress PWR ON switch (S1). Indicator lamp (DS1) should light.

   b. Hold remote CRIMP STOP switch (S4) “down.”

c. Depress START switch (S5).

d. Rotate hand knob CLOCKWISE until crimp fingers are raised. If anvil does not appear symmetrical with crimp fingers, or crimped tines of terminals are not symmetrical, re–align anvil with the crimper.

2. Loosen the two button head capscrews on the anvil cap (Figure 14) so that there is a slight pressure on the anvil. Hand–cycle machine until crimp fingers are raised. Refer to Step 1 for hand–cycling procedures.

CAUTION

Do not allow anvil to touch crimp fingers.

Crimp and Shear Tooling for 1.27 mm [.050 in.] Centerline Product

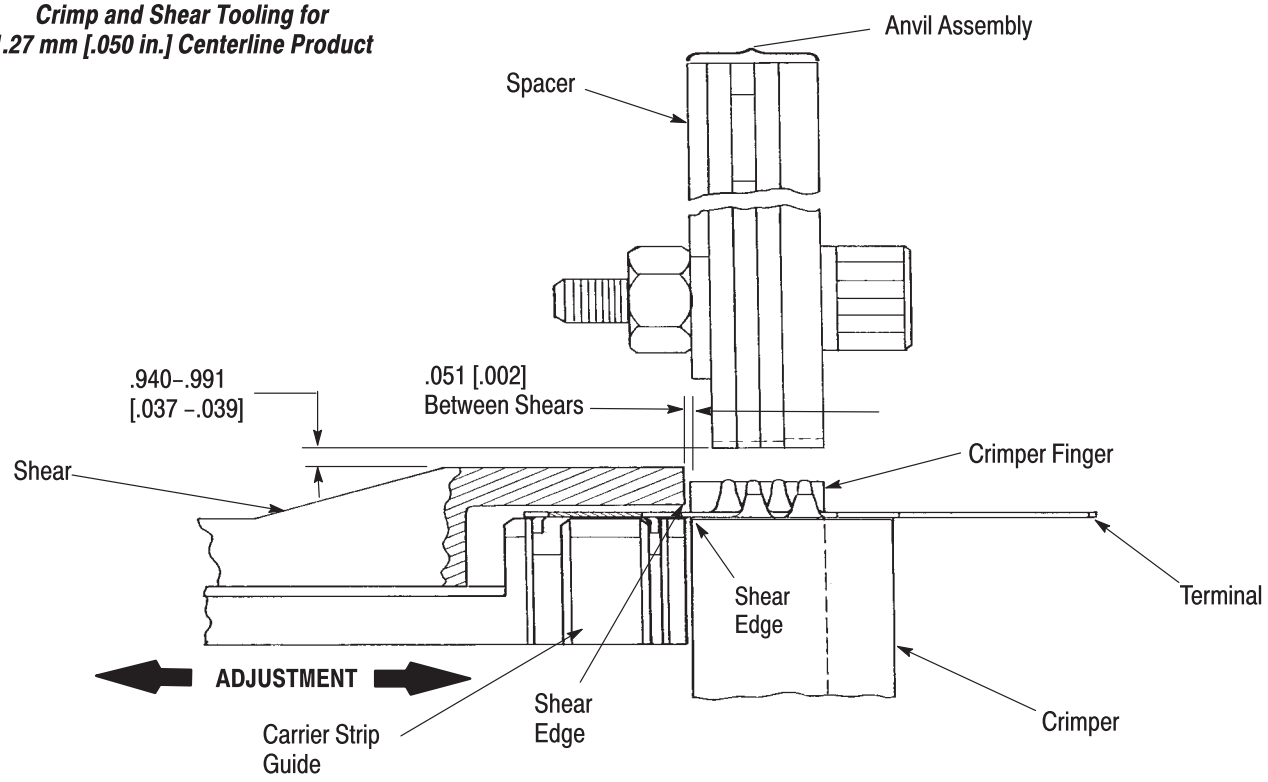


Figure 15

3. Turn hex head alignment screw (see Figure 7) until anvil appears centered. Maintain position of anvil and alignment screw; then tighten button head capscrews.

4. Test crimp a cable to ensure crimped tines are symmetrical in width. Refer to Application Specification 114–16008 and 114–16015.

NOTE

Terminal feed also affects symmetry of crimped tines.

Crimp and Shear Tooling for 2.54 mm [.100 in.] Centerline Product

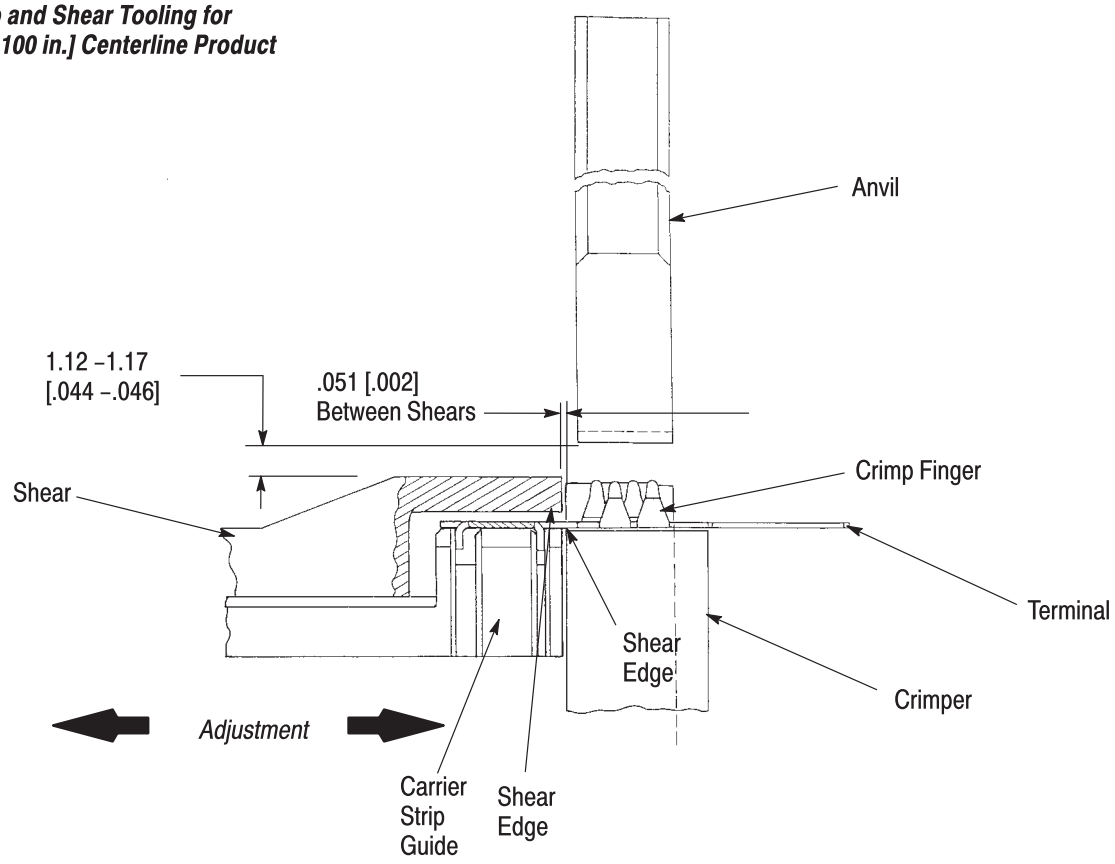


Figure 16

5.6. Crimp Finger Height Adjustment (Figure 17)

DANGER

Be sure hands are clear of crimping section before connecting plug (P1) to power supply..

1. The “S” height is the distance between the raised crimp fingers and the anvil, and is measured with a thickness gage. See Figure 17**,** Detail A.

Determining the desired “S” Height:

a. For formed cable, the “S” height dimension is obtained by measuring the cable thickness “A” and the insulation thickness “B” and dividing the total by 2. See Figure 17**,** Detail B.

b. For laminated cable, the “S” height dimension is obtained by measuring the thickness of cable.

c. In both cases, the cable should be snug, but not tight, between the fully raised crimp fingers and the anvil.

2. To perform the “S” height adjustment: remove front guard to provide access under machine table, loosen setscrew on crimp finger height adjustment screw, and turn knob to obtain appropriate “S” height, as determined in Step 1. See Figure 17**.**

3. Tighten setscrew on adjustment screw after desired “S” height is attained.

NOTE

Turning adjustment knob CLOCKWISE reduces the “S” height, while turning the knob COUNTERCLOCKWISE increases the “S” height. One revolution moves the “S” height approximately 0.13 mm [.005 in.].

NOTE

It may be necessary to slightly increase the “S” height to reduce the amount of cable wave, or curl, induced by crimping.

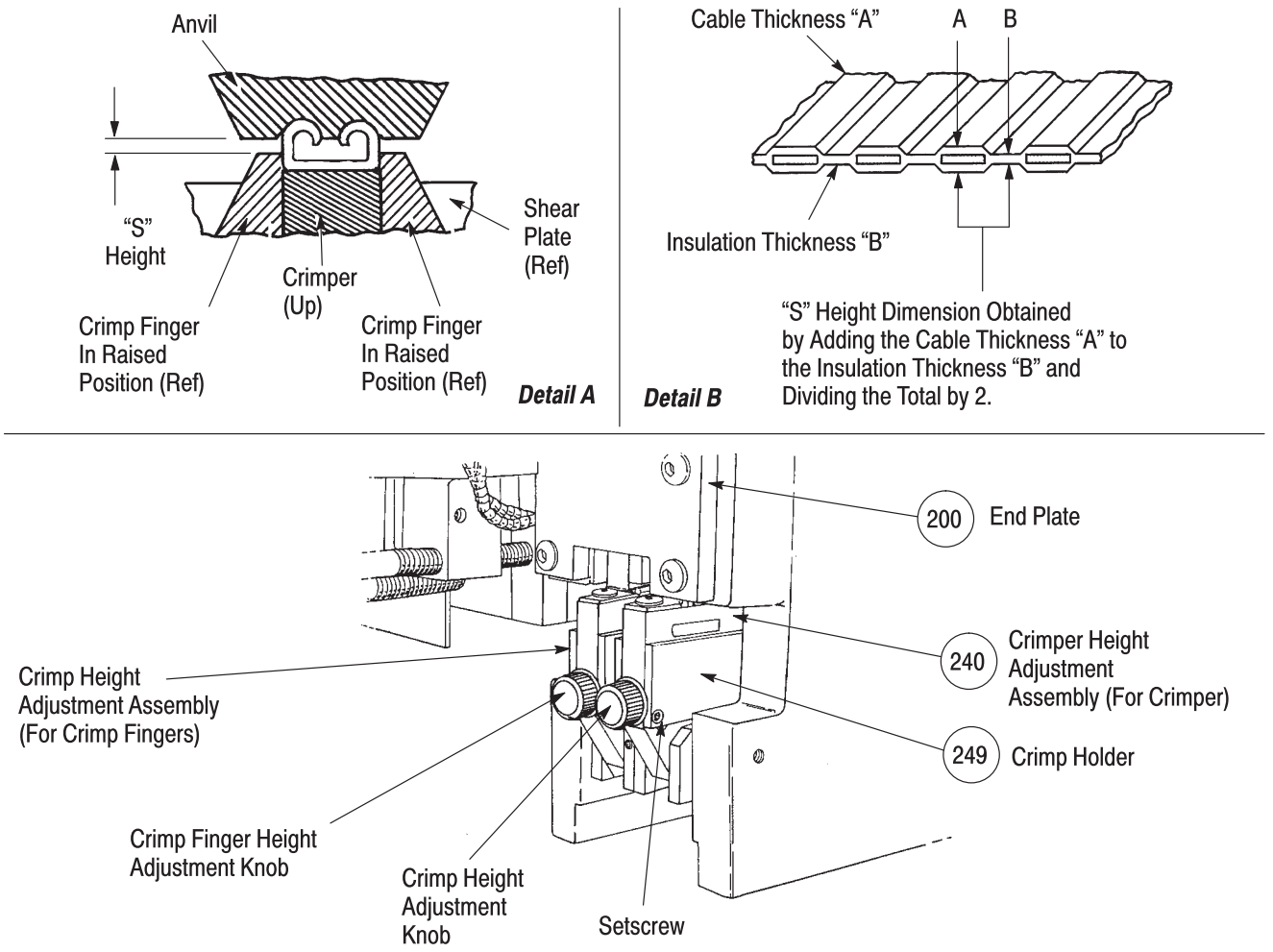


Figure 17

5.7. Crimp Height (Figure 17)

A. Verification

DANGER

Be sure hands are clear of crimping section before connecting plug (P1) to power supply.

1. Determine crimp height by loading machine with contacts and performing setup procedures, as described in Section 4, MACHINE SETUP ADJUSTMENTS.

2. Crimp several contacts, as described in Section 6, CRIMPING PROCEDURE.

3. Remove crimped cable or circuitry from slide assembly, and measure the crimp height using a standard micrometer. For details on crimp height inspection dimensions, refer to Application Specifications 114–16008 and 114–16015, and Quality Specification 102–16050. If the crimp height does not conform to the required dimensions, adjust the crimp height.

CAUTION

Using a standard micrometer (6.35 mm [.250–in.] diameter anvil and spindle) beyond the first or last contact on the cable will result in checking more than one terminal at a time.

B. Adjustment

1. Loosen setscrew on crimp height adjustment screw; then turn knob. See Figure 17.

NOTE

Turn adjustment screw CLOCKWISE to reduce the crimp height, or turn screw COUNTERCLOCKWISE to increase the crimp height. One revolution moves the crimper approximately 0.03 mm [.001 in.].

2. Reposition cable onto slide assembly; then hand–cycle machine to crimp several contacts. Remove crimped cable from slide assembly and inspect crimp height, as described in Step 3 of Paragraph 5.7,A. Repeat Steps 1 and 2 until required crimp height is obtained.

3. Tighten setscrew on crimp height adjustment screw after the proper adjustments are made.

NOTE

It is recommends using statistical process control to monitor and maintain a consistent crimp height.

6. CRIMPING PROCEDURE (Figure 3)

Before placing the machine in production operation, make sure it has been properly set up and adjusted according to the procedures in Section 4, MACHINE SETUP ADJUSTMENTS. Proceed as follows:

NOTE

If terminating machine is setup with a programmer kit, refer to 409–5880 for operating procedures.

CAUTION

To ensure uniformity of crimps and ease in centering the cable conductors, it is recommended that the same side of the cable always be placed against the product guide. The curl in the flexible flat cable should be down.

1. Depress PWR ON and MOTOR ON switches (S1 and S2). See Figure 3.

2. Release product clamp and position cable onto slide assembly using the procedures described in Section 4, MACHINE SETUP ADJUSTMENTS. See Figure 7.

3. Push drag release handle to the right; then push slide assembly back against the rear stop.

4. Depress START switch (S5) to cycle the machine.

CAUTION

If a malfunction to the machine is observed, IMMEDIATELY depress the STOP switch (S3) to stop the machine. Refer to Section 6, TROUBLESHOOTING.

5. Push drag release handle to the right and pull slide assembly back until it rests against the forward stop.

6. Open product clamp and remove crimped cable.

7. Repeat Steps 2 through 6 until cable is properly crimped. Inspect cable for proper termination, using Application Specifications 114–16008 and 114–16015.

DANGER

When crimping is completed, TURN OFF machine by depressing the PWR ON (S1) and MOTOR ON switches (S2). See Figure 3.

7. TROUBLESHOOTING

The following table is provided to assist in isolating troubles in the most likely order in which they may occur. The table lists the probable cause and remedy for correcting the situation.

TROUBLE	PROBABLE CAUSE	REMEDY
1. Contacts not centering on conductor during operation.	Product not properly aligned in slide assembly.	Refer to setup procedure in Section 4.
	Product not within specified tolerances.	Check product. Refer to appropriate Application Specification.
	Contact strip not uniform or has been distorted.	Check strip for snagging off of reel. Remove bad strip.
	Oil on the table gibs.	Wipe all oil from gibs.
	Contact strip feed finger improperly adjusted.	Adjust contact strip feed finger. Refer to Paragraph 4.5.
	Slide feed finger and/or contact strip feed finger excessively worn.	Replace feed finger. Refer to Section 9.
2. Improper crimp height.	Crimp height assembly improperly adjusted.	Adjust crimper. Refer to Paragraph 5.7.
	Anvil improperly adjusted.	Adjust anvil. Refer to Paragraph 5.5.
	Crimper and/or anvil excessively worn.	Replace tooling. Refer to Section 9.
3. Contacts distorted in crimping.	Gap between anvil and crimp fingers not properly adjusted.	Adjust finger height assembly. Refer to Figure 15 or 16.
	Anvil improperly adjusted.	Adjust anvil. Refer to Paragraph 5.5.
	Crimper, crimp fingers, and/or anvil excessively worn.	Replace tooling. Refer to Paragraph 9.2
	Shear block improperly positioned or worn.	Reposition shear or replace if necessary.
4. Machine over or under set number of cycles during operation.	Crimp stop switch bearing plate on slide assembly not properly adjusted.	Refer to setup procedure in Paragraph 4.3.
	Defective wiring.	Check and replace wiring as needed. Refer to schematic in Section 2.
	Defective electrical component(s).	Check components by referring to schematic in Section 2. Replace as necessary, see Section 9.
	Total conductor count setting.	Adjust product centering fine adjustment (Paragraph 5.2) so that number of conductors crimped, equals setting at cable position indicator.

TROUBLE	PROBABLE CAUSE	REMEDY
5. Contact strip does not advance or is erratic.	Damaged contact strip.	Check strip, cut off and remove damaged strip.
	Contact strip feed finger improperly adjusted.	Adjust feed finger. Refer to Paragraph 4.5.
	Contact strip feed finger excessively worn or tip broken.	Replace feed finger. Refer Paragraph 9.4.
	Broken spring(s) in feed finger actuating assembly.	Replace springs as necessary. Refer to Paragraph 9.4.
	Strip drag improperly set.	Drag adjustment screw, see Figure 7.
6. Slide assembly does not advance properly during cycling.	Improper tension or drag.	Adjust drag spring tension.
	Slide feed finger improperly adjusted.	Adjust feed finger. Refer to Paragraph 4.5.
	Slide feed finger excessively worn or broken.	Replace feed finger. Refer Section 9.
	Tape feed ratchet excessively worn or chipped.	Replace ratchet. Refer to Section 9.
	Broken spring on slide feed finger.	Replace spring. Refer to Section 9.
	Slide and guide dirty.	Clean the slide and the guide.
7. Burrs on contacts where sheared.	Crimper excessively worn.	Replace tooling as necessary. Refer to Paragraph 9.3.
	Shear plate excessively worn.	Replace shear plate. Refer to Paragraph 9.5.
	Shear plate improperly adjusted.	Adjust shear plate. Refer to Section 9.
	Defective contact strip.	Check strip. Replace reel if necessary.
8. Motor runs but machine will not cycle when slide assembly is pushed back and START pushbutton is depressed, or motor continues to cycle after product is completed.	Defective wiring.	Check and replace wiring as needed. Refer to Paragraph 2.3.
	Broken switch, S4.	Replace S4. Refer to electrical schematic, Paragraph 2.3.
	Clutch not lubricated.	Lubricate clutch. Refer to Figure 18.
9. Tearing of printed circuits during feeding and crimping operation.	Improper “S” dimension.	Adjust crimp fingers. Refer to Paragraph 5.6.
10. Width of tines vary in a crimp or asymmetrical crimp.	Crimper and crimper fingers not symmetrical with anvil.	Adjust anvil. Refer to Paragraph 5.5.

8. PREVENTIVE MAINTENANCE

Disconnect machine from electrical outlet before performing maintenance, inspection, or repairs.

8.1. Cleaning

1. Daily remove metal chips with a vacuum cleaner, brush, or air hose.

Eye protection and personal protective equipment must be worn when using compressed air for cleaning. Compressed air must be reduced to less than 207 kPa [30 psi].

2. Monthly, clean machine with a clean, dry cloth.

3. Monthly, remove grease using an approved solvent or cleaning fluid.

8.2. Inspection

1. Daily, make sure all component parts are secure in the tooling area.

2. Daily, check for evidence of excessive wear. Make any necessary repairs.

3. Monthly, inspect wiring for evidence of chafing, loose connections, or damage. Make necessary repairs. Refer to Figure 5.

4. Monthly, inspect machine for proper lubrication. If necessary, lubricate the machine as described in Paragraph 8.3, Lubrication.

5. Daily, use a piece of cable to inspect the effectiveness of the cable clamp and pad. The cable must not move during operation. Adjust the clamp or replace the pad if necessary.

6. Check drive chain for proper adjustment. The chain must have approximately 6.4 mm [.25 in.] slack between the drive sprocket and clutch sprocket. If necessary, adjust the motor mount.

7. Twice a year, disassemble and clean the crimp height adjuster. Apply a thin coat of light machine oil to the assembly to inhibit rust.

8.3. Lubrication

Avoid excessive lubrication on machine parts. Remove excess lubricant before starting the machine.

There should be no lubrication on table feed slide gibs.

1. Lubricate drive shaft bearings and cams with a general, all–purpose grease.

2. Monthly, lubricate drive chain and actuating linkage for feed fingers with a few drops of SAE 30 oil or equivalent. Wipe off excess oil.

3. Lubricate clutch where shown (in Figure 18) with a good grade clutch lubricant.

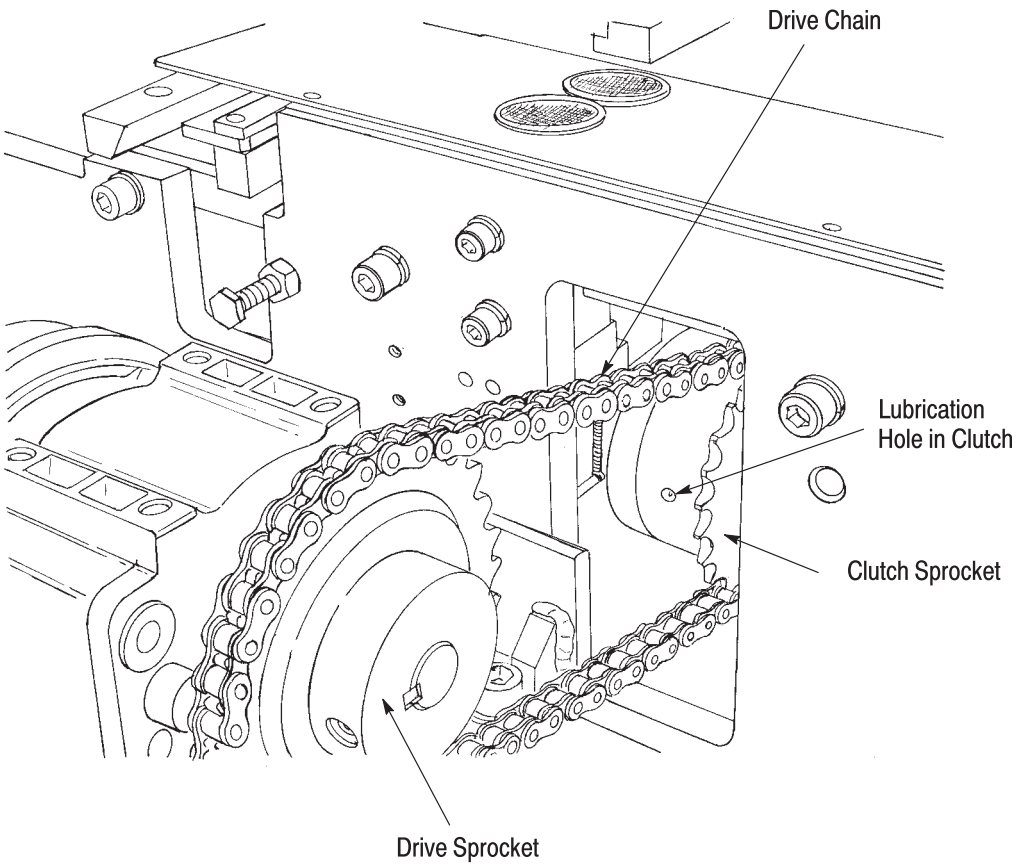


Figure 18

9. PARTS REPLACEMENT

This section covers parts replacement of those recommended spares listed on the the drawings shipped to customers. Recommended Spares, which are not covered in this section, are easily replaced by referring to the assembly drawings, supplied with the machine. Tyco Electronics recommends stocking spare parts to avoid machine production downtime.

Following the replacement of parts, especially within the crimping section, the machine adjustments should be thoroughly checked to ensure proper adjustments. See Section 4, MACHINE SETUP ADJUSTMENTS.

DANGER

DISCONNECT MACHINE from power outlet before performing maintenance, inspection, or repairs.

NOTE

The following procedures identify customer replaceable parts using the item numbers on Drawing 224910.

9.1. Electrical Components Replacement

No special instructions are required to replace electrical components or wiring. However, to ensure proper installation, carefully note the color coding of all wires and the component positions before removal. Refer to the electrical schematic in Figure 5.

9.2. Anvil Replacement (Figure 19)

1. Remove two screws (8), from locator anvil (137).

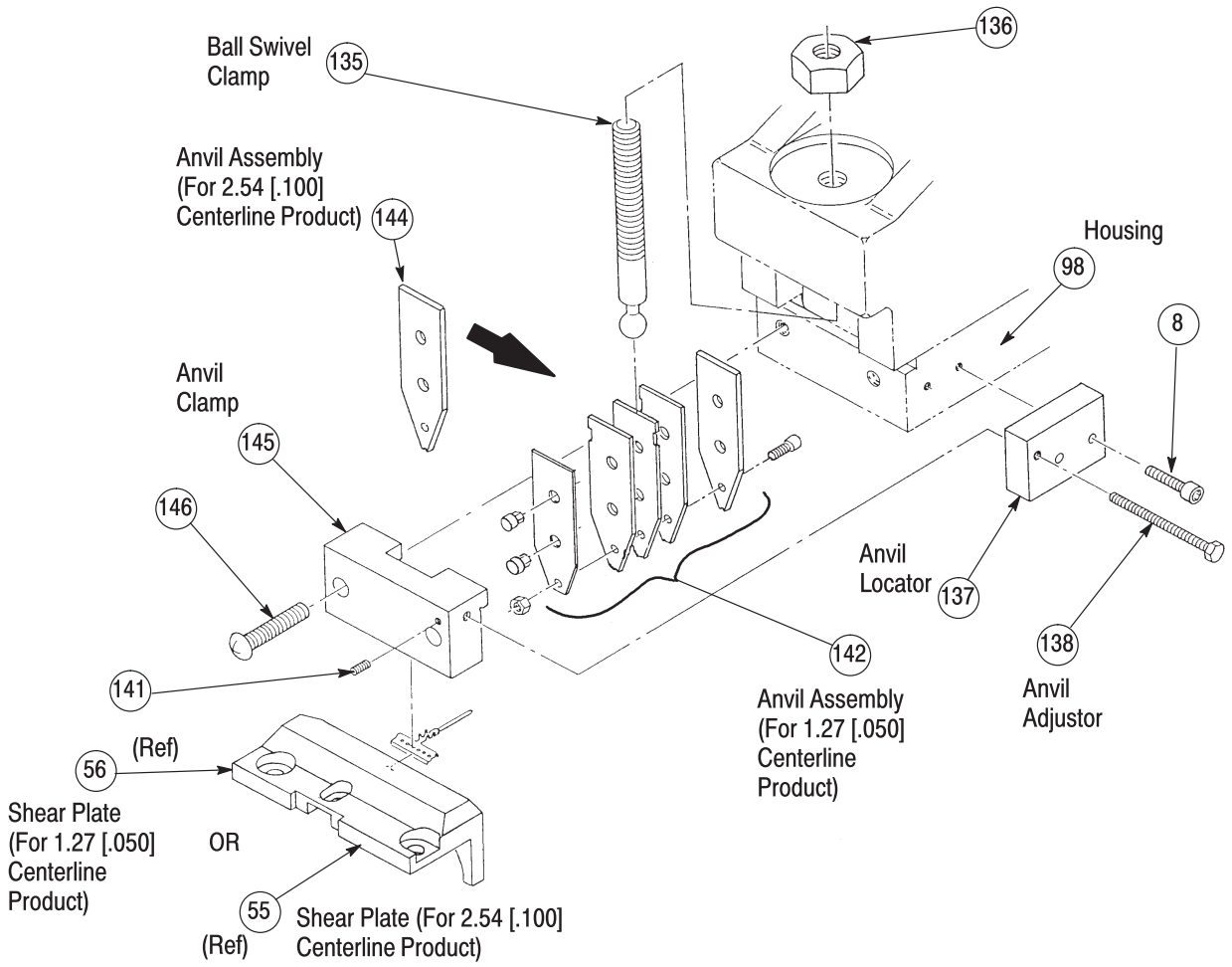


Figure 19

2. Remove anvil clamp and anvil locator by removing 2 screws (146), and two screws (8).

NOTE

Do not change setting of adjuster anvil (138) in anvil cap (145).

3. Remove anvil (142, 143, or 144) from anvil cap (145).

4. Replace anvil in anvil cap and install the assembly into the housing (98).

NOTE

With anvil cap (145) against housing (98), and the anvil (142, 143, or 144) against the swivel ball clamp (135), tighten screw (8) in anvil locator (137) first; then tighten screws in anvil cap (146).

5. Check contacts for proper configuration as described in Paragraph 4.2 and make adjustments If necessary.

9.3. Crimper and/or Crimp Fingers Replacement (See Figure 17)

1. Move locator (39).

NOTE

The locator is a U– shaped block that is located on the top plate (the crimp tooling passes through it).

2. Remove cover (45).
3. Remove scrap guide (281).

NOTE

Mounted to underside of top plate.

4. Remove end plate (200).

NOTE

Only three screws required to mount end plate. Do NOT use a screw in upper left corner.

5. Rotate crimper assembly and crimp finger assembly forward.
6. Crimpers (251 or 253) may be replaced by removing crimp holder (249).
7. Crimp fingers may be replaced by sliding them off their pivot pins.
8. Replace tooling in reverse order to re–assemble.

9.4. Feed Fingers Replacement

No special instructions are required to replace the contact strip feed finger (133 and 134), or tape feed fingers (88 and 89); in the event replacement is necessary, make adjustments as described in Section 4, MACHINE SETUP ADJUSTMENTS.

9.5. Shear Plate Replacement

1. Remove cable support plate (187).
2. Remove shear plate (55, or 56); then lift shear plate out.

NOTE

It is helpful to measure the position of the stock guide so that it may be installed in the new shear in approximately the same place.

3. Remove stock guide and install in the new shear. The stock guide controls the length of the tab when the contact is sheared and the position of the contact under the anvil.
4. Install shear plate on guide support with the two screws, but do not tighten.
5. Hand–cycle machine without contacts until crimper is fully raised. Secure shear to machine so that shear is .051 mm [.002 in.] from the raised crimper. Use shim or feeler gauge to obtain space between shear and crimper.
6. Complete hand–cycle of machine.

CAUTION

Refer to Paragraph 4.2, Checking Contacts for Proper Configuration, to check shear and crimp. Check for position of stock guide by examining, under magnification, crimped tines for misalignment relative to the anvil. This is particularly important with 1.27 mm [.050 in.] centerline products. For best results, use shim gages between stock guide and shear for locating the guide in small increments.

10. REVISION SUMMARY

Since the previous release of this sheet, the following changes have been made to 409–5875:

- Updated document format to corporate requirements
- Replaced with the Tyco Electronics logo