

molex®

TM-2000 UNIVERSAL PRESS


Use with Molex FineAdjust or Mini-Mac Applicators




Operation Manual



Order No.63800-8399









- Description
- Operation
- Maintenance

Safety Warnings and Information

	<p>Read and understand all of the instructions and safety information in this manual before operating or servicing this tool.</p> <p style="text-align: center;"><u>Keep this manual available when using this tool.</u></p> <p>Replacement manuals are available for download at no charge at www.molex.com.</p>
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SAFETY ALERT SYMBOL	
<p>This symbol is used to call your attention to hazards or unsafe practices which could result in an injury or property damage. The signal word, defined below, indicates the severity of the hazard. The message after the signal word provides information for preventing or avoiding the hazard.</p>	
 DANGER	<p>DANGER: Indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.</p>
 WARNING	<p>WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</p>
 CAUTION	<p>CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. CAUTION may also be used to alert against unsafe practices associated with events that could lead to personal injury.</p>

 WARNING	 WARNING
	
<p>Always wear proper eye protection when Operating or servicing this equipment.</p> <p>Failure to wear eye protection could result in serious eye injury from flying debris.</p>	<p>Heavy Object To avoid muscle strain or back injury, use lifting aids and proper lifting techniques when removing or replacing. Failure to observe these precautions may result in injury or property damage.</p>
	
<p>Never wear clothing or jewelry that is loose or That could potentially hang into the equipment and get caught.</p> <p>Failure to observe this warning could result in Severe Injury or death.</p>	<p>Never install or service this machine while connected to any electrical power source. Disconnect power by unplugging the press from its power source.</p> <p>Failure to observe this warning could result In severe injury or death.</p>
 WARNING	 WARNING
	
<p>Never operate, service, install, or adjust this machine without proper instruction and without first reading and understanding the instructions in this manual and all applicable press and/or wire processing machine. manuals.</p>	<p>Always hand cycle the applicator in the equipment to ensure the tooling is properly aligned.</p> <p>Failure to observe these precautions may result in Injury or property damage.</p>

	 WARNING Never use this press or wire processing machine without guards or safety devices that are intended to prevent hands from remaining in the die space. Failure to observe this warning could result in Severe injury or death.	 WARNING  Do not use compressed air to clean this equipment. The forces created by compressed air can force debris into the tool. Failure to observe these precautions may result in injury or property damage.
	 WARNING Always wear proper ear protection when Operating or servicing this applicator.	
 CAUTION The Molex applicators are designed to operate in presses with standard shut heights of 135.80mm (5.346"). Installation in crimp presses with other than standard shut heights can cause severe tool breakage. It is advisable that before installation, a check of the shut height be performed. Molex will not be liable for any damages as a result of installation in a crimp press with nonstandard or improperly set shut height. Failure to observe these precautions may result in injury or property damage.		
 CAUTION Never perform any service or maintenance other than as described in this manual. Never modify, alter or misuse the equipment Molex crimp specifications are valid only when used with Molex terminals, applicators and tooling. Failure to observe this precaution may result in injury and property damage.		

Tooling Technical Assistance

Molex offers tooling technical assistance for customers who may need some guidance for tooling adjustments. This support can be obtained by calling either of the two numbers listed below and asking for the Molex Tooling Group.
Call Toll Free 1-800-786-6539 (US) 1-630-969-4550 (Global).

This assistance is limited to the operation and set-up of a customer's Molex Press. Questions with regard to Molex connector products or how to identify the proper tooling and/ or tooling documentation should be directed to your local Molex personnel or Customer Service Representative.

When calling for service on the press a copy of the *Tooling Manual* and Specific *Applicator Tooling Specification Sheet* should be present and a person that is familiar with the applicator should be present. Be sure the following information is supplied:

1. Customer name
2. Customer address
3. Person to contact such as (name, title, e-mail, and telephone number)
4. Applicator order number (Lease number also if applicable)
5. Serial number (Lease number also if applicable)
6. Molex Connector product order number
7. Urgency of request
8. Nature of problem

Molex Application Tooling Group

2200 Wellington Court
Lisle, IL 60532, USA
Tel: +1 (630) 969-4550
Fax: +1 (630) 505-0049

Visit our Web site at <http://www.molex.com>

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Section 1

General Description

- 1.1 Description
- 1.2 Features
- 1.3 Technical Specifications
- 1.4 Delivery Check
- 1.5 Tools

General Description

1.1 Description

The 63800-8300 (120V AC version) and the 63800-8400 (240V AC version) TM-2000 Universal Press is an economical, electrically-operated, single-cycle flywheel press. It is designed to provide an effective method of applying a wide range of side-feed and rear-feed terminals to a pre-stripped discrete wire or cable. The TM-2000 is suited to mid-volume semi-automatic operations.

Production flexibility is obtained through the use of interchangeable FineAdjust or Mini-Mac applicators.

The TM-2000 will complete one crimping cycle with each depression of the foot pedal. Safe operation is provided by an interlock switch that renders the press inoperative if the safety guard is removed.

1.2 Features

- Utilizes both FineAdjust and Mini-Mac applicators, and most industry standard applicators
- Industry shut height of 135.80mm (5.346")
- Ideal for mid-volume, semi-automatic applications
- Meets ISO standard
- Totally enclosed for operator safety, including a power interlock switch for the front guard, with "guard open" indicator light
- Resettable counter for accurate batch counting
- Modular solid state controls. Power cord and foot pedal plug in easily
- CE certified for sale in Europe (240/50 Hz version)

1.3 Technical Specifications

Dimensions with reel mounted

Height 1260.00mm (49.60")
 Width 560.00mm (22.00")
 Depth 686.00mm (27.00")
 Unpacked weight 145kg (320 lbs)

Power Requirements

Voltage: 63800-8300-120V AC 60 HZ
 Voltage: 63800-8400-240V AC 50 HZ

Note: Press shipped setup for 120V AC service

Production Rate

500 terminations per hour maximum, depending on operator skill and wire length.

Flywheel Rotation: 210 RPM

Processing Capability

Up to 10 AWG (5.0mm²) of copper conductor in solid or stranded wire.

Sound Level

Operator will be exposed to less than 85 DB.

1.4 Delivery Check

After removing the packaging band, the top and sides of the box should lift off easily. The following items are included in this package :

	<u>Quantity</u>
Main Press Body	1
Reel Support Assembly	1

Carton Contents	<u>Quantity</u>
69018-6237 PowerCord (for 63800-8300)	1
OR	
62500-0113 Power Cord (for 63800-8400)	1
63800-8394 Foot Pedal	1
69018-8235	
10 mm Hex Wrench	1
63800-8399	
TM-2000 Instruction Manual	1

* For international applications, the power cord/plug may need to be replaced or adapted with the appropriate connection.

1.5 Tools

The following tools are recommended for setup and adjustments to the applicator in this press

- ✓ Metric hex wrench set
- ✓ Small standard screwdriver
- ✓ Adjustable wrench
- ✓ Needle nose pliers
- ✓ Crimp micrometer
- ✓ Eye loupe (10x)
- ✓ Wire stripper/cutter

Section 2

Installation

- 2.1 Lifting/Mounting
- 2.2 Reel Support
- 2.3 Foot Pedal and Power Connection
- 2.4 Terminal Feed Guide
- 2.5 Function Test
- 2.6 Safety and Work Area Check

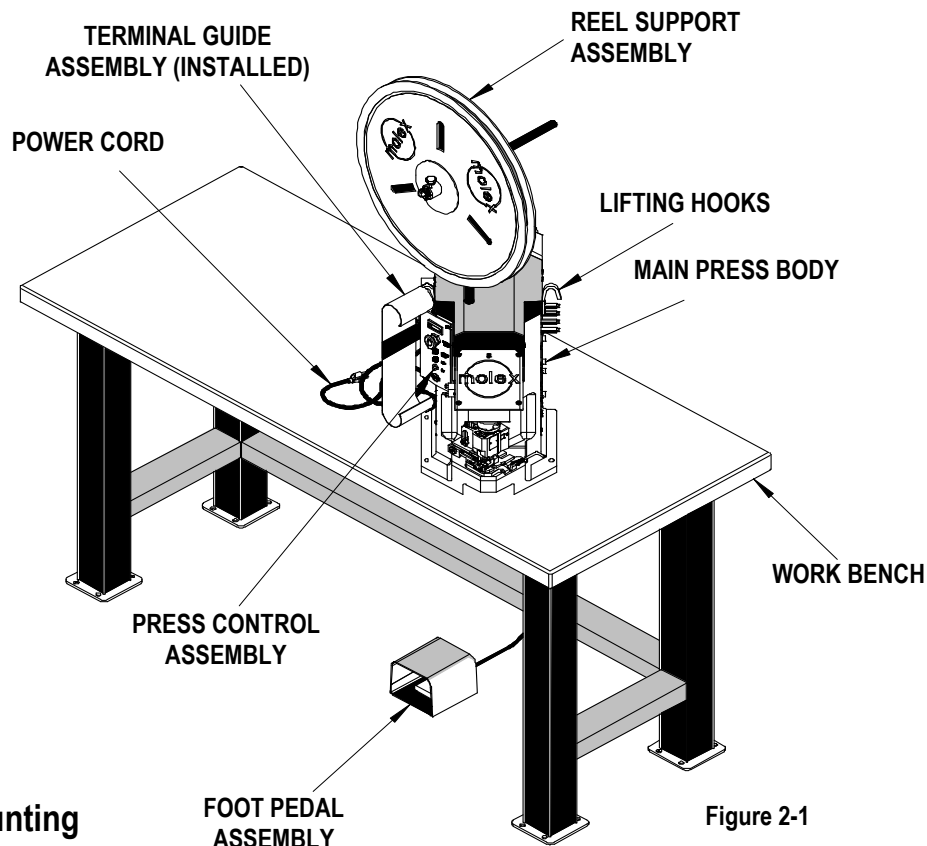


Figure 2-1

2.1 Lifting/Mounting



WARNING: The TM-2000 Press weighs over 145 kg (320 lbs); it should not attempt to be lifted by one individual. Mechanical lifting devices should be used. A person lifting the press can sustain severe back or other injuries.

Lifting hooks are provided on each side of the press. A heavy-duty chain, rope, cable, or belt can be used with loops, links, or rings on each end that can securely attach to the lifting hooks. An electric, hydraulic, or mechanical crane should be used to lift the press. Lift the press up approximately 12.00mm (.50") and verify that the press is well balanced. Upon verification, the press can be lifted onto a sturdy workbench. Access to the back of the machine is required for manual cycling. A wooden bench that is a minimum of 25.00mm (1.00") thick will offer quiet vibration-free operation. For thinner or sheet metal tops, the TM-2000 can be attached to the table with two 12mm bolts. Bolts are not supplied by Molex.

2.2 Reel Support

Install the reel support in the hole located on the left side of the top cover. For rear feed, rotate the reel support as required. See Figure 2-2.

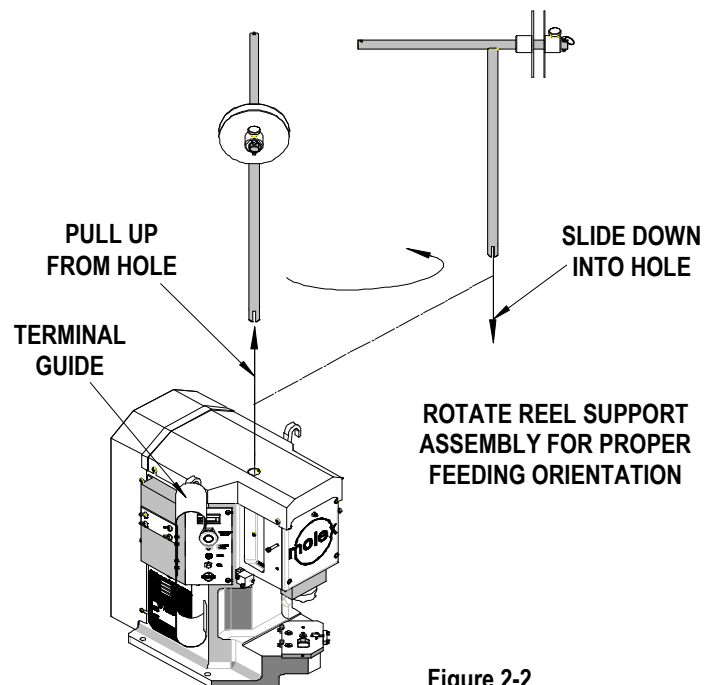


Figure 2-2

2.3 Foot Pedal and Power Connection

Connect the 4-pin plug for the foot pedal in the rear of the press control assembly. Turn the locking ring clockwise until tight. Connect the power cord plug to the socket in the back of the control assembly. Use a grounded electrical outlet as the power source. Two fuses are located in the fuse drawer directly above the power socket. To replace the fuses, use a small screwdriver to open the fuse drawer, remove damaged fuses and replace. See Figure 2-3.

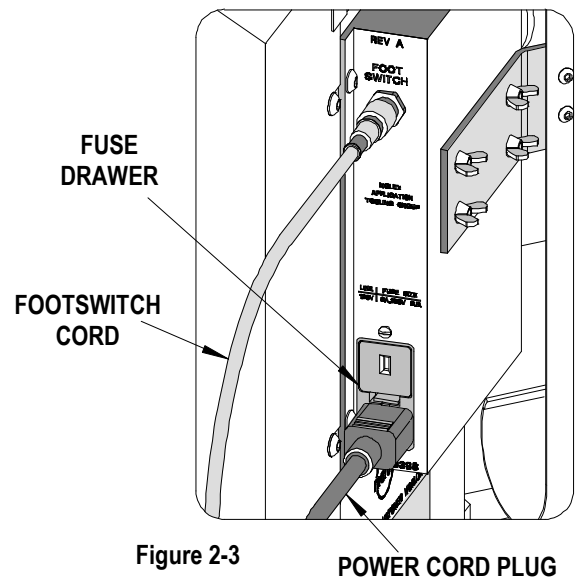


Figure 2-3

POWER CORD PLUG

2.4 Terminal Feed Guide

Depending on side or rear-feed applications, the terminal guide plate and bracket must be repositioned.

The TM-2000 press is set for side-feed applicators when shipped from the factory. When rear-feed applicators are used, the four 5mm wing nuts are removed. The guide bracket is rotated 180 degrees and the assembly is then mounted on the right side of the press. See Figure 2-4.

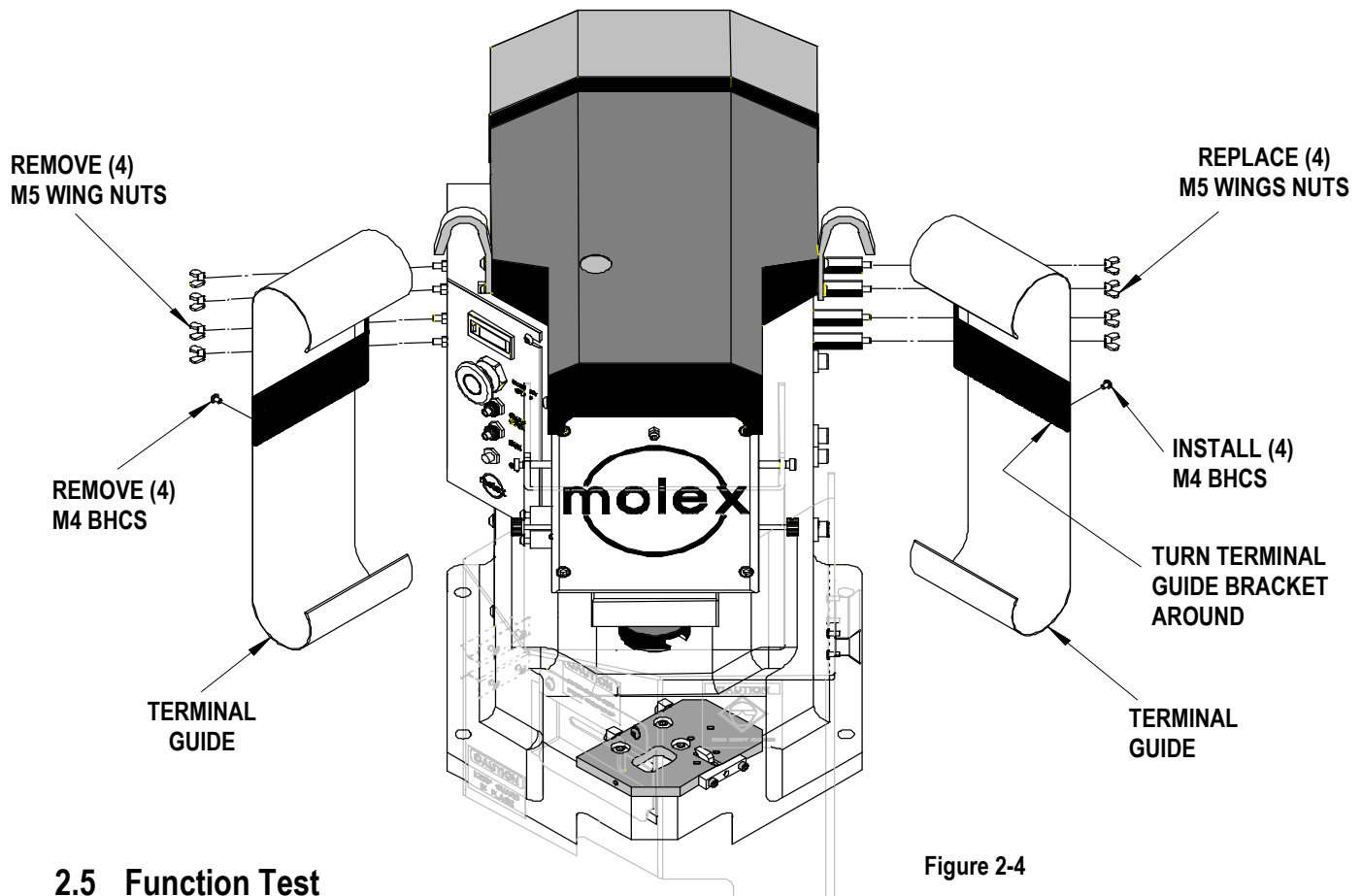
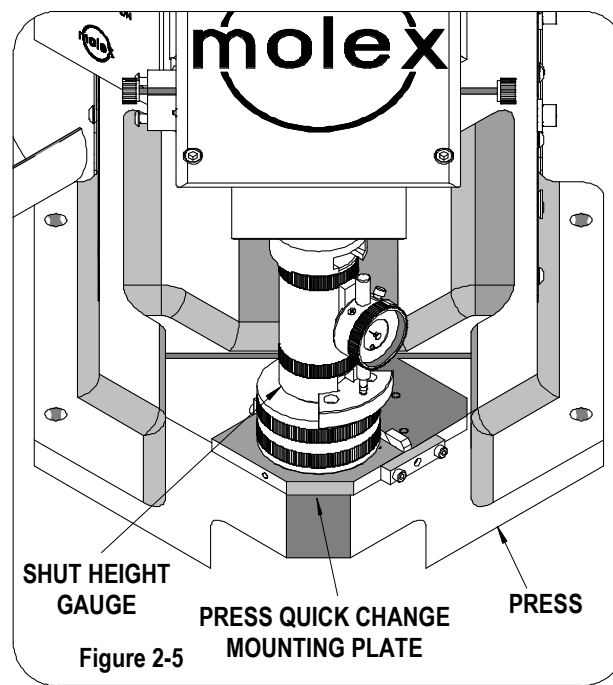


Figure 2-4

2.5 Function Test

When the TM-2000 is shipped from the factory, it is set to the industry shut height of 135.80 mm (5.346") with a calibrated load gauge. The press shut height gauge is spring loaded to give an accurate reading on the press shut height. See Figure 2-5. Molex recommends hand cycling the press each time an applicator is installed.



CAUTION: Always manually cycle the press before restoring power to the machine.

Verification of Press Shut Height

The shut height of 135.80mm (5.346") should not change throughout the life of the press. However, the shut height should be checked on a periodic basis with a calibrated shut height gauge or if it is thought the shut height might have been altered.

Shut height gauges may be purchased from:

Artos Eng.	602-581-0070
Komax Corp.	847-537-6640

The gauges should come with instructions for use and calibration. See Section 4.3 of this manual for resetting the shut height of the TM-2000 to industrial standards.

2.6 Safety and Work Area Check

Check that the crimping position is ergonomic for the operator's size. A bench height of 762.00 to 813.00mm (30.00 to 32.00") will provide operator comfort, and allows both feet to rest on the floor. The foot pedal should be placed in a comfortable position. Check that the press position is located approximately 150.00mm (6.00") from the edge of the bench. A chair or stool with adjustable height and backrest should be provided for maximum comfort and back support for the operator. Observe where the emergency stop button is on the control panel. See Figure 2-6.

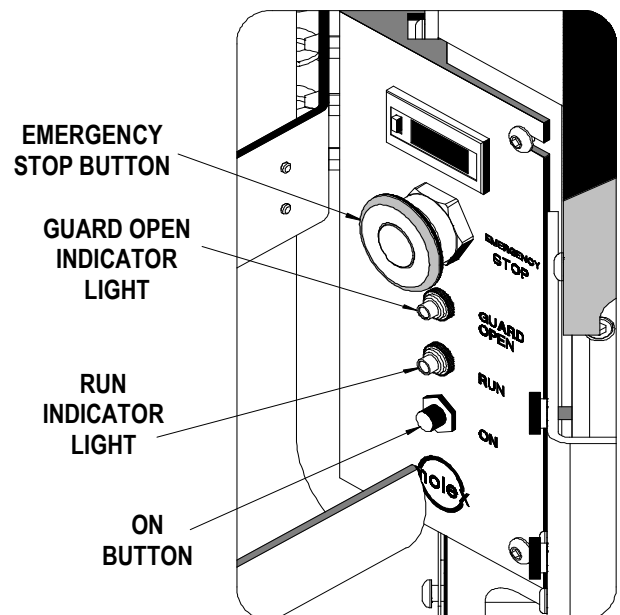


Figure 2-6



CAUTION: Molex recommends that the operator and observers wear eye protection when the press is in operation or being serviced.

Section 3

Setup and Operation

- 3.1 Applicator Installation and Removal
- 3.2 Manually Cycling the Press
- 3.3 Operation

3.1 Applicator Installation and Removal



Always turn off and disconnect the power supply to the press. Turn off the “POWER” switch located on the control panel.

Steps

1. Remove press guard.
2. Verify that the applicator is for the product. (Reference specification sheets supplied with the applicator).
3. Clean the press quick change mounting plate of scrap or chips that may interfere with the applicator installation.
4. Using a 4mm hex wrench, turn the M5 x 30.00 Lg. SHCS clockwise until the locking clamp is in the full out position.
5. Locate the applicator lug bolt in the press yoke. See Figure 3-1.
6. Align the applicator base plate with the locator clamps on the press quick change mounting plate.
7. To lock applicator, turn M5 x 30.00 Lg. SHCS counter clockwise until tight.
8. Confirm that the applicator is secured properly.

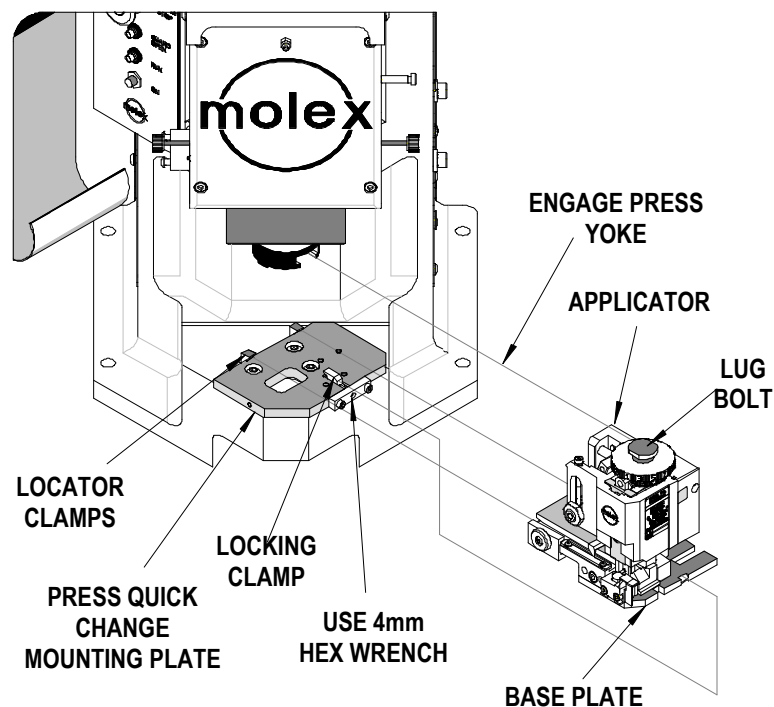


Figure 3-1

3.2 Manually Cycling the Press



Power down the press by pressing the emergency stop button located on the control panel.



Always hand cycle the applicator in the press to ensure the tooling is properly aligned and terminal feed adjustment. It also gives the setup person the ability to step through the press cycle manually.

Steps

1. Insert the 10mm hex wrench through the access hole in the center of the rear cover and locate it in the M12 SHCS. See Figure 3-2.
2. Rotate the hex wrench counter clockwise. This turns the flywheel and moves the ram down and up.

3. Always return the press back to top dead center insuring that the clutch collar is engaged by the actuator. This is done by reversing the direction of the 10mm wrench after hearing the clutch actuator make a click sound. See Figure 4-3.
4. Remove the 10mm hex wrench.

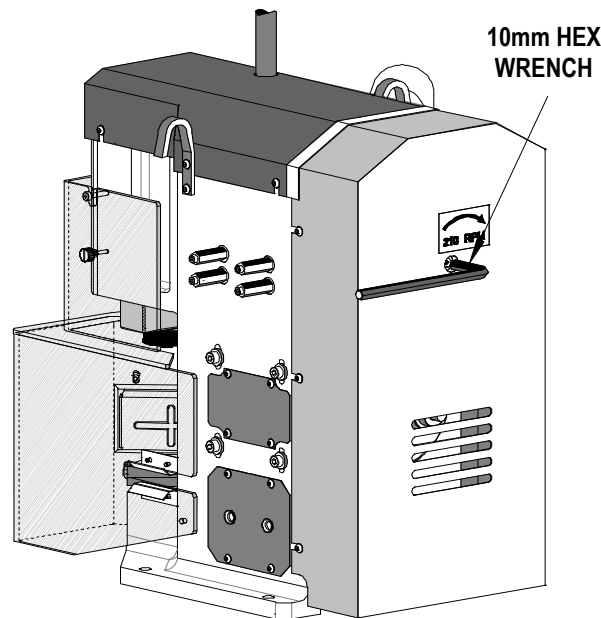


Figure 3-2

3.3 Operation



CAUTION: Make sure the press guard is in position and all setup procedures are followed. Follow the safety and work area instructions.

Steps

1. Wire should be stripped and prepared for processing.
2. Place the prestripped wire through the slot in the press guard and push until it contacts the wire stop. See Figure 3-3.
3. Press the foot pedal down once. Use a sweeping motion to the right with the crimped wire.
4. Check the crimped wire and confirm that it meets the applicator specifications and visual inspection.

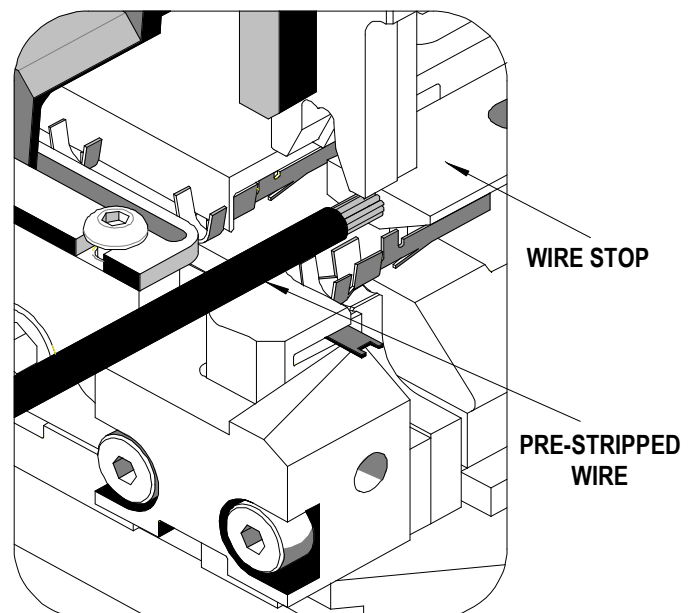


Figure 3-3

Section 4

- 4.1 Maintenance
- 4.2 Clutch Service/Replacement
- 4.3 Shim Installation/Removal
- 4.4 Oiler

4.1 Maintenance



Always turn off and disconnect the power supply to the press. Turn off the "POWER" switch located on the control panel.

The TM-2000 press requires very little maintenance. The press ram will need to be greased periodically using the grease fitting located on the face plate or remove the face plate and apply grease as indicated. See Figure 4-1.

For efficient operation the TM-2000 press should be cleaned daily with a soft bristle brush to remove any carrier strip debris and terminal plating dust from the tooling area.

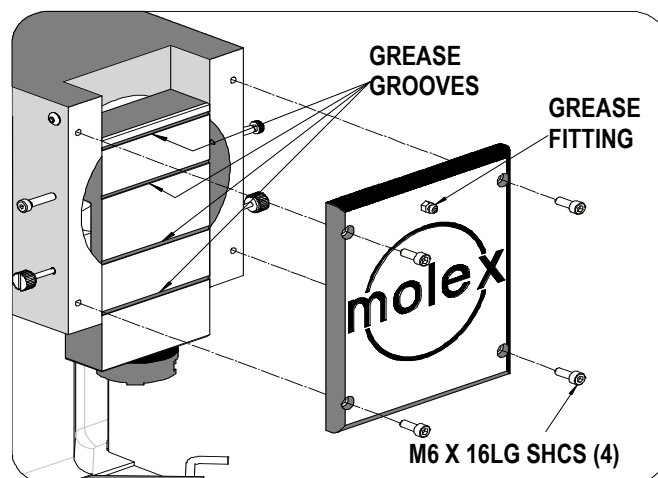


Figure 4-1

4.2 Clutch Service/Replacement

Operation Check 1



Always turn off and disconnect the power supply to the press. Turn off the "POWER" switch located on the control panel.

1. Remove the rear cover of the TM-2000 press. Verify that the clutch control collar is in the locked position. See Figure 4-3. Insert the 10mm hex wrench into the socket head cap screw. This screw is located in the center of the flywheel. See Figure 4-2. This screw is spring loaded to prevent the wrench being left in the unit.
2. Attempt to rotate the hex wrench clockwise. If the unit will not turn, it is functioning properly.
3. Next, rotate the input hub/flywheel clockwise by hand. The input hub/flywheel should be free to rotate. During this portion of the operational check, the black spring housing should not rotate. See Figure 4-2.
4. If the unit fails operational check 1, the clutch unit has failed internally or the actuator is not functioning properly and the clutch unit must be replaced.

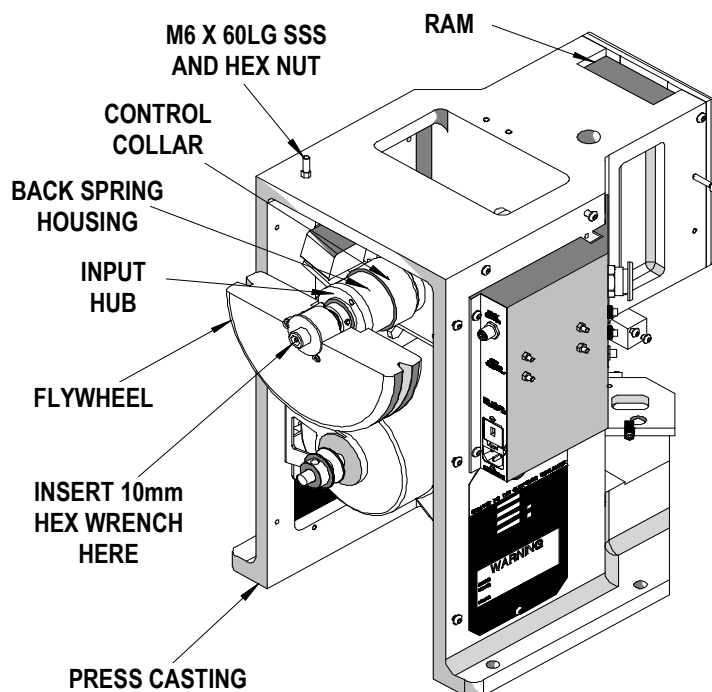


Figure 4-2

Operation Check 2



CAUTION: By disengaging the actuator, (See Figure 4-3) the ram will be free to move. The weight of the ram can result in downward motion. Use caution to ensure that the area under the ram is clear of fingers and hand tools. The machine guard should be in place.

1. Verify that the clutch control collar is unlocked. See Figure 4-3. The crankshaft, input hub/flywheel, and black spring housing should rotate freely with the 10mm wrench moving the ram down and up.
2. After 360 degrees of clockwise rotation, the actuator will engage the clutch control collar and rotation will stop. This is normal operation.

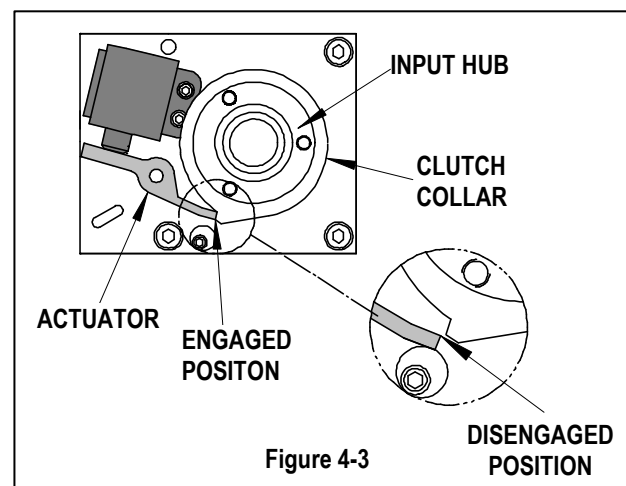


Figure 4-3

3. If rotation with the 10mm wrench is not possible, and the actuator is disengaged, the clutch unit is demonstrating early signs of failure and must be replaced.

Removing the Clutch Unit



WARNING: This procedure should be followed to ensure compliance with safety instructions. Molex cannot accept liability in the event of a subsequent accident caused by clutch failure when improperly serviced by the customer.



Always turn off and disconnect the power supply to the press. Turn off the "POWER" switch located on the control panel. See Figure 4-4 for the following steps.

1. Remove the V-Belt.
2. Disconnect the leads from the clutch solenoid.
3. Remove the flywheel bearing retainer screw and washer from the end of the crankshaft.
4. Remove (3) M6 x 40.00 Lg. SHCS from the flywheel.
5. Remove the flywheel. The inner race of the flywheel may stay on the crankshaft when the flywheel is removed.
6. Remove the 5.0mm x 35.00 Lg. spiral pin from the clutch and crankshaft using a drive punch.
7. Remove the (3) M6 x 16.00 Lg. SHSS (socket head shoulder screw) from the clutch plate.
8. Pull the clutch/solenoid assembly from the crankshaft. This may require pry bars to push from the rear side of the clutch plate. If the inner race of the flywheel remained on the crankshaft, it will be pushed off before the solenoid/clutch assembly.
9. Determine if the inner race for the flywheel can be reused or be replaced.

Installing the Clutch Unit



Note: The (3) M6 x 16.00LG SHSS (socket head shoulder screw) used to mount the clutch plate permit free axial and radial movement around the crankshaft. This allows the friction surfaces to be in perfect alignment for the wrap-up function of the springs. Free movement of the unit is necessary because the brake hub is rigidly attached to the clutch plate and any restrictions could result in malfunction and possible damage to the springs.

See Figure 4-4 for the following steps.

1. Slide the solenoid/clutch assembly onto the crankshaft.
2. Replace (3) M6 x 16 Lg. SHSS.
3. Secure the clutch to the crankshaft by inserting a new 5.0mm x 35 Lg. spiral pins.
4. Adjust the clutch timing. See section 4.2.5: Solenoid/Clutch Assembly Adjustment.
5. Slide the inner race onto the crankshaft followed by the flywheel.
6. Replace the (3) M6 x 40 Lg. SHCS in the flywheel.
7. Replace the flywheel bearing retainer screw and washer in the end of the crankshaft.
8. Reconnect the leads for the clutch solenoid.
9. Replace the V-Belt.

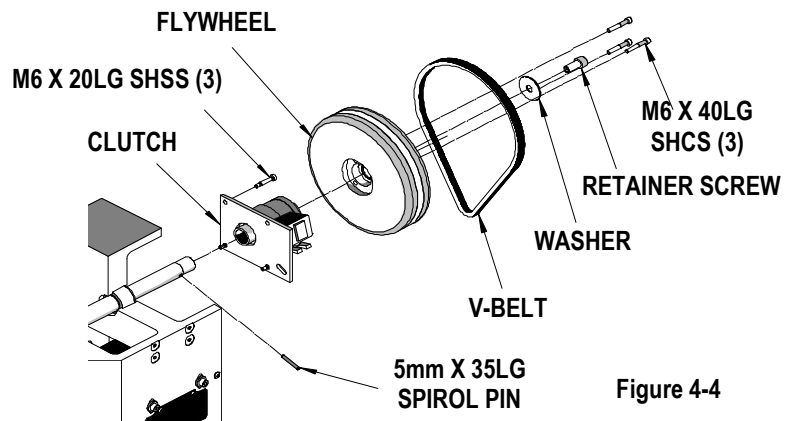


Figure 4-4

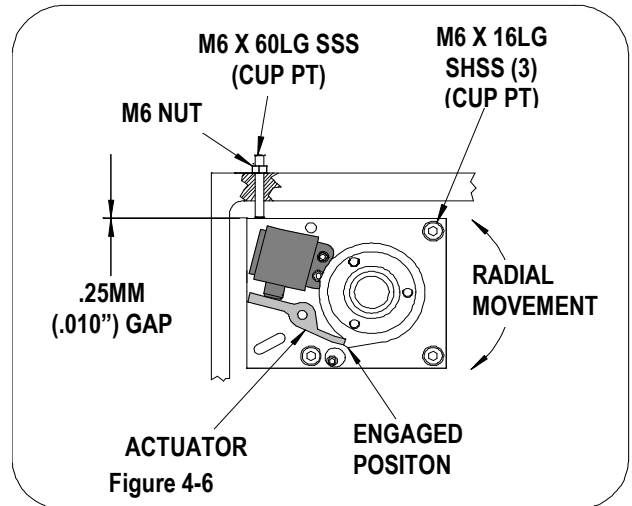
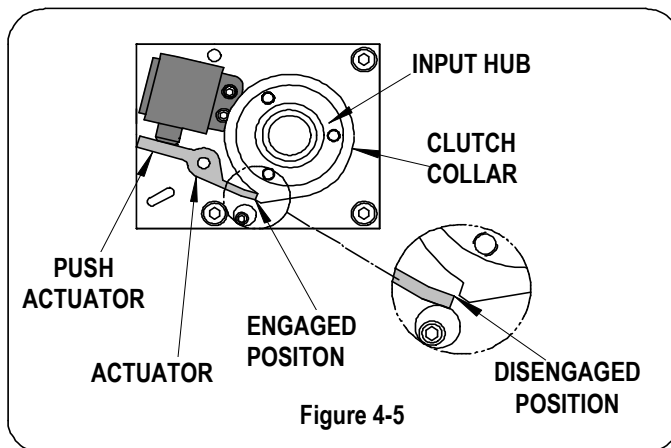
Solenoid/Clutch Assembly Adjustment



CAUTION: By disengaging the actuator, (See Figure 4-3) the ram will be free to move. The weight of the ram can result in downward motion. Use caution to ensure that the area under the ram is clear of fingers and hand tools. The machine guard should be in place.

1. Locate the retaining ring in front of the clutch control collar, (See Figure 4-2). Using a regular tip screwdriver, unseat the ring from its groove and slide it toward the flywheel.

- Insert the 10mm hex wrench into flywheel bearing retainer screw. Hold the wrench firmly and release the clutch control collar by pushing the actuator. See Figure 4-5. The crankshaft, input hub/flywheel, and black spring housing are now free to rotate.



- Rotate the 10mm hex wrench clockwise observing the ram down and up motion. When the ram has traveled a complete down and up motion, hold the position of the ram just past top dead center (this is when the ram has traveled to the full up position and starts its descent downward).
- Now observe the relationship of the control collar to the actuator. See Figure 4-5. If the control collar is butted up against the actuator, no adjustment is required.
- If the control collar stops short of the actuator, pull the control collar back towards the flywheel and reposition the collar to the new setting. The control collar uses spline teeth to control the engagement.
- Replace the retaining ring to lock the control collar in position.
- Verify proper clearance for radial movement of the solenoid/clutch assembly. Check the gap between the solenoid/clutch mounting plate and the M6 stop screw located on the upper left hand corner. If the gap is more or less than the recommended 0.25mm (.010") loosen the M6 nut and adjust the screw to the appropriate gap. Be certain to tighten the nut and double check the gap after securing the nut. See Figure 4-6.

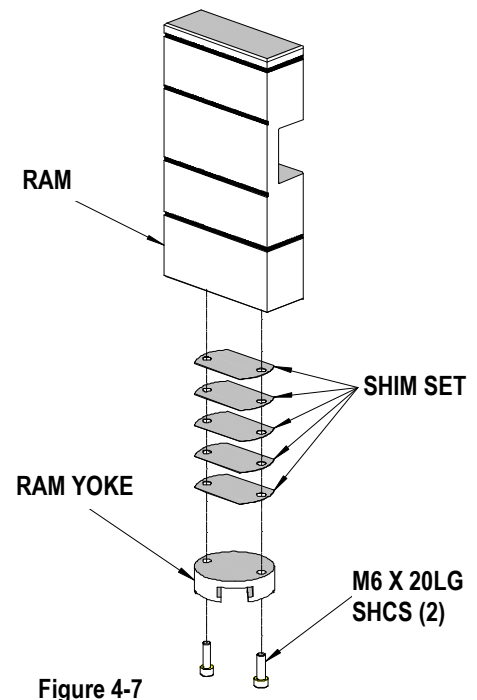
Solenoid/Clutch Assembly Lubrication

The clutch has sintered metal components that have been impregnated at manufacturing with bearing infusion oil No. 33 for permanent lubrication. When the machine is subjected to continuous heavy-duty operation or the machine operates in high temperature or in less than clean environments, the bearing oil may wash out or the assembly may become polluted with foreign matter. Flushing in a lighter bearing infusion oil as used in manufacturing can restore efficiency. If this process proves ineffective, the solenoid/clutch assembly should be replaced.

4.3 Shim Installation/Removal



Always turn off and disconnect the power supply to the press. Turn off the "POWER" switch located on the control panel.



The TM-2000 is shipped from the factory set at the industry shut height of 135.80mm (5.346") . The shut height can be changed by adding or removing shims. SeeFigure 4-7.



CAUTION: Molex will not be responsible for damage to applicators when the industry shut height of 135.80mm (5.346") has been changed on the press. Molex recommends that all shim adjustments be done to the applicator.

4.4 Oiler

Description

The wick action oiler is included as an option to lubricate. This ensures the products when entering and feeding through tooling to ensure smooth, trouble-free operation. The oiler applies a thin coat of oil to the terminals for proper feed and better release from termination punches. The oiler is primarily used for terminals with gold plating. To avoid contamination when shipped and during setup, the oiler is shipped from the factory with no lubricant oil.

Adjustments

Oiler Position

Adjust the position of the oiler unit using the mounting screw that attaches the oiler to the guard assembly. Simply loosen the screw, slide the unit to the desired position, and tighten the screw. The unit can be removed and placed on the right side of the guard assembly for rear-feed applications.

Oiler Wick

Adjust the height of the oiler wick by pulling up or pushing down on the wick to the appropriate height. The wick can be moved using pliers or simply grab it with your fingers.

Maintenance

Filling the Reservoir

While firmly holding the lid, screw the jar (oil reservoir) counter clockwise until it is removed. Fill the jar with the desired lubricant oil and replace the lid.

Replacing the Wick

While firmly holding the lid, screw the jar oil reservoir) counter clockwise until it is removed. Feed a new wick up into the tube until it protrudes from the top end of the tube and replace the lid.

Package of 25 Wicks: Molex Order No: 63890-0727

Lubricant Oil

Recommended oil: Transdraw B-19

Vendor: Mid-Town Petroleum
9707 South 76th Avenue
Bridgeview, IL 60455
Toll-Free: 877-255-3533
Direct: 708-599-8700

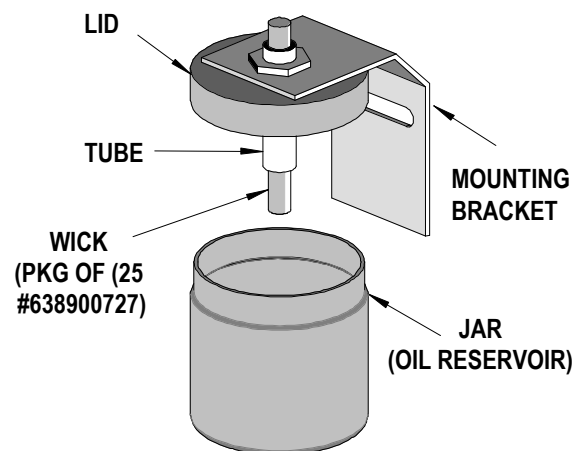


Figure 4-8 OILER ASSEMBLY

Fax: 708-599-1040
E-mail: sales@midtownoil.com
www.midtownoil.com
www.precisionlubricantsinc.com

Maintenance Schedule

The following is offered as a general guideline for maintenance. Tool life can be increased with good maintenance practices or decrease with lack of maintenance.

Items	Frequency Cycles	Frequency Time	Materials
Rams	25,000	Daily	Bearing Lube
Clutch Settings	500,000	Quarterly	None Required
Cleaning	25,000	Daily	Use soft bristle brush on applicator mounting plate
V-Belt	500,000	Quarterly	Check tension and for cracks. Replace if required.

Section 5

- 5.1 Parts List
- 5.2 Assembly Drawings
- 5.3 Electrical Schematics
- 5.4 Troubleshooting

5.1 Parts List

Item	Order No.	Description	Qty
1	63800-6905	Press Yoke	1
2	63800-6997	Quick Change Mounting Plate	1
3	63800-8301	Press Frame	1
4	63800-8302	Press Face Plate	1
5	63800-8303	Press Ram	1
6	63800-8306	Crankshaft	1
7	63800-8309	Mounting Bracket	1
8	63800-8350	Guard Assembly	1
9	63800-8311	Trip Rod	1
10	63800-8357	Actuator Mounting Block	1
11	63800-8315	Rear Cover	1
12	63800-8316	Front Cover	1
13	63800-8317	Adjustment Screw	1
14	63800-8318	Press Motor Mount	1
15	63800-8319	Limit Switch Bracket	1
16	63800-8320	Shim Set	1
17	63800-8326	Serial Number Plate	1
18	63800-8327	Upper Cover Plate	1
19	63800-8328	Lower Cover Plate	1
20	63800-8398	Control Assembly	1
21	63800-8330	Support Tube Weldment	1
22	69002-5013	Disc Assembly	2
23	69002-5073	Main Wiring Harness (not shown)	1
24	63890-0720	Oiler Assembly	1
25	69002-5518	Eccentric Bearing Retainer	1
26	69002-5520	Crankshaft Bearing Retainer	1
27	69002-5521	Flywheel	1
28	69002-5523	Bearing Retainer	1
29	69002-5541	Plunger	1
30	69002-5555	Flywheel Bearing Screw	1
31	69002-5556	Terminal Guide	1
32	69002-5607	Front Bearing Retainer	1
33	63800-8394	Footswitch Assembly	1
34	11-40-0185	Lifting Hooks	2
35	63600-0805	Post	4
36	63700-2493	Flexible Vinyl Plug	2
37	69018-5044	120V -1/3 HP motor **	1
38	69018-6052	Limit Switch	1
39	69018-6219	8.0 Amp Fuse (not shown) **	2
40	69018-6237	Power Cord (120V) **	1
41	69018-6241	Solenoid/Clutch Assembly	1
42	69018-7031	Crankshaft Bearing	1
43	69018-7032	Inner Race	1
44	69018-7033	Eccentric Bearing	1
45	69018-7034	Inner Race	1
46	69018-7035	Eccentric Bearing	2
47	69018-7036	Inner Race	2

48	69018-7037	V – Belt	1
49	69018-7038	Pulley	1
50	69018-8135	Knurled Knob	1
51	69018-8136	Quick Release Pin	1
REF	69018-8235	Hex Wrench (10 mm)	1
53	69018-9542	Compression Spring	1
REF	63800-8399	TM-2000 Manual	1
55	69002-5552	RPM Label	1
56	63800-8355	Guard Insert (Deep)	1
57	63800-8356	Guard Insert (Shallow) (Optional)	REF
58	63700-2344	Caution Label	1

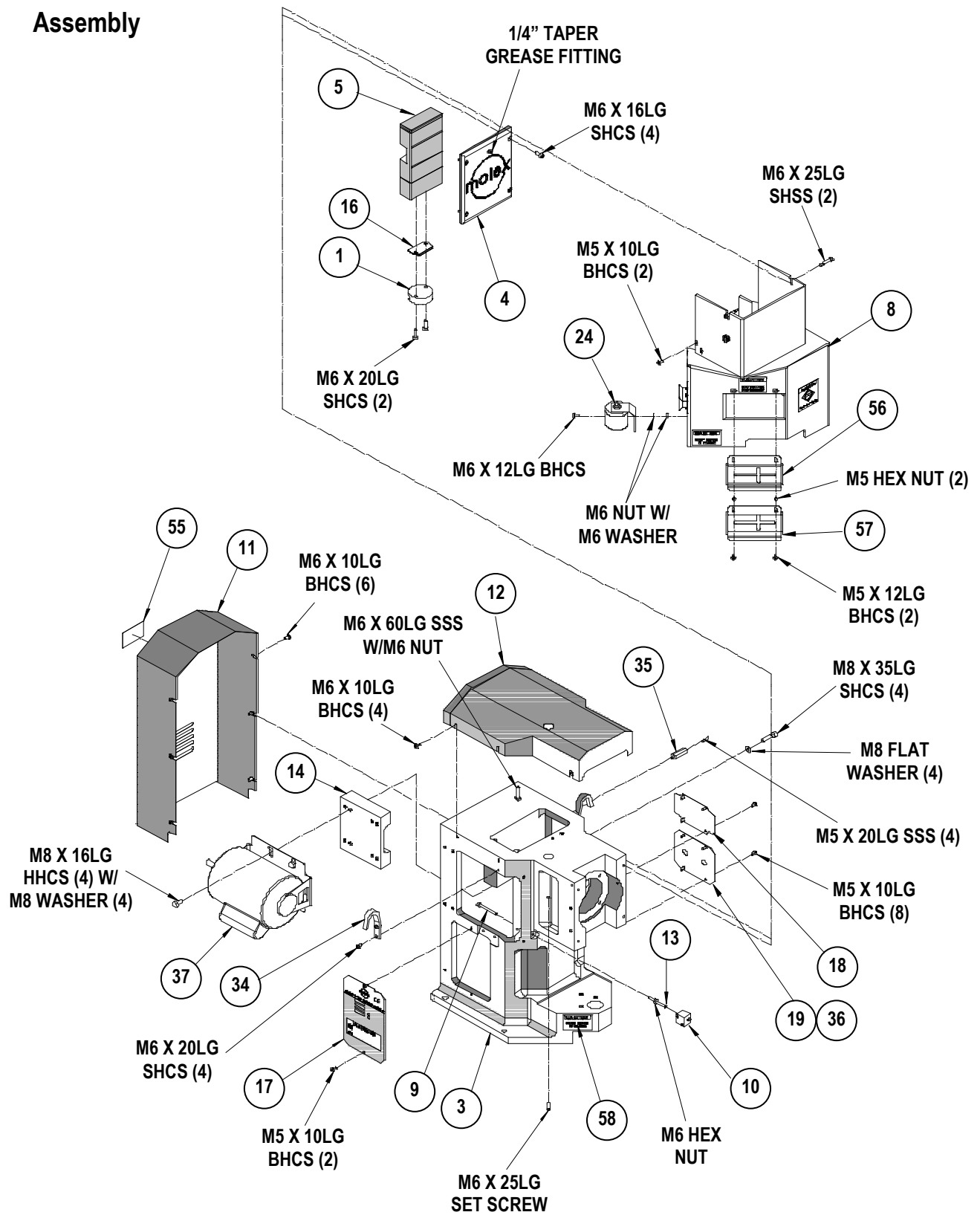
**Components for 240V AC Version

Item	Order no	Description	Qty
59	62500-0113	Power Cord (240V)	1
60	69018-5021	240V AC 50 Hz Motor	1
61	69018-6239	5 Amp Fuse (not shown) RSP	2

Hardware

Item	Description	Qty
1	M4 X 6LG BHCS	4
2	M4 X12LG SHCS	2
3	M5 X 10LG BHCS	14
4	M5 X 10LG FHCS	1
5	M5 X 20LG SSS	4
6	M5 X 12LG BHCS	2
7	M5 Hex Nut	2
8	M5 Wing Nut	4
9	5mm Dia X 35LG Spiral Pin	1
10	M6 X 10LG BHCS	10
11	M6 X 12LG BHCS	1
12	M6 X 12LG FHCS	4
13	M6 X 12LG SSS	1
14	M6 X 16LG SHCS	4
15	M6 X 20LG SHSS	3
16	M6 X 20LG SHCS	6
17	M6 X 25LG SHSS	2
18	M6 X 25LG Set Screw	1
19	M6 X 40LG SHCS	3
20	M6 X 60LG SSS	1
21	M6 Flat Washer	1
22	M6 Hex Nut	3
23	M8 X 16LG HHCS	4
24	M8 X 35LG SHCS	4
25	M8 Hardened Flat Washer	8
26	1/4"-28 Taper Grease Fitting	1

5.2 Assembly



5.2 Assembly (continued)

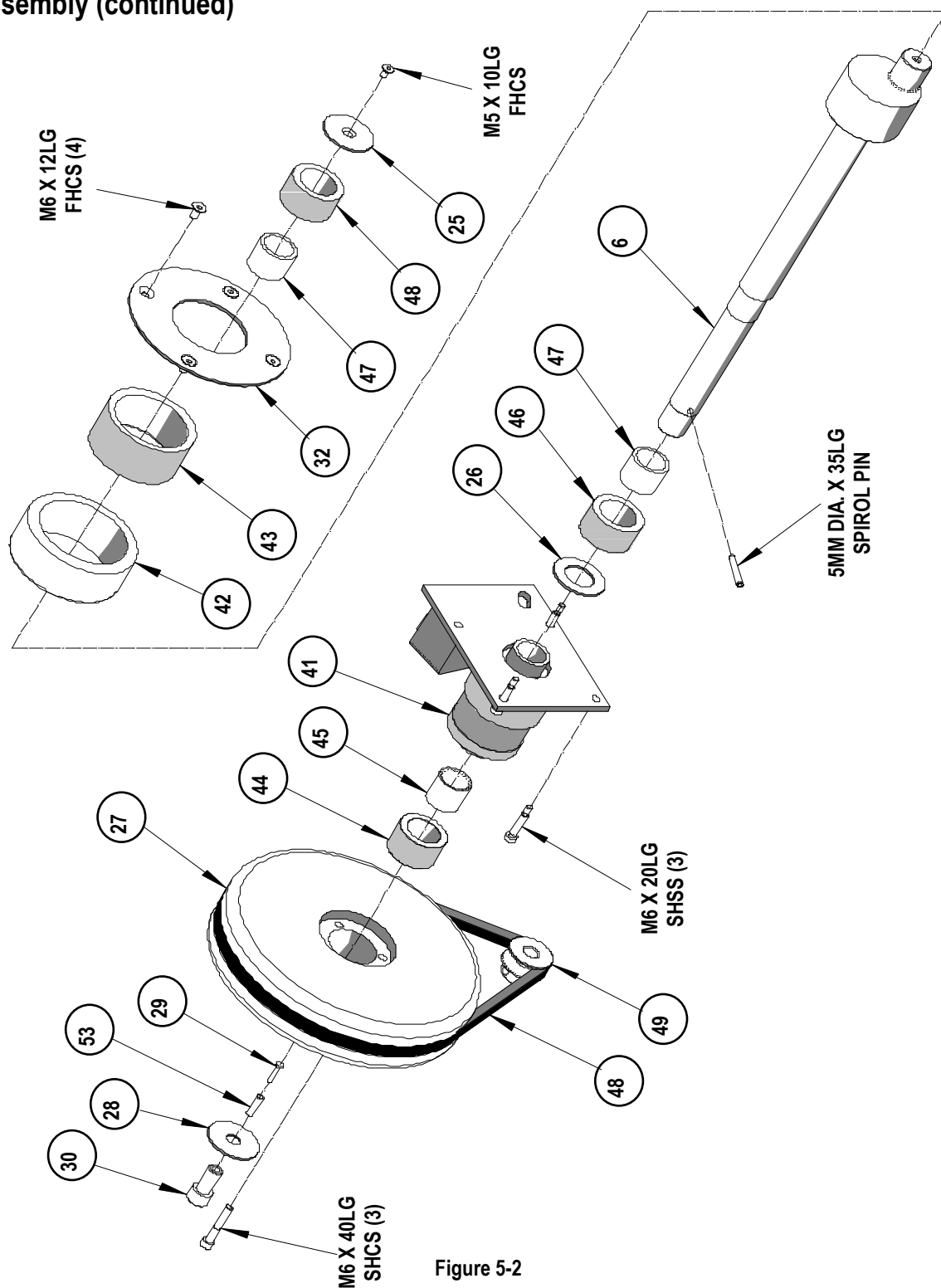


Figure 5-2

5.2 Assembly (continued)

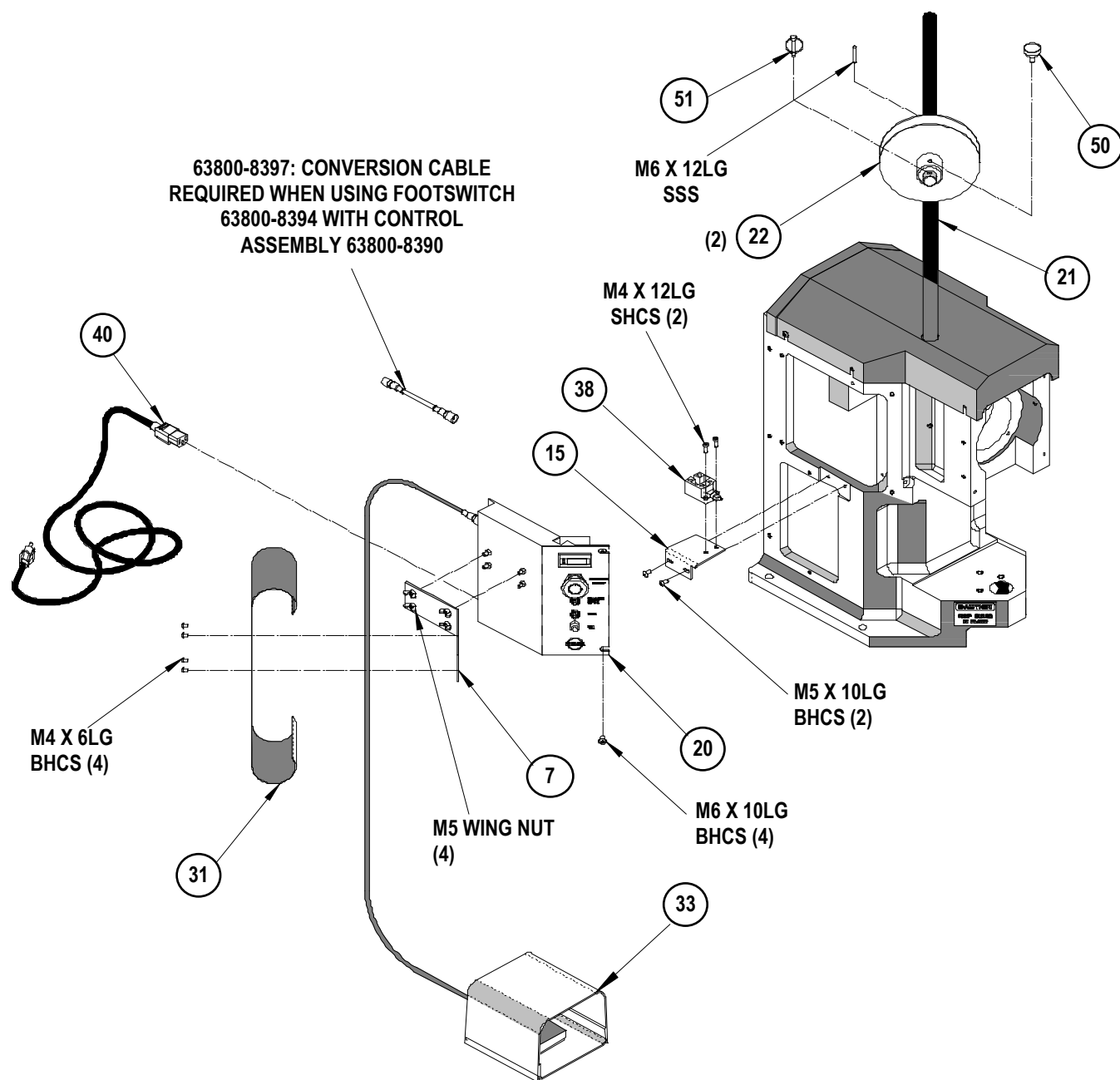
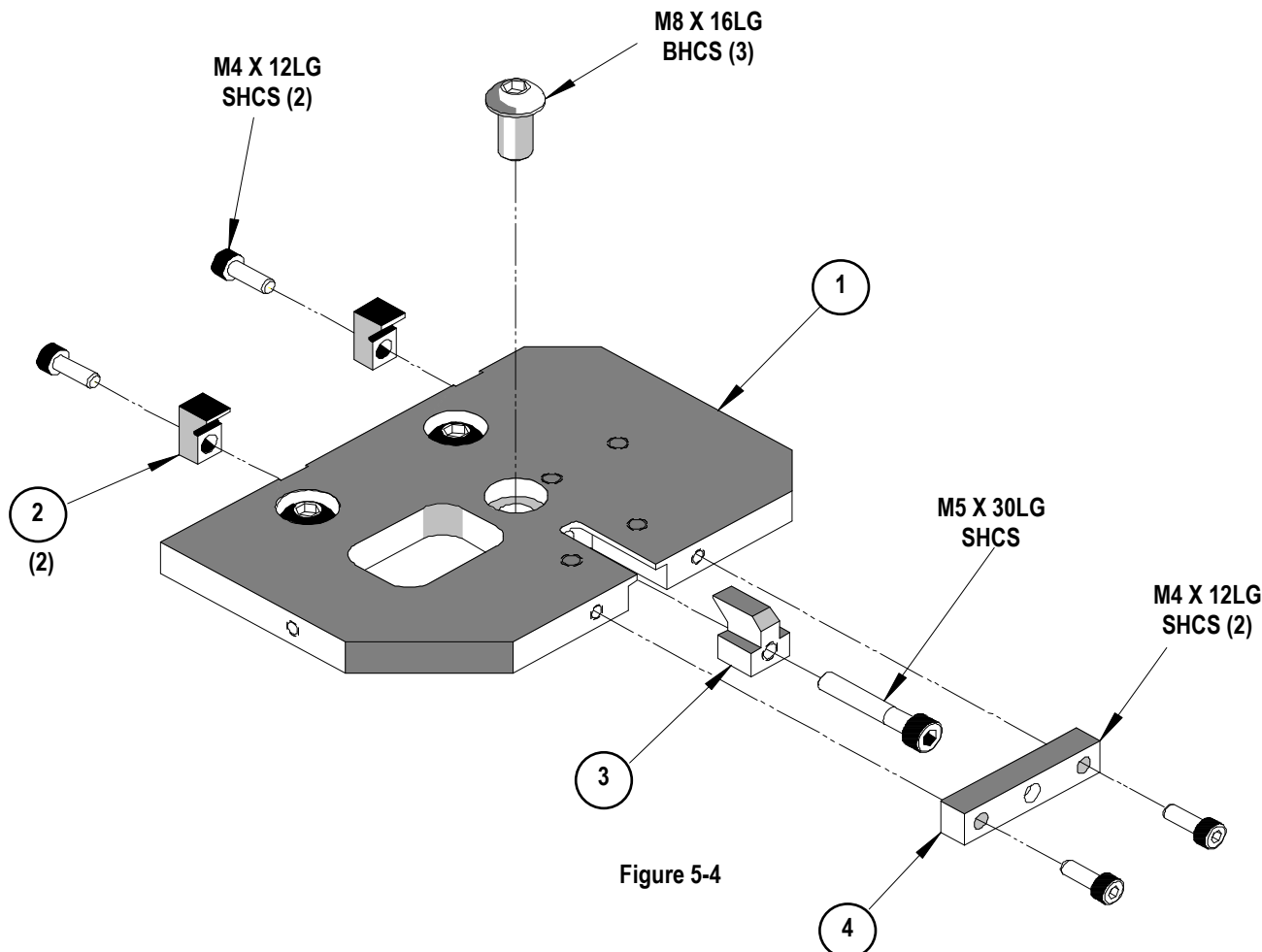


Figure 5-3

5.2 Assembly (continued)



Quick Change Mounting Plate Assembly
Item No. 2 (63800-6997)

Item	Order No.	Description	Required
1	63800-6917	Press Mounting Plate	1
2	63800-6902	Alignment Block	2
3	63800-6918	Locking Clamp	1
4	63800-6919	Clamp Retainer	1

5.3 Electrical Schematic

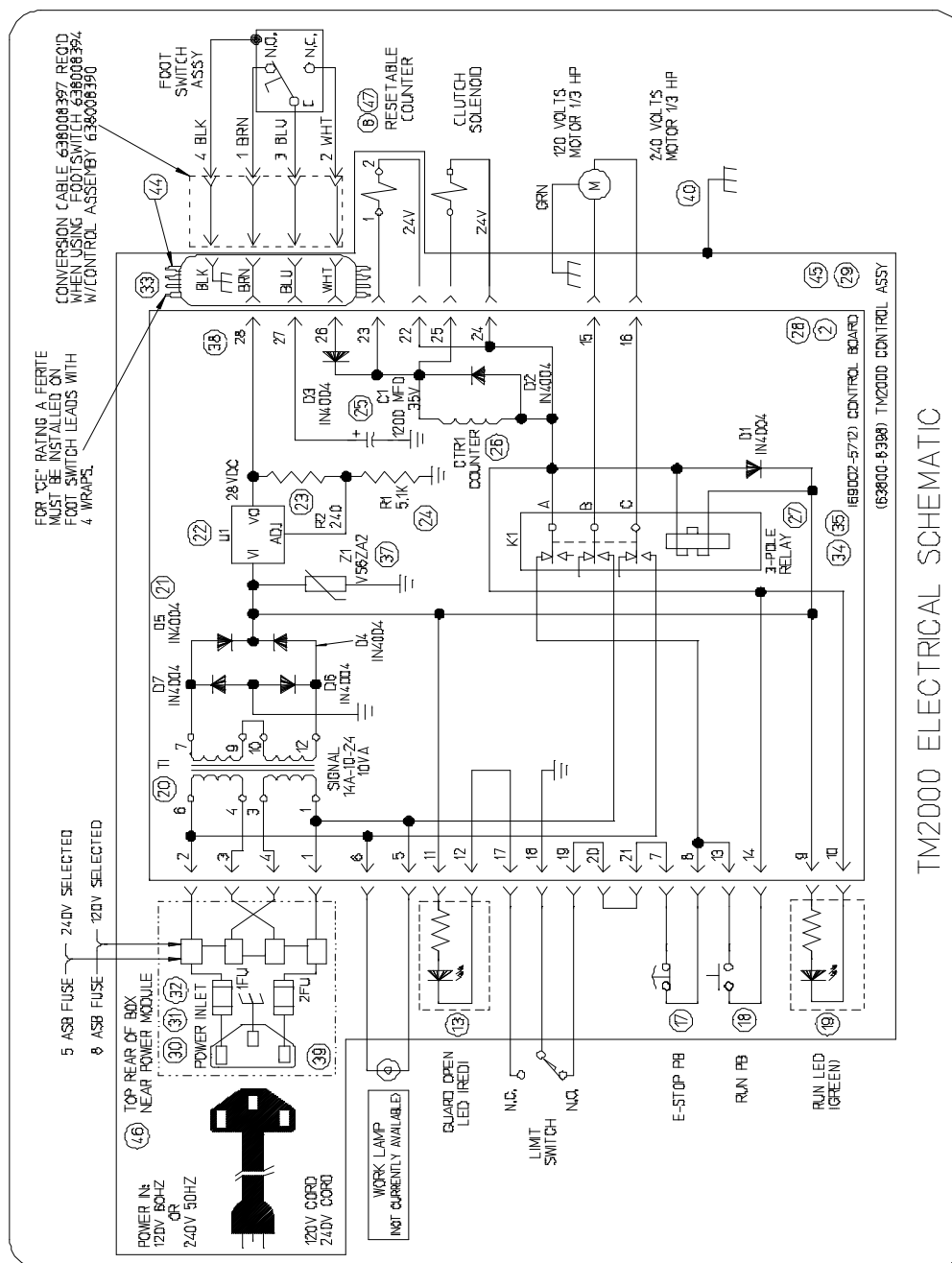


Figure 5-5

5.3 Electrical Parts List

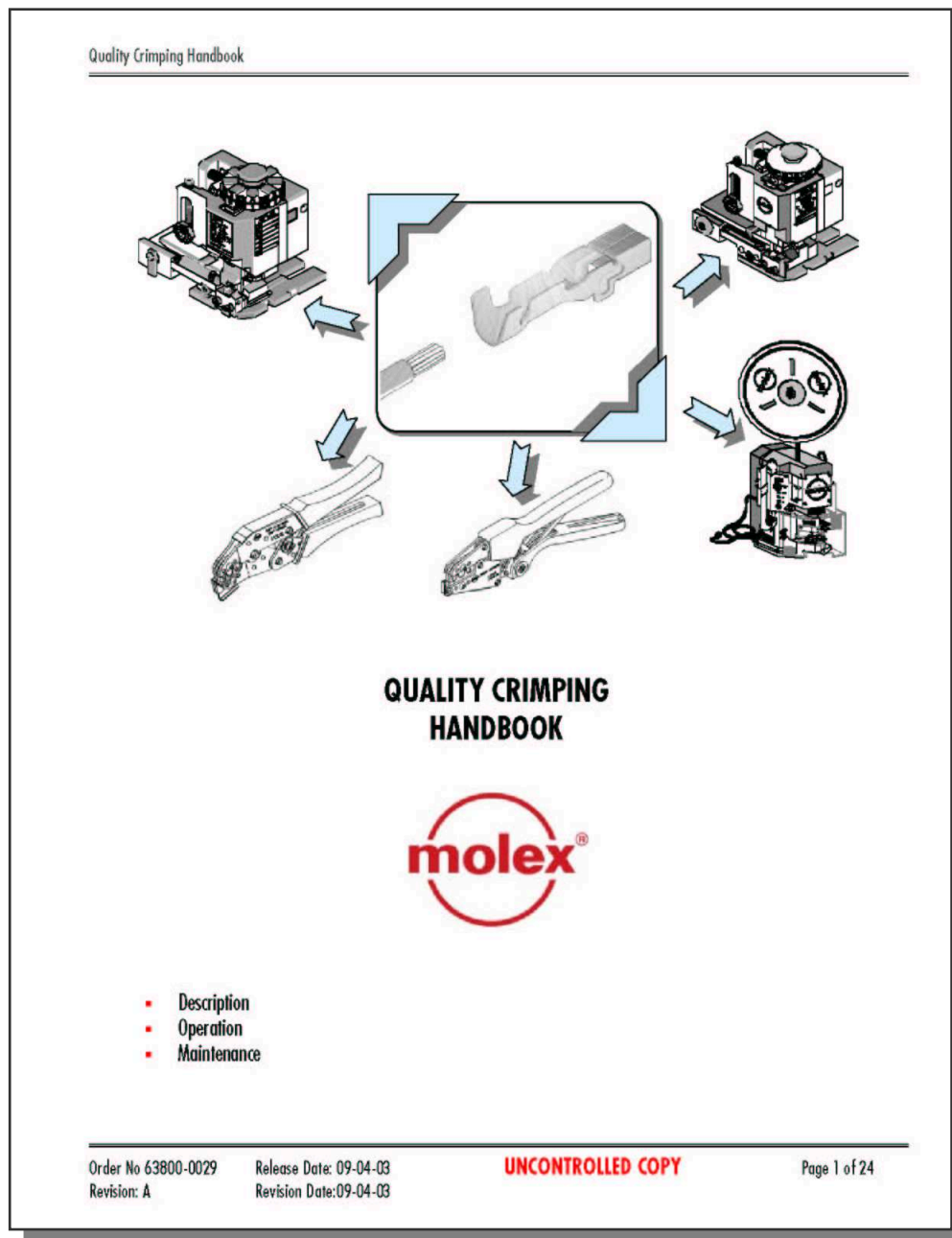
Item	Order no	Description	Required
2	69002-5712	Control PCB Assembly	1
8	62500-0762	24 V Resettable Counter	1
13	69018-6251	Guard Open Red LED Assembly	1
17	69018-6223	E-Stop Button Assembly	1
18	69018-6222	Run Button Assembly	1
19	69018-6252	Run Green LED Assembly	1
20	69018-6226	Transformer 10VA 24 VCT	1
21	69018-6231	Diode	7
22	69018-6227	Positive Adjustable Regulator	1
23	69018-6234	Resistor 221 Ohm 1/10 W 1%	1
24	69018-6235	Resistor 5.11K Ohm 1/4 W 1%	1
25	69018-6233	Capacitor 1200MFD 35V	1
26	69018-6228	Counter 7 Digit (Non-Resetable)	1
27	69018-6242	Relay 3PDT	1
28	69002-5713	Blank PCB	1
29	63800-8391	Enclosure	1
30	69018-6221	Power Voltage Selector (115/230VAC)	1
31	69018-6220	Module Power Entry	1
32	11-32-2733	Fuse Drawer (2 Pole)	1
33	62500-1055	Micro – DC Series (4-Pin) (Female)	1
34	69018-6230	Relay Hold Down Spring	1
35	69018-6229	Relay Socket - PCB	1
37	69018-6232	Metal Oxide Varistor	1
39	63800-4216	Power Entry Assembly	1
40	69018-6262	Ground Wire Assembly	1
45	63800-8392	Silk Screen Label Front	1
46	63800-8385	Silk Screen Label Rear	1
47	69018-6219	8 Amp (120 VAC) 5mm x 20mm Fuse	2
48	69018-6239	5 Amp (240 VAC) 5mm x 20mm Fuse	2
49	62500-1075	MTG Bracket (Counter)	1

5.4 Troubleshooting

Symptom	Cause	Solution
Motor will not run	Power/Power cord failure	Check supply
	Loose connection	Refer to control schematic
	Guard interlock switch disengaged	Install guard
	Fuse blown	Replace
	On/Off switch failure	Replace
	Motor thermal overload.	Push reset button on motor
	Belt too tight	Adjust Motor Mount.
Flywheel fails to rotate (Motor runs)	Motor failure	Replace
	Belt slipping/broken	Adjust/Replace
Flywheel rotates press will not cycle	Drive pulley loose	Tighten
	Loose connection	Refer to control schematic
	Foot switch connection	Check/Replace
	Faulty footswitch	Check Connection/Replace
	Faulty control assembly	Check Connection/Replace
Excessive clutch noise/failure	Faulty counter	Check Connection/ Replace
	Clutch/Solenoid failure	See Section 4.2
Press double/multi-cycles	Out of adjustment	Adjust See Section 4.2.515)
	Clutch component failure	Adjust/Replace
	Solenoid sticks	Check/Replace
	Faulty control assembly	Check/Replace
	Shorted leads in foot switch	Replace
Ram drops from top dead center	Broken clutch screw	Check/Replace
	Broken clutch pin	Replace
	Faulty clutch spring	Check/Replace

For more information use the Quality Crimping Handbook

There is no charge for this book, which can be found on the Molex Website (www.molex.com) or contact you local Molex sales engineer

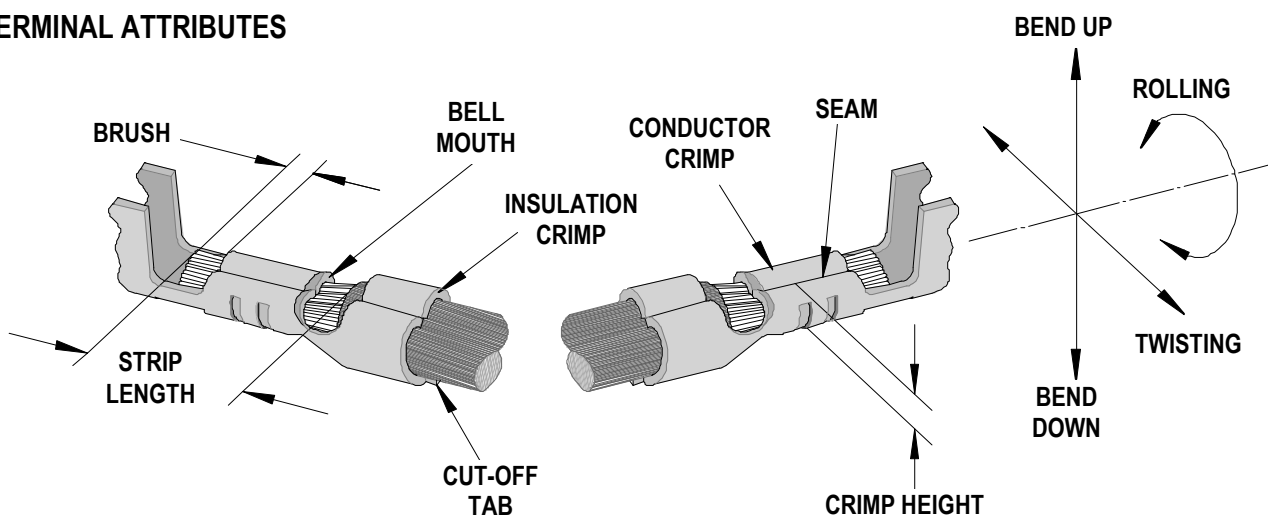


Appendix A

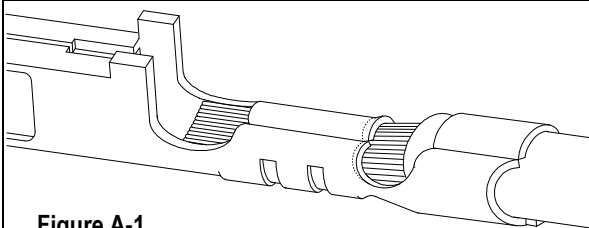
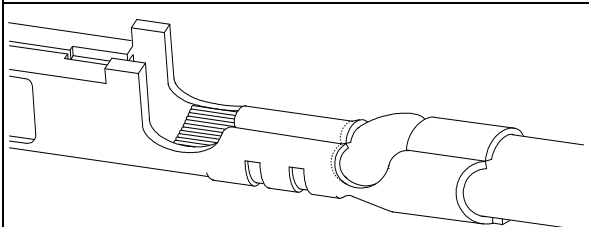
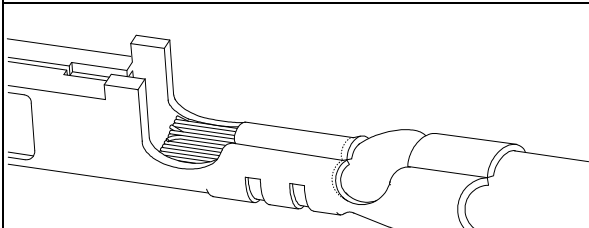
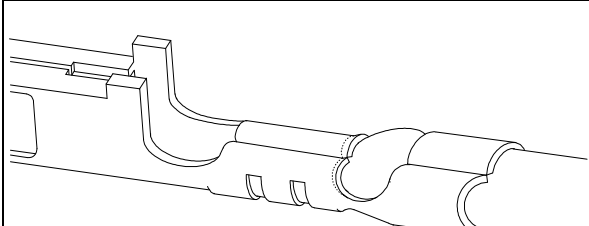
Crimp Terminations

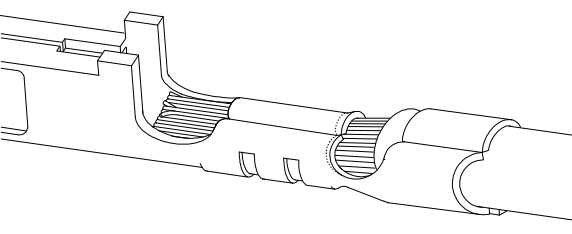
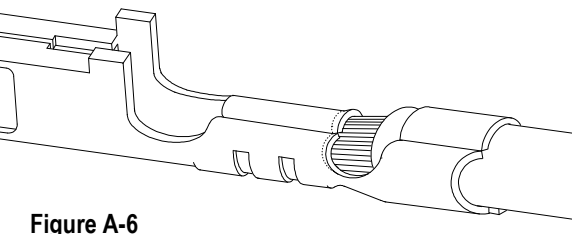
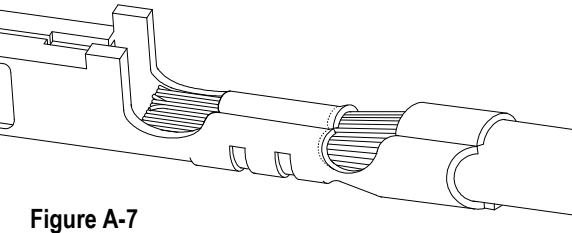
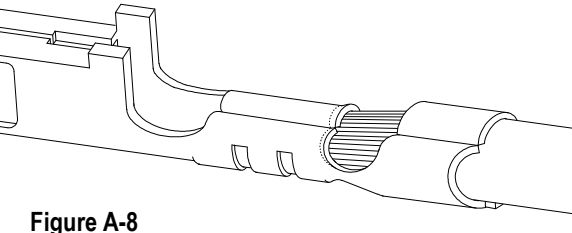
- A.1 Conductor Brush and Terminal Position
- A.2 Conductor Bell mouth and Terminal Cut-off Tab
- A.3 Conductor Crimp Height Measurement
- A.4 Insulation Crimp
- A.5 Pull Force Testing

TERMINAL ATTRIBUTES

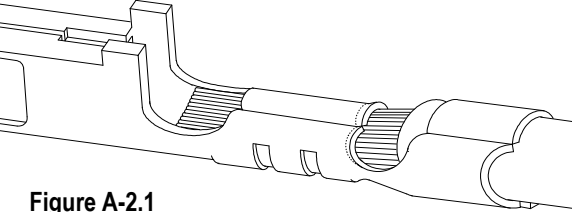
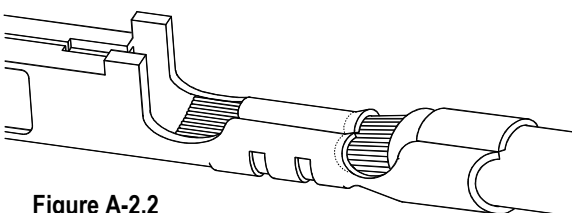


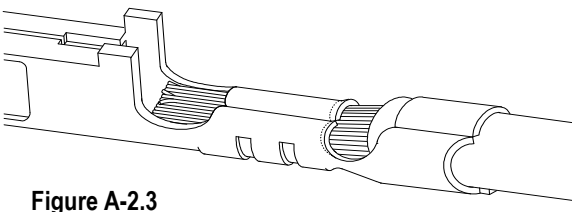
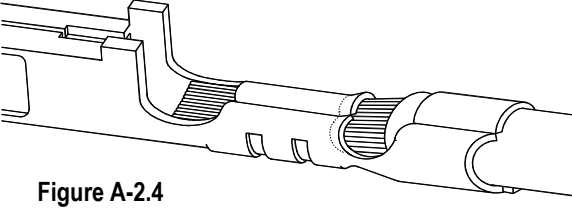
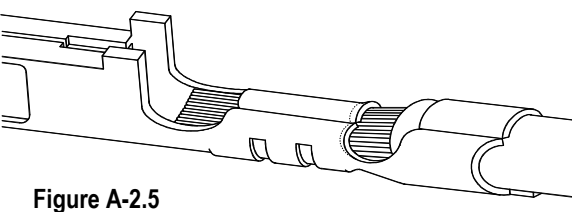
A.1 Conductor Brush and Terminal Position

 <p>Figure A-1</p>	<p>A-1 Optimum Crimp Setup</p> <p>The insulation edge should be centered in the middle of the transition area. The conductor brush should extend past the conductor crimp and not extend into the contact area.</p>
 <p>Figure A-2</p>	<p>A-2 Insulation Under Conductor Crimp, Good Conductor Brush Length</p> <p>Cause: Strip length too short. Solution: Verify strip length specification and adjust as necessary.</p>
 <p>Figure A-3</p>	<p>A-3 Insulation Under Conductor Crimp, Long Conductor Brush Length</p> <p>Cause: Wire stop position incorrect. Solution: Adjust wire stop to center the insulation in the transition area.</p>
 <p>Figure A-4</p>	<p>A-4 Insulation Under Conductor Crimp, Short or No Conductor Brush Length</p> <p>Cause: 1) Strip length too short and 2) Wire stop position incorrect. Solution: 1) Verify strip length specification and adjust as necessary. 2) Adjust wire stop to center the insulation in the transition area.</p>

 <p>Figure A-5</p>	<p>A-5 Insulation Edge Centered in the Transition Area, Conductor Brush Too Long</p> <p>Cause: 1) Strip length too long. 2) Irregular wire cut-off or wire strands pulled from insulation bundle.</p> <p>Solution: 1) Verify strip length specification and adjust as necessary. Readjust wire stop for bench applications 2) Check for worn stripping blades</p>
 <p>Figure A-6</p>	<p>A-6 Insulation Edge in the Center of Transition Area, Conductor Brush Too Short</p> <p>Cause: Strip length too short.</p> <p>Solution: Verify strip length specification and adjust as necessary. Readjust wire stop for bench applications.</p>
 <p>Figure A-7</p>	<p>A-7 Insulation Edge Under Insulation Crimp Form, Good or Long Conductor Brush Length</p> <p>Cause: Strip length too long.</p> <p>Solution: Verify strip length specification and adjust as necessary. Adjust the wire stop.</p>
 <p>Figure A-8</p>	<p>A-8 Insulation Edge Under Insulation Crimp Form, Short or No Conductor Brush Length</p> <p>Cause: 1) Wire stop position incorrect. 2) Verify operator's placement ability, or crimp rate.</p> <p>Solution: 1) Adjust the wire stop to center the insulation in the transition area. 2) Operator training, reduce crimping rate.</p>

A.2 Conductor Bell Mouth and Terminal Cutoff Tab

 <p>Figure A-2.1</p>	<p>A-2.1 Optimum Crimp Setup</p> <p>Tooling was set up to produce conductor bell mouth to nominal specification, and/or approximately 1x to 2x terminal material thickness. The cutoff tab is approximately 1x terminal material thickness.</p>
 <p>Figure A-2.2</p>	<p>A-2.2 Excessive Bell mouth, Cutoff Tab Flush With Insulation Crimp</p> <p>Cause: 1) Terminal tooling position. 2) Camber in the terminal strip.</p> <p>Solution: 1) Verify pull force. 2) Adjust terminal track into the applicator.</p>

 <p>Figure A-2.3</p>	<p>A-2.3 No or Small Bell mouth, Long Cutoff Tab</p> <p>Cause: 1) Terminal to tooling position. 2) Camber in the terminal strip.</p> <p>Solution: 1) Verify pull force. 2) Adjust terminal track towards operator.</p>
 <p>Figure A-2.4</p>	<p>A-2.4 Excessive Bell mouth, Good Cutoff Tab</p> <p>Cause: 1) Check for worn conductor punch tooling. 2) Check for correct conductor punch tooling.</p> <p>Solution: Replace tooling if necessary</p>
 <p>Figure A-2.5</p>	<p>A-2.5 Excessive Cutoff Tab, Good Conductor Bell mouth</p> <p>Cause: 1) Check for worn cutoff tooling. 2) Check for correct cutoff tooling.</p> <p>Solution: Replace tooling if necessary.</p>

A.3 Crimp Height Measurement

NOTE: Conductor height should be measured with a blade type micrometer or a caliper.

CAUTION: Care must be taken not to measure the extrusions

A.3.1 Crimp height off target

Cause:

- 1) Changed wire type, stranding or vendor.
- 2) Changed insulation color or durometer.
- 3) Changed crimp tooling.
- 4) Changed crimping press.(Shut-height)
- 5) Changed press type. (Manufacturer)
- 6) Changed terminal reel. (Lot code)
- 7) Changed tooling set-up.
- 8) Damaged or worn tooling.

Solution: Adjust tooling back to target
(Refer to Section 2.8 & 2.9)

A.3.2 Crimp height variability too high

Cause:

- 1) Wire variability.
- 2) Terminal variability.
- 3) Damaged, loose or worn tooling.
- 4) Measurement error *.
- 5) Terminal spring back too great **.
- 6) Cut or missing wire strands.

Solution:

- 1 or 2) Inspect incoming product for variability.
- 3) Tooling replacement or tightening.
- 4) Gauge capability analysis.
- 5) Tooling crimp height adjustment.
- 6) Stripping process adjustment.

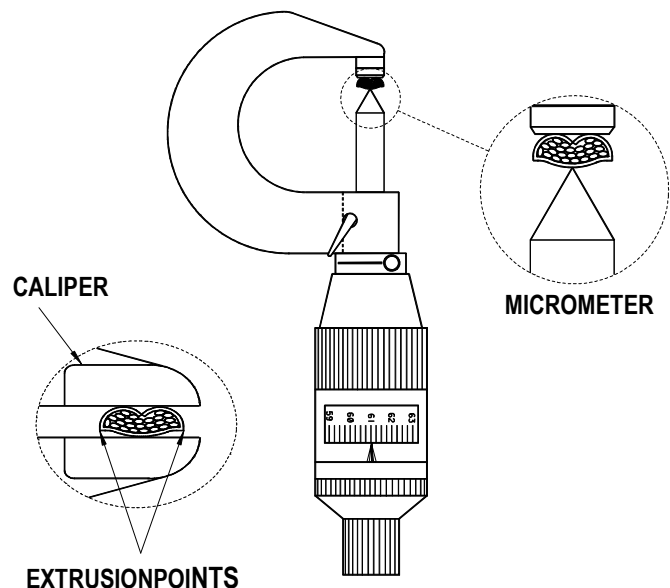


Figure A-3.1
CRIMP HEIGHT MEASUREMENT

* Most common cause of crimp height variability

A.4 Insulation Crimp

A.4.1 Preferred Insulation Crimp

It is preferred that the insulation crimp completely surrounds the outside diameter of the insulation. The terminal should hold on to the wire as firmly as possible without cutting through to the conductor strands. It should be noted that a preferred crimp only occurs in a small portion of the full insulation range a terminal can accommodate. A preferred insulation crimp is recommended for high vibration or movement applications.

An overlap insulation crimp is normally only developed for high vibration or movement applications where the wire diameter is near the lower terminal specification limit.

A.4.2 Acceptable Insulation Crimp

A terminal is normally specified to cover a wide range of insulation wall thickness over a range of wire sizes. Within this specified range, an insulation crimp may not completely surround the wire or fully hold the full diameter of the wire. This condition will still give an acceptable insulation crimp for most applications.

- A large insulation crimp should firmly grip at least 88% of the wire.
- A smaller insulation crimp should firmly grip at least 50% of the wire and firmly hold the top of the wire.

A.4.3 Marginal Insulation Crimp

An insulation diameter near the maximum and minimum specification of a terminal may cover less than what is normally considered acceptable. These strain reliefs should only be used on applications that have low vibration or movement.

- An insulation crimp that covers less than 88% of a large insulation diameter.

Cause: Not enough terminal grip length.

Solution: 1) Evaluate if the same terminal is available in a different wire range.

- 2) Try crimping the wire one setting tighter. This will embed the terminal more into the insulation. The insulation wall thickness is normally enough; therefore cutting strands is not a worry. Terminal insulation grips kicking back away from the terminal or slight insulation bulging may be noticed. Evaluate the terminal loaded into a housing for acceptability

- b) An insulation crimp that covers less than 50% of a small insulation diameter.

Cause: Too much terminal grip.

Solution: 1) Find out if the same terminal is available in a different wire range.

- 2) Find out if overlapping crimp tooling is available.

** It is normal for a termination to spring back to a final crimp position after crimping. It is possible to achieve the same final crimp height with two different tool height setups. This is due to the inherent spring back characteristics of a terminal and wire combination. The tighter the crimp, the more it may spring back. You may adjust the crimp tool 0.05mm (.002") tighter and measure a crimp height change of only 0.03mm (.001").

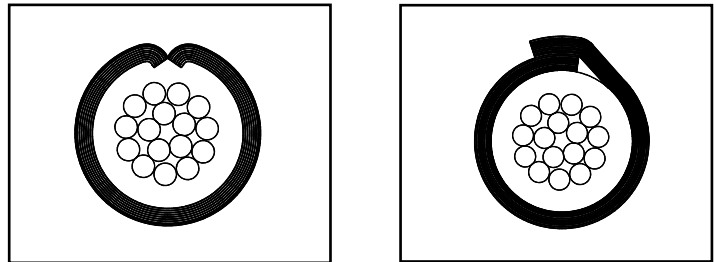


Figure A-4.1 Preferred Insulation Crimp

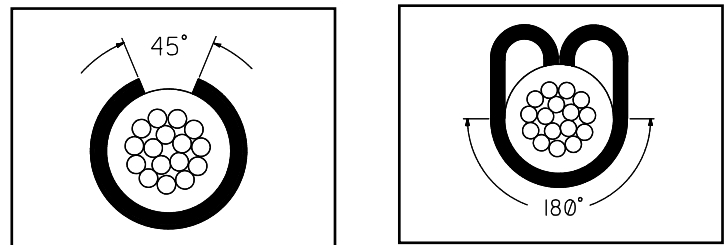


Figure A-4.2 Acceptable Insulation Crimp

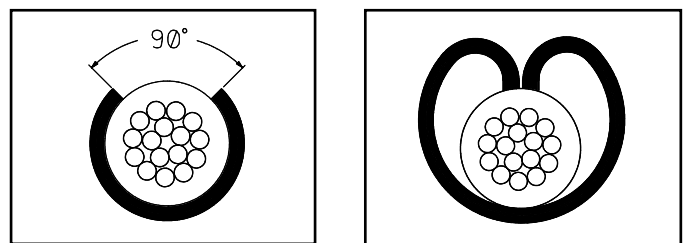


Figure A-4.3 Marginal Insulation Crimp

A.4.4 Marginal Insulation Crimp

An Insulation diameter that are too small or thin-walled insulated wire. A loose crimp ensures no strand damage and offers insulation containment. Insulation crimps that pierce through the insulation will offer more strain relief. In some cases insulation terminal grips will push the strands to the side. Yet, there is always the possibility that a wire strand could be nicked. In severe cases, a wire strand may be cut. Careful application evaluation is needed for both of these cases.

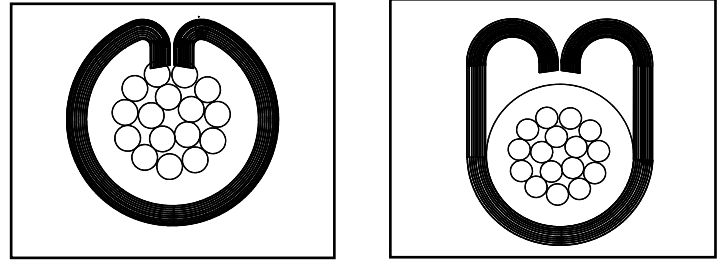


Figure A-4.4 Marginal Insulation Crimp

Cause: 1) Crimp tooling adjustment.
2) Wire diameter variability.

A.5 Pull Force Testing

A.5.1 Pull Force Procedure

Wire connectors and soldering lugs for use with copper conductors. (Per UL486A October 8, 1991) UL Section 12 Pullout Test.

- 12.1 The connectors subjected to the static heating test or secureness test shall be subjected to a direct pull of the value specified for one minute. Only those conductors that have been subjected to the secureness test are to be subjected to the pullout test. The connector is acceptable if it does not become separated from the conductor or conductors after completion of the test.
- 12.2 For an insulated connector in which the insulation is assembled to the connector during installation, the test should be conducted with the insulation in place if it is always supplied with the connector by the manufacturer. Otherwise, the test should be conducted without the insulation assembled to the connector. Breaking or tearing of the insulation of an insulated connector is acceptable in the pullout test. The pull is to be exerted by means of a tension testing machine or equivalent, so that there will be no sudden application of force or jerking during the test.

The following is the procedure Molex uses for the qualification of pull force:

1. Cut wire length approximately 150mm (6.0") long.
2. Strip one end to 13mm (.50"), or long enough so no wire insulation is under the insulation grip.
3. Terminate the appropriate terminal to the wire to the nominal crimp height.
4. Visually inspect the termination for bell mouth, wire brush, and cut strands.
5. Set pull tester to 25.4mm (1.0") per minute. For most applications, a higher rate will not have a significant impact on the data. Verify higher pull rates with data taken at 25.4mm (1.0") per minute.
6. Knot the non-terminated end of the wire.
7. Regardless of pull tester type, both wire and terminated end must be securely clamped. (Note: Clamp terminal contact interface, do not clamp conductor crimp.)
8. Activate pull test.
9. Record a minimum of 25 readings of maximum pull force. After the application has been qualified, a minimum of 5 pull force measurements should be done to confirm each setup.
10. Compare lowest reading to minimum pull force specification.

A.5.2 Pull Test Problems

A.5.2.1 Wire breaks before conductor grip pull force low

Material Evaluation

Cause: Wire material properties, and/or coatings.

Solution: Test non-terminated wire for breaking strength.

Stripping Evaluation

Cause: Cut or nicked strands from stripping operation.

- 1) Wire being manually stripped.
- 2) Poor automatic stripping cutoff.
- 3) Worn strip tooling.

Solution: 1) Switch to semiautomatic or automatic wire stripping machine.
2) Correct stripping machine setup.

A.5.2.2 Wire pulls out of conductor grip, crimp height good

Material Evaluation

Cause: 1) Terminal material thickness too small.
2) Terminal serration depth/form.
3) Terminal plating thickness.
4) Gold plating application.

Solution: 1) Evaluate a new terminal.
2) Or 3) Contact terminal manufacturer.
4) Evaluate selective Gold application.

Stripping Evaluation

Cause: Wrong strip length, poor conductor brush.

Solution: Adjust strip length.

Test Values For Pullout Test UL486A			
Conductor Size		Pullout Force	
AWG	mm ²	N	LB
30	0.05	6.7	1.5
28	0.08	8.9	2
26	0.13	13.4	3
24	0.20	22.3	5
22	0.324	35.6	8
20	0.519	57.9	13
18	0.823	89.0	20
16	1.31	133.5	30
14	2.08	222.6	50
12	3.31	311.5	70
10	5.261	356.0	80
9	8.367	400.5	90

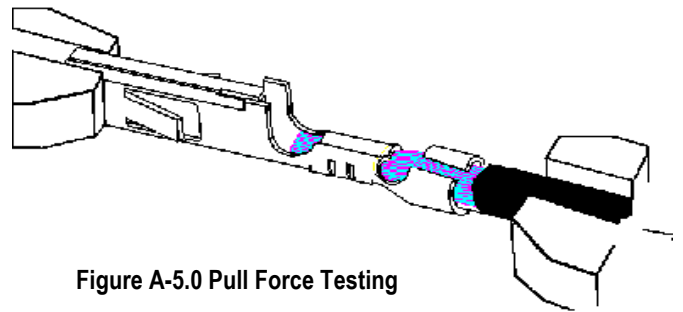


Figure A-5.0 Pull Force Testing



EC Declaration of Conformity

We hereby declare that the following product is in conformity with the requirements of the following EC Directives:

Product:	Termination Machine		
Type:	TM-2000		
Title and No. Of Directive:	Machine Directive	89/392/EEC	

This product is designed and manufactured in accordance with the following standards:

EMC:

Emissions:	EN55011: 1998
	EN 50081 2:1993
	EN61000-3-2: 1995
	EN61000-3-3: 1995

Immunity	EN 50082-2: 1995
	EN 61000-4-2,3,4,5,6,8,11

Electrical Safety

Safety of Machinery-Electrical Equipment of Machines

EN 60204-1:1993

Manufacturer:

Name:	Molex Application Tooling Group
Address:	2200 Wellington Court
	Lisle, IL 60532 USA
Date:	Nov. 6 2000
Signed:	_____
Typed Name:	Steven F. Wright
Title:	Director of Engineering

Visit our Website at <http://www.molex.com>