

AMP* Mass Termination Bench Machine
820750-2 for AMPMODU* MTE Connectors

409-5738
(was CM 5738)
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AMP

***customer
manual***

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CM 5738

**AMP*
MASS TERMINATION
BENCH MACHINE 820750-2
FOR AMPMODU* MTE CONNECTORS**

4-3-92

customer manual

AMP

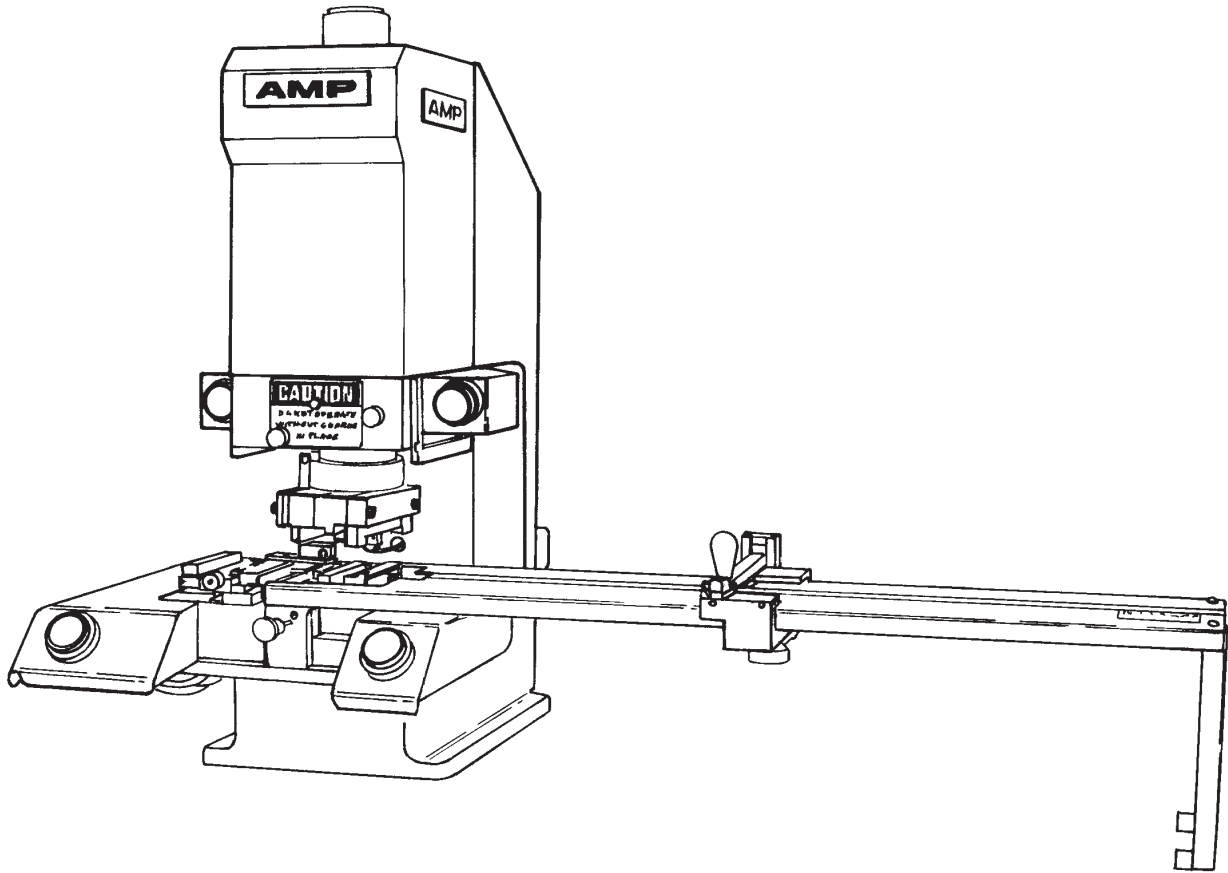
**AMP INCORPORATED
Harrisburg, PA 17105**

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AMP Incorporated**



NOTE: Safety Shield Removed for Clarity.

Frontispiece. AMP Mass Termination Bench Machine 820750-2

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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.

CUSTOMER HOTLINE MACHINE/PRODUCT SERVICE 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 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 Field Engineering Services for applicable fees.

INFORMATION REQUIRED WHEN CONTACTING FIELD ENGINEERING SERVICES

AMP Field Engineering Services offers the **Customer Hotline** as a means of providing technical assistance when required.

When contacting AMP Field Engineering Services 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 Customer Hotline, 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

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1. INTRODUCTION

AMP Mass Termination Bench Machine No. 820750–2 (see Frontispiece) is designed to terminate AMPMODU MTE connectors with 0.05 through 0.4mm² [22 through 30 AWG] discrete wires or ribbon cable — for single-ended harnesses. The fully pneumatic machine will accept 2– through 25–position single-row connectors and a wire–insulation–diameter range of .76mm to 1.37mm [.030 to .054 in.]. The machine is pushbutton–actuated to provide the 1223 kg [2700 lb] force necessary for mass termination.

NOTE

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

1.1. Specifications

Pneumatic Requirements: 552 kPa [80 psi], minimum, constant air pressure. A filter, regulator, and lubricator (customer supplied) are required (see Figure 3–3). Estimated air consumption, .0016m³/5 [3.5 scfm].

Dimensions: 596.9mm L x 882.7mm W x 596.9mm H [23.5 in. L x 34.75 in. W x 23.5 in. H.] Additional space is required for supplying wire to the machine, either by reel racks or barrels. See NOTE below.

Weight: 49.83kg [110 lb]

AMP Product: AMPMODU MTE single–row receptacle (plain, polarized/latching and guide rib) and pin (shrouded or guide rib) assemblies, preloaded with 2 to 25 slotted contacts. Strip–form product may also be used.

Harness Length: 152.4mm to 609.6mm [6 in. to 24 in.] from end of wire to wire end of connector.

NOTE

It is the responsibility of the customer to provide a method of supplying wire to the machine (reels or barrels). Keep the following points in mind:

- Never use wire that has been reeled to a diameter less than 76.2mm [3 in.]
- Avoid excessive drag in the wire–feed system that could cause operator fatigue. (The operator must pull the wire manually — up to 25 wires.)
- Be sure to allow adequate wire supply space. A slight droop in the wire feed to the machine (without dragging on the work table) will assist in tensioning individual wires.
- When using ribbon cable in the machine make sure that the cable is notched as specified in Figure 4–3 of this manual. Make sure that wire scrap is removed after every cycle.

1.2. Safety Precautions

When reading this manual, pay particular attention to **DANGER**, **CAUTION**, and **NOTE** statements. A **DANGER** statement is to inform you of possible hazards that could cause personal injury. A **CAUTION** is to advise you of precautions to take to avoid damage to the machine. A **NOTE** highlights special or important information.

1.3. Documentation

Each machine is shipped with a documentation package which should be retained for customer reference. The package includes drawings of the machine, along with this manual which includes information for receiving, installation, operation, safety, and maintenance of the machine. For information beyond the scope of the documentation package, contact your local AMP Field Engineer

or: AMP Incorporated
Field Engineering
P.O. Box 3608
Harrisburg, PA 17105–3608
Customer Hotline: 1 800 722–1111

2. DESCRIPTION

2.1. Physical Description

This compact bench-mounted machine consists of four basic subassemblies: the frame subassembly, the application tooling subassembly, the pneumatic subassembly, and the harness tray subassembly.

The frame subassembly consists of a cast metal, machined frame with a mounted multi-power air cylinder to drive the ram. The cylinder is capable of exerting 1223kg [2700 lb] of force at 552 kPa [80 psi], minimum, air pressure.

The throat area of the frame holds the application tooling subassembly: upper tooling inserts the wires and lower tooling terminates AMPMODU MTE connectors. In operation, the lower tooling is moved from a position outside the shield (where the operator loads the connectors), to the insertion area for termination with wires. Lower tooling movement is controlled by a pullback cylinder mounted on the frame subassembly. The seating of contacts is accomplished by a pushbutton-operated seating cylinder.

The pneumatic subassembly is mounted in the frame between the two ribs. This assembly contains the pneumatic controls for the shield interlock, pushbuttons, control module, relay valves, and power valves for the multi-power cylinder, pullback cylinder, seating cylinder, and unlatch cylinder.

2.2. Machine Component Identification

Use the following illustrations as guides for operation and repair. Figure 2-1 shows the four basic subassemblies. Figures 2-2 and 2-3 show the application tooling subassemblies and identify major components in upper and lower tooling. Figure 2-4 locates components of the pneumatic control sub-assembly. For identification beyond the scope of these illustrations, refer to the drawings supplied with the machine.

2.3. Sequence of Operation

To start the cycle, the operator must depress simultaneously and hold both upper pushbuttons for the entire cycle. The cycle consists of four distinct operations:

1. the tooling slide retracts and is positioned under the ram;
2. the ram descends, shears the wires, and terminates them on the contacts;
3. the ram returns to the up position;
4. the tooling slide moves forward to the operator for visual inspection of the contacts which, if acceptable, are seated by the operator depressing both lower pushbuttons.

If the operator releases the upper pushbuttons during the cycle, the machine will stop at the end of the current operation. It is a good idea to stop the cycle momentarily between operations 1. and 2. (see above) to observe the relationship between the wire and the tooling. This is especially important when running ribbon cable. If everything appears to be properly position, the cycle is resumed by depressing both upper pushbuttons and holding them until the end of the cycle.

The operator can now remove the finished harness, load the next connector(s) into position, clamp the connectors by pushing the knob, and pull the wires to length for the next harness, as described in Paragraph 4.2.

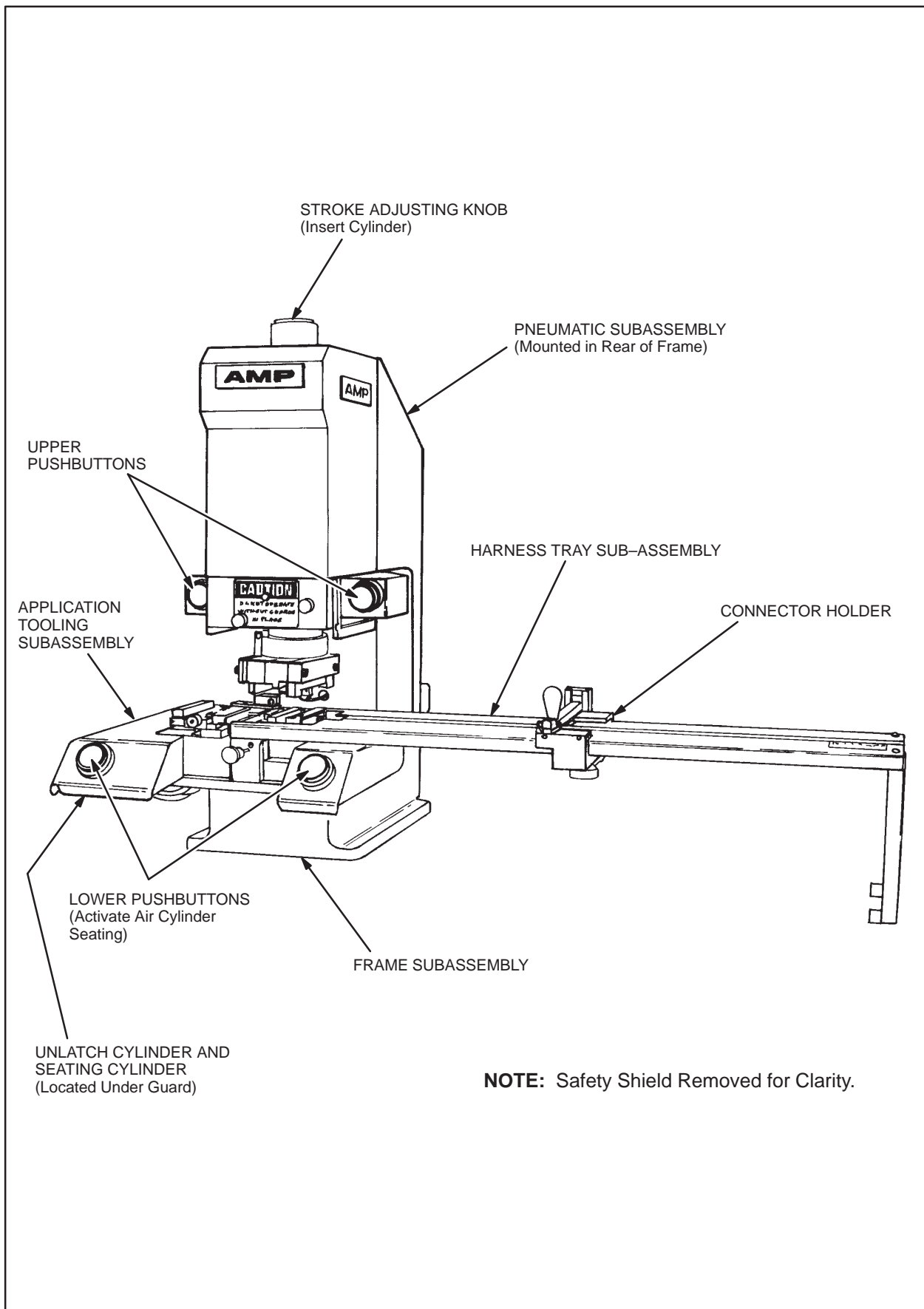


Fig. 2-1. Machine Component Identification

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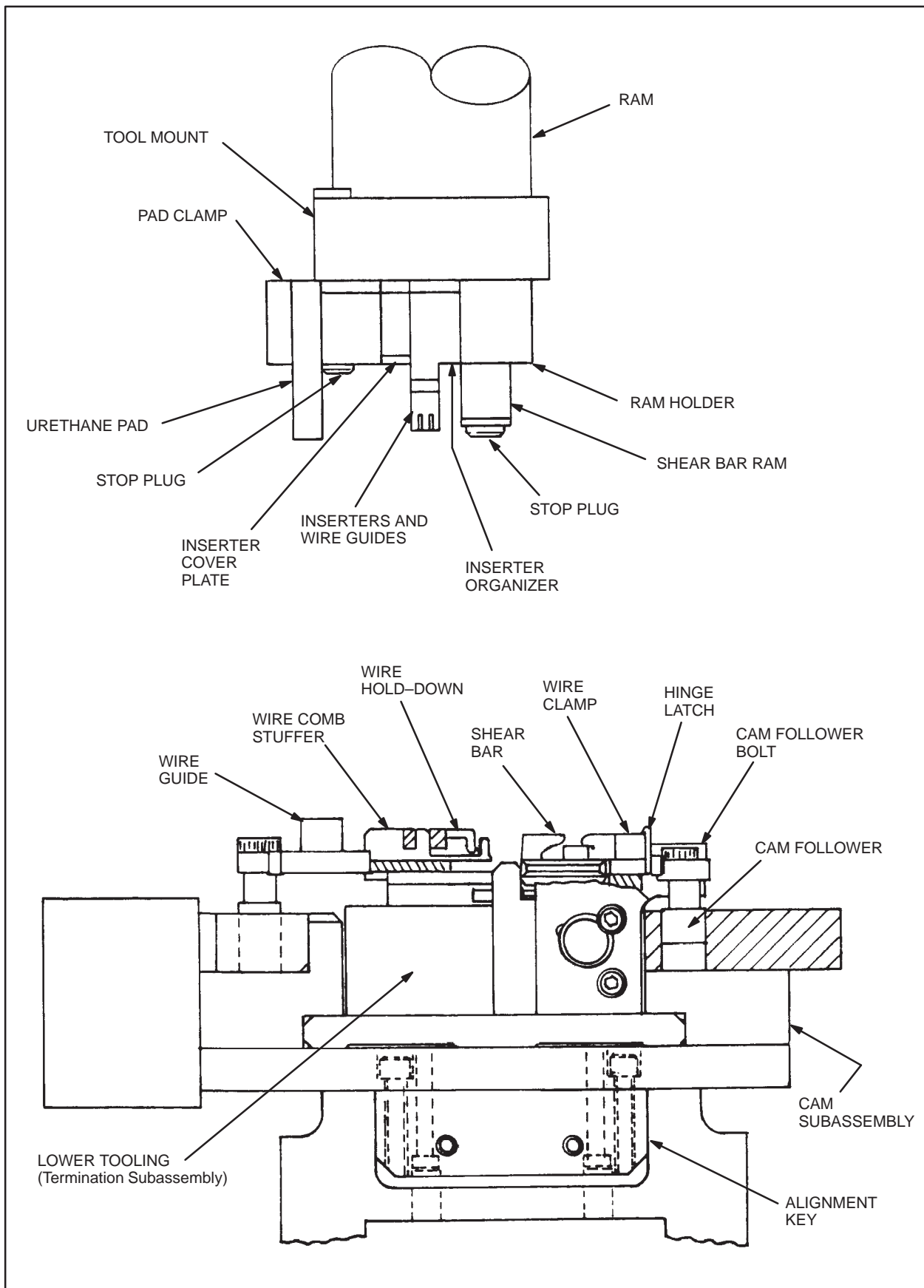


Fig. 2-2. Application Tooling Subassembly: Upper Tooling (Insertion), Lower Tooling (Termination), and Cam Subassemblies

91-90

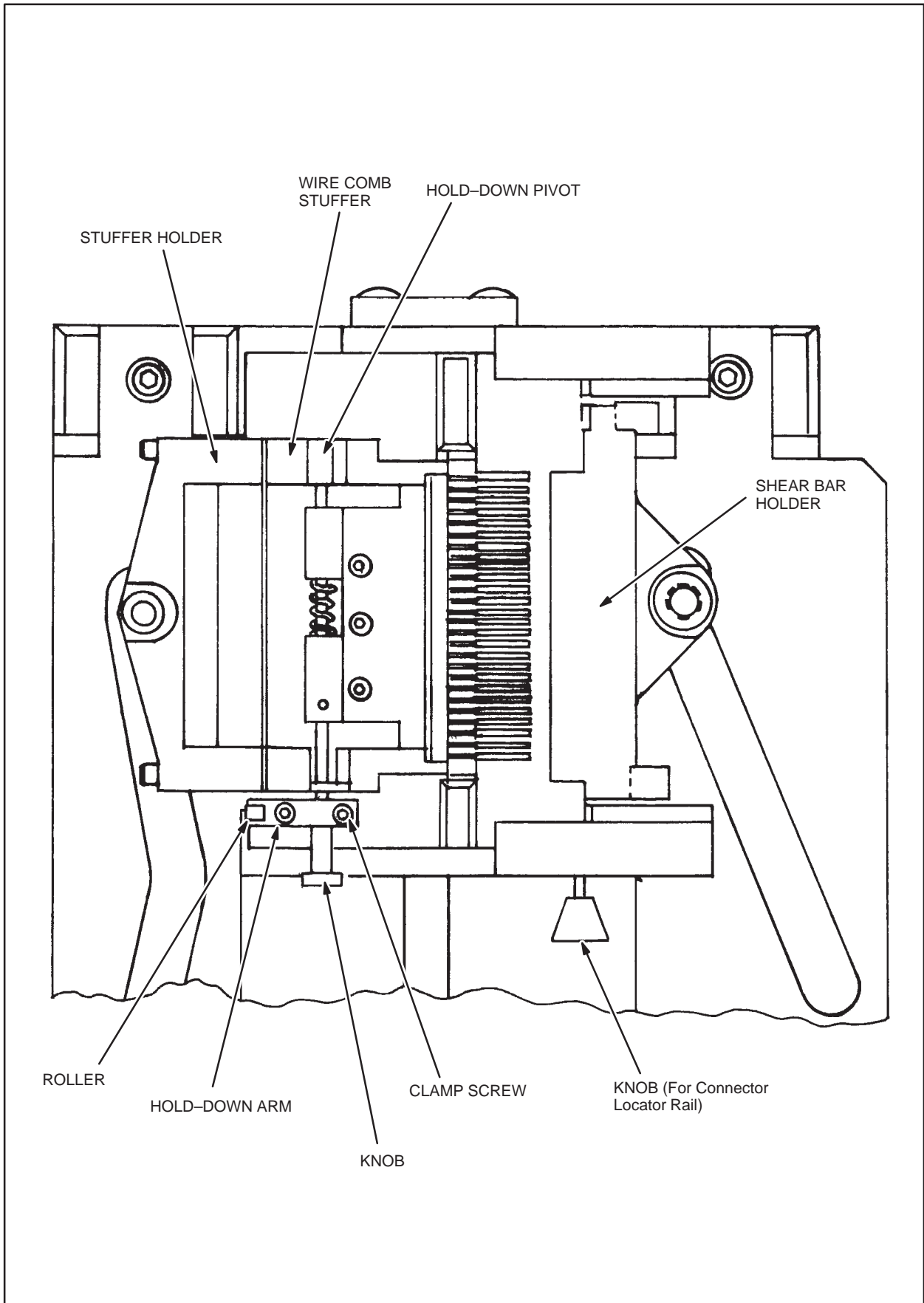


Fig. 2-3. Application Tooling (Top View)

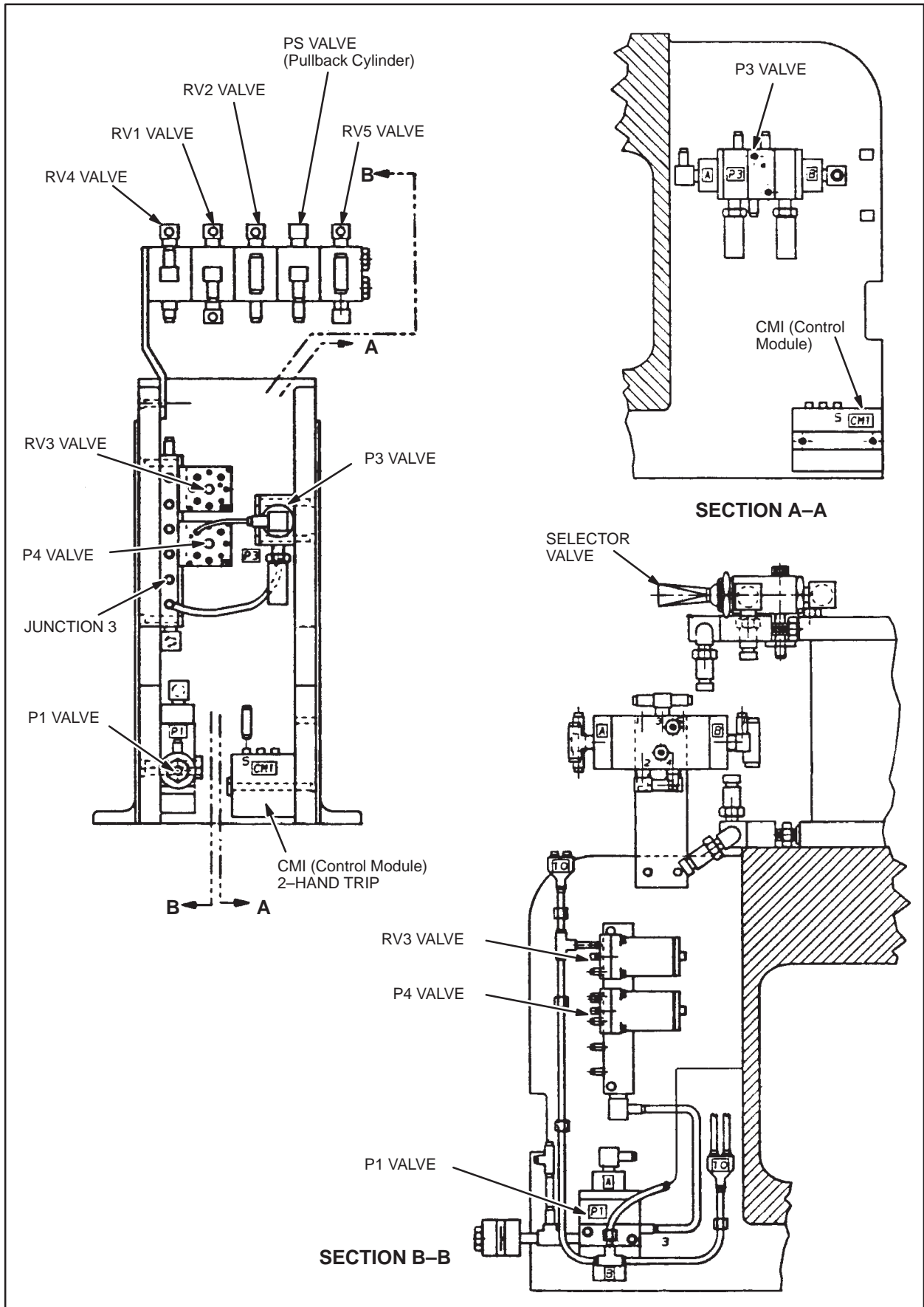


Fig. 2-4. Pneumatic Control Subassembly

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3. RECEIVING INSPECTION AND INSTALLATION

3.1. Receiving Inspection

The machine is thoroughly inspected during and after assembly. Before it is shipped, a final series of tests and inspections is made to ensure proper functioning. Still, the following inspection should be performed as a safeguard against problems generated during shipment.

1. Carefully uncrate the machine and place it on a sturdy bench where there is enough light to permit a careful examination.
2. Thoroughly inspect the entire machine for evidence of damage that may have occurred during transit. If the machine is damaged, file a claim against the carrier and notify AMP Incorporated immediately.
3. Check all components and parts to make sure they are secure.
4. Check all air lines for evidence of loose connections or leaks.

3.2. Considerations Affecting Machine Placement

Proper 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 operator's chair, and the placement of a foot switch if one is used.

A. Bench

A sturdy bench 711.2mm to 762mm [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 open area under the bench should allow the chair to slide in far enough for the operator's back to be straight and supported by the back rest.

B. Machine Location on Bench

The machine should be located near the front of the bench, and the machine work area (the application subassembly area where the product is applied) should be 152.4mm to 203.2mm [6 to 8 in.] from the front edge. Access to the back of the machine must be provided for maintenance purposes.

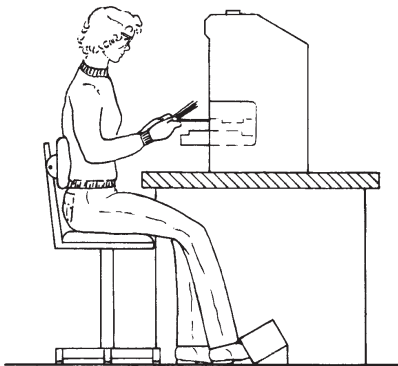


Fig. 3-1. Proper Position for Operator

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In Figure 3-1, note that with the chair height and back rest properly adjusted and the chair properly located, the operator's back is straight and supported by the chair and the upper arms are in direct line with the torso.

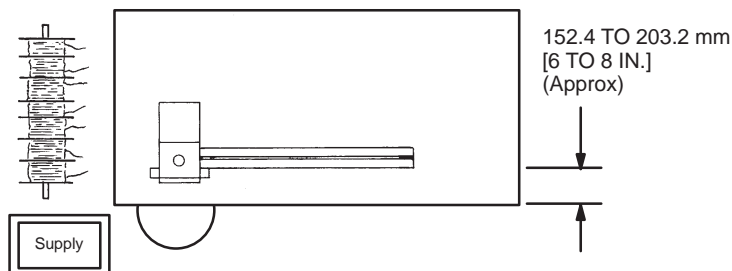


Fig. 3-2. Materials Location — Plan View

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Figure 3-2 is a typical plan view to illustrate the convenience to handling of materials afforded by a proper setup.

NOTE

The machine should also be located to the left end of the bench so that incoming wires do not drag on the table surface. The bench should have adequate space on the right-hand side for the harness tray to move front and back with the tooling.

C. Operator's Chair

The operator's chair should swivel, and the seat and back rest should be padded and independently adjustable. The back rest should be large enough to support the back both above and below the waist.

In use, the chair should be far enough under the bench so that the operator's back is straight and supported by the back rest.

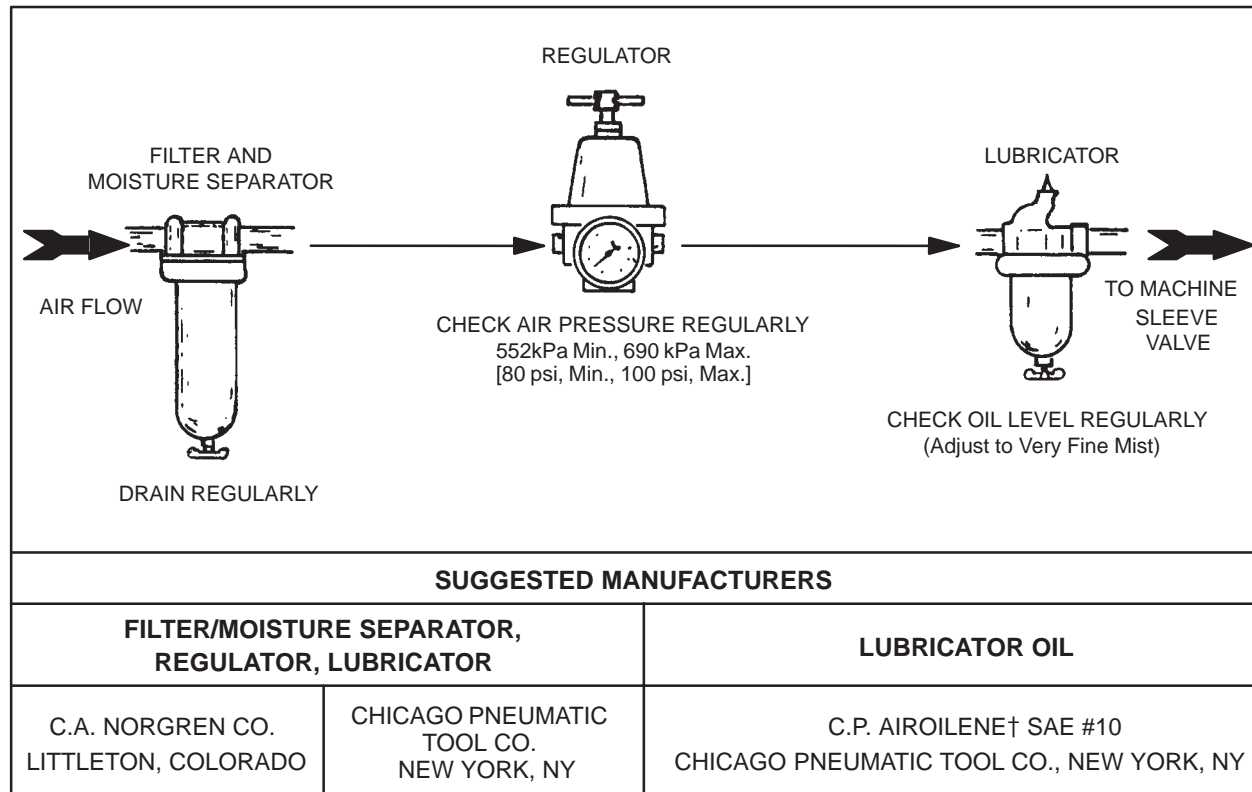
D. Harness Tray Assembly

The machine is shipped without the harness tray sub-assembly attached to the machine. The customer, after inspecting and placing the machine on a bench, must attach the harness tray sub-assembly to the machine. Refer to the drawings supplied with the machine or Paragraph 2.2 of this manual. *The tray is not required when running ribbon cable.*

3.3. Machine Installation

Keeping the points in Paragraph 3.2 in mind, install the machine in a well-lighted work area, as follows:

1. Secure the machine to the bench with four 1/4-in.-dia bolts or lag screws.
2. Install air line filter, air pressure regulator, and lubricator (supplied by customer) between air supply and sleeve valve as shown in Figure 3-3. The assembly must be as close to the machine as possible. Fill air line lubricator with manufacturer-recommended lubricant.
3. Blow air through the air hose to remove any foreign particles before attaching supply hose on the back of the machine. When machine is not in use, air supply should be turned "off."



† TRADEMARK OF CHICAGO PNEUMATIC TOOL CO.

Fig. 3-3. Filter-Regulator-Lubricator Assembly

4. MACHINE SETUP AND PRODUCTION OPERATION

Information contained in this section pertains to the setup of the machine prior to operation and to the operation of the machine in production. Paragraphs 4.1 and 4.2 are applicable to termination of discrete wire. Paragraphs 4.3 and 4.4 are applicable to termination of ribbon cable.

4.1. Machine Setup – Discrete Wire Termination

With the machine properly installed as described in Section 3 and *air supply disconnected*, use the following procedure for connector and cable positioning:

1. Determine type of connector. Position connector locator rail according to connector type. Remove hold-down at each end of the connector locator rail. Install locator rail as shown in Figure 4-1, and re-install the hold-downs.

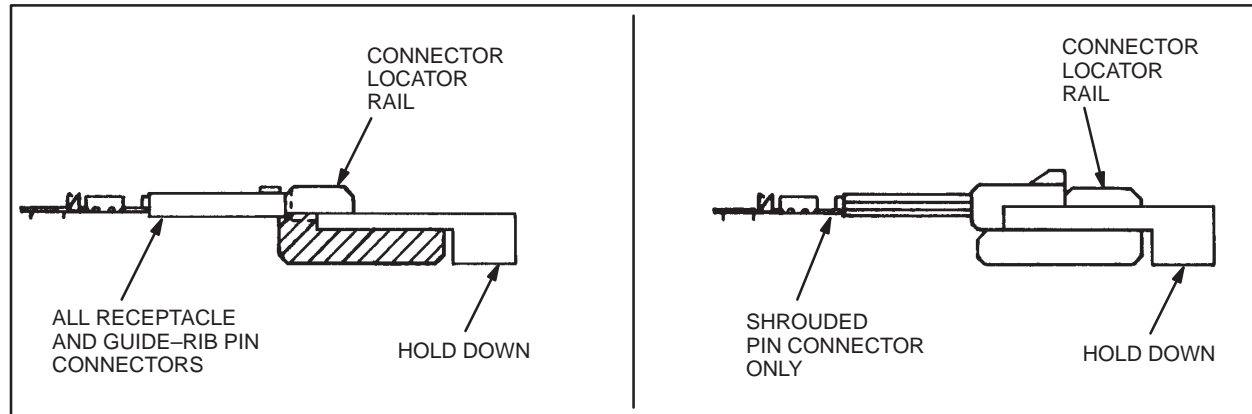


Fig. 4-1. Connector Locator Rail Placement

90-187

2. PULL the knob to move the connector locator rail to the RIGHT and to provide space to load the connectors. Load connectors into tooling. Note that all connectors can be stacked up to 25 positions. (When stacking shrouded connectors, count the empty contact space between each connector due to housing width.)
3. While applying light finger pressure to the top of the connectors, PUSH the knob to move the connector locator rail to the LEFT and clamp the connectors in the tooling.

CAUTION

Inserts in the connector rail are mounted in urethane. Improper connector loading or prying on the inserts will result in permanent damage to the connector rail.

4. Position the connector locator by sliding it against the connector housing and locking in place. This helps position connectors in the same location for each cycle in the production run. Contacts are located by the contact organizer bar.
5. To thread wires, first raise the two-step hinge assembly on the left side of the tooling and the wire clamp on the right side.

NOTE

If wires are color coded, make sure each wire is threaded at the proper location.

6. Thread wires through the appropriate holes in the wire guide, and lace through the slots of the wire comb stuffer and the shear bar. On the initial setup, wire ends should be located just beyond the right side of the machine frame. Lower and secure the wire clamp and the two-step hinge assembly. The connector(s) and cable are ready for termination.
7. Using the tape measure mounted on the harness tray, adjust the clamp base to the required harness length. This measurement indicates the length of wire to the wire end of the connector. Adjust as required.

The machine is ready for cycling.

4.2. Production Operation – Discrete Wire Termination

DANGER

MAKE SURE that the safety shield and covers are properly installed before beginning production operation. For operator protection, the safety shield must be mounted in place in order to operate the machine. DO NOT DEFEAT THIS INTERLOCK.

In order to operate the machine, the lockout valve at the rear of the machine must be turned “on” to allow the air supply to pass to the pneumatic subassembly. Assuming that the machine has been set up by following the procedures in Paragraph 4.1, prepare a test harness (or harnesses, if stacked) as follows:

1. Turn on air supply and and move lockout valve to “on” position.
2. Press both upper pushbuttons simultaneously and hold in the depressed position. This positions the applicator under the upper tooling, lowers the ram to crimp height, retracts the ram, and returns the applicator to the forward position.
3. Visually inspect terminated contacts.
4.
 - a. If terminations are visually acceptable, press and hold both lower pushbuttons simultaneously until the contacts are seated and the carrier shear unlatches.
 - b. If the terminations are not acceptable, loosen the connector rail, remove the connectors from the nest area and then press and hold both lower pushbuttons until the carrier shear unlatches (refer to Section 6, TROUBLESHOOTING).

CAUTION

After first complete cycle, scraps of wire from the initial threading must be removed from the terminating area before proceeding.

5. Open the wire clamp at the right side of the tooling and on the harness tray.
6. Lift the terminated test connector(s) from the nest area. Pull the knob to move the connector rail to the right and provide space to load the connector(s). Load the connector(s), making sure that contacts are properly positioned in the contact organizer bar. While applying light finger pressure to the top of the connectors, push the knob to move the connector locator rail to the left and clamp the connector(s) in the tooling.
7. Pull the terminated test connector(s) to the right, lacing wires through the shear bar. Lower the wire clamp.
8. Continue to pull test connector(s) to the right until positioned behind lower wire clamp on the harness tray — to obtain the required harness length. Close the upper wire clamp.
9. **Manually re-tension the wires** for the next termination by grasping them to the left of the machine and removing the slack.
10. Cycle the machine again by depressing both upper pushbuttons simultaneously and holding them. Visually check the contact terminations on the second harness. Depress the lower pushbuttons to seat the contacts.
11. Remove and check test harness. For production run, repeat the procedure starting with Step 7. Remember to visually inspect terminations prior to seating.

NOTE

Scrap produced by shearing the carrier strip from contacts will fall onto the workbench below the application subassembly. The operator should remove scrap periodically.

4.3. Machine Setup – Ribbon Cable Termination

The 820750–2 Mass Termination Bench Machine can be used to terminate 2.54mm [.100–in.] centerline ribbon cable. If ribbon cable termination was specified at time of order, the machine has already been set up at the factory. Some of the following steps may be unnecessary since they have been performed during factory setup. With the machine properly installed (see Section 3, MACHINE INSTALLATION), and the air supply disconnected, use the following procedure for cable preparation and connector and cable positioning.

1. Determine the type of connector. Position connector locator rail according to connector type (either receptacle or shrouded pin). Remove hold–down at each end of the connector locator rail. Install locator rail as shown in Figure 4–1, and reinstall hold–downs.
2. Pull the knob to move the connector locator rail to the right and to provide space to load connectors. Load connectors into tooling, noting that all connectors can be stacked up to 25 positions. When stacking shrouded connectors, count the empty contact space between each connector due to housing width.
3. While applying light finger pressure to the top of the connectors, push the knob to move the connector rail to the left and clamp the connectors in the tooling.

CAUTION

Inserts in the connector rail are mounted in urethane. Improper connector loading or prying on the inserts will result in permanent damage to the connector rail.

4. Position the connector locator by sliding it against the connector housing and locking it into place. This helps position connectors in the same location for each cycle in the production run. Contacts are located by the contact organizer bar.

Refer to Figure 4–2 for Steps 5 through 8

5. Remove the machine wire guide.
6. Make sure that the wire clamp is in place and closed.
7. Adjust the setscrew so that the hinged wire holder holds the ribbon cable in place above the wire comb stuffer but still allows the cable to slide along its length on the wire comb stuffer.
8. Remove the harness tray from the machine. It is not used to measure or cut wire when terminating ribbon cable.

DANGER

MAKE SURE that the safety shield and covers are properly installed before beginning production. For operator protection, the safety shield must be mounted in place in order to operate the machine. DO NOT DEFEAT THIS INTERLOCK.

In order to operate this machine, the lockout valve at the rear of the machine must be in the “on” position. Turn on air supply and open lockout valve.

It is important that the operator be aware of the following procedures and actions of the machine prior to production operation:

- Before loading ANY connectors or cable, close the hinged wire holder.
- Then depress both upper pushbuttons simultaneously and IMMEDIATELY RELEASE THEM. The tooling should move back under the press ram and stop.
- Now depress both upper pushbuttons again and HOLD them until the ram descends, then ascends, and finally the tooling moves back.
- At this point the cycle is complete. Push and hold both lower pushbuttons to unlatch the carrier shear.

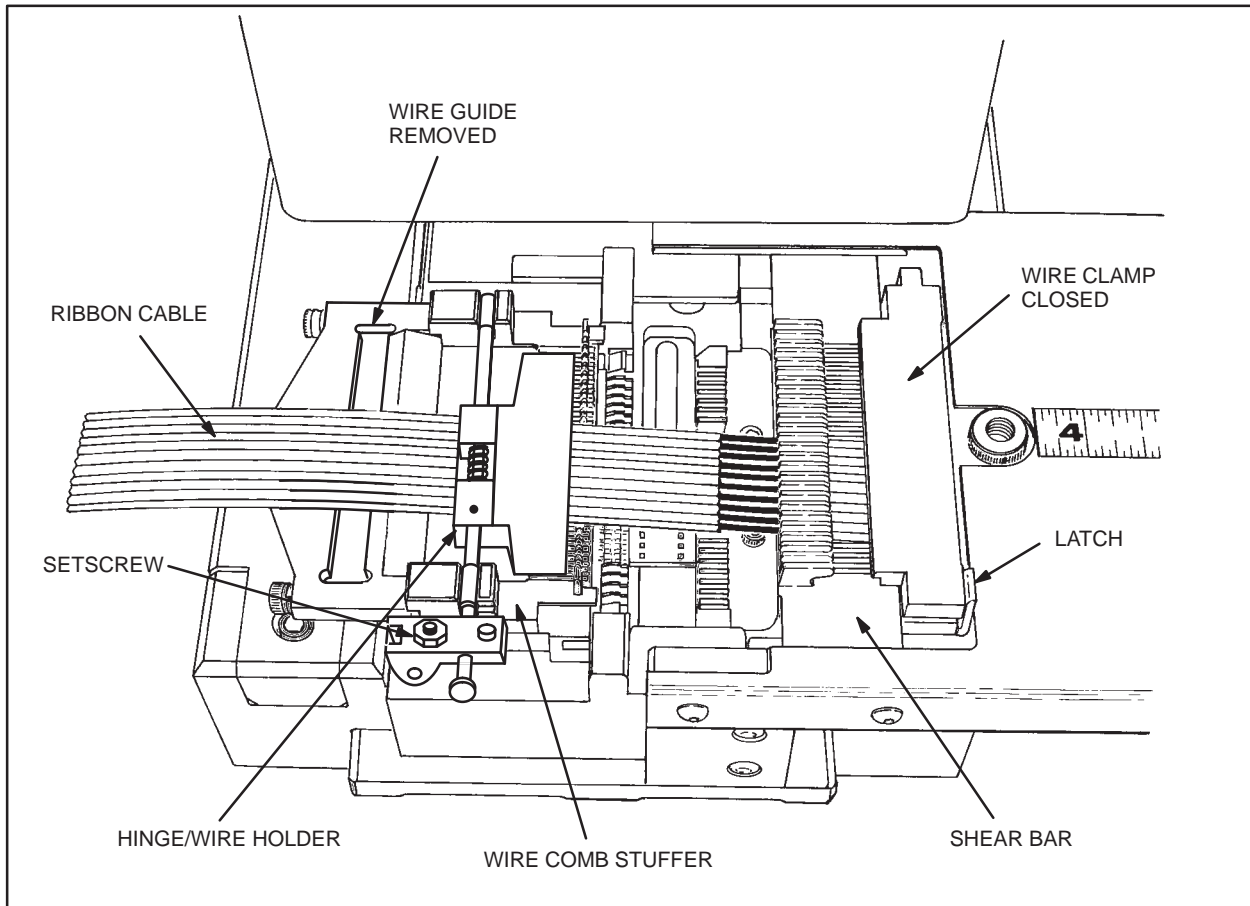


Fig. 4-2. Ribbon Cable Tooling Component Identification

92-137

- Perform this sequence several times to obtain a feel for the operation of the machine. By stopping the cycle before the ram descends, the operator can observe that the tooling is functioning properly before termination. **This is very important when running ribbon cable.** Occasionally, the cable can catch on the upper tooling as the slide moves back. If this happens, the cable must be straightened out before continuing the cycle.

The cable must be notched as shown in Figure 4-3. AMP Incorporated manufactures and markets a notcher which will automatically notch pre-cut ribbon cable. Contact your local AMP sales engineer or distributor for information on the notcher. Once the cable is properly notched, the production run may commence.

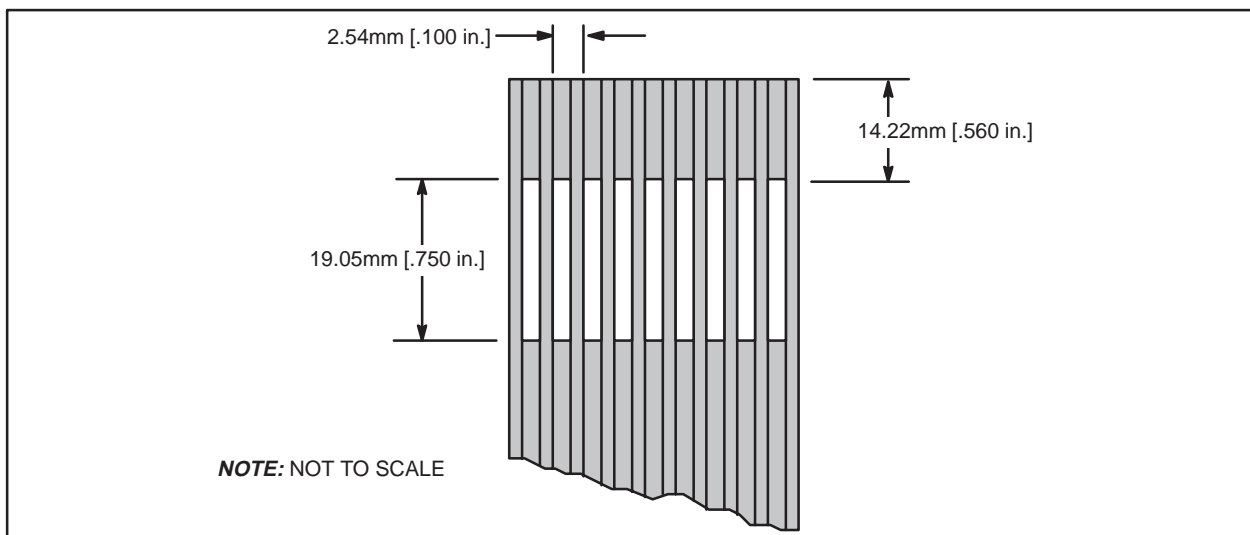


Fig. 4-3. Ribbon Cable Notching Requirements

200-127E

4.4. Production Operation – Ribbon Cable Termination

1. Open the hinged wire holder.
2. Pull the connector clamp knob OUT to open the connector cavity. Load the connector(s) into place, making sure that the contacts are properly positioned. While applying light finger pressure to the top of the connector(s), push the connector clamp knob IN to clamp the connector in place.
3. Lace the notched end of the ribbon cable into the comb on top of the shear bar. Make sure that the end of the cable is against the wire clamp, which must be in place and closed. Close the hinged wire holder.
4. Press both upper pushbuttons simultaneously **AND IMMEDIATELY RELEASE THEM**. The tooling should move back under the press ram and stop. At this point observe that the ribbon cable is lying properly under the press ram and that the notch in the cable has engaged the comb portion of the wire comb stuffer as well as the comb on the shear bar. If this has not taken place, gently pull on the left end of the cable until the notch engages the wire comb stuffer.
5. If the cable is properly positioned, push both buttons again and hold them until the ram descends, then ascends, and the tooling moves back to the front of the machine.
6. Visually inspect the terminations:
 - If they are acceptable, press and hold both lower pushbuttons to seat contacts in the housing. Release pushbuttons and unlatch the carrier shear. Then raise the hinged wire holder and pull the connector clamp knob towards the front of the machine to remove the terminated cable assembly.
 - If they are unacceptable, remove the connector from the tooling first, **THEN** unlatch the carrier shear by pushing and holding both lower pushbuttons. Examine the bad terminations, determine the cause, and take corrective action.
7. Remove the wire scrap. Wire scrap must be removed from the shear bar every cycle.

NOTE

Scrap produced by shearing the carrier strip from the contacts will fall onto the workbench below. It should be removed periodically.

5. PREVENTIVE MAINTENANCE

Preventive maintenance of the machine is limited to periodic cleaning, inspection, and lubrication. Depending on the amount of use, a maintenance program should be established on a regular basis, then maintained, whether daily, weekly, or monthly. Although the unit requires little maintenance, a general inspection should be made daily to prevent damage or unnecessary downtime. Remove upper rear cover and safety shield for cleaning and inspection.

DANGER

When doing preventive maintenance, make sure machine's air supply is OFF.

5.1. Cleaning

Prior to operation, or on a daily basis, perform the following procedure:

1. Using a CLEAN, dry cloth, wipe the entire machine to remove any evidence of dust or other contamination.
2. Using a solvent or similar cleaning fluid that will not affect metals, rubber, or plastic, remove any evidence of oil or grease from areas that should NOT be lubricated.
3. Using an approved-type air hose, blow out any plastic or metal debris that may be in the machine.

DANGER

Compressed air for cleaning must be reduced to less than 207 kPa [30 psi], and effective chip guarding and personal protective equipment (including eye protection) must be used.

5.2. Inspection

Perform the following inspection daily or prior to each time the machine is used.

1. Check to be sure all the components of the machine are secure, and watch for evidence of worn or broken parts.
2. Inspect the pneumatic system for loose connections or leakage in the air lines. Repair and/or replace components as necessary.
3. Check the air supply system and follow the manufacturer's instructions for proper care of the air supply filter/regulator/lubricator.

5.3. Lubrication

The air supply must be lubricated as described in Section 3. Maintain the proper lubricant and level as recommended by the manufacturer.

The machine has only one grease fitting located on the front side above the safety shield. After every 8–10 hours of use, lubricate with No. 1 consistency lithium soap–base grease or any SAE–approved grease recommended for bearings or sliding surfaces. Remove any excess grease after lubrication.

The tooling area requires only a lightweight grease for the sliding surfaces. After every 8–10 hours of use, lubricate the sliding areas of the wire–comb stuffer and the shear bar. At the same time, the carrier shear and shear–return pads should also be lubricated, along with the shear bar ram in the upper tooling. Apply a thin film of lightweight grease to the slide plate and cam contours. Remove excess lubricant to prevent accumulation of dirt.

6. TROUBLESHOOTING

6.1. General

Problems may occur during operation of the machine. Probable causes and remedies for problems are listed in Figure 6–1 to assist in troubleshooting.

To localize pneumatic troubles, refer to the pneumatic diagram supplied with the machine. Follow the sequence of operation through the logic to the point where the trouble occurred.

Before using the troubleshooting chart, check the following basic items:

1. Be sure the air supply is connected and the lockout valve is open.
2. Be sure the wire and connectors are loaded in the machine properly.
3. Be sure the safety shield is installed properly to maintain the interlock “passing.”
4. Be sure no foreign objects such as wire, connectors, or carrier strip scraps have jammed the machine.

TROUBLE	PROBABLE CAUSE	REMEDY
WIRE AND/OR PRODUCT RELATED		
1. Wire not properly terminated in contact slot.	Wire threaded into shear bar incorrectly.	Thread properly and run another sample.
	Wire related.	Change wire. See NOTES, page 1.
2. Contacts not seated.	Stop screw for seating mis-adjusted.	Adjust per 7.2.E
	Loose cam follower.	Tighten cam follower.
	Wire not terminated in IDC slot properly.	See No. 1 above.
	Connectors misloaded.	Reload properly.
	Contact pre-stop not rolled over, shear damaged or misadjusted.	Inspect and replace, or re-adjust.
	Wire holder not keeping wire in slots of wirecomb stuffer.	Repair or replace wire holder.
3. Product damaged during cycle.	Knob not pushed IN to clamp connectors.	Reload and push knob IN.
	Connectors not loaded properly.	Reload properly.
	Shear bar sticks in DOWN position.	Check shear clearance. Re-align tooling per Section 7.2.C
4. Wire length variation.	Connector not clamped squarely on harness tray.	Clamp connector squarely.
	Wire not re-tensioned by operator.	Tension wire before cycling.
TOOLING RELATED		
1. Connector locator will not slide.	Scrap is jammed in slot.	Clean slot/remove scrap.
2. Carrier shear sticks in DOWN position.	Scrap clogged in shear area.	Clean/remove scrap from shear area.
	Lubrication required.	Lubricate.
3. Machine stalled — product jammed.	Misloaded connector(s).	TURN OFF AIR; clean jam. Position machine to point where jam occurred. Open sleeve valve slowly. Finish cycle.
4. Poorly sheared wires.	Worn tooling.	Replace.
	Tooling alignment is not correct.	Re-align tooling per Section 7.
LOGIC RELATED		
1. Machine will not operate at all.	Sleeve valve not open.	Open sleeve valve.
	Safety shield not in place.	Mount shield on machine.
	Limit valve for safety shield not in place.	Adjust valve.
2. Incomplete cycle; general problems.	Broken or kinked tubing, defective valve, seized cylinder, mechanical binding, damaged or misadjusted limit valve.	Repair, replace, or adjust necessary part.

Fig. 6-1. Troubleshooting Guide

6.2. Pneumatic Troubleshooting Procedure

The following procedure is designed to help locate and remedy problems in the pneumatic system.

DANGER

When troubleshooting the machine, remain clear of upper and lower tooling.

1. Determine from the sequence on the pneumatic diagram where in the sequence the machine stopped.
2. Work backwards, from that point, through the logic until the defective component is found.
3. Check the following components, as described:
 - a. Check the limit valves (LV). If the cylinder has traveled full stroke, disconnect the tubing from the LV to check air flow at both “in” and “out” ports. If air supply is not present, check to see if the cylinder has traveled full stroke.
 - b. Check valves for both supply and output air. Determine why the valve has not shifted:
 - 1) Is the air signal present at the pilot port?
 - 2) Is there an air signal on the opposite pilot port that would prevent shifting of the valve?
 - c. Check the cylinders to make sure there is an air supply from the valve at the appropriate cylinder port. Check internal cylinder leakage by disconnecting the opposite port. Check for mechanical binding of the mechanism that the cylinder is trying to move.

If the machine still fails to operate properly after following the above troubleshooting steps, contact your local AMP Field Engineer or contact AMP Field Engineering, Harrisburg, PA 17105–3608 (Customer Hotline: 1 800 722–1111).

CAUTION

A characteristic of the type of pneumatic logic used in this machine is as follows: This machine can be disconnected from the air supply in the middle of a cycle. When it is subsequently reconnected to the air supply, the machine will return to the position it was in when it was disconnected. In other words, if you disconnect the air during the middle of a cycle and then move the tooling by hand, make sure you return the tooling to the position it was in when you disconnected it.

*For example: Assuming that you disconnect the air supply when the press ram is down and the lower tooling slide is back, you can then manually raise the ram and pull the slide forward. If you connect the air back to the machine at this point, the slide will retract and the ram will descend simultaneously with **very expensive damage** resulting because the machine cycle is not designed for these actions to occur simultaneously. The proper procedure would be to push the slide back and push the ram down manually **BEFORE** reconnecting the air. The machine would then be in the same position as when the air was disconnected.*

7. REPAIR, ALIGNMENT, AND REPLACEMENT OF PARTS

A set of drawings and parts lists is supplied with each machine. Refer to these items for part name and number to order parts requiring replacement. Recommended spares are indicated on the parts list, and are the customer's responsibility to stock and replace as necessary. To make sure that pneumatic connections are correct, refer to the pneumatic assembly and pneumatic diagram, as supplied, when it is necessary to make repairs.

For major repair service, contact your local AMP Field Representative, or AMP Incorporated, Harrisburg, PA 17105-3608 on the Customer Hotline: 1 800 722-1111.

DANGER

Make sure the air supply is turned "off" BEFORE making repairs or replacing parts, unless otherwise specified.

7.1. Mechanical Parts

Tooling is aligned during assembly and should require no further alignment. When tooling is replaced, it is wise to recheck the tooling alignment prior to running the machine under power. Always perform this work with the air supply disconnected.

When replacing tools or checking alignment, remove only one tool at a time. This ensures that re-alignment can be done quickly and easily by aligning the replaced tooling to the unmoved tooling.

7.2. Tooling Alignment Procedure (Figure 7-1)

Although tooling alignment should not change with normal use, in the event that it becomes necessary, use Alignment Kit 820511-3 and Tooling Alignment Procedure on reference drawing 852193 (both are supplied with the machine), in conjunction with the following steps.

A. Preliminary Alignment (Upper and Lower Tooling)

Use the following procedure to align the terminating subassembly with the insertion subassembly (upper and lower tooling):

1. Remove safety shield and rear guard. Loosen the eight mounting screws that retain the tooling.
2. Remove shear bar ram and ram holder on right side of inserters and the push block, clamp pad, and urethane pad on left side of the inserters.
3. Mount alignment fixture to inserter organizer as shown.
4. Remove shear bar holder from shear bar, slide shear bar to left (over shear pads), depress and keep down by sliding shear bar depressor over shear bar.
5. Push terminating subassembly under the ram. The slide must be against the slide stop.
6. Depress carrier shear and latch it in the down position.
7. Using the selector valve, carefully and slowly move the insertion tooling down to engage the terminating subassembly as shown. Take care not to damage tooling.
8. Pull cam subassembly front and to the left, so that the slide is against the slide stop and the shear bar is against the shear edge of the inserters.
9. Turn the adjusting screw on the alignment fixture to be sure that the shear edges stay together. Tighten the adjusting screw with fingers until tight – DO NOT TIGHTEN WITH WRENCH.
10. Tighten the four mounting screws that secure the tooling to the press base, then tighten the four remaining screws.
11. Use the selector valve to raise the insertion tooling and pull the slide forward.
12. Remove the alignment fixture, shear bar depressor, and shear bar.

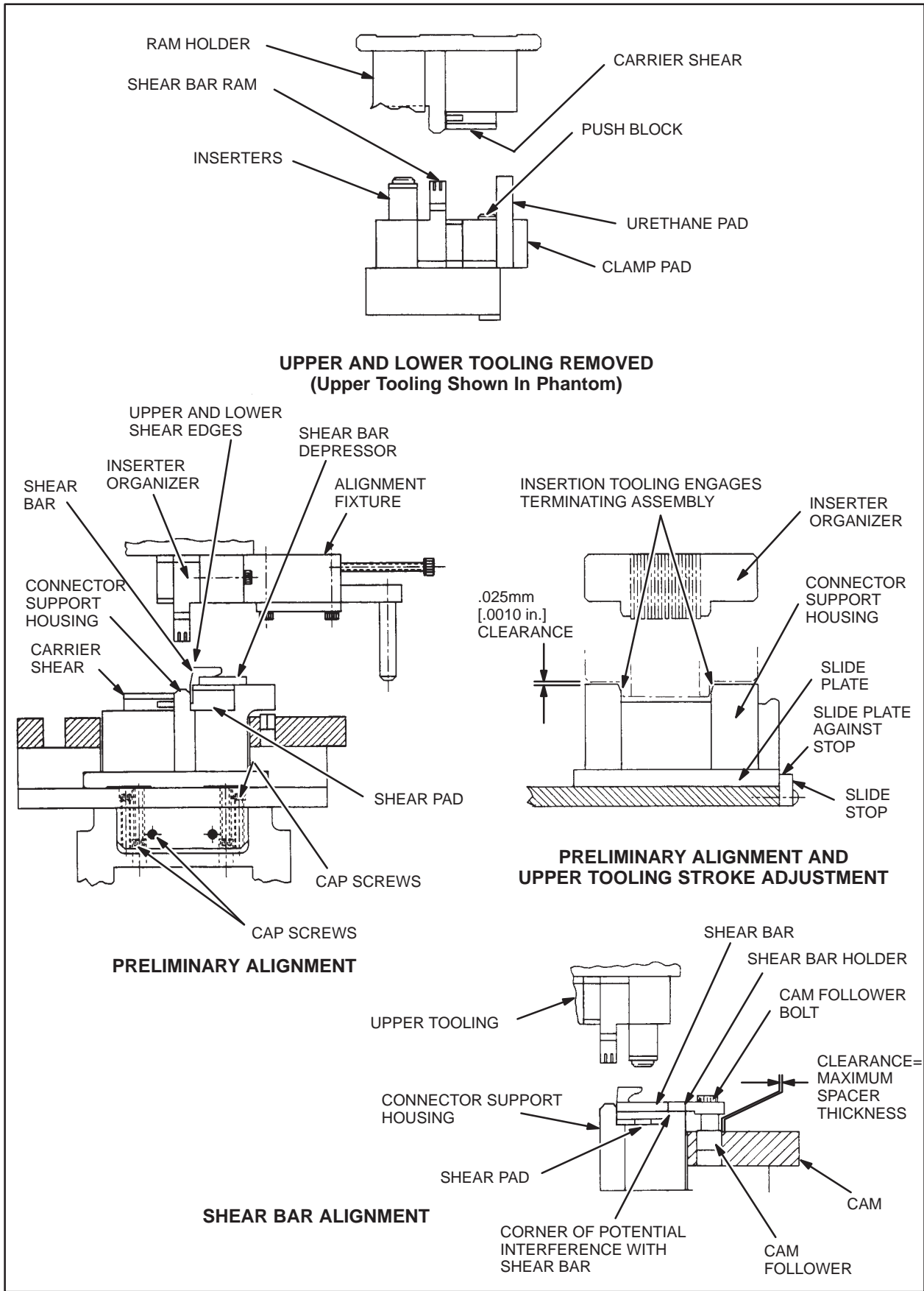


Fig. 7-1. Tooling Alignment

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B. Upper Tooling Stroke Adjustment

Use the following procedure to set the stroke adjustment for the upper tooling, and to ensure that wire insertion depth is correct.

1. Turn the stroke adjusting knob (Figure 2–1) on the cylinder **CLOCKWISE** 3/4 of a turn. This sets vertical clearance in excess of .025mm [.001 in.] required between the connector support housing and inserter organizer.
2. Push the lower tooling back under the upper tooling.
3. Using the selector valve, lower the upper tooling. Check the clearance between the inserter organizer and the connector support housing while maintaining pressure on the selector valve.
4. Release the selector valve, to dump all air pressure on the cylinder.
5. Rotate the adjusting knob **COUNTERCLOCKWISE** to decrease the clearance (one increment of the knob is a height change of .025mm [.001 in.]). Repeat this procedure from Step 3 until .025mm [.001-in.] clearance is reached. See Fig. 7–1.
6. Lock the stroke adjusting knob in place with the setscrew on the side of the knob.

C. Shear Bar Alignment (Figure 7–1)

Take the following steps to ensure smooth operation of the shear bar as it is depressed to roll over the pre-stops on the contacts.

1. Re-install all upper tooling and the shear bar with its holder, cam follower bolt, and cam follower. Tighten the cam follower bolt.
2. Push the terminating subassembly back under the upper tooling. Using the selector valve, move the upper tooling down slowly. Watch the shear bar to be certain that it does not interfere with the corner on the connector support housing as it is depressed. This will cause the tool to tip at an angle. Use the selector valve to raise the upper tooling.
3. Push the shear bar as far **LEFT** as possible. Measure the clearance between the cam follower and the cam contour. This is the maximum spacer thickness required between the shear bar and the shear bar holder.
4. Stack the shear bar spacers (P/N 820116–1) together and/or remove laminations to achieve the thickness determined in the previous step. Total thickness must not exceed the measured clearance and should be within .051mm [.002 in.].
5. Install the shear bar spacers, and recheck shear bar operation by repeating Step 2. Apply a thin film of lightweight grease to the guiding surfaces of the shear bar.

D. Connector Rail Adjustment (Figure 7–2)

The minimum opening between the connector support housing and the connector rail must be adjusted so that excess pressure is not placed on the connector(s) or tooling. Proceed as follows:

1. Pull the knob so that the connector rail moves to the right. Install Gage No. 843884–1 (supplied with the machine) as shown in Section A–A.
2. Push the knob so that the connector rail moves left, against the gage. Adjust the setscrew so that the cam stops against the setscrew and the gage fits the opening. The adjusting setscrew is accessed through the alignment retainer plate.
3. Repeat this procedure until the gage opening is correct. Tighten the locking setscrew.

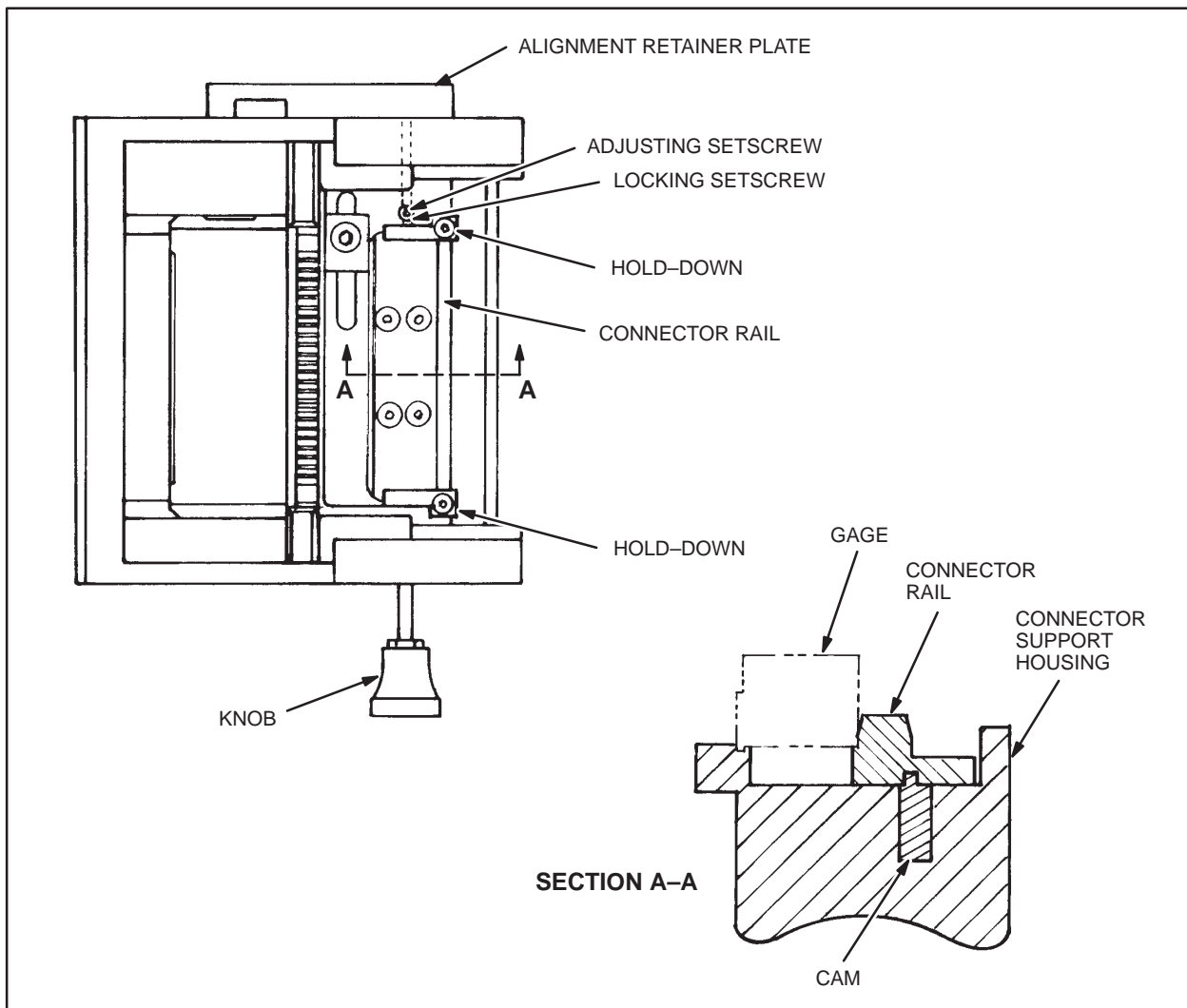


Fig. 7-2. Connector Rail Adjustment

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E. Wire Comb Stuffer Seating Depth Adjustment (Figures 7-1, 7-2, and 7-3)

To ensure that contacts are seated properly in the housings, proceed as follows:

1. Pull the knob so that the connector rail moves to the RIGHT. Install Gage No. 843884-1 (supplied with the machine) as shown in Figure 7-2, Section A-A. The specially-machined step in the gage must be placed to the LEFT, as shown.
2. Push the knob so the connector rail moves LEFT; the gage should be against locating edge (on the left) of the connector support housing.
3. The wire comb stuffer and holder should be mounted on the carrier shear with the cam follower engaged in the cam. Remove the left-hand pushbutton bracket and cap to gain access to the locknut and adjusting screw for seating depth. Loosen the locknut.
4. Manually push the cam track in until the adjusting screw stops the movement. The end of the wire comb stuffer should be .000mm to .051mm [.000 to .002 in.] from the gage. Rotate the adjusting screw until the adjustment is correct, then tighten the locknut.
5. Install the cap and pushbutton bracket.

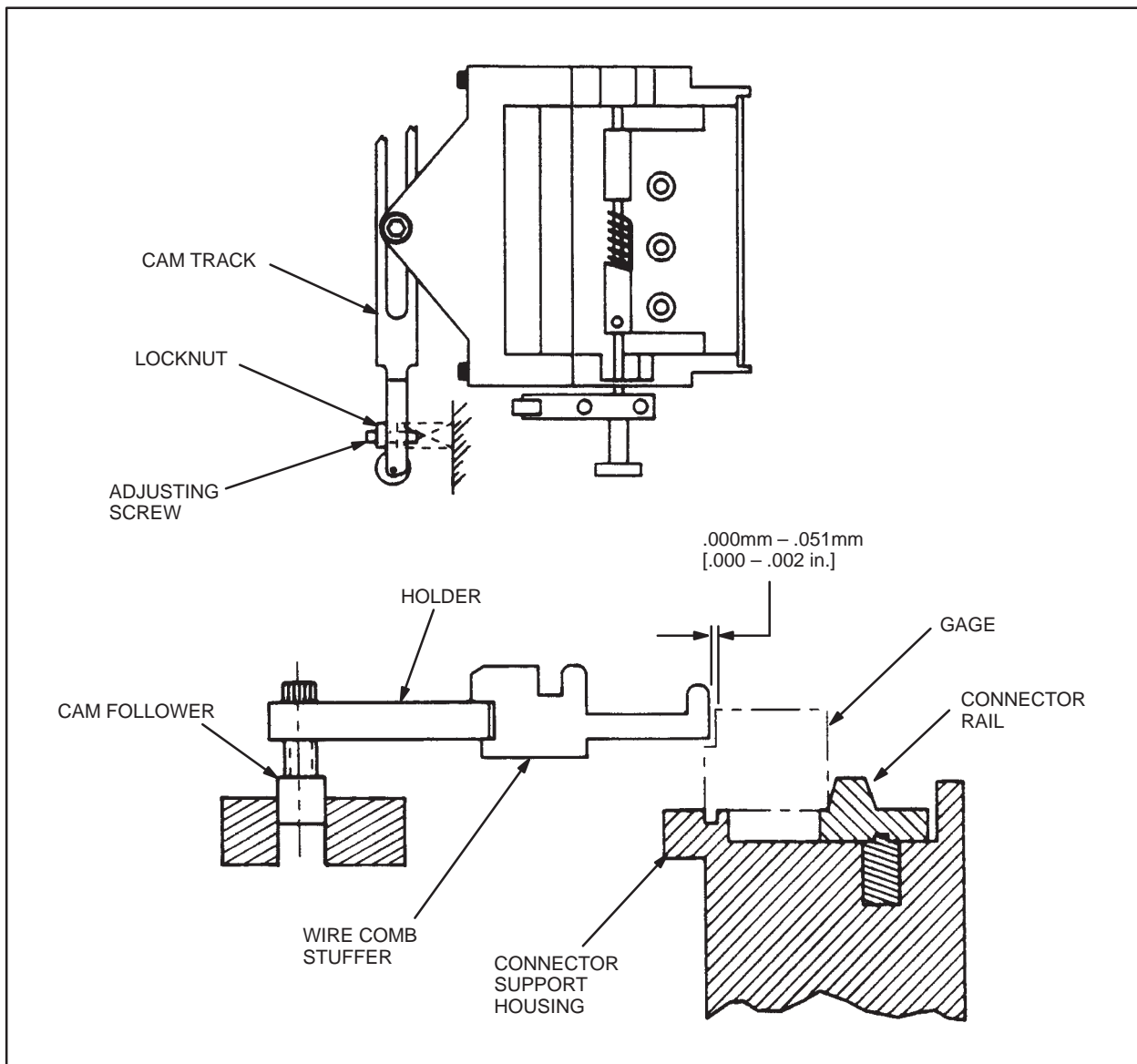


Fig. 7-3. Seating Depth Adjustment

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7.3. Pneumatic Parts

A. Replacement of a Control Valve

Each control valve is a self-contained unit that can be replaced. Refer to the pneumatic assembly and the pneumatic diagram which show the control valves (P1, P2, and RV1, RV2, for example). Proceed as follows:

DANGER

Disconnect air supply before replacing or repairing pneumatic parts.

1. Remove upper rear cover.
2. Remove all tube connections from the control valve.
3. Remove mounting screws and lift control valve out of the machine.
4. Transfer all fittings and plumbing from damaged valve to replacement valve; install parts in the reverse order of removal. **MAKE SURE** that all air lines and fittings are properly positioned and connected.

B. Control Module Replacement (2-Hand Trip)

The 2-hand trip control module is a self-contained unit that is not repairable. To replace it, proceed as follows:

DANGER

Disconnect air supply before replacing or repairing pneumatic parts.

1. Remove the upper and lower rear covers.
2. Remove air lines from damaged valve.
3. Remove the two screws holding the module in place.
4. Replace module with a new unit.
5. Reposition screws and air lines; replace covers.

C. Pushbutton Replacement or Repair (Figure 7-4)

With air supply "off," gain access for pushbutton repairs by removing screws from pushbutton housing. Remove housing and proceed as follows:

1. Remove fittings.
2. Unscrew poppet valve from pushbutton adapter.
3. Rotate pushbutton adapter to UNLOCK position.
4. Unscrew nut to remove sealing ring and pushbutton from panel. Replace parts as needed and re-assemble.

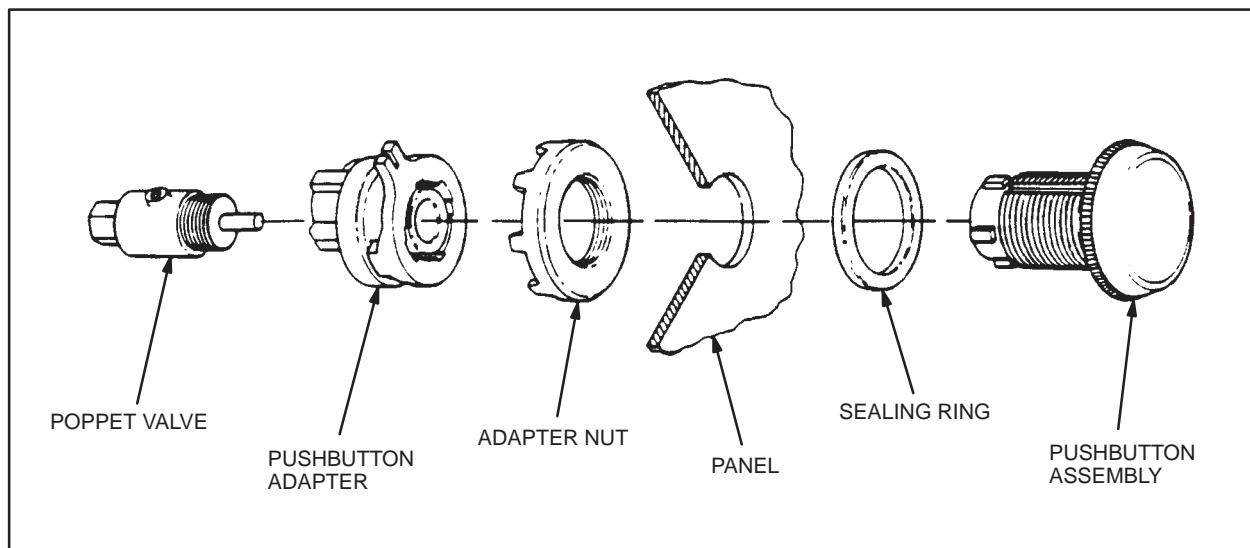


Fig. 7-4. Pushbutton Assembly

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D. Miscellaneous Pneumatic Components

Other pneumatic components not mentioned can also be replaced. Refer to the pneumatic assembly drawing and pneumatic diagram included with the machine, and proceed as follows:

1. Make sure air supply is "off." Remove covers, as required.
2. Remove component from mounted position; remove fittings.
3. Replace fittings into new component. Remount new component; correctly re-install tubing; replace covers.