

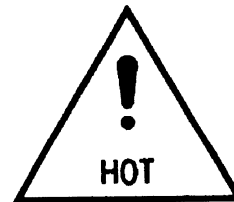
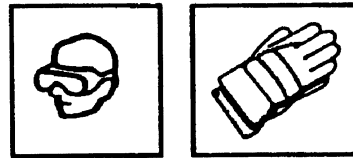
**SEMI-AUTOMATIC POLYPROPYLENE
STRAPPING MACHINE**

OPERATION & MAINTENANCE MANUAL

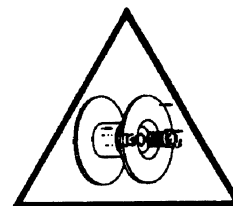
SAFETY INSTRUCTIONS

Read these safety instructions before operating or servicing your strapping machine.

1. Read the operating instructions and all of the signs on machine carefully.
2. Wear eye or face, and hand protection. Do not wear loose clothing.
3. Keep hands or other parts of the body out of the strap chute area during operation.
4. The temperature of the heater plate is high up to 320 °C. Do not touch!
5. Do not insert strap in the guide while there is not a package on the operation table.
6. Do not replace any safety parts of different specifications.
7. Watch the springing force of spring when opening reels.
8. Shut off all electric power after machine operation or servicing machine.
9. Do not use water or steam to clean the machine.
10. Keep this operation manual at your strapping machine. Refer to it often.



DO NOT TOUCH HEATER PLATE



WATCH THE SPRING WHEN OPENING.

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MAJOR COMPONENTS

In figures 1 thru 4 the major components of the machine and the strapping head are shown in detail.

A detailed description of additional systems and specific components follows:

STRAP DISPENSER:

The dispenser supplies strapping material to the strapping head. It is located inside the cabinet on the lower left-hand side. A friction brake is provided to limit over-run of strap.

1. GRIP – The grip holds the lead end of the strap beneath the anvil while the remainder of the strap is being tensioned around the package.

STRAP FEED AND TENSION – Both feed and tension are achieved by two sets of gear rollers powered by an electric motor by means of a drive-belt and slip-clutch system.

An operator controlled adjustable timer controls the duration of strap feed. When the set time for feeding is up, the timer stops feeding strap. If additional feed is required beyond that determined by the timer setting, jog feed will be facilitated by pushing the "Jog" feed button on the operator's control panel.

3. WELDING AND CUT-OFF – Welding of the strap ends and cutting of the strap supply are facilitated in this process.
4. PACKAGE RELEASE – After a short weld-cool period (necessary to avoid welded ends from popping open) the package is released.

(Note:) The afore mentioned functions: 1, 3 and 4 are driven by a cam shaft coupled to the drive system by means of an electromagnetic clutch which turns one full revolution per cycle.

HOT KNIFE. The "Hot Knife" is centrally located at the front of the strapping head. Movement of the knife is controlled by a cam.

ELECTRICAL SYSTEM. An all new electrical system using solid state technology supplies continual power supply to the electrical components within the machine. Using simple to insert circuit boards provides for safe and fast maintenance free operation.

OPERATOR CONTROLS. The Electrical Control Panel consists of the "Main Power ON-OFF Switch," "Feed Length Timer," "Reset Switch" and "Feed Length Switch" (Jog Feed).

INTRODUCTION

This manual contains safety, operating, and maintenance instructions for the SP-1 Semiautomatic Power Strapping Machine. This model is designed to strap packages with plastic strap 1/4" to 5/8" (6mm to 15mm) wide. The strap ends are joined by means of "hot-knife" welding process.

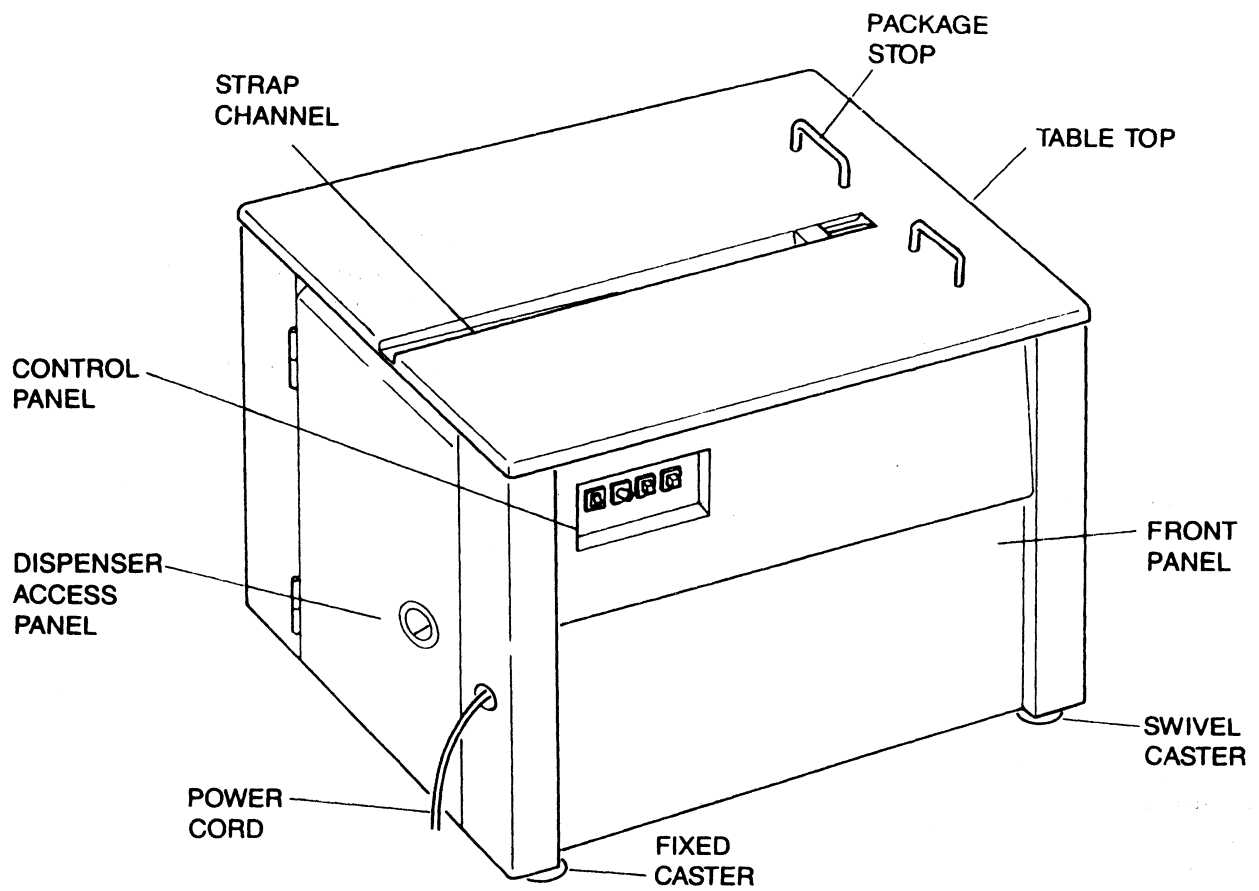


FIGURE 1. MAJOR COMPONENTS, EXTERIOR

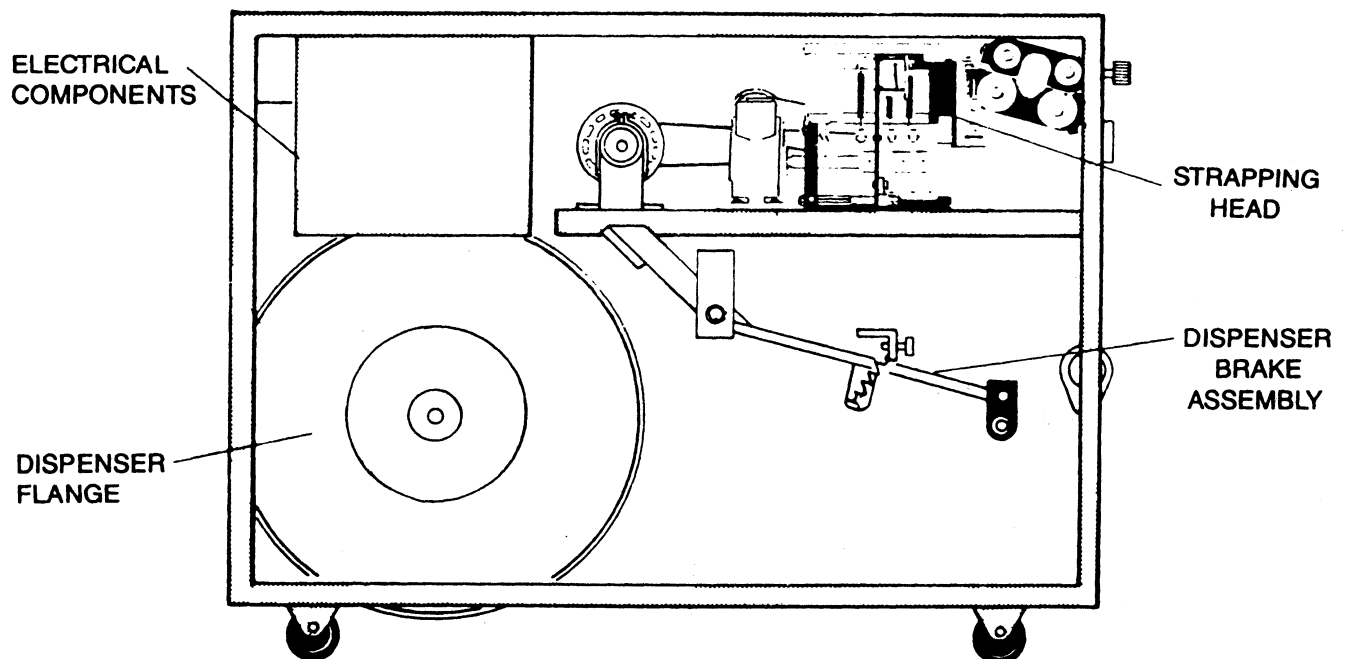


FIGURE 2. MAJOR COMPONENTS, FRONT VIEW

SP-4

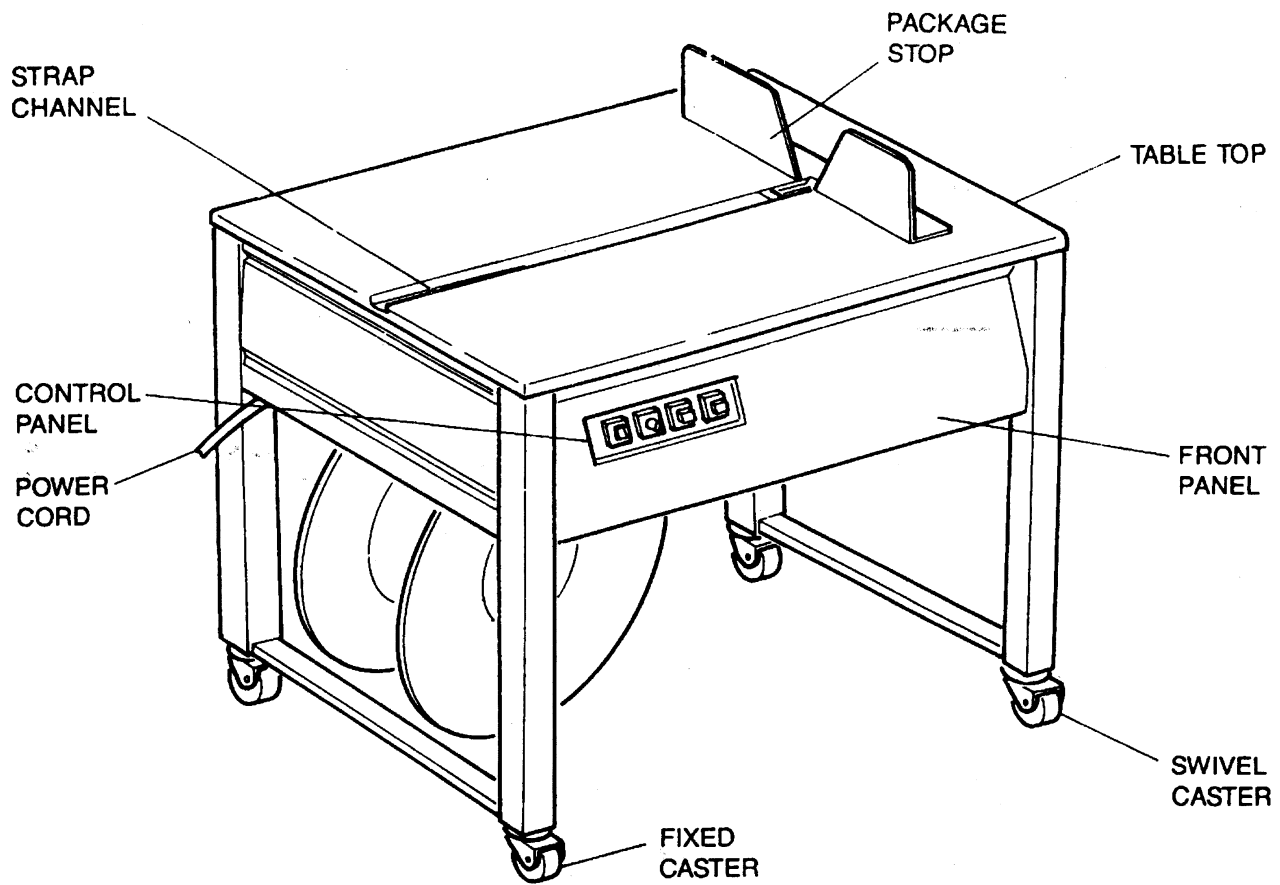


FIGURE 3. MAJOR COMPONENTS, EXTERIOR

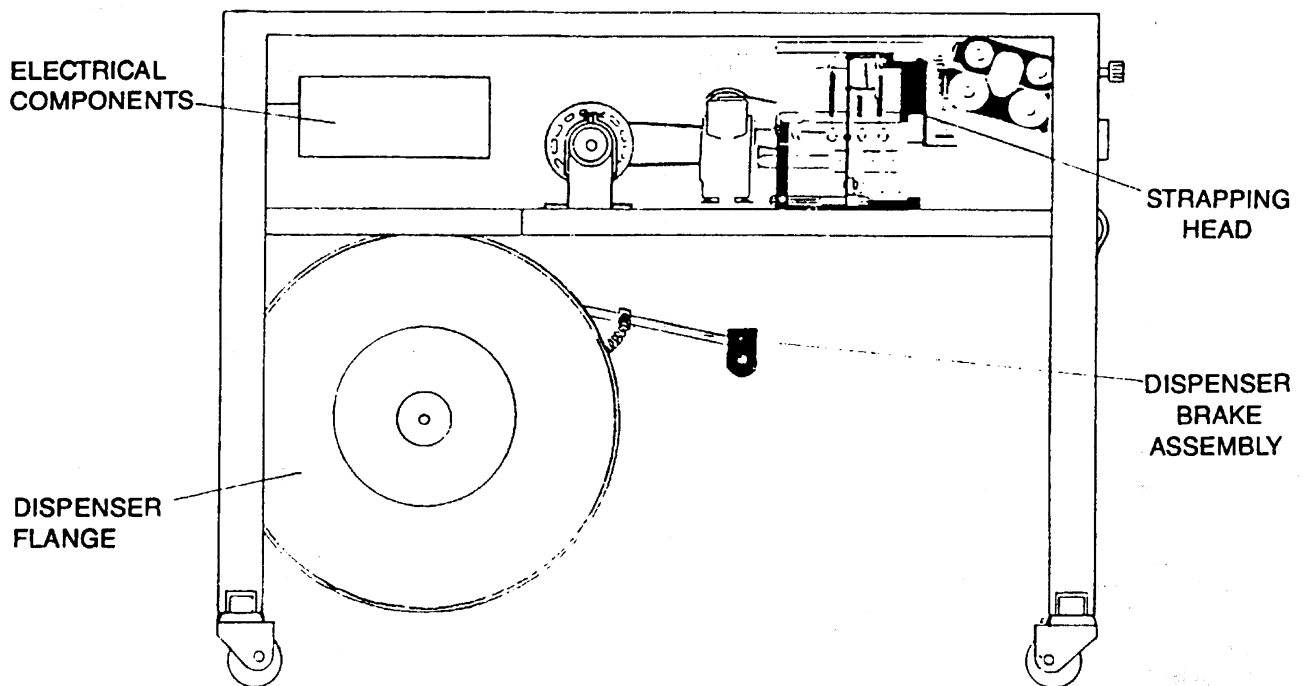


FIGURE 4. MAJOR COMPONENTS, FRONT VIEW

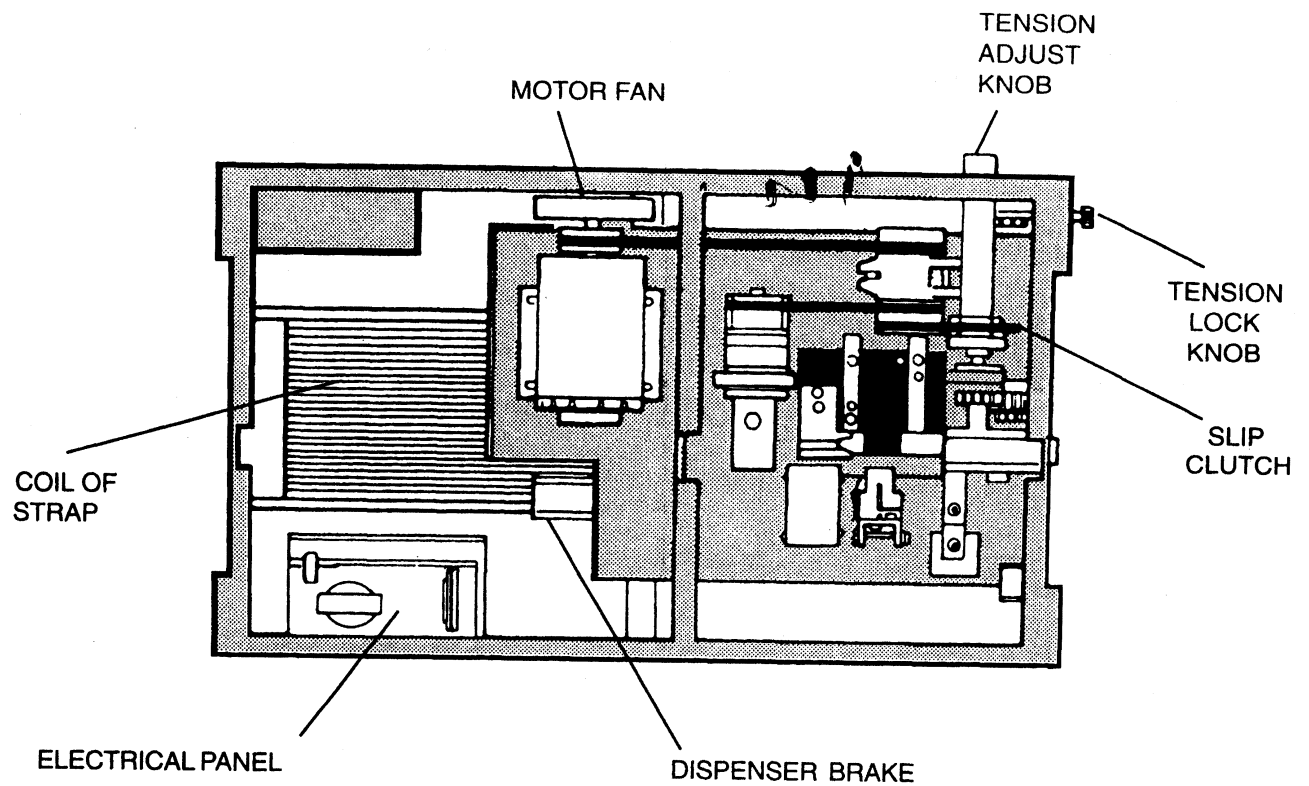


FIGURE 5. MAJOR COMPONENTS, TOP VIEW

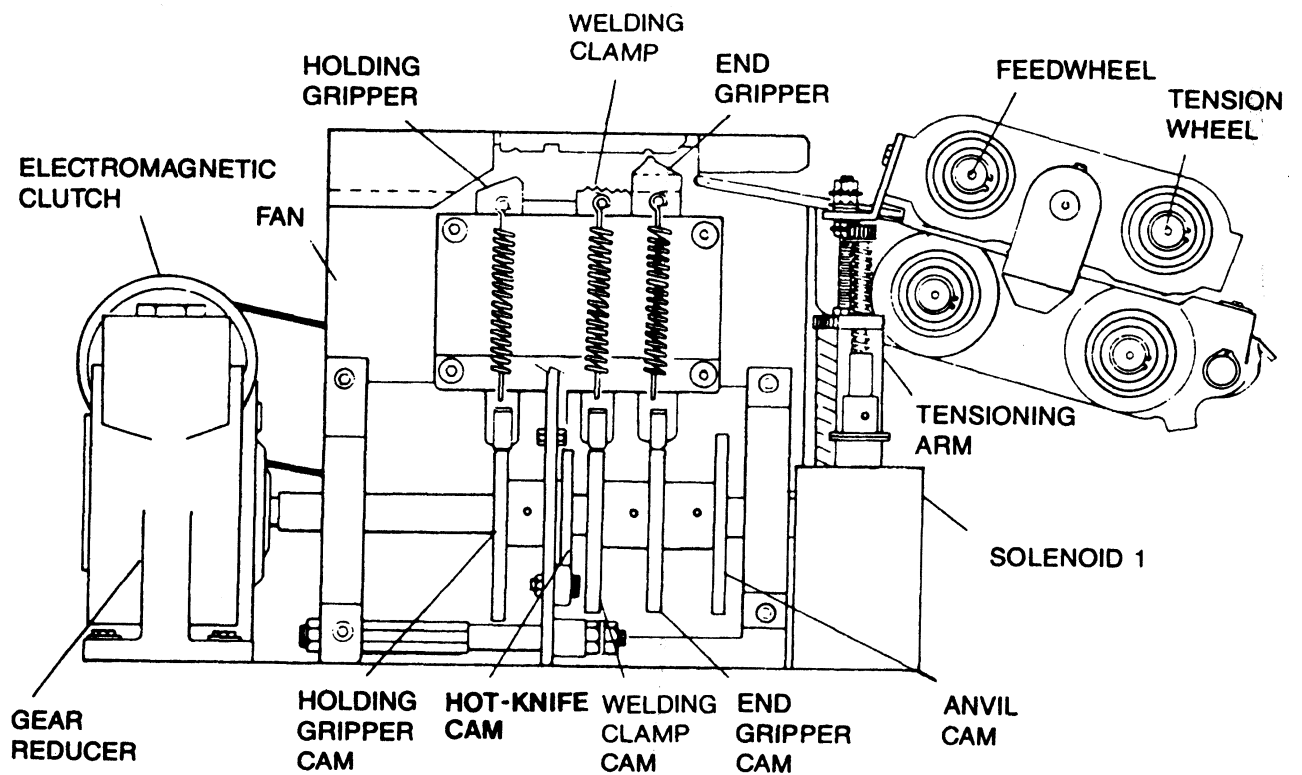


FIGURE 6. MAJOR COMPONENTS, STRAPPING HEAD

INSTALLATION

Installation of the SP-1 requires that the machine be uncrated, placed in its proper position and secured in place with the caster locks. Operation may begin once strap of the proper size is loaded and the power cord is plugged into the appropriate electrical outlet.

One set of tools and spare parts is packed with each machine for use in making adjustments and for replacement of parts as needed. Please compare your supplied tools with the following list:

Tools list

Phillips screwdriver

1 1/2" brush

8mm/10mm open end wrench

5mm Allen wrench

4mm Allen wrench

3mm Allen wrench

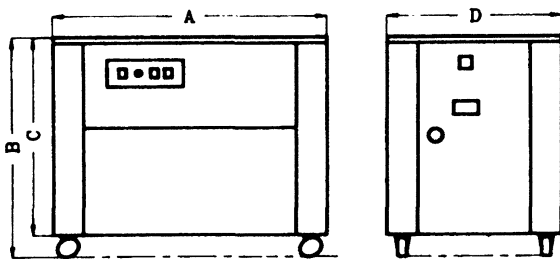
2.5mm Allen wrench

Lubricating oil

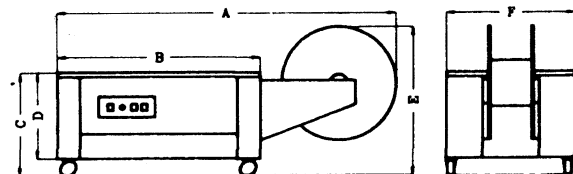
STRAP GUIDE (OPTIONAL)

1	660076	1/4" (6mm) strap guide, entry
1	660080	1/4" (6mm) strap guide, exit
1	660077	3/8" (10mm) strap guide, entry
1	660081	3/8" (10mm) strap guide, exit
1	660078	1/2" (13mm) strap guide, entry
1	660082	1/2" (13mm) strap guide, exit
1	660079	5/8" (15.5mm) strap guide, entry
1	660083	5/8" (15.5mm) strap guide, exit

SP-1



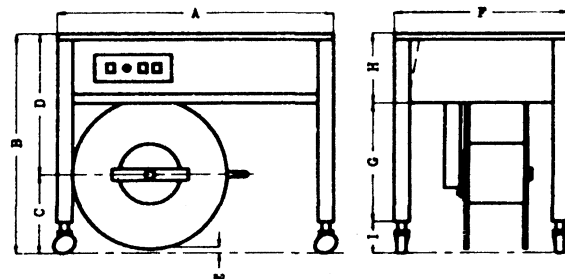
A---895mm. C---655mm.
B---735mm. D---565mm.



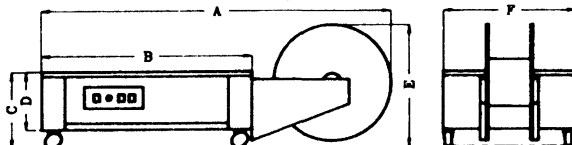
A---1510mm. C---470mm. E---655mm.
B---895mm. D---380mm. F---565mm.

SP-1L

SP-4



A---895mm. D---465mm. G---395mm.
B---735mm. E---20mm. H---230mm.
C---270mm. F---565mm. I---110mm.



A---1510mm. C---330mm. E---515mm.
B---895mm. D---220mm. F---565mm.

SP-1SL

INSTALLATION DIMENSIONS AND CLEARANCES.

OPERATING INSTRUCTIONS

OPERATOR'S CONTROLS

CONTROL PANEL. The control panel is located on the left-hand side of the front panel of the machine. Refer to Figure 9.

POWER SWITCH. A single pole, single set luminous push button glows when turned on. All electrical circuits and the electric motor are then energized. Pushing the "Power Switch" once more cuts off all power supply to the machine.

STRAP FEED LENGTH TIMER. Metered lengths of strap can be adjusted to automatically feed in a range of from 1" (25mm) to approximately 25 feet (7620mm).

RESET SWITCH. When pushed, the electromagnetic clutch is energized and the strapping head turns one complete revolution, stopping in the home position.

FEED LENGTH SWITCH. When pushed, additional strap is fed out into the strap channel. Strap feed will continue as long as the button is pushed.

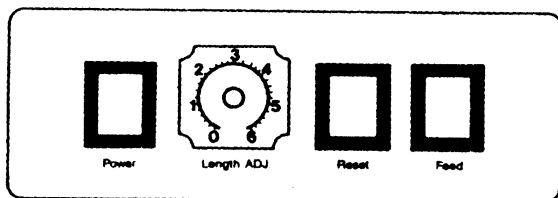


FIGURE 9. OPERATOR'S CONTROL PANEL

LOADING STRAP IN MACHINE

Refer to Figure 10 and proceed as follows:

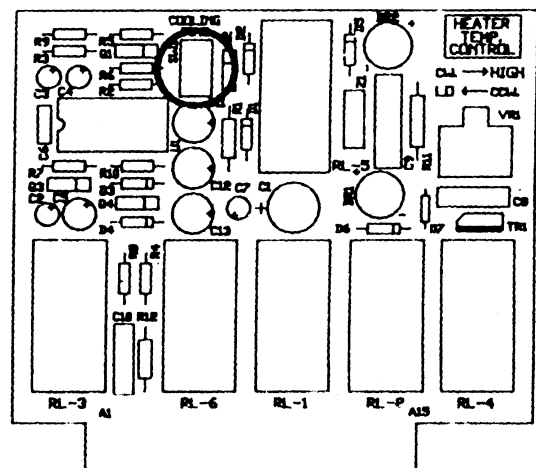
1. Withdraw the dispenser assembly. Place the assembly as shown. (Fig. 10, P. 8)
2. Push down on the lock and turn to disengage from the roll pin that protrudes from the shaft.
3. Remove the lock and lift the right flange from the dispenser shaft.

COOLING TIME DIP-SWITCH ADJUSTMENT

The cooling time adjustment on your machine allows the user to adjust the cooling time to meet his strapping requirements. Please follow the steps below to adjust the cooling time of the heater.

Attention: Before making any dip-switch changes Power MUST be OFF.

Cooling time Shortest For very light tension	
Cooling time Medium Normal setting	OR
Cooling time Longest For high tension	



4. Place a coil of strap on the left flange allowing the shaft to poke through the plastic wrap. Pay-off must be from the top of the coil if the friction brake is to operate properly, as shown in Figure 11.
5. Replace the right flange and reinstall the lock.
6. At this time the securing straps can be removed from the coil of strap.
7. Place the dispenser assembly back into the rear-end of the machine. Make sure the assembly is placed in properly. The lock should be positioned to the right. This can be verified by noting that the drag arm of the friction brake contacts the left dispenser flange.
8. When installed, close the rear panel door.

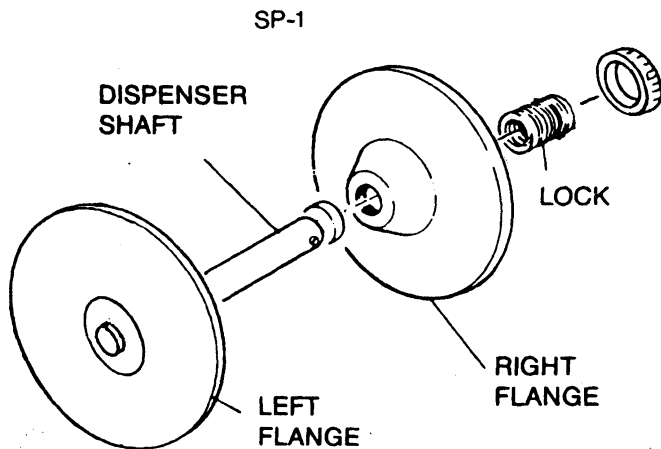


FIGURE 10. DISPENSER ASSEMBLY

THREADING STRAP THROUGH MACHINE

The threading procedure involves routing strap from the dispenser and up through the strapping head. Refer to Figure 11 and proceed as follows:

1. Open the right-hand door and pull about 3 feet (1M) of strap from the coil.
2. Thread the strap through the looper (B), pass it under roller (C) and allow it to exit the cabinet. Close the right-hand door.
3. Pull up on the strap, then insert the lead-end between the guide and roller (D).
4. Continue to push the strap through the head until it can be seen at point (E).

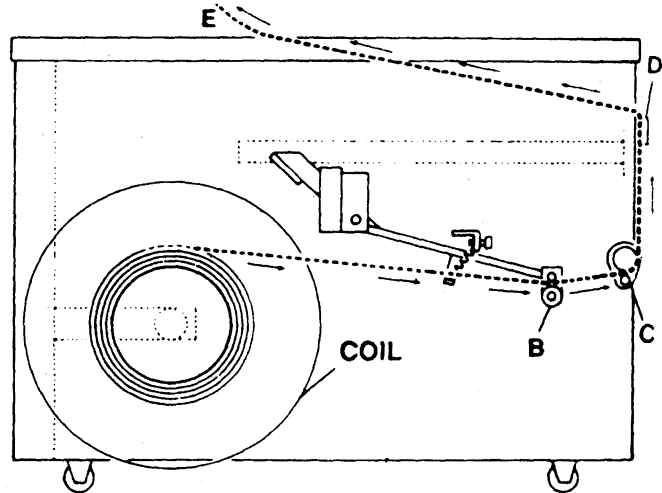


FIGURE 11. STRAP THREADING DIAGRAM

STRAPPING CYCLE

The machine is now ready for strapping a package. To operate the SP-1, proceed as follows:

1. Push the power switch to the "ON" position and allow the hot knife 5 seconds to reach operating temperature.
2. Place a package on the table top, directly above the sealing head. Allow the package to contact the two package stops.
3. Grasp the strap on the left side on the package, bring it over the package and insert the lead-end into the strap guide on the right side of the package. As the lead-end of the strap closes LS1, the strap will be tensioned, welded and then released, all automatically. "CAUTION!!" Be sure to keep fingers from beneath the strap.
4. Remove the strapped package and note the length of the strap fed out for the next cycle. Adjust the timer as needed.
5. Note the condition of the weld and the tension of the tie on the package. If the condition of the weld or the level of tension is unsatisfactory, adjust the hot knife temperature or the tension level as needed. Ref: Operating Adjustments.

OPERATING ADJUSTMENTS

ADJUSTING TENSION

If tension adjustment is required, proceed as follows:

1. Loosen the locking knob at the righthand end of the machine.
2. Turn the knurled knob, located at the rear of the machine, clockwise to increase tension, counterclockwise to decrease tension.
3. When set to the desired tension level, tighten the locking knob.

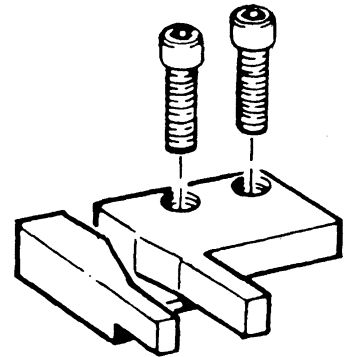


FIGURE 12. EXIT GUIDE

ADJUSTING HOT-KNIFE TEMPERATURE

If the weld appears to be only minimal, it may be that the temperature is improperly set. Make all corrections, in small increments, according to the following conditions:

RAISING HOT-KNIFE TEMPERATURE – If the weld appears to have insufficient heating, turn the hot-knife rheostat (Item 19 on the PC board), in a clockwise direction.

LOWERING HOT-KNIFE TEMPERATURE – If the condition of the weld appears to have been over heated, turn the rheostat counter clockwise.

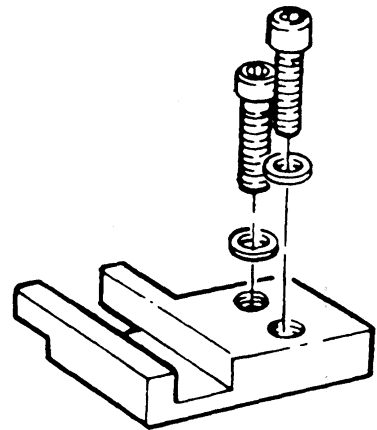


FIGURE 13. ENTRY GUIDE

REPLACING STRAP GUIDES

Each machine is shipped with 4 sets of strap guides. The strap guide sizes supplied are for strap of 1/4" (5-6mm), 3/8" (10mm) 1/2" (13mm) and 5/8" (16mm) respective.

Note: Each set consists of an exit and re-entry guide. Ref: Fig. 12 & 13 for identification.

Fig. 14, shows the correct location of each guide. Be sure not to inter-mix the sets as feeding reliability will be affected.

Note: When installing the guides be sure not to over-tighten the mounting screws.

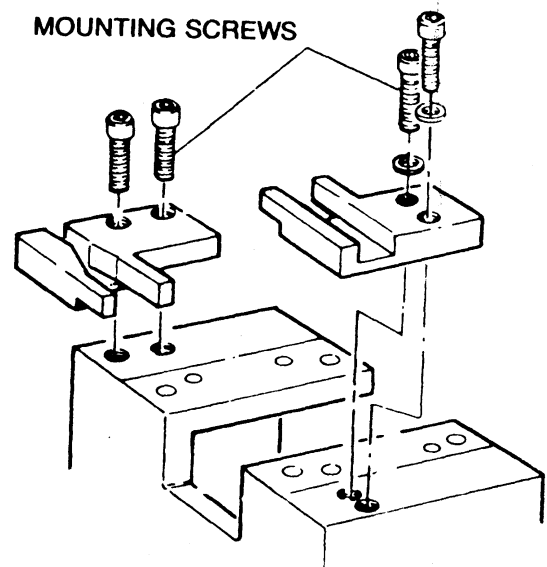


FIGURE 14. GUIDE LOCATION

PRINCIPLES OF OPERATION

GENERAL

The strapping cycle can be divided into three distinct operations:

- a. Grip and tension
- b. Weld, cut, and release
- c. Feed

The following descriptions refer to Figures 15 through 20. Note that both the mechanical and the control functions of the micro switches are described.

1. NEUTRAL POSITION. When the strap is initially threaded through the machine, it enters the head under the strap guide and over roller D, between two sets of feed and tension rollers and on through a slot in the end gripper. It then passes beneath the anvil, over the welding clamp and holding gripper and out into the strap channel on the left-hand side of the table top where the operator has access to it.

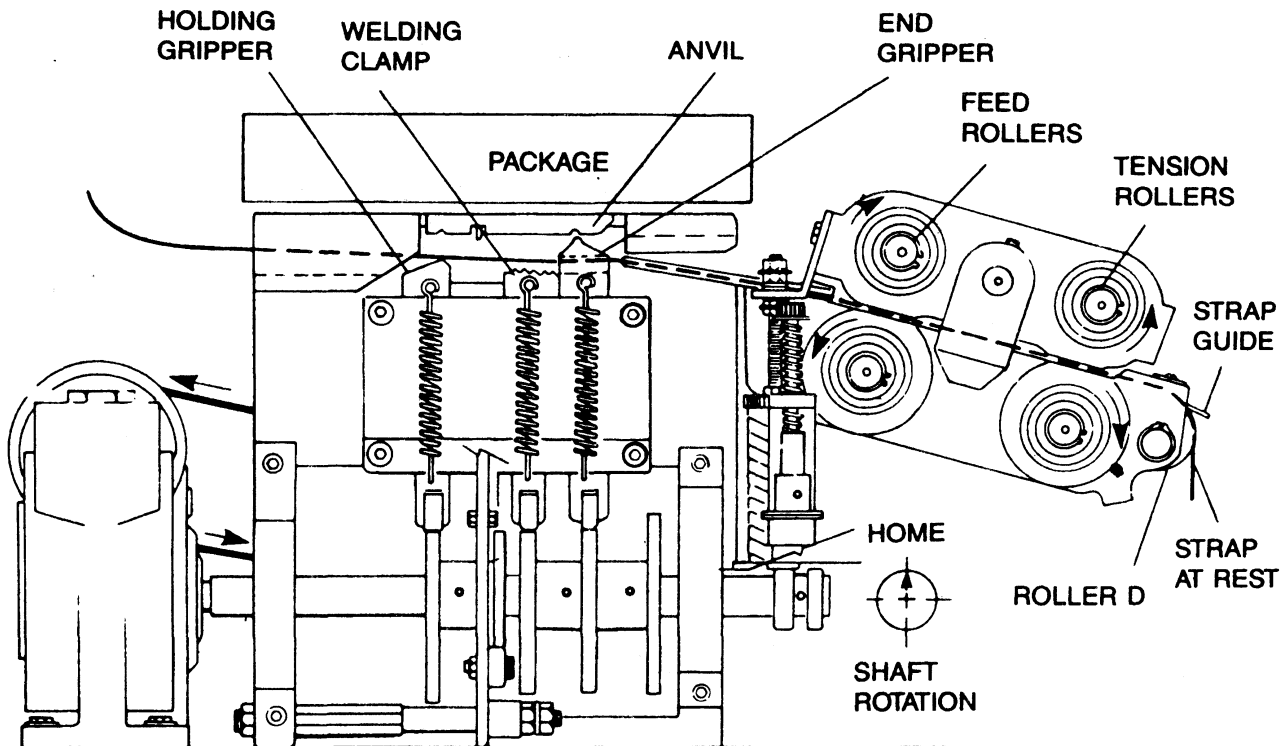


FIGURE 15. NEUTRAL POSITION

2. ENCIRCLING PACKAGE; TRIPPING LS1. Grip and tension is initiated by the operator who encircles the package with the strap and inserts the strap end into the slot of the upper strap guide on the right-hand end of the machine. In doing so, the strap is guided between the gripper portion of the end gripper and anvil then into a slot in the anvil where it makes contact with the start switch detector lever. As the lever moves to the left, it trips the cycle start switch, LS1.

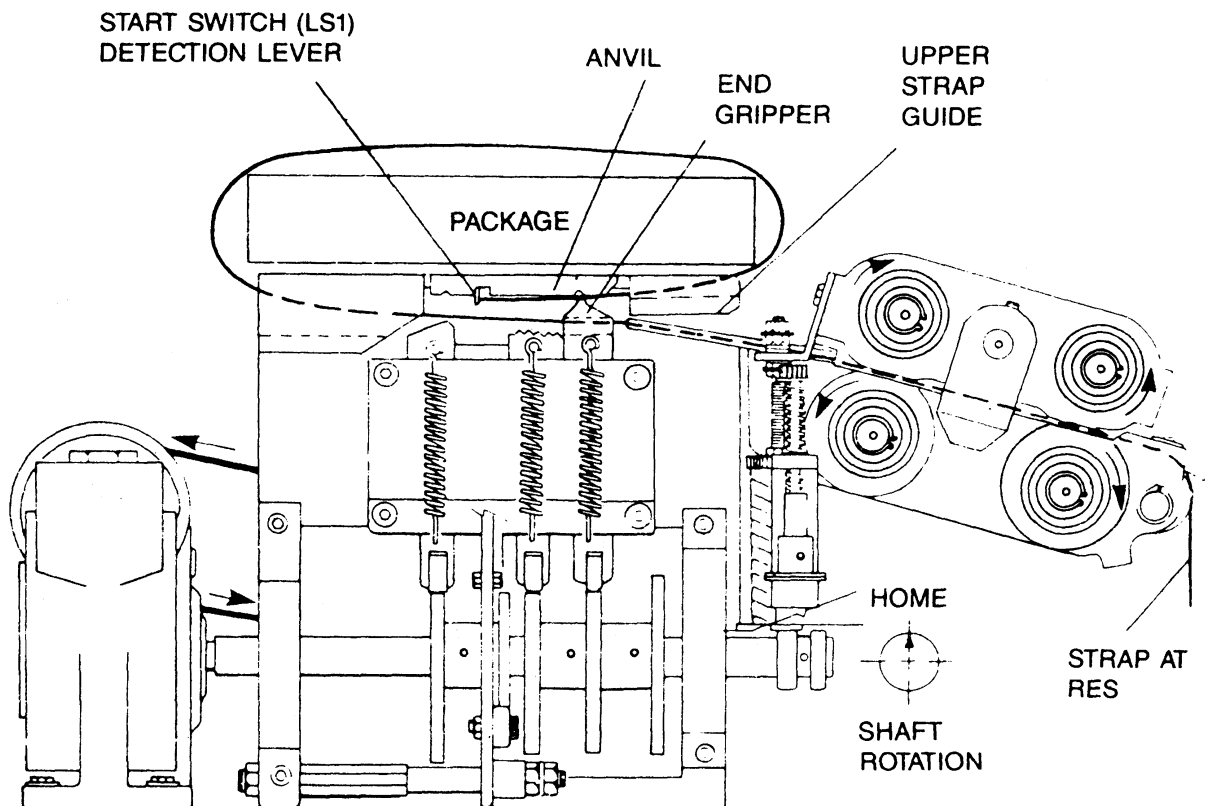


FIGURE 16. ENCIRCLING PACKAGE; TRIPPING LS1

3. TENSION. When LS1 is closed, the electromagnetic clutch energizes and the cam shaft rotates approximately 45 degrees. This small amount of shaft rotation is controlled by LS3, mounted at the right-hand end of the cam shaft. When LS3 closes it de-energizes the electromagnetic clutch and the end gripper will have been moved upward to contain the upper strap beneath the anvil.

The 45 degrees of cam rotation brings the LS4 surface of the cam into play with the tension lever. The tension lever pivots and closes the tension rollers. The tension rollers close against the strap, drawing it back through the head, thus tensioning it around the package. When full tension has been drawn, the electron tension detector reacts at same time, the electromagnetic clutch energizes again.

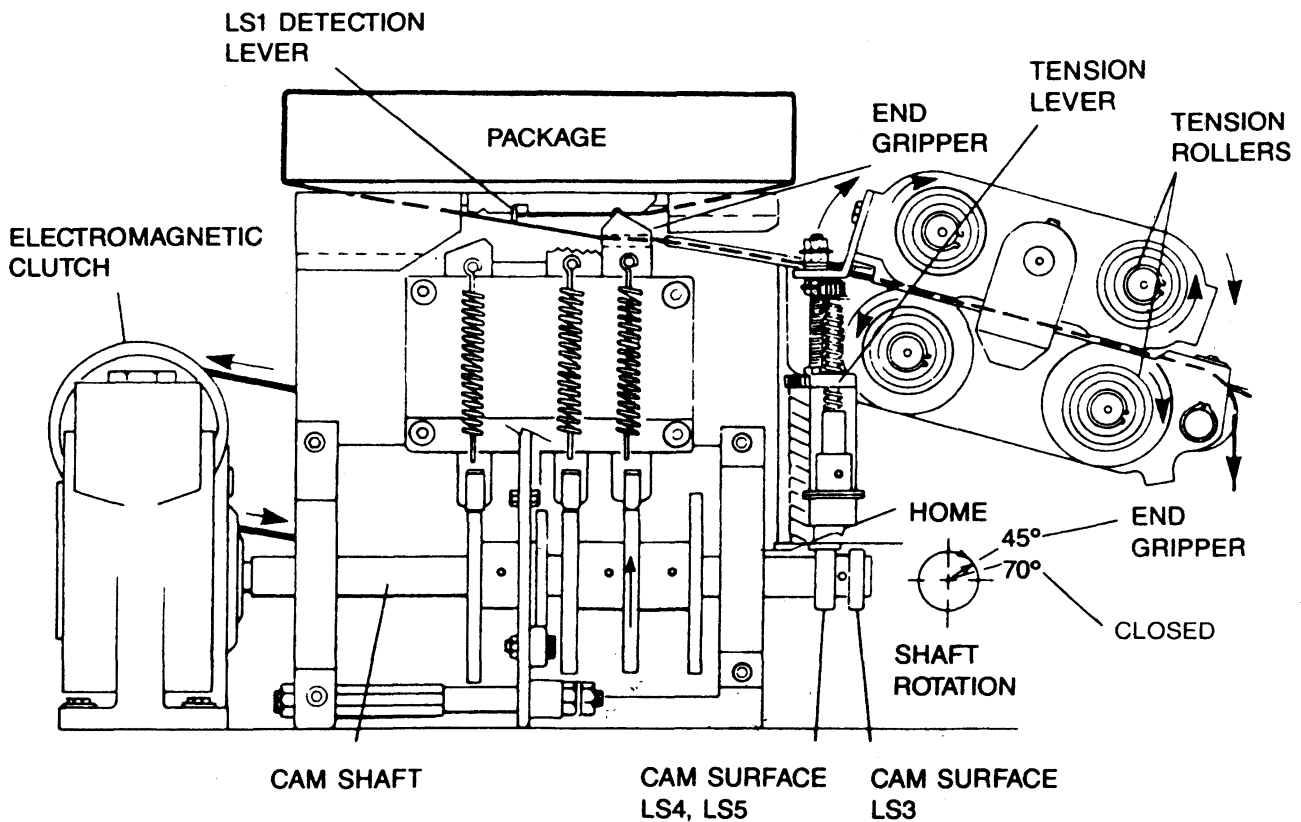


FIGURE 17. TENSION

4. **HOLDING GRIPPER RISES; HOT-KNIFE MOVES INWARD.** Momentarily electron tension detector energizes the control circuit to energize the electromagnetic clutch and turn the cam shaft. As the cam shaft turns, the holding gripper rises to contain the other end of the strap beneath the anvil. The tension lever is lowered to release tension and the welding clamp begins to rise.

It's important to note that all tension to the strap must be released before the strap is cut, otherwise the strap-end could be damaged and feeding reliability will be affected.

The hot-knife moves in between the two layers of strap.

NOTE: TENSION ROLLERS ARE RELEASED AND STRAP IS AT REST.

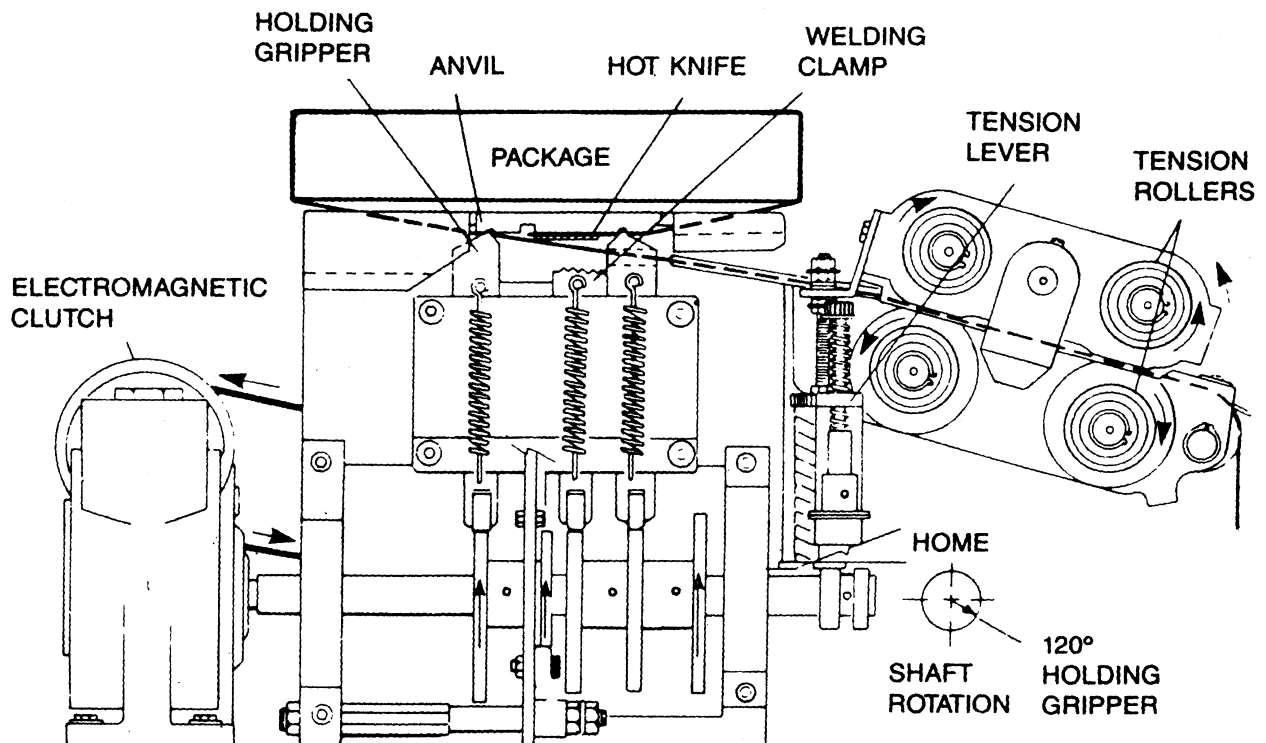


FIGURE 18. HOLDING GRIPPER AND HOT-KNIFE

5. STRAP IS CUT; WELD IS MADE. The welding clamp cuts the strap during it's upward movement then pushes the upper surface of the lower strap against the lower surface of the hot-knife. It then pushes the hot-knife against the lower surface of the upper strap.

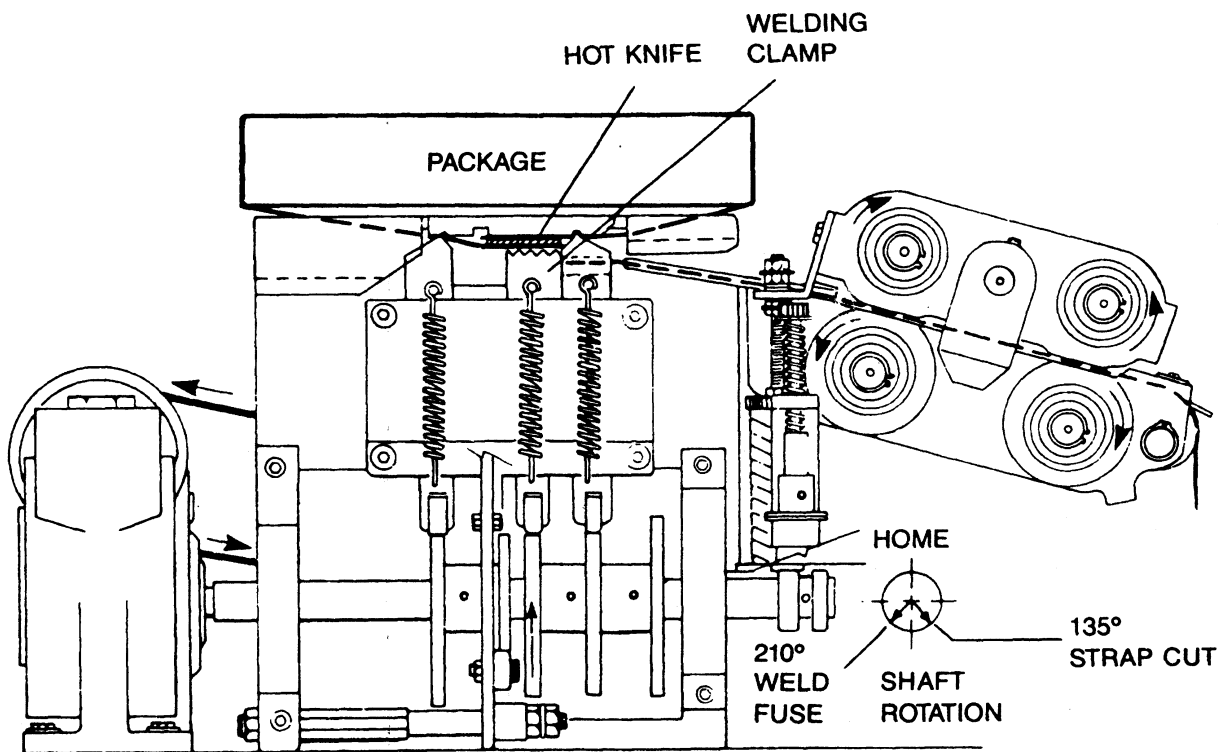


FIGURE 19. STRAP IS CUT & WELD IS MADE

6. WELD IS RELEASED; HEAD RETURNS TO HOME POSITION. The hot-knife retracts and the welding clamp pushes the two molten surfaces together, welding the strap.

LS4 closes and stops the cam shaft for approximately 1/2 second. After this short delay, to ensure that the strap fuses properly, the cam shaft again turns and the holding gripper, the welding clamp and the end gripper retract to the neutral position.

The anvil then retracts and the welded strap is released to the lower side of the package.

The cam shaft returns to the home position and closes LS3 and LS5. The electromagnetic clutch is de-energized by LS3 while LS5 energizes SOL1. As the solenoid pulls down on the tensioning lever, the feed rollers close against the strap, pushing it through the head and out into the strap channel. The feed timer de-energizes and SOL1 is released.

Strap feed stops and the machine is ready for the next cycle.

NOTE: SOL1 ENERGIZES TO CLOSE FEED ROLLERS AND FEED STRAP AFTER THE CAM SHAFT REACHES HOME POSITION

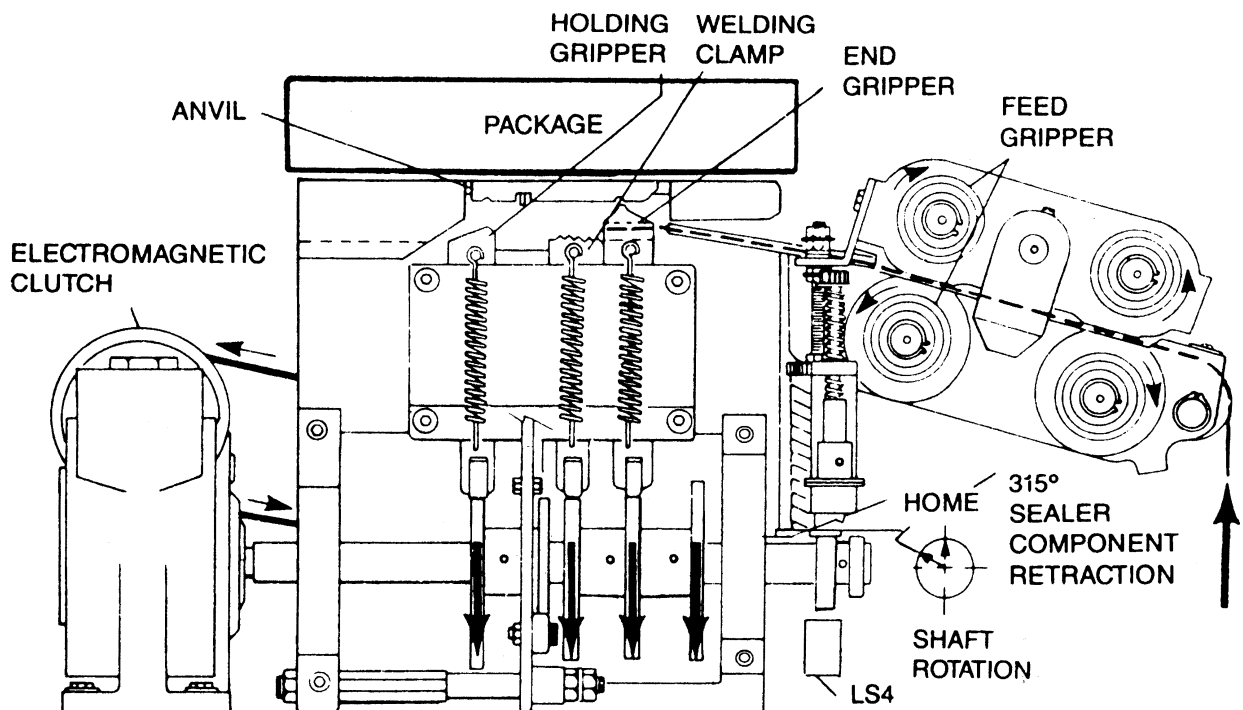


FIGURE 20. WELDED STRAP IS RELEASED; HEAD IS IN HOME POSITION ; STRAP FEEDS

SERVICE ADJUSTMENTS AND CLEARANCES

ANVIL To ensure that the anvil operates smoothly, a minimum clearance between the anvil and the left and right guides must be maintained. To adjust, proceed as follows:

1. Make sure the right-hand guide is securely mounted.
2. Loosen the two left-hand guide mounting screws.
3. Insert a shim, .002" (.050mm) thick .118" (3mm) wide by 5" (130mm) long between the shoulder of the anvil and the left guide.
4. Push the left guide against the anvil and tighten the left guide mounting screws.
5. Remove the shim and check to make sure the anvil moves smoothly.

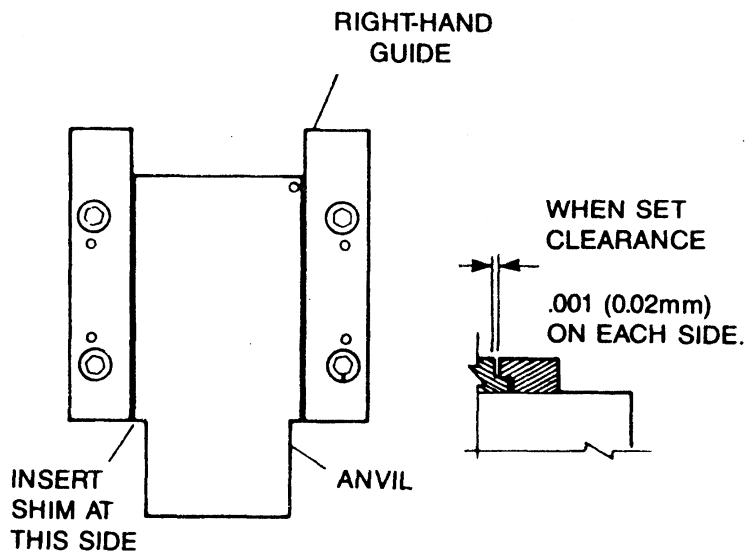


FIGURE 21. ANVIL CLEARANCE

SWITCH CAM: The switch cam is a two level cam. The inner cam actuates LS4 and LS5. The outer cam actuates LS3.

To make sure the cams are set properly, proceed as follows:

1. Make sure the machine is in the neutral or home position.
2. If the micro-switches need adjusting, loosen the mounting screws and set LS4 and LS5 as seen in Figure 22. When properly set, tighten the mounting screws.

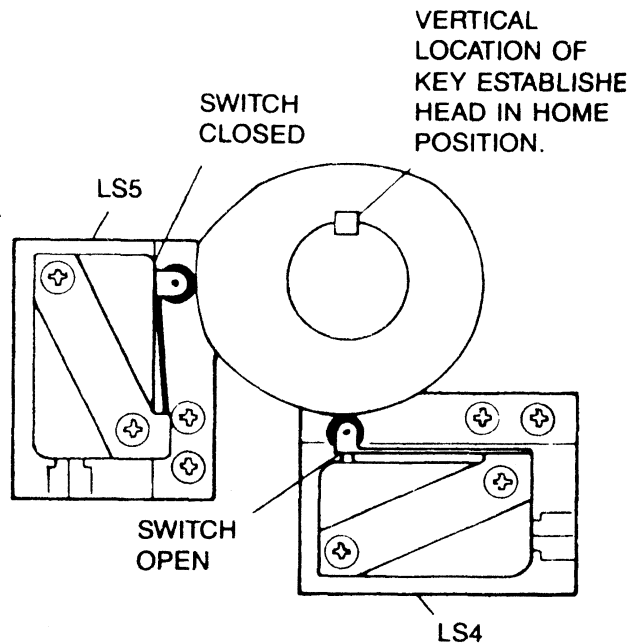


FIGURE 22. LS4 AND LS5

3. Position LS3 as shown in Figure 20. When set, tighten the mounting screws.

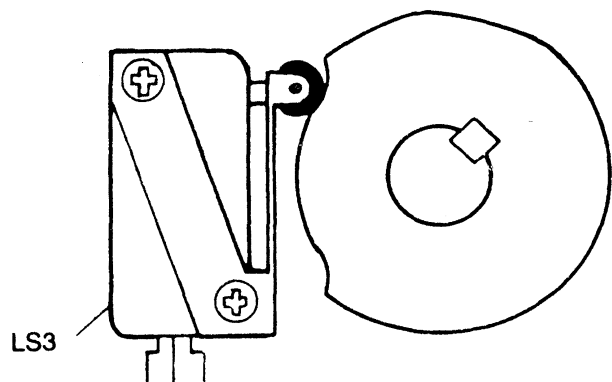
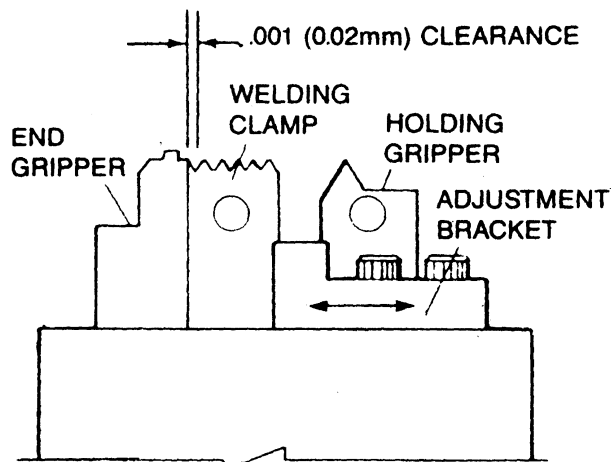


FIGURE 23 LS3

WELDING CLAMP AND END GRIPPER. To adjust the clearance between the welding clamp and the end gripper, refer to Figure 23 and proceed as follows:

1. Remove the anvil.
2. Loosen the two socket head cap screws that secure the "L" shaped adjustment bracket to the casting.
3. Push the block left or right to adjust the clearance. The clearance should not exceed .001" (0.02mm).
4. When set, securely tighten the two mounting screws.



PARTS SEEN FROM REAR SIDE OF HEAD

FIGURE 24 WELDING CLAMP AND END GRIPPER CLEARANCE

Note: If the cutting surface of the welding clamp has become dull, the welding clamp can be turned 180 degrees, thus doubling the life of the part.

TENSION LEVER. Before making any adjustments to the tension lever, check to see if the tension lever is in a level condition. To check and adjust if need be proceed as follows:

1. Manually turn the rotor of the electromagnetic clutch until the key, seen at the end of the cam shaft, is positioned as shown in Figure 25

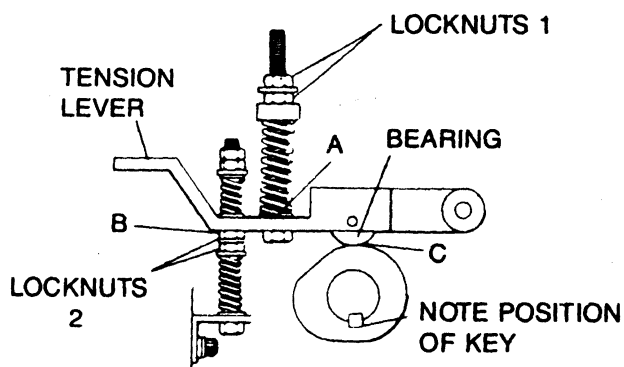


FIGURE 25. ADJUSTING TENSION LEVER

2. Make sure the tension lever bearing is in contact with the surface of the cam.
3. If there is no clearance at points A, B, and C then the tension lever is considered to be level.

4. If there is clearance at any point, loosen locknuts (1) and (2) and adjust all clearance out at points A, B, and C.
5. When set, tighten the locknuts.

FEED AND TENSION ROLLERS. When the machine is in the neutral position, the feed and tension rollers should not come into contact with the strap. The clearance between the rollers should be .040" (1.0mm). To adjust the feed rollers away from the strap proceed as follows:

1. Loosen the locknuts and turn all 4 nuts upward. This will raise the angle plate, pivoting the feed rollers upward. Make all adjustments in very small increments. When set, insert a .020 (0.5mm) shim between the angle plate and the locknut B and tighten locknut A against locknut B.
2. Remove the shim and press down on the angle plate. Tighten the locknuts, C and D.

To adjust the tension rollers away from the strap, reverse the above procedure.

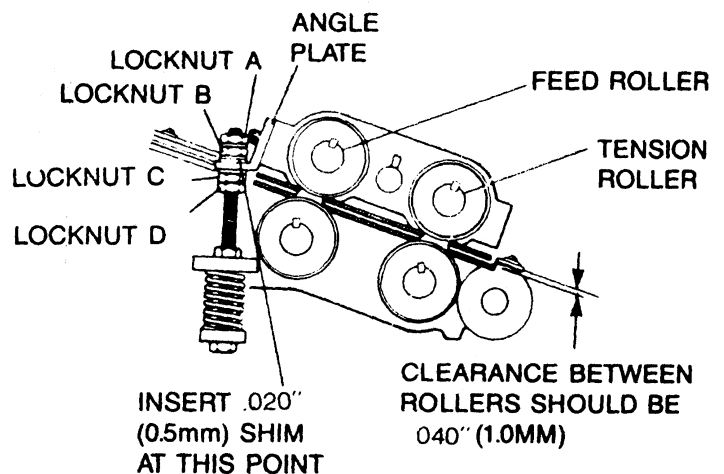


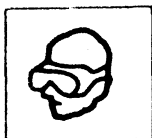
FIGURE 26. ADJUSTING FEED AND TENSION ROLLERS

MAINTENANCE

WARNING

BEFORE SERVICING MACHINE

Wear safety glasses with side shields which conform to ANSI Standard Z87. 1.



Failure to wear safety glasses could result in severe personal injury or blindness.

PROTECT YOUR EYES

- Only trained personnel should service machine.
- Unless specified, shut off and disconnect all electrical power.
- Follow all service instructions.
- Make sure the hot-knife blade is cool before servicing
- Use the correct tools.
- Never adjust, repair or oil moving machinery.



READ GENERAL SAFETY INSTRUCTIONS, PAGE 2 OF THIS MANUAL.

GENERAL. Periodic checks of all drive belts for replacement should be made to prevent worn out or stretched belts which will affect tensioning

LUBRICATION. Make sure the machine is clean before applying lubricants to the points shown in the figure below. Note: Use a brush or compressed air to dispose of debris.

TENSION TRIP ARM ASSEMBLY SLEEVES. Apply a few drops of light machine oil to the edge of the sleeve so that the oil can penetrate to the shoulder of the screw.

TOP SLIDE, GUIDE PLATES, WELDING CLAMP, END GRIPPER, AND HOLDING GRIPPER. Apply light machine oil to these parts at the points indicated in Figure 27.

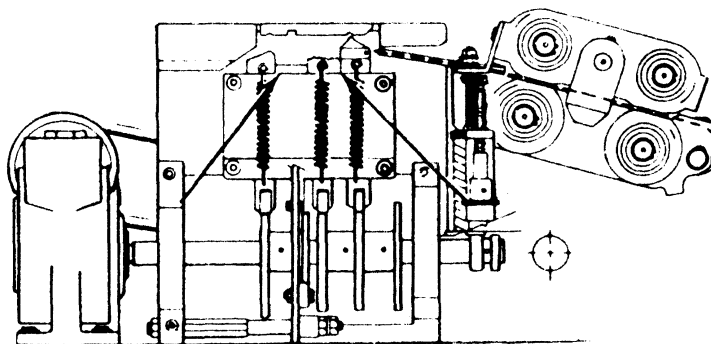


FIGURE 27. LUBRICATION POINTS

GEAR REDUCER. Replace the oil in the gear reducer once a year in the following manner:

1. Remove the oil filling plug at the top of the reducer.
2. Remove the lower plug and allow the oil to drain from the gearing.
3. Reinstall the lower plug and fill with gear oil
4. Reinstall the upper plug.

Note: The following parts should NEVER be lubricated:

1. Electromagnetic clutch
2. Roller assemblies
3. Belts and pulleys
4. Clutch disc

TROUBLESHOOTING

SYMPTOM: Strap jams in strapping head while feeding.

CAUSE

1. Debris accumulation in feed/tension roller area.

REMEDY

1. Disassemble the roller assembly and remove debris. See Adjustment Section, Figure 23.

SYMPTOM: Strap pulls from head before seal and cut-off.

1. Worn gripper.

1. Replace gripper

SYMPTOM: Strap will not feed.

1. Solenoid 1 will not activate.

1. Adjust the clearance of LS5 in relation to the switch cam. Refer to Figure 22.
2. Replace LS5.
3. Adjust LS3 if needed to ensure the head stops in HOME position.

SYMPTOM: Strap is not being cut-off upon completion of strapping cycle.

1. LS3 inoperative.
2. LS3 improperly adjusted.
3. Clearance between welding clamp and end gripper too great.
4. Cutting surface on welding clamp is dull.

1. Replace and adjust LS3, refer to Fig. 23.
2. Adjust LS3 as required.
3. Adjust the clearance as detailed in Adjustments and Clearances Section.
4. Turn the welding clamp 180° to bring new cutting surface into play. Details in Adjustments and Clearances Section.

SYMPTOM: Machine will not complete seal and cut-off.

1. The belt that activates the tension trip arm is broken or has come off the pulleys.
2. LS2 inoperative.

1. Replace the belt, if necessary. Remount the belt if it has come off the pulleys. Refer to Parts List, Figure 4.
2. Replace LS2. Refer to Parts List, Fig. 4.

SYMPTOM: Poor strap weld.

1. Hot-knife temperature is too high or too low.
2. The 5 amp fuse has blown.

1. Adjust the hot-knife temperature, Details in Operating Instructions Section.
2. Before replacing the 5 amp fuse, attempt to identify the cause of why the fuse failed and make necessary repairs..

PARTS LIST, FIGURE 1

KEY	QTY.	PART NO.	DESCRIPTION
1	1	660124	Main body block
2	1	660125	Guide slot
3	1	660126	Guide plate
4	1	660120	End gripper
5	1	660121	Welding Clamp
6	1	660122	Holding gripper
7	1	660123	L-type angle plate
8	3	660119	Clevis
9	1	660127	Spring hook plate
10	1	660130	Separating arm
11	1	660134	Top cover holder
12	1	660135	Separating plate
13	1	660136	Guide plate, left hand side
14	1	660116	Guide plate, right hand side
15	1	660115	Microswitch detector lever
16	1	660117	Separating arm pin
17	2	660118	Sleeve, separating arm pin
18	3	660128	Compression spring
19	1	660131	Tension spring, short
20	4	660132	Tension spring, long
21	1	660224	Microswitch, heavy
22	4	660436	Ball bearing, 635 ZZ
23	3	660129	Spring hook
24	1	660133	Spring hook
25	1	660475	Spring pin, 4 dia. x 14
26	1	660478	Spring pin, 5 dia. x 20
27	3	660477	Spring pin, 5 dia. x 14
28	5	660474	Spring pin, 3 dia. x 18
29	1	660155	Brass bushing
51	7	660316	Socket head cap screw, M5 x 12
52	1	660314	Socket head cap screw, M5 x 6
53	1	660318	Socket head cap screw, M5 x 16
54	1	660319	Socket head cap screw, M5 x 20
55	1	660320	Socket head cap screw, M5 x 25
56	2	660330	Socket head cap screw, M6 x 25
57	2	660334	Socket head cap screw, M6 x 50
58	2	660363	Socket head set screw, M5 x 8
59	1	660380	Phillips head machine screw, M4 x 15
60	1	660390	Flat head cap screw, M3 x 20
61	3	660374	Phillips head machine screw, M3 x 15
62	4	660398	Hex Nut, M3
63	1	660399	Hex Nut, M4
64	1	660400	Hex Nut, M5
65	2	660402	Hex Nut, M8
66	6	660419	Lock washer, M3
67	2	660420	Lock washer, M4
68	7	660421	Lock washer, M5
69	1	660423	Lock washer, M8
70	5	660422	Lock washer, M6
72	1	660071	Retainer, top cover holder
73	1	660553	Socket head cap screw, M4x20

KEY	PART NO.	DESCRIPTION
4,8,18,22,23,27,28	660120A	End gripper assembly
5,8,18,22,23,27,28	660121A	Welding Clamp assembly
6,8,18,22,23,27,28	660122A	Holding gripper assembly

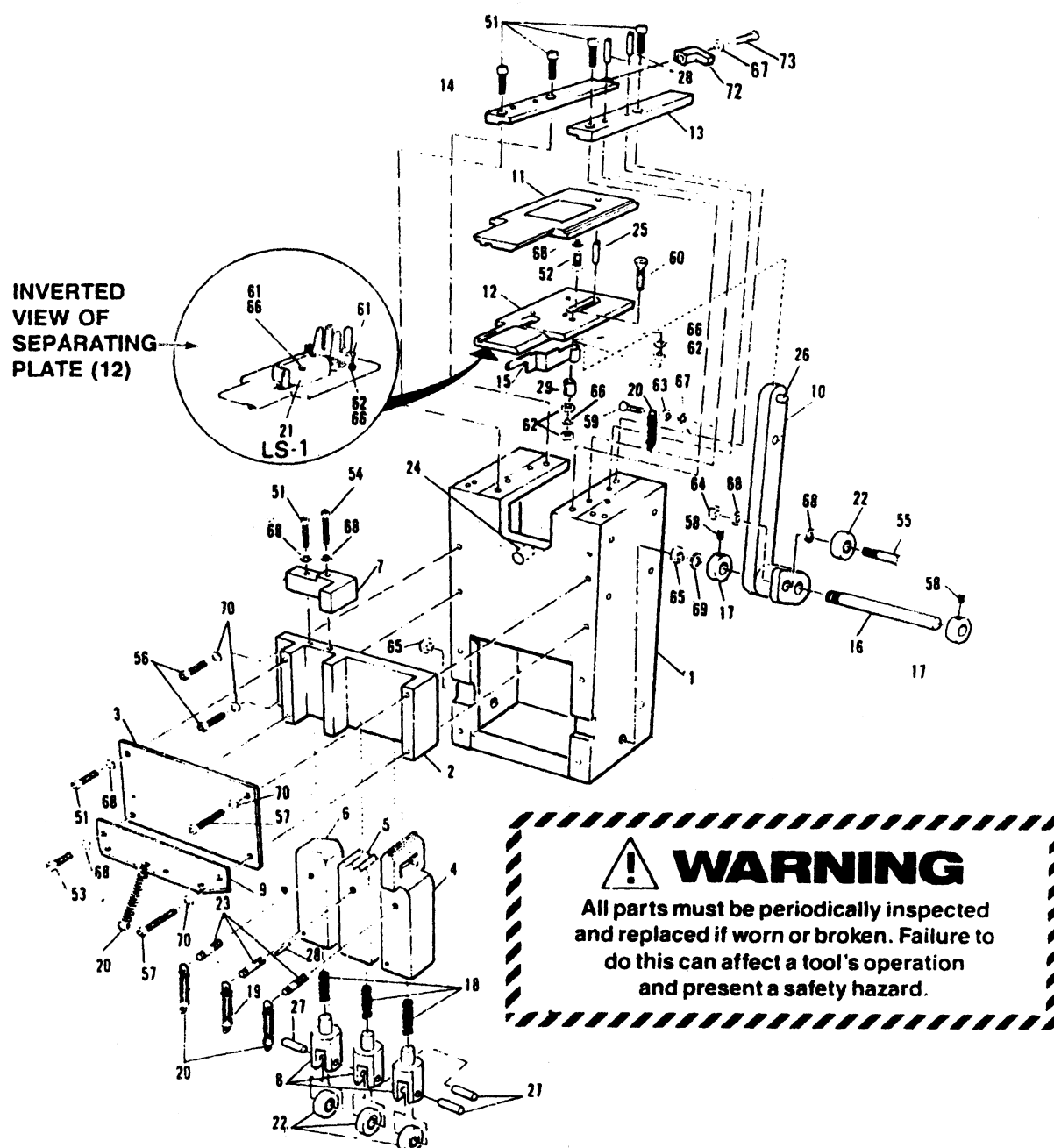
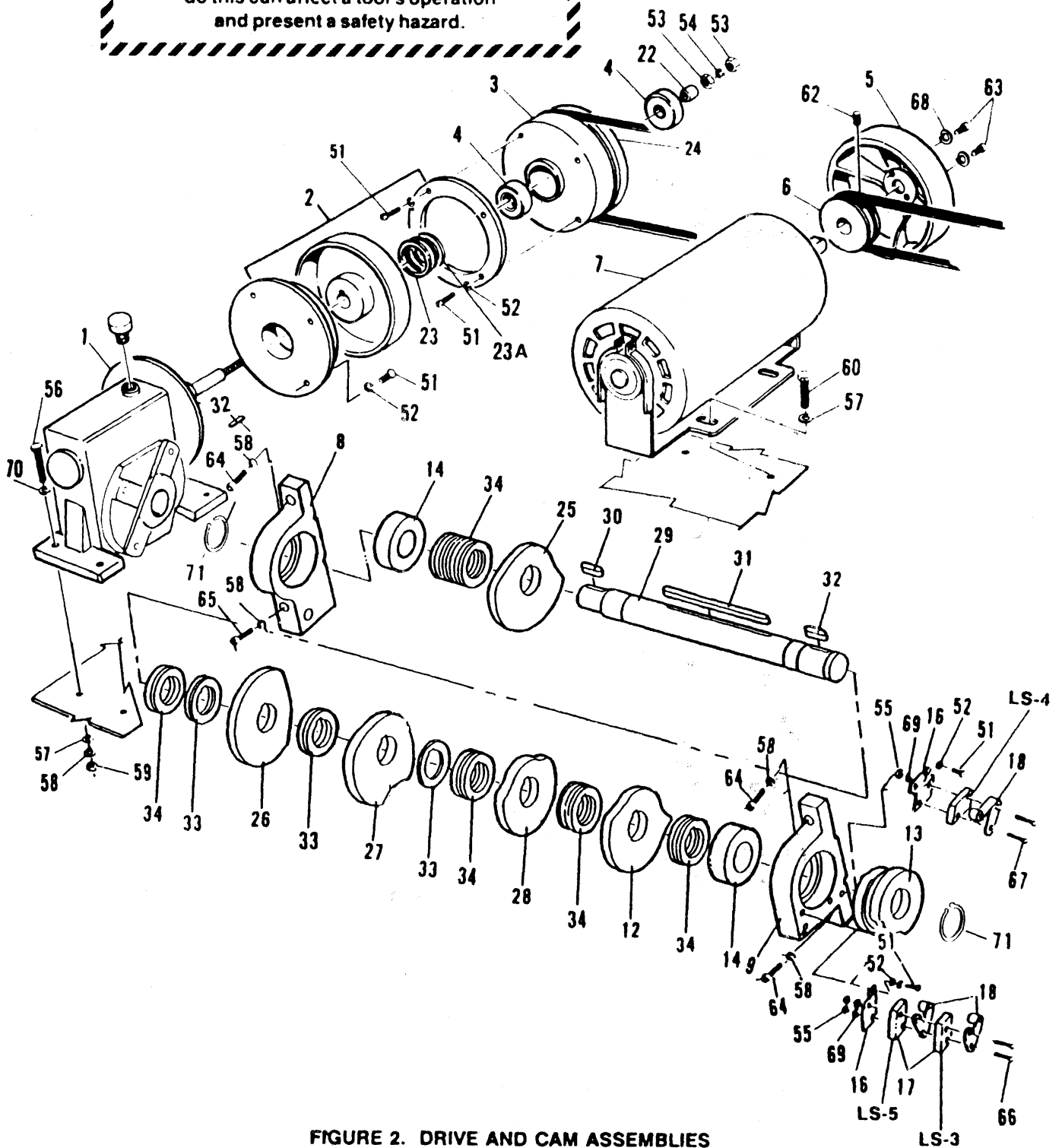


FIGURE 1. WELDING COMPONENTS

PARTS LIST, FIGURE 2

KEY	QTY.	PART NO.	DESCRIPTION
1	1	660137	Reduction gear
2	1	660138	Clutch
3	1	660139	Pulley
4	2	660441	Clutch ball bearing 6201 ZZ
5	1	660140	Motor fan
6	1	660141	Motor pulley
7	1	660165	Motor, 1 phase, 110V, 50/60 Hz
		660165A	Motor, 1 phase, 220V 50 Hz.
		660165B	Motor, 1 phase, 240V 50 Hz.
8	1	660142	Bearing bracket, cam shaft
9	1	660143	Bearing bracket
12	1	660151	Cam
13	1	660152	Cam
14	2	660440	Ball bearing, 6003 ZZ
16	2	660148	Microswitch seat
17	3	660224	Microswitch, heavy
18	3	660149	Microswitch spring plate
22	1	660145	Spacer 12x4
23	AS REQ'D	660416	Shim 0.1mm
23A		660416A	Shim 0.5mm
24	1	660146	Spacer 12 x 8
25	1	660540	Cam
26	1	660541	Cam
27	1	660538	Cam
28	1	660539	Cam
29	1	660542	Cam shaft
30	1	660486	Key, 5x5x15
31	1	660499	Key, 5x5x80
32	2	660487	Key, 5x5x16
33	5	660543	Shim 20mm
34	21	660544	Shim 3.0mm
51	12	660377	Phillips head machine screw, M4 x 8
52	12	660420	Lock washer, M4
53	2	660403	Hex Nut, M10
54	1	660424	Lock washer, M10
55	4	660398	Hex Nut, M3
56	4	660354	Hex bolt, M6 x 25
57	8	660411	Plain washer, M6 x 21
58	12	660422	Lock washer, M6
59	8	660401	Hex Nut, M6
60	4	660353	Hex bolt, M6 x 20
62	1	660365	Socket head set screw, M6 x 8
63	2	660316	Socket head cap screw, M5 x 12
64	3	660329	Socket head cap screw, M6 x 20
65	1	660333	Socket head cap screw, M6 x 45
66	2	660373	Phillips head machine screw, M3 x 30
67	2	660375	Phillips head machine screw, M3 x 20
68	2	660421	Lock washer, M5
69	4	660419	Lock washer, M3
70	4	660412	Plain washer, M6 x 16
71	2	660460	Ring, S-17



LS-3

PARTS LIST, FIGURE 3

KEY	QTY.	PART NO.	DESCRIPTION
1	1	660012	Bearing housing, upper
2	1	660013	Bearing housing, lower
3	1	660014	Tightness adjustment shaft
4	1	660015	Roller shaft
5	1	660018	Roller shaft
6	1	660019	Pin
7	1	660016	Roller shaft
8	1	660017	Roller shaft
9	1	660020	Nylon gear, 40 teeth
10	2	660001	Nylon gear, 20 teeth
11	1	660002	Gear
12	1	660003	Steel gear
13	4	660004	Steel roller
14	1	660005	Plastic roller
15	8	660439	Ball bearing, 6002 ZZ
16	7	660006	Plastic circlet
17	6	660007	Circlet
18	10	660008	Circlet
19	2	660009	Strap guide
20	1	660010	Strap guide
22	1	660021	Strap guide
23	1	660022	Strap guide
24	1	660023	Strap guide
25	1	660024	Strap guide
26	1	660025	Strap guide
27	1	660026	L-type angle plate
28	2	660491	Key, 5 x 5 x 12
29	6	660487	Key, 5 x 5 x 16
30	1	660489	Key, 5 x 5 x 30
31	9	660463	Ring, S-15
32	2	660461	Ring, S-10
33	2	660473	Spring pin, 3 dia. x10
34	1	660486	Key 5x5 x 15
35	1	660556	Electron tension detector
36	1	660556I	Magnet
51	6	660377	Phillips head machine screw, M4 x 8
53	8	660391	Flat head cap screw, M4 x 6
54	4	660392	Flat head cap screw, M4 x 8
55	1	660316	Socket head cap screw, M5 x 12
56	2	660363	Socket head set screw, M5 x 8
57	2	660351	Hex bolt, M6 x 12
58	6	660422	Lock washer, M6
59	2	660330	Socket head cap screw, M6 x 25
60	2	660329	Socket head cap screw, M6 x 20
61	6	660420	Lock washer, M4
62	6	660407	Plain washer, M4 x 10
64	1	660421	Lock washer, M5
65	1	660409	Plain washer, M5
66	1	660411	Plain washer, M6 x 21
67	1	660365	Socket head set screw, M6 x 8
69	2	660399	Hex nut, M4
70	2	660580	Truss head machine screw M4 x 12
71	2	660581	Tooth head washer M4



WARNING

All parts must be periodically inspected and replaced if worn or broken. Failure to do this can affect operation and present a safety hazard.

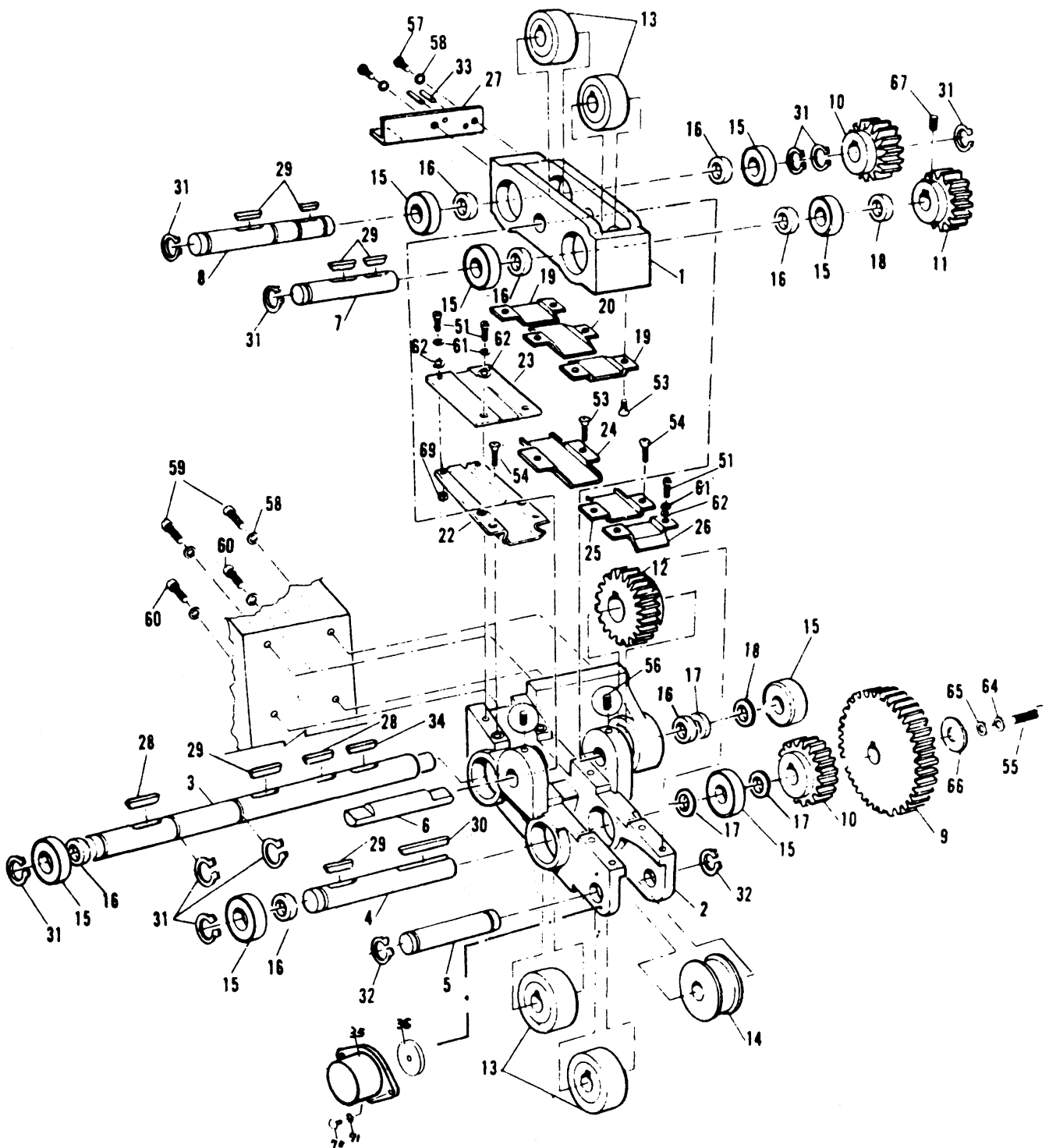


FIGURE 3. STRAP FEED/TENSION ASSEMBLY

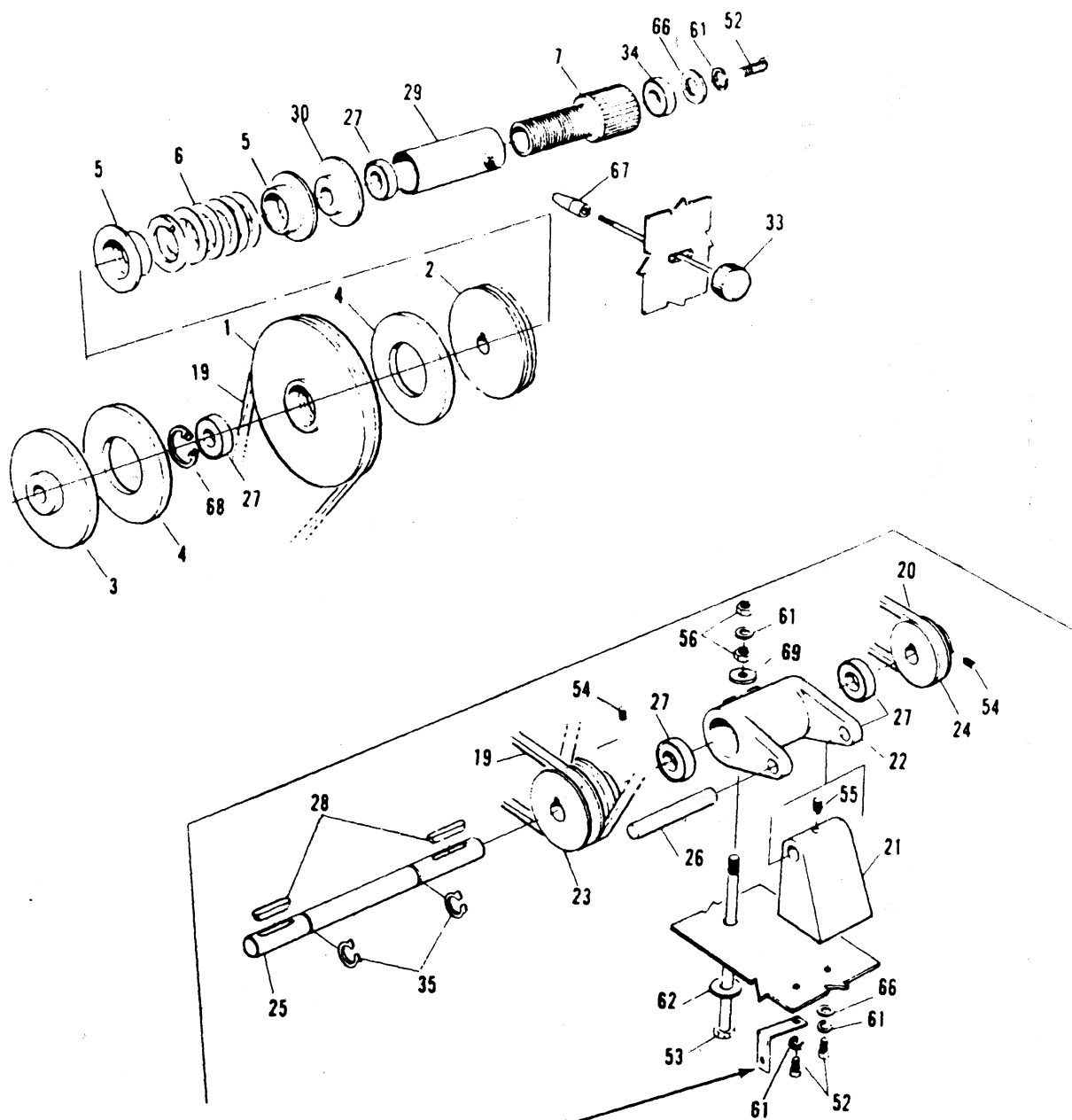
PARTS LIST, FIGURE 4

KEY	QTY.	PART NO.	DESCRIPTION
1	1	660036	Tightening pulley
2	1	660035	Tightening pulley
3	1	660034	Tightening pulley
4	2	660033	Clutch disc
5	2	660032	Spring guide
6	1	660031	Compression spring
7	1	660030	Tightness Adjustment nut
19	2	660495	Belt, K-19
20	1	660496	Belt, M-30
21	1	660046	Transmission seat
22	1	660047	Transmission bracket
23	1	660048	Pulley
24	1	660049	Pulley
25	1	660050	Transmission bracket shaft
26	1	660051	Transmission bracket pin
27	4	660439	Ball bearing, 6002 ZZ
28	2	660488	Key, 5 x 5 x 20
29	1	660029	Tightness adjustment sleeve
30	1	660028	Tightness adjustment cover
33	1	660027	Tightness adjustment screw
34	1	660437	Ball bearing, 6000 ZZ
35	2	660465	Ring, S-15
51	1	660318	Socket head cap screw, M5 x 16
52	3	660328	Socket head cap screw, M6 x 16
53	1	660313	Hex bolt, M6 x 70
54	2	660365	Socket head set screw, M6 x 8
55	1	660364	Socket head set screw, M6 x 6
56	2	660401	Hex Nut, M6
57	1	660375	Phillips head machine screw, M3 x 20
58	1	660406	Plain washer, M3
59	1	660419	Lock washer, M3
60	1	660398	Hex Nut, M3
61	4	660422	Lock washer, M6
62	1	660412	Plain washer, M6 x 16
63	2	660409	Plain washer, M5
64	1	660421	Lock washer, M5
65	1	660400	Hex Nut, M5
66	2	660411	Plain washer, M6 x 21
67	1	660306	Terminal sleeve, 8
68	1	660468	Ring, R-32
69	1	660413	Plain washer M6x13



WARNING

All parts must be periodically inspected and replaced if worn or broken. Failure to do this can affect operation and present a safety hazard.



For reference only.
See Figure 9, Item 25.

FIGURE 4. TENSION ADJUSTMENT AND SENSING ASSEMBLIES

PARTS LIST, FIGURE 5

KEY	QTY.	PART NO.	DESCRIPTION
1	1	660075	Heater arm
2	1	660073	Heater arm screw
3	1	660074	Heater arm side plate
4	1	660072	Heater blade holder
6	1	660070	Heater spring
8	1	660132	Tension spring, long
11	1	660062	Solenoid shaft head
12	1	660067	Bracket
13	1	660066	Solenoid shaft
14	4	660065	Spring cover
15	1	660064	Compression spring
17	1	660059	Tension lever
18	1	660058	Feed back arm screw
19	2	660436	Ball bearing, 635 ZZ
20	1	660057	Adjustable nut
21	1	660056	Compression spring
23	1	660456	Ring, E-12
24	1	660475	Spring pin, 4 dia. x 14
25	1	660060	Compression spring
26	1	660061	Rubber washer
27	2	660476	Spring pin, 4 dia. x 40
28	1	660477	Spring pin, 5 dia. x 20
29	1	660053	Solenoid 110V
		660053A	Solenoid 220V
		660053B	Solenoid 240V
32	1	660076	Guide, 1/4" (6mm)
	1	660077	Guide, 3/8" (10mm)
	1	660078	Guide, 1/2" (13mm)
	1	660079	Guide, 5/8" (15.5mm)
36	1	660080	Guide, 1/4" (6mm)
	1	660081	Guide, 3/8" (10mm)
	1	660082	Guide, 1/2" (13mm)
	1	660083	Guide, 5/8" (15.5mm)
40	1	660084	Instant heating heater plate
51	1	660357	Hex bolt, M6 x 90
52	1	660358	Hex bolt, M6 x 100
53	1	660327	Socket head cap screw, M6 x 12
54	1	660378	Phillips head machine screw, M4 x 16
55	1	660317	Socket head cap screw, M5 x 12
56	9	660421	Lock washer, M5
57	2	660400A	Lock Hex Nut, N5
58	5	660399	Hex Nut, M4
59	2	660420	Lock washer, M4
60	13	660401	Hex Nut, M6
61	9	660422	Lock washer, M6
62	1	660402	Hex Nut, M8
63	2	660423	Lock washer, M8
64	1	660380	Phillips head machine screw, M4 x 15
66	8	660347	Hex bolt, M5 x 12
67	9	660409	Plain washer, M5



WARNING

All parts must be periodically inspected and replaced if worn or broken. Failure to do this can affect operation and present a safety hazard.

KEY	QTY.	PART NO.	DESCRIPTION
68	2	660413	Plain washer, M6×13
69	4	660316	Socket head cap screw, M5×12
70	4	660412	Plain washer, M6×16
71	1	660411	Plain washer, M6×21

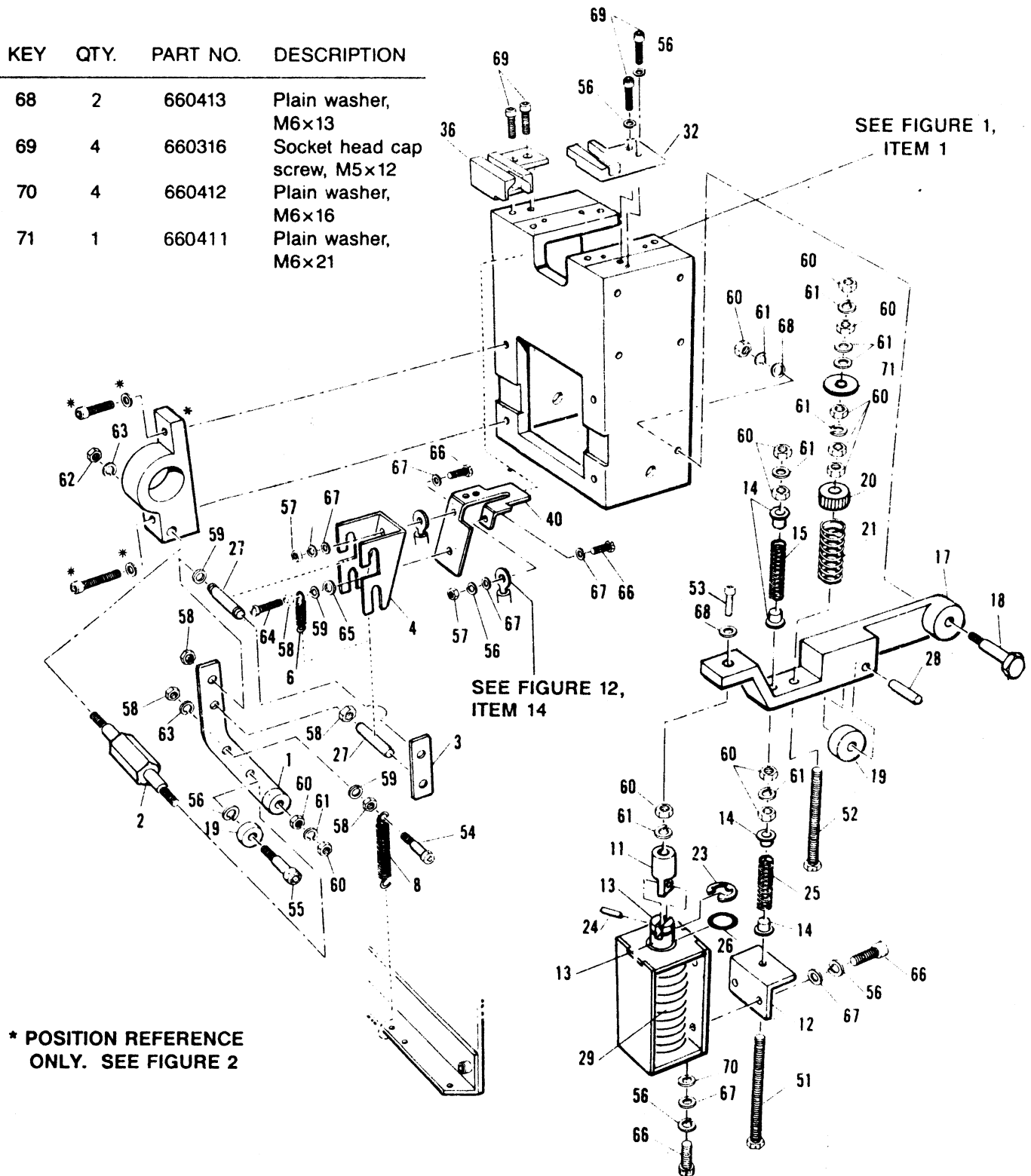


FIGURE 5. HOT-KNIFE AND TENSION LEVER ASSEMBLIES

PARTS LIST, FIGURE 6 (SP-1)

KEY	QTY.	PART NO.	DESCRIPTION
1	1	660500	Body
2	1	660096	Door, right hand
3	1	660095	Door, left hand
4	1	660094	Sustaining plate
5	1	660093	Stainless steel top cover
6	2	660092	Package stop
7	1	660091	Plastic roller bracket
8	1	660278	Cable
10	1	660088	Guide plate
11	2	660097	Door holder
13	3	660100	Door magnet
14	2	660101	Wheel, swivel
51	25	660352	Hex bolt, M6 x 15
52	25	660422	Lock washer, M6
53	37	660411	Plain washer, M6 x 21
54	20	660401	Hex Nut, M6
56	7	660402	Hex Nut, M8
57	4	660414	Plain washer, M8
58	5	660423	Lock washer, M8
59	2	660372	Phillips head machine screw, M3 x 10
60	10	660419	Lock washer, M3
61	2	660398	Hex Nut, M3
62	8	660371	Phillips head machine screw, M3 x 6
63	12	660406	Plain washer, M3
64	8	660412	Plain washer, M6 (16mm O.D.)

PARTS LIST, FIGURE 7 (SP-4)

KEY QTY. PART NO. DESCRIPTION

1	1	660601	Body
2	1	660602	Sustaining plate
3	1	660552	Stainless steel top cover
4	2	660092	Package stop
5	1	660088	Guide plate
6	2	660620	Wheel swivel 5/8"
7	1	660091	Plastic roller bracket
8	1	660601L	Metal sheet
10	4	660625	Lock washer, M16
11	2	660628	Wheel fixed 5/8"
12	14	660402	Hex nut, M8
13	14	660423	Lock washer, M8
14	8	660621	Socket head cap screw, M8x25
15	6	660401	Hex nut, M6
16	8	660422	Lock washer, M6
17	8	660412	Plain washer, M6(16MM o.d.)
18	6	660352	Hex bolt, M6x15
21	2	660327	Socket head cap screw, M6x12
22	4	660406	Plain washer, M3
23	2	660372	Phillips head machine screw, M3x10
24	2	660419	Lock washer, M3
25	2	660398	Hex, nut, M3
27	8	660414	Plain washer, M8
28	2	660637	Screw
29	2	660639	Pin
30	2	660640	Spring
32	4	660641	Ring S-10
33	2	660638	Screw
34	2	660065	Spring cover
53	6	660411	Plain washer, M6x21

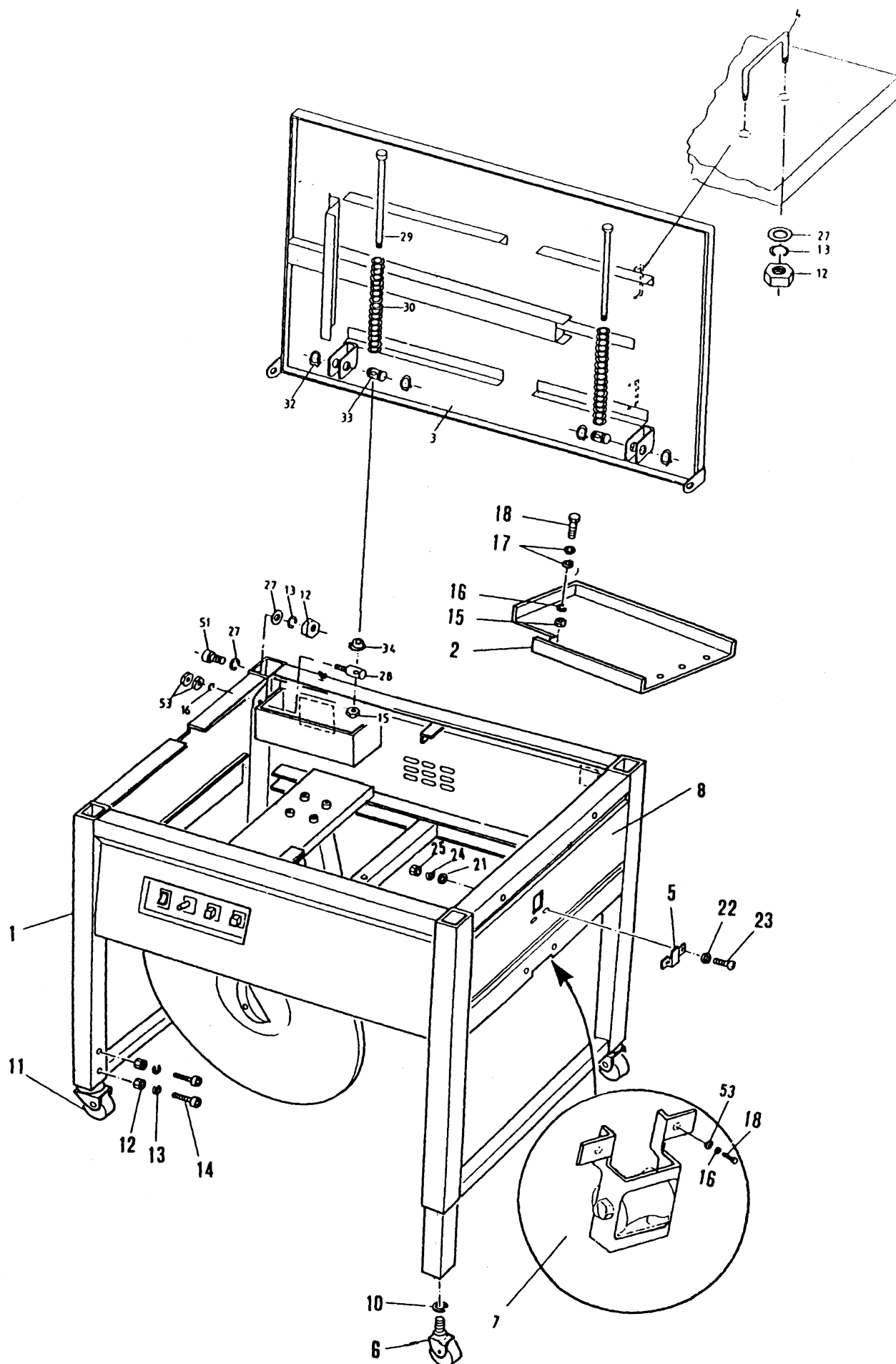


FIGURE 7. CABINET COMPONENTS (SP-4)

PARTS LIST, FIGURE 8

KEY	QTY.	PART NO.	DESCRIPTION
1	1	660530	Spring
2	1	660531	Right flange
3	2	660445	Ball bearing, 6302 ZZ
4	1	660532	Dispenser shaft
5	1	660533	Sleeve
6	1	660534	Left flange
7	1	660535	Sleeve
8	1	660536A	Lock
12	1	660537	Dispenser screw
28	1	660365	Socket head set screw M6x8
29	2	660463	Ring, S-15
30	1	660479	Spring pin, 5diax50
		660523	Dispenser complete

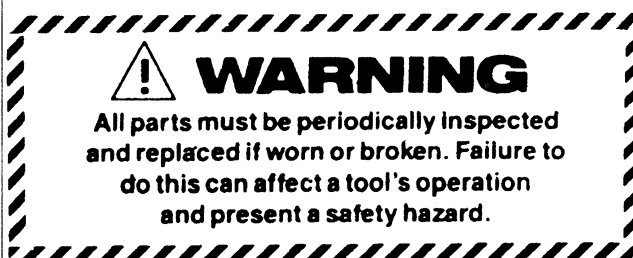
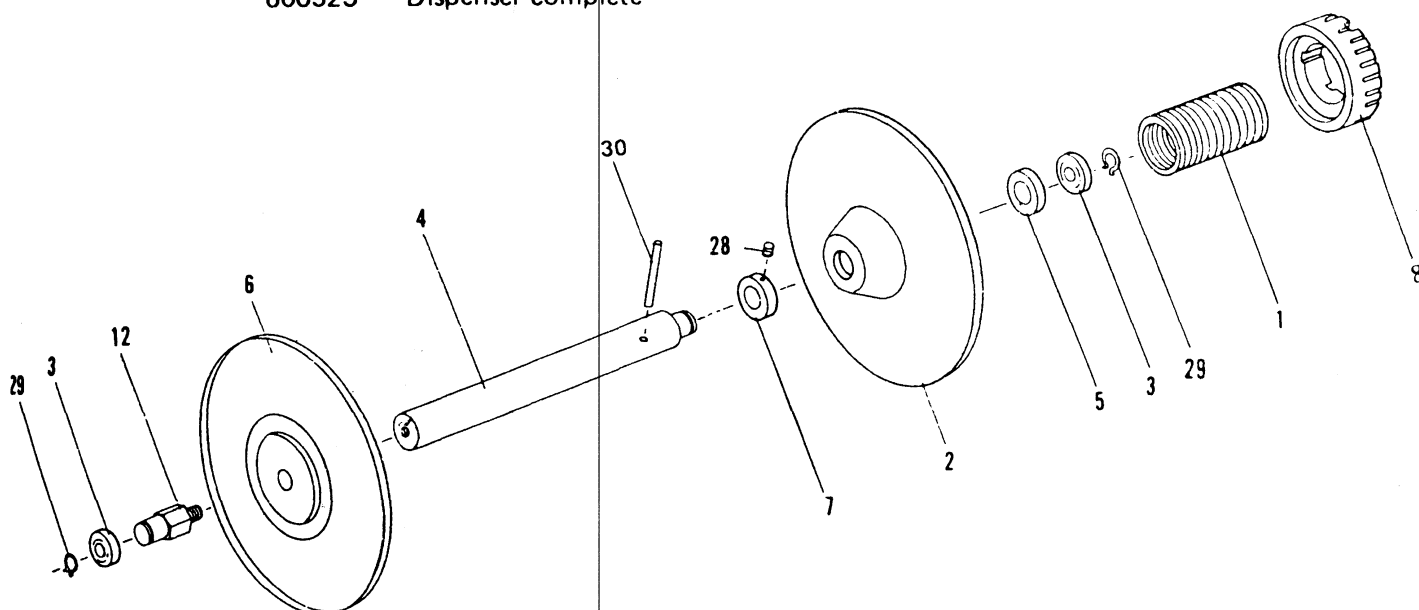
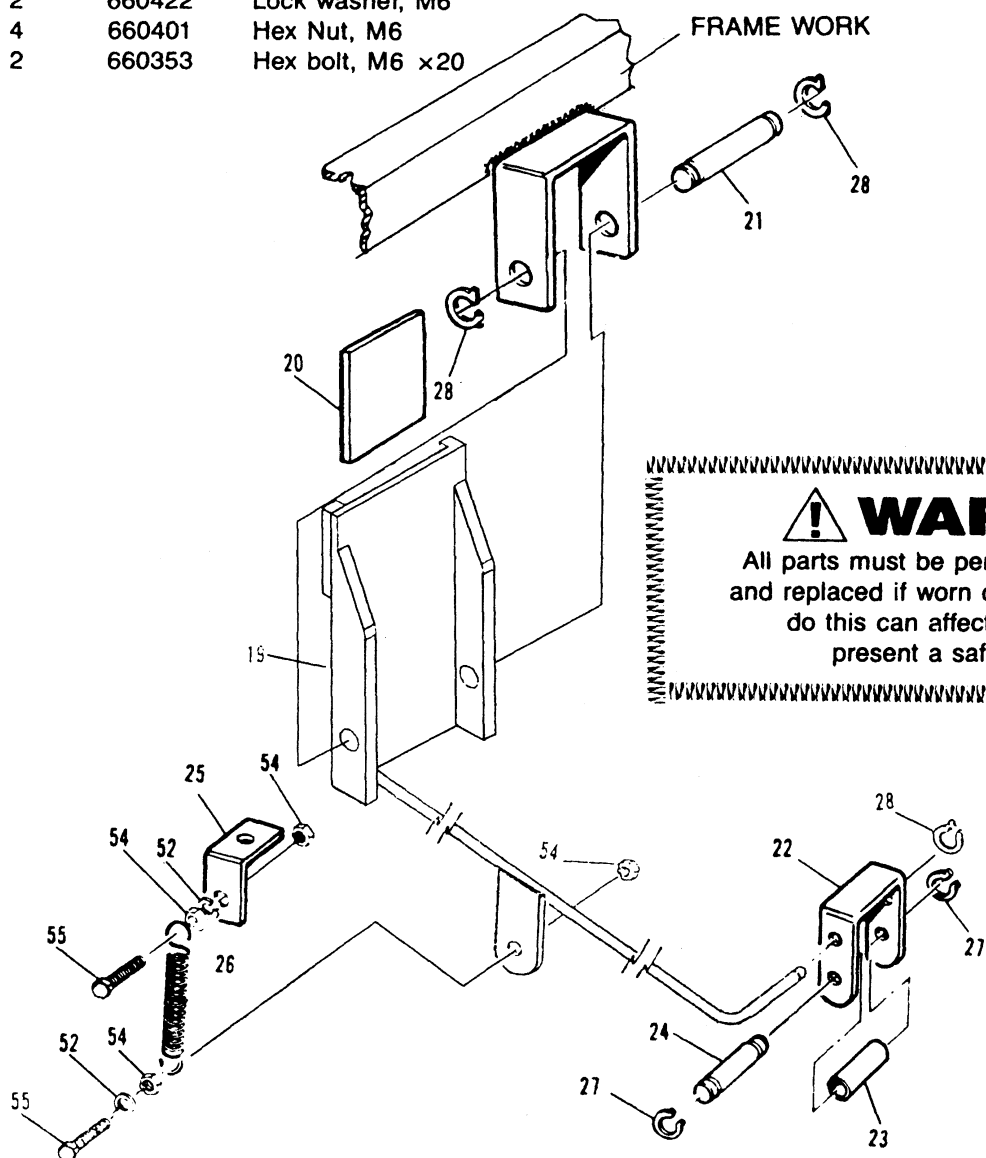


FIGURE 8. DISPENSER ASSEMBLY (Part No. 660523)

PARTS LIST, FIGURE 9

KEY	QTY	PART NO.	DESCRIPTION
19	1	660105	Brake
20	1	660106	Brake rubber
21	1	660107	Brake fixed pin
22	1	660108	Roller frame
23	1	660109	Plastic roller
24	1	660110	Pin
25	1	660111	Angle plate
26	1	660112	Brake spring
27	2	660454	Ring, E-6
28	3	660461	Ring, S-10
52	2	660422	Lock washer, M6
54	4	660401	Hex Nut, M6
55	2	660353	Hex bolt, M6 x20



! WARNING

All parts must be periodically inspected and replaced if worn or broken. Failure to do this can affect operation and present a safety hazard.

FIGURE 9. DISPENSER BRAKE ARM (SP-1)

PARTS LIST, FIGURE 10

KEY	QTY.	PART NO.	DESCRIPTION
1	1	660603	Reel
2	1	660609	Reel brake arm
3	1	660606	Reel brake pulley
4	1	660501	Left flange
5	1	660502	Reel center drum
6	4	660422	Lock washer, M6
7	4	660328	Socket head cap screw, M6x16
8	1	660605	Reel shaft
9	1	660201	Right flange
10	1	660607	Reel nut handle
11	1	660108	Roller frame
12	1	660461	Ring, S-10
13	1	660109	Plastic roller
14	1	660110	Pin
15	2	660453	Ring, E-4
		660523A	Dispenser complete

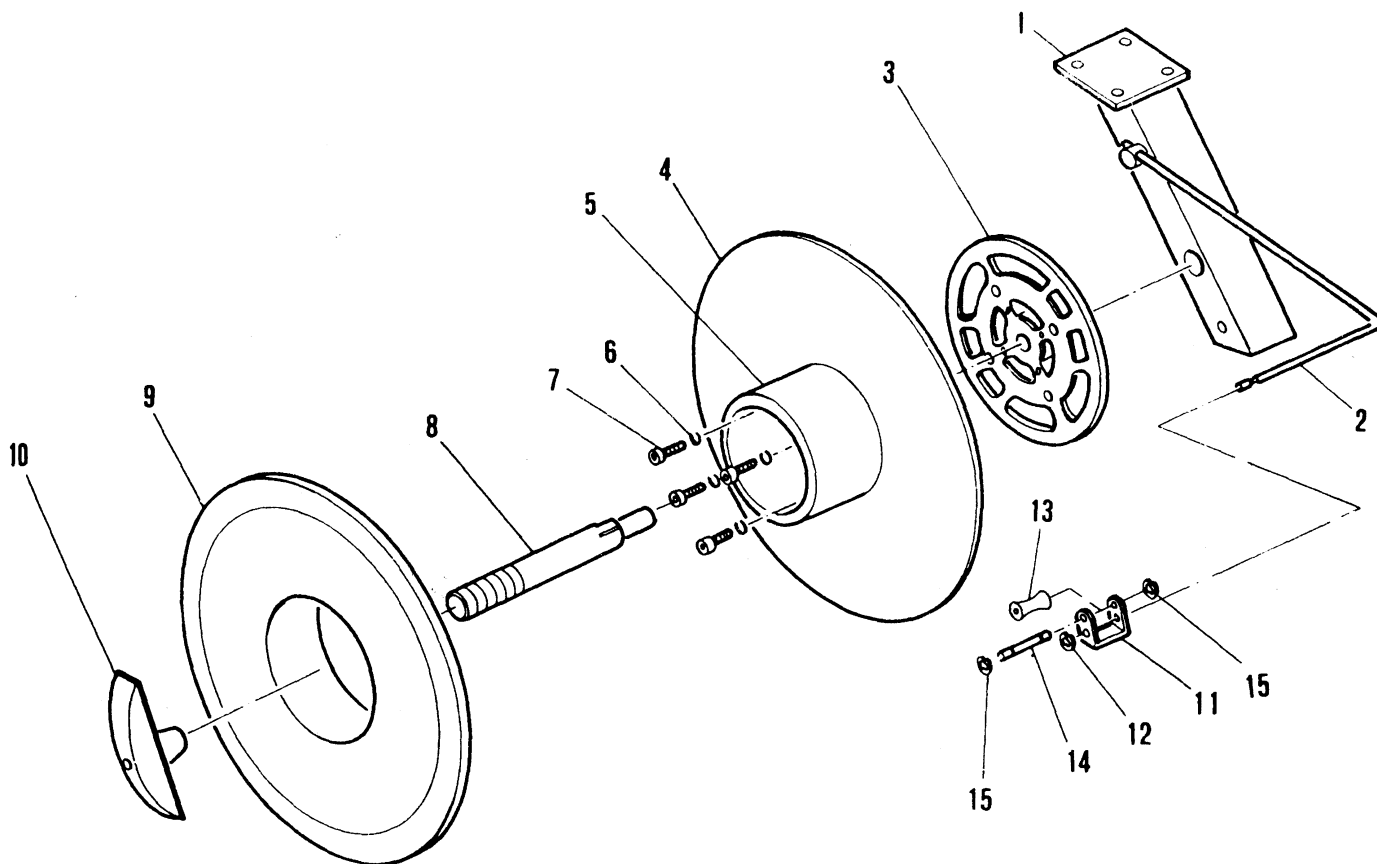


FIGURE 10 DISPENSER ASSEMBLY (SP-4)

KEY	QTY.	PART NO.	DESCRIPTION
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1	1	660560	Brake spring
2	1	660053	Solenoid 110V
		660053A	Solenoid 220V
		660053B	Solenoid 240V
3	1	660545	Hex bolt, M12x70
4	1	660546	Plain washer, M12
5	1	660547	Lock washer, M12
6	1	660548	Hex Nut, M12
7	1	660456	Ring, E-12
8	1	660061	Rubber washer
9	1	660549	Brake
10	1	660106	Brake rubber
11	2	660067	Bracket
12	1	660571	Plaster roller
13	1	660334	Socket head cap screw, M6x50
14	1	660412	Plain washer, M6
15	2	660401	Hex Nut, M6
16	1	660422	Lock washer, M6
17	2	660551	Lever
18	1	660630	Dispenser

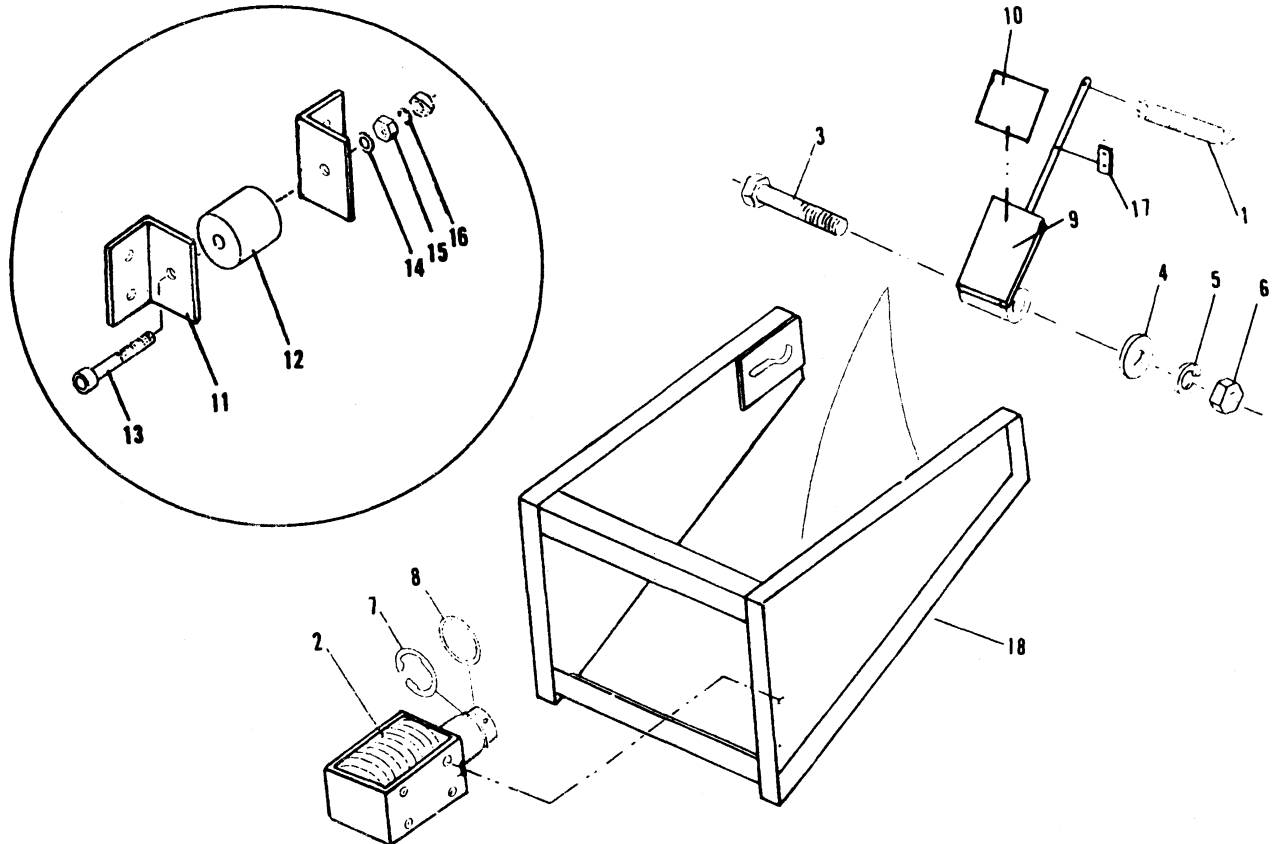


FIGURE 11 Dispenser Supporter (SP-1L)

PARTS LIST, FIGURE 1

KEY	QTY	PART NO.	DESCRIPTION
1	1	660218	Control plate
2	1	660225	Power switch
3	1	660260	Potentiometer, adjustable
4	1	660231	Reset switch
5	1	660232	Feed switch
6	1	660247	Cut safety switch TM1703
7	2	660268	Insulator
8	1	660220	Simoke fan, 110V
		660220A	Smoke fan, 220V
		660220B	Smoke fan, 240V
9	1	660272	Fan bracket
10	1	660277	Fan cover
11	1	660276	Protect cover
12	1	660212	Instant heating transformer, 110V
		660212A	Instant heating transformer, 220V
		660212B	Instant heating transformer, 240V
14	2	660271	Instant heating cable
15	2	660290	Insulating tube
17	1	660249A	Cut safety switch TM1702
18	1	660268A	Isolator
56	10	660420	Lock washer, M4
57	14	660399	Hex Nut, M4
61	6	660383	Socket head cap screw, M4 × 30
62	14	660425	Plain washer, M4
63	3	660379	Phillips head machine screw, M4 × 12
64	2	660384	Phillips head machine screw, M4 × 45
65	2	660351	Hex bolt, M6 × 12
66	2	660422	Lock washer, M6
68	4	660349	Hex bolt M4 × 14



WARNING

All parts must be periodically inspected and replaced if worn or broken. Failure to do this can affect operation and present a safety hazard.

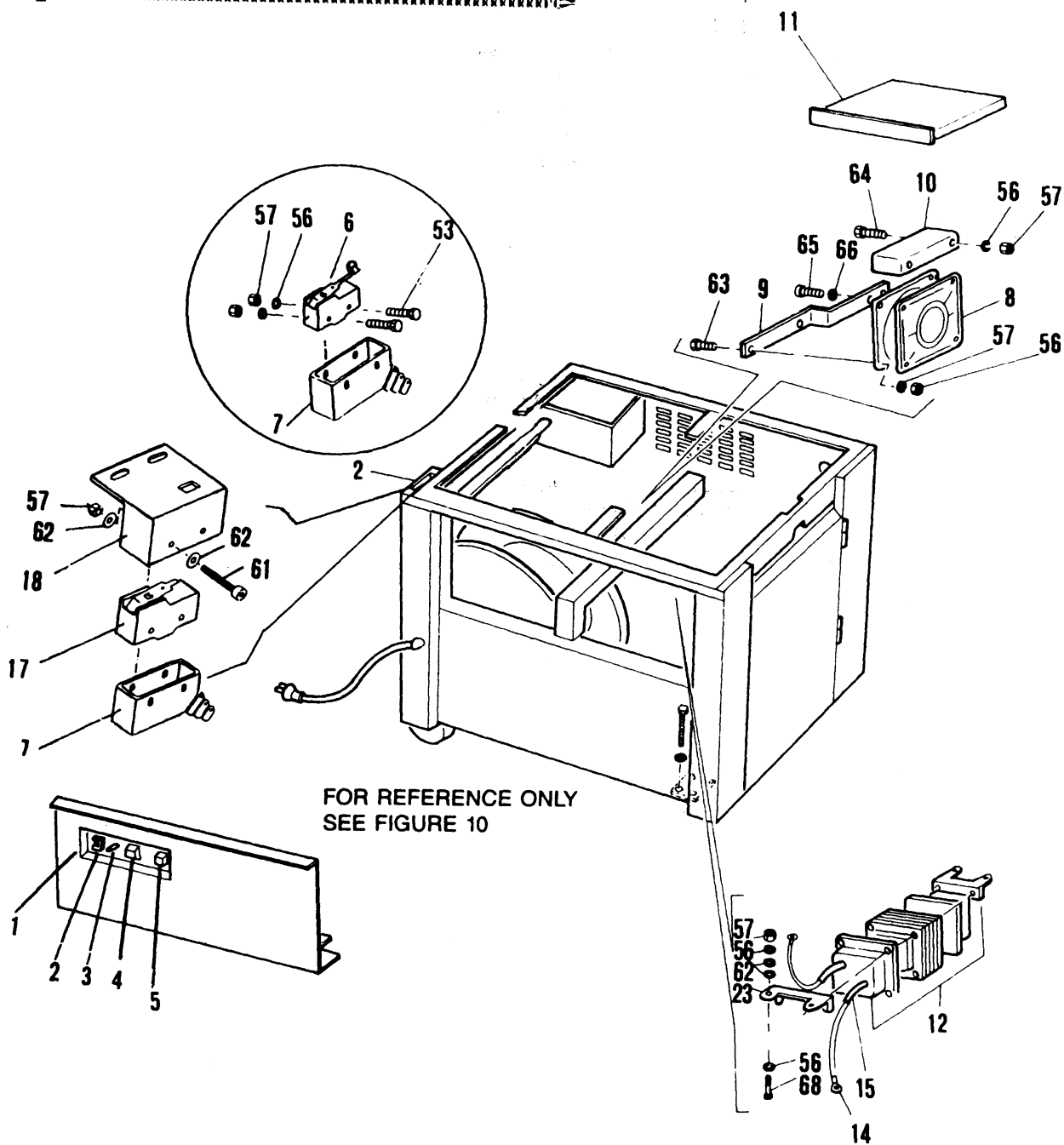


FIGURE 11 ELECTRICAL COMPONENTS (SP-1)

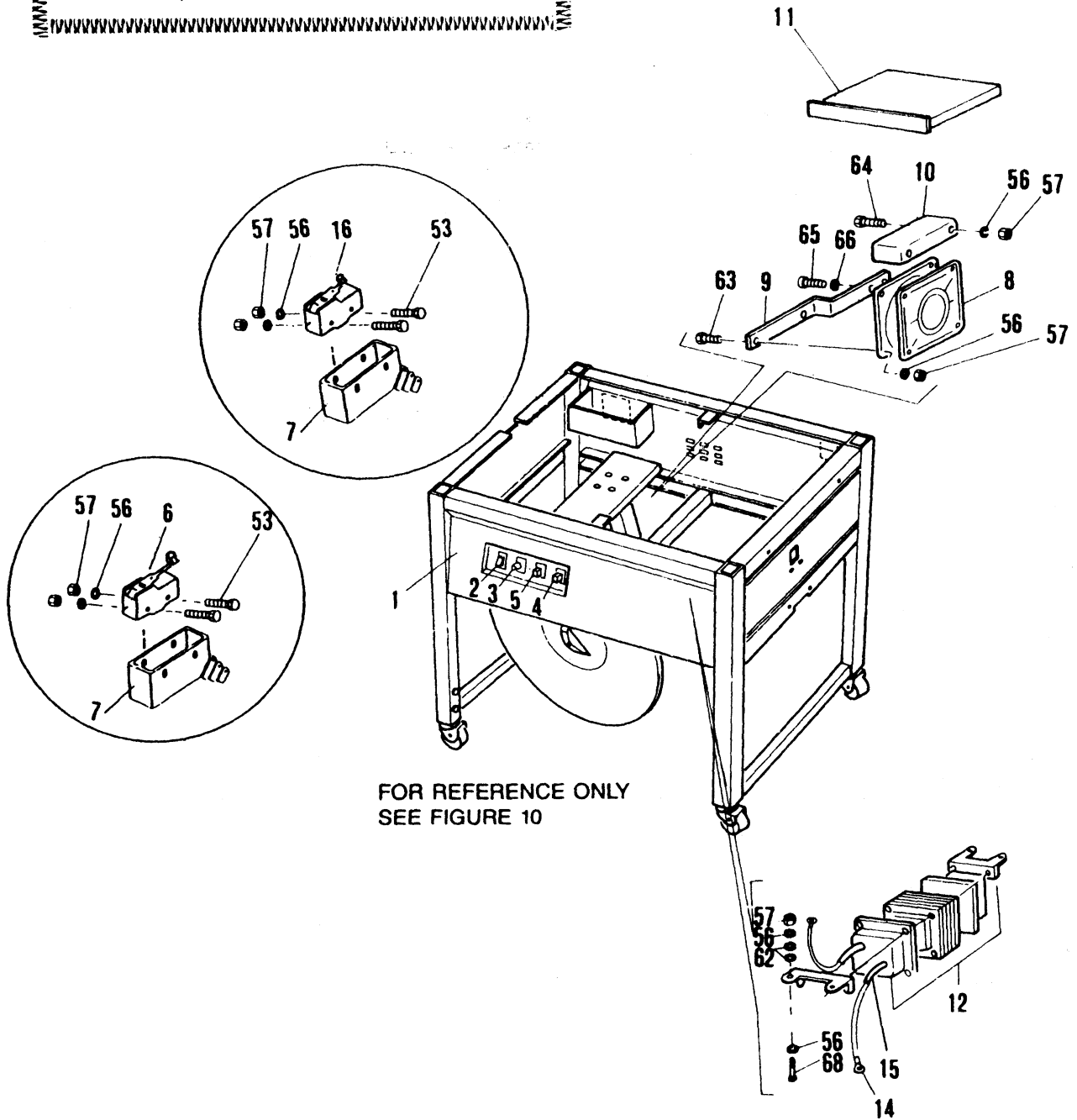
PARTS LIST, FIGURE 12

KEY	QTY	PART NO.	DESCRIPTION
1	1	660601	Body
2	1	660225	Power switch
3	1	660260	Potentiometer, adjustable
4	1	660231	Reset switch
5	1	660232	Feed switch
6	1	660247	Cut safety switch TM1703
7	2	660268	Insulator
8	1	660220	Smoke fan, 110V
		660220A	Smoke fan, 220V
		660220B	Smoke fan, 240V
9	1	660272	Fan bracket
10	1	660277	Fan cover
11	1	660276	Protect cover
12	1	660212	Instant heating transformer, 110V
		660212A	Instant heating transformer, 220V
		660212B	Instant heating transformer, 240V
14	2	660271	Instant heating cable
15	2	660290	Insulating tube
16	1	660248	Cut safety switch TM1704
53	2	660372	Phillips head machine screw, M3 × 10
56	10	660420	Lock washer, M4
57	12	660399	Hex nut, M4
61	6	660383	Socket head cap screw, M4 × 30
62	12	660425	Plain washer, M4
63	2	660379	Phillips head machine screw, M4 × 12
64	2	660384	Phillips head machine screw, M4 × 50
65	2	660351	Hex bolt, M6 × 12
66	2	660422	Lock washer, M6
68	4	660349	Hex bolt, M4 × 14



WARNING

All parts must be periodically inspected and replaced if worn or broken. Failure to do this can affect operation and present a safety hazard.

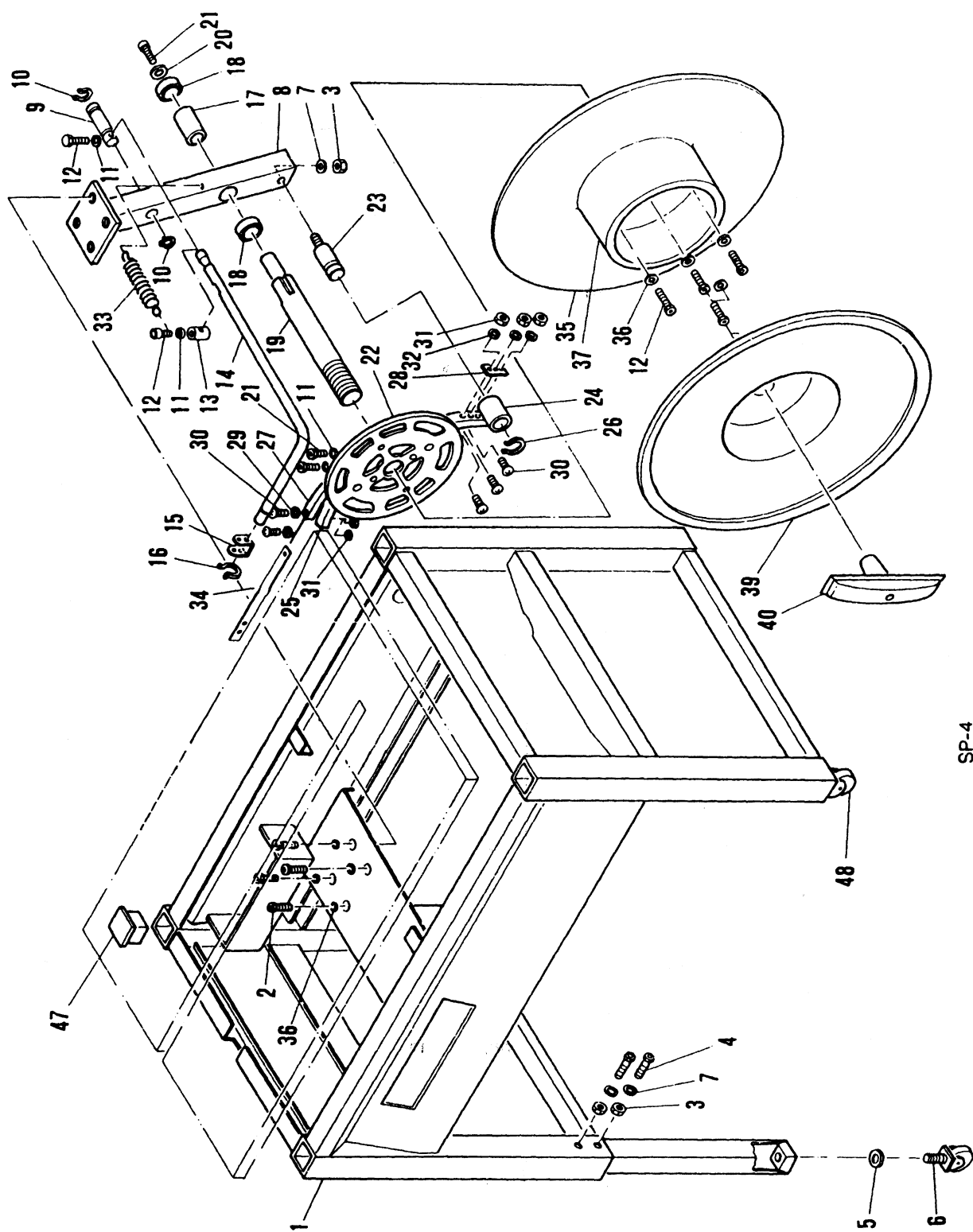


FOR REFERENCE ONLY
SEE FIGURE 10

FIGURE 12. ELECTRICAL COMPONENTS (SP-4)

PARTS LIST, FIGURE 13

KEY	QTY.	PART NO.	DESCRIPTION	(SP-4)
1	1	660601	Body	
2	4	660330	Socket head cap screw M6 x 25	
3	9	660402	Hex Nut M8	
4	8	660621	Socket head cap screw M8 x 25	
5	4	660625	Lock washer M16	
6	4	660620	Wheel. Swivel 5/8"	
7	9	660423	Lock washer M8	
8	1	660603	Reel	
9	1	660608	Pin	
10	2	660464	Ring S-20	
11	4	660401	Hex Nut M6	
12	6	660328	Socket head cap screw M6 x 16	
13	1	660610	Free slide roller bracket	
14	1	660609	Reel brake arm	
15	1	660108	Roller frame	
16	1	660461	Ring S-10	
17	1	660604	Bearing bracket	
18	2	660440	Ball bearing 6003 ZZ	
19	1	660605	Reel shaft	
20	1	660624	Plain washer M6 x 32	
21	3	660329	Socket head cap screw M6 x 20	
22	1	660606	Reel brake pulley	
23	1	660611	Shaft	
24	1	660612	Brake belt tightener	
25	1	660613	Brake tightener section	
26	1	660463	Ring S-15	
27	1	660619	Brake-V belt	
28	1	660614	Belt holder plate	
30	5	660382	Phillips head machine screw M4 x 30	
31	5	660399	Hex Nut M4	
32	3	660420	Lock washer M4	
33	1	660618	Front brake tension arm spring	
34	1	660617A	Reverse brake tension arm spring	
35	1	660501	Left flange	
36	8	660422	Lock washer M6	
37	1	660502	Reel center drum	
39	1	660201	Right flange	
40	1	660607	Reel nut handle	
47	4	660622	Plastic Bracket	
48	2	660628	Wheel, swivel/locking 5/8"	



SP-4

FIGURE 13. HOUSING, DISPENSER & BRAKE ASSEMBLY COMPONENTS.

PARTS LIST, FIGURE 14 (Optional)

KEY	QTY.	PART NO.	DESCRIPTION
1	1	660552	Stainless steel top cover
2	1	660615	Package stop
3	2	660327	Socket head cap screw M6 x 12
4	2	660623	Plain washer M6
5	2	660626	WN M6
6	2	660412	Plain washer M6

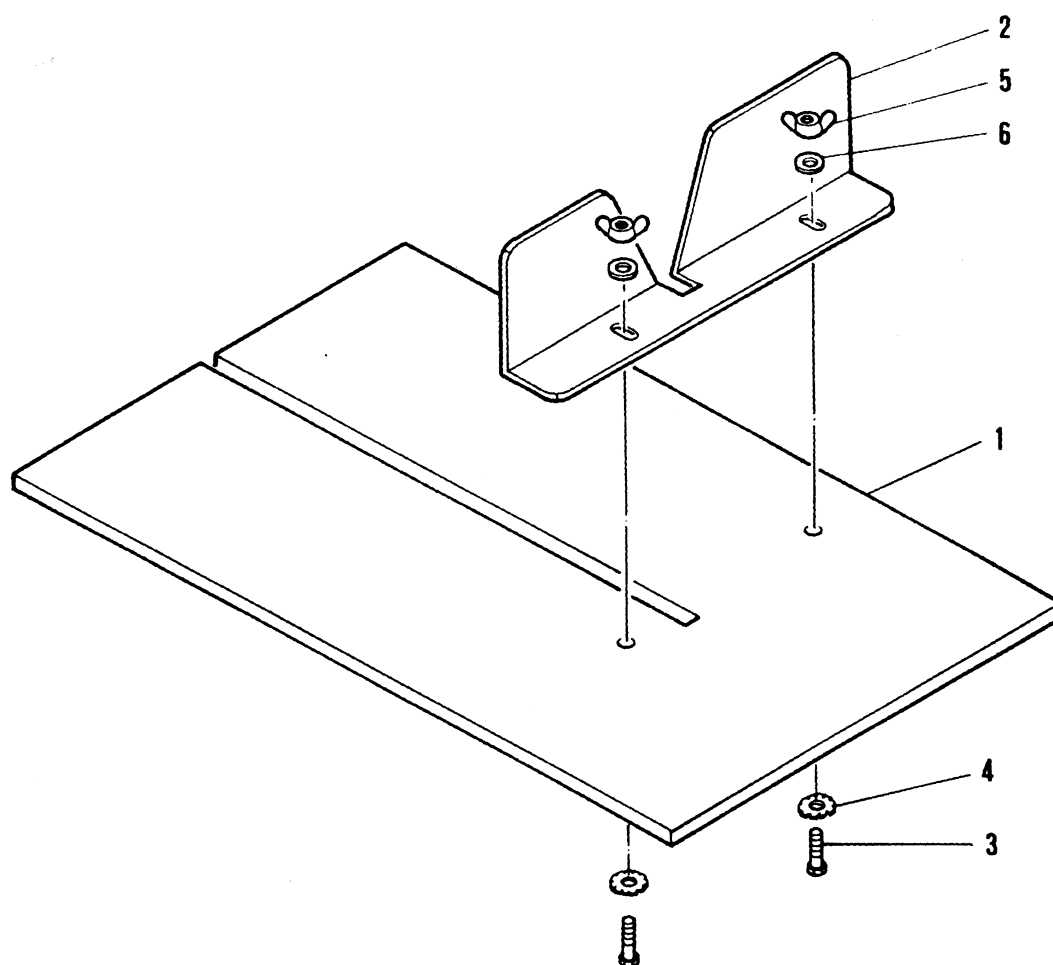
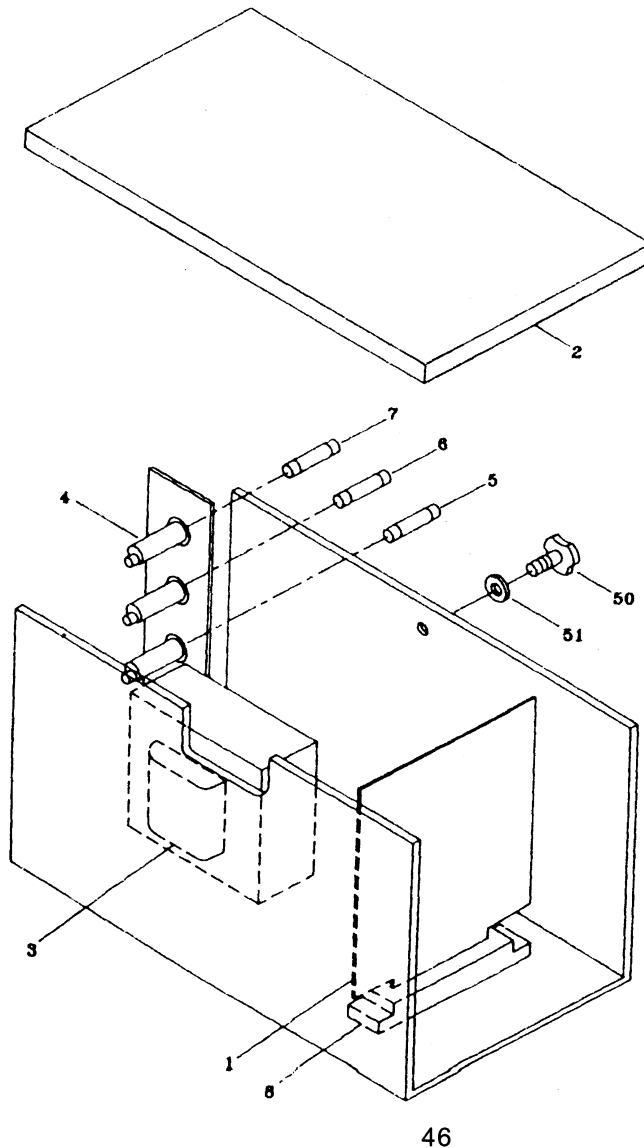
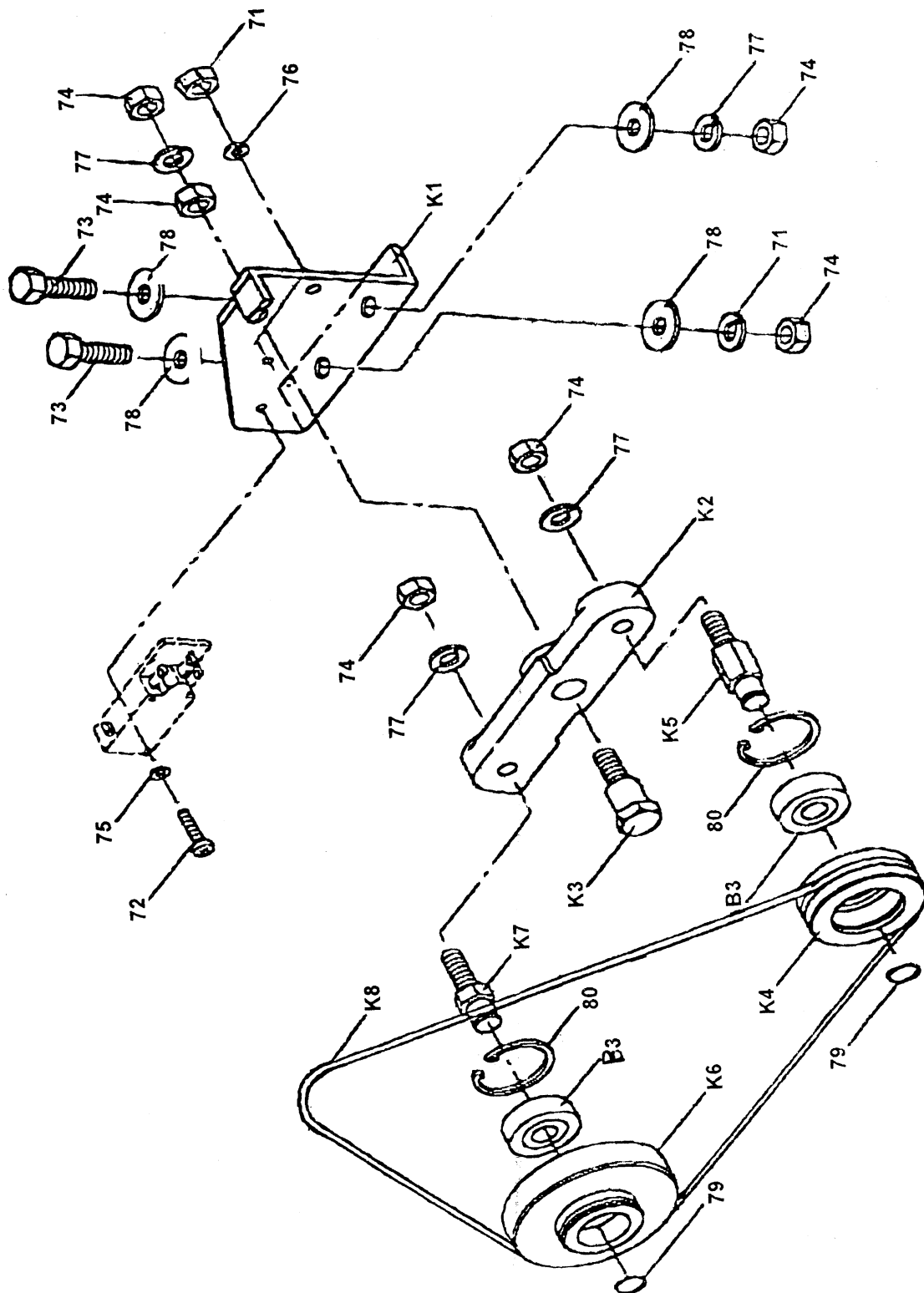


FIGURE 14. SP-4 • TOP COVER & PACKAGE STOP

KEY	QTY.	PART NO.	DESCRIPTION
1	1	660519	Pc board assembly 110V
	1	660519A	Pc board assembly 220V
	1	660519B	Pc board assembly 240V
3	1	660179	Transformer, 110V-28V
	1	660179A	Transformer, 220V-28V
	1	660179B	Transformer, 240V-28V
4	1	660251	Fuse box
5	1	660520	Fuse, 10A (FOR 110V) FU-1
	1	660521A	Fuse, 8A (FOR 220V, 240V) FU-1
6	1	660207	Fuse, 2A (FOR 220V, 240V) FU-2
	1	660208	Fuse, 3A (FOR 110V) FU-2
7	1	660522	Fuse, 1A FU-3
8	1	660269	Pc board holder
9	1	660252E	Control box Assy
2	1	660275	Control box cover
50	1	660627	Lock
51	1	660412	Plain washer,M6





PARTS LIST FIGURE 16

KEY	QTY	PART NO	DESCRIPTION
K1	1	6600556A1	Bracket
K2	1	6600556A2	Arm
K3	1	6600556A3	Arm screw
K4	1	6600556A4	Pulley
K5	1	6600556A5	Shaft
K6	1	6600556A6	Pulley
K7	1	6600556A7	Shaft
K8	1	6600556A8	Belt
B3	2	6600556A9	Bearing 608zz
71	2	660398	Hex nut M3
72	2	660390	Flat head cap screw, M3 x 20
73	2	660353	Hex bolt, M6 x 20
74	6	660401	Hex nut M6
75	2	660581A	Tooth head washer M3
76	2	660419	Lock washer M3
77	5	660422	Lock washer M6
78	4	660411	Plain washer, M6 x 21
79	2	660556A10	Ring S-8
80	2	660556A11	Ring R-22