Flexible Flat Cable Terminating Machine
No's. 768600–[ ] and 354044–[ ]

409–5835
(was CM 5835)
14 DEC 95 Rev A

AMP

AMP

Flexible Flat Cable Terminating Machine
No's. 768600–[ ] and 354044–[ ]

DANGER

SAFETY PRECAUTIONS PREVENT INJURY

Safeguards are designed into AMP* machines to protect operating personnel from most hazards during normal machine operation. However, as with most machinery, certain precautions must be taken by the operator and repairman.

Never insert hands into an installed machine/applicator, or any part of a machine that is operated by electricity or compressed air, without first pulling the machine power cable plug from the outlet receptacle and/or shutting off the compressed air at the line valve and disconnecting the air hose. This will prevent injury in the event that switches or other controls are accidentally activated.

A grounded electrical outlet should always be used to receive the plug on the machine power cable.

To improve clarity, photographs and drawings may not show machine/applicator guards. In some cases, it is impractical to show the variety of guards designed to meet specific safety requirements, as set forth in codes and standards adopted by customers and/or enforced in a given locale.

Though a guard may not be shown, and procedures may not reflect the need for its removal, the guard **must** be in place during normal operation of the machine/applicator.

TECHNICAL ASSISTANCE CENTER

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

GENERAL MACHINE POLICY

All machines remain the property of AMP Incorporated. The customer shall have no title to the machine(s) and his interest shall be limited to the use of said machine(s) for the purpose indicated, during the stated term, at the specified plant.

No major change or modification shall be made without written consent of AMP Incorporated. Spare and component parts are available at nominal prices.

A list of component parts is included in the instructional material or drawings supplied with each machine.

The customer shall be fully responsible for the maintenance of the machine(s) including servicing, repair, and replacement of damaged or broken parts. Each machine shall be returned in usable condition — reasonable wear and tear excepted. Before returning the machine, contact AMP Incorporated, Harrisburg, Pennsylvania requesting instructions for shipping and disposition.

AMP Field Service Engineers are available to provide assistance in the adjustment or repair of the machine when problems arise which your maintenance personnel are unable to correct. Contact AMP Incorporated for applicable fees.

INFORMATION REQUIRED WHEN CONTACTING SERVICE PRODUCTS BUSINESS

AMP Incorporated offers the **Technical Assistance Center** as a means of providing technical assistance when required.

When contacting AMP Incorporated by telephone regarding service to a machine or tool, 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 corrected in this manner.

When calling the Technical 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. Machine or tool 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

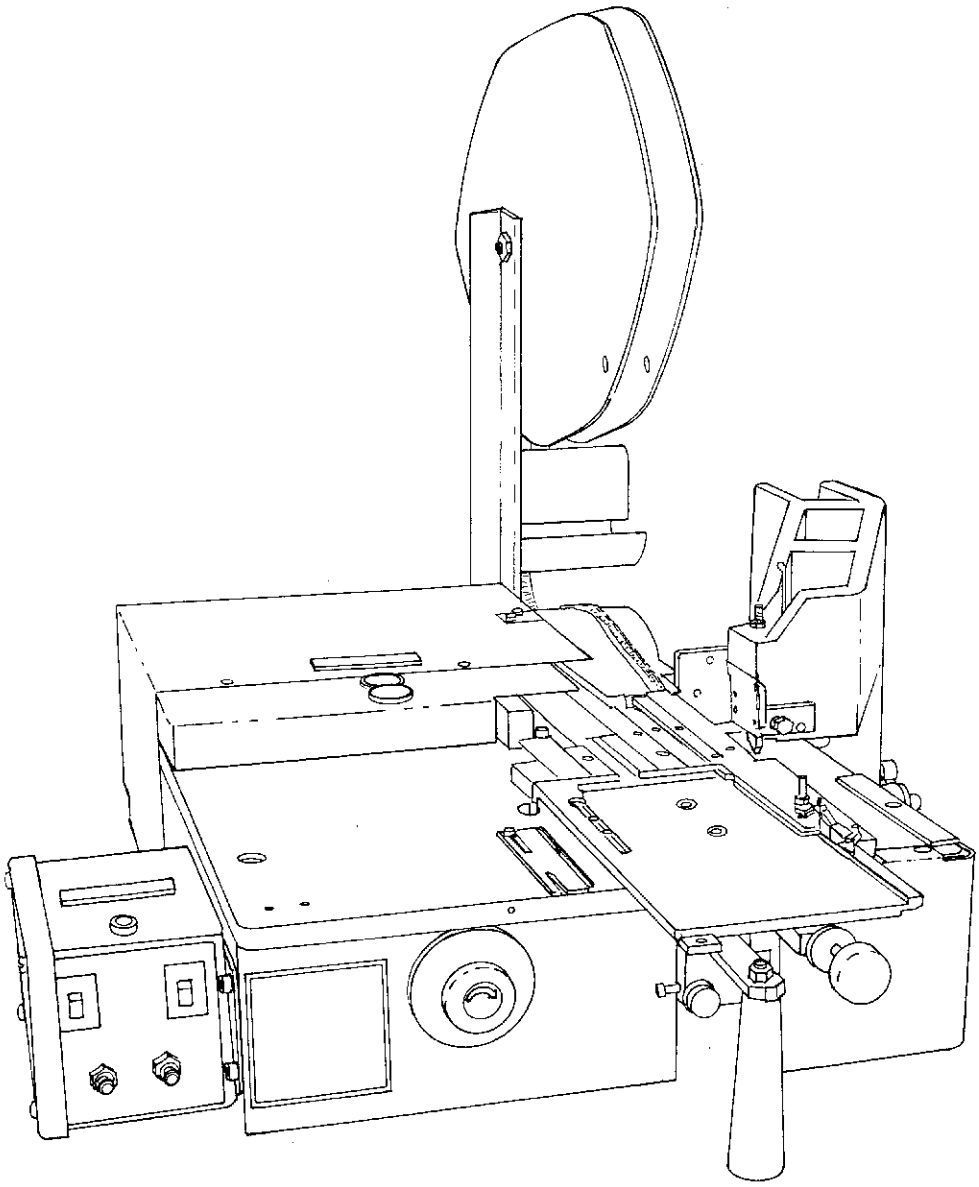


Figure 1 95–280

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 AMP Flexible Flat Cable (FFC) Terminating Machines 768600–2, –3, –5, –6, –7 and 354044–2, –3, –5, –6 (See Figure 1). The terminating machines are designed to crimp a variety of AMP 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

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 Control Box)	FLEXIBLE FLAT CABLE TERMINATING MACHINE (With Programmer Control Box)	ELECTRICAL REQUIREMENTS	CONTACT TYPE AND MAXIMUM QUANTITY	CONDUCTORS	
				CENTERLINES mm [in.]	WIDTH mm [in.]
768600–2	354044–2	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]	
768600–3	354044–3	220 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]	
768600–5	354044–5	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]
768600–6	354044–6	120 Vac 60 Hz	Multi–Crimp 55	1.27 [.050]	0.61–0.71 [.024–.028]
768600–7	___	220 Vac 50 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 [.o59–.065]

Figure 2

A Programmer Control Box 468955–2 can be ordered separately and added to the 768600 series machines. Refer to instruction sheet 408–9842 for details concerning the use and operation of the AMP Programmer Control Box.

NOTE *The programmer pc board is capable of programming skips (conductors not to be terminated) from positions 2 to 49 on 1.27 mm [.050–in.] centerline machines; from positions 2 to 35 on 2.54 mm [.100–in.] centerline machines; from positions 2 to 17 on 5.08 mm [.200–in.] centerline machines, and from positions 2 to 11 on 7.62 mm [.300–in.] centerline machines.*

Product Specifications and cable requirements are available in AMP Application Specifications 114–16008 for 1.27 mm [.050–in.] centerline cable, and 114–16015 for 2.54 mm [.100–in.] centerline cable. AMP Product Specifications 108–40002 and 108–9024 provide performance tests for the FFC product line. AMP 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 personnel should follow carefully the procedures in Section 4, 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 7, PREVENTIVE MAINTENANCE, necessary and helpful information in Section 6, TROUBLESHOOTING. For information beyond the scope of this manual, contact your local AMP Field Sales Engineer or AMP Field Applications Engineer at 1–800–722–1111.

Reasons for re–issue are in Section 9, 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 115 Vac, 50/60 Hz (for machines 768600–2, –5, and –6, and 354044–2, –5, and –6), or 220 Vac, 50 Hz (for machines 768600–3 and –7, and 354044–3). The machine dimensions are 470 mm wide by 457 mm high by 698 mm long [18 1/2–in. wide by 18–in. high by 27 1/2–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 power supply switches on the control panel (see Figure 3). The control panel consists of a PWR ON switch (S1) with an internal indicator light (DS1), a MOTOR ON switch (S2) with an internal indicator light (DS2), a START switch (S5), and an emergency STOP switch (S3). A circuit breaker (CB) is located on top of the control panel.

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 *AMP Programmer Control Box 468955–2 can be purchased separately and used with the 768600 series machines (it is included with the 354044 series machines). The control box provides a means of programming a selected number of contacts to skip, which is accomplished by inserting a program pc board into the edge connector of the control box. For details concerning the installation and operation of the control box, refer to AMP Instruction Sheet 408–9842.*

The motor (located at the back of the machine) drives the machine 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 detachable hand knob is provided to manually cycle the machine during setup and when making adjustments. The hand knob must ONLY be rotated CLOCKWISE.

CAUTION *Damage could occur to the clutch and tooling if the hand knob is rotated COUNTERCLOCKWISE.*

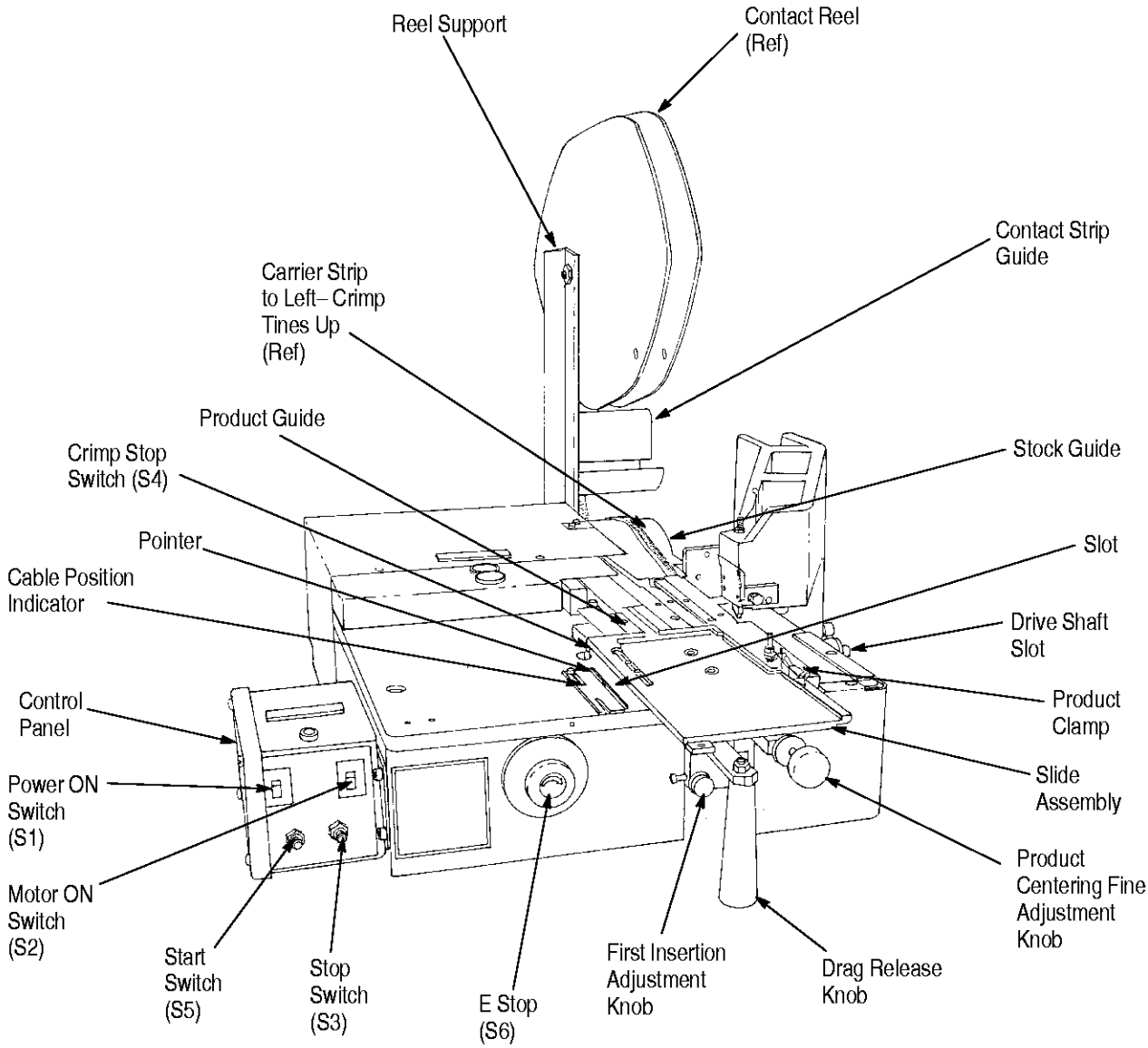


Figure 3

95–280

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 10. 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 13.

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 9. For details concerning setup and adjustments, refer to Section 4, MACHINE SETUP AND 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 14 for position of slide assembly against rear stop.) The 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 AND ADJUSTMENTS.*

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 S2) 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 crimp stop switch (S4) "closed." With the 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.

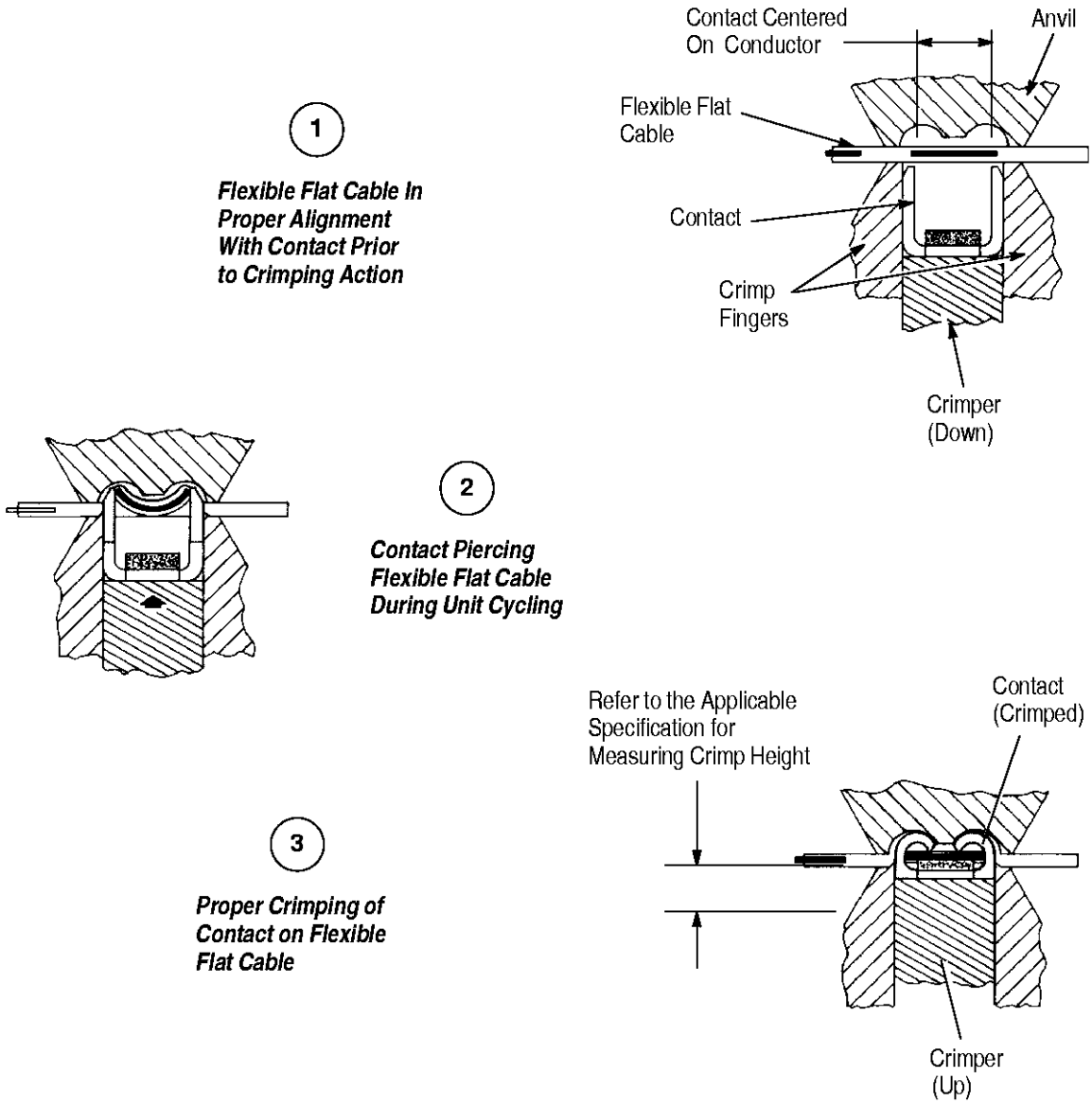
NOTE *During each revolution, the contact strip and slide assembly advance one position which aligns the contact and conductor between the anvil and the crimper.*

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.

NOTE *Should it be necessary to stop the crimping operation, the STOP switch (S3) or the Emergency STOP (S6) can be depressed to disengage the clutch and stop rotation of the drive shaft at the completion of that termination cycle.*

During the crimping of the last contact, the crimp stop switch (S4) is de–actuated (opened) to prevent further cycling of the machine. 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.



91–598

Figure 4

2.3. Electrical System Description (Figure 5)

When the electrical plug is connected to an electrical outlet (120 Vac), with a separate ground, 120 Vac power is supplied through the circuit breaker (CB) to the PWR ON switch (S1). On 768600–3 and –7 and 354044–3 machines, a step–down transformer converts 220 Vac to 120 Vac. When the PWR ON switch (S1) is "on," the indicator lamp (DS1) is lighted and power is supplied to the alignment lamp (DS3, and through the normally closed STOP switch (S3) , and the normally closed EMERGENCY STOP switch (S6) to the normally open CRIMP STOP switch (S4). When the MOTOR ON switch (S2) is depressed to "on," the indicator lamp (DS2) in the pushbutton lights and the motor (B1) starts and runs continuously. The motor will be turned "off" when either the MOTOR "off" switch (S2) is depressed or the PWR "off"switch (S1) is depressed.

When the slide assembly is pushed forward (away from the operator) against the rear stop, the CRIMP STOP switch (S4) is mechanically "closed" to supply power to the START switch (S5), and to post 3 of relay (K1).

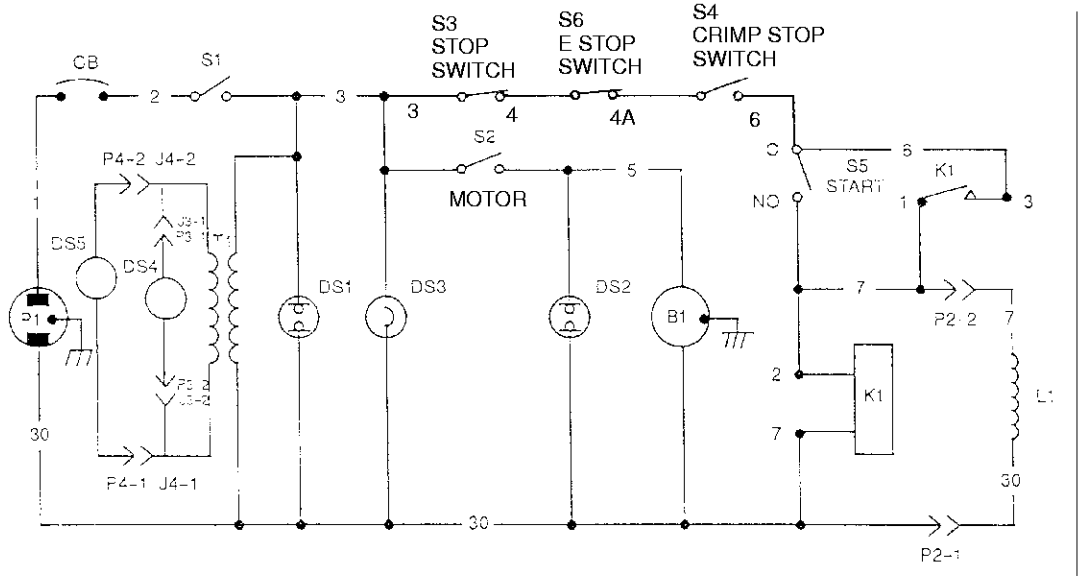


Figure 5

200-106F

When the START switch is momentarily depressed, power is supplied to posts 1 and 2 of relay (K1) which energizes the relay coil and "closes" the circuit between posts 1 and 3, holding the coil energized after release of START switch (S5). At the same time, clutch solenoid (L1) is energized, allowing the machine to automatically cycle. At any time during automatic cycling, the machine may be stopped from performing the remainder of the terminations beyond the current termination cycle by depressing STOP switch (S3) or EMERGENCY STOP switch (S6).

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 AMP Incorporated immediately.

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

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

NOTE *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)

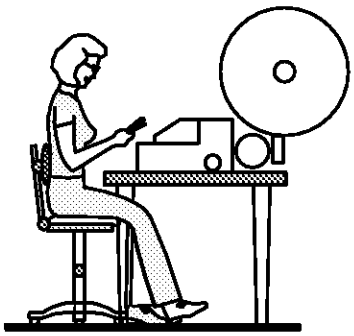
A sturdy bench 710 to 760 mm [28 to 30 in.] high aids comfort by allowing the operator's feet to rest on the floor and the weight and leg position to be easily shifted. The bench should have rubber mounts to reduce noise. An open area under the bench should allow the chair to slide far enough in for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

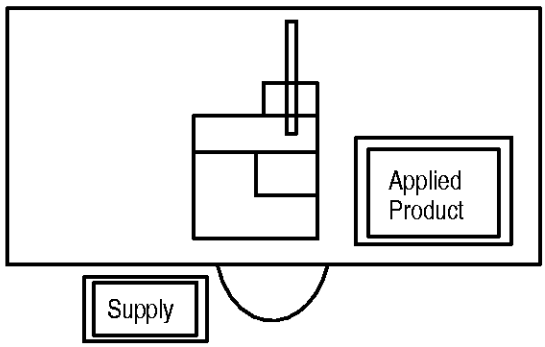
— *Operator's Chair*

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.



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

3.3. 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 of 120 Vac, 60 Hz, or 240 Vac, 50 Hz single phase current with a separate ground.

2. Place the machine on a bench according to the information in Paragraph 3.2, Factors Affecting Machine Placement.

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:

DANGER *To avoid personal injury, do not attempt to operate machine without guards.*

DANGER *Keep hands clear of crimp area.*

CAUTION *Remove terminal strip from machine.*

1. Insert electrical plug (P1) in the electrical outlet.

2. Depress PWR ON switch (S1). Indicator lamp (DS1) in the pushbutton should light.

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 (K1). DO NOT depress the MOTOR ON switch (S2) to start the motor (B1) at this time.

DANGER *The motor must NOT be running when performing the following steps. To avoid personal injury, do NOT attempt the following steps with the motor running.*

5. Hand–cycle the machine through several crimping cycles by inserting the detachable hand knob in the slot in the drive shaft and rotating CLOCKWISE as viewed from the right side of the machine. Observe operation of the crimp fingers, crimpers, and advancement of slide assembly. See Figure 7.

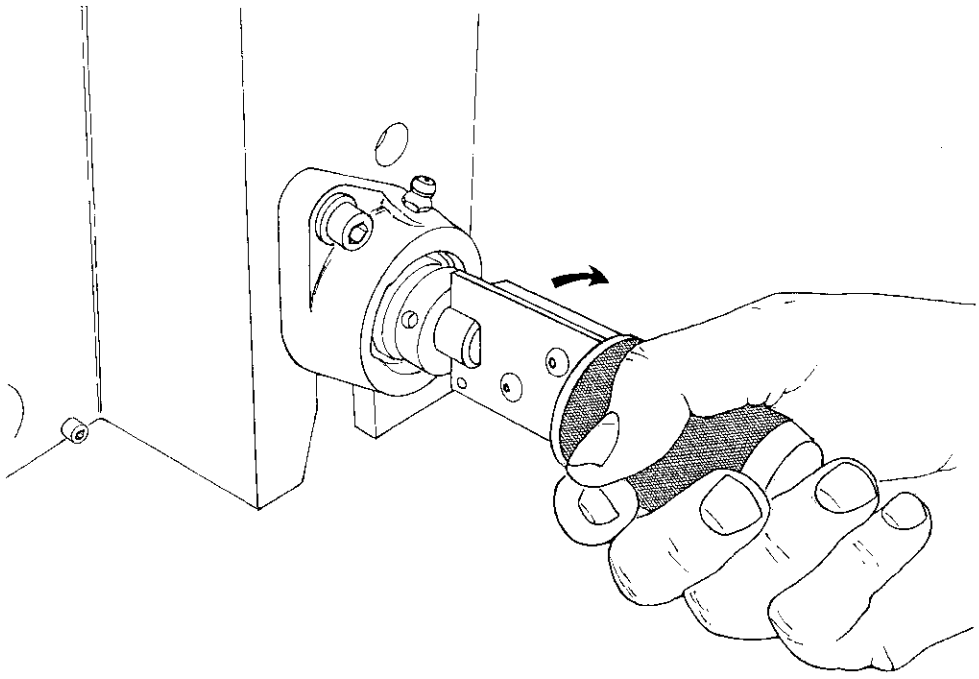


Figure 7 95–281

CAUTION *DO NOT ROTATE HAND KNOB COUNTERCLOCKWISE.*

6. Depress the STOP pushbutton switch (S3). This will de–energize the clutch solenoid (L1) and relay (K1).

7. Remove detachable hand knob. Repeat Step 3, then depress the MOTOR ON pushbutton switch.

DANGER *To avoid personal injury, do NOT attempt to start motor with hand knob in the drive shaft.*

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

Indicator lamp (DS2) in the pushbutton should light and the motor (B1) should start and run continuously. Observe motor operation for smoothness and security.

8. Depress START pushbutton switch (S5). The machine should start and continue to cycle until the 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 ON and PWR ON switches (S1 and S2) to "off."

DANGER *At the completion of machine operation, both the MOTOR ON and PWR ON pushbutton switches (S1 and S2) should be depressed to turn "off" the machine, and the electrical plug (P1) should be disconnected.*

4. MACHINE SETUP AND ADJUSTMENTS

4.1. Machine Setup

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

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

This section contains procedures for setting up the terminating machine without a control box after it has been properly installed and checked out, as described in Section 3, RECEIVING INSPECTION AND INSTALLATION. To set up and operate a terminating machine with a programmer control box, refer to instruction sheet 408–9842 (packaged with the control box) for installation procedures. Machine setup is the same for the FFC product line as well as for the ARINC type contacts. 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.

4.2. 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.

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

CAUTION *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 11.*

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

4.3. 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 PWR ON switch (S1).

4. Depress START switch (S5) and hold. Do NOT depress the MOTOR ON switch (S2) to start the motor (B1) at this time.

DANGER *To avoid personal injury, do NOT attempt to start motor with hand knob in the drive shaft.*

5. Depress the CRIMP STOP switch (S4) and hold. Release the START switch (S5). See Figure 8.

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

NOTE *The CRIMP STOP switch may be released after partial rotation of the drive shaft.*

CAUTION *DO NOT rotate hand knob COUNTERCLOCKWISE.*

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

4.4. First Insertion Adjustment

Unlock first insertion adjustment knob by loosening the socket head cap screw. See Figure 8. 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.

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 4.5.*

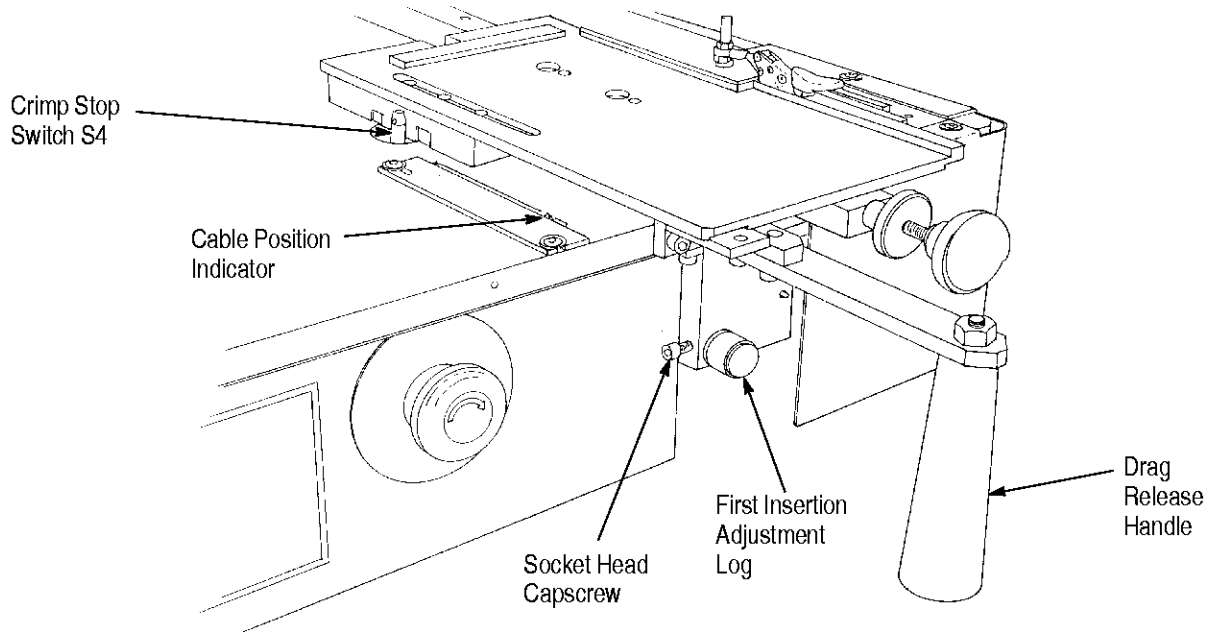


Figure 8

4.5. Product Centering Fine Adjustment

DANGER *Keep hands clear of crimping section at all times.*

1. Position slide assembly against forward stop, as shown in Figure 9; then depress the PWR ON switch (S1), to light the alignment lamp on the sighting block.

2. Release 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 forward until it rests against the rear stop.

DANGER *To avoid personal injury, do not attempt to start motor with hand knob in the drive shaft..*

4. Hand–cycle machine through a crimping cycle by depressing START switch, then inserting the detachable hand knob in the slot in the drive shaft and rotating CLOCKWISE one full revolution.

5. Observe the relationship of the conductor under the anvil. To center the conductor under the anvil, loosen the thumbnut, (see Figure 9) and rotate the product centering fine adjustment knob. Rotate CLOCKWISE to move the slide assembly toward the back of the machine, COUNTERCLOCKWISE toward the front of the machine. One revolution moves the slide assembly approximately 0.25 mm [.010 in.]

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

7. Depress STOP switch before completion of first cycle.

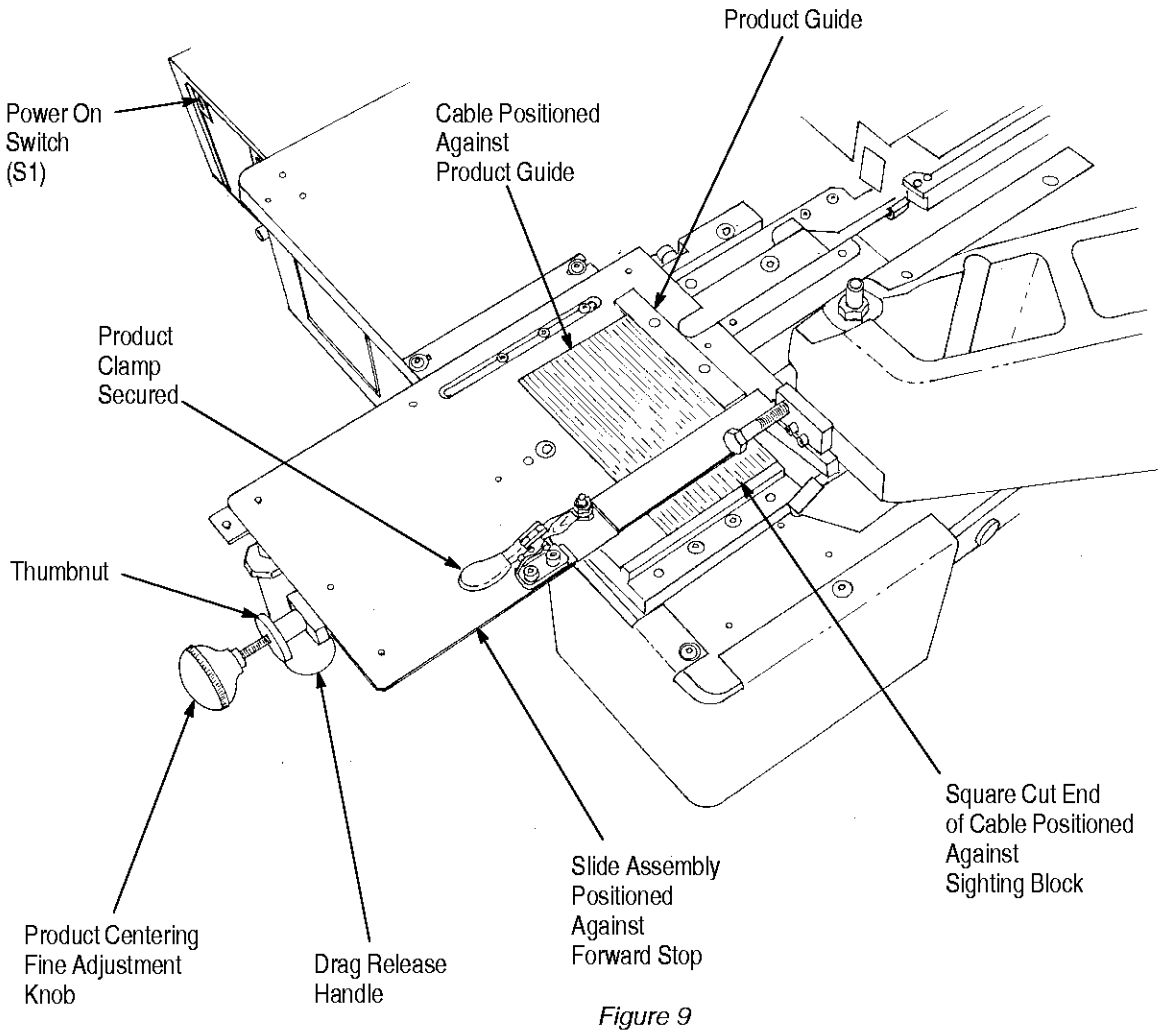


Figure 9

95–283

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 AMP 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 4.4.

12. Tighten thumbnut.

NOTE *To ensure all contacts are centered to the conductors, perform CRIMPING PROCEDURE, Section 5, and inspect all contacts.*

4.6. Adjustments

The following adjustments may be required in conjunction with machine setup, during production operation, or following the replacement of parts. These adjustments should be checked in the following sequence and adjusted if necessary. AMP recommends the consultation of an AMP Field Engineer should any adjustments be required other than those covered in this section.

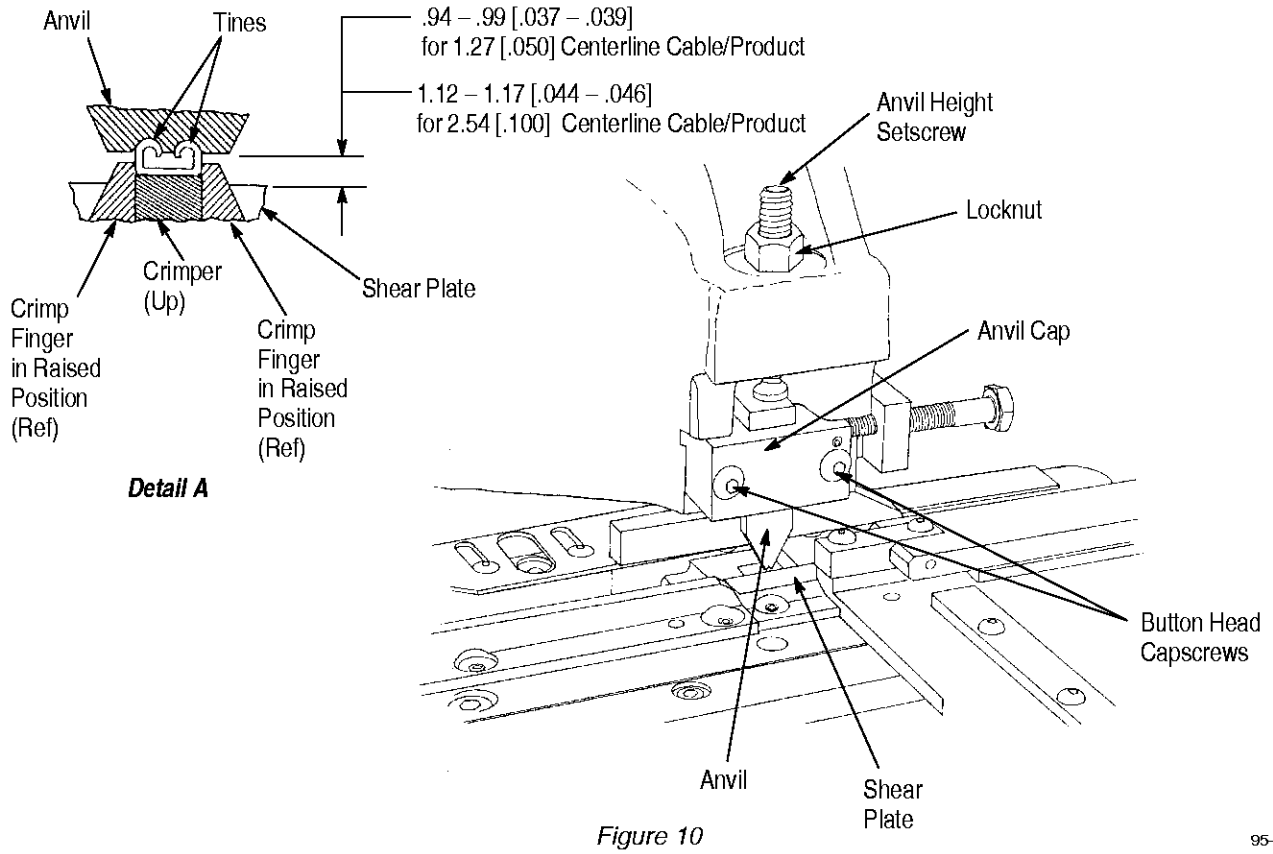
4.7. Anvil and Shear Plate Adjustment (Figure 10)

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 10, Detail A, and Figures 11 and 12.

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.*



Detail A

Figure 10

95–284

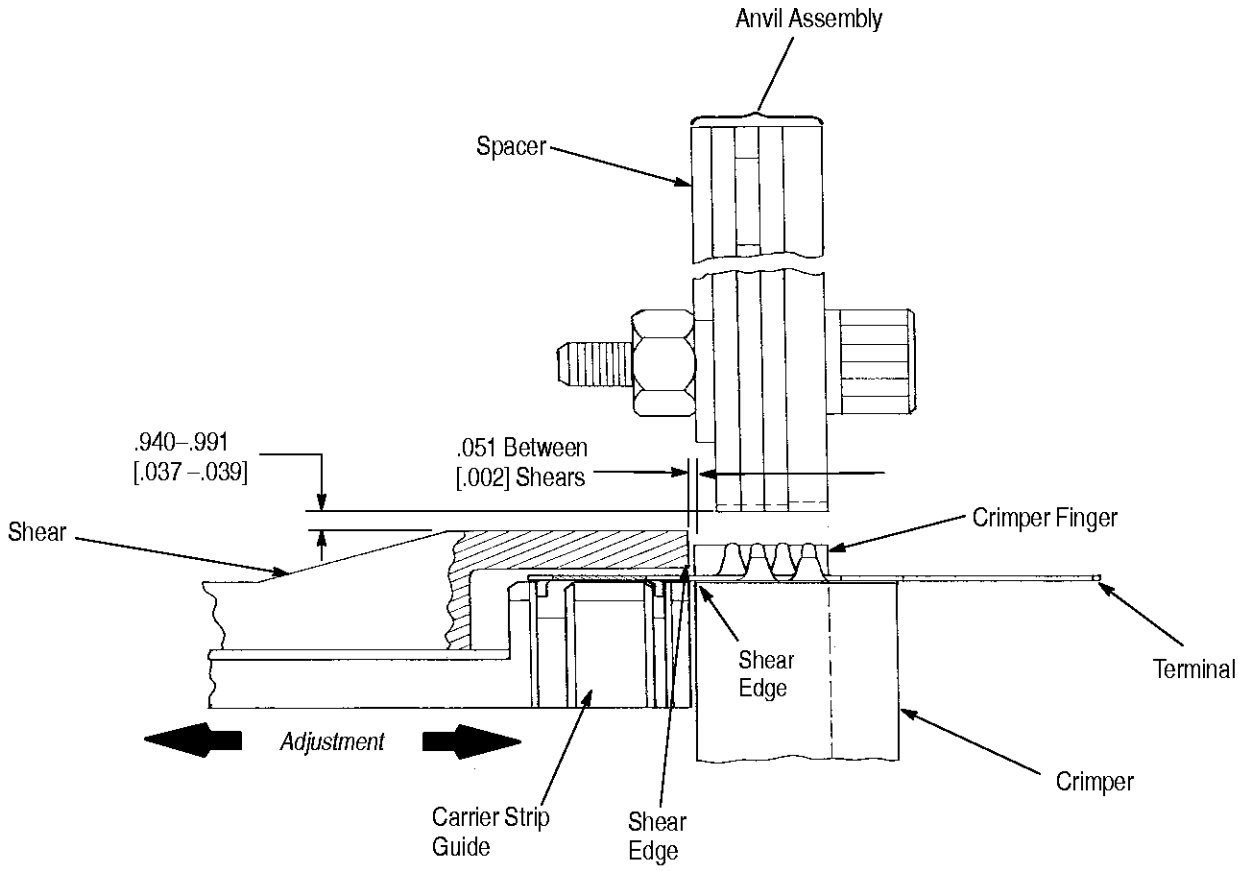
3. If the anvil requires adjustment, loosen the two button head capscrews so that there is a slight pressure on the anvil. Loosen locknut on anvil height setscrew. See Figure 10. While holding anvil, turn setscrew until the required gap dimension is obtained. Refer to Step 2. When anvil is properly adjusted, retighten button head capscrews and locknut on the setscrew.

4.8. Anvil and Crimper Alignment (Figure 11 and 12).

DANGER *Connect electrical plug (P1) to power supply. Keep hands clear of crimping section.*

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 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 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.

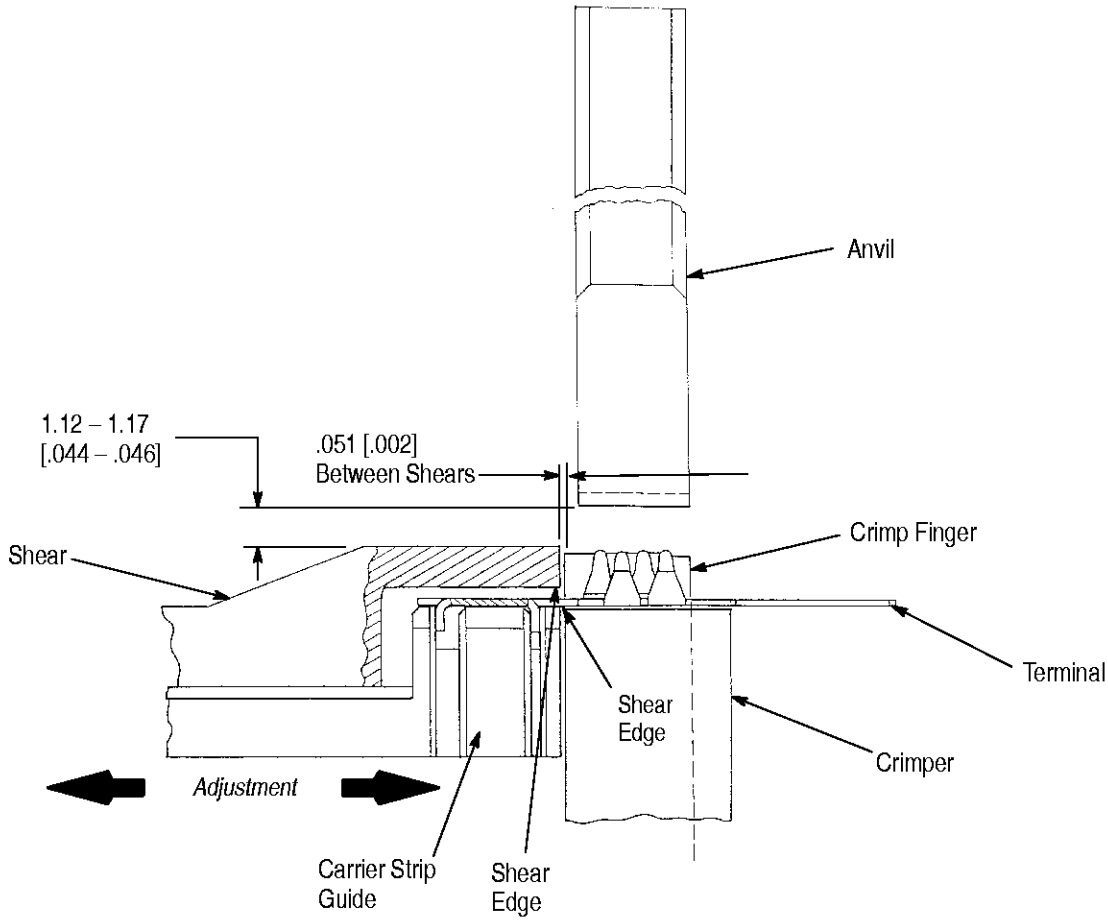
CAUTION *Do not allow anvil to touch crimp fingers.*



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

Figure 11

95–285



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

95–286

Figure 12

3. Turn hex head alignment screw (see Figure 15) 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 AMP Application Specification 114–16008 and 114–16015.

NOTE *Terminal feed also affects symmetry of crimped tines.*

4.9. Crimp Finger Height Adjustment (Figure 13)

DANGER *Connect electrical plug (P1) to power supply. Keep hands clear of crimping area.*

1. The "S" height is the distance between the raised crimp fingers and the anvil, and is measured with a thickness gage. See Figure 13, 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 13, Detail B.

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

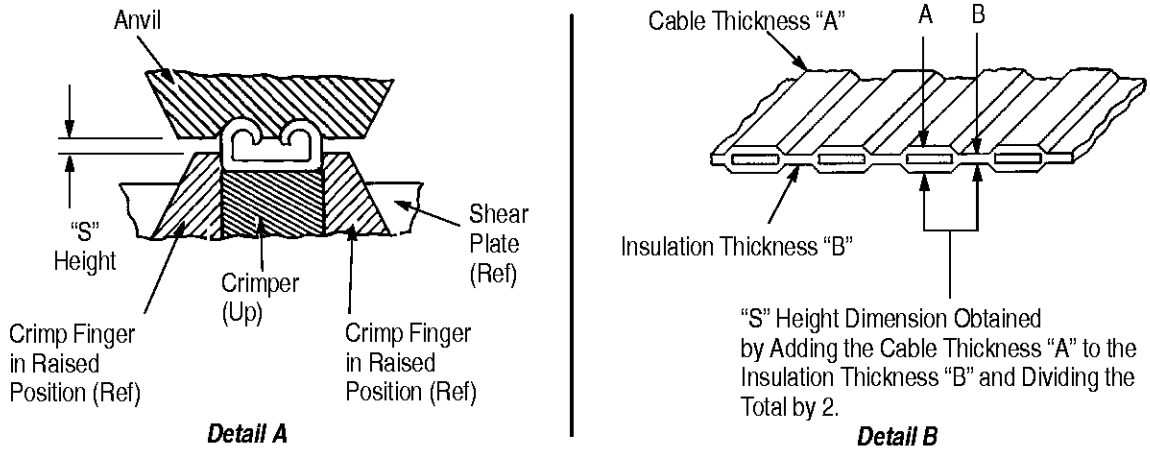
c. In both cases, the cable should be snug, but not tight, between the fully raised crimp fingers and the anvil.

2. To perform the "S" height adjustment: remove front cover under machine table, loosen locknut on crimp finger height adjustment screw, and turn slotted screw to obtain appropriate "S" height, as determined in Step 1. See Figure 13.

3. Tighten locknut on adjustment screw after desired "S" height is attained.

NOTE *Turning adjustment screw CLOCKWISE reduces the "S" height, while turning the screw 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.*



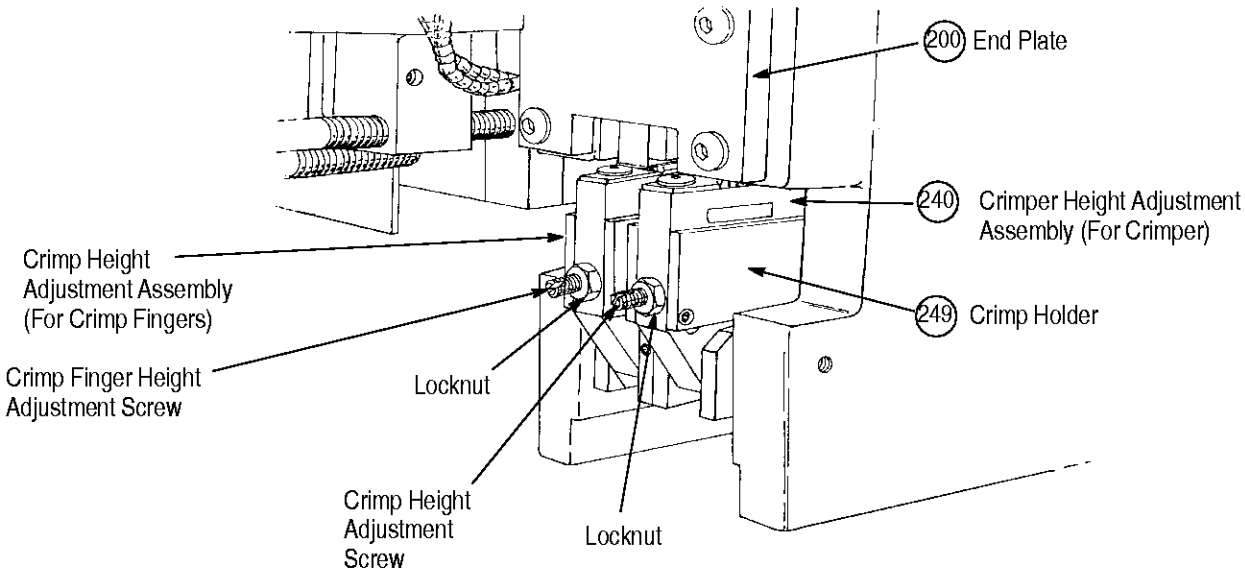


Figure 13 95–287

4.10. Crimp Height (Figure 13)

A. Verification

DANGER *Connect machine to electrical outlet. Keep hands away from the anvil crimping section.*

1. Determine crimp height by loading machine with contacts and performing setup procedures, as described in Paragraph 4.1, Machine Setup.

2. Crimp several contacts, as described in Section 5, 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 AMP Application Specifications 114–16008 and 114–16015, and AMP 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 lock nut on crimp height adjustment screw; then turn slotted screw. See Figure 13.

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 4.10, A.. Repeat Steps 1 and 2 until required crimp height is obtained.

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

NOTE *AMP Incorporated recommends using statistical process control to monitor and maintain a consistent crimp height.*

4.11. Crimp Stop Switch Bearing Plate Adjustment (Figure 14)

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 forward (toward the rear stop) until the next to the last conductor to be crimped is aligned with the anvil. When slide assembly is properly positioned, release the handle to lock the slide assembly in place.

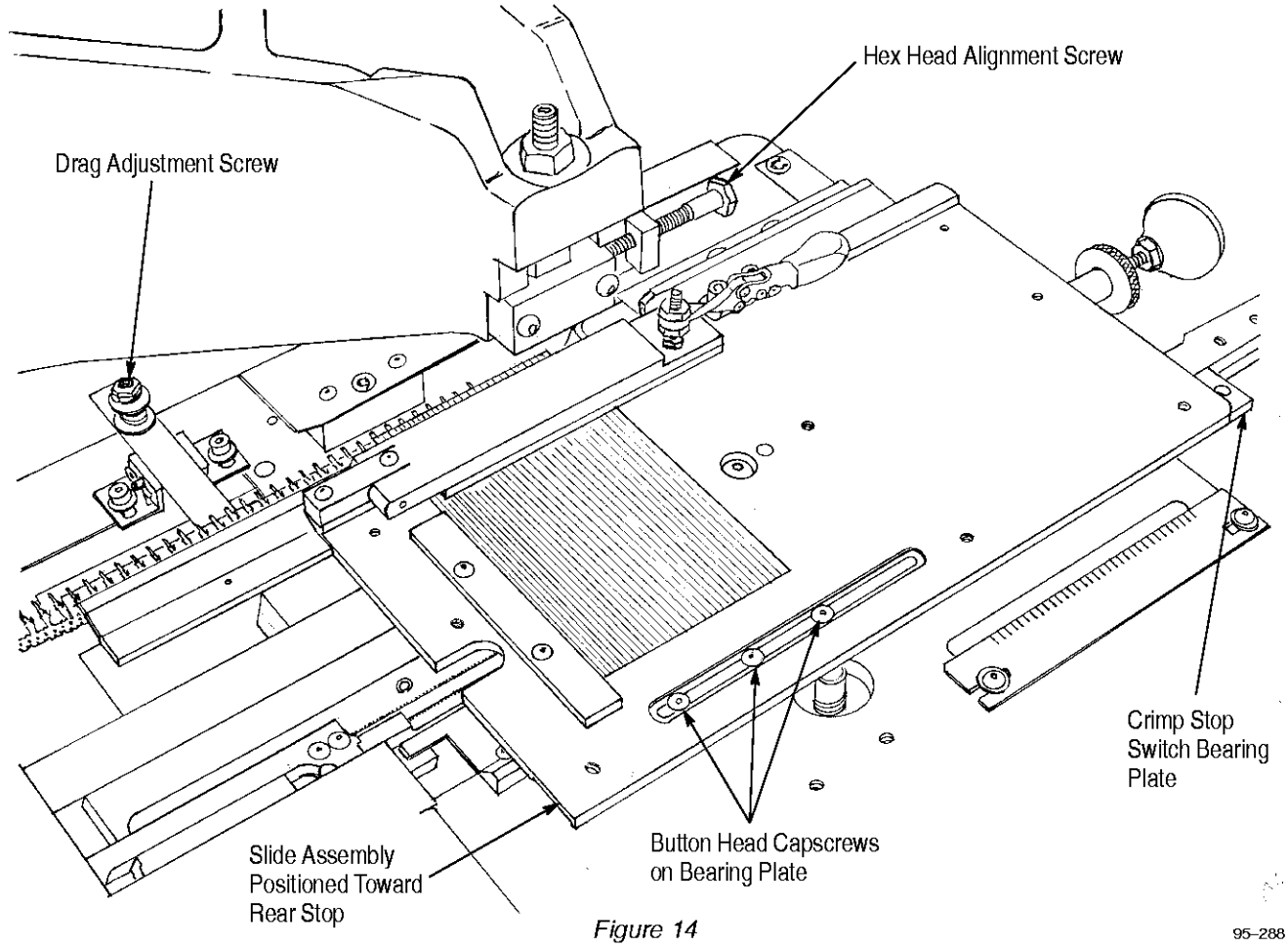


Figure 14

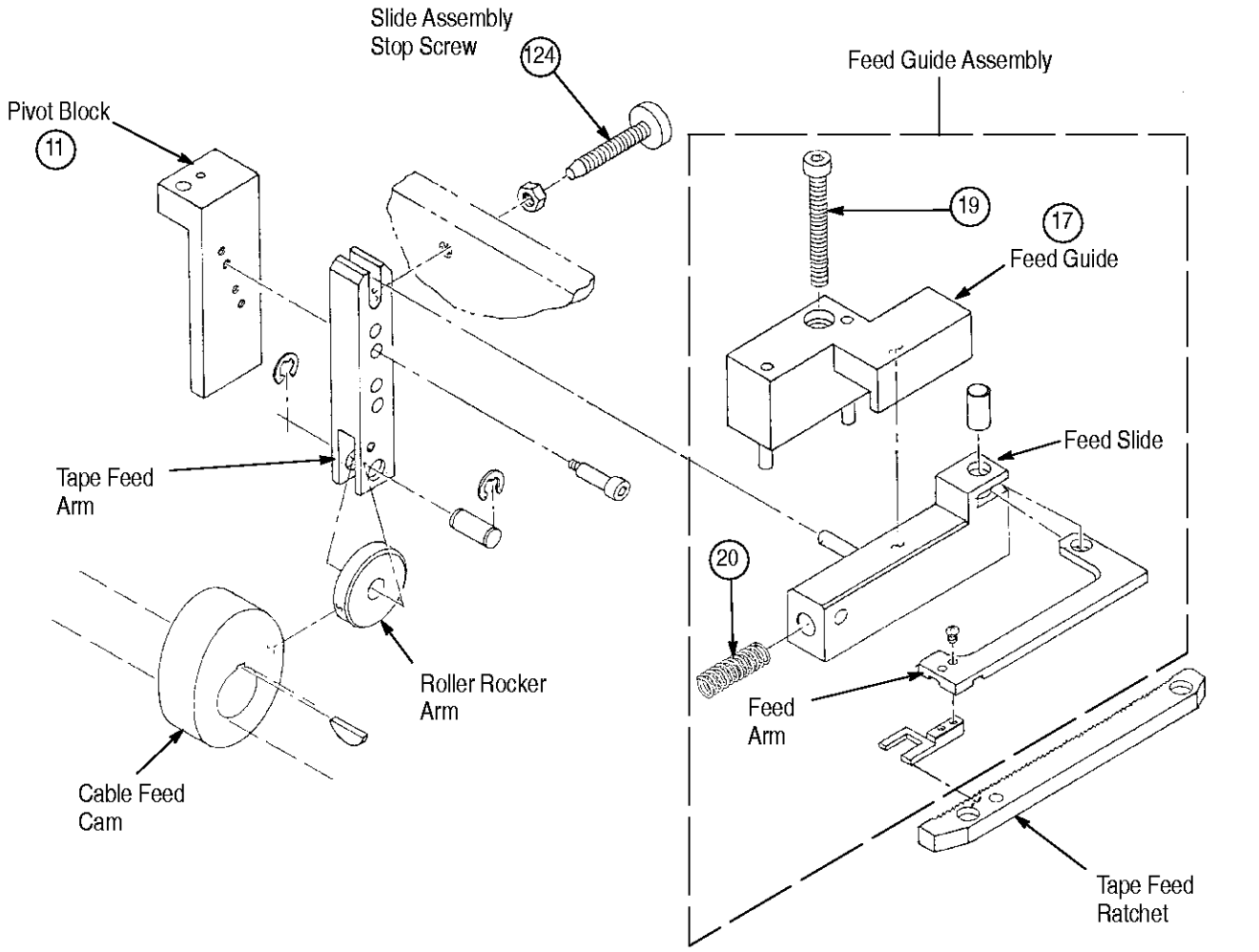


Figure 15 95–289

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.

4.12. Adjustments From 2.54 mm [.100 in.] Centerline to 5.08 mm [.200–in.] Centerline or 7.62 [.300 in.] Centerline Cable (Figure 16)

To convert terminating machines 768600–2 ,–3,–5, and –7 and 354044–2, –3, and –5 to crimp on different conductor centerlines, follow these instructions:

DANGER *DISCONNECT MACHINE from electrical outlet before performing adjustments.*

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 15, see detail, item 17, Part Number 854924–1) (one socket head capscrew).

NOTE *Compression spring will be free.*

4. Remove item 11, Pivot Block, Tape Feed Arm Attached, Figure 15 (one socket head cap screw).

NOTE *Turn Pivot Block COUNTERCLOCKWISE to pass through table opening.*

5. Tooling arrangements:

Insert the shoulder screw into the appropriate holes in the Tape Feed Arm and Pivot Block as specified in the following table.

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 16

CAUTION *Because of tooling requirements, product specified for 1.27 mm [.050 in.] centerline conductor centers 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 (part number 2–22280–1).

8. Adjust Slide Assembly stop screw (see Figure 15) 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.

4.13. Contact Strip Feed Finger Extension and Retraction Adjustments (Figure 18)

A. Feed Finger Extension Adjustment

During a machine cycle, the contact strip feed finger extension screw (see Figure 17) controls the forward position of the contact in the crimping section. If the contact is over– or underfed, the crimp fingers will touch the contact as they raise to contain it during the cycle. To adjust the contact strip feed finger, proceed as follows:

1. Load contact strip into machine, if necessary; then hand–cycle the machine until a contact is advanced into the crimping section.

2. Loosen the locking screw in the pivot block, accessible through the hole in the frame next to the drive shaft (referenced but not visible in Figure 18).

NOTE *Do NOT overloosen the locking screw, as re–tightening will cause a shift in the extended position.*

3. Turn the contact strip feed finger extension screw so that the contact is positioned in the center of the crimp fingers.

4. Tighten the locking screw in the pivot block and recheck contact position by hand–cycling machine.

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 18. 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 19.*

CAUTION *If mounting positions are changed, the contact feed finger positions must be checked to ensure adjustments are correct.*

NOTE *It may be necessary to make a feed finger retraction adjustment.*

B. Feed Finger Retraction Adjustment

The contact strip feed finger stop screw (see Figure 17) 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 17) COUNTERCLOCKWISE to allow more backstroke, CLOCKWISE to allow less backstroke.

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

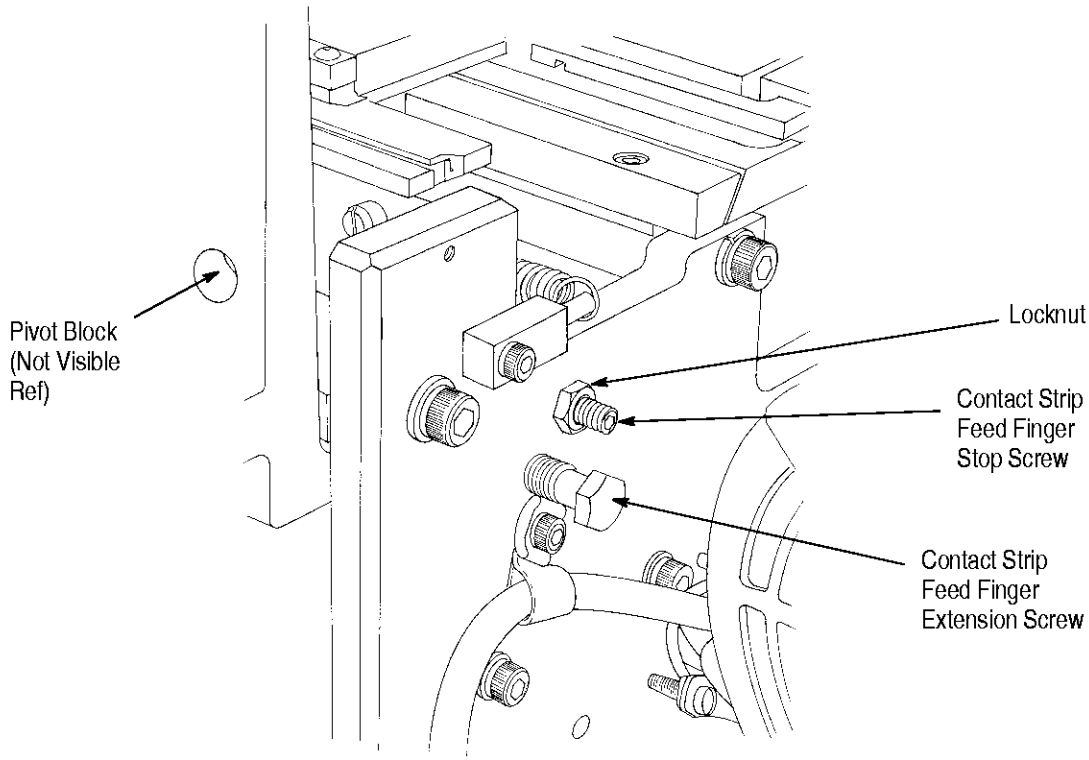


Figure 17

95–290

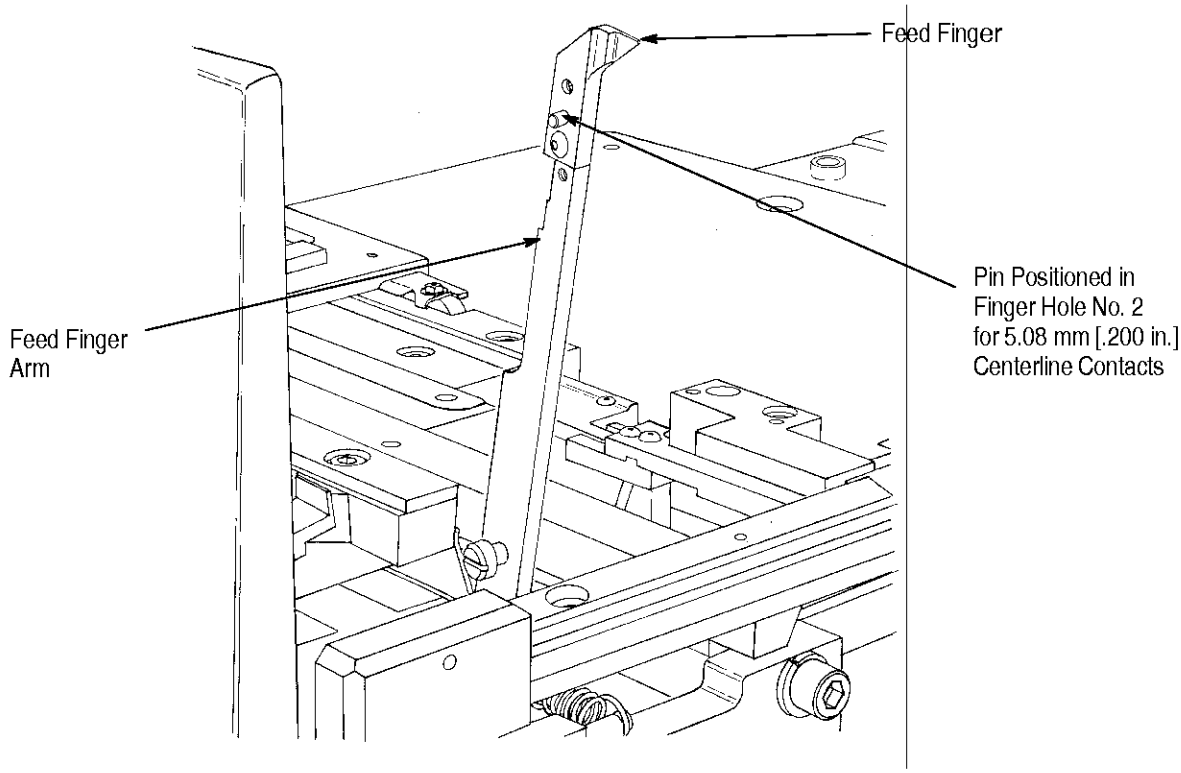


Figure 18 95–291

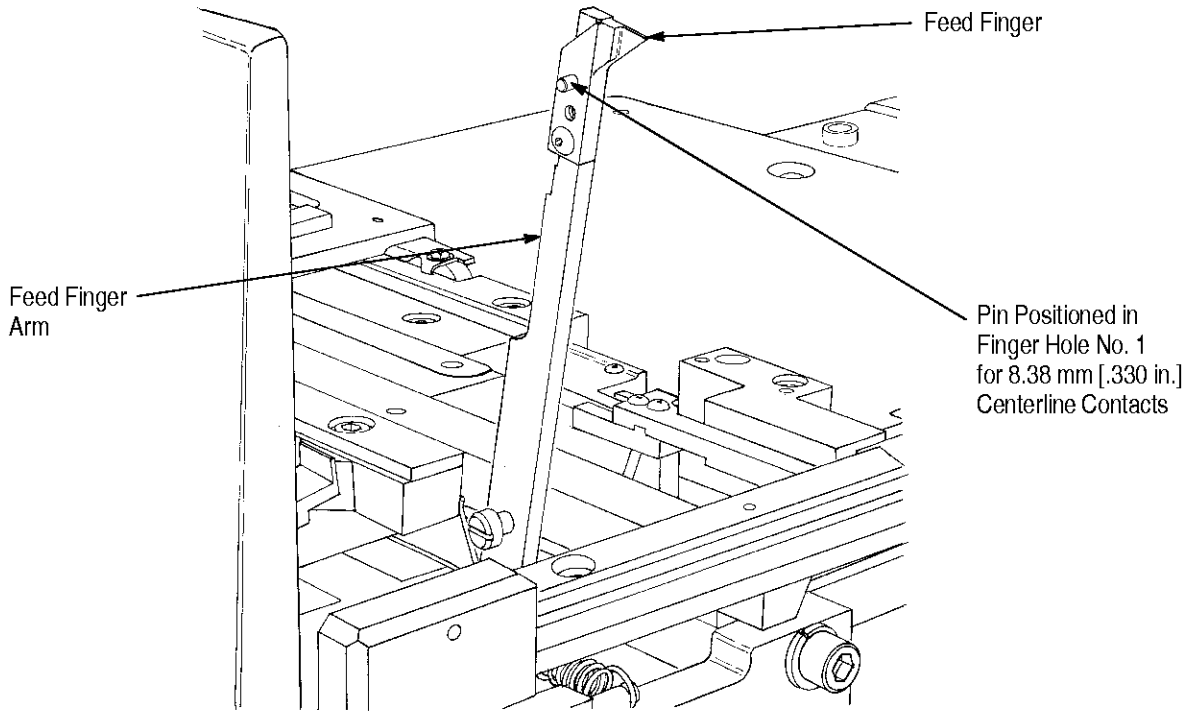


Figure 19 95–292

5. 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 AND ADJUSTMENTS. Proceed as follows:

NOTE *If terminating machine is setup with a programmer control box, refer to 408–9842 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 AND ADJUSTMENTS. See Figure 9.
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 AMP 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.*

6. 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 4.13.
	Slide feed finger and/or contact strip feed finger excessively worn.	Replace feed finger. Refer to Section 8.
2. Improper crimp height.	Crimp height assembly improperly adjusted.	Adjust crimper. Refer to Paragraph 4.10.
	Anvil improperly adjusted.	Adjust anvil. Refer to Paragraph 4.8.
	Crimper and/or anvil excessively worn.	Replace tooling. Refer to Section 8.
3. Contacts distorted in crimping.	Gap between anvil and crimp fingers not properly adjusted.	Adjust finger height assembly. Refer to Figure 11 or 12.
	Anvil improperly adjusted.	Adjust anvil. Refer to Paragraph 4.8.
	Crimper, crimp fingers, and/or anvil excessively worn.	Replace tooling. Refer to Paragraph 8.2.
	Shear block mispositioned 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 4.11.
	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 8.
	Total conductor count setting.	Adjust product centering fine adjustment (Paragraph 4.5) 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 4.13.
	Contact strip feed finger excessively worn or tip broken.	Replace feed finger. Refer Paragraph 8.4.
	Broken spring(s) in feed finger actuating assembly.	Replace springs as necessary. Refer to Section 8.4.
	Strip drag improperly set.	Drag adjustment screw, see Figure 14.
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 Section 4.4.
	Slide feed finger excessively worn or broken.	Replace feed finger. Refer Section 8.
	Tape feed ratchet excessively worn or chipped.	Replace ratchet. Refer to Section 8.
	Broken spring on slide feed finger.	Replace spring. Refer to Section 8.
	Slide and guide dirty.	clean slide and guide.
7. Burrs on contacts where sheared.	Crimper excessively worn.	Replace tooling as necessary. Refer to Paragraph 8.3.
	Shear plate excessively worn.	Replace shear plate. Refer to Paragraph 8.5.
	Shear plate improperly adjusted.	Adjust shear plate. Refer to Section 8.
	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 20.
9. Tearing of printed circuits during feeding and crimping operation.	Improper “S” dimension.	Adjust crimp fingers. Refer to Paragraph 4.9.
10. Width of tines vary in a crimp or asymmetrical crimp.	Crimper and crimper fingers not symmetrical with anvil.	Adjust anvil. Refer to Paragraph 4.8.

7. PREVENTIVE MAINTENANCE

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

7.1. Cleaning

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

DANGER *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.

7.2. 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 7.3, 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.

7.3. Lubrication

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

CAUTION *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 with Santotrac† 50 (see Figure 20). Santotrac 50 can be purchased from:

Stoners Incorporated
P.O. Box 65
Quarryville, PA 17566

† Trademark of Monsanto Company

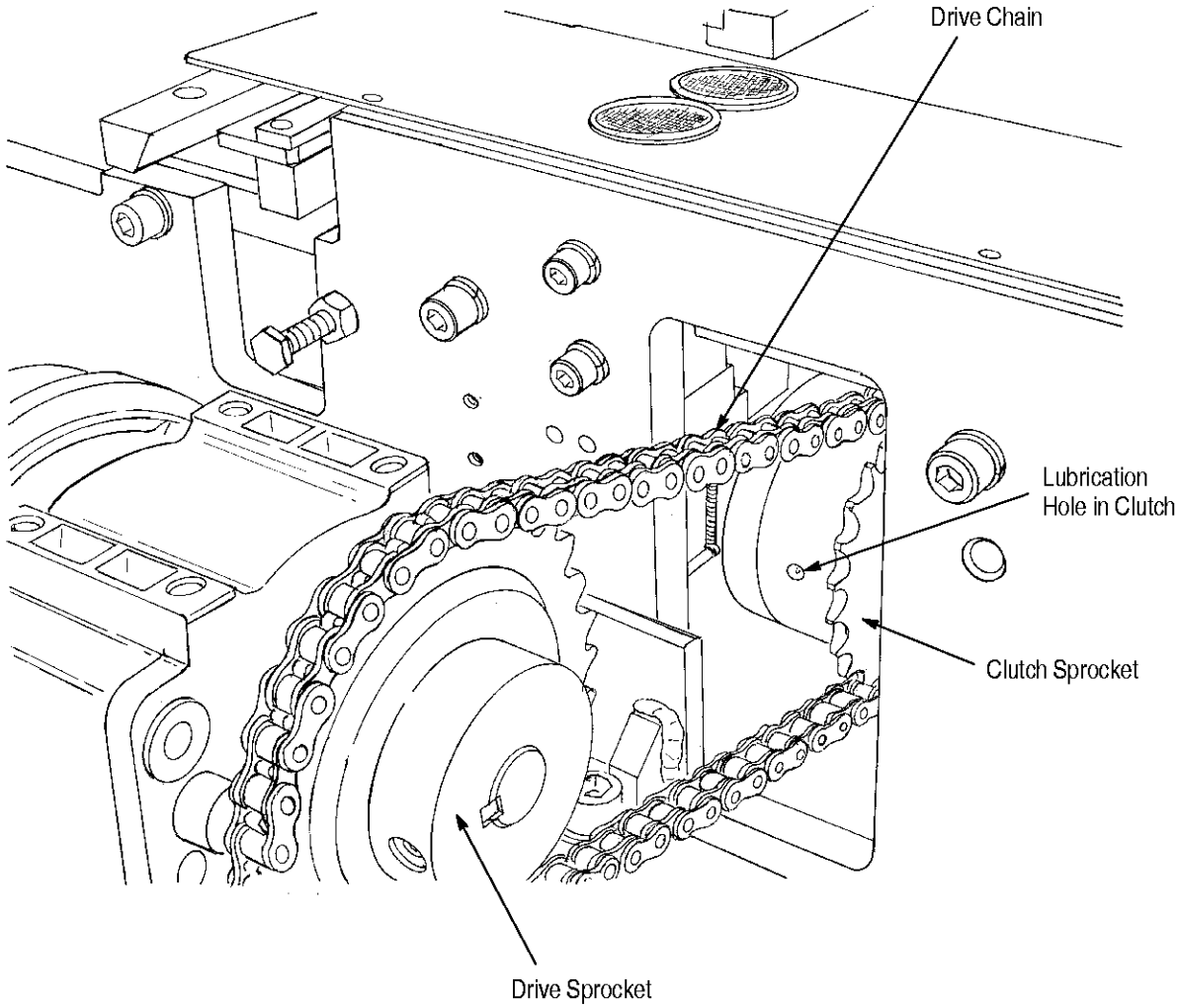


Figure 20 95–293

8. PARTS REPLACEMENT

This section covers parts replacement of those recommended spares listed on the AMP Customer Drawings. Recommended spares, which are not covered in this section, are easily replaced by referring to the assembly drawings, supplied with the machine. AMP 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 AND 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 AMP Customer Drawing 768600.*

8.1. 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.

8.2. Anvil Replacement (Figure 21)

1. Remove two screws (8), from locator anvil (137).
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 4.3 and make adjustments necessary.

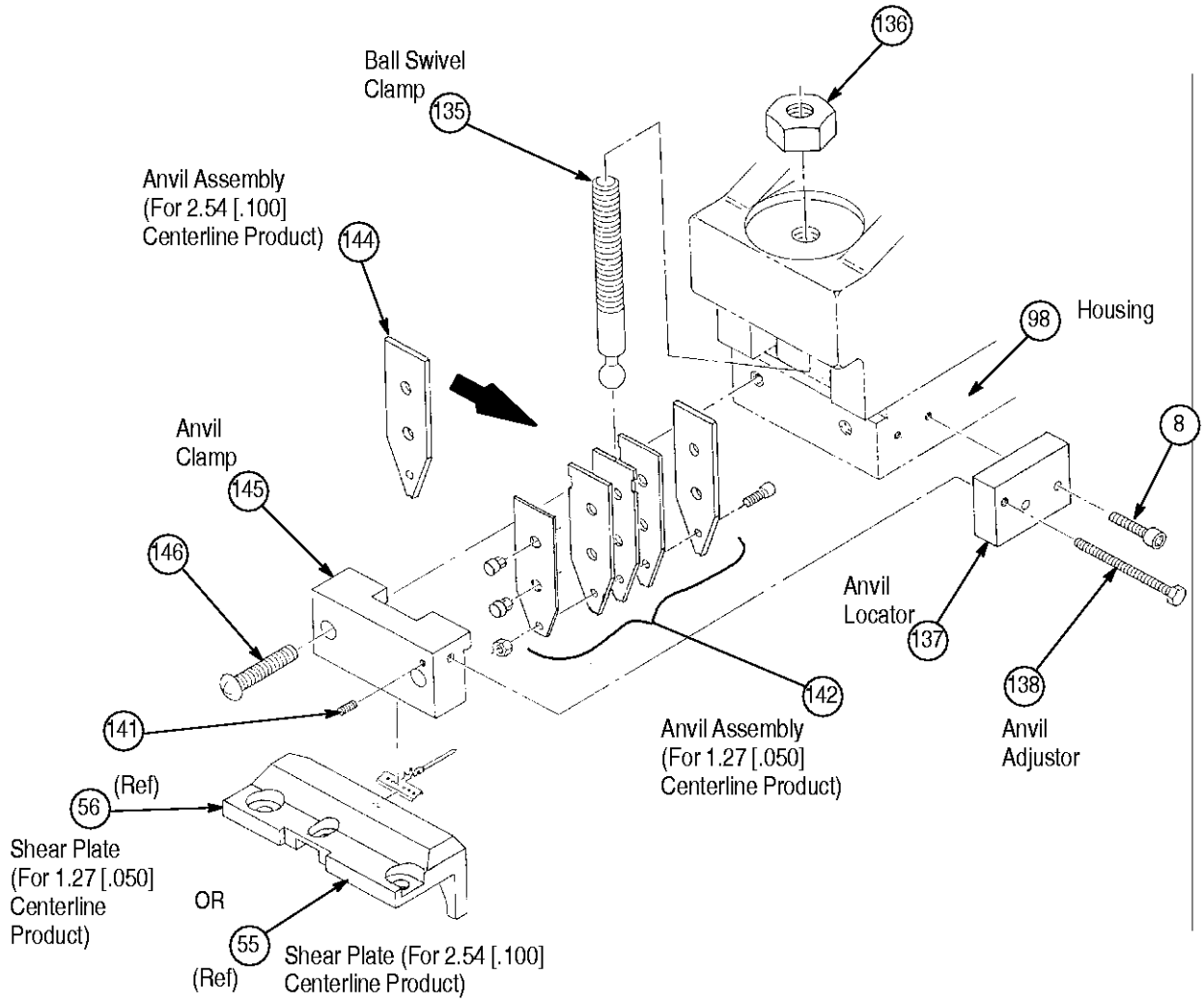


Figure 21

95–294

8.3. Crimper and/or Crimp Fingers Replacement (See Figure 13)

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 (303).

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, 252, 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.

8.4. 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 AND ADJUSTMENTS.

8.5. Shear Plate Replacement

1. Remove cable support plate (187).
2. Remove shear plate (54, 55, or 65); 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 4.3, 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.*

9. REVISION SUMMARY

Since the previous issue of this manual, the following changes and additions were made:

Per EC 0150–3341–95

- Removed 768600–1 and –4, and 354044–1 and –4 machines
- Added 768600–7 machine
- Revised electrical schematic, Figure 5
- Added new Section 3, RECEIVING INSPECTION AND INSTALLATION
- Renumbered Section 4 and all subsequent Sections following
- Added Figures 11, 12, 15 and 17 in Revised Section 4
- Revised Paragraphs 4.8, 4.9, and 4.12
- Added Figure 20 in Revised Section 7
- Added Figure 21 to Revised Section 8
- Added Paragraph 8.5, Shear Plate Replacement to Revised Section 8