

customer manual

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SAFETY PRECAUTIONS AVOID INJURY

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

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

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

TOOLING ASSISTANCE CENTER

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

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

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

INFORMATION REQUIRED WHEN CONTACTING THE TOOLING ASSISTANCE CENTER

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

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

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

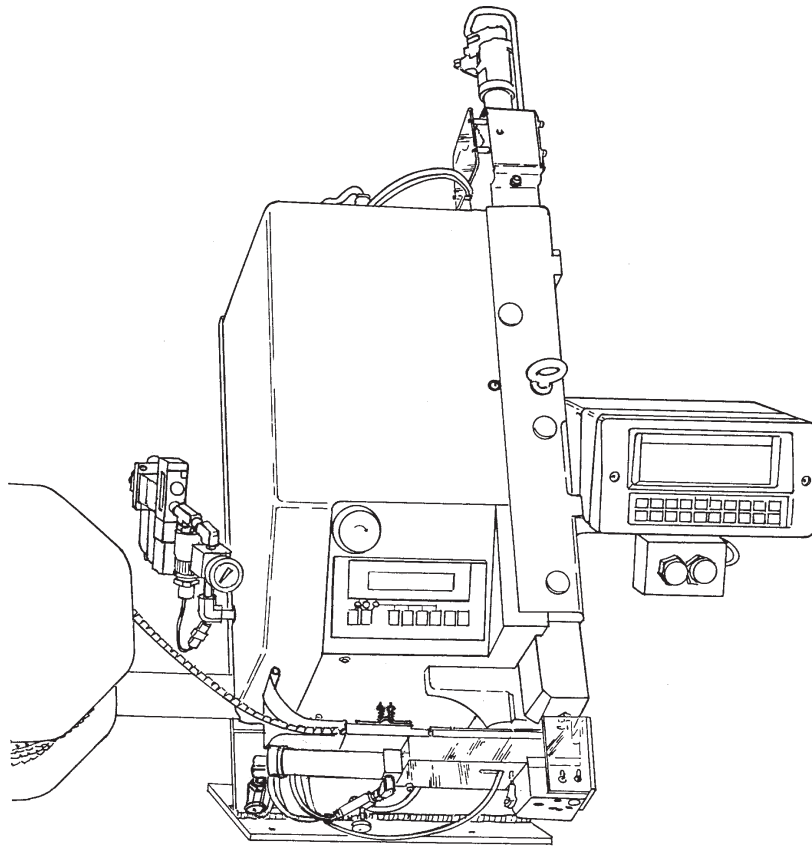


Figure 1

1. INTRODUCTION

This manual provides information concerning the setup, operation, and maintenance of the AMPLIVAR Product Terminators (APT) shown in Figure 1 and listed in Figure 2. These terminators apply AMPLIVAR Direct Connect Terminals to pre-stripped wires and unstripped magnet wires.

Serrations in the terminals cut through the magnet wire insulation to make electrical contact. This eliminates a time-consuming stripping operation. Direct Connect Terminals are applied with uniformly high mechanical strength and electrical conductivity, at high-volume production rates.

Each AMPLIVAR Product Terminator weighs approximately 71 kg [156 lbs], and requires a power source of 120 Vac, .5 A, 60 Hz, or 240 Vac, .25 A, 50 Hz, depending on the model of the terminator. Compressed air at a minimum of 620.5 to 689.5 kPa [90 to 100 psi] pressure is required for proper operation.

The manual is arranged in an order convenient for setup and maintenance personnel:

- Section 2 contains descriptive information and information that may be helpful in diagnosing problems;
- Section 3 contains Receiving Inspection and Installation instructions;
- Section 4 contains terminator setup instructions for setup personnel (any attempt to operate the terminator without proper setup and checkout could result in damage and unnecessary downtime);
- Section 5 contains step-by-step operating instructions for operating personnel;
- Section 6 contains instructions for terminator adjustments;
- Section 7 contains preventive maintenance information;
- Section 8 contains repair and replacement instructions; and
- Section 9 contains supplemental wire stuffer information.

For information beyond the scope of this manual, contact Tyco Electronics using the Tooling Assistance Center toll free number: 1-800-722-1111.



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

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



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



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



Highlights special or important information.

2. DESCRIPTION

AMPLIVAR Product Terminators (APT) automatically feed terminals into position in the crimping area, crimp the terminals to magnet wire, and trim the scrap wire from the terminal. Unlike many standard bench-type crimping machines, the primary crimping motion on the APT Direct Connect occurs in the horizontal plane and not vertically, as in many other automatic machines.

APT variations are shown in Figure 2.

Refer to the appropriate Crimp Quality Monitor Manual for CQM information.

The crimp tooling is nearly flush with the right-hand surface of the terminator, allowing the operator to hold the wire close to the tooling, in order to crimp very short leads.

APT VARIATIONS			CRIMP QUALITY MONITOR ASSEMBLY		TERMINATOR DESCRIPTION
APT Model	APT for Direct-Connect Assemblies	APT for Splice Terminator Assemblies●	120 Vac	240 Vac	
Model II	679454-[]	679450-[]	Not Used	Not Used	Terminator has precision manual crimp height adjustment.
Model II w/Crimp Quality Monitor ‡	679455-[]	679451-[]	90686-1	90686-3	Terminator is used with the Crimp Quality Monitor and has precision manual crimp height adjustment.
Model IIA ‡	679456-[]	679452-[]	90686-1	90686-3	Terminator is used with the Crimp Quality Monitor and has <i>automatic</i> crimp height adjustment.
Model IIIA†	679457-[]	679453-[]	90686-2	90686-4	Terminator is used with the Crimp Quality Monitor and has <i>automatic</i> crimp height adjustment and automatic sequencing.

● Refer to 409-5841 for information about APT Splice Terminator Assemblies.

‡ Refer to 409-5858 for APT Model IIA Crimp Quality Monitor information.

† Refer 409-5845 for APT Model IIIA Crimp Quality Monitor information.

Figure 2

During production operation, the operator places wire and magnet wire in the slot of the wire shear in the “target area” of the terminator, then depresses the foot switch. The terminator automatically shears the terminal

from its strip, crimps the terminal onto the wire, shears off the excess wire, and advances the next terminal into the crimping position. The terminator's electrical circuit prevents the foot switch from actuating the machine while a cycle is already in progress. The amount of time the foot switch is depressed is not critical. For a detailed functional description of the terminator, refer to Paragraph 2.3.

Although design features of the APT minimize tooling changes, the large number of wire combinations that can be joined with APT Direct Connect terminators necessitate *some* tooling changes. Refer to the tooling matrix in Figure 22. Two or three wires may be joined in one terminal, and combinations of magnet wire and lead wire (stranded, solid, or fused stranded) can be used.

Magnet wire should *always* be placed on the bottom so the AMPLIVAR serrations pierce the magnet wire varnish for acceptable termination.

Calculation of Circular Mil Area

Circular Mil Area (CMA) is the cross-sectional circular area of a magnet wire. For example, when terminating two .040-in. diameter magnet wires, each wire would have a CMA of 40 mils squared, or 1600 CMA per wire, a total CMA of 3200.

CMA for stranded wire is the diameter of a single strand in mils squared times the number of strands.

2.1. Major Groups and Subassemblies (See Figure 3)

Refer to tooling matrix in Figure 22 for Direct Connect tooling variables.

The four major groups or subassemblies of the APT are:

- the feed plate group;
- the crimp tooling group;
- the ram group; and
- the air input and valve stack assembly.

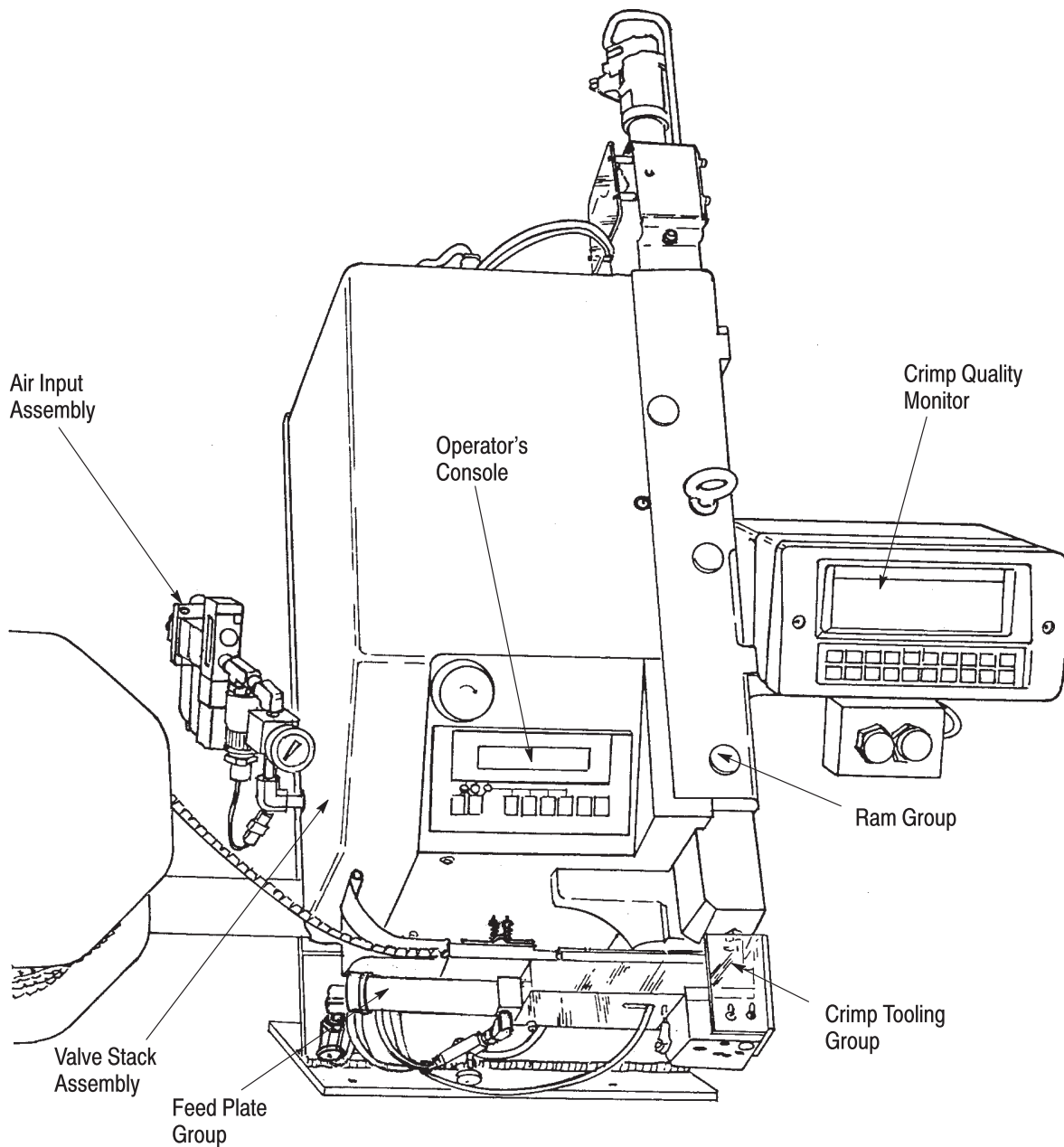


Figure 3

A. Feed Plate Group (See Figures 4 and 5)

Two feed plates are available to accommodate the full range of terminals. Each feed plate contains a groove that guides the terminal strip to the "target area." The feed finger, driven by the feed air cylinder, advances the terminal strip. Each cycle of the terminator advances the strip one position. The terminal strip drag prevents the strip from being pulled back as the feed finger retracts to pick up the next feed point in the strip. The hold down secures and controls the terminal strip through the feed plate and into the tooling area, and acts as a wire shear.

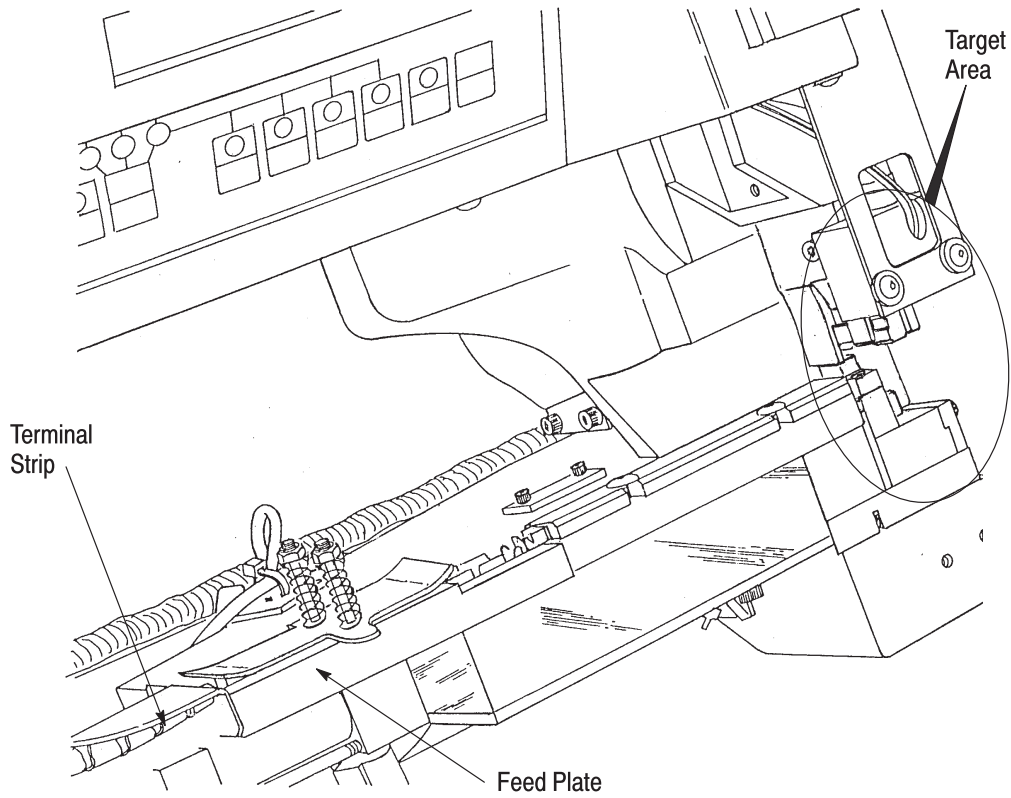


Figure 4

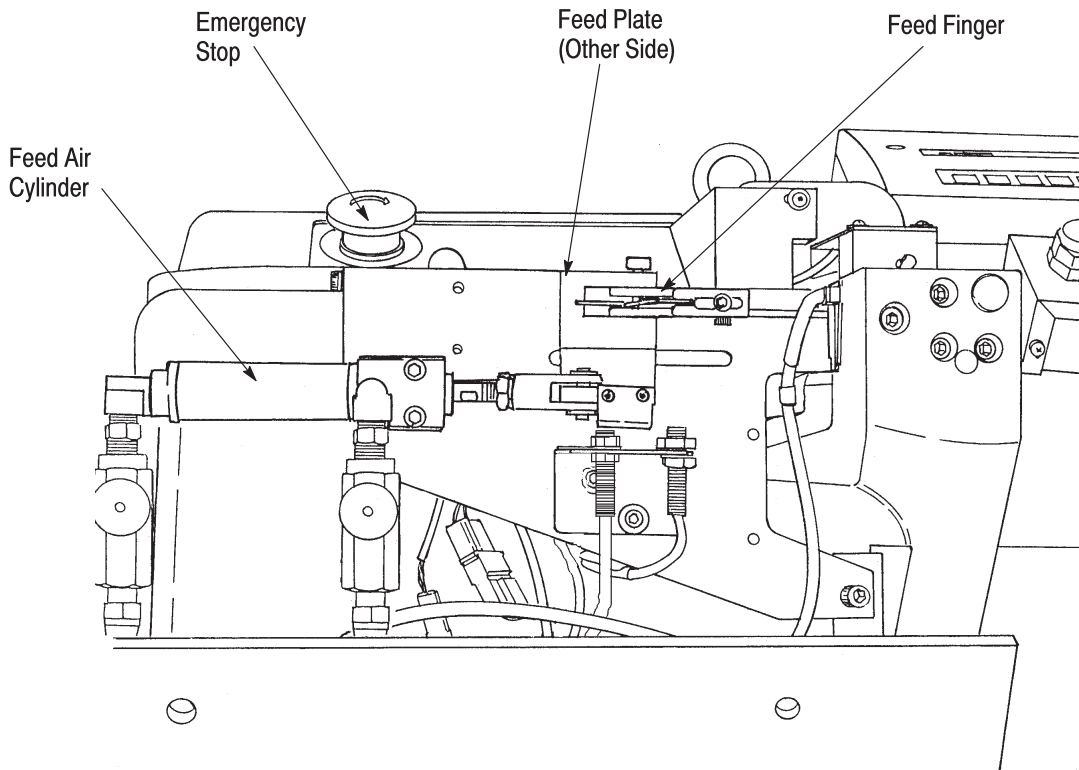


Figure 5

B. Crimp Tooling Group (See Figure 6)

The crimp tooling group consists of the insulation and wire crimper with insulation disc and spacer attached to the ram with a button head screw. The slug blade is attached to the ram with two socket head cap screws. The wire anvil and insulation anvil lock into the anvil holder with the retainer plate. The product guide attaches to the anvil holder with two, socket head cap screws. The wire shear attaches to the product guide with two socket head cap screws. The product hold down attaches to the feed plate with two button head screws. The anvil holder attaches to the frame with three socket head cap screws.

When the ram advances, the slug blade pre-trims the wire with the product hold down and the wire shear. The wire crimper and product guide then perform a final wire trim, and the slug blade and front shear cut the connecting carrier from the terminal strip. The feed finger retracts to pick up another terminal.

Product is crimped when the ram is fully extended. The ram retracts and a preset blast of air is directed at the anvil to clear scrap wire and chips from the "target area." With the ram fully retracted, the feed finger feeds a terminal into position for crimping and the cycle is complete.

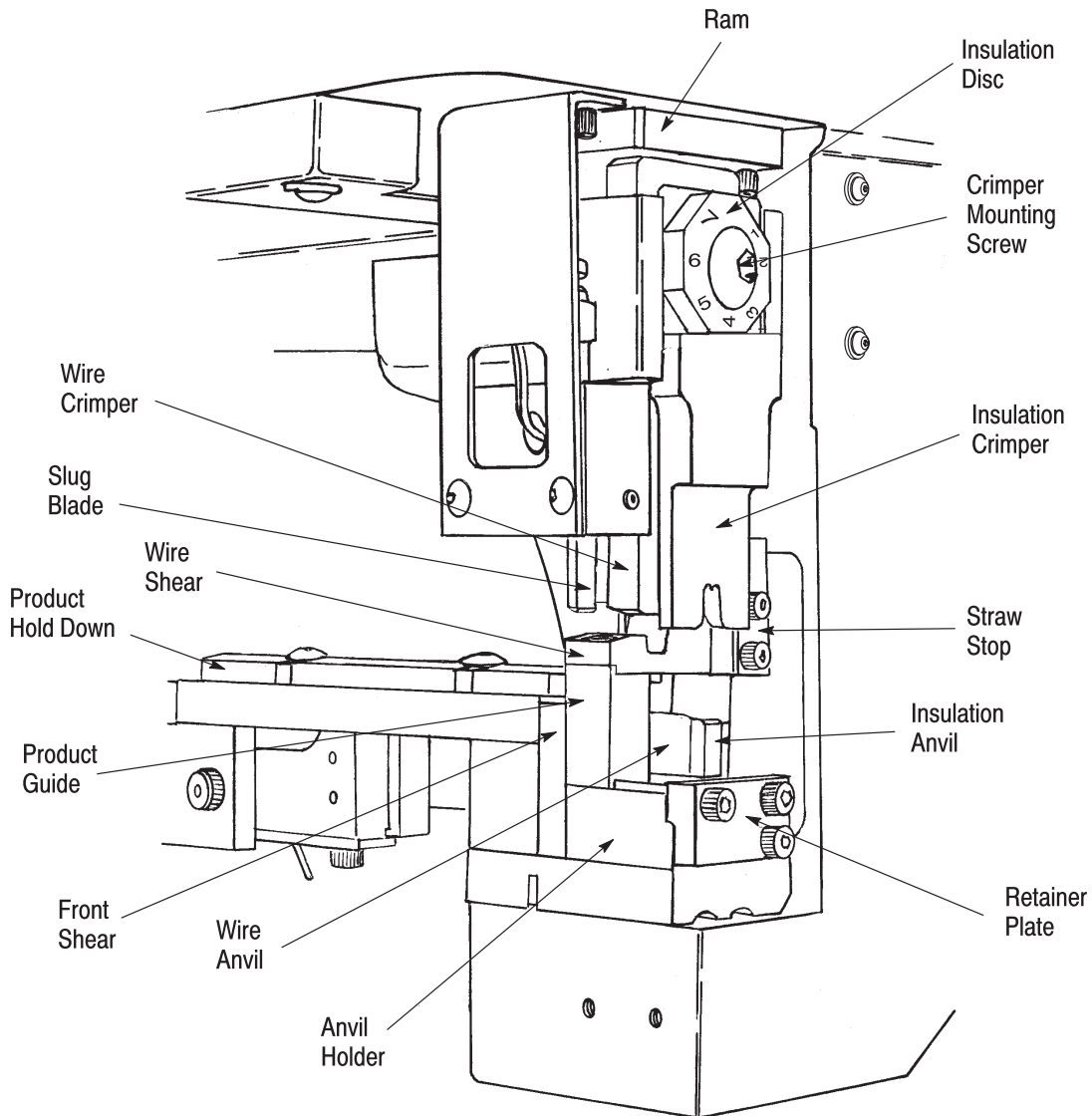


Figure 6

C. Ram Group (See Figure 7)

The ram group provides the force required for the crimper to crimp terminals. The ram group consists of the terminator frame, ram air cylinder, link, ram bellcrank, and the ram. When the ram air cylinder is fully retracted, the ram is also fully retracted by the linkage which connects the two components. Refer to Paragraph 4.4,B for further details on checking the ram stroke.

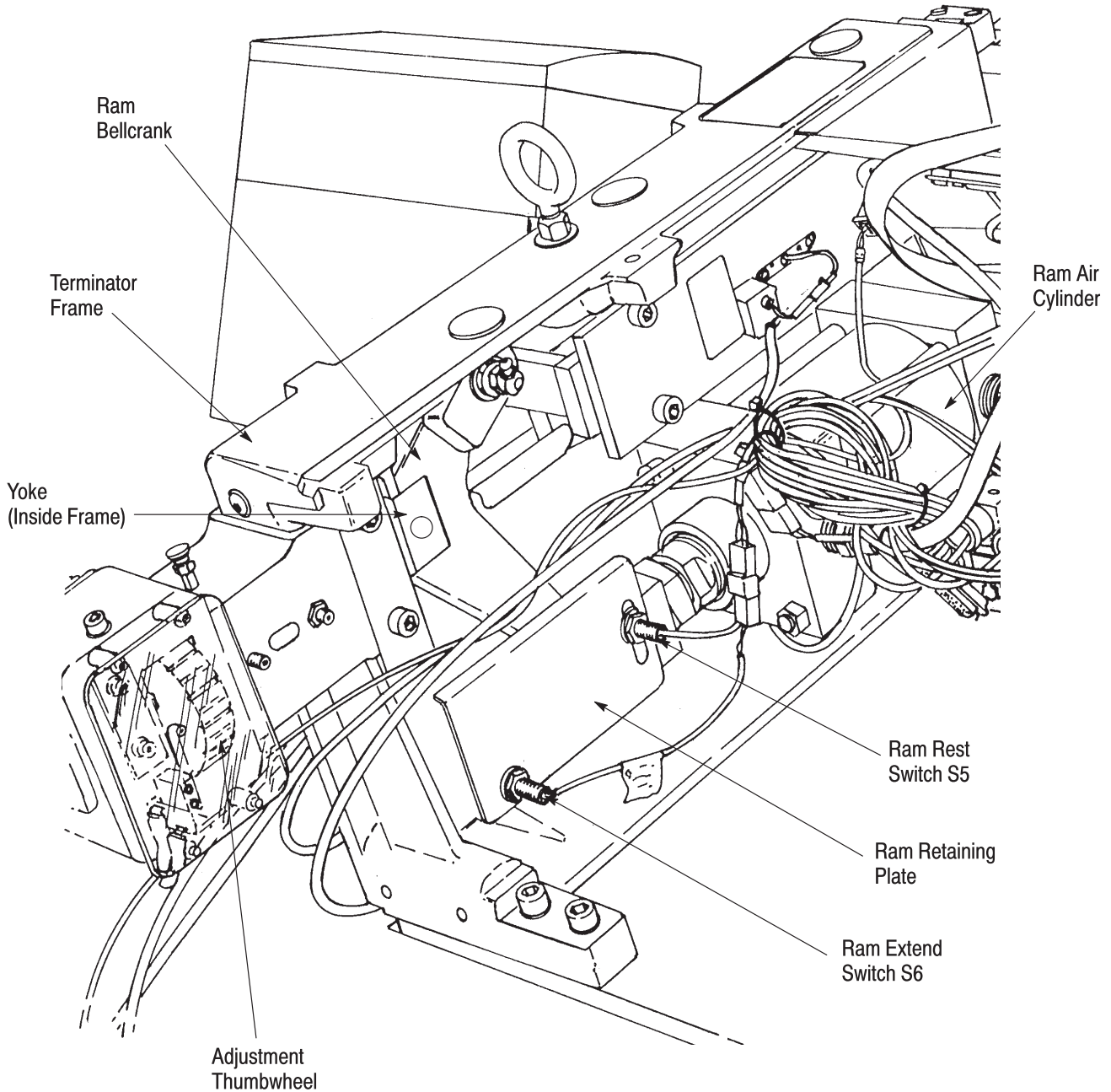


Figure 7

D. Air Input and Valve Stack Assembly (See Figure 8)

Compressed air supplied to the terminator passes through air filters to provide clean air for the air valves and air cylinders.

The main components of this system are the lockout valve, the air filter, the coalescing filter, the main solenoid valve, the pressure switch, the regulator, the gage, and manifold assembly. Refer to the pneumatic diagram in Figure 9 for a functional description of the valve operation in relation to the air cylinders.

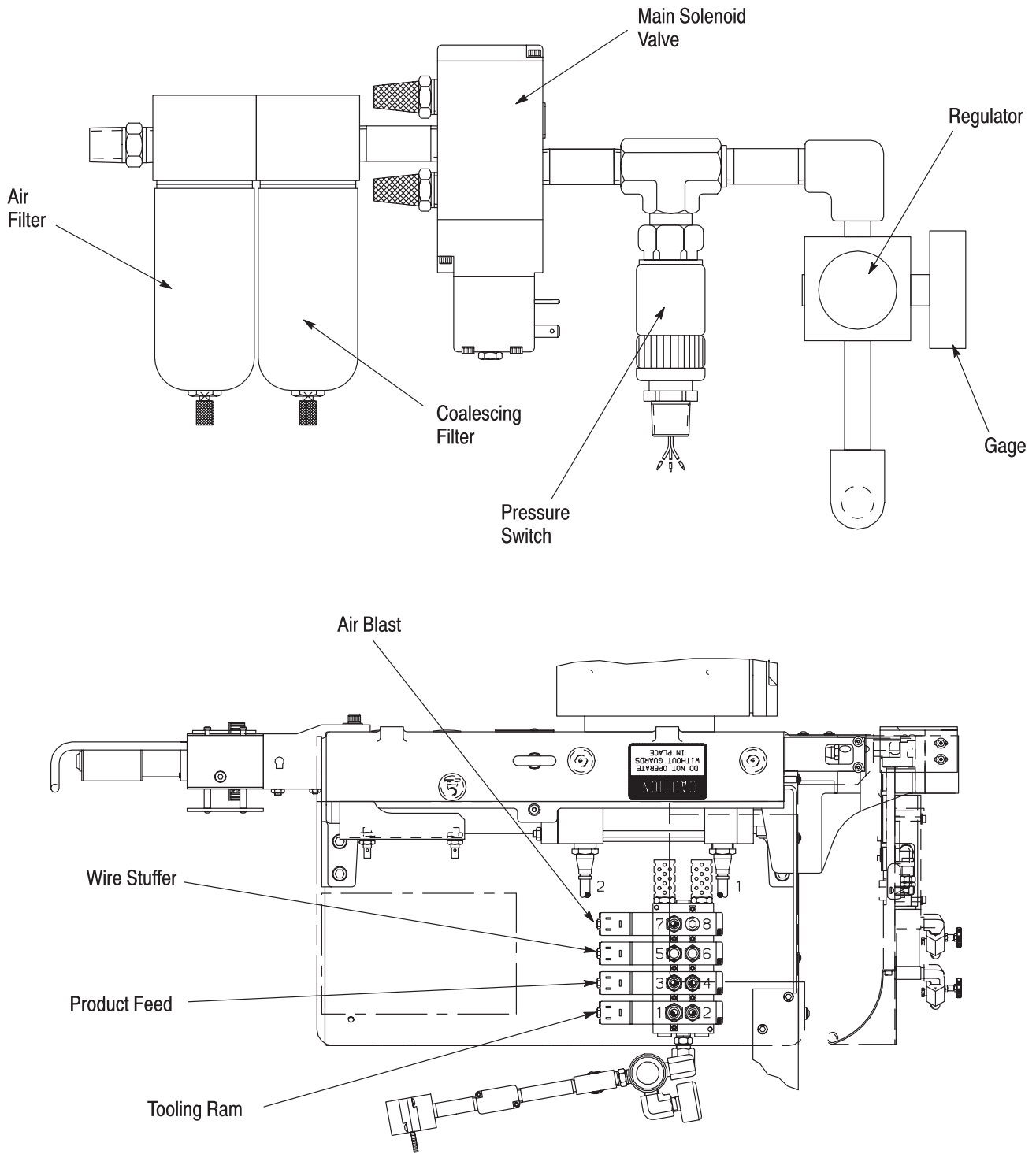


Figure 8

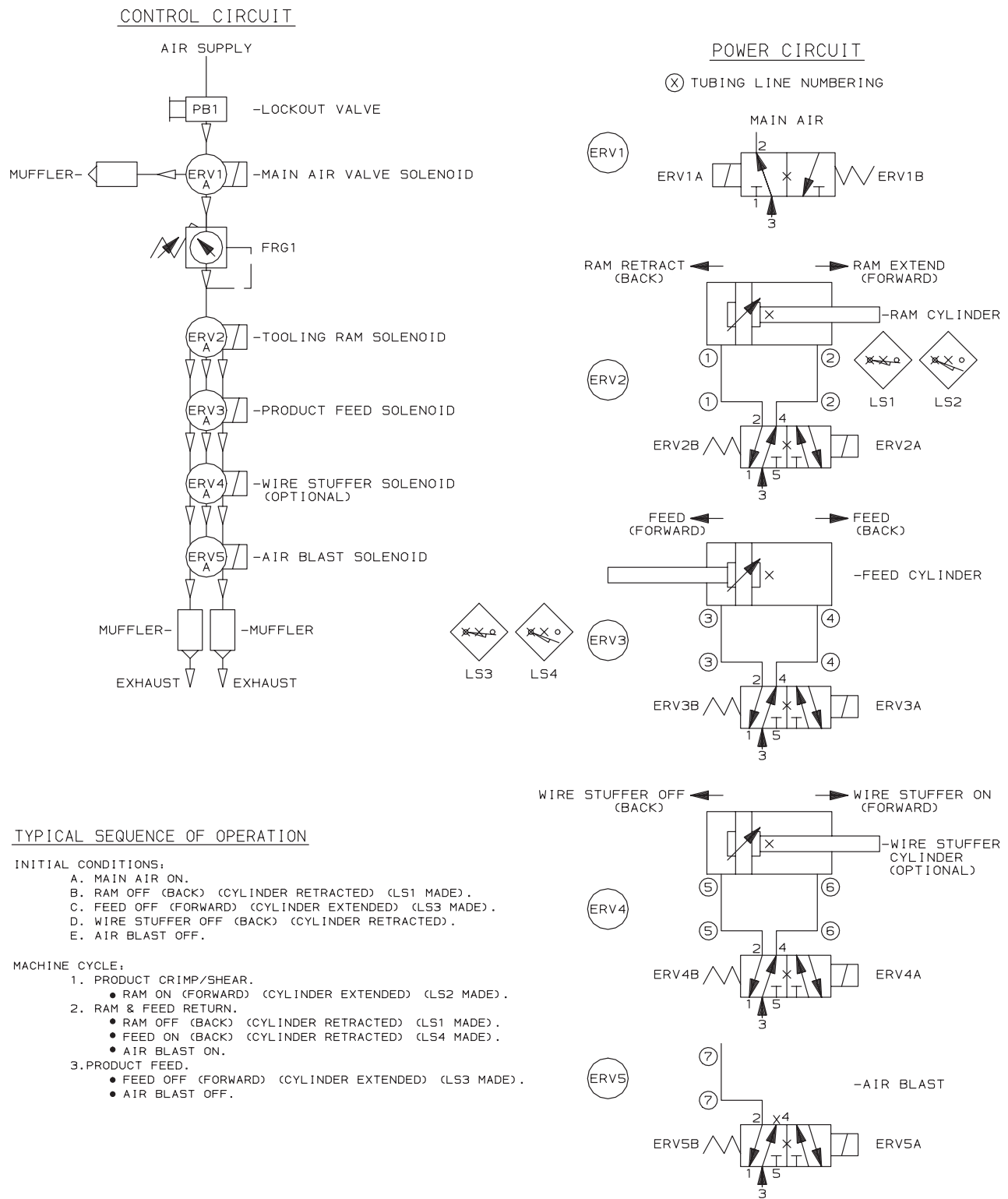
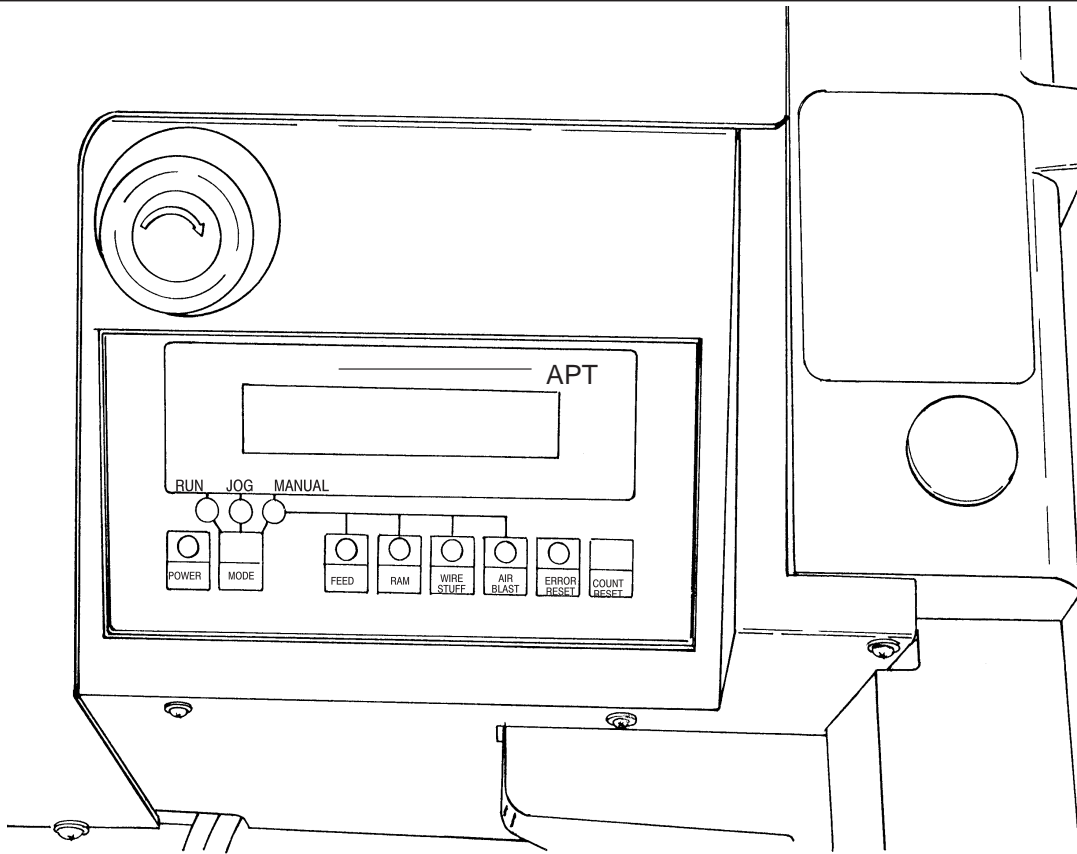


Figure 9

2.2. Switches and Controls

The operator control panel, located at the front of the terminator, contains all switches and controls necessary for operation of the APT. Including the normal key functions and the special key functions. See Figure 10 and Figure 11.

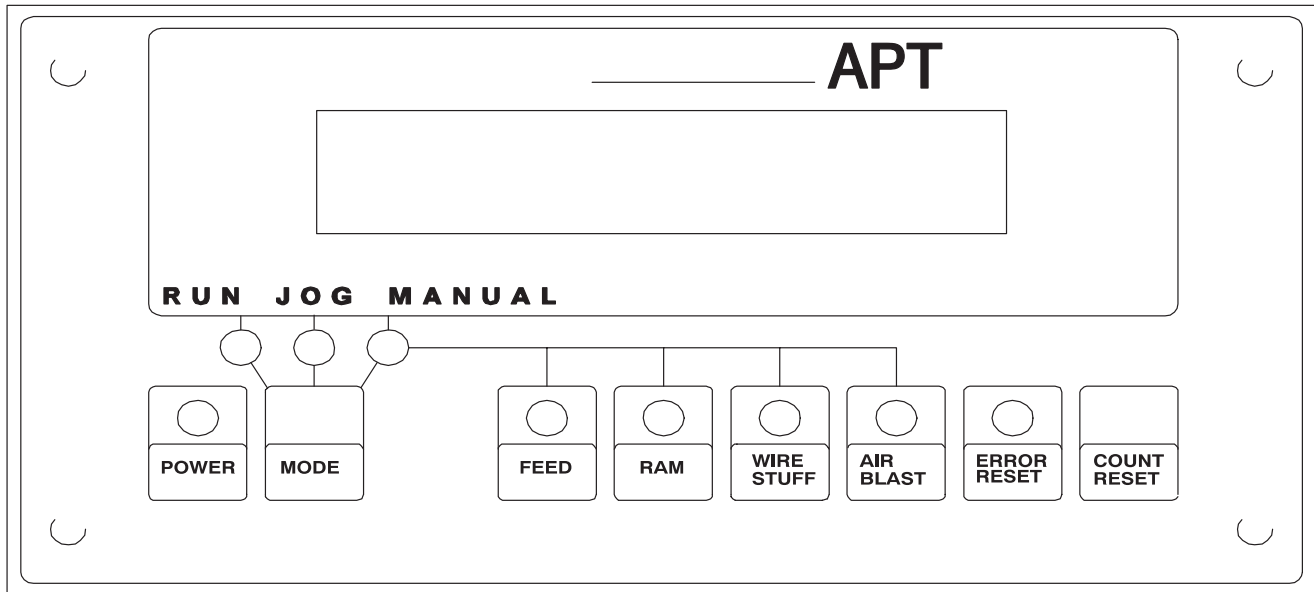
A. Normal Key Functions (Figure 10)



KEY FUNCTION	DESCRIPTION
POWER	The POWER button is used to turn power “on” or “off.” When the power indicator lamp is lit, the power is “on” to the terminator. POWER “off” dumps the main air supply and turns off the electric supply. Note that the air supply must be available (LOCKOUT ON) to turn the power “on.”
MODE	<p>The MODE button is used to sequence the terminator through three possible conditions of operation, as indicated by the corresponding light. The terminator is in the RUN mode when first powered “ON.”</p> <ul style="list-style-type: none"> ● RUN mode is used to cycle the terminator automatically. ● JOG mode is used to sequentially step the terminator through a complete cycle. The foot switch must be depressed for each step. ● MANUAL mode is used to perform selected tooling moves. The keypad is used to cycle the terminator in the MANUAL mode.
FEED	The FEED button is used to feed product to the crimp tooling. It can be used only in the RUN or MANUAL modes.
RAM	The RAM button cycles the crimping ram. It can be used in the MANUAL mode only.
WIRE STUFF	The WIRE STUFF button is used to cycle the optional wire stuffer. It can be used in the MANUAL mode only.
AIR BLAST	The AIR BLAST button is used to cycle the air blast to the “target area.” It can be used in the RUN or MANUAL mode.
ERROR RESET	The ERROR RESET button is used to reset the terminator after errors.
COUNT RESET	The COUNT RESET button is used to reset the current crimp cycle count.

Figure 10

B. Special Key Functions (Figure 11)



KEY FUNCTION	DESCRIPTION
HOST Mode	Put the machine into the HOST mode by pressing and holding the MODE button for three seconds. To exit the HOST mode, press and release the MODE button.
ENGLISH/FRENCH Toggle Mode	<p>To toggle between the two languages, press and hold the MODE button. Then press and hold the RAM button. Release the MODE button; and release the RAM button.</p> <p>If the language is currently English, the message "FRANCAIS SELECTIONNE" will be displayed. If the language is currently French, the message, "ENGLISH" will be displayed.</p>
CQM ON/OFF POST-FEED PRE-FEED Mode	<p>To toggle between the four machine combinations (CQM On / Pre-Feed; CQM On / Post-Feed; CQM Off / Pre-Feed; and CQM Off / Post-Feed) proceed as follows:</p> <ol style="list-style-type: none"> 1. Press and hold the MODE button. 2. Press and hold the FEED button. 3. Release the MODE button 4. Release the FEED button. (The current state is briefly displayed when the FEED button is released.)
AIR BLAST TIME ADJUSTMENT Mode	<p>To enter the mode whereby the air blast time (duration) can be adjusted, proceed as follows:</p> <ol style="list-style-type: none"> 1. Press and hold the MODE button. 2. Press and hold the AIR BLAST button. 3. Release the MODE button 4. Release the AIR BLAST button. <p>The message "Air Blast Time xxx ms" will be displayed. The minimum time is 0 milliseconds. the maximum time is 1000 milliseconds. Adjust the air blast as follows:</p> <ul style="list-style-type: none"> ● Press the FEED button to <i>decrease</i> the air blast time by five milliseconds. ● Press the RAM button to <i>increase</i> the air blast time by five milliseconds. ● Press the COUNT RESET button or the WIRE STUFFER button to <i>increase</i> the air blast by 20 milliseconds. ● Press the ERROR RESET or blank button to <i>decrease</i> the air blast time by 20 milliseconds. <ol style="list-style-type: none"> 5. Press the MODE button to exit the AIR BLAST TIME ADJUSTMENT Mode.

Figure 11

Depressing the foot switch enables the APT to complete one cycle of operation. The terminator cannot be cycled again until the foot switch is released. Once a cycle is in progress, it must be completed before another cycle can occur.

2.3. Functional Description

For a description of the terminator's pneumatic functions, refer to Figure 9.

3. RECEIVING INSPECTION AND INSTALLATION

3.1. Receiving Inspection

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

1. Carefully uncrate the terminator and place it on a sturdy bench or table with proper light to permit a careful examination.
2. Thoroughly inspect the entire terminator for evidence of damage that may have occurred in transit. If it is damaged in any way, file a claim against the carrier and notify Tyco Electronics immediately.
3. Check all components to be certain that they are secure.
4. Check all wiring for loose connections, cuts, or other possible causes of electrical short circuits.
5. Inspect all pneumatic lines for evidence of loose connections and cuts that may cause leakage.

NOTE

It is important that this manual and other documents (such as drawings and parts lists), as well as any enclosed product samples, remain with the terminator for the benefit of personnel responsible for installation, operation, and maintenance.

3.2. Considerations Affecting AMPLIVAR Product Terminator Placement

The location of the terminator 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 the foot switch, if one is used.

DANGER

If machine is mounted to APT Base 679984-1, be sure to bolt the machine base to the table.

Bench

A sturdy bench, 711 to 762 mm [28 to 30 in.] high, aids comfort by allowing the operator's feet to rest on the floor. The operator's weight and leg position can be easily shifted. The bench should have rubber mounts to reduce noise. 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.

AMPLIVAR Product Terminator Location on Bench

The terminator should be located near the front of the bench and the tooling area (the area where product is applied) should be 152 to 203 mm [6 to 8 in.] from the front edge. Access to the back of the machine must be provided.

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.

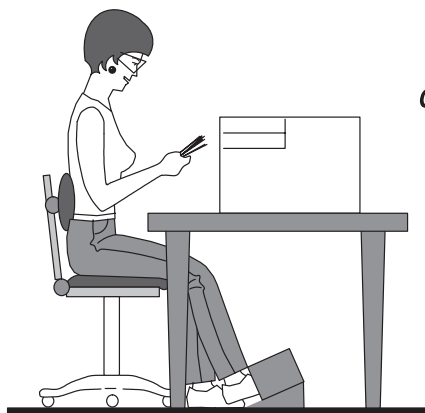
In use, the chair should be far enough under the bench so that the operator's back is straight and supported by the back rest.

Foot Switch

When the operator is correctly positioned in front of the terminator, the foot should rest on the switch comfortably and easily. The switch should be placed on a rubber mat. This allows the switch to be movable and permits the operator to shift positions to minimize fatigue. At the same time the mat prevents the switch from sliding unintentionally.

The preference for locating the switch varies among operators. Some like the switch located so that their foot rests on the switch when their legs are in the natural sitting position (calf perpendicular to the floor). Others prefer it slightly in front of the natural position. It is important that the foot be approximately 90° to the calf when resting on the switch. Those who prefer the switch slightly forward may require a wedge-shaped block placed under it.

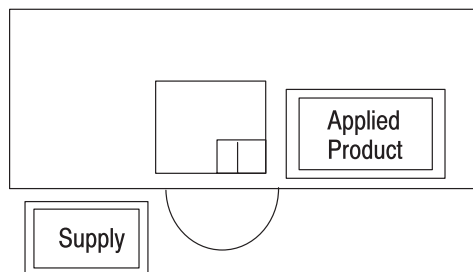
The figures below show proper location and position for foot and switch, and a typical layout for the efficient handling of materials.



GOOD

Physical considerations as recommended and the operator in a desirable position. 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.

Proper Position, Adjustments, and Locations



A typical plan view to illustrate the convenience of handling materials afforded by the proper setup.

Materials Locations — Plan View

Figure 12

3.3. Installation

The terminator assembly can be used in several different configurations, with and without a Crimp Quality Monitor. Refer to the appropriate Crimp Quality Monitor (CQM) manual for installation instructions.

4. APT SETUP PROCEDURES

This section contains procedures for setting up and checking the AMPLIVAR Product Terminator prior to production operation. Proper terminator setup will assure that all alignments and adjustments are correct in order to produce terminations of the proper crimp height for the type of terminal and size wire being used. If procedures are not carried out in detail, especially following the initial installation of the machine, damage may result to the tooling.

Also included in this section is the manual cycling procedure. Note that this procedure is referenced throughout this manual.

4.1. Pre-Loading Alignment Check



To avoid personal injury while setting up and loading the machine, be sure the electrical plug and air supply are disconnected. Accidentally cycling the APT could cause personal injury.



Perform this procedure ONLY when specified within another procedure, and ONLY in the proper sequence. Otherwise, damage to the tooling may result due to misalignment and/or wrong adjustments.



To avoid tooling damage, be sure electrical and air supply are disconnected before starting this procedure. In addition, be sure the crimp height dial is set at "0," as described in Paragraph 6.1.

1. Remove the machine cover.
2. Slowly pull the lower arm of the bellcrank away from the front of the machine and closely observe the shear and crimper assembly as it nears the anvil. If the shear and crimper assembly are not aligned, stop pulling the bellcrank arm and make any necessary adjustments before proceeding. See the Tooling Alignment Procedure, Paragraph 4.2.
3. Install the machine cover.

4.2. Tooling Alignment Procedure



*This procedure is necessary whenever the anvil holders are replaced, and any time the screws securing the anvil holders are loosened. The alignment procedure is **not** required when replacing just the anvils or the crimpers. **Be sure** the ram is adjusted to the correct crimp height for the tooling and application before performing the tooling alignment procedure.*



To avoid personal injury, be sure the electrical and air supply are disconnected before starting this procedure. Accidentally cycling the APT could result in personal injury.



Extending the ram under air power when a terminal is not in place may damage the crimp tooling. Perform the ram extension manually for tooling alignment.

1. Remove anvil guard, ram guard, and the machine cover by removing screws securing each to the APT frame.
2. Remove the three screws securing the anvil holder to the frame. See Figure 13.
3. Remove the retaining plate from the anvil holder and replace the anvils. Re-attach the retaining plate so that it holds the anvils to the anvil holder. Install the three screws to the anvil holder without tightening them.
4. Move the anvil holder until the product guide is against the slug blade and place one thickness of paper over the anvils.
5. Slowly advance the ram by pulling the lower arm of the bellcrank away from the front of the machine until it stops. At this point, the ram linkage should have fully extended the crimper over the anvils, and the paper will help to center the anvils under the crimper.
6. Tighten the three screws securing the anvil holder to the frame.

7. Retract the ram by pushing the lower arm of the bellcrank toward the front of the machine until it stops.
8. Remove the paper that was placed over the anvil.
9. Replace the anvil guard and ram guard on the terminator frame.
10. Replace the machine cover.

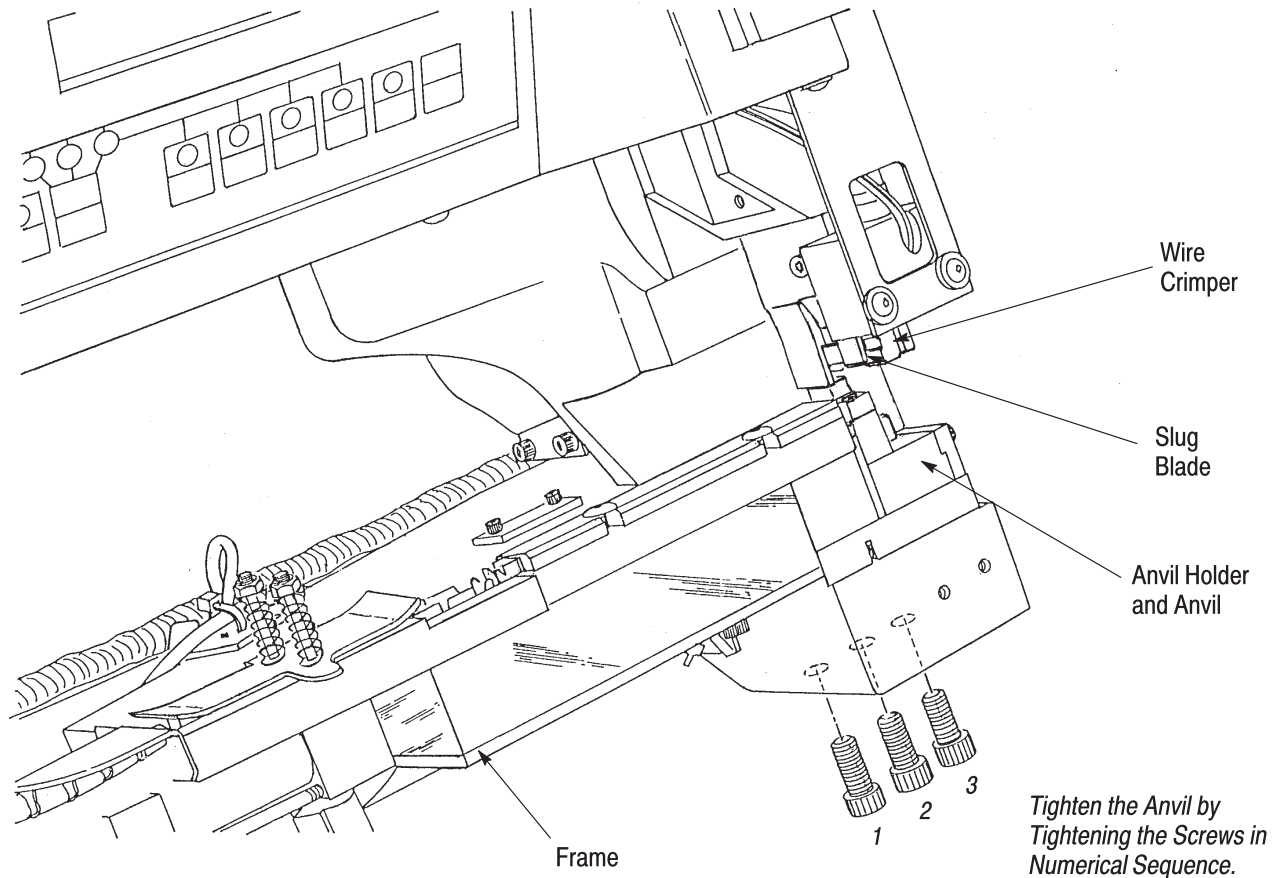


Figure 13

4.3. Terminal Strip Loading



To avoid personal injury, be sure the electrical plug and air supply are disconnected. Accidentally cycling the APT could cause personal injury.

1. Place a reel of the correct type of terminals on the reel support so the terminal strip enters the groove in back of the feed plate with the open "U" toward the back of the terminator.
2. Push the drag tab away from the feed plate and feed the terminal strip through strip guide and the groove in the feed plate until the first terminal passes the feed finger.
3. Pull back slightly on terminal strip to ensure feed finger is indexed against first terminal.

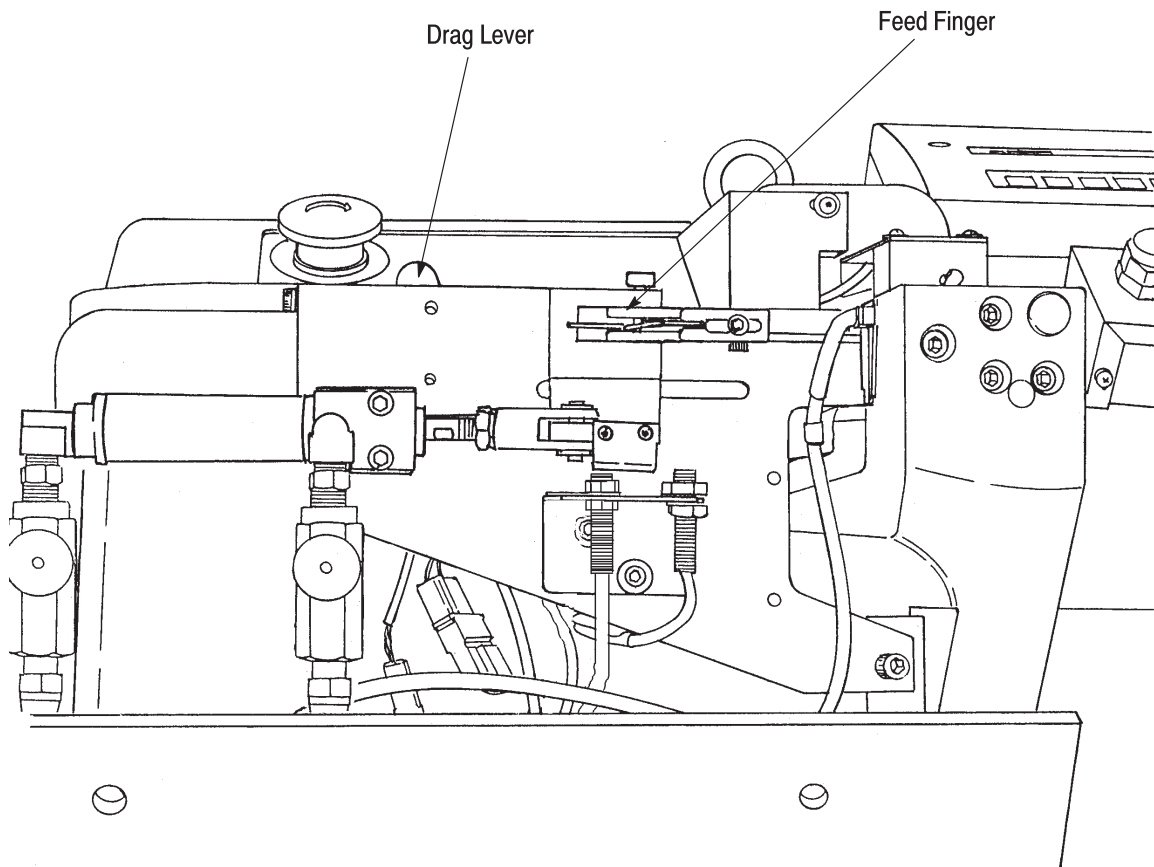


Figure 14

4.4. APT Checkout

A. Terminal Strip Feed Check

1. With terminal strip loaded into the APT, as described in Paragraph 4.3, disengage and hold the feed finger (Figure 14) while checking the drag on the terminal strip. The drag must be adjusted so that it applies enough pressure to prevent pullback of the strip by the feed finger. If adjustment is required, refer to Paragraph 6.2. After checking the drag, reposition the first terminal as described in Paragraph 4.3.

NOTE

Perform the following procedure in the MANUAL mode.



2. Connect the electrical plug and air supply.
3. Depress the POWER pushbutton (see Figure 10). The indicator lamp above the pushbutton will light.
4. Enter the Manual mode by pressing the MODE push button.
5. Depress and release the FEED button. The terminal strip should advance one terminal length.
6. Continue to depress and release the FEED button until the **first** terminal is centered on the anvil. If the terminal DOES NOT stop directly centered on the anvil, adjust feed as described in Section 6.
7. At completion of this check, perform the ram cylinder/ram linkage and switch check as described in Paragraph 4.4,B.

B. Ram Cylinder/Ram Linkage and Switch Check

1. Remove terminator cover by removing screws and washers.

DANGER



To avoid personal injury, KEEP HANDS CLEAR of terminator interior while performing this check.

CAUTION



Terminal must be in position over anvil when ram is cycled under power or tooling damage may occur.

2. Connect the electrical plug and air supply. Depress the POWER pushbutton "ON", to ensure the retraction side of the ram cylinder is pressurized.
3. Check Ram Rest Switch S5 (Figure 7), on ram retaining plate, to be sure it is actuated "closed." If necessary, adjust the switch as described in Section 6.
4. Enter the JOG mode by depressing the MODE pushbutton.
5. Place wire in the tooling area as shown in Figure 15 (the total Circular Mil Area of the wire should be within the CMA range of the terminal being crimped).
6. Jog the terminator by depressing the foot switch until ram is fully extended, as described in Figure 9.
7. Check Ram Extended Switch S6 (Figure 7), on ram return switch bracket (Item 50), to be actuated "closed" by bellcrank. If necessary, adjust the switch as described in Section 6.
8. Replace terminator cover.
9. Perform automatic crimping check as described in Paragraph 4.4,C.

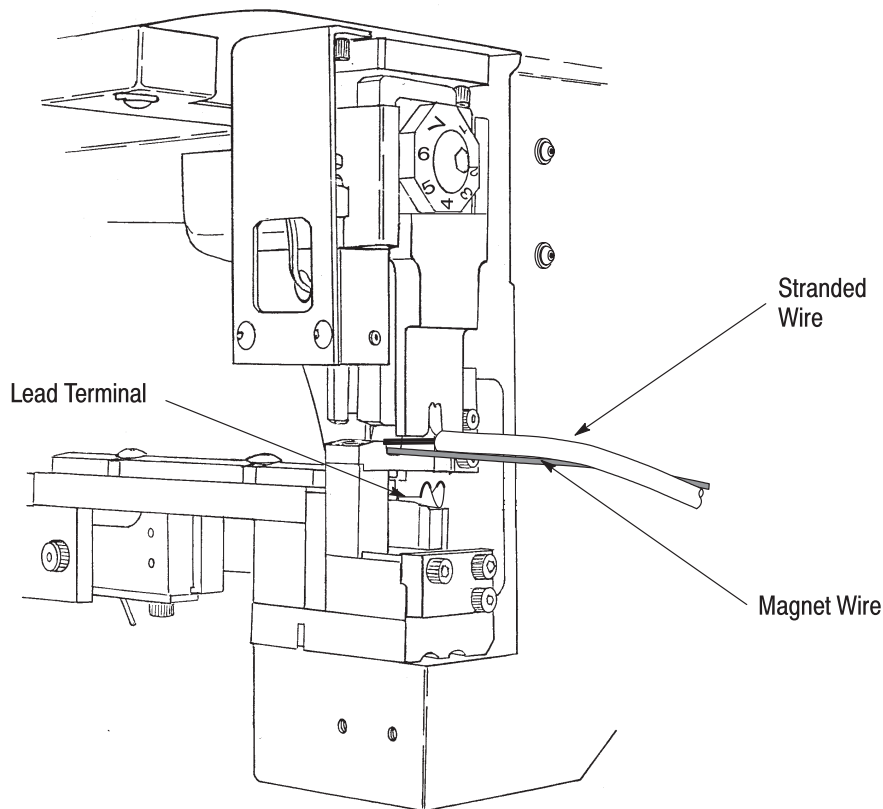


Figure 15

C. Automatic Crimping Check

1. Connect the electrical plug and air supply.
2. Depress the POWER button (see Figure 11). The indicator lamp above the pushbutton will light. (The terminator will be in the Run mode.)
3. Place wire in the tooling area as shown in Figure 15, (the total Circular Mil Area of the wire should be within the CMA range of the terminal being crimped).



Be sure the terminal is in position over the anvil when the machine is cycled under power, or tooling damage may occur.

4. Depress the foot switch to cycle the machine.

Terminations must conform to the requirements set forth in Paragraph 4.5. If necessary, make any adjustments that may be required, as described in Section 6.

If the terminations obtained from the automatic crimping check conform to all requirements, the terminator is ready for production operation as described in Section 5. If the terminator is not to be operated immediately, depress the POWER button, then disconnect the electrical plug and air supply.

4.5. Termination Inspection

All terminations produced by the APT must conform for quality and crimp height as follows:

1. Inspect the termination for conformance to the requirements set forth in Figure 16.

1. This area must be bellmouth in shape.
2. The sheared end must be cleanly cut off.
3. The wires must extend through the crimped splice.
4. The magnet wire must lie in the bottom of the splice.
5. When two magnet wires are used, they should lie side by side.

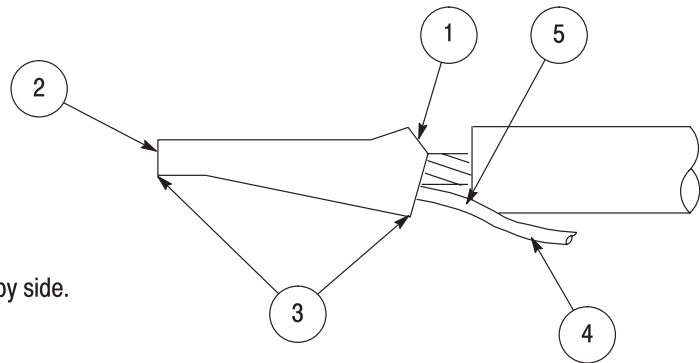


Figure 16

2. Using a crimp height comparator as shown in Figure 17, measure the crimp height of the termination as shown in Figure 18. The crimp height must be within ± 0.08 mm [.003 in.] of the measurement specified for the type terminal and size wire being used, as obtained from your Tyco Electronics Field Service Engineer.

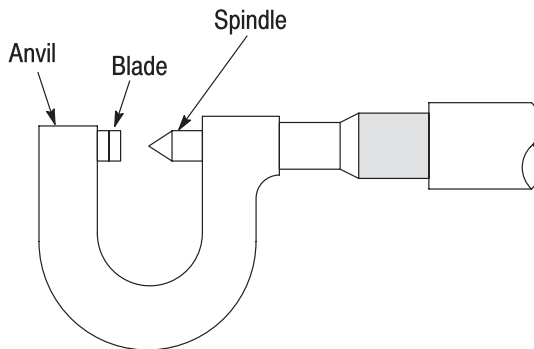


Figure 17

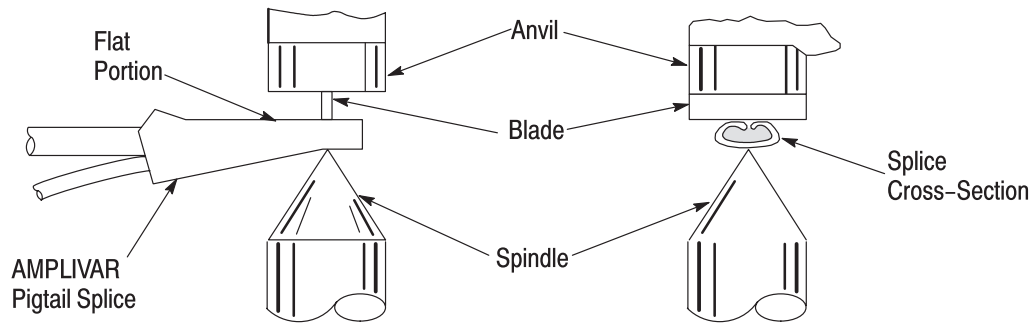


Figure 18

Tyco Electronics recommends the use of a modified micrometer. It is recommended that the customer contact a local tooling distributor to obtain a crimp height micrometer. A typical micrometer used by Tyco Electronics is the Mitutoyo Micrometer (Series 342).

5. APT PRODUCTION OPERATION

Before placing the terminator in production operation, be sure it has been properly setup and checked out according to procedures in Section 4. Operate the APT as described.

1. Connect the terminator to the air supply.
2. Plug the electrical plug into the electrical outlet. *Be sure all guards and covers are in place.*



Never operate the APT without a terminal over the anvil and wires in the “target area.”

3. Depress the POWER pushbutton (See Figure 11). The indicator above the POWER pushbutton will light.



Personnel who have not previously operated the APT should manually cycle it several times while observing the operation and travel of the feed finger and ram before proceeding.

4. Place wires in the “target area,” aligned with the terminal. See Figure 15. When using stranded wire and magnet wire, position as shown in Figure 15. When splicing two magnet wires, they may be in any position with respect to each other. The crimp tooling will automatically position them side-by-side in the bottom of the terminal as crimping occurs.
5. With wires in position, depress the foot switch. The terminator will cycle only once, regardless of how long the foot switch is held down.
6. At periodic intervals during production operation, perform the termination inspection described in Paragraph 4.5.
7. At completion of production operation, depress the POWER pushbutton. Disconnect the electrical plug and air supply.

6. ADJUSTMENTS

The following procedures may be necessary when adjusting the terminator, during production operation, or following the replacement of parts.

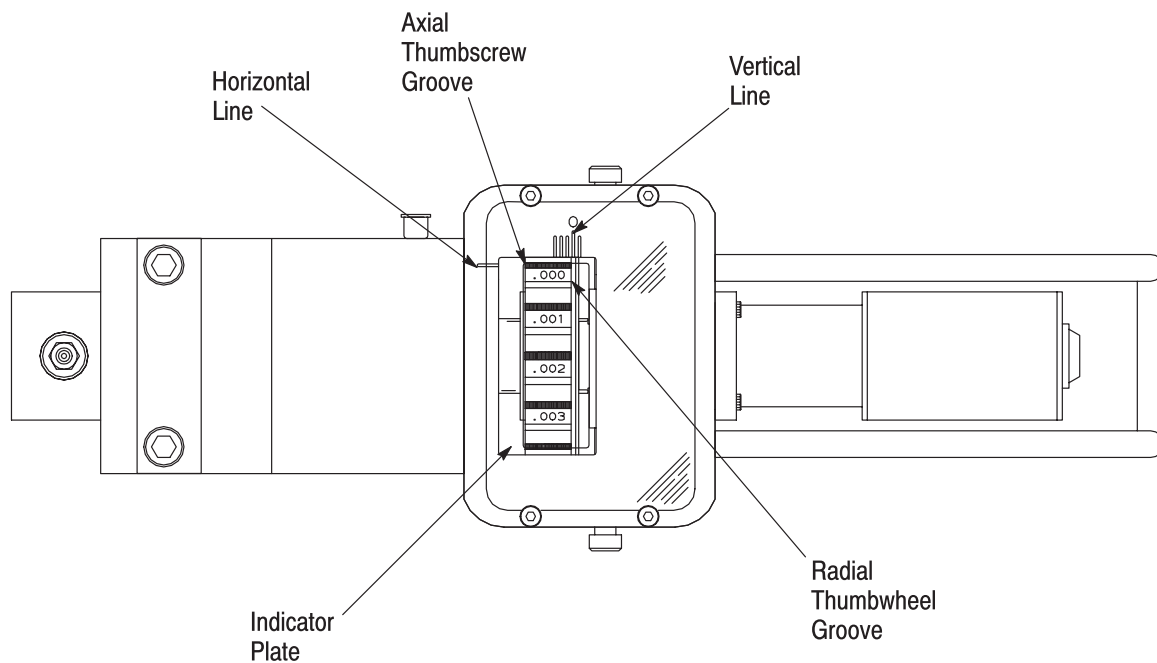


Figure 19

6.1. Crimp Height Adjustment

A. Wire Crimp Height Adjustments

Wire crimp adjustments may be necessary to produce actual desired wire crimp height. Aligning the vertical line of the indicator plate with the radial thumbwheel groove, and the horizontal line of the indicator plate with the axial thumbwheel zero groove will produce a maximum crimp height for for all products. See Figure 19 .

Each vertical line on the indicator plate represents one thumbwheel revolution, or .406 mm [.016 in.] adjustment.

1. To *decrease* crimp heights, turn the thumbwheel clockwise. Note that these are tooling increments, which may not reflect the actual crimp height changes.
2. To *increase* crimp heights, turn the thumbwheel counterclockwise. Note that these are tooling increments, which may not reflect the actual crimp height changes.

B. Insulation Crimp Height Adjustments

DANGER



To avoid personal injury, be sure electrical plug and air supply are disconnected while performing the following adjustment. Accidentally cycling the APT could cause personal injury.

Insulation crimp height adjustments may be performed to produce the desired insulation crimp height. Loosen the crimper mounting screw and rotate the insulation disc to the appropriate position. While holding the insulation crimper against the insulation disc and the wire crimper against the upper pocket in the ram, tighten the crimper mounting screw. See Figure 6.

NOTE



There are eight insulation crimp height settings. Setting "1" (against the insulation crimper) produces the highest crimp height, while setting "8" produces the lowest crimp height. Moving the disc one increment will move the insulation crimper approximately .254 mm [.010 in.].

NOTE



A change to the wire crimp height will produce an equal change to the insulation crimp height. Be sure the wire crimp height is established before adjusting the insulation crimp height.

6.2. Feed Adjustments (Figure 20)

A. Feed Finger Positioning

1. If necessary, load terminator with terminal strip as described in Paragraph 4.3.
2. Connect electrical plug and air supply, then depress the POWER button and the MODE button (so that the terminator is in the Manual Mode).
3. Repeatedly depress and release the FEED button to advance the lead terminal until it is centered on the anvil in the “target area.”
4. Visually determine if terminal strip is being overfed or underfed by the feed finger.
5. To adjust, loosen locknut on feed cylinder shaft, then turn feed cylinder shaft IN or OUT of feed cylinder clevis, as required, to center terminal on anvil. While making adjustment, pull back on terminal strip to hold feed point against feed finger.
6. At completion of adjustment, tighten locknut to secure cylinder shaft in feed cylinder clevis.

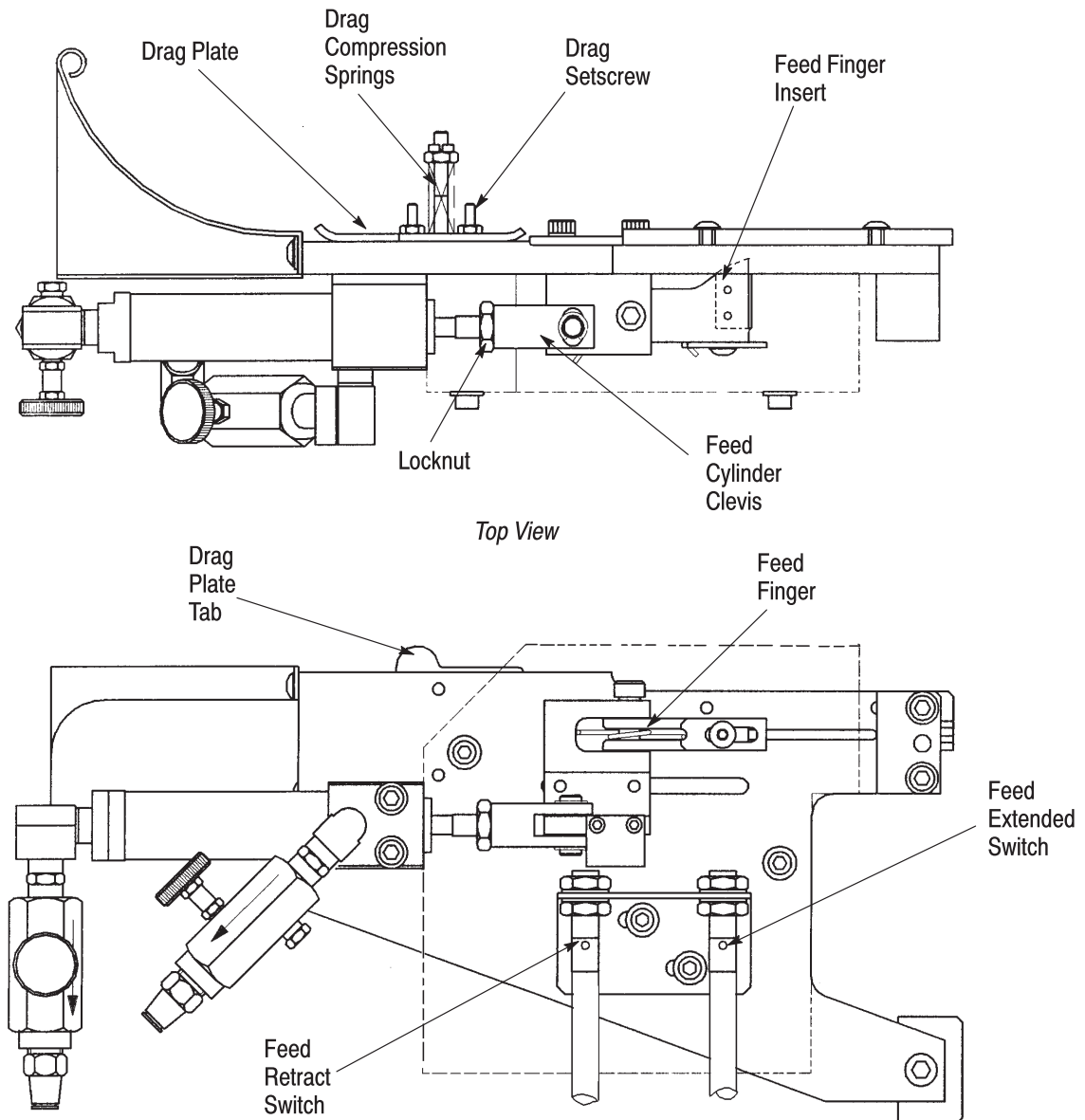


Figure 20

7. Center the terminal over the anvil as follows:
 - a. Loosen the three screws that mount the terminal feed assembly to the frame of the machine;
 - b. Adjust the assembly so that the terminal is centered over the anvils; and
 - c. Tighten the feed assembly mounting screws.
8. Perform at least two actual crimps and visually examine the crimped terminals for equal cutoff tabs.
9. Repeat Steps 3 through 7 until the cutoff tabs are equal and the feed is adjusted.

B. Flow Control Valves

The flow control valves, located on both sides of the feed cylinder, should be adjusted in such a manner as to slow the feed finger advancement/retraction and prevent it from “slamming” at the end of stroke. This also helps prevent overfeeding.

To adjust the speed, turn the valve adjustment:

- IN to slow the cylinder action;
- OUT for faster action.

NOTE



It is not necessary for the speed to be fast. Normally, the operator cannot remove a completed termination and insert wires for the next termination before another terminal is in position.

C. Terminal Strip Drag

The drag must apply sufficient pressure to the terminal strip to prevent pullback of the strip by the feed finger when it is retracted to pick up the next feed point. If necessary, adjust as follows:

1. Increase or decrease drag pressure by compressing or releasing the drag compression springs. The flex nuts, which contain the spring, should be in the same relative position on the drag stud, in order to balance spring pressure.
2. The two drag setscrews, in the drag, are to hold the drag away from the feed plate and assist in the installation of terminals. The setscrews must not be set so that they inhibit terminal drag.

NOTE



When installing terminals, pull the drag plate away from the feed plate.

6.3. Adjustment of Ram and Feed Switches (Items 60, Assembly Drawing 354000)

Connect the electrical plug and air supply, then depress the POWER button. Select MANUAL mode using the MODE button. This will display the APT inputs on the screen. Shaded circles indicate that the switch is actuated.

APT inputs are read left-to-right as follows:

1. Terminator cycle foot switch;
2. Wire stuffer foot switch;
3. Ram extend;
4. Ram retract;
5. Feed extend;
6. Feed retract;
7. Wire stuffer extend;
8. Wire stuffer retract;
9. Emergency Stop monitor.

A. Ram Extend Switch

CAUTION

A terminal must be located over the anvil when extending the ram, or tooling damage may occur.



1. Depress RAM pushbutton to extend ram.
2. Check appropriate input for switch actuation.
3. To adjust switch actuation, loosen nuts. Move switch toward cylinder clevis until input is indicated on the display.
4. Tighten nuts to secure.
5. Depress RAM button to retract ram.

B. Ram Retract Switch

1. Check appropriate input for switch actuation.
2. To adjust, loosen nuts. Move switch toward cylinder clevis until input is indicated on the display.
3. Tighten nuts to secure.

NOTE

Remove product prior to extending the ram, to prevent jamming of the terminal.



C. Feed Extend Switch

1. Check appropriate input for switch actuation.
2. Loosen both switch plate securing screws.
3. Move the switch plate toward the switch actuator until the input is indicated on the display.
4. Loosen the proximity switch nuts and move the switches if necessary.
5. Tighten the proximity switch nuts and the switch plate screws.

D. Feed Retract Switch

1. Depress the FEED button to retract the ram.
2. Check appropriate input for switch actuation.
3. Loosen both switch plate securing screws.
4. Move the switch plate toward the switch actuator until the input is indicated on the display.
5. Loosen the proximity switch nuts and move the switches, if necessary.
6. Tighten the proximity switch nuts and the switch plate screws.

7. PREVENTIVE MAINTENANCE

Preventive maintenance consists of cleaning, inspection, and lubrication. A scheduled maintenance program should be established. It is very important that the “target area” be kept clean at all times to ensure proper termination.

Remove terminator cover while performing the following procedures.

DANGER

To avoid personal injury, be sure electrical plug and air supply are disconnected while performing preventive maintenance procedures. Accidentally cycling the APT could cause personal injury.



7.1. Cleaning

1. Clean the entire APT with a clean, dry cloth.
2. Remove all evidence of metal chips and other contamination using a vacuum cleaner, brush, or air hose.



Compressed air used 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.

3. Remove any evidence of grease from unlubricated area and nonmoving parts by using an appropriate solvent or similar cleaning fluid.

7.2. Inspection

1. Inspect terminator to be sure all parts are secure. Make any repairs necessary to prevent a malfunction.
2. Inspect the APT for evidence of excessive wear. Replace any unserviceable parts.
3. Inspect all electrical wiring for evidence of broken insulation, chafing, and/or loose connections. Make any repairs that may be necessary by referring to the electrical schematic and wiring drawing shipped with the terminator.
4. Inspect all air lines for loose connections. Make any necessary repairs by referring to the pneumatic diagram. See Paragraph 2.3, Functional Description.
5. Inspect the filter for excessive condensation. Drain and clean the filter if necessary.

7.3. Lubrication (Figure 21)

1. Remove plugs from APT frame.
2. Lubricate grease fittings, through holes in the frame, using a grease gun containing a general purpose grease.
3. Lubricate the feed finger slide with SAE 30 oil.
4. Lubricate the threads of the precision adjustment screw.
5. Lubricate adjuster yoke slide area with SAE 30 oil.
6. Remove all excess lubrication, then replace plugs in the frame.
7. Lubricate every 150,000 cycles.

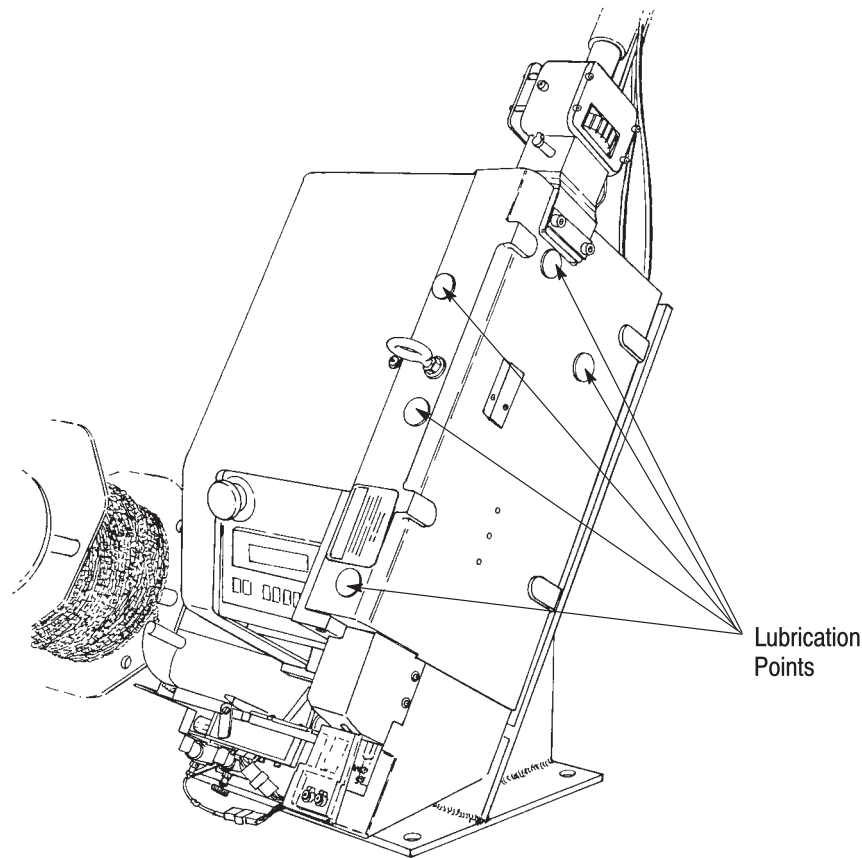


Figure 21

8. REPAIR AND/OR REPLACEMENTS

The APT can be disassembled using the procedures in this section and the terminator assembly drawings.

Procedures within this section primarily pertain to the replacement of parts that are considered to be recommended spares and should be stocked by the customer.

NOTE



Procedures described in this section pertain to the replacement of parts that are considered to be recommended spare parts, to be stocked by the customer.

DANGER



To avoid personal injury while making repairs or replacements, be sure the electrical plug and air supply are disconnected. Accidentally cycling the APT could cause personal injury.

Refer to Figure 22 for a tooling matrix.

8.1. Slug Blade Replacement

1. Remove the anvil guard and the ram guard.
2. Remove the two screws in the slug blade and remove the slug blade from the ram. Note the orientation of parts for replacement purposes.
3. Install the new slug blade so that it is seated against the bottom of the slot in the ram.
4. Perform the Pre-Loading Alignment Check as described in Paragraph 4.1.
5. Install the anvil guard and the ram guard.

8.2. Crimper Replacement

1. Remove the screws securing the ram guard and remove the ram guard.
2. Remove the screws from straw stop.
3. Remove the button head screw to remove the insulation crimper, wire crimper, insulation disc, and spacer (if used). Pull the crimpers from the ram, with the loose straw stop.
4. Install replacement crimpers with the straw stop between them. The wire crimper must be against the bottom of the slot in the ram and the insulation crimper must be against the appropriate surface of the insulation disc. Install the straw stop to wire shear.
5. Perform the Pre-Loading Alignment Check as described in Paragraph 4.1.
6. Install the ram guard.

8.3. Anvil Replacement

1. Remove anvil guard by removing screws.
2. Remove the retainer plate to replace anvils.
3. Install anvils and then retainer plate so that anvils are held down on the anvil holder.
4. Perform the Tooling Alignment Procedure, as described in Paragraph 4.2.
5. Install the anvil guard.

8.4. Feed Finger Insert Replacement

1. Remove the two flat head screws from the feed finger and replace the feed finger insert.
2. Attach the feed finger insert with the two flat head screws.
3. Loosen the self-locking nut and remove the screw and compression spring; then remove the feed finger from holder.
4. If necessary, install pin in the new feed finger. Install the feed finger using the reversed removal procedure.
5. Perform the feed adjustments as described in Paragraph 6.2.

8.5. Pneumatic System Repairs

When making repairs to the pneumatic system, refer to Pneumatic Diagram 354138 (Paragraph 2.3.).

8.6. Electrical System Repairs

To make repairs to the terminator system, refer to the APT schematic and electrical drawings. If the ram switches are replaced, refer to Paragraph 6.3 for making the proper adjustments.

8.7. Product Hold Down Replacement (See Figure 6)

1. Remove product hold down by removing two screws.
2. Manually lower ram and install new product hold down to the feed plate so the shear edge is against the shear blade.
3. Perform the Pre-Loading Alignment Check as described in Paragraph 4.1.

Tooling Matrix

D-C TOOLING ASSEMBLY	PRODUCT REF (CRIMP WIDTH)		MAXIMUM CRIMP HEIGHT	DIRECT CONNECT TOOLING ASSEMBLY VARIABLES						
				FRONT SHEAR	WIRE SHEAR	SLUG BLADE	CRIMPER SPACER	WIRE ANVIL	WIRE CRIMPER	INSULATION ANVIL
768684-1	63455	3.5 [.140]	2.4 [.094]	768687-1	768689-1	768703-1	768702-1	768690-1	768700-1	768741-1
768684-2	63454	2.7 [.110]	1.8 [.073]	768687-1	768689-1	768703-1	768702-1	768690-2	768700-2	768741-2
768684-3	63453	2.3 [.090]	1.4 [.054]	768687-1	768689-1	768703-1	768702-1	768690-3	768700-3	768741-3
768684-4	63459	2.7 [.110]	1.9 [.074]	768687-2	354363-1	768703-2	N/A	354021-1	768700-4	354022-1
768684-5	63458	2.3 [.090]	1.3 [.050]	768687-2	354363-1	768703-2	N/A	354021-2	768700-5	354022-2

D-C TOOLING ASSEMBLY	PRODUCT REF (CRIMP WIDTH)		MAXIMUM CRIMP HEIGHT	DIRECT CONNECT TOOLING ASSEMBLY VARIABLES			FEED PLATE ASSEMBLY	FEED PLATE ASSEMBLY VARIABLES	
				INSULATION CRIMPER	PRODUCT GUIDE	STRAW STOP		FEED PLATE	HOLD DOWN
768684-1	63455	3.5 [.140]	2.4 [.094]	768699-1	768686-1	768685-1	768874-1	768716-1	768715-1
768684-2	63454	2.7 [.110]	1.8 [.073]	768699-2	768686-1	768685-1	768874-1	768716-1	768715-1
768684-3	63453	2.3 [.090]	1.4 [.054]	768699-3	768686-1	768685-1	768874-1	768716-1	768715-1
768684-4	63459	2.7 [.110]	1.9 [.074]	768699-4	768686-2	768685-2	768874-2	768716-2	768715-2
768684-5	63458	2.3 [.090]	1.3 [.050]	768699-3	768686-2	768685-2	768874-2	768716-2	768715-2

Figure 22

9. REVISION SUMMARY

Updated format and updated the Tyco Electronics logo