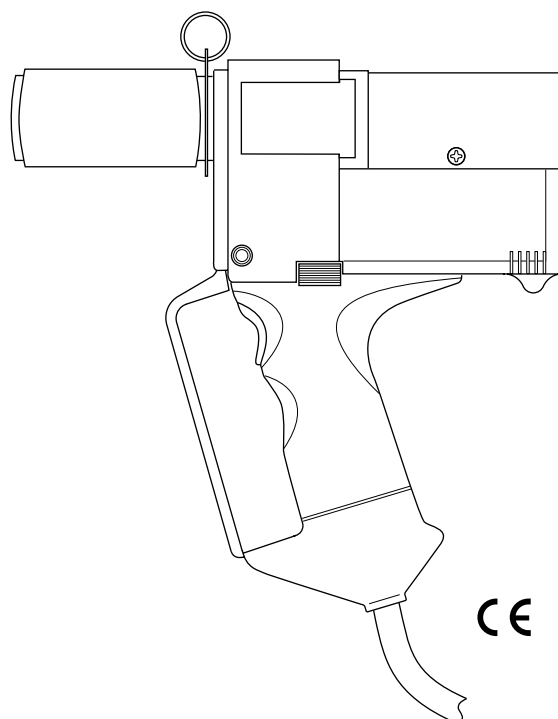


# INSTRUCTION MANUAL



## **GATOR<sup>®</sup>** **CLS60GL Punch Driver** **120 Volt and 230 Volt**



**Read and understand** all of the instructions and safety information in this manual before operating or servicing this tool.

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## Description

The CLS60GL Punch Driver is a hand-held, self-contained tool intended to be used with Greenlee punches, dies, and draw studs for punching holes through plastic, fiberglass, aluminum, and steel.

The CLS60GL is designed to be used with the following Greenlee accessories:

- Standard punches, dies, and draw studs
- Slug-Buster® punches, dies, and draw studs
- Slug-Splitter® punches, dies, and draw studs
- Electronic connector panel punches
- Special shape punches, dies, and draw studs (“D”, Double “D”, Key, Square, Rectangular, and Oiltight with notches)

Standard, Slug-Buster, electronic connector panel punches, and special shape punches can punch holes through plastic, fiberglass, aluminum, and steel. Slug-Splitter punches, dies, and draw studs are capable of punching through all of these materials as well as stainless steel. Refer to the “Capacity and Draw Stud Selection Guide” in this manual for detailed information on punch sizes and maximum material thickness. Do not exceed the capacity of the punch.

## Safety

Safety is essential in the use and maintenance of Greenlee tools and equipment. This manual and any markings on the tool provide information for avoiding hazards and unsafe practices related to the use of this tool. Observe all of the safety information provided.

## Purpose of this Manual

This manual is intended to familiarize all personnel with the safe operation and maintenance procedures for the following Greenlee tools:

CLS60GL11 120 Volt Punch Driver

CLS60GL22 230 Volt Punch Driver

Keep this manual available to all personnel.

Replacement manuals are available upon request at no charge.

All specifications are nominal and may change as design improvements occur. Greenlee Textron shall not be liable for damages resulting from misapplication or misuse of its products.

GATOR, Kwik Stepper, Slug-Buster, and Slug-Splitter are registered trademarks of Greenlee Textron.

AVIA is a registered trademark of Avia International.

Mobil is a registered trademark of Mobil Oil Corporation.

NUTO is a registered trademark of Exxon Corporation.

Tellus is a registered trademark of Shell Oil Company.

# ***KEEP THIS MANUAL***

## IMPORTANT SAFETY INFORMATION



### SAFETY ALERT SYMBOL

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.

#### **⚠ DANGER**

Immediate hazards which, if not avoided, **WILL** result in severe injury or death.

#### **⚠ WARNING**

Hazards which, if not avoided, **COULD** result in severe injury or death.

#### **⚠ CAUTION**

Hazards or unsafe practices which, if not avoided, **MAY** result in injury or property damage.



#### **⚠ DANGER**

Read and understand all of the instructions and safety information in this manual before operating or servicing this tool.

Failure to observe this warning will result in severe injury or death.



#### **⚠ DANGER**

Do not use this tool in a hazardous environment. Hazards include flammable liquids, gases, or other materials. Using this tool in a hazardous environment can result in a fire or explosion.

Failure to observe this warning will result in severe injury or death.



#### **⚠ WARNING**

Electric shock hazard:

This tool is not insulated. When using this unit on or near energized electrical lines, use proper personal protective equipment.

Failure to observe this warning can result in severe injury or death.



#### **⚠ WARNING**

Electric shock hazard:

- Connect the power cord to a receptacle of proper voltage for the tool in use on a ground fault-protected circuit only.
- Do not modify the power cord or plug.
- Inspect the power cord before use. Repair or replace the cord if damaged.
- Do not pull or carry by cord, use the cord as a handle, close a door on the cord, run over the cord, or pull the cord around sharp edges or corners. Keep the cord away from heated surfaces.
- Do not unplug by pulling on the cord. To unplug, grasp and pull the plug—not the cord.
- Disconnect from power before servicing.

Failure to observe these warnings can result in severe injury or death.

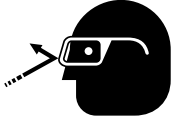



#### **⚠ WARNING**

- Do not expose to rain.
- Do not use in wet or damp locations.

Failure to observe these warnings can result in severe injury or death.


## IMPORTANT SAFETY INFORMATION

	<b>⚠ WARNING</b>
	<p>Wear eye protection when operating or servicing this tool.</p> <p>Failure to wear eye protection can result in serious eye injury from flying debris or hydraulic oil.</p>


	<b>⚠ WARNING</b>
	<p>Keep hands away from the tool head when in use.</p> <p>Failure to observe this warning can result in severe injury or death.</p>

<b>⚠ WARNING</b>
<p>Do not operate the tool while wearing loose clothing. Loose clothing can get caught in moving parts.</p> <p>Failure to observe this warning can result in severe injury or death.</p>

<b>⚠ WARNING</b>
<p>Do not allow anyone to stand directly in front of the punch. A component failure could propel parts that could strike nearby personnel with sufficient force to cause severe injury or death.</p>

	<b>⚠ WARNING</b>
	<p>Skin injection hazard:</p> <p>Do not use hands to check for oil leaks. Oil under pressure easily punctures skin. If injured, seek medical attention immediately to remove oil.</p> <p>Failure to observe this warning can result in serious injury, gangrene, or death.</p>

<b>⚠ WARNING</b>
<ul style="list-style-type: none"> <li>• Inspect the punch, die, draw stud, and spacers for wear or damage. Replace any worn or damaged items with Greenlee replacement parts. Replace any punches that have dull cutting surfaces.</li> <li>• Thread the punch completely onto the draw stud. All of the punch threads must be engaged by the draw stud threads. Incomplete assembly could cause punch failure, which could propel parts that could strike nearby personnel with sufficient force to cause severe injury or death.</li> <li>• Use only with Greenlee punches, dies, and draw studs. Other manufacturers' components may not withstand the forces generated by this punch driver and may break and strike nearby personnel, causing severe injury or death.</li> </ul>

	<b>⚠ WARNING</b>
	<p>Do not use solvents or flammable cleaners to clean the tool body. Solvents could ignite, causing serious injury or property damage.</p>

## IMPORTANT SAFETY INFORMATION

### ⚠ WARNING

Inspect tool before use. Replace any worn or damaged parts with Greenlee replacement parts. A damaged or improperly assembled tool can break and strike nearby personnel.

Failure to observe this warning can result in severe injury or death.

### ⚠ WARNING



Extension cords:

- Use only 16, 14, or 12 AWG extension cords.
- Do not use extension cords that are longer than 30 m (100').
- Repair or replace damaged extension cords.

Failure to observe these warnings can result in severe injury or death.

### ⚠ CAUTION

- This tool is not designed for continuous use. After 30 to 40 cycles, allow the tool to cool for 15 minutes.
- Do not place the tool in a vise. The tool is designed for hand-held operation.
- Ensure that all bystanders are away from the work area when operating the tool.
- Ensure that the work area is clean, dry, uncluttered, and well-lit.
- Use this tool for the manufacturer's intended purpose only.

Failure to observe these precautions can result in injury or property damage.

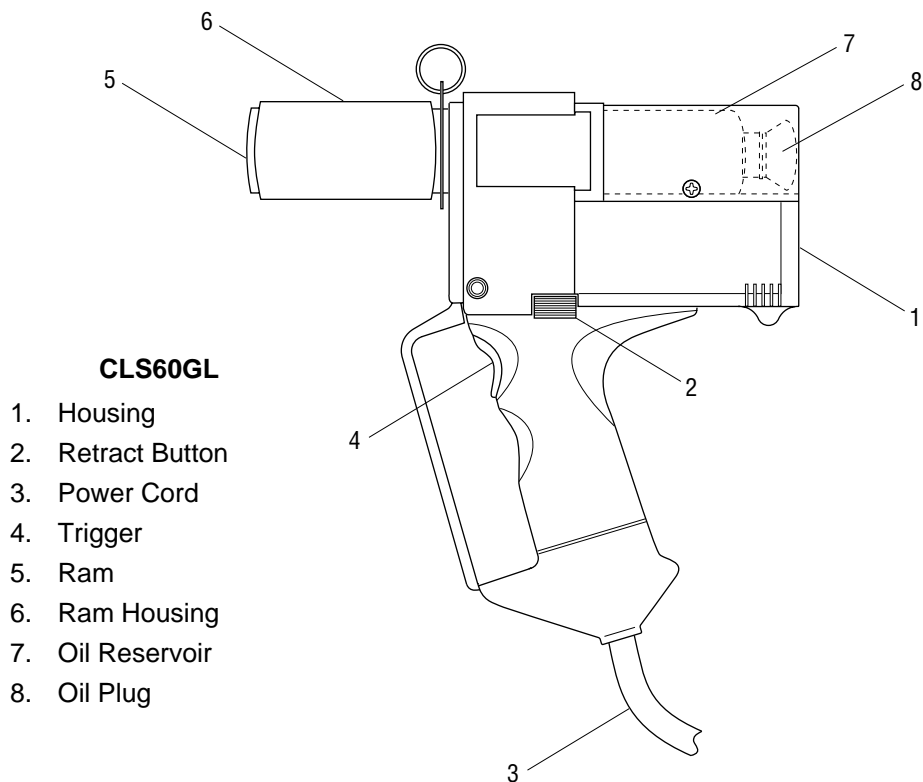
### ⚠ CAUTION

Do not perform any service or maintenance other than as described in this manual. Injury or damage to the tool may result.

Failure to observe this precaution can result in injury and property damage.

*Note: Keep all decals clean and legible, and replace when necessary.*

## Identification



## Specifications

Length	
Ram Retracted .....	262 mm (10.31")
Ram Extended .....	284 mm (11.18")
Width .....	76 mm (3")
Height .....	292 mm (11.5")
Mass/Weight .....	3 kg (6.6 lb)
Maximum Punch Force .....	60 kN (6.7 tons)
Maximum Punch Diameter in 10 ga. (3 mm) Mild Steel .....	63.5 mm (2.5")
Maximum Ram Travel .....	22 mm (0.87")
Punching Time	
1/2" Conduit in 10 ga. (3 mm) Mild Steel .....	5 seconds
2" Conduit in 10 ga. (3 mm) Mild Steel .....	12 seconds
Sound Level .....	< 75 dB (A) at 1 meter
Vibration .....	< 2.5 m/s <sup>2</sup>
Motor Voltage	
CLS60GL11 .....	120 VAC, 60 Hz, 2.1 A
CLS60GL22 .....	230 VAC, 50 Hz, 1.1 A
Hydraulic Oil .....	50 ml (0.1 pint) of Shell Tellus® T 15

## Operation

	<b>⚠ WARNING</b>
	<p>Electric shock hazard:</p> <p>This tool is not insulated. When using this unit on or near energized electrical lines, use proper personal protective equipment.</p> <p>Failure to observe this warning can result in severe injury or death.</p>

	<b>⚠ WARNING</b>
	<p>Wear eye protection when operating or servicing this tool.</p> <p>Failure to wear eye protection can result in serious eye injury from flying debris or hydraulic oil.</p>

	<b>⚠ WARNING</b>
	<p>Skin injection hazard:</p> <p>Do not use hands to check for oil leaks. Oil under pressure easily punctures skin. If injured, seek medical attention immediately to remove oil.</p> <p>Failure to observe this warning can result in serious injury, gangrene, or death.</p>

	<b>⚠ WARNING</b>
	<p>Keep hands away from the tool head when in use.</p> <p>Failure to observe this warning can result in severe injury or death.</p>

<b>⚠ CAUTION</b>	
<ul style="list-style-type: none"> <li>• This tool is not designed for continuous use. After 30 to 40 cycles, allow the tool to cool for 15 minutes.</li> <li>• Do not place the tool in a vise. The tool is designed for hand-held operation.</li> <li>• Ensure that all bystanders are away from the work area when operating the tool.</li> <li>• Ensure that the work area is clean, dry, uncluttered, and well-lit.</li> <li>• Use this tool for the manufacturer's intended purpose only.</li> </ul> <p>Failure to observe these precautions can result in injury or property damage.</p>	

## Operation (cont'd)

1. Select the punch, die, and draw stud to make the appropriate size hole. Refer to the illustrations on the following pages.
2. Determine and mark the exact location for the hole. Use a Greenlee Kwik Stepper® drill bit to drill a hole that is slightly larger than the draw stud. This is the pilot hole.
3. Push the retract button to fully retract the ram.
4. Thread the 3/4" draw stud or 3/4" adapter completely into the punch driver. Refer to the illustrations on the following pages.

*Note: For a punch and die with a 3/8" center hole, thread the 3/8" draw stud into the end of the 3/4" adapter.*

5. Install a spacer, if necessary. Refer to the illustrations on the following pages.
6. Slide the die over the draw stud with the open end of the die facing away from the punch driver.
7. Insert the draw stud through the pilot hole.
8. Thread the punch onto the draw stud with the cutting surfaces of the punch facing the material. Tighten the punch by hand until the spacer, die, material, and punch contact each other.

*Note: All of the punch threads must be engaged by the draw stud threads. If any of the punch threads are not engaged, disassemble the setup, remove the spacer, and reassemble the setup.*

9. Pull the trigger. Release the trigger as soon as the hole is completed.

### IMPORTANT

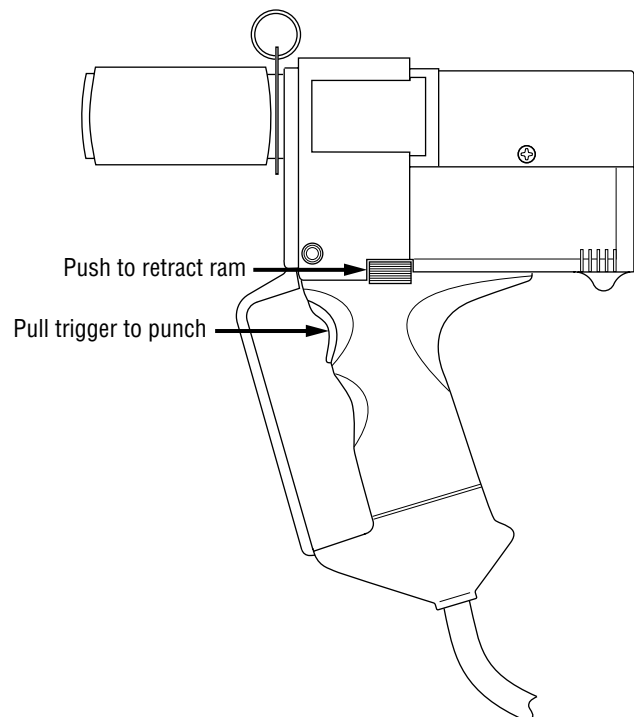
Release the trigger when the punch completes the hole. The tool will not sense when a hole is made.

*Note: A "popping" sound indicates that the CLS60GL has reached relief pressure. This may indicate that the operation attempted is beyond the capacity of the tool.*

10. Release the trigger. When the punch is completed, the ram retracts completely.

*Note: At any time during the punching cycle, pushing the retract button will result in a complete return of the ram.*

11. Unscrew the punch. Remove slugs from the die. Remove the spacer and unscrew the draw stud.





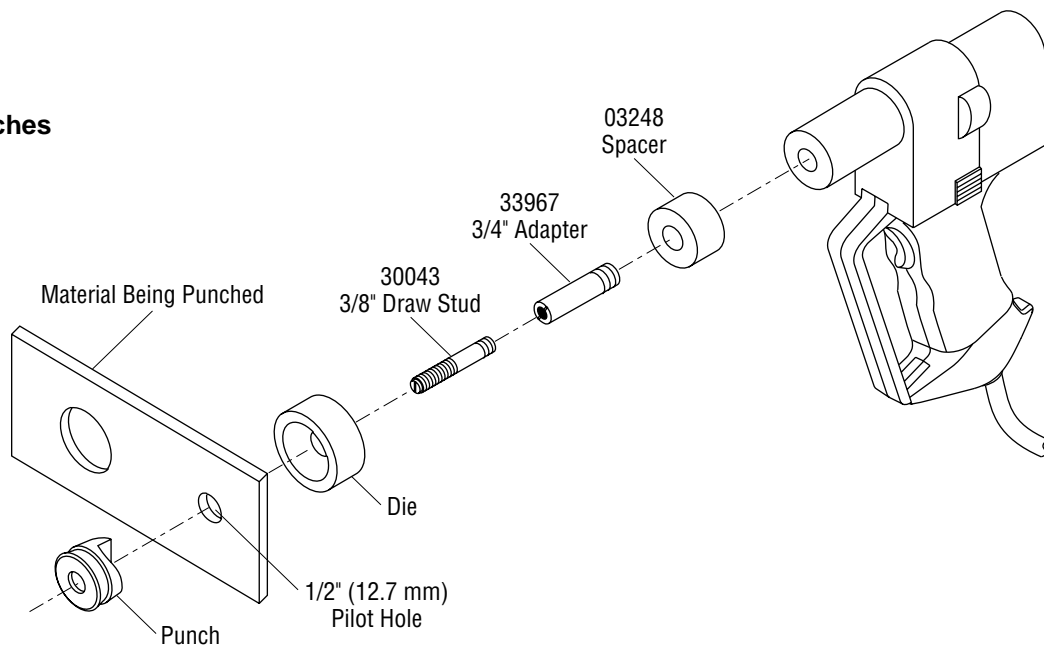
## Operation (cont'd)

### Punching with Round Punches

Metric: 22.5 mm

Conduit Size: 1/2"

Actual Size: 0.885"

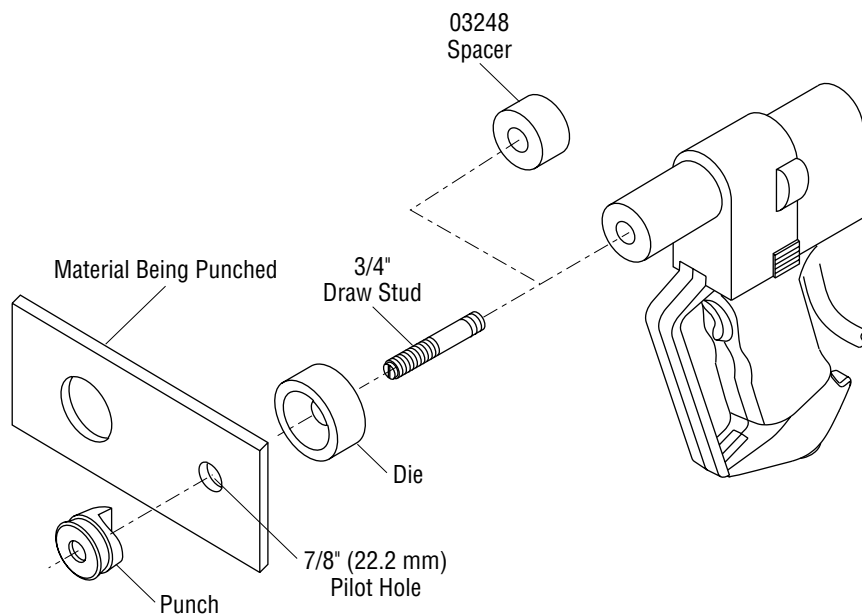


### Punching with Round Punches

Metric: 28.3 mm to 61.5 mm

Conduit Size: 3/4" to 2"

Actual Size: 1.115" to 2.416"



## Operation (cont'd)

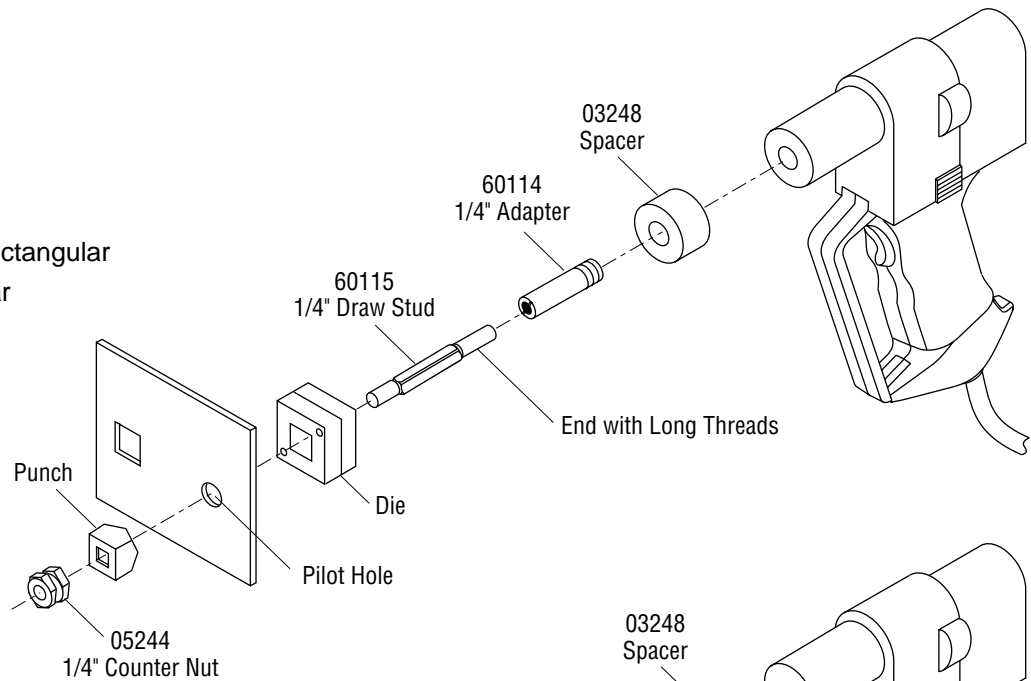
### Punching with Square and Rectangular Punches

Metric: 12.7 mm square

Inches: 1/2" square

Metric: 11.1 mm x 22.2 mm rectangular

Inches: 7/16" x 7/8" rectangular



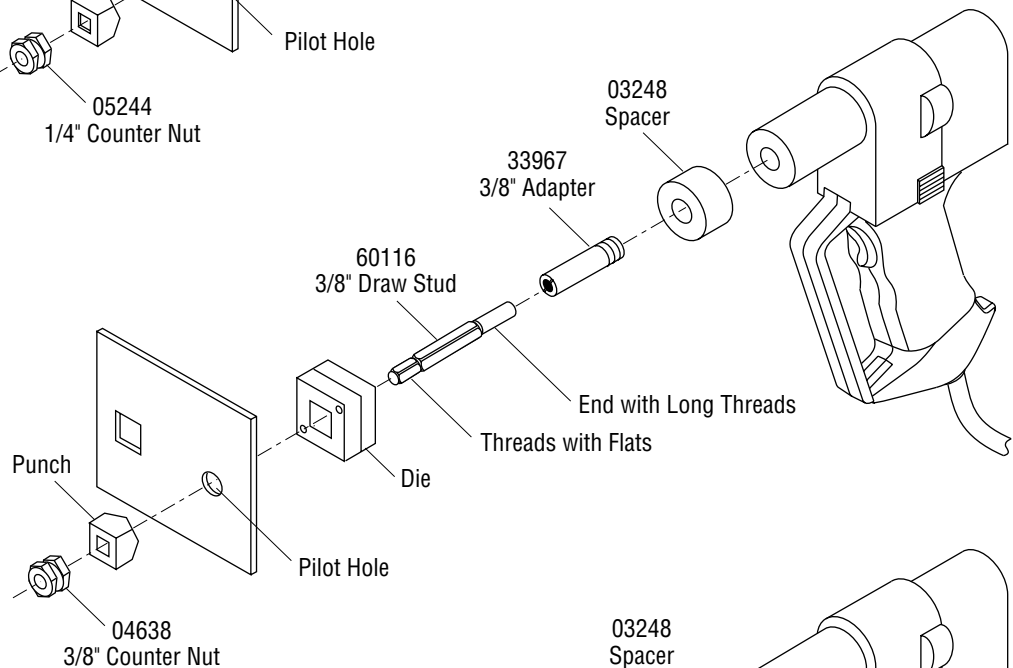
### Punching with Square and Rectangular Punches

Metric: 15.9 mm to 24.0 mm square

Inches: 5/8" to 0.945" square

Metric: 17.0 mm x 19.0 mm rectangular

Inches: 0.670" x 0.749" rectangular



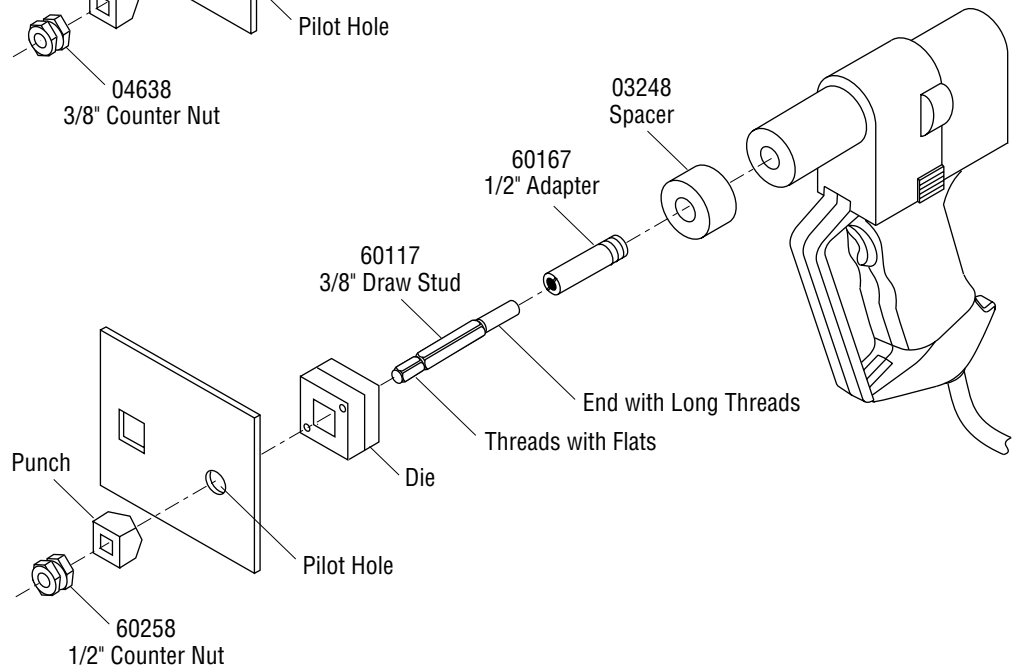
### Punching with Square and Rectangular Punches

Metric: 25.4 mm square

Inches: 1" square

Metric: 19.1 mm x 29.0 mm to 31.8 mm x 35.1 mm rectangular

Inches: 0.750" x 1.140" to 1.250" x 1.380" rectangular



## Operation (cont'd)

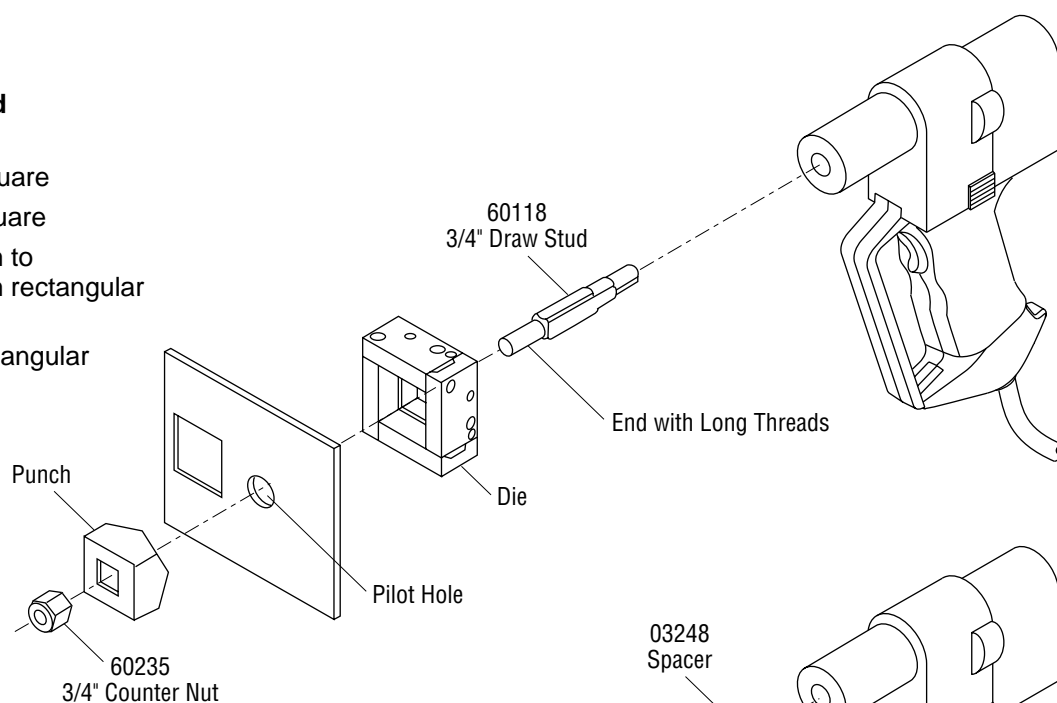
### Punching with Square and Rectangular Punches

Metric: 46.0 mm to 68.0 square

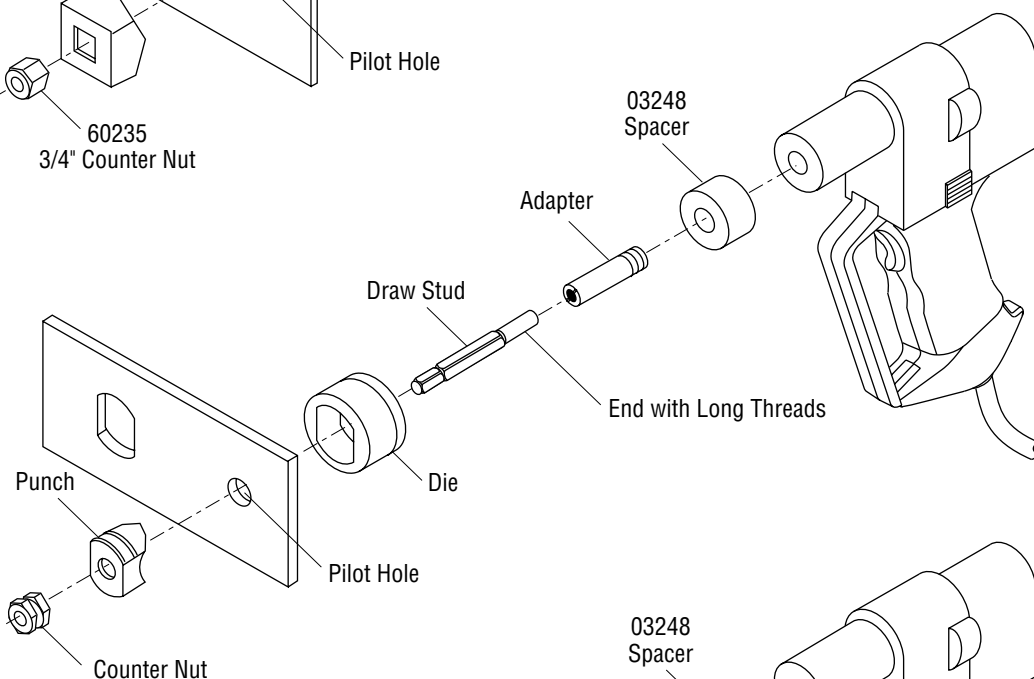
Inches: 1.811" to 2.677" square

Metric: 33.3 mm x 66.7 mm to  
35.0 mm x 65.0 mm rectangular

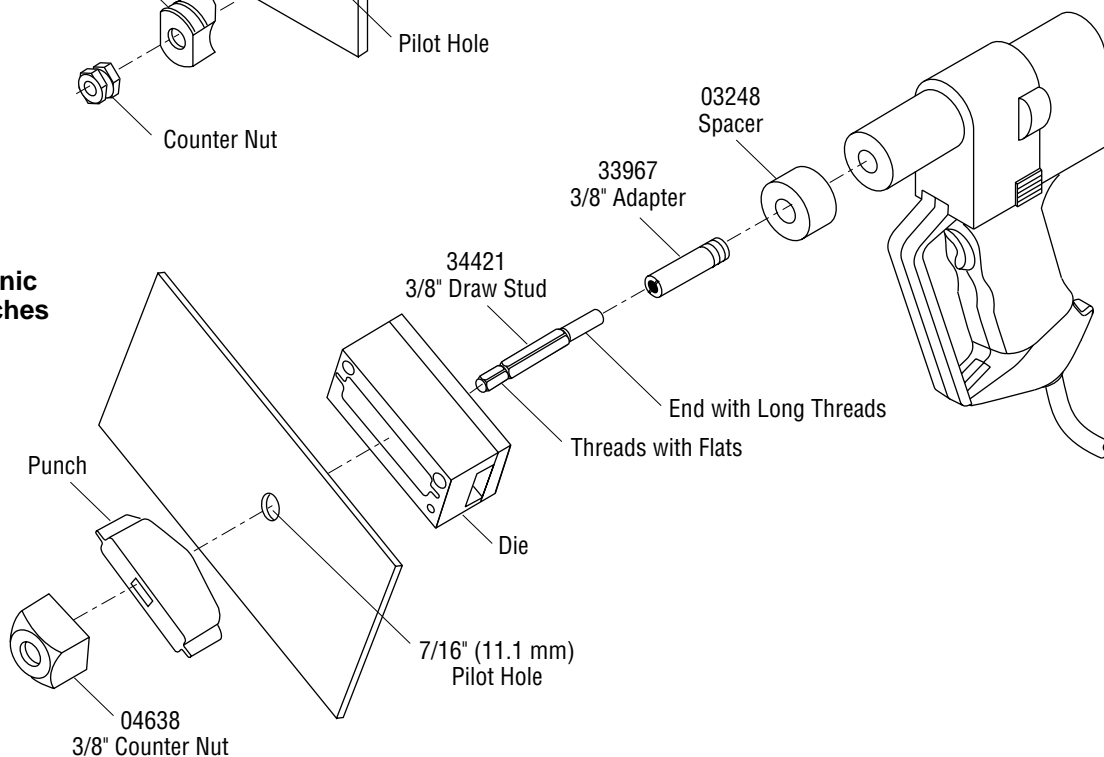
Inches: 1.312" x 2.625" to  
1.378" x 2.559" rectangular



### Punching with "D", Double "D", and Key Punches





### Punching with Electronic Connector Panel Punches





## Capacity and Draw Stud Selection Guide

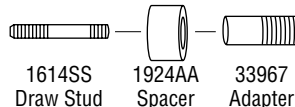

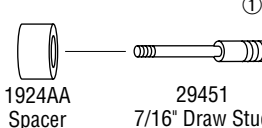

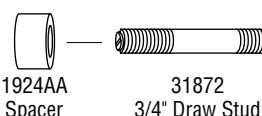
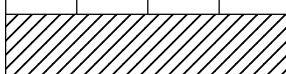
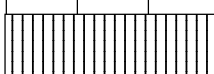

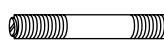
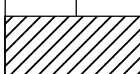

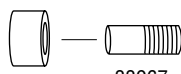

Includes optional step-saver adapter

 16 ga. (0.0598" [1.5 mm])  
Mild Steel and 1/8" Soft Aluminum

 10 ga. (0.1345" [3 mm])  
Stainless Steel

 10 ga. (0.1345" [3 mm])  
Mild Steel

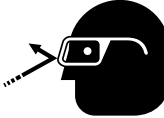
 12 ga. (0.1046" [2.5 mm])  
Stainless Steel


Stud and Accessories	Standard and Slug-Buster Punches							Slug-Splitters						
	1/2" con. ø 0.885" 22.5 mm	3/4" con. ø 1.115" 28.3 mm	1-7/32" con. ø 1.210" 30.5 mm	1" con. ø 1.362" 34.6 mm	1-1/4" con. ø 1.701" 43.2 mm	1-1/2" con. ø 1.951" 49.6 mm	2" con. ø 2.416" 61.5 mm	1/2" con. ø 0.885" 22.5 mm	3/4" con. ø 1.115" 28.3 mm	1-7/32" con. ø 1.210" 30.5 mm	1" con. ø 1.362" 34.6 mm	1-1/4" con. ø 1.701" 43.2 mm	1-1/2" con. ø 1.951" 49.6 mm	2" con. ø 2.416" 61.5 mm
 1614SS Draw Stud    1924AA Spacer    33967 Adapter														
 1924AA Spacer    29451 7/16" Draw Stud														
 1924AA Spacer    31872 3/4" Draw Stud														
 31872 3/4" Draw Stud														
 1924AA Spacer    33967 Adapter														


Electronic Connector Punches  
RS-232, 229, 231, 234, 238

① 29451 included with CLS60GL11A and CLS60GL22A units only.

## Maintenance

	<p><b>⚠ WARNING</b></p>
	<p>Wear eye protection when operating or servicing this tool.</p> <p>Failure to wear eye protection can result in serious eye injury from flying debris or hydraulic oil.</p>

	<p><b>⚠ WARNING</b></p>
	<p>Skin injection hazard:</p> <p>Do not use hands to check for oil leaks. Oil under pressure easily punctures skin. If injured, seek medical attention immediately to remove oil.</p> <p>Failure to observe this warning can result in serious injury, gangrene, or death.</p>

	<p><b>⚠ WARNING</b></p>
	<p>Do not use solvents or flammable cleaners to clean the tool body. Solvents could ignite, causing serious injury or property damage.</p>

### Daily

Before use:

1. Inspect the tool for damage or leaks.
2. Inspect the punching components and replace any worn, damaged, or missing components with Greenlee replacement parts:
  - Punch must be sharp.
  - Die must be in good condition.
  - Draw stud must be straight, and threads must be in good condition.

After use:

1. Use a damp cloth and mild detergent to clean the housing. Allow the housing to dry.
2. Fully retract the ram. Place the tool in the carrying case and store in a cool, dry place.

### Monthly

1. Thoroughly clean all surfaces.
2. Check the oil level.

### Annually or After 10,000 Punches

1. Replace the hydraulic oil.
2. Send the tool to an authorized Greenlee service center for inspection.

### Checking the Oil Level

1. Remove the two screws that retain the tank housing cover. Remove the tank housing cover.
2. Point the tool head downward and remove the oil reservoir plug. Fill reservoir if necessary.
3. Replace the oil plug and tank housing cover.

### Recommended Hydraulic Oils

AVIA® HVI 15  
 Shell Tellus T 15  
 Mobil® DTE 15  
 NUTO® H 15

## Troubleshooting

Problem	Probable Cause	Probable Remedy
Tool is inoperative.	Dirt, contaminants, etc., in ram area of tool.	Clean tool.
	Tool components worn or damaged.	Return tool to an authorized Greenlee service center.
Ram stops during operation.	Oil level is low.	Check oil level. Refill reservoir.
	Air in hydraulic system.	Pull trigger and hold retract button simultaneously. Hold for approximately 10 seconds.
Ram stops before punch is completely through material.	Ram has reached end of travel.	Press retract button. After ram is fully retracted, tighten punch or draw stud. Die, material, and punch must be snug. Proceed to punch.
	Spacer needed.	Disassemble setup. Add spacer. Reassemble and punch.
	Air in hydraulic system.	Pull trigger and hold retract button simultaneously. Hold for approximately 10 seconds.
	Rated capacity of tool has been exceeded.	Reduce size of punch, thickness of material, etc.
Tool loses oil.	Damaged internal seal.	Return tool to an authorized Greenlee service center.
	Oil plug not installed properly.	Refill reservoir and replace plug.

## Disassembly

### Main Components

1. Unscrew two tank cover screws (52) and remove the tank cover.
2. Remove the hydraulic reservoir plug (74) and drain the hydraulic fluid.
3. Reinstall the plug.
4. Loosen two screws (23). Unscrew and remove the punch head assembly (20).
5. Unscrew three screws (24). Remove the ram (25), three spacers (26), compression spring (28), and piston (27). Replace the piston O-ring (21) and backup ring (22).
6. Remove the remaining housing screws (52).
7. Remove the housing half.
8. Remove the trigger cover (51) and spring (56).
9. Lift the pump/motor assembly and circuit card from the housing half.
10. Slide a plastic bag over the circuit card and electronic subassemblies. Tape the bag shut to protect the subassemblies from hydraulic oil and other contamination.
11. Unscrew the shoulder bolt (30) and remove the release lever (34).
12. Remove screws (102) and separate the gear housing/motor subassembly from the pump housing.

### Pump

1. Use a hooked tool to remove the reservoir O-ring (78). Gently tug it over the reservoir.
2. Remove the reservoir (72).
3. Remove the pump piston (150).
4. Remove the screw plug (151), O-ring (152), washer (153), and spring (154). Replace the sealing washer (153).
5. Use a piece of tape to mark the side of the relief that is facing up. (This is a reference point for reassembly.) Remove the unloading valve by unscrewing the plug (126).
6. Remove the feeder tube subassembly by unscrewing the feeder tube (76). Replace the oil filter (75). Remove metal chips from the magnet (80).
7. Remove the threaded bushing (70) and replace the O-ring (71).

### Motor, Gearbox, and Bearing

1. Remove the tamper-proof paper seal (96).
2. Remove two screws (92). Remove the end cap (100).
3. Apply pressure evenly at three points around the ball bearing (91) and gently pry the bearing up to remove it.
4. Remove the eccentric (101), grooved ball bearing (99), and snap ring (98) subassembly from the shaft.
5. Remove four screws (93). Remove the mounting block (103) from the gear housing (94).
6. Use a snap-ring removal tool to remove the snap ring (98).
7. Unscrew four bolts (not numbered) and hex nuts (97) from the gear housing (94). Separate the gear housing from the motor flange (104). Unscrew two flat head screws (106) to separate the flange from the motor (90).

## Assembly

### Motor, Gearbox, and Bearing

1. Install four hex nuts (97) into the motor flange (104).
2. Install two flat head screws (106) into the motor flange (104) and motor (90). Tighten the screws.
3. Install four screws (not numbered) and hex nuts (97) into the gear housing (94). Tighten the screws.
4. Install four screws (93) into the mounting block (103) and gear housing (94). Tighten the screws.
5. Replace the grooved ball bearing (99) and snap ring (98).
6. Replace the eccentric (101). Use a fiber mallet to tap the eccentric onto the shaft. Replace the ball bearing (91).
7. Align the end cap (100). Use a fiber mallet to tap the cover until it is flush on the mounting block (103). Install two screws (92).
8. Align the gear housing/motor subassembly so that the pump piston (150) extends through the mounting block (103) and makes contact with the grooved bearing (99). Locate and start the screws (102) through the mounting block and into the pump housing. Tighten the screws.

### Pump

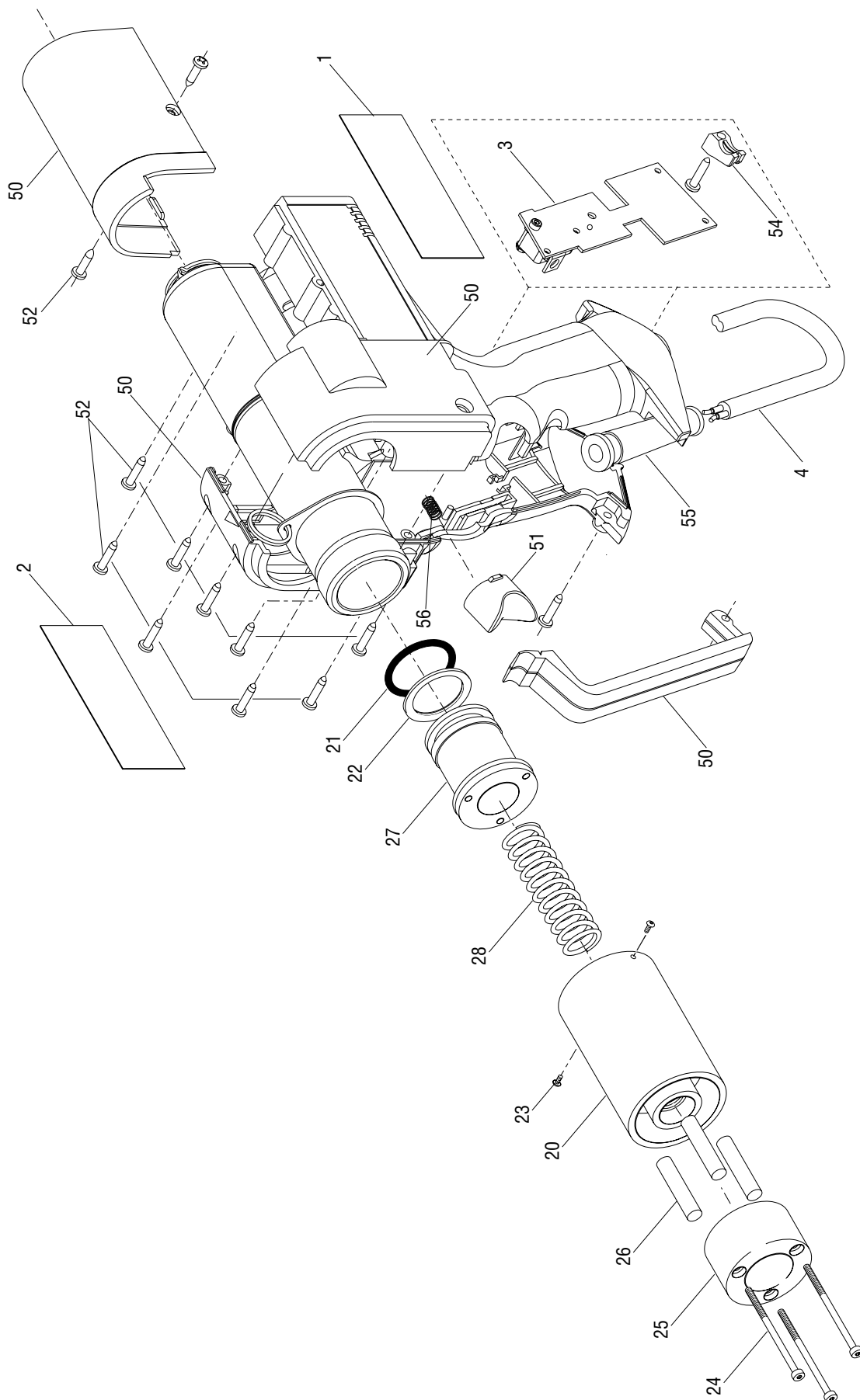
1. Insert the seal (122) and unloading valve subassembly into the pump housing. Grasp the needle valve subassembly by the plug (126) and twist it several turns clockwise. Stop when the piece of tape is facing up.
2. Assemble the O-ring (152) to the pump piston (150). Assemble the screw plug (151), spring (154), and sealing washer (153) to the pump housing. Install the pump piston (150).
3. Install the release lever (34) so that the forked end engages the unloading valve subassembly between the pressure relief (126) and the support ring (127). Install the screw (30) and washer (31).
4. Insert the threaded bushing (77) and feed tube subassembly (75, 76, 80). Screw in until snug.
5. Install the reservoir (72). Slip the O-ring (78) over the reservoir. Using a hooked tool, carefully slip the O-ring over the lip of the pump housing.
6. Insert the plug (74) into the reservoir.

### Main Components

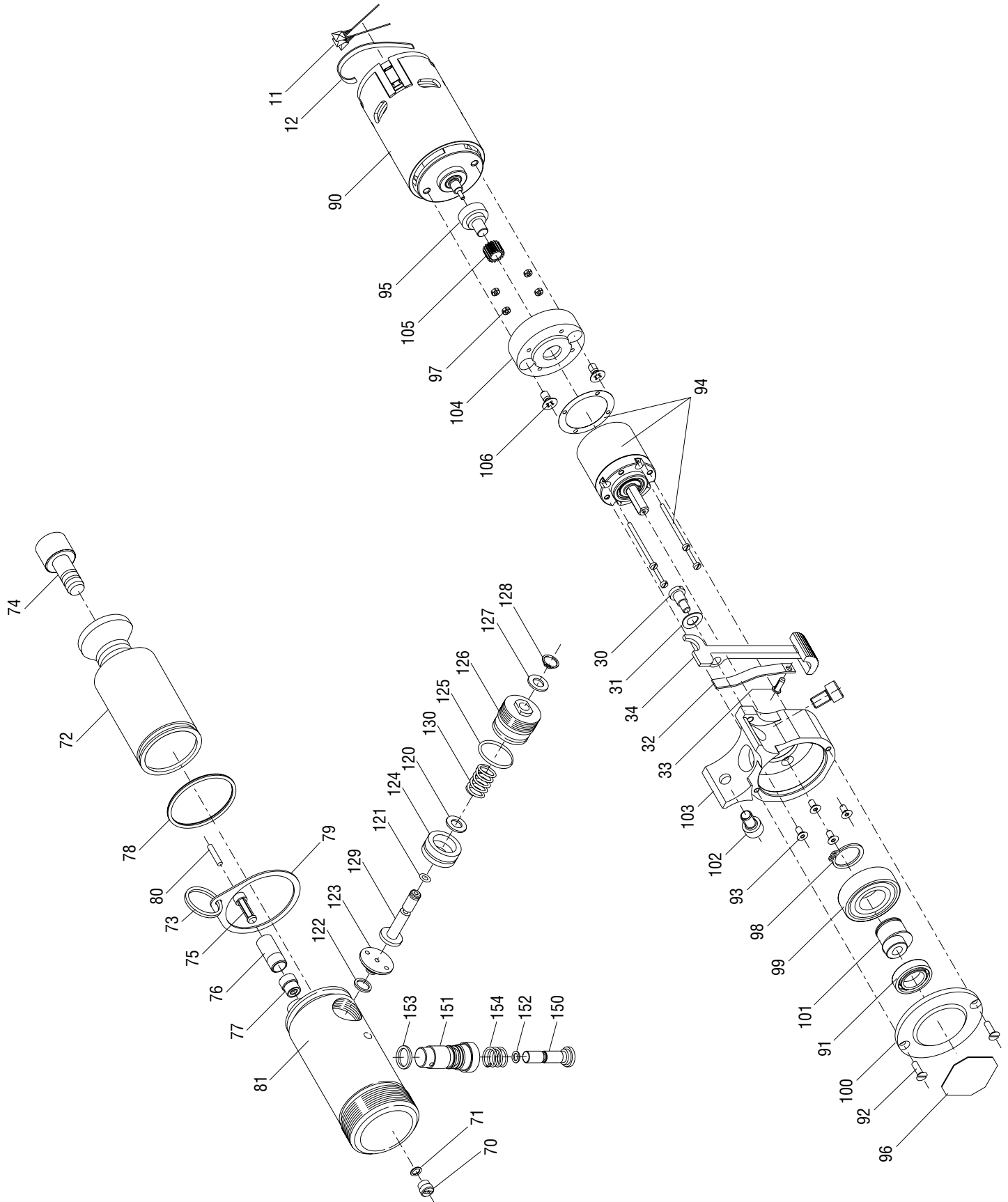
1. Remove the protective plastic bag from the electronics subassembly.
2. Lay the gear housing/motor subassembly into the right half of the housing. Insert the circuit board into the circuit board recess.
3. Lay the wires into the case. Be sure that the wires will not be pinched.
4. Guide the wires for the power cord so that the cord lays on top of the electronics box.
5. Install the switch cover (51) and spring (56). Press and release the trigger to be sure that it operates freely.
6. Locate the right housing half on the top of the left housing half. Check for pinched wires.
7. Install the housing screws (52).
8. Install the piston (27) and compression spring (28).
9. Replace the punch head assembly. Screw the ram housing (20) until it stops; back off 3/4 of a turn and tighten the screws (23). Be sure that the ram housing rotates freely approximately 350°.
10. Rotate the ram housing until the three M4 threaded holes in the piston are aligned with the three  $\varnothing$  0.18" (4.5 mm) holes in the ram housing. Install the three spacers (26), ram (25), and three screws (24). Tighten the screws.
11. Clamp the head assembly into a vise with the reservoir plug facing upward. Remove the fill plug (74) and fill the reservoir with hydraulic oil.
12. Plug the power cord into a live receptacle.
13. Squeeze the trigger while pressing the release lever for 45 to 60 seconds. Fill the reservoir with hydraulic oil. Replace the fill plug (74).
14. Replace the tank cover and tank cover screws (52).



## Illustration



**Illustration**



## Parts List

Key	Part No.	Description	Qty
1	500 1551.6	Decal, identification .....	1
2	500 1425.0	Decal, safety, 120 volt .....	1
	500 1527.3	Decal, safety, 230 volt .....	1
3	500 1560.5	Plate with microswitch, 120 volt .....	1
	500 1689.0	Plate with microswitch, 230 volt .....	1
4	500 1561.3	Power cord, 120 volt.....	1
	500 1627.0	Power cord, 230 volt.....	1
	500 1559.1	Engine accessories kit (includes items 11–13)	
11	500 1582.6	Capacitor .....	3
12	500 1581.8	Cable tie .....	1
13	500 1583.4	Tap, 4.8 x 0.5 (not shown).....	1
	500 1682.2	Punch drive unit (includes items 20–28)	
20	500 5828.2	Ram housing .....	1
21*	500 4192.4	O-ring .....	1
22*	500 4194.0	Backup ring .....	1
23	500 4168.1	Button head screw.....	2
24	500 4929.1	HSC screw .....	3
25	500 4926.7	Ram .....	1
26	500 4927.5	Spacer .....	3
27	500 5827.4	Piston .....	1
28	500 7019.3	Compression spring .....	1
30	500 4163.0	Screw, socket head .....	1
31	500 4922.4	Lock washer .....	1
32	500 4125.8	Spring .....	1
33	500 5872.0	Screw .....	1
34	500 5879.7	Release lever .....	1
50	500 1563.0	Housing kit.....	1
51	500 1564.8	Switch cover .....	1
52	500 4207.6	Screw .....	14
54	500 1565.6	Cable clip.....	1
55	500 1567.2	Protective cable cover .....	1
56	500 1569.9	Compression spring .....	1
57	500 1571.0	Film insulation (not shown).....	1
58	500 1566.4	Plug (not shown) .....	1
	500 1354.8	Pump housing, reservoir assembly (includes items 70–81)	
70	500 4144.4	Threaded bushing .....	1
71*	500 4143.6	O-ring .....	1
72	500 5861.4	Hydraulic reservoir .....	1
73	500 4198.3	Ring .....	1
74	500 4122.3	Reservoir plug .....	1
75	500 5880.0	Filter .....	1
76	500 5882.7	Filter adapter .....	1
77	500 5885.1	Threaded bushing .....	1
78*	500 5886.0	O-ring .....	1
79	500 5829.0	Attachment ring .....	1
80	500 5898.3	Magnet .....	1
81	500 1355.6	Pump housing .....	1

**Parts List (cont'd)**

Key	Part No.	Description	Qty
	500 1683.0	Motor assembly, 120 volt (includes items 90A and 91–106)	
	500 1684.9	Motor assembly, 230 volt (includes items 90B and 91–106)	
90A	500 1577.0	Motor, 120 volt.....	1
90B	500 1606.7	Motor, 230 volt.....	1
91	500 4138.0	Ball bearing .....	1
92	500 4155.0	Screw .....	2
93	500 4157.6	Screw .....	4
94	500 4133.9	Gearbox.....	1
95	500 1575.3	Insulating sleeve.....	1
96*	500 4153.3	Seal .....	1
97	500 1579.6	Hex nut .....	4
98	500 4151.7	Retaining ring .....	1
99	500 4139.8	Grooved ball bearing.....	1
100	500 4108.8	End cap .....	1
101	500 4123.1	Eccentric.....	1
102	500 8403.8	Screw .....	2
103	500 8402.2	Eccentric case .....	1
104	500 1573.7	Motor flange .....	1
105	500 1574.5	Gear .....	1
106	500 1580.0	Screw .....	2
	500 1593.1	Relief valve assembly (includes items 120–130)	
120	500 5860.6	Washer .....	1
121*	500 4134.7	O-ring .....	1
122*	500 5862.2	Seal .....	1
123	500 5363.0	Valve seat.....	1
124	500 5864.9	Plunger .....	1
125*	500 5869.0	O-ring .....	1
126	500 5871.1	Adjusting nut.....	1
127	500 5875.4	Support ring .....	1
128*	500 5876.2	Retaining ring .....	1
129	500 5877.0	Needle valve.....	1
130	500 5894.0	Spring .....	1
	500 1685.7	Piston pump assembly (includes items 150–154)	
150	500 5892.4	Pump piston .....	1
151	500 1688.1	Box for pump .....	1
152*	500 5897.5	O-ring .....	1
153*	501 0366.0	Sealing washer .....	1
154	500 4147.9	Spring .....	1
*	500 5904.1	Seal kit (includes items marked with an asterisk)	
	500 1686.5	Case with inserts	

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