

# 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

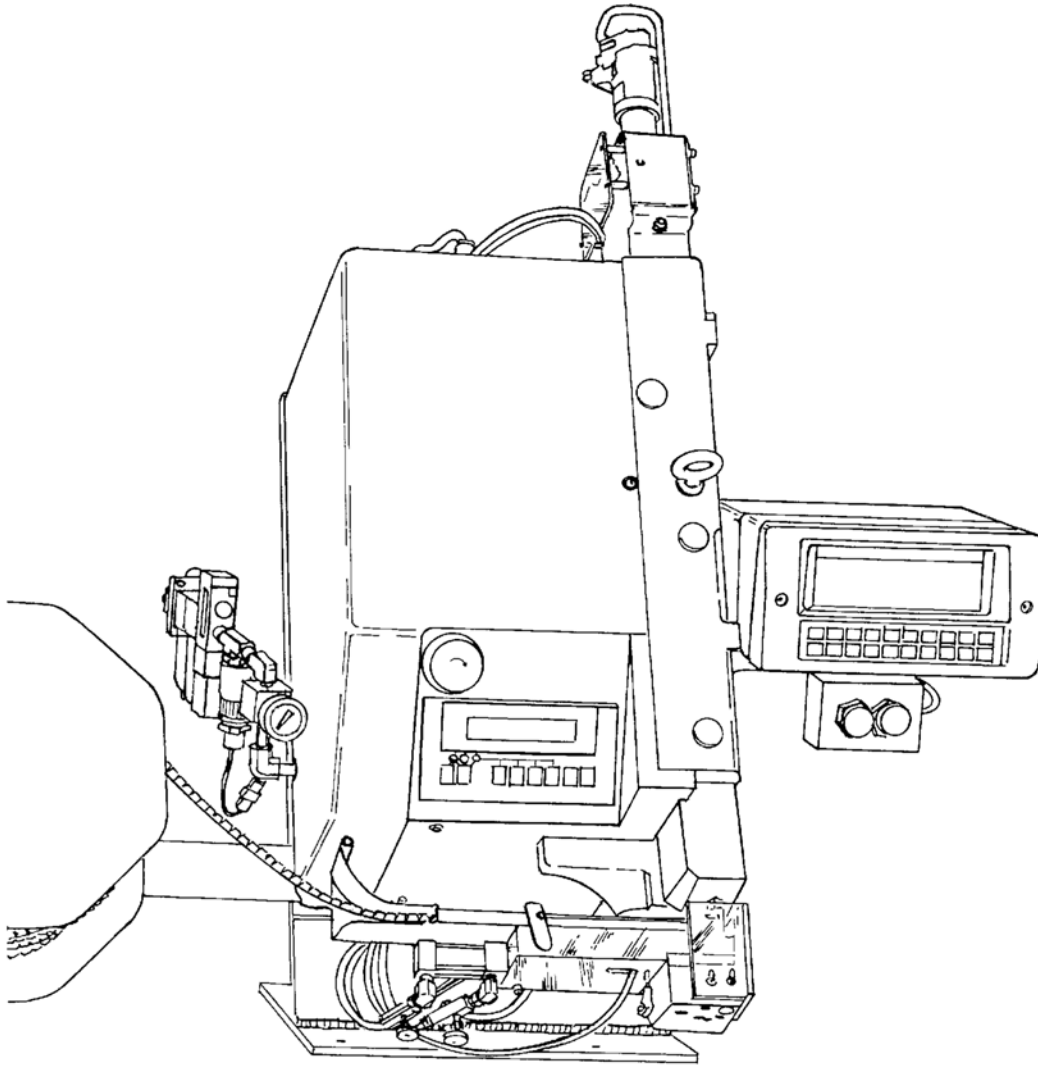


Figure 1

## 1. INTRODUCTION

This manual provides information concerning the setup, operation, and maintenance of the AMPLIVAR Product Terminators (APT) shown in Figure 1. See Figure 2 for APT Product Terminator variations. These terminators apply AMPLIVAR pigtail splices and AMPLIVAR Cluster Pin receptacles to pre-stripped wires and unstripped magnetic wire.

**NOTE**

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



Serrations in the splices cut through the magnet wire insulation to make electrical contact. This eliminates a time-consuming stripping operation. Splices 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 115 Vac, 3 A, 60 Hz, or 230 Vac, 1.5 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.

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

A wire stuffer assembly can be used with this terminator to eliminate the need to change AMPLIVAR splices if the combined circular mil area (CMA) of the wires to be crimped is less than the specified minimum of the splice used

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 procedures;
- 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 a brief revision summary.

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

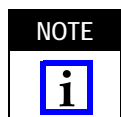
When reading this manual pay particular attention to DANGER, CAUTION, and NOTE statements.



*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 splice. Unlike many standard bench-type crimping machines, the primary crimping motion on the APT occurs in the horizontal plane and not vertically, as in many other Tyco Electronics automatic machines.

APT variations are shown in Figure 2.

APT Model	Splice Terminator Assemblies	Direct-Connect Assemblies	120 Vac	240 Vac	Terminator Description
Model II	679450-[]	679454-[]	Not Used	Not Used	Terminator has precision manual crimp height adjustment.
Model II w/Crimp Quality Monitor	679451-[]	679455-[]	90686-1	90686-3	Terminator is used with the Crimp Quality Monitor and has precision manual crimp height adjustment.
Model IIA	679452-[]	679456-[]	90686-1	90686-3	Terminator is used with the Crimp Quality Monitor and has automatic crimp height adjustment.
Model IIIA	679453-[]	679457-[]	90686-2	90686-4	Terminator is used with the Crimp Quality Monitor and has automatic crimp height adjustment and automatic sequencing.

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, for splicing very short leads.

During production operation, the operator places wire and magnet wire in the barrel of the terminal 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 double-tripping; that is, the foot switch cannot be actuated when a cycle is 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.

The large number of wire combinations that can be joined with AMPLIVAR splices requires some tooling changes, although design features minimize the number of changes required. Refer to Figure 23 for product and tooling cross-references. Only two different feed plates are required to terminate the entire range of splices. Two or three wires may be joined in one splice, 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.

A wire stuffer assembly is also available. This device is used when the customer's wire combination circular mil area (CMA) is less than the minimum published CMA for the AMPLIVAR product being terminated. The wire stuffer provides additional magnet wire CMA to the terminated magnet wire CMA to meet the specified CMA range for a given AMPLIVAR product.

#### **Calculation of 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)**

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.

#### **A. Feed Plate Group (See Figure 4 and Figure 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 air feed 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 terminal strip through the feed plate.

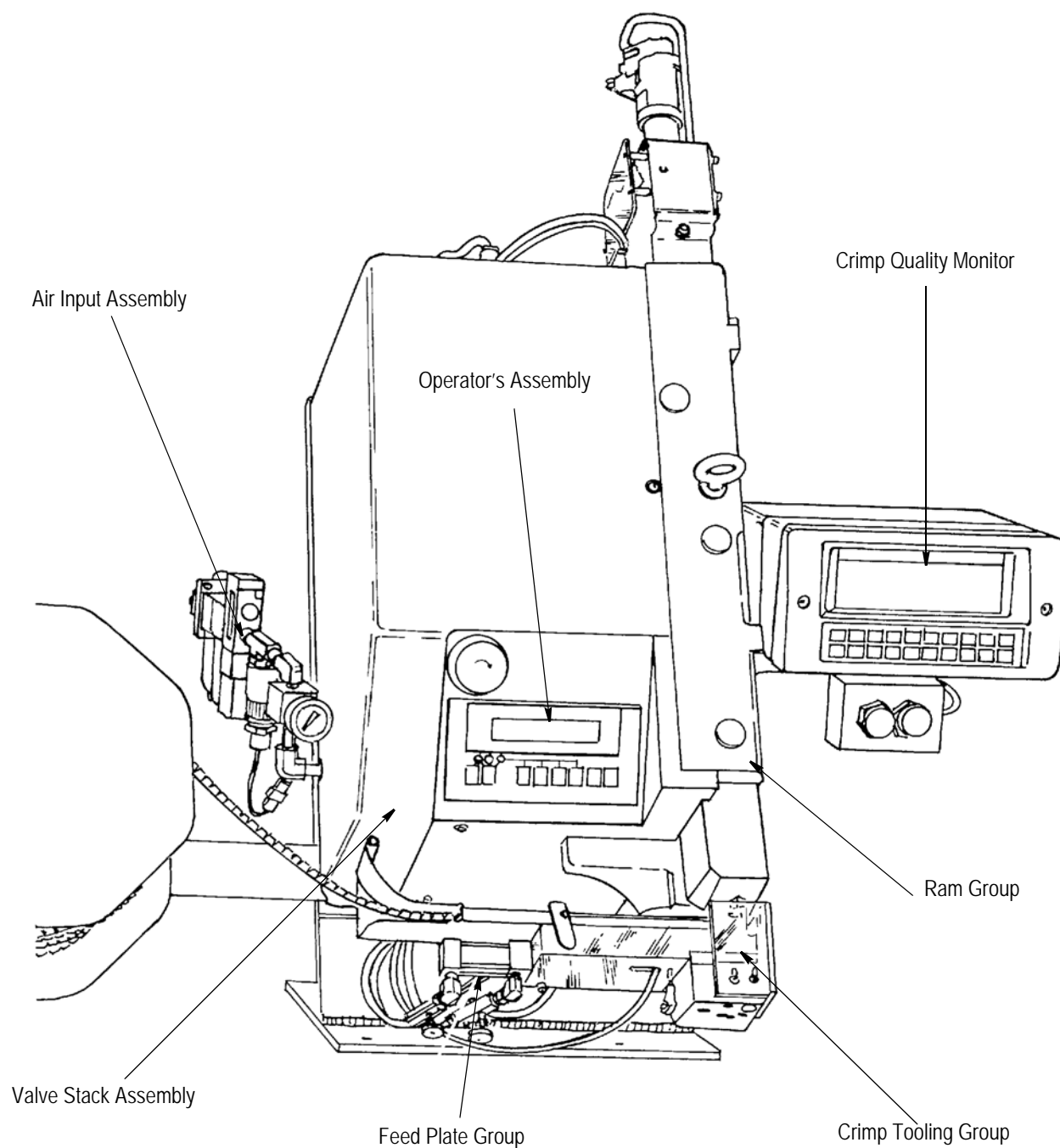


Figure 3

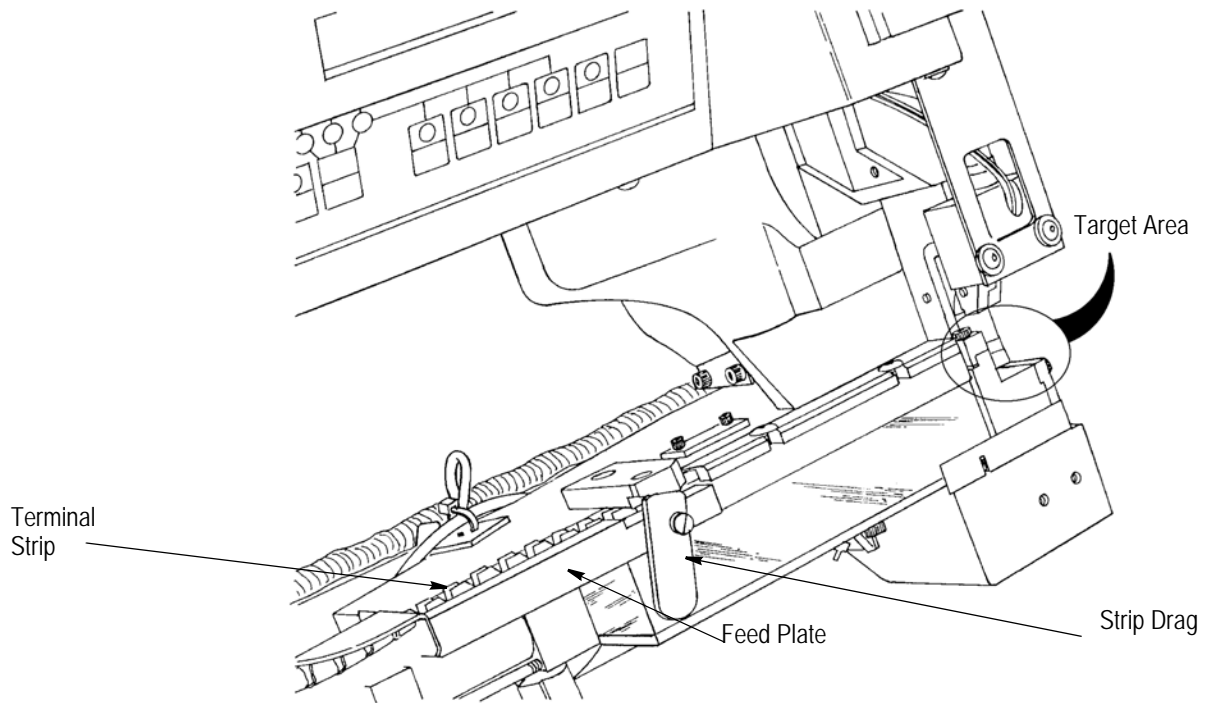


Figure 4

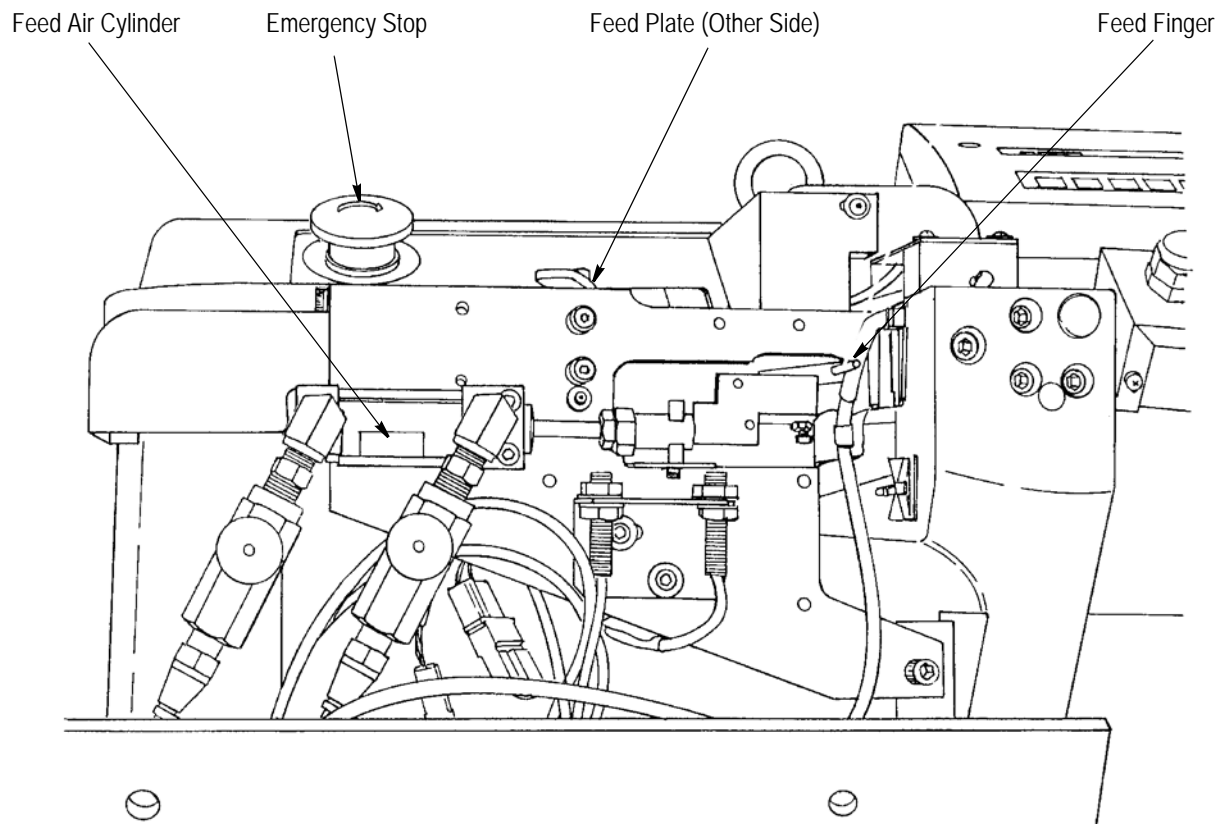


Figure 5



## B. Crimp Tooling Group (See Figure 6)

The crimp tooling group consists of the crimper holder, the shear blade, and the crimper.

The crimper holder is attached to the ram with two screws. The crimper and the shear blade are attached to the crimper holder with two screws. The sides opposite the crimping and shear surfaces must be seated against the crimper holder.

The anvil holder is mounted to the terminator frame. The anvil is held in place in the anvil holder by the stripper guide plate. The guide shear is mounted on the anvil holder and helps ensure that the wire is positioned for a perfect crimp. The crimper guide is engaged with the anvil holder at all times and eliminates crimper-anvil adjustment in ONE DIRECTION.

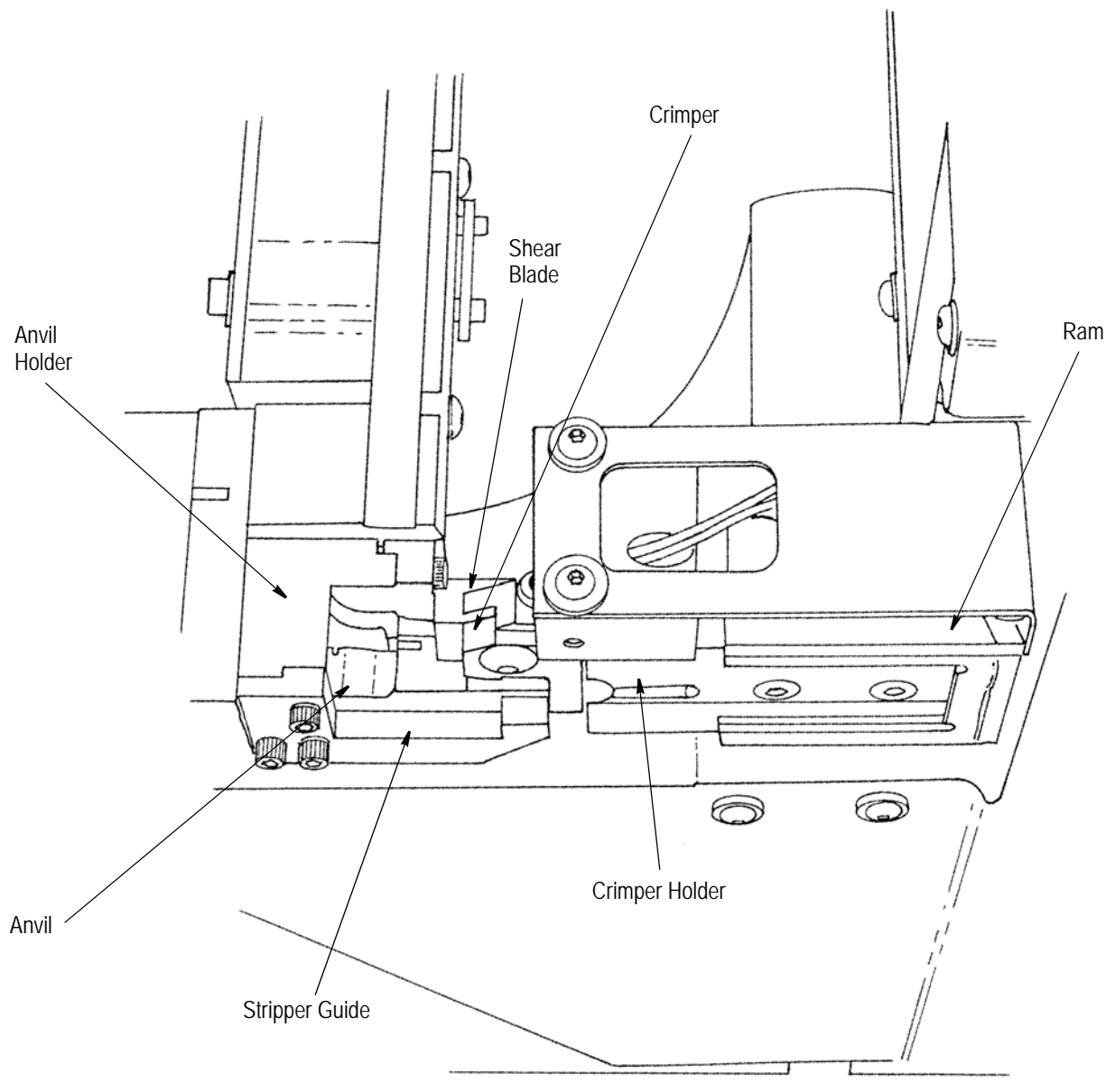


Figure 6



When the ram advances, the shear blade trims the scrap wire and at the same time shears the terminal from the strip. As the ram retracts, the stripper plate strips the crimped terminal from the crimper. As the ram reaches the fully retracted position, a preset blast of air is directed at the anvil to clear scrap wire and chips from the "target area." When the ram is fully retracted, the feed finger extends and the cycle is complete.

### 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 4.3,C for further details on checking the ram stroke.

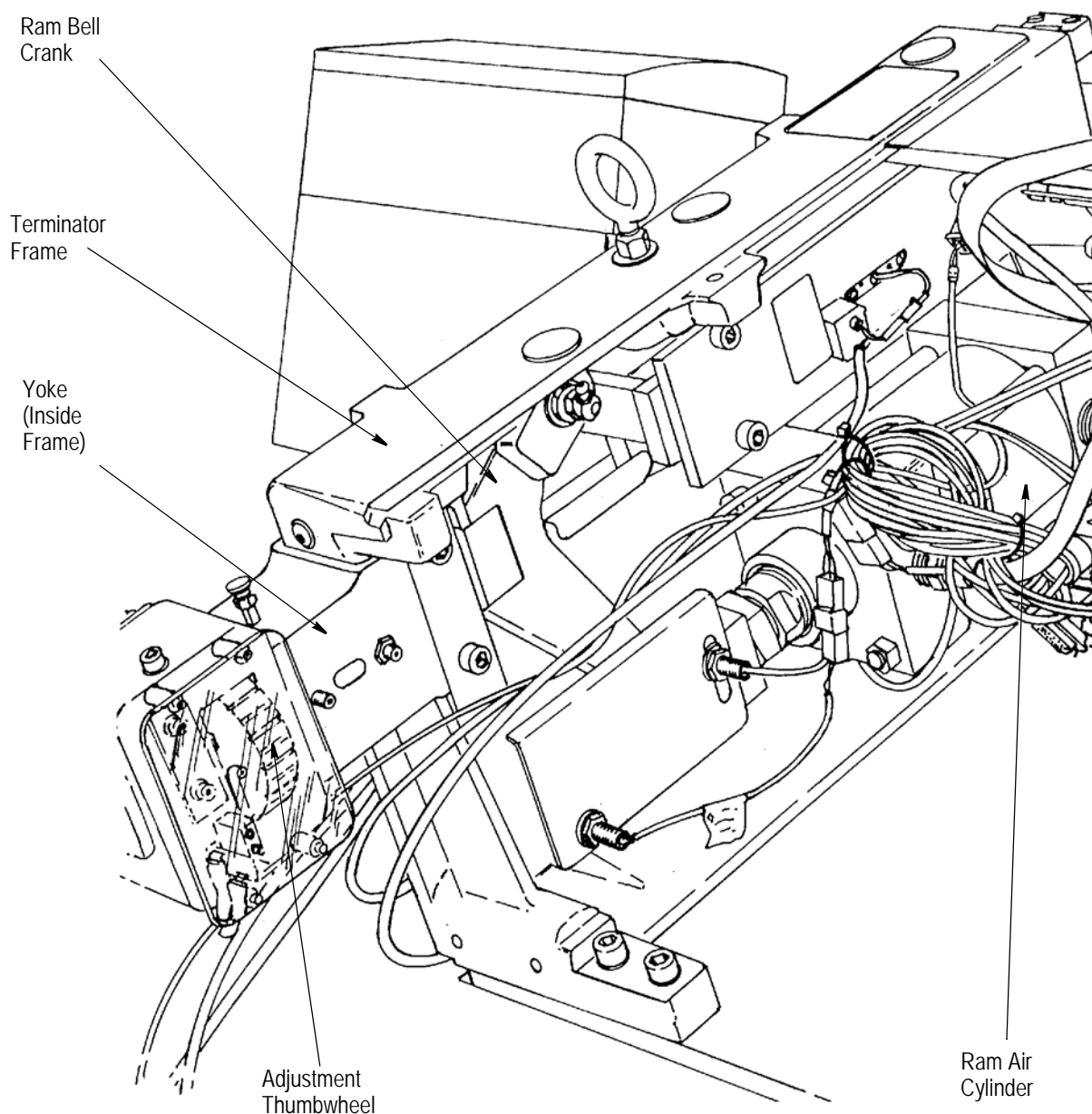


Figure 7

#### D. Air Input and Valve Stack Assembly (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 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.

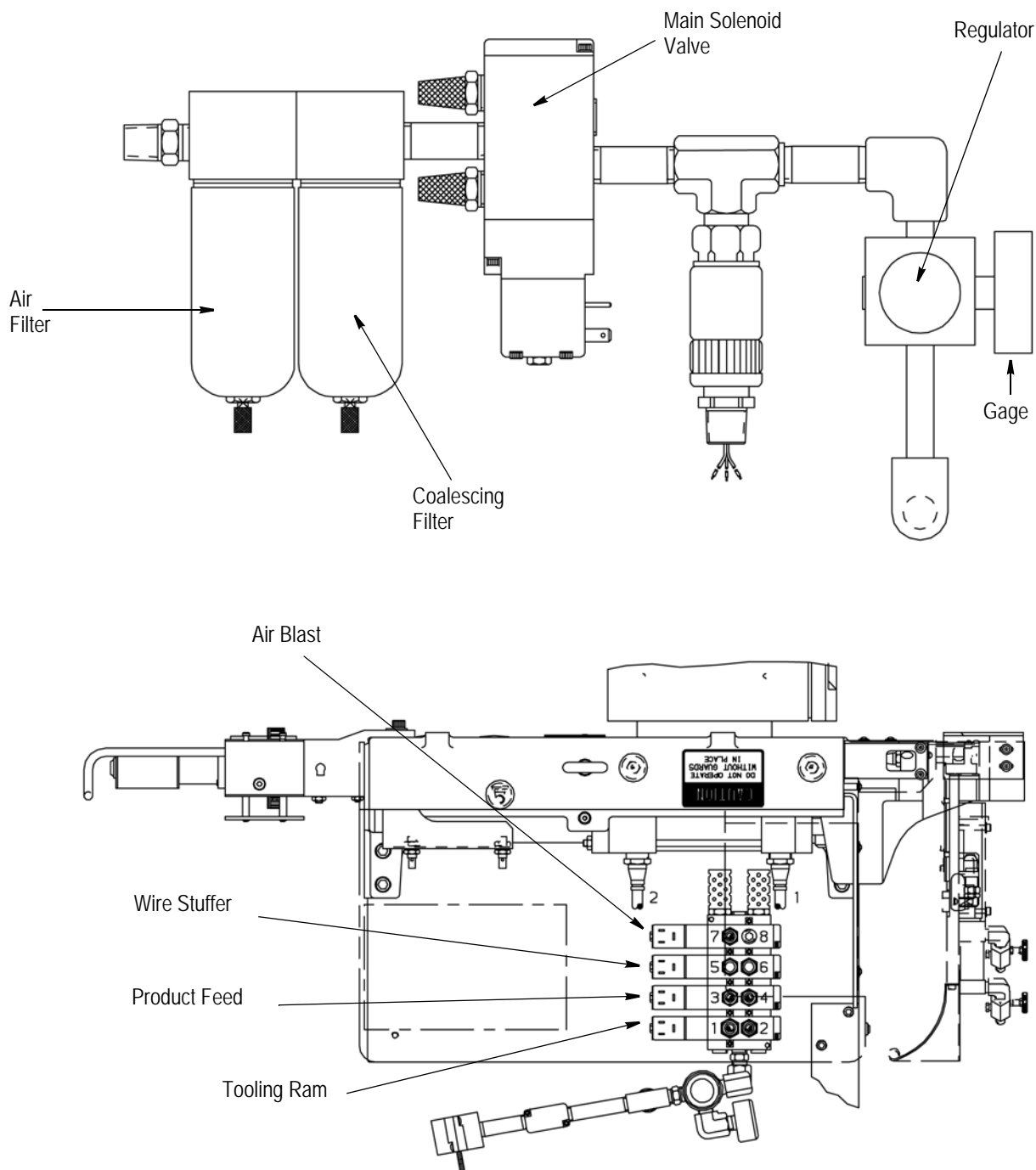
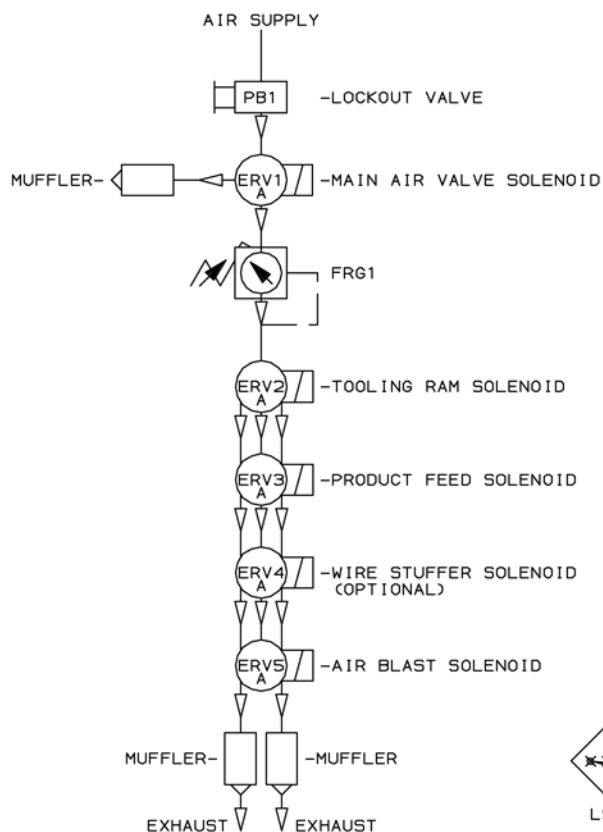


Figure 8

## CONTROL CIRCUIT



## TYPICAL SEQUENCE OF OPERATION

### INITIAL CONDITIONS:

- A. MAIN AIR ON.
- B. RAM OFF (BACK) (CYLINDER RETRACTED) (LS1 MADE).
- C. FEED OFF (FORWARD) (CYLINDER EXTENDED) (LS3 MADE).
- D. WIRE STUFFER OFF (BACK) (CYLINDER RETRACTED).
- E. AIR BLAST OFF.

### MACHINE CYCLE:

1. PRODUCT CRIMP/SHEAR.
  - RAM ON (FORWARD) (CYLINDER EXTENDED) (LS2 MADE).
2. RAM & FEED RETURN.
  - RAM OFF (BACK) (CYLINDER RETRACTED) (LS1 MADE).
  - FEED ON (BACK) (CYLINDER RETRACTED) (LS4 MADE).
  - AIR BLAST ON.
3. PRODUCT FEED.
  - FEED OFF (FORWARD) (CYLINDER EXTENDED) (LS3 MADE).
  - AIR BLAST OFF.

## POWER CIRCUIT

(X) TUBING LINE NUMBERING

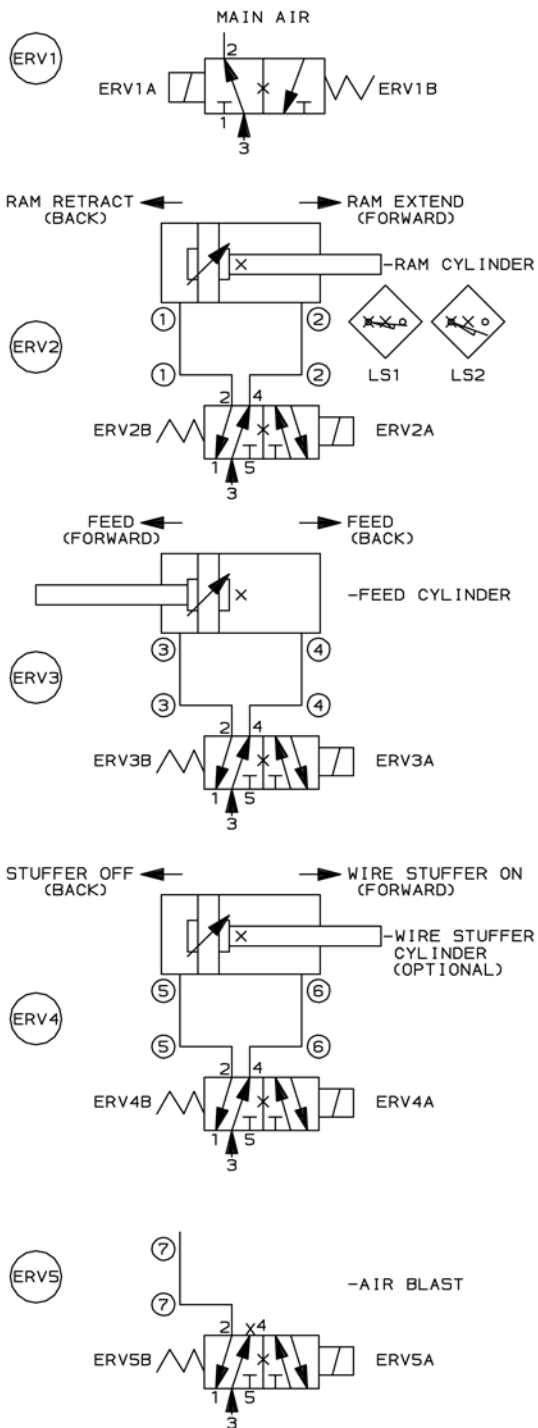


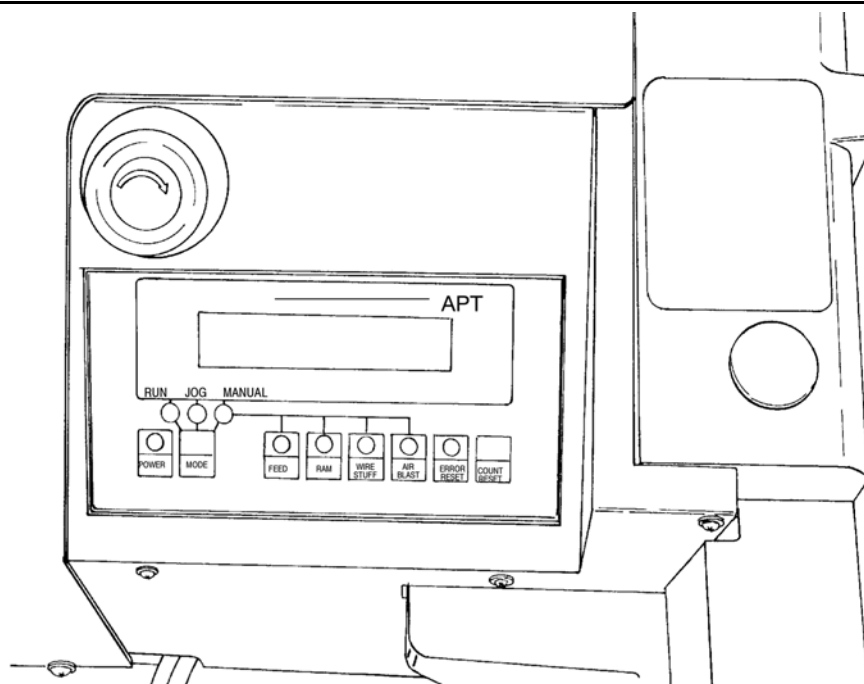
Figure 9

## 2.2. Switches and Controls

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

### A. Normal Key Functions

See Figure 10.

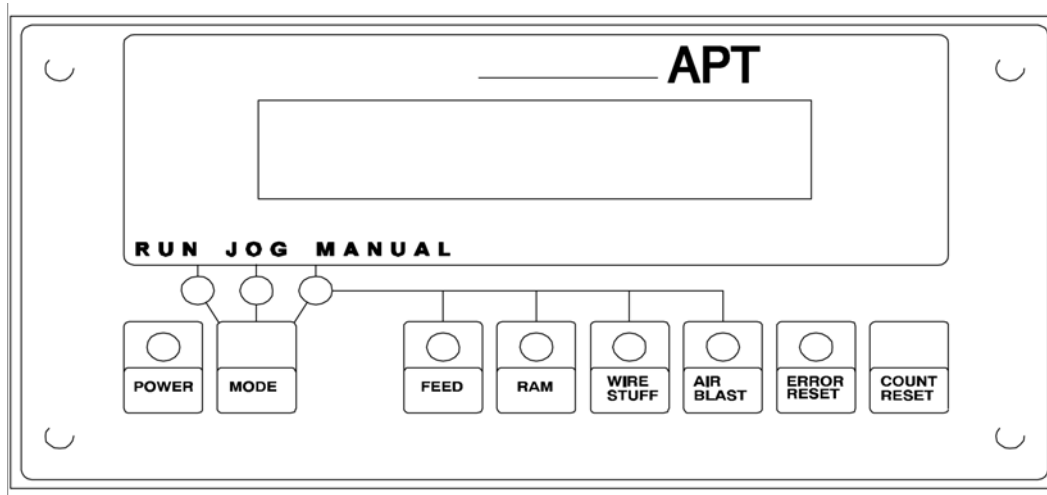


KEY FUNCTION	DESCRIPTION
POWER	The POWER button is used to turn power "on" or "off." When the power indicator lamp is lit, the power is "on" to the terminator. POWER "off" dumps the main air supply and turns off the electric supply. Note that the air supply must be available (LOCKOUT ON) to turn the power "on."
MODE	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."
	<ul style="list-style-type: none"> <li>RUN mode is used to cycle the terminator automatically.</li> </ul>
	<ul style="list-style-type: none"> <li>JOG mode is used to sequentially step the terminator through a complete cycle. The foot switch must be depressed for each step.</li> <li>MANUAL mode is used to perform selected tooling moves. The keypad is used to cycle the terminator in the MANUAL mode.</li> </ul>
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)

See 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	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.  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.
CQM ON/OFF POST-FEED PRE-FEED Mode	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: <ol style="list-style-type: none"> <li>1. Press and hold the MODE button.</li> <li>2. Press and hold the FEED button.</li> <li>3. Release the MODE button</li> <li>4. Release the FEED button. (The current state is briefly displayed when the FEED button is released.)</li> </ol>
AIR BLAST TIME ADJUSTMENT Mode	To enter the mode whereby the air blast time (duration) can be adjusted, proceed as follows: <ol style="list-style-type: none"> <li>1. Press and hold the MODE button.</li> <li>2. Press and hold the AIR BLAST button.</li> <li>3. Release the MODE button</li> <li>4. Release the AIR BLAST button.</li> </ol> <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"> <li>• Press the FEED button to decrease the air blast time by five milliseconds.</li> <li>• Press the RAM button to increase the air blast time by five milliseconds.</li> <li>• Press the COUNT RESET button or the WIRE STUFFER button to increase the air blast by 20 milliseconds.</li> <li>• Press the ERROR RESET or blank button to to decrease the air blast time by 20 milliseconds.</li> </ul> <ol style="list-style-type: none"> <li>5. Press the MODE button to exit the AIR BLAST TIME ADJUSTMENT Mode.</li> </ol>

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

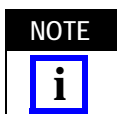
For a description of the terminator's pneumatic functions, refer to Figure 9

## 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.



*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).



*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.

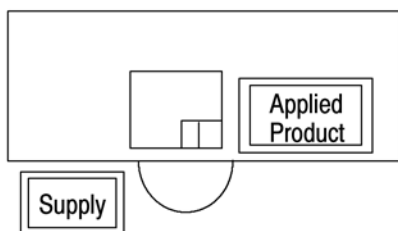
The figures below show proper location and position for foot and switch, and a typical layout for the efficient handling of materials.



**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 the AMPLIVAR Product Terminator and checking it out prior to performing 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



*DO NOT perform this procedure, except when specified within another procedure, then ONLY in the proper sequence. Otherwise, damage to the tooling may result due to misalignment and/or wrong adjustments.*

1. Before connecting air or electric, completely close the air regulator by turning the regulator knob CLOCKWISE until it is snug.
2. Connect the electrical plug and air supply to the AMPLIVAR Product Terminator. For units with a Crimp Quality Monitor, plug in the monitor at this point.
3. Depress the POWER button. The light above the POWER button will indicate power is "ON." Refer to Figure 13.

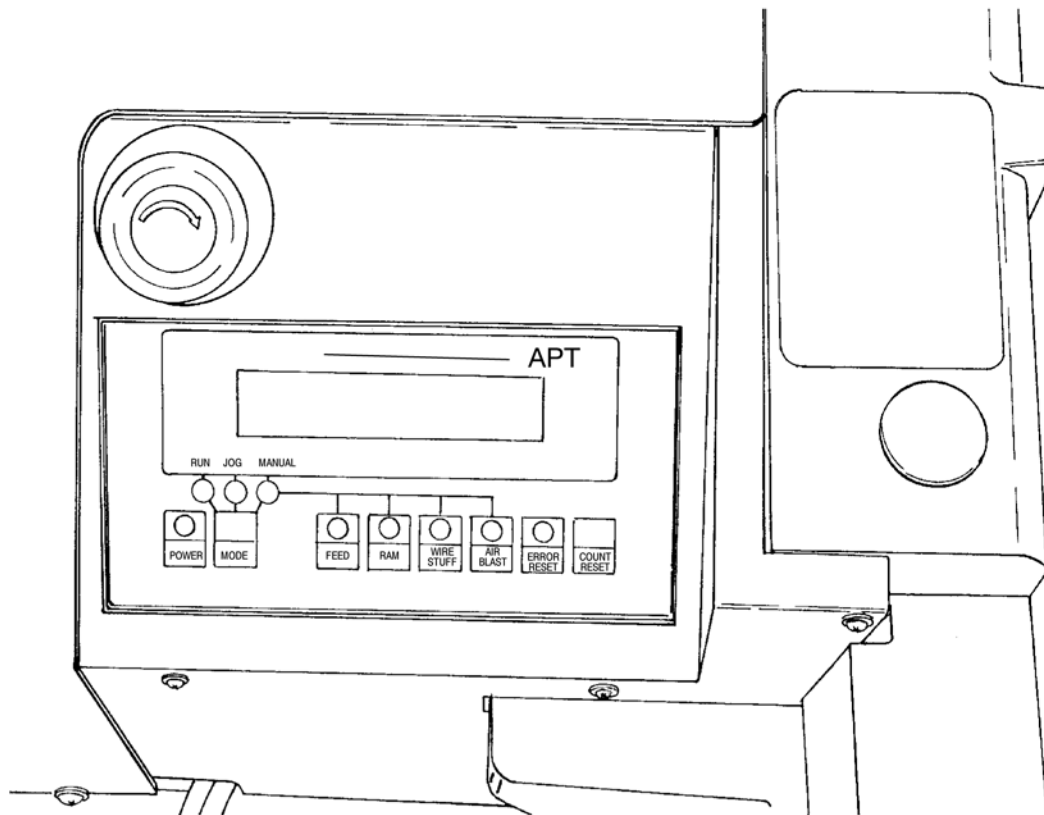


Figure 13



*To avoid personal injury, keep hands clear of the feed plate and the "target area" at all times.*

4. Depress the MODE pushbutton until the JOG light above the mode button is lit.
5. The terminator screen will indicate "RAM EXTEND". Depress the foot switch, then slowly open the regulator by turning the knob counterclockwise. This will allow the ram to advance slowly.
6. Closely observe the shear and crimper assembly as it nears the anvil. If the shear and crimper assembly are not aligned, IMMEDIATELY CLOSE the regulator by turning the knob clockwise. Make any necessary adjustments before proceeding.
7. After the ram has fully extended, open the regulator knob (counterclockwise) until the gage reads 621 kPa [90° psi]. The ram will remain fully extended under pressure.

8. The control screen will indicate RETRACT RAM AND FEED. To retract the ram, depress the foot switch.
9. The screen will indicate EXTEND FEED. Depress the foot switch to extend the feed.
10. Depress the MODE button twice, to enter the RUN mode.
11. Depress the POWER pushbutton, then disconnect the electrical plug and air supply.

#### 4.2. Tooling Alignment Procedure (See Figure 14)



*This procedure is necessary when replacing anvil holders, or any time the screws securing the anvil holders are loosened.*



*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.*

1. Remove anvil guard and ram guard by removing screws securing each to the APT frame.
2. Remove the three screws securing the anvil holder to the frame.
3. Remove stripper plate from anvil holder and remove the anvil; then slide new anvil holder over the crimper guide and loosely install the three screws to the anvil holder.

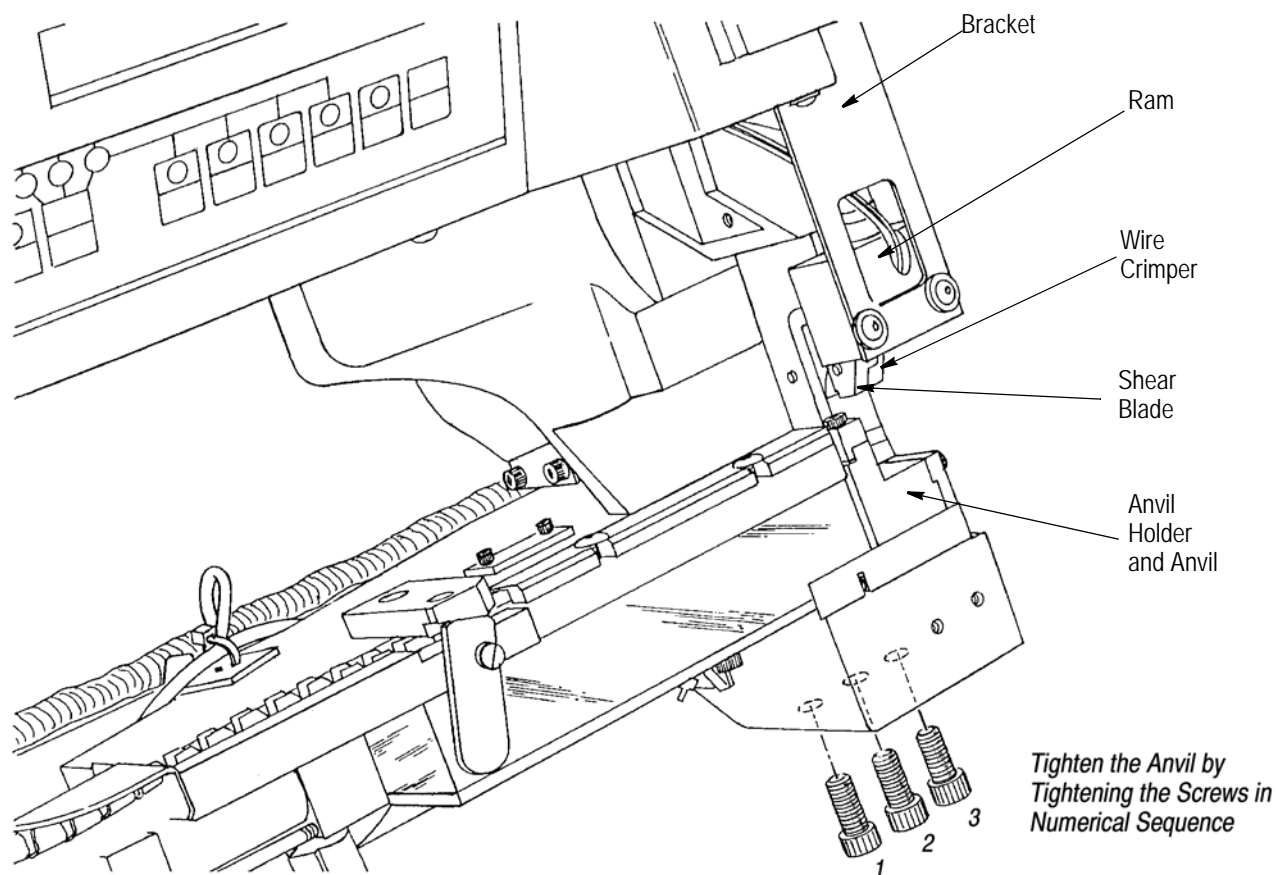


Figure 14

4. Place one thickness of paper over the anvil, and center the anvil below the crimper.
5. Slowly advance the ram by performing the Pre-Loading Alignment Check, described in Paragraph 4.1.
6. Tighten the screws securing the anvil holder to the frame, and tighten the screws in the stripper plate to secure the stripper plate to the anvil holder.
7. Replace the anvil guard and ram guard on the terminator

**CAUTION**


*When replacing the ram guard, be sure that the guard is mounted high enough to clear the crimper holder when the ram extends.*

8. Retract the ram by completing the Pre-Loading Alignment Check, described in Paragraph 4.1, Steps 8 through 11.

#### 4.3. Terminal Strip Loading (Refer to Figure 15)

**DANGER**


*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. Rotate the drag lever to release and hold drag open (back), then feed terminal strip through strip guide, and groove in feed plate until the end reaches the feed finger.
3. Depress and hold feed finger release pin on front of feed plate while feeding terminal strip through until first terminal has passed tip of feed finger, then release pin to engage feed finger. Pull back slightly on terminal strip to assure feed finger is indexed against first terminal.

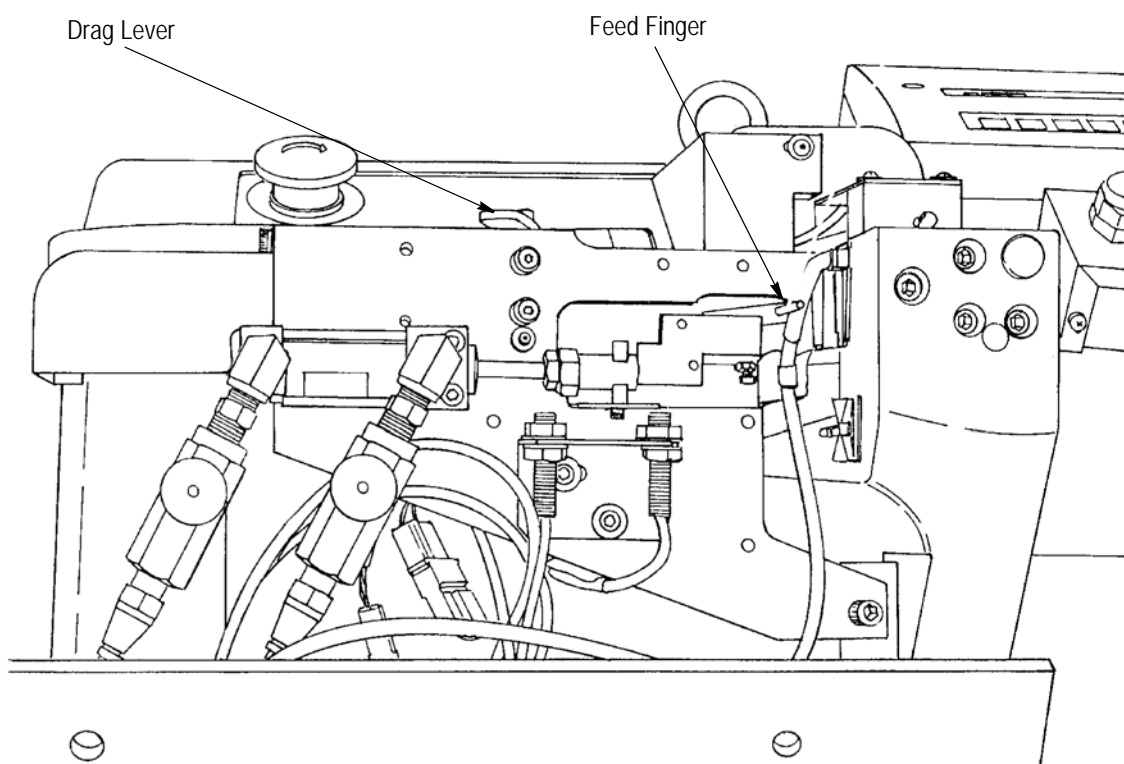


Figure 15

#### 4.4. APT Checkout

##### A. Terminal Strip Feed Check

1. With terminal strip loaded into the APT, as described in Paragraph 4.3, depress and hold feed finger release pin 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 13). The indicator lamp above the pushbutton will light.
4. Depress and release the FEED button. The terminal strip should advance one terminal length.
5. 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.
6. At completion of this check, perform the ram cylinder/ram linkage 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.*



2. Connect the electrical plug and air supply. Depress the POWER pushbutton "ON", to assure the retraction side of the ram cylinder is pressurized.
3. Check ram rest switch S5, 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. Jog the terminator by depressing the foot switch until ram is fully extended, as described in Paragraph 4.1.
6. Check ram extended switch (S6), on ram return switch bracket (Item 50), to be actuated "closed" by bellcrank. If necessary, adjust switch as described in Section 7.
7. Replace terminator cover.
8. Perform manual crimping check as described in Paragraph 4.4,C.

##### C. Manual Crimping Check

1. With the electrical plug and air supply connected, depress the POWER pushbutton.
2. With a terminal in the "target area," place magnet wires or a combination of stranded wire and magnet wire in position, as shown in Figure 16, with the magnet wire toward the front of the terminal.
3. Manually cycle the terminator as described in Paragraph 4.1. Observe the ram advancement and the shearing and crimping of the terminal in the "target area."
4. After the ram has fully retracted, remove the terminal and inspect it in accordance with Paragraph 4.5. If necessary, make any adjustments that may be required.
5. At completion of this check, perform the automatic crimping check as described in Paragraph 4.4,D.

##### D. Automatic Crimping Check

The automatic crimping check is performed in the same manner as the manual crimping check described in Paragraph 4.4,C, except that the air regulator must be fully open. The terminator must be in the RUN mode and the foot switch must be depressed to cycle the APT. 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 manual crimping check and the automatic crimping check conform to all requirements, the terminator is ready for production operation as described in Section 5. If terminator is not to be operated immediately, depress the POWER button, then disconnect the electrical plug and air supply.

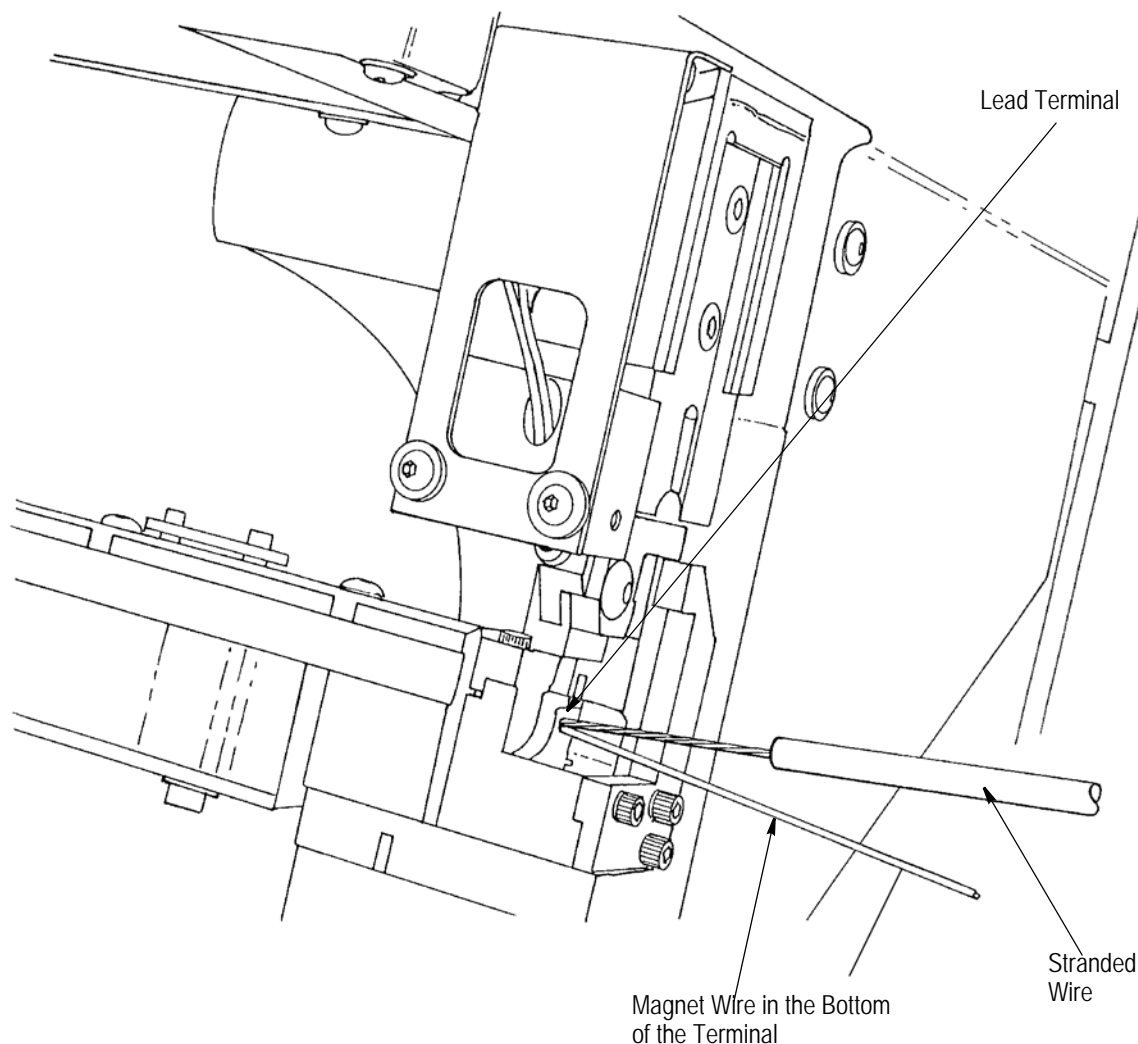


Figure 16

#### 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 17.
2. Using a crimp height comparator as shown in Figure 18, measure the crimp height of the termination as shown in Figure 19. The crimp height must be within  $\pm 0.08$  mm [.003 in.] of the measurement specified for the type terminal and size wire being used, as obtained from your Tyco Electronics Field Engineer.

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.

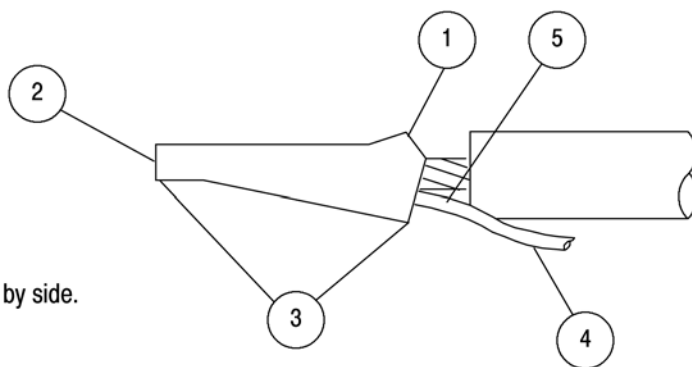


Figure 17

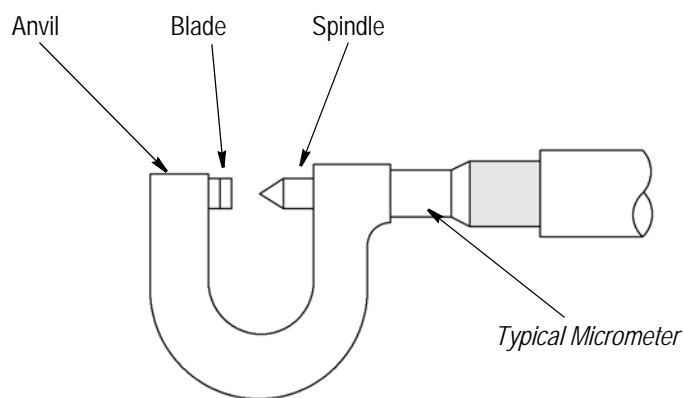


Figure 18

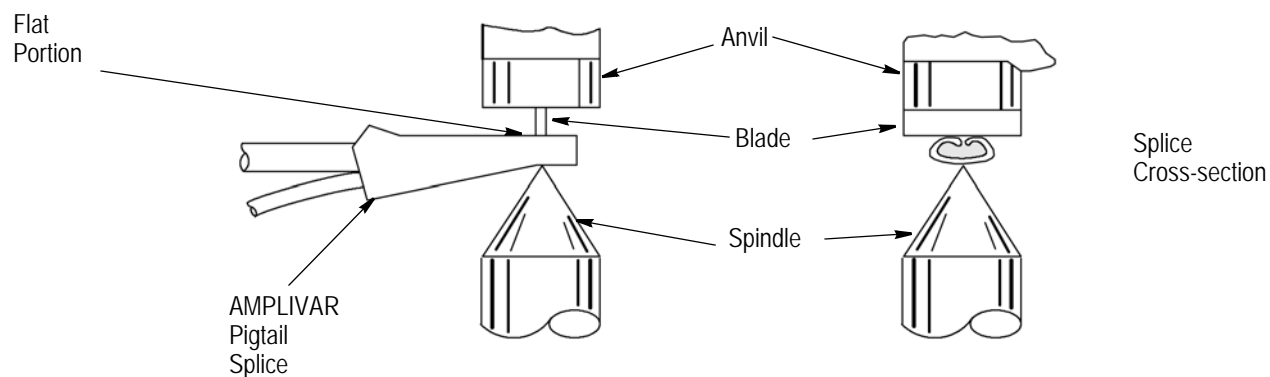


Figure 19

TE 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 TE 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 13). The indicator lamp above the POWER pushbutton will light.



*Personnel who have not previously operated the APT should manually cycle it several times, as described in Paragraph 4.1, 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 16. When using stranded magnet wire, position as shown in Figure 16. 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.

### 6.1. Crimp Height Adjustment (Tooling Increments)

Crimp height adjustment may be necessary to produce actual desired 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 all products. See Figure 20.

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.



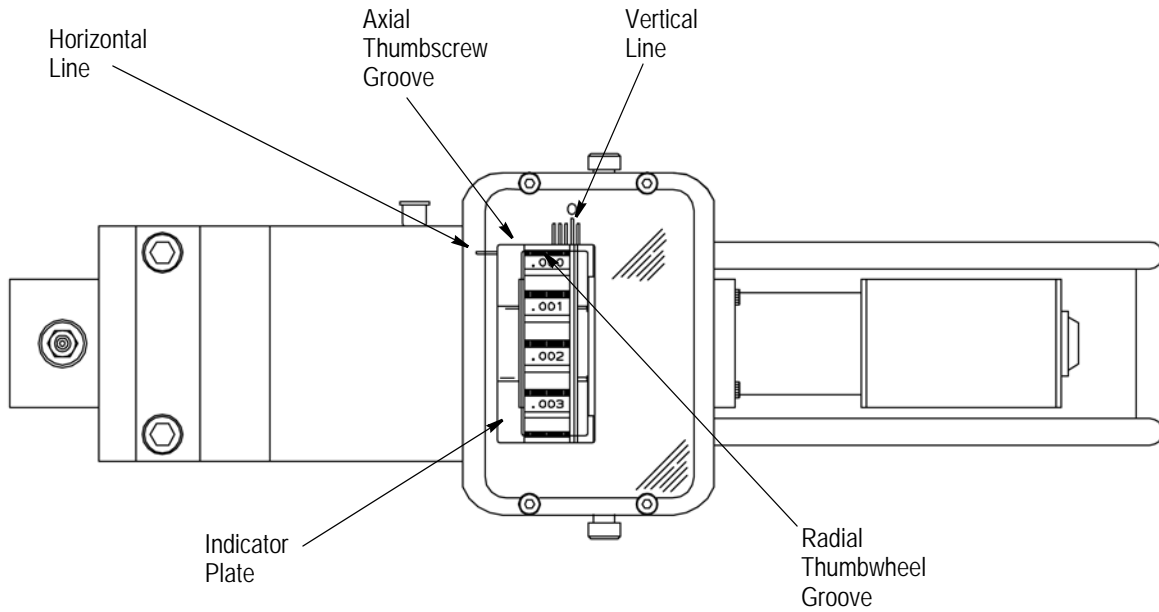


Figure 20

## 6.2. Feed Adjustments (Figure 21)

### 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 (in RUN or MANUAL mode).

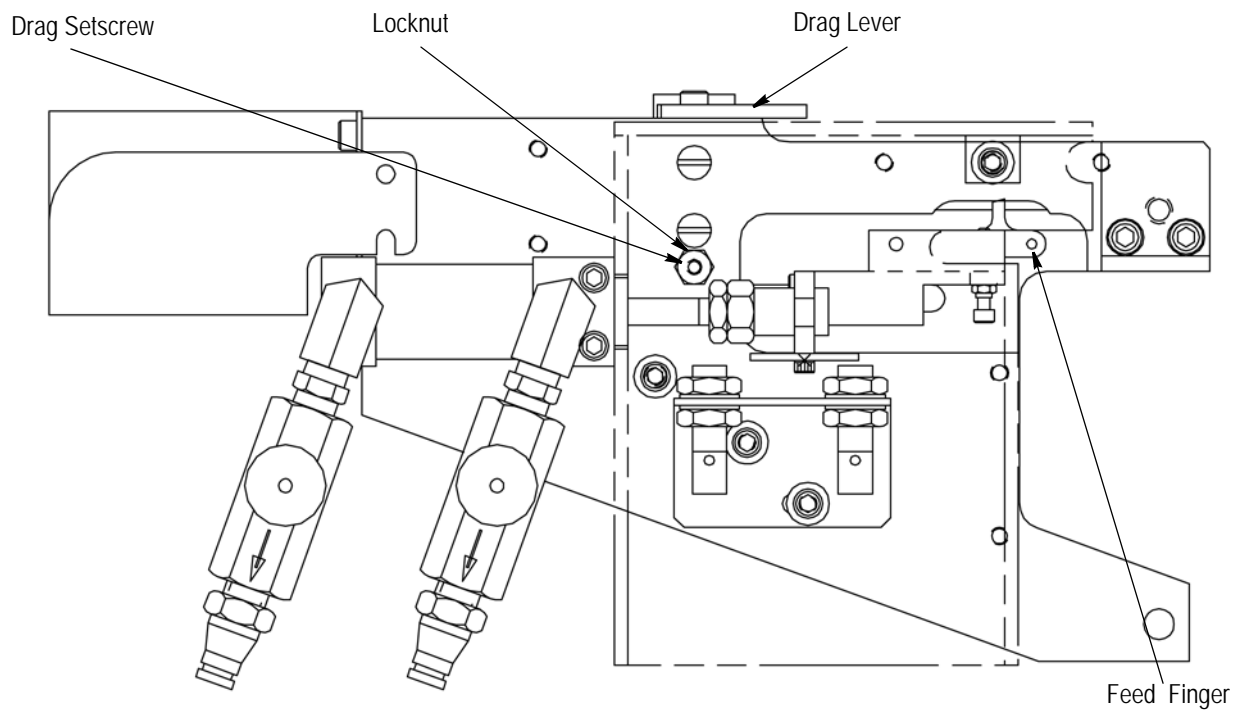


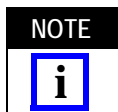
Figure 21

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 adapter IN or OUT 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 adapter.
7. Perform at least two actual crimps and visually examine the product for equal cutoff tabs.
8. 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 over-feeding.

To adjust the speed, turn the valve adjustment IN to slow the cylinder action, turn it OUT for faster action.



*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. Loosen the locknut on the drag setscrew. With the drag lever released, turn the setscrew as required until the drag rests evenly on the terminal strip.
2. While holding the setscrew in the adjusted position, tighten the locknut.
3. Rotate the drag lever to lift the drag from the terminal strip. The drag should pivot on the setscrew.

#### 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's inputs on the screen. Shaded circles indicate that the switch is actuated.

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

- Terminator cycle foot switch;
- Wire stuffer foot switch;
- Ram extend;
- Ram retract;
- Feed extend;
- Feed retract;
- Wire stuffer extend;
- Wire stuffer retract; and
- Emergency Stop monitor.

#### A. Ram Extend Switch

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 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.

### 6.4. Optional Wire Stuffer Adjustments

There are two adjustments required for the optional wire stuffer. First, perform the Hitch Feed Adjustment (Paragraph 6.4,A). Then perform the Stuffer Feed Length Adjustment (Paragraph 6.4,B).

#### A. Hitch Feed Adjustment (Figure 22)

**DANGER**

*To avoid personal injury, be sure electrical plug and air supply are disconnected before performing, the hitch feed adjustment.*



1. "Dump" the air.
2. Remove the stuffer guard.
3. Loosen the jam nut on both hitch feeds and loosen the adjustment screw until the stuffer wire loads easily. Make sure that the top of each cam is seated under the end of the adjustment screw. As wire is being strung through a hitch feed, the bottom of a cam should swing upwards in an arc with the center of rotation at the contact point between an adjustment screw and the top of the cam.

**NOTE**


*It may also be necessary to loosen the coil spring nuts if the hitch feed cams cannot swing forward and up enough to allow the wire to load. Do not loosen the coil spring nuts excessively past the point at which the stuffer loads.*

4. The hitch feed cam should act as a ratchet -- only allowing the wire to move forward. Adjust the moving hitch first. Turn the adjustment screw "in" or "out" as necessary until the stuffer wire slides easily (in one direction only). Tighten the jam nuts on the hitch feed.
5. Adjust the stationary hitch feed by turning the adjustment screw "in" or "out" as necessary until the stuffer wire slides easily (in one direction only).
6. Check the adjustment.
  - a. Verify that the wire moves forward with little resistance.
  - b. Manually extend the stuffer cylinder and then pull back on the stuffer wire. (The wire and movable hitch should not move backward when pulled.)

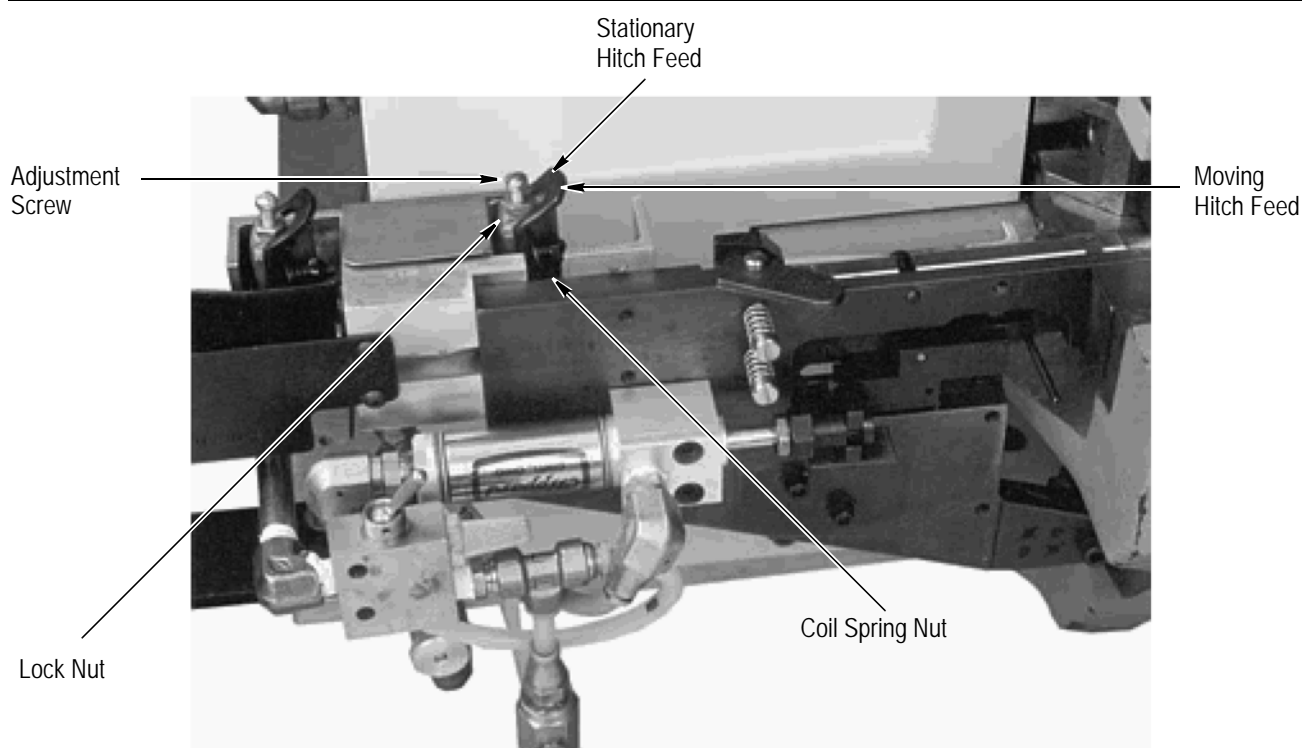


Figure 22

7. Tighten the jam nut on the stationary hitch feed.
8. Re-install the stuffer cover.
9. Apply air pressure.
10. Cycle the stuffer under power to verify proper adjustment.
11. Perform further adjustments if necessary.

## B. Feed Length Adjustment



*To avoid personal injury, be sure electrical plug and air supply are disconnected before performing, the hitch feed adjustment.*

1. "Dump" the air.
2. Remove the stuffer guard.
3. Loosen the jam nut on the stuffer cylinder rod.
4. Turn the stuffer cylinder rod into the movable hitch feed bracket to shorten the length of wire being fed. Turn the stuffer cylinder rod out of the movable hitch feed bracket to increase the length of wire being fed.
5. Tighten the jam nut.
6. Re-install the stuffer cover.
7. Apply air pressure.
8. Cycle the stuffer under power to verify proper adjustment.
9. Perform further adjustments if necessary.

## 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 assure proper termination.

Remove terminator cover while performing the following procedures.



*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 non-moving 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 23)

1. Remove plugs from APT frame.
2. Lubricate grease fittings, through holes in the frame, using a grease gun containing a general purpose grease.

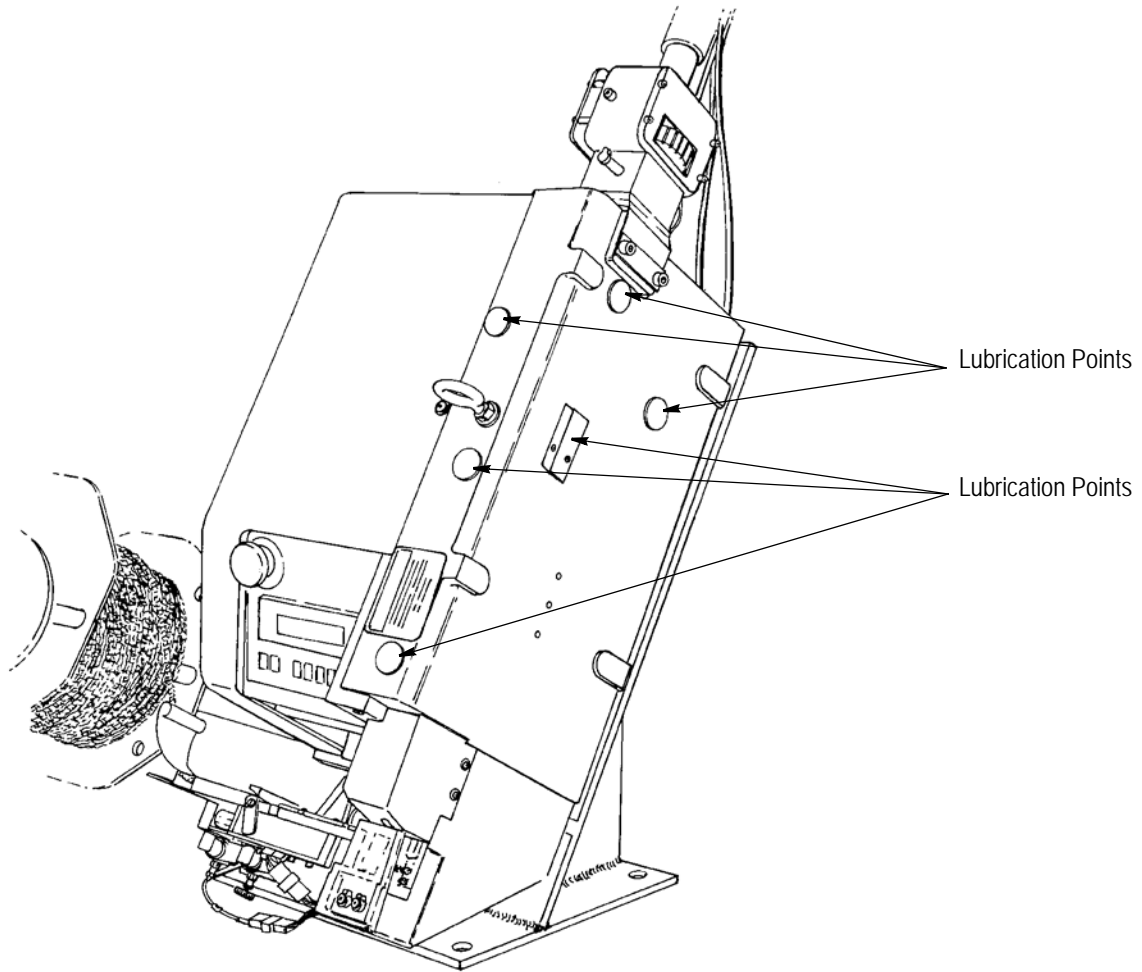


Figure 23

3. Lubricate the feed finger slide with SAE No. 30 oil.
4. Lubricate the threads of the precision adjustment screw.
5. Lubricate adjuster yoke slide area with SAE No 30 oil.
6. Remove all excess lubrication, then replace plugs in the frame.

## 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.



*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 24 for a tooling matrix.

### 8.1. Shear Blade and/or Crimper Replacement

1. Remove the anvil guard and the ram guard by removing screws.

PRODUCT REF (CRIMP WIDTH)	MAXIMUM CRIMP HEIGHT	SPLICE TOOLING ASSEMBLY	SPLICE TOOLING VARIABLES					FEED PLATE ASSEMBLY			VARIABLES	
			CRIMPER	SHEAR	ANVIL	ANVIL HOLDER	RETAINER	GUIDE	SHEAR	FEED PLATE ASSEMBLY	HOLD DOWN	DRAG
62295 (.250)	.086	354100-1	354003-1	354005-1	354004-1	354002-1	354104-1	679326-1	354137-1	457265-2	457266-9	457302-1
62310 (.220)	.105	354100-2	354003-2	354005-1	354004-2	354002-1	354104-2	679326-2	354137-2	457265-2	457266-7	457302-1
62002 (.180)	.119	354100-3	354003-3	354005-2	354004-3	354002-1	354104-1	679326-3	354137-2	457265-2	457266-7	457302-1
62310 (.180)	.119	354100-4	354003-4	354005-2	354004-4	354002-1	354104-2	679326-2	354137-2	457265-2	457266-7	457302-1
62309 (.180)	.102	354100-5	354003-5	354005-1	354004-4	354002-1	354104-2	679326-4	354137-3	457265-2	457266-8	457302-1
62001 (.180)	.078	354100-6	354003-6	354005-3	354004-5	354002-2	354104-3	679326-5	354137-4	457265-1	457266-5	457302-1
62001 (.140)	.090	354100-7	354003-7	354005-3	354004-6	354002-2	354104-3	679326-5	354137-4	457265-1	457266-5	457302-1
42779 (.140)	.087	354100-8	354003-7	354005-3	354004-6	354002-2	354104-3	679326-6	354137-4	457265-1	457266-5	457302-1
62201 (.140)	.090	354100-8	354003-7	354005-3	354004-6	354002-2	354104-3	679326-6	354137-4	457265-1	457266-5	457302-1
62308 (.140)	.090	354100-9	354003-8	354005-3	354004-7	354002-2	354104-4	679326-6	354137-4	457265-1	457266-5	457302-1
62306 (.140)	.070	1-354100-0	354003-9	354005-4	354004-6	354002-2	354104-3	679326-7	354137-5	457265-1	457266-1	457302-1
42775 (.110)	.080	1-354100-1	1-354003-0	354005-4	354004-8	354002-2	354104-3	679326-7	354137-5	457265-1	457266-1	457302-1
42776 (.110)	.080	1-354100-1	1-354003-0	354005-4	354004-8	354002-2	354104-3	679326-7	354137-5	457265-1	457266-1	457302-1
62040 (.110)	.083	1-354100-1	1-354003-0	354005-4	354004-8	354002-2	354104-3	679326-7	354137-5	457265-1	457266-1	457302-1
62306 (.110)	.083	1-354100-1	1-354003-0	354005-4	354004-8	354002-2	354104-3	679326-7	354137-5	457265-1	457266-1	457302-1
62307 (.110)	.075	1-354100-1	1-354003-0	354005-4	354004-8	354002-2	354104-3	679326-7	354137-5	457265-1	457266-1	457302-1
42777 (.110)	.063	1-354100-2	1-354003-1	354005-5	354004-8	354002-2	354104-3	679326-8	354137-6	457265-1	457266-3	457302-1
42778 (.110)	.063	1-354100-2	1-354003-1	354005-5	354004-8	354002-2	354104-3	679326-8	354137-6	457265-1	457266-3	457302-1
62000 (.110)	.066	1-354100-2	1-354003-1	354005-5	354004-8	354002-2	354104-3	679326-8	354137-6	457265-1	457266-3	457302-1
62157 (.110)	.066	1-354100-2	1-354003-1	354005-5	354004-8	354002-2	354104-3	679326-8	354137-6	457265-1	457266-3	457302-1
62200 (.110)	.066	1-354100-2	1-354003-1	354005-5	354004-8	354002-2	354104-3	679326-8	354137-6	457265-1	457266-3	457302-1
62304 (.110)	.066	1-354100-2	1-354003-1	354005-5	354004-8	354002-2	354104-3	679326-8	354137-6	457265-1	457266-3	457302-1
62305 (.110)	.059	1-354100-2	1-354003-1	354005-5	354004-8	354002-2	354104-3	679326-8	354137-6	457265-1	457266-3	457302-1
62303 (.080)	.052	1-354100-3	1-354003-2	354005-6	354004-9	354002-2	354104-3	679326-9	354137-7	457265-1	457266-6	457302-3

Figure 24



2. Remove the two screws securing the crimper and the shear blade to the crimper guide. Note the orientation of parts for replacement purposes.
3. Install new shear blade and crimper using the reversed removal procedure.

#### 8.2. Anvil, Anvil Holder, or Guide Shear Replacement

1. Remove anvil guard and the ram guard by removing screws.
2. Remove the screws securing the stripper plate to the anvil holder.
3. Remove the anvil from the anvil holder.
4. If only the anvil is to be replaced, install the new anvil using the reversed removal procedure.
5. If the guide shear is to be replaced, loosen screws and remove the guide. Install the new guide shear by using the reversed removal procedure.
6. If the anvil holder is to be replaced, remove the three screws securing it to the frame. Install the new anvil holder and mount the guide shear by using the reversed removal procedure. Refer to Paragraph 4.1. for Pre-loading Alignment Check, and Paragraph 4.2 for Tooling Alignment Procedures.
7. Install the guards.

#### 8.3. Feed Finger Replacement

1. Remove the two screws securing the feed cylinder to the feed plate. Pull cylinder away from the feed plate to disengage the feed cylinder adapter from the switch actuator.
2. Remove the two screws and feed finger holder retainer in back of the feed plate; then remove the feed finger holder from the front.
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.

#### 8.4. Pneumatic System Repairs

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

#### 8.5. 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.

### 9. REVISION SUMMARY

- Logo change and company change

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