

**MINI-MAC APPLICATOR
INSTRUCTION MANUAL
European Application Tooling**

AS.01.08.02/ISSUE B
FILENAME M-69037-0999

NOTE: All Molex "MINI-MAC" Applicators are provided with a list of perishable tooling and crimp data sheet. This information can also be found on the Molex Web Site.

CAUTION: The Molex "MINI-MAC" Applicators are designed to operate in crimp presses with standard shut height of 135.80 mm (5.346 inches). Installation in crimp presses with other than standard shut heights can cause tool breakage. It is advisable that before installation, a check of the shut height is performed.

Installation:-

Contact your local Molex Office for Tooling Installation and Training.

Molex cannot be held responsible for incorrect customer installation nor any damage caused as a result of installation in crimp press with non-standard shut heights.

Training must be given to all Mini-Mac users to ensure safety.

WARNING

NEVER USE THIS UNIT WITHOUT GUARDS OR SAFETY DEVICES THAT ARE INTENDED TO PREVENT HANDS FROM REMAINING IN THE DANGER AREA.

NEVER OPERATE, SERVICE OR ADJUST THIS UNIT OR INSTALL SPARE PARTS WITHOUT PROPER INSTRUCTION AND WITHOUT FIRST READING AND UNDERSTANDING THE INSTRUCTIONS IN THE OPERATOR'S OR UNIT MANUAL.

WORK SAFELY AT ALL TIMES

CAUTION: Always have safety guards properly mounted on press when equipment is in operation.

OPERATION & SERVICE INSTRUCTION

MOLEX “MINI-MAC” APPLICATOR

Molex Application Tooling Europe (MATE)
Molex House
Millennium Centre
Farnham
Surrey GU9 7XX

Phone: +44-(0)1252-720720
Fax: +44-(0)1252-720721

AS.01.08.02/ISSUE B
FILENAME M-69037-0999

Technical Contents

	Page
Introduction.....	5
Special Characteristics.....	5
Description	6
Important Note	7
MINI-MAC Applicator Installation & Removal	7
Loading and Unloading Terminal	9
Adjustments	9
MINI-MAC Replacement Parts	12
Storage, Cleaning & Lubrication	13
Wire Stripping & Handling	13
Tensile Strength	15
Trouble Shooting the MINI-MAC	16
Base Applicator 69028-1493 & Parts List	17/18
Check Conductor Crimp Height	19
Slug Hole Clearance	20
Adjustable Support Block Assy.....	21

Introduction

The Molex “MINI-MAC” is designed to operate with numerous commercially available universal bench type presses and fully automated wire processing machines

The “MINI-MAC” is versatile, reliable, easy to install and provides a termination to meet the most stringent requirements. Generally, only the crimp punches, anvils and carrier strip cut-off tool elements wear out and need to be replaced.

Molex supplies the “MINI-MAC” Applicator preset and tested for a specific terminal. It can be immediately installed on your press with little or no adjustments.

The “MINI-MAC” can be supplied as a side feed or end feed applicator depending upon the terminal carrier strip location.

Molex offers a range of crimp presses for operating the “MINI-MAC” Applicators-

Contact your local Molex Sales Office or Distributor for latest information.

Special Characteristics:-

1. Enhanced Crimping Capacity
2. Automatic Terminal Feed
3. Adjustable Terminal Feed
4. Positive Stop for Wire Positioning (Bench Press)
5. Terminals are Separated from Carrier Strip Automatically
6. Crimp Punches & Anvils provide quick-change capabilities
7. Quiet Operation and Maintenance Free
8. Easy to Keep Clean
9. Low Down time
10. Operator Fatigue Reduced

Important Shut Height of Crimp Press

The Molex “MINI-MAC Applicators” are designed to operate in crimp presses with standard shut height of 135.80 mm (5.346 inches). Installation in crimp presses with other than standard shut heights can cause tool breakage. It is advisable that before installation, a check of the shut height is performed.

The shut height of the press can be adjusted with a shut height gauge, which is calibrated under load to achieve the 135.80 mm (5./346 inch) measurement. The press manufacturer can have the service technicians readjust the press for proper shut height. A shut height gauge is available to purchase from Molex.

Before starting production with a newly installed MINI-MAC Applicator, manually cycle the press with terminals and wire in position. If the press should not cycle freely, the press will need adjustment since the shut height is too short. If a complete cycle can be made without any interruption, then the production cycle can be started after the crimp height qualification has been completed.

Description

The principal mechanical parts of the “MINI-MAC” are illustrated in Figures 1 & 2.

Before inserting a terminal strip the drag pressure lever must be in the up position so the strip will slide easily under the terminal drag plate and rear cover plate. The open barrel terminal should be initially centred over the anvil. The feed finger will transfer a new terminal over the anvil during each press cycle. This is a mechanical actuation between the ram slide that holds the up stroke transfer cam or down stroke transfer cam and the feed finger assembly. The transfer cam lengths to be employed by the ram slide depend upon the press stroke. A press with a 28.58 mm (1 1/8”) stroke uses a shorter transfer cam than a press with a 41.28 mm (1 5/8”) stroke. (See Figures 4, 5, & 6).

When the “MINI-MAC” is mounted in an automatic wire processing machine, only the down stroke transfer cam is applied thus leaving the anvil without any obstruction while the press is idle in the up position. The up stroke transfer cam will always place a terminal over the anvil when the press is idle in the up position.

The ram slide retains the conductor punch in a pre-set position, also, the floating insulation punch and front cut-off striker are held by an M8 button head socket cap screw. The floating insulation punch varies insulation crimp height setting a relation to conductor crimp height. The front cut-off striker depresses the cut-off plunger and separates the crimped terminal from the carrier strip.

Double carrier strip terminals also require a rear cut-off punch (not shown in the illustrations) which may be attached to the ram slide to the rear of the crimp tooling.

Many Molex terminals have a center carrier strip, in which case a cut-off punch separates the crimped terminal from the carrier strip. As such, a cut-off striker is not needed.

Below the ram adapter shank is the conductor adjustment cam that has four pairs of small platforms designated with letters A, B, C and D. Four different crimp settings can be achieved by indexing the cam. Each index will increase or decrease the setting. In addition, the insulation adjustment cam (below the conductor adjustment cam) has 8 different settings designed with Number 1 thru 8 in increments of approximately 0.23 mm (.009”) to a total of 1.78 mm (.070”) to allow adjustment of insulation crimp height.

Attached to the base plate are the crimp anvils that support the terminal during the crimp operation. Also attached are the cut-off plunger retainer block, spacers (if required) and adjustable terminator base and track that holds the rear and front cover plates and terminal strip drag assembly.

IMPORTANT

**POWER MUST BE OFF
and Power Cable Disconnected**

Manual press cycling is essential for safety and preventing equipment damage - always cycle by hand when trouble shooting or changing adjustments, tooling, applicator or accessories.

“MINI-MAC” Applicator Installation & Removal

All presses must be equipped with a common universal* type quick-change base plate and adapter on the press ram.

- A. Always turn off and disconnect power to the press.
- B. Slide the “MINI-MAC” onto the base plate until the two notches on the left side engage against the stops and at the same time enter the ram adapter shank on top of the ram slide into the adapter on the press ram.
- C. Some presses have locking latches on the base plate which have to be flipped up for securing the applicator, others have knurled finger screws and some have “T” type latches. All are located on the right side of the base plate for tight positioning of the applicator. These must be firmly secured before operating press.
- D. Remove applicator by reversing the above steps.

* Contact local Molex Sales Office or Distributor for specific information.

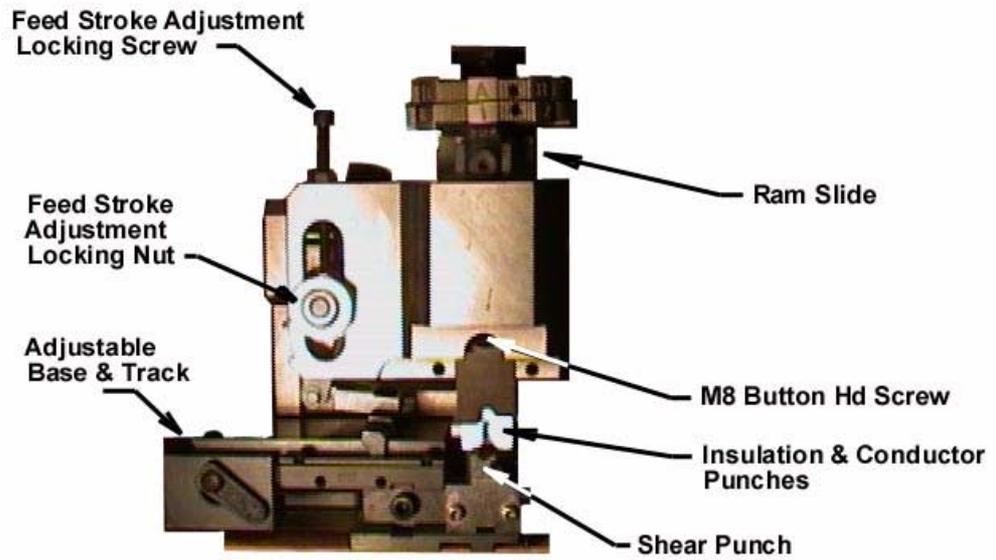


FIG.1

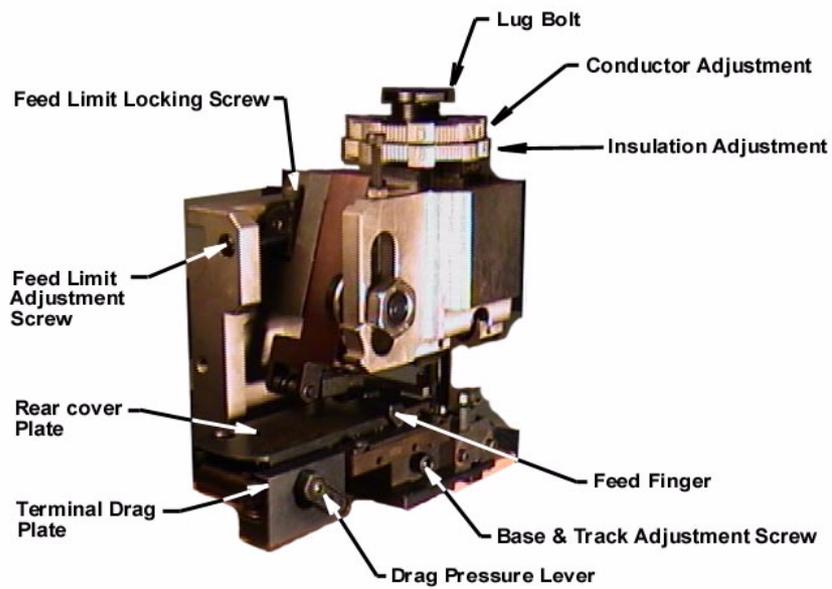


FIG.2

Loading & Unloading Terminal Strip Into “MINI-MAC”

- A. The specified terminal is stamped on the applicator identification plate. Do not apply any other terminal than as indicated on the plate at side of the applicator.
- B. Turn off power and disconnect power cable from receptacle.
- C. Fully raise the drag pressure lever so the terminal will slide with ease into the terminator base and track.
- D. Push terminal strip until first terminal comes to rest centered above anvil.
- E. Turn the drag pressure lever down to engage the terminal drag plate.
- F. Cycle press by hand to be certain that the feed finger transfers the next terminal to a centered position over the anvil and that all other parts slide and engage without any interference. It is advisable to go through this procedure several times.
- G. When unloading terminal strip make sure power is off and disconnect power cable from receptacle.
- H. Turn drag pressure lever to the up position. Hand cycle press to the fully raised position.
- I. Raise feed finger and pull terminal strip back until disengaged from the terminator base and track.

Adjustments (Refer to Fig. 1 & Fig. 2)

- A. Conductor crimp adjustment may not be needed as it was preset at assembly. However, if for any reason the conductor crimp is too loose or tight, adjustment can be made by indexing the wire adjusting cam. Letter “A” gives the loosest and “D” the tightest position (as shown on plate at side of applicator).
- B. Insulation crimp adjustment can be achieved using the same method as in the conductor crimp height setting. Index the insulation adjustment cam so the numbers (1 thru 8) will align with the selected letter of the conductor crimp cam in front of the applicator. Number 1 is the loosest and Number 8 gives the tightest crimp. A total adjustment of 1.78 mm (.070”) is possible.
- C. The terminal feed fingers should have a little over-travel on the back stroke to pick up the next carrier strip position. Adjustment can be made by loosening the M12 hex jam nut to permit up and down movement of the swivel attachment. The M4 socket head cap screw also has to be adjusted to permit up movement. Lowering the swivel pin in the support slot will shorten the feed stroke; raising the swivel pin will lengthen the feed stroke. When the stroke is adjusted tighten the M12 hex jam nut and locate the M4 socket head cap screw against the swivel pin slider.

- D. Cycle press by hand transferring terminal to check if terminal is centered above anvil.

If terminal is not exactly above anvil, loosen M5 socket head cap screw then turn feed limit adjustment screw clockwise to shorten feed finger transfer stroke. To lengthen the stroke, turn adjustment screw counter-clock-wise. After proper setting tighten M5 socket head cap screw.

- E. Rear cover plate should be adjusted so the strip will slide smoothly over the terminator base and track. Approximately 0.25 mm (.010") clearance between cover plate and terminal strip is advised.
- F. To set terminator base and track in proper relation to anvil and cut-off plunger, loosen base and track adjustment locking screw underneath base plate and turn socket head cap screw in front of applicator. Clockwise turning will move the terminator base and track to the rear and counter-clock-wise to the front of the applicator (see FIG.3). After adjustment tighten the track adjustment locking screw.
- G. If you find when installing your MINI-MAC into the Crimp Press that the crimp height is not correct, please note that the shut height can be adjusted by placing or removing shims from beneath the adjusting pads instead of adjusting the actual press or grinding the pads..

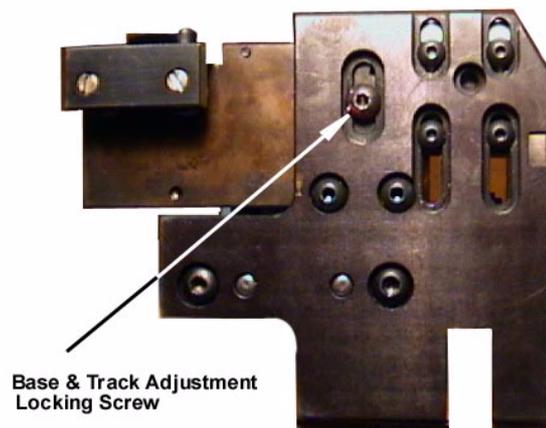


FIG.3

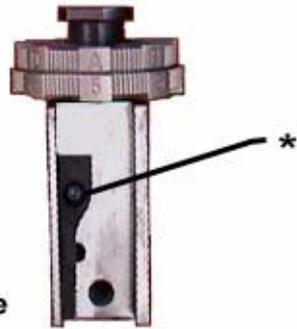


FIG. 4
28.58mm Cam
Down stroke Mode

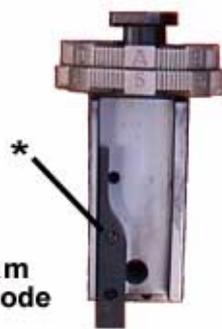


FIG. 5
41.28mm Cam
Up stroke Mode

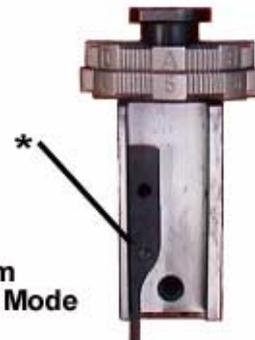


FIG. 6
41.28mm Cam
Down stroke Mode

*** : Location Hole**
Transfer cam alternative postions.

MINI-MAC” Replacement Parts (See fig. 7)

Under normal operating conditions, the perishable tooling will wear and need to be replaced. Have all power to the press shut off and disconnected. Press ram should be in the raised position. Remove the Mini-Mac from press if required for easier access to parts.

When replacing any perishable tooling parts always leave the locking screws for both punches and anvils finger tight prior to alignment. Place the terminal strip into the applicator track and over the anvils. Cycle the press by hand and at bottom dead centre tighten up the locking screws for both the punches and anvils. Once this is done complete the cycle so that the press is now at top dead centre. Cycle a second time to ensure that the ram moves freely in the applicator base.

- A. To replace the anvils, remove socket head cap screw from the front of the shear die or anvils and remove the anvils.
- B. The shear punch is spring loaded. When the socket head cap screw on the side of the die is removed the punch is pushed out of the die. Replace the spring if damage or loss of pressure is evident. To replace, reverse the procedure. Be certain after the socket head cap screw is reinstalled that the punch moves freely. Add a drop of oil to the sliding surfaces.
- C. Crimp punch replacement can be accomplished by pulling the ram slide out of the applicator body. Loosen the M8 button head socket cap screw and remove (where fitted) front cut-off striker, insulation punch spacer, insulation punch and conductor punch. When reinstalling tighten the M8 button head screw only finger tight refit ram slide and observe alignment on anvil before tightening. Punches must move freely over anvil.

NOTE: Always be aware which way parts have been removed so that reinstallation can be made in proper reversed sequence. Also, compare part numbers to be certain proper components are being used again. A set of perishable tools should always be available to reduce down time.

Storage, Cleaning and Lubrication

- A. Store applicator in a dust-free environment. To prevent bottoming off the ram slide, which might cause damage to the punches and anvils, leave a crimped terminal in the applicator or place a piece of wood or rubber between punches and anvils.
- B. The applicator should be cleaned every day while not in storage. Use a clean, dry cloth or brush to expel all dirt, slugs and chips from the unit.
- C. Lubricate with a SAE20 (non-detergent) motor oil. Oil the ram slide including the up or down stroke transfer cam, the feed finger assembly, all moving parts and adjusting screws.

Wire Stripping and Handling

Proper wire preparation is a necessary part of the crimping process regardless of the potential application.

The stripping length of wires should be adhered to as given on Molex's perishable tooling data or set-ups sheets. Clean insulation stripping without nicks or scratches on the conductor is of utmost importance if a high tensile strength low resistance and good continuity crimp is to be achieved. The stripped wire should extend beyond the wire crimp barrel and the insulation should be seen between the wire crimp barrel and the insulation crimp barrel.

Proper wire handling must be observed and the operator should never present splayed strands to the wire crimp barrel. The pre-stripped wire should be placed against the wire stop. When the ram slide descends the punches will gather the wire and bring it down into the wire and insulation barrels of the terminal. The wire stop is also acting as a stripping unit extracting the terminal from the punches after the crimp operation.

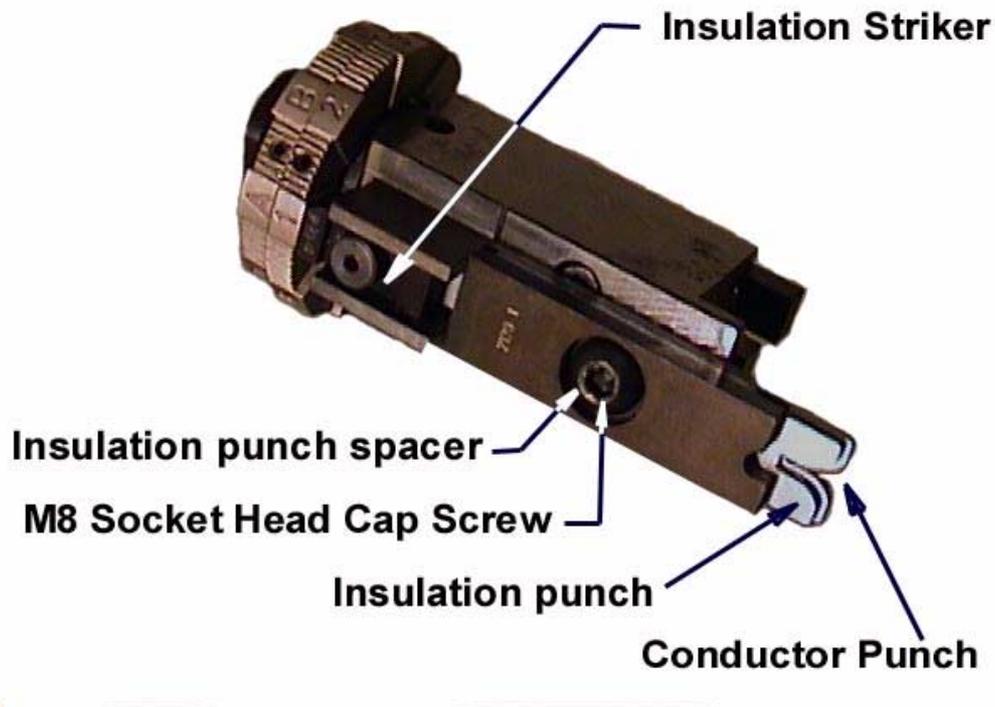


FIG.7 Mini-Mac replacement parts.



FIG.8 Typical Molex Terminals Crimped on the Mini-Mac.

Tensile Strength

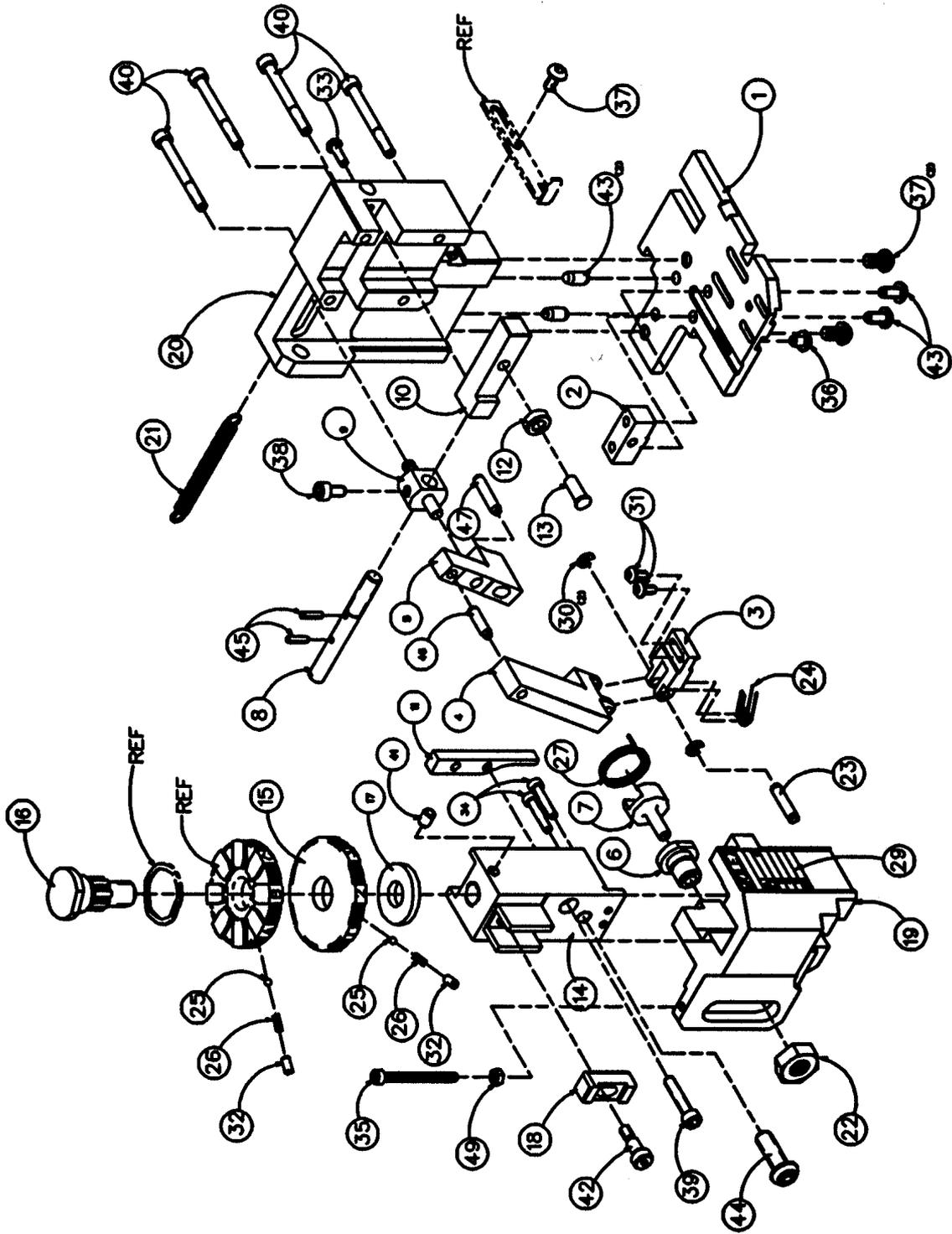
When measuring the pull-out force of a terminated wire to a Molex terminal a suitable tensile tester should be used.

Tensile requirements listed below are for solid and stranded wire and can be used for guidance. Refer to Molex Product Specification for subject terminal.

Wire Size		Joint Tensile Strength of Termination Depending Upon Crimp Height	
AWG	mm ²		
10	5.25	80 - 90 lbs.	(36.28 - 40.81 kg)
12	3.25	65 - 80 lbs.	(29.48 - 36.28 kg)
14	2.00	40 - 65 lbs.	(18.14 - 29.48 kg)
16	1.25	30 - 50 lbs.	(13.61 - 22.67 kg)
18	0.75	20 - 30 lbs.	(9.07 - 13.61 kg)
20	0.50	15 - 20 lbs.	(6.80 - 9.07 kg)
22	0.33	9 - 12 lbs.	(4.08 - 5.44 kg)
24	0.20	7 - 10 lbs.	(3.17 - 4.54 kg)
26	0.16	4 - 6 lbs.	(1.81 - 2.72 kg)
28	0.08	3 - 4 lbs.	(1.36 - 1.81 kg)
30	0.05	2.5 - 3 lbs.	(1.13 - 1.36 kg)
32	0.03	2 - 2.5 lbs.	(0.91 - 1.13 kg)
34	0.04	1.5 - 2 lbs.	(0.68 - 0.91 kg)
36	0.01	1 - 1.1 lbs.	(0.45 - 0.50 kg)

Trouble-Shooting The “MINI-MAC”

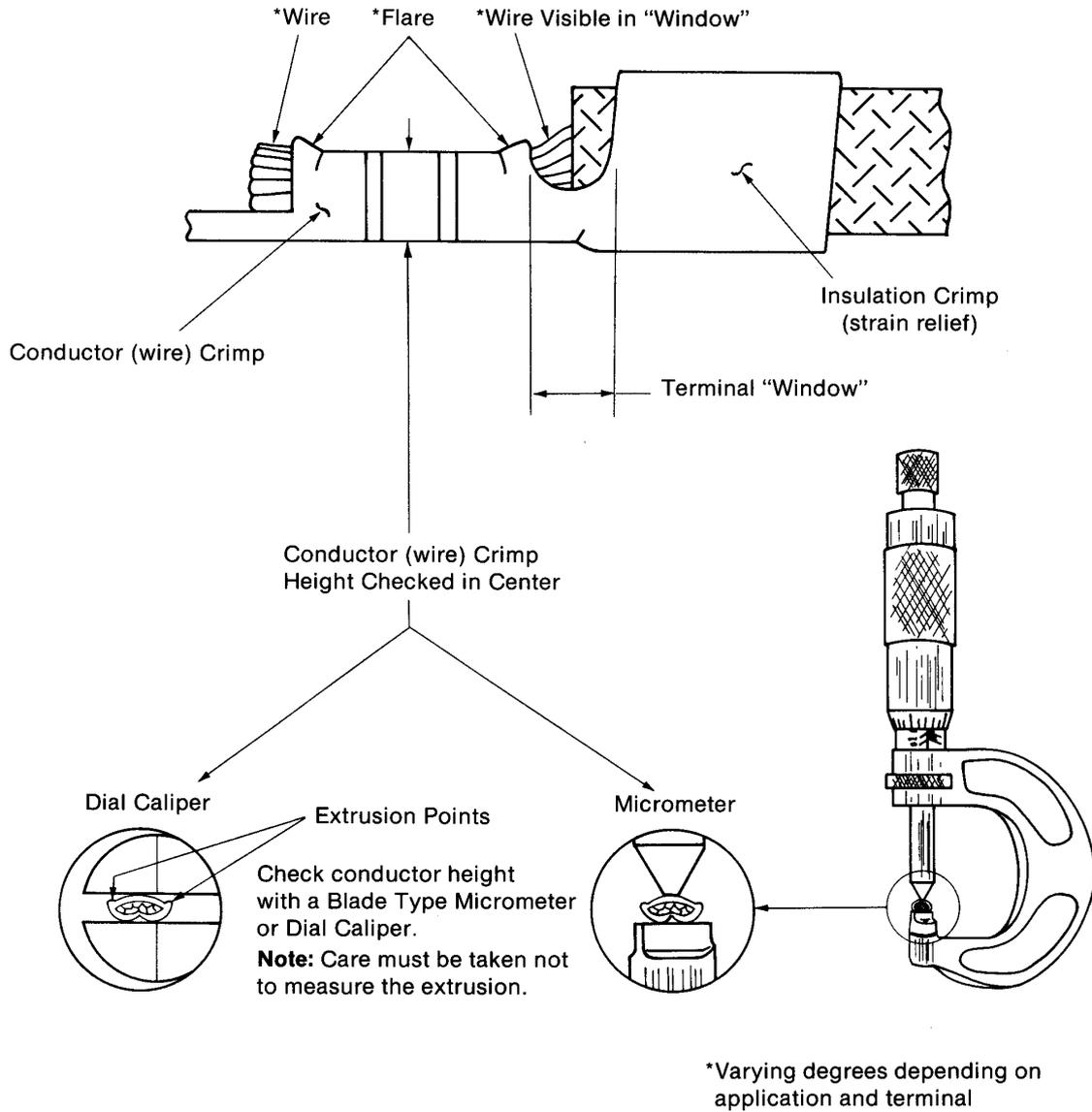
Problem	Correction
Terminal Not Advancing	Verify Terminals are not bent or damaged Check proper feed finger setting.
	Drag plate holding terminal strip back. Check compression springs
	Terminal jammed under cover plate. Cut terminal strip with shears from reel and release feed finger pulling terminal strip with a pair of pliers until dislodged from the terminal base and track.
Excessive Flare	Adjust base and track to get properly aligned with punches and anvils.
	Conductor crimp punch worn, replace
Cut-Off Punch Does Not Return to Original Position.	Plunger adjusted too tight against anvil. Readjust
	Cut-off punch spring damaged or broken. Replace spring
	Punch sides or die scored. Remove scoring marks and oil again. If problem not solved, replace with new cut-off details.
Anvil & Punches Worn, Damaged or Scored	Complete replacement is necessary because of intricate crimp configuration and polish.



Mini-Mac base applicator 69028-1493

BASIC APPLICATOR FRAME ASSY - PARTS LIST					
EDP NO: 69028-1493			ENG NO:		
ITEM	EDP NO	SIZE	ENG NO	DESCRIPTION	QTY
1	69028-0649			BASE PLATE	1
2	69028-0101			REAR SUPPORT FRAME	1
3	69028-0106			FEED PAWL LEVEL	1
4	69028-0653			FEED ARM	1
5	69028-0636			LEVER	1
6	69028-0109			HINGE BUSHING	1
7	69028-0110			SLIDER	1
8	69028-0637			FEEDING ADJUSTING SCREW	1
9	69028-0638			PIN	1
10	69028-0654			SLIDER FEEDER CAM	1
11	69028-0116			CAM	1
12	69028-0118			ROLLER	1
13	69028-0119			PIN	1
14	69028-0655			RAM	1
15	69028-0807			INS. ADJUSTING CAM	1
16	69028-0123			LUG BOLT	1
17	69028-0799			WASHER	1
18	69028-0484			INSULATION STRIKER	1
19	69028-0656			FACE PLATE	1
20	69028-0657			BACK FRAME	1
21	69028-0640			SPRING	1
22	69028-0133			SELF LOCKING NUT	1
23	69028-0147			CYLINDER PIN	1
24	69028-0154			SPRING-TORSION	2
25	69028-0155			BALL-RETAINER	2
26	69028-0156			SPRING-BALL RETAINER	1
27	69028-0647			TORSION SPRING	1
28					
29	69037-0021			MINI-MAC NAME PLATE	1
30	11-32-0548			SNAP RING 4MM	2
31	69902-1408			M4 X 8MM LG. BHCS	2
32	69901-1408			M4 X 8MM LG. SHSS	2
33	69902-1412			M4 X 12MM LG. BHCS	1
34	69901-1420			M4 X 20MM LG. SHCS	2
35	69901-1445			M4 X 45MM LG. SHCS	1
36	69902-1506			M5 X 6MM LG. BHCS	1
37	69902-1510			M5 X 10MM LG. BHCS	3
38	69901-1510			M5 X 10MM LG. SHCS	1
39	69901-1525			M5 X 25MM LG. SHCS	1
40	69901-1545			M5 X 45MM LG. SHCS	4
41	69904-1608			M6 X 8MM LG. SHSS	2
42	69905-6510			M6 X 10MM LG. SHSHLD'RS	1
43	69902-1610			M6 X 10MM LG. BHCS	1
44	69902-1825			M8 X 25MM LG. BHCS	1
45	69909-2312			3MM DIA X 12MM LG. ROLL PIN	2
46	69809-1520			5MM DIA X 20MM LG. DOWEL PIN	1
47	69809-1525			5MM DIA X 25MM LG. DOWEL PIN	1
48	69909-1616			6MM DIA X 14MM LG. DOWEL PIN	2
49	69807-1400			HEX NUT M4	1

Typical Crimp



Refer to Molex product specification for details.
FIG.9 Check wire crimp height

Slug Hole Clearance for MINI-MAC Applicators

Additional Important Information

When installing MINI-MAC Applicators with Centre Carrier Shear Punch on industry standard press, check for proper slug clearance. The slugs from the carrier strip cut-off should be able to fall freely through the press base without any obstructions.

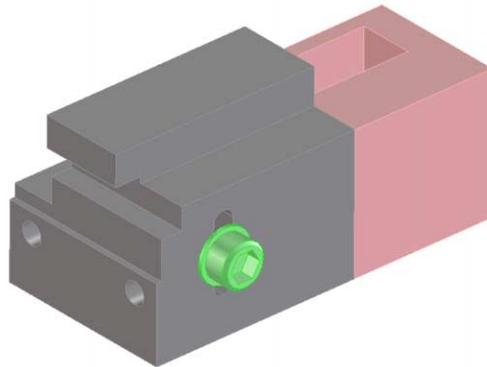
This can be checked by removing the lower tooling, anvils and cut-off block, placing the MINI-MAC in the press and just looking at the position of the slug (rectangular) hole in the MINI-MAC base and assuring no part of that hole is obstructed. If there is an obstruction, the press needs to be modified by removing material allowing the slugs to drop freely. Please remember that the base of the crimp press should be modified and not the MINI-MAC base.

Adjustable Support Block Assembly

All Molex MiniMac front carrier terminal applicators from serial number 13,714 will be supplied with a new adjustable support block assembly.

All applicable older Mini-Mac's will have this adjustable support block assembly supplied if any spares are required. Relevant part No. 2188-**.

Below is a picture of the new adjustable support block assembly. (part No. 69037-0500).



Replacing the adjustable support block assembly.

This procedure should only be attempted by a competent engineer.

1. Turn press mains power off and remove the applicator.
2. Remove the fixing screws from the base of the applicator and withdraw the assembly. (Shear die, anvil and support block).
3. Remove the anvils, shear die and replace on the new support block assembly.
4. Place the new assembly into the Mini-Mac and replace the lower fixing screws.
5. Set the height of the adjustable support block assembly*.
6. Replace Mini-Mac into press, cycle the press by hand with terminals in position to check tooling alignment.
7. Check crimping quality before starting production.

* When replacing adjustable support block, measure existing block height and adjust height to suit.

In case of any difficulties, contact your local Molex sales office.