

# GP44

## *Semi-Automatic Strapping*

### Operation and Maintenance Manual

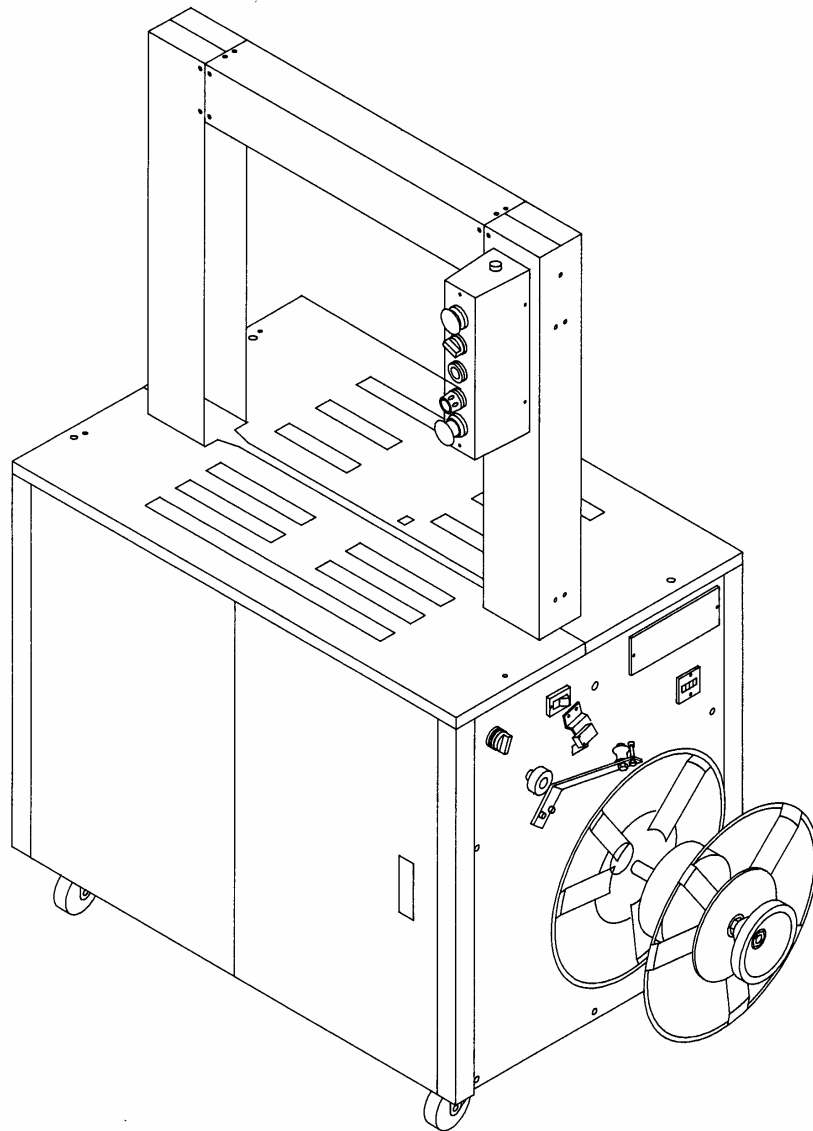


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## INTRODUCTION

This manual supplies all the necessary information for the correct use of the machines supplied by Polychem Corporation.

Instructions, drawings, tables and any other information contained in this manual are all confidential. They may not be reproduced, either fully or partially, without the authorization of Polychem Corporation. Polychem reserves all exclusive rights on this matter, and is enabled to carry out all changes that will be required.

This manual should be kept in good condition and in an easily accessible place, along with the spare parts manual, so that they may be quickly referenced when necessary.

The machine serial number should always be included when a request for information is made. This helps insure that the correct replacement parts are specified for the machine.

Polychem Corporation

## SERIAL NUMBER LOCATION

There are two identifying markers on the machine. The bottom frame is stamped on the cross brace where the machines frame is bolted to the caster frame. The machine will be stamped as shown below:

**COR-0067**

A Polychem tag is also affixed to the machine. It appears as shown below.

<b><i>POLYCHEM CORP.</i></b>	
<i>MODEL NO.</i>	<input type="text"/>
<i>SERIAL NO.</i>	<input type="text"/>

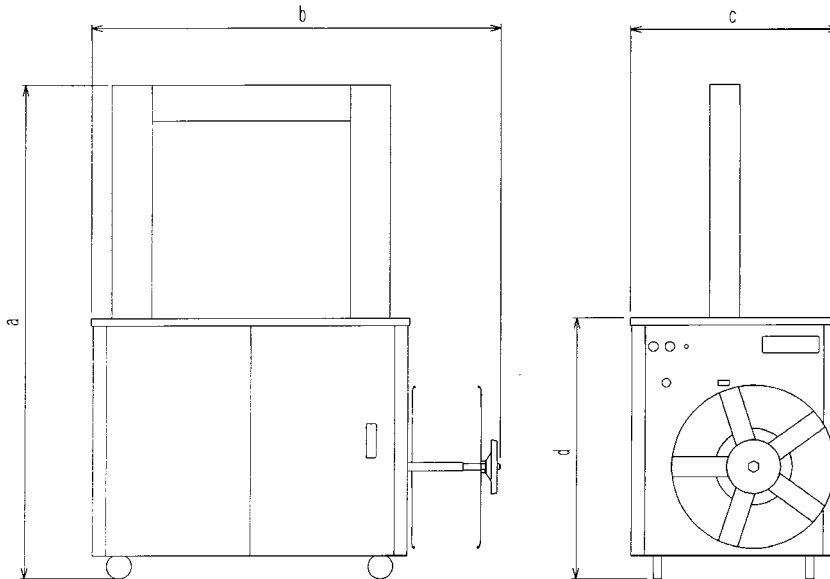
### SAFETY INSTRUCTIONS:

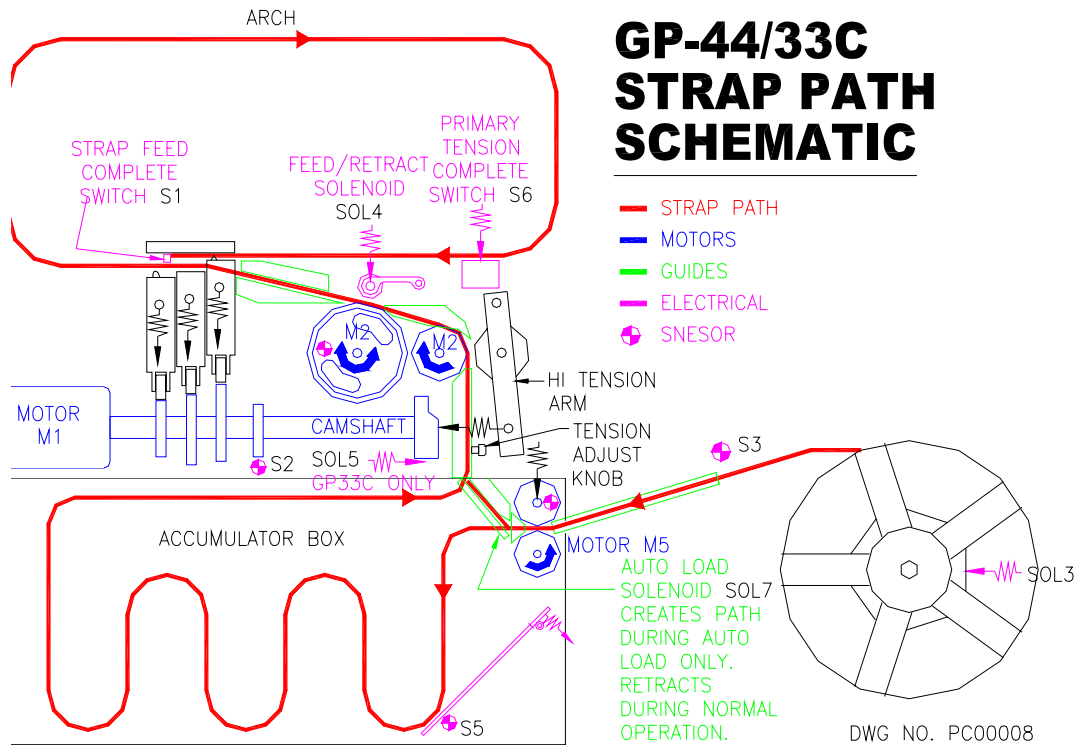
1. This manual provides specific information regarding Operation and Maintenance for your new machine. Please read through this manual and familiarize yourself completely before operating the machine.
2. Only trained and authorized personnel should operate or service this machine.
3. We put many safety features into all of its equipment, including this one, to provide its customers with the safest equipment possible. Extreme caution should be exercised any time an operator is near moving parts.
4. Never work on the interior of this or any machine without disconnecting the power supply.
5. The use of safety glasses is highly recommended.
6. Never operate this or any other machine that has safety switches or equipment that has been altered or is not functional. Report these conditions to a supervisor immediately.
7. Always check to see all guards are in place before operating this machine.
8. Never put any part of your body near, or into moving machinery. Keep hands away from the strap during tensioning. Never adjust, lubricate, or service moving machinery
9. Shut off all electrical power when machine is not in use.
10. Keep the machine clean and follow a recommended maintenance program.
11. Observe all warning placards throughout the machine and warning notations made throughout the manual.

## SPECIFICATIONS

Model : GP-44 Automatic strapping machine  
 Sealing Method : Heat seal  
 Strap Size : 5mm,6mm, 1/4", 7mm, 8mm, 9mm, 3/8", 12mm, 1/2"  
 Strap Core Size : Inside  $\phi$ 200mm, Width 200mm  
 Electric Power : Single Phase  
 115v, 50/60Hz  
 Strap Cycle Time : Maximum 44 cycles per minutes  
 Machine Size :

Arch Size		Height (mm) [ a ]	Width (mm) [ b ]	Depth (mm) [ c ]	Table Height (mm) [ d ]	Weight (kg)
Width (mm)	Height (mm)					
600	400	1295	1242	623	787	170
600	500	1395	1242	623	787	170
600	600	1495	1242	623	787	170
800	400	1295	1382	623	787	175
800	500	1395	1382	623	787	175
800	600	1495	1382	623	787	175
800	800	1695	1382	623	787	175
1000	600	1495	1582	623	787	175
1000	800	1695	1582	623	787	175
1000	1000	1895	1582	623	787	175
1200	400	1295	1782	623	787	180
1200	600	1495	1782	623	787	180
1200	800	1695	1782	623	787	180
1600	600	1495	2182	623	787	185





**KEY COMPONENTS (Refer to Strap Path Schematic)**

Ref	Description	Location	Function
EB1	Electric Brake Cam Motor (M1)	In back of M1	Stops cam in home position, primary tension position and final tension position.
EB2	Electric Brake Feed/Retract Motor (M2)	In back of M2	Stops feed/retract motor when strap is not feeding or retracting
EB3	Reel Brake	On reel shaft	Stops reel when not loading strap
M1	Cam Shaft Motor	Under conveyor	Rotates camshaft
M2	Strap Feed/Retract Motor	Under conveyor	Rotates feed/retract wheels
M5	Accumulator Load Motor	Before accumulator box	Feeds strap into the accumulator box
SA 1	Tabletop Safety Switch	Side of conveyor top	Verifies that the tabletop is closed
SA2	Tabletop Safety Switch	Side of conveyor top	Verifies that the tabletop is closed
SOL3	Reel Brake Solenoid	On reel shaft	Provides some drag on the reel to prevent it from "free wheeling"
SOL4	Strap Feed/Retract Solenoid	Under conveyor	Presses the strap against the feed/retract wheel to feed/retract strap
SOL7	Initial Feed Solenoid	Behind accumulator box	Engages only during initial load to create a path for strap to initially load into the strapping head/arch.
S1	Strap End Detect Switch	Under slide plate	Detects if the end of the strap has made it entirely around the arch
S2	Camshaft Home Proximity Switch	Near camshaft	Stops the cam in the home position (TR12) and the primary tension position (TR 93).
S3	Strap Present Proximity Switch	After reel	Verifies that strap is present and flowing into the accumulator box



S5	Accumulator Level Switch	In accumulator box	Detects when the strap in the accumulator box has overcome the weight lever
S6	Primary Tension Complete Switch	Right side of seal area	Signals that primary tension is complete (strap is around the package) and for cam to rotate to final tension position
S7	Package Present Safety Switch	Hole in table top	Verifies that a package is in the strapping area
S10	One Shot ON/OFF	Near accumulator box inside machine (bottom)	In Automatic mode. OFF: Allows machine to run continuously when S7 is covered. ON: Machine will cycle only once when S7 is covered.

**INTRODUCTION**

This manual gives you operation, safety, and maintenance instructions for the GP-44 automatic strapping machine. The GP-44 machines are automatic strapping devices. This model is designed to strap packages or bundles with plastic strap. The strap ends are joined by heat sealing process.

**SIMPLE DESCRIPTION OF THE MACHINE**

The figure below shows the exterior of the machine.

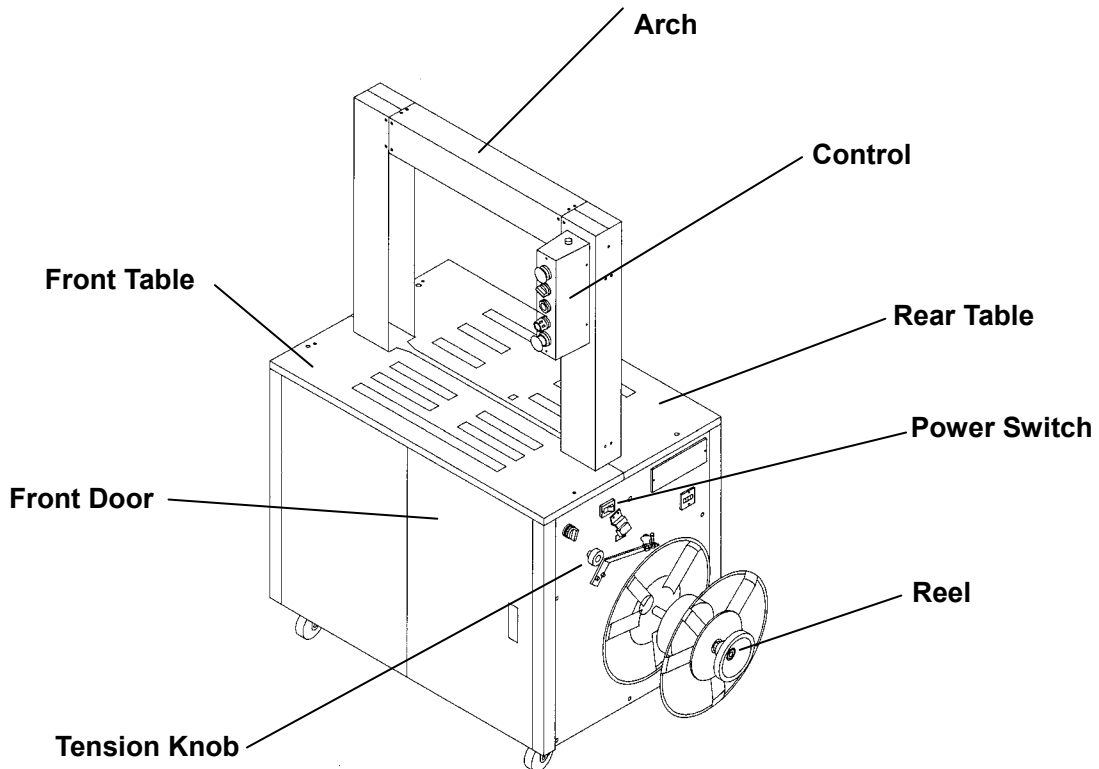
A package to be applied strapping is placed on the front and rear table under the arch.

A strapping cycle can be separated into four distinct operations:

1. Strap feed
2. Grip and Tension
3. Weld, cut and release

Strap feed for next cycle

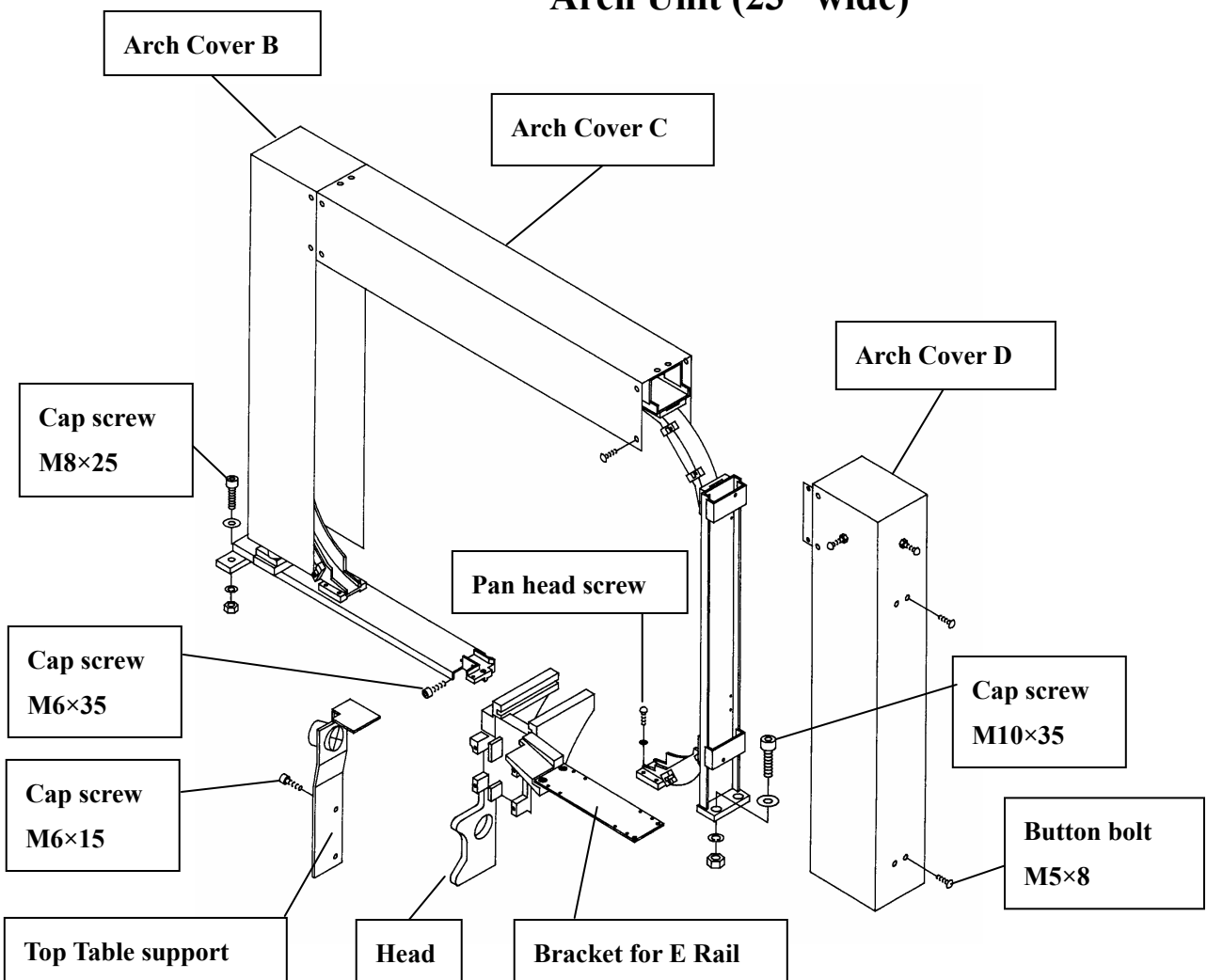
Depressing the Manual Strap Switch or foot switch pedal initiates a strapping cycle. The strap is pulled back into the pool box and tightened around the package. The strapping head, located within the cabinet of the machine, performs the end gripping, cutting off and welding the strap. When a sealing cycle has been completed, the strap is drawn from the pool box by the feed/tension system of the strapping head and then fed around the arch.



**PROCEDURE OF ASSEMBLING ARCH UNIT**

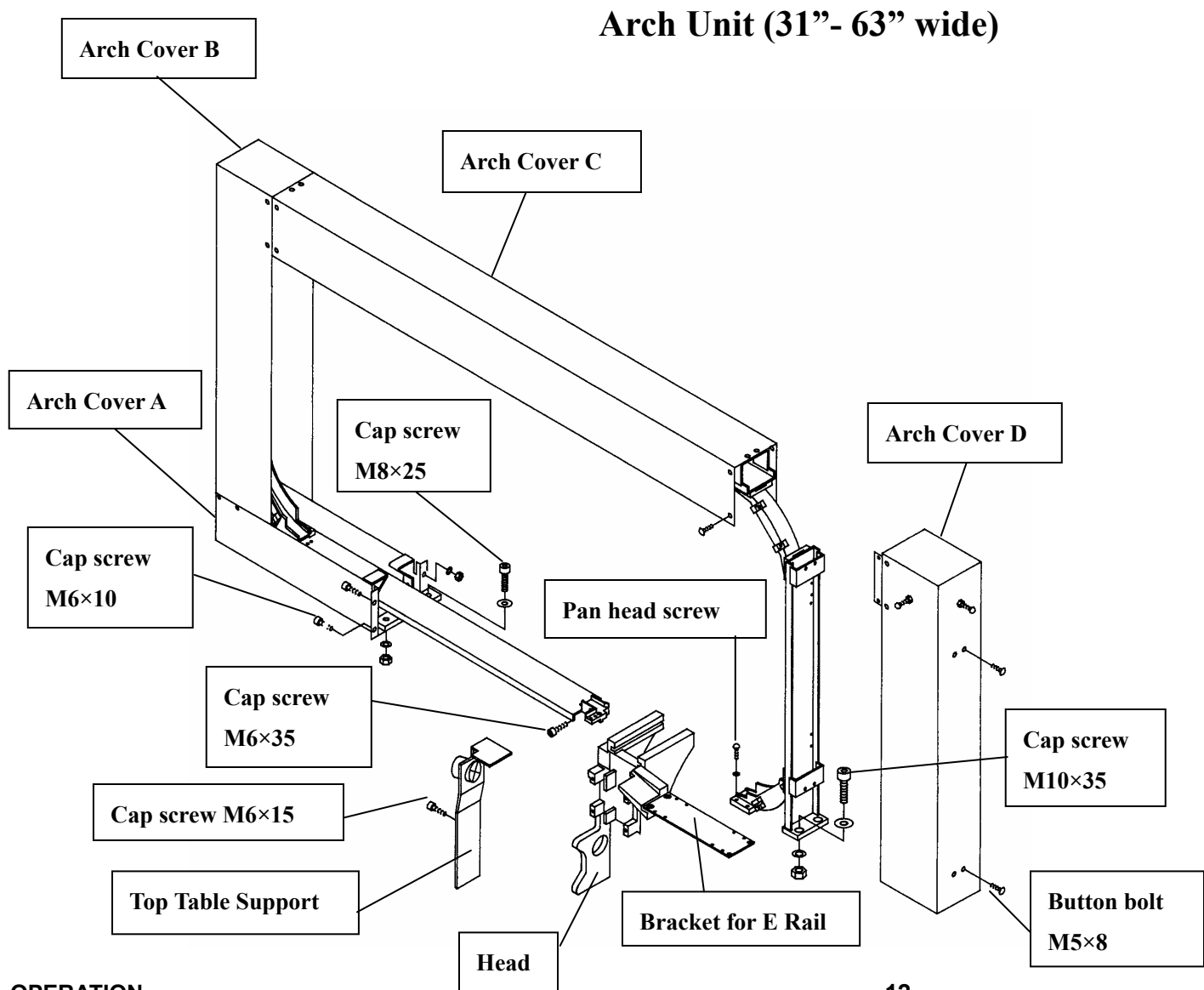
1. Remove Arch Cover D.
2. Unscrew cap screws and remove the top table support. (Cap screw is M6×15)
3. Mount the arch unit on the frame and drive cap screw softly. (Cap screw is M8×25 and M10×35)
4. Fix the arch unit firmly on Head by cap screws. (Cap screw is M6×35)
5. Fix the arch unit firmly on the installed Bracket for E Rail by pan head screws.
6. Tighten cap screws driven softly in No3.
7. Install the top table support removed in No2 to head.
8. Fix Arch Cover D on the arch unit.

**Arch Unit (23" wide)**



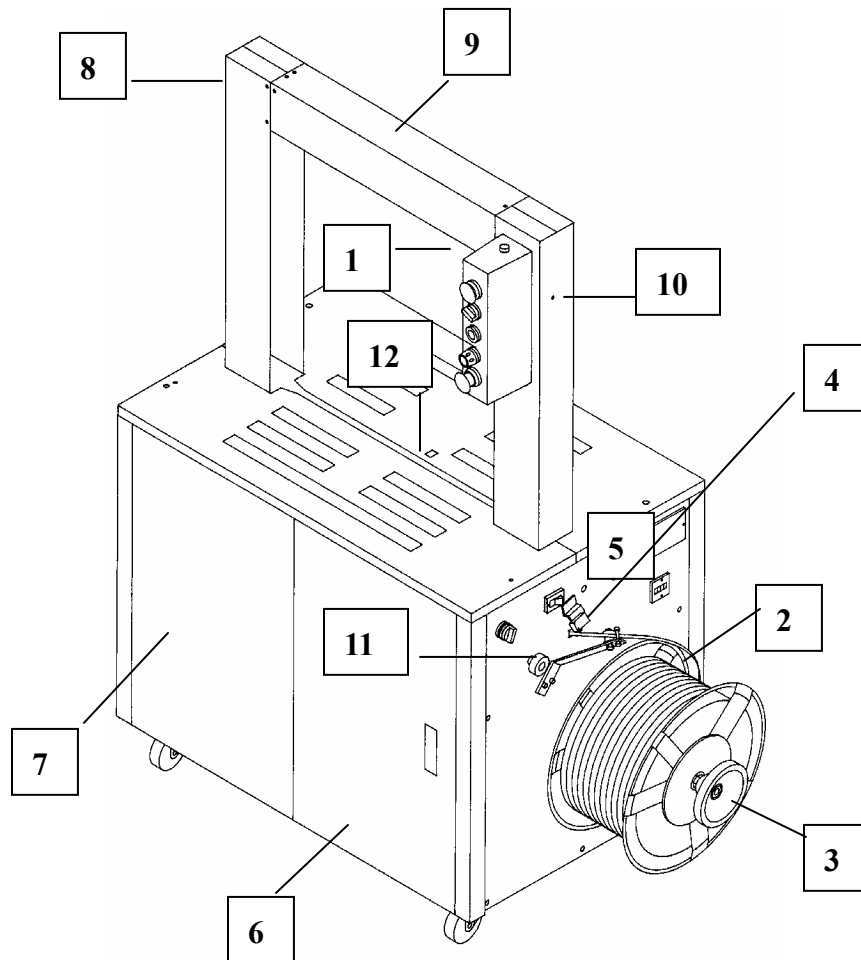
**PROCEDURE OF ASSEMBLING ARCH UNIT**

1. Remove Arch Cover A and Arch Cover D.
2. Unscrew cap screws and remove the top table support. (Cap screw is M6×15)
3. Mount the arch unit on the frame and drive cap screw softly. (Cap screw is M8×25 and M10×35)
4. Fix the arch unit firmly on Head by cap screws. (Cap screw is M6×10)
5. Fix the arch unit firmly on the installed bracket for E Rail by pan head screws.
6. Tighten cap screws driven softly in No3.
7. Install the top table support removed in No2 to head.
8. Fix Arch Cover A and Arch Cover D on the arch unit.



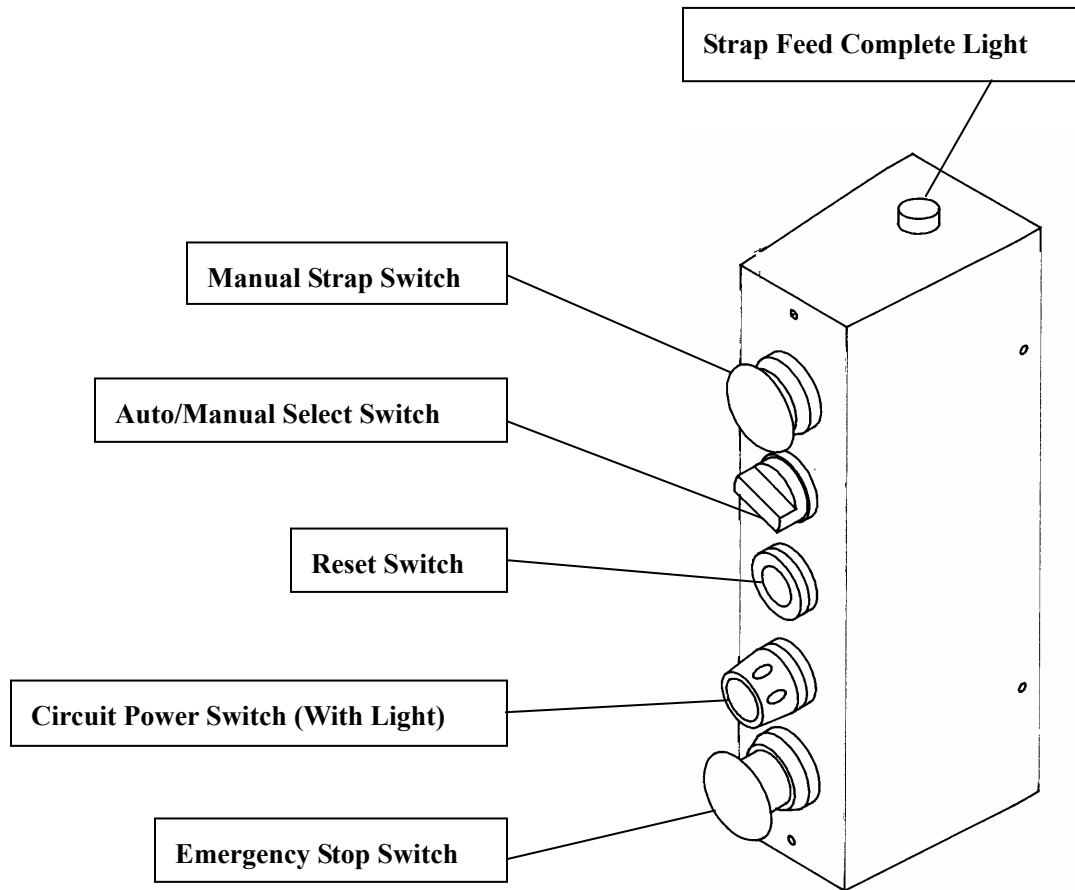
**NAME OF PART and FUNCTION**

- 1.Control Box**
- 2.Reel Coil**
- 3.Reel Nut**
- 4.V-Roller**
- 5.Sensor: Strap detect sensor (53)**
- 6.Front Door**
- 7.Front panel**
- 8.Arch B**
- 9.Arch C**
- 10.Arch D**
- 11.Tension Adjust Knob: Turn right to increase tension.**
- 12.Sensor: Parcel detect sensor (57)**



**MAGNETIC OPERATION CONTROL BOX (GP44)**

Note: Control Box can be re-posted on either side of the machine.

**1. Strap Feed Complete Light**

Green light glows when strap has fed into the arch completely.

**2. Manual Strap Switch**

Press this switch to start strapping operation, when in manual mode.

**3. Auto/Manual Select Switch**

Strapping procedure can be selected by this switch.

**Auto:** Strap cycle initiated by photo eye S7

**Manual:** Strap cycle initiated by Manual Strap Switch or Foot Switch

**4. Reset Switch**

When the machine stops due to some trouble, press this switch so that the machine goes back to the home position.

Strap is cut and remains in the arch and it must be removed by hand.

**NOTE: Turn strap feed switch (located on the side of the machine) OFF then back ON to feed strap around arch.**

**5. Circuit Power Switch (with light)**

Power light glows when all safety switches are clear and Circuit Power Switch is pressed

The machine can be ready for using after 30seconds (after heater blade warms up).

**6. Emergency Stop Switch**

When it is pressed, all operation of the machine and all pilot lights are turned "OFF".

**NOTE: Power still remains in the machine when Emergency Stop Switch is pressed.**

**Make sure to disconnect power cable when you inspect the inside of the machine.**

### SET-UP

#### 1) UNCRATING THE MACHINE

- a) Remove the bolt holding the top of the crate to the pallet.
- b) Remove the cross-braces that are nailed in to keep the machine from shifting.
- c) Lift the top of the crate off of the pallet and set it aside.
- d) Carefully remove stretch wrapping from the machine.

#### 2) INSTALLING THE MACHINE

- a) With a forklift placed under the framework of the machine, gently lift up the machine a minimal distance to clear the pallet.
- b) CAUTION: Make sure the forks are all the way through the far side of the frame.
- c) Slide the pallet out from under the machine.

#### 3) POWER REQUIREMENTS

**DANGER: The following procedure should be preformed by a trained electrician.**

- a) Install a quick disconnect power plug onto the end of the cord.
- b) Make sure to properly ground the machine to avoid a shock hazard.
- c) Next check the machine for proper phasing of the three phase power if so equipped. The M2 (strap Feed/Retract) motor is the only motor on the machine that is phase sensitive.
- d) Load strap in the machine per the "Strap Loading Instructions'. If phasing is not correct, strap will load up to the head, but will not complete loading around the arch, and Strap Feed light will not illuminate. If this occurs, reverse phasing.
- e) Load strap again, and strap should feed completely around the arch. The Strap Feed light will illuminate signaling that strap feed was successful.
- f) Make sure to verify that the machine is wired for correct voltage. See the "Electrical Hook-up" section of the manual.



### TESTING AND OPERATING THE MACHINE

#### 1. INITIAL SET-UP OF THE MACHINE

After installing the plug for the three phase power, and testing for the proper motor rotation, the machine is ready for testing.

Move the machine to the line it will be used in to check the conveyor gap. The machine should set level and have all wheels in contact with the floor. If not, the wheel should be lowered until in contact. Some machines are equipped with rubber wheels and there will be a slight rocking when the machine is stopping, strapping, and releasing a parcel. This is normal. If equipped with the optional steel wheels, this rocking will be eliminated.

#### 2. LOADING OF STRAP

Now that the machine is ready for operation, the first thing that needs to be accomplished is loading the strap.

- 1) Remove the locking nut on the reel shaft.
- 2) Then remove the outer flange.
- 3) Take a roll of plastic strapping from its box and following the directional unwinding arrows on the reel flange, slide the coil over the inner hub.
- 4) Then replace the outer reel flange and the locking nut.
- 5) Tighten the nut snug and then cut the retaining ribbons or tape on the strapping roll.
- 6) After the tape or ribbon is cut and removed, tighten the locking nut firmly.

Cut the end of the strap straight.

Following the instructions on the side of the machine, load the strap in (curl down) and turn AUTO LOAD switch to right. The upper STRAP FEED switch will illuminate if the loading process was correct.

#### 3. PREPARING FOR OPERATION

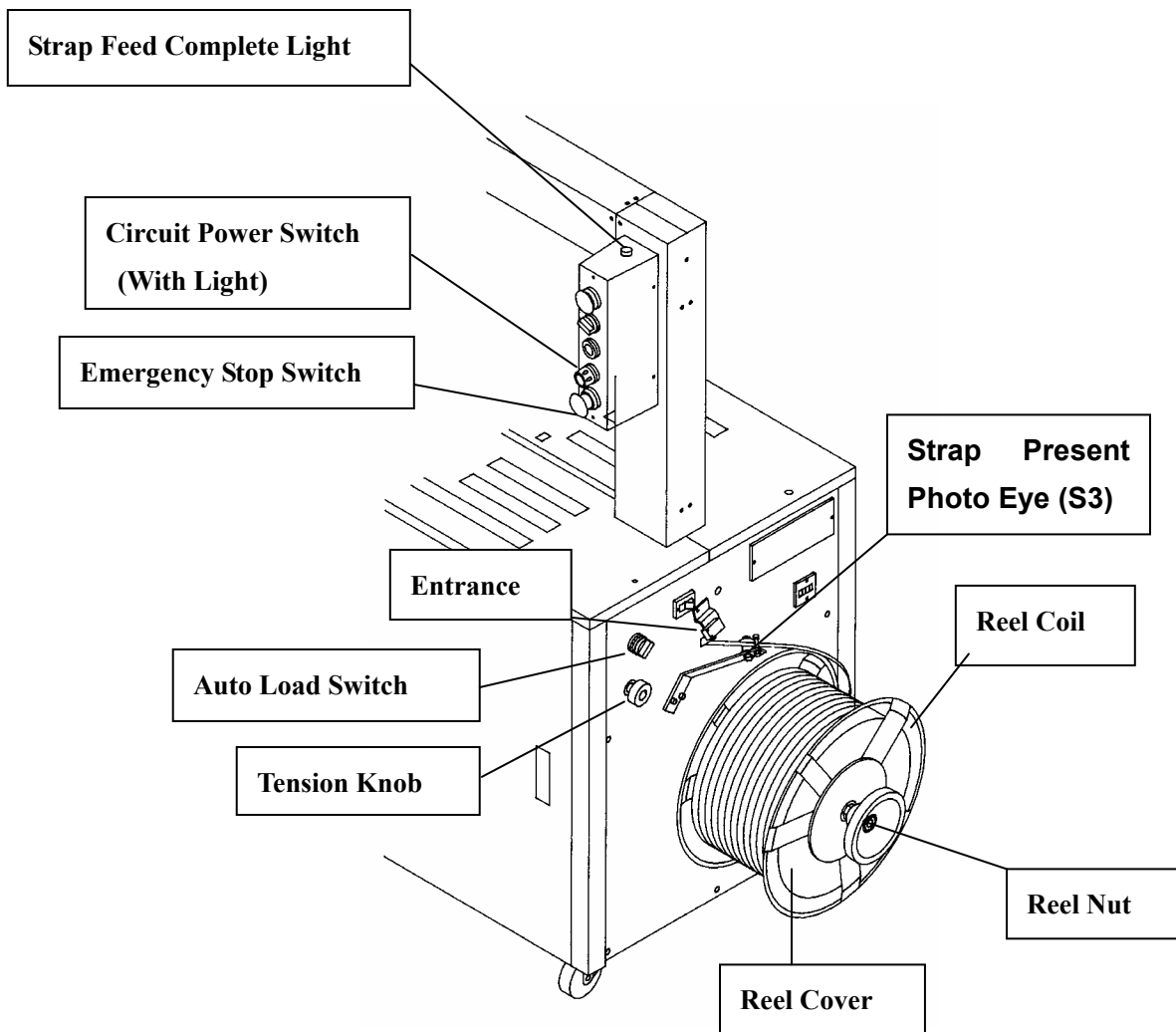
Once the machine is loaded and the STRAP FEED switch is illuminated, the machine can be cycled and tested.

Place 200mm to 250mm high test parcel in the arch and push the MANUAL STRAP button. The machine should apply a strap around the parcel at whatever tension the tension adjustment knob is set at.

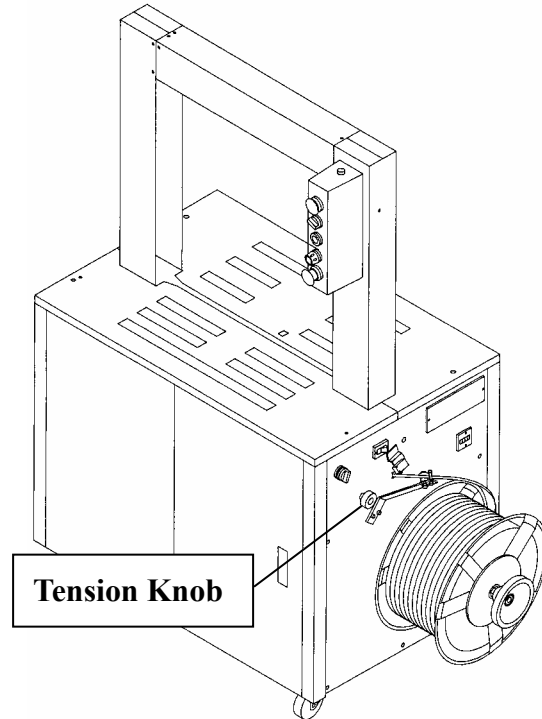
**HOW TO LOAD STRAP**

1. Make sure strap is clear from photo eye S3.
2. Turn Auto Load Switch to the left.
3. Load a coil on the reel as per drawing so that a tip of strap may be pulled and then Reel Cover and Reel Nut may be installed and Reel Nut may be tightened firmly.
4. Thread strap through the guide roller and insert the strap into the entrance until the strap reaches the feed roller. S3 will sense the strap.
5. Turn Auto Load Switch to the right so that the strap feeds into the arch completely.

**NOTE: Strap Feed Complete Light glows green when strap has successfully fed around the arch.**



## ADJUSTING OF STRAP TENSION



There is Tension Knob in the right side of the machine.

- 1) By turning it clockwise, the strap tension is high.
- 2) By turning it anti-clockwise, the strap tension is low.

**NOTE:** It should be turned gradually. Adjusting this knob changes the gap between the two rollers that pull tension on the strap. (The greater the gap, the less "bite" on the strap, therefore, the less tension)

### SEQUENCE OF OPERATION

#### STRAPPING CYCLE

All strapping machines follow the same basic strapping cycle. They all perform the following functions.

Feed strap

Grip lead end of the strap

Initial retraction/tension

Controlled tension

Release tension, cut and weld. Release strap.

#### FEED STRAP

With the cam in home position, the strap feed solenoid (sol 4) (PLC output Y27) is engaged which forces the strap feed roller against the drive wheel and the strap feed motor is engaged in the forward direction. This sends the strap through the arch until the end of the strap hits the strap end detect switch (M switch) (PLC input X03) to signal the machine is ready to cycle.

#### GRIP LEAD END OF STRAP

The package detect photo eye (PLC input X13) is signaled in automatic mode (or the machine is cycled manually) to start a cycle.

When the cycle starts, the cam shaft motor M1 (PLC output Y01) turns, this causes the first gripper to extend to the first position with moderate pressure on the strap against the slide plate. Also the slide plate retracts approx. 3/8" to allow the strap to clear the strap end detect switch area (the switch turns off). The cam shaft turns until it turns on the cam proximity switch (B switch) (PLC input X05). It then starts a short timer in the PLC, which then stops the motor by applying a brake. The camshaft should now be in the initial retraction position (2<sup>nd</sup> detent). **NOTE: If the package detect photo eye loses sight of the package during the cycle, the feed retract motor will stop.**

#### INITIAL RETRACTION/TENSION

When the cam proximity switch (B switch) (PLC input X05) is made, it starts the primary tension motor M2 (PLC output Y02) (in reverse). When the motor starts, it also engages the strap feed solenoid (Sol 4) (PLC output Y04) to pull initial (soft) tension. This pulls the strap out of the arch. As the strap exits the arch and tightens on the bundle, it trips the primary tension complete switch (PLC input X06). Initial retraction is now complete.

### CONTROLLED TENSION

The primary tension complete switch (PLC input X06) disengages the strap feed solenoid (Sol 4) (PLC output Y04) and starts the cam shaft motor M1 (PLC output Y01). As the cam motor turns the camshaft, the bearing on the Roller Bracket Assembly (High Tension Arm falls into the large detent of the end cam, which pulls controlled tension on the strap. The tension is controlled by the spring setting on the high tension arm (overall setting should not be adjusted frequently) and the slip clutch (fine tune setting) on the tension wheel.

### RELEASE TENSION, CUT AND WELD. RELEASE STRAP

As the cam shaft continues to turn, the grippers and heater element are activated by bearings that are riding on the cam. The left gripper extends to grip the trailing end of the strap to maintain the tension that has been established, and create a gap between the two layers of strap at the overlap which is to be welded. Since both ends of the strap are now gripped, the tension between the left gripper and the Roller Bracket Assembly can be released as the Roller Bracket Assembly drops out of the large detent in the end cam. The heater element enters the gap that has just been created between the two strap layers. The middle gripper then goes up to the 1<sup>st</sup> compression position to wedge the two layers of strap against the heater element in the middle, the slide plate on the top and the middle gripper on the bottom. As the middle gripper extends, it cuts the strap against the right gripper. The heater element retracts out from between the straps. The middle gripper then extends fully to compress the two layers of heated strap together and holds them for a short period of time against the slide plate to solidify the weld. As the cam shaft continues to rotate, all the grippers go down to the home position due to spring pressure and the seal anvil retracts snapping the tensioned, sealed strap against the package.

**NOTE:** There must be sufficient tension to allow this to happen.

As the camshaft turns, the cam proximity switch (B switch) (PLC input X05) turns off. It then starts a short timer in the PLC, which stops the camshaft (by applying a brake), in the home position. When, the cam proximity switch (B switch) (PLC input X05) turns off, the cycle starts over again with operation #1.

### AUTO FEED CYCLE

With no strap in the machine, when the machine is turned on, the Auto Load Switch (PLC input X20) should be off. This makes sure that the auto load solenoid (Sol 7) (PLC output Y22) is extended which creates a track into the head.

**NOTE:** If the auto load solenoid (Sol 7) (PLC output Y22) is not engaged, a track to the head is not created and the strap runs directly into the accumulator box.

The end of the strap must be fed until it is between the two initial load rollers. When the Auto Load Switch

(PLC input X20) is turned to ON and the strap is detected by the incoming photo eye (PLC input X26). The auto load solenoid (Sol 7) (PLC output Y22) stays on for a period of time set by the PLC to allow the strap feed solenoid (Sol 4) (PLC output Y27) to pick up the strap from the auto feed (pool box) rollers.

After the timer expires, the track is no longer present, and the strap then feeds into the pool box.

The strap feed solenoid (Sol 4) (PLC output Y27) fills the arch until strap is detected by the strap end detect switch (M switch) (PLC input X03).

When the strap end detect switch (M switch) (PLC input X03) is made, the strap feed solenoid (Sol 4) (PLC output Y27) drops out, while the Pool Box Motor (M5) (PLC output Y23) keeps filling the accumulator box based on the spring tension setting on the pool box limit lever (PLC input X15).

Once pool box limit lever (PLC input X15) is made, the Auto Loading Motor (M5) turns off and the Reel Brake is engaged.

### TROUBLESHOOTING

#### SCOPE

The following troubleshooting procedure provides a step-by-step procedure to help solve problems that occur on the strapping machines. Since all strapping machines perform five basic functions:

- Strap Feed
- Grip Lead End
- Initial Retraction
- Controlled Tension
- Release Tension, Cut and Weld

The troubleshooting is organized according to these basic functions. Lastly, there is an electrical troubleshooting procedure to help diagnose typical electrical problems.

There are a few quick checks that should be made on any machine before starting the troubleshooting process. These checks will make sure that the basic functions of the machine are in tact. Before starting the troubleshooting process, make sure that:

- The machine is stopping cleanly in home position. The end cam should be stopping in the small detent and the right gripper should be at the small portion of the cam immediately ready to ride up the cam into the gripping position.
- Check the incoming strap photo eye to make sure it is properly sensing the strap. Adjust the sensitivity if necessary.
- Check and set the control voltage to 100 volts. Set the incoming voltage to the proper taps.
- Blow out and clean out the machine to make sure all components are free, unobstructed and moving properly.

If a particular component is not acting properly, remember that there are several actions that must happen for a component to activate. The path that the signal to activate a component usually starts with an output on the PLC. The output on the PLC occurs when the conditions set in the PLC program are correct for that particular output. The output on the PLC then usually activates a relay. The relay starts or stops the flow of electricity to the component. Once the electricity flows to the component, the components should activate unless it is defective or obstructed.

TROUBLESHOOTING PROCEDURE

**Strap Feed**

NOTE: If there is a short feed, the green strap feed complete light should not be illuminated. If it is, clean out the lever to make sure it is not stuck. Also check the switch to make sure it works properly. Check switch plug for corrosion.

Symptom	Cause	Solution	GP
Sluggish Feed	Feed Solenoid is bottoming out and not contacting the strap sufficiently	Adjust feed solenoid per procedure	X
Sluggish Feed	Spring pressure on feed solenoid is not sufficient	Increase spring pressure on feed solenoid. Check to make sure the sprig is the proper type	X
Sluggish Feed	Plunger is not engaging in the feed solenoid	Inspect plunger and solenoid for dirt, pitting, or other obstructions	X
Sluggish Feed	Feed bearings are dirty, wet or greasy.	Eliminate the cause of the contamination.	X
Sluggish Feed	Feed bearings do not rotate freely	Replace feed roller bearings	X
Sluggish Feed	Too much strap or too little strap in the accumulator	Adjust sensor spring in the accumulator. Make sure the accumulator feed roller/motor are working properly and adding strap to the accumulator. Make sure the sensors detecting the amount of strap entering the accumulator (retract wheel and accumulator feed wheel) are functioning properly. Make sure the parameters in the PLC program are set properly. Check for adequate spring tension on the initial feed rollers. On MR machines check clutch on accumulator fill roller.	X
Sluggish Feed	Right or Left guide are set too tight and causing drag on the strap	Adjust guides to approx. strap width + 1mm	X
Sluggish Feed	There is a slight obstruction in the strap path	Inspect strap path, guides and arch for debris and obstructions. Check all guides have adequate clearance. Look for damaged arch track.	X
Sluggish Feed	The strap is getting damaged during the cutting and/or tensioning cycle.	See Weld and Cut and Tensioning section	X
Sluggish Feed	Poor quality strap (camber)	Replace with another roll of strap	X
Sluggish Feed	High tension wheel is damaging the strap and creating a weak point in	Make sure the slip clutch is on the high tension wheel is slipping 1/4 – 1/3 turn during high tension cycle.	



	the strap.		
Sluggish Feed	Grippers are not returning properly due to lack of grease	Grease grippers and replace. Check for foreign mater that may also be impeding gripper movement.	<b>X</b>
Hard Feed - escaping track	Feed bearing shaft is bottoming out on the Solenoid plunger and not allowing the spring to come into play	Adjust feed solenoid per procedure	<b>X</b>
Hard Feed - escaping track	Spring pressure on feed solenoid too much	Decrease spring pressure on feed solenoid. Check to make sure the spring is the proper type	<b>X</b>
Short Feed	There is an obstruction in the strap path	Inspect strap path, guides, grippers and arch for debris and obstructions. Make sure grippers are returning to home position. Check all guides have adequate clearance. Look for damaged arch track. Determine point where strap is stopping and start searching there.	<b>X</b>
Short Feed	Too much strap or too little strap in the accumulator	Adjust sensor spring in the accumulator. Make sure the accumulator feed roller/motor are working properly and adding strap to the accumulator. Make sure the sensors detecting the amount of strap entering the accumulator (retract wheel and accumulator feed wheel) are functioning properly. Make sure the parameters in the PLC program are set properly. Check for adequate spring tension on the initial feed rollers. On MR machines check clutch on accumulator fill roller.	<b>X</b>
Short Feed	The strap is not removing from the reel properly	Correct the strap reel installation and strap threading. Correct any knots or tangles.	<b>X</b>
Short Feed	The strap is getting damaged during the cutting and/or tensioning cycle.	See Weld and Cut and Tensioning section	<b>X</b>
Short Feed	Poor quality strap (camber)	Replace with another roll of strap	<b>X</b>
Short Feed	High tension wheel is damaging the strap and creating a weak point in the strap.	Make sure the slip clutch is on the high tension wheel is slipping 1/4 – 1/3 turn during high tension cycle.	

Grip Lead End of Strap

On GP machine, timing is critical since the cycle starts from the home position and the right gripper must grip the lead end of the strap before the initial retraction occurs. On MR machines, timing is not critical as the cycle starts from the grip position. When the strapping cycle is initiated, the strap is already gripped.

<b>Symptom</b>	<b>Cause</b>	<b>Solution</b>	<b>GP</b>
Strap is pulling out from gripper	Right gripper is not shimmed properly and is not sufficiently gripping the strap	Check to make sure the Seal Anvil is not bent or cracked. Check compression pad for maximum compression. Shim grippers per procedure.	<b>X</b>
Strap is pulling out from gripper	Retraction is occurring before the right gripper extends	Check to make sure cam is stopping in the home position. Check to make sure there is not a delay in cam motor starting. This includes the PLC output, relay, and motor. In some cases on older machines a timer can be added to the PLC program to delay the start of the retraction.	<b>X</b>
Strap is damaged/cut by the left gripper	Right gripper is not shimmed properly and is applying too much pressure to the strap	Inspect plunger and solenoid for dirt, pitting, or other obstructions	<b>X</b>

**Initial Retraction**

NOTE: The S6 switch signals the machine that initial retraction is complete and it is now time to go into controlled tension. There is a watchdog timer in the program that will tell the machine to go into final tension even if the S6 switch is not activated. This is a subtle difference in the machine operation that will occur if the S6 switch malfunctions. It is only noticeable as a slight delay in the initial retraction end/controlled tension start.

<b>Symptom</b>	<b>Cause</b>	<b>Solution</b>	<b>GP</b>
Machine is sealing before initial retraction is complete	The strap is getting caught on something during initial retraction which is falsely tripping the S6 switch.	Eliminate cause of the snagging. Inspect strap path for problem areas or restrictions. Make sure arch flaps are opening sufficiently and arch flap spring tension is not too high.	<b>X</b>
Machine is sealing before initial retraction is complete	The S6 switch is giving a faulty signal	Replace the S6 switch.	<b>X</b>
Machine is sealing before initial retraction is complete	Retract solenoid plunger is not engaging properly	Inspect plunger and solenoid for dirt, pitting, or other obstructions. Make sure solenoid is adjusted properly. Make sure plunger linkage is moving freely.	<b>X</b>
Machine is sealing before initial retraction is complete	Retract bearings are dirty, wet or greasy.	Eliminate the cause of the contamination.	<b>X</b>
Machine is sealing before initial retraction is complete	Retract bearings do not rotate freely	Replace feed roller bearings on GP.	<b>X</b>
Machine is sealing before initial retraction is complete	Too much strap in the accumulator	Adjust sensor spring in the accumulator. Make sure the accumulator feed roller/motor are working properly and adding strap to the accumulator.	<b>X</b>
Machine is sealing before initial retraction is complete	There is a slight obstruction in the strap path	Inspect strap path, guides and arch for debris and obstructions. Check all guides have adequate clearance. Look for damaged arch track.	<b>X</b>
Machine is sealing before initial retraction is complete	Poor quality strap (camber)	Replace with another roll of strap	<b>X</b>

**Controlled Tension**

On the Shoko machines, tension is controlled by the spring tension on the high tension arm as the high tension arm drops into the groove in the end cam. The spring on this high tension arm should be set at 2 ¼” and left alone. It is not something that should be constantly adjusted. On the MR machines, there are two modes of controlled tension. On tall bundles, the tension is controlled as described previously. On small bundles, a solenoid engages to intercept the high tension arm. There is also a slip clutch on the machines on the high tension wheel. The slip clutch reduces the shock on the strap as the high tension wheels contact the strap to pull tension. This slip clutch should be set to slip 1/4 - 1/3 turn as the machine pulls controlled tension. On GP machines, the external tension knob limits the travel of the high arm can which limits its contact with the strap and therefore reduces the tension.

<b>Symptom</b>	<b>Cause</b>	<b>Solution</b>	<b>GP</b>
Strap is breaking	Tension is set too high	Reduce tension on the tension knob. The spring on the tension control arm should be set at 2 ¼”.	<b>X</b>
High tension wheel is leaving a mark on the strap.	The slip clutch is not set properly	Make sure the slip clutch is on the high tension wheel is slipping 1/4 – 1/3 turn during high tension cycle.	
The strap is too loose/ too tight on small bundles	The small bundle tension bolt on the solenoid is not adjusted properly	Adjust the small bundle tension bolt on the solenoid to achieve proper tension.	
The strap is too loose/ too tight on small bundles	The top photo eye is blocked and it is not detecting the small bundle	Clean the photo eyes.	
The strap is too loose/ too tight on small bundles	The small bundle solenoid is not operation properly	Check the solenoid, free up the plunger, replace if necessary.	

**Release Tension, Cut and Weld**

NOTE: The sequence that these functions take place is that as the controlled tension is completing, the left gripper extends to hold the tension that has been created. As the middle gripper extends to compress the two layers of strap against the heater blade, the middle gripper shears the strap against the right gripper. After the heater blade retracts, the middle gripper compresses the two layers of strap against each other to create the weld.

When troubleshooting welding problems, check the appearance of the strap for evidence of contact by the heater blade. This can be used to determine if the problem is that the heater blade is interfering and not making it in between the strap or if the problem is elsewhere.

**NEVER BEND THE HEATER BLADE WHEN IT IS COLD. THE HEATER BLADE MAY CRACK.**

Symptom	Cause	Solution	GP
The weld is breaking and there is no evidence of full heater blade contact on the strap	The heater blade is bent or the bracket is out of position and the heater blade is not extending between the straps.	Cycle the cam by hand and determine the cause of the interference. Eliminate the cause of the interference. Realign heater blade and heater tower.	X
The weld is breaking and there is evidence of proper contact with the heater blade	The middle gripper is not applying adequate pressure to seal the melted strap	Shim middle gripper per specification	X
The weld is breaking and there is evidence of proper contact with the heater blade	The left gripper is not adequately gripping the strap and allowing movement during the welding cycle	Shim left gripper per specification	X
The weld is breaking and there is evidence of proper contact with the heater blade	The seal anvil is cracked or bent which is not allowing proper compression by the middle gripper.	Replace the seal anvil. Re-shim the grippers when replacing the seal anvil. Over shimming the grippers is a typical cause of a cracked seal anvil, therefore, they should be checked when a seal anvil is detected.	X
The weld is breaking and there is evidence of proper contact with the heater blade	The heater blade is not providing adequate heat.	Check heater blade, insulation and wiring. Look for discontinuity in this circuit. Check heater blade for build-up. Check the heater control voltage (100V). Adjust the heater blade tap to a lower letter.	X
The cut is not clean	The left gripper is not adequately gripping the strap during the cutting operation	Shim left gripper per specification	X
The cut is not clean	The cutting surface on the middle gripper is not sharp or there is not tight contact between the middle and right gripper	Replace the middle gripper. Make sure the spring holding the middle and right gripper together is intact.	X

### Electrical

NOTE: The machine has a safety interlock system to prevent operation of the machine without all components of the machine in proper position. These interlocks include the emergency stop button(s), the door interlocks, and the tabletop interlocks. The “Trouble Check” output on the PLC will be illuminated if all safety interlocks are closed. If any of the interlocks are open, the machine will not power up.

220 and 440 volt machines have three distinct circuits that control the machine.

- A 220 Volt circuit that controls the major motors.
- The 100 Volt circuit that controls the heater blade, the PLC, the 24 VDC power supply (if equipped) and some motors.
- The 24 VDC circuit that controls the PLC inputs and outputs.

Each of these circuits is individually fused to protect the components in the circuit. In addition to the fuses, each component typically is protected by a motor starter or circuit breaker.

110 volt machines have two distinct circuits that control the machine.

- The 100 Volt circuit that controls the heater blade, the PLC, the 24 VDC power supply (if equipped) and some motors.
- The 24 VDC circuit that controls the PLC inputs and outputs.

Each of these circuits is individually fused to protect the components in the circuit. In addition to the fuses, each component typically is protected by a motor starter or circuit breaker.

Most electrical problems involve power disruptions due to one of the reasons above, interlocks, fuses, motor starters and relays.

### GENERAL MAINTENANCE

The machine has been designed to be a very low maintenance, reliable machine.

However, by following some basic preventative maintenance, the machine will perform trouble free for many years.

#### **CAUTION:**

Always disconnect the power supply and use extreme caution when performing any maintenance or when using compressed air to clean the machine. Always wear safety glasses. Maintenance should only be performed by people familiar with the operation of the machine.

**NOTE:** This is only a suggested guide to periodic maintenance. Depending on the frequency of use, the environment and the type of parcel being strapped, maintenance should be adjusted to assure optimum performance.

#### **DAILY CLEANING AND INSPECTION:**

1. The machine should be thoroughly blown out and have all paper debris removed daily. This will remove the strap dust, paper dust, scraps of paper, or fragments of strap left in the machine from previous operation.
2. Use an air blowgun.  
Pay close attention to the strap seal head and strap accumulation chamber.  
Remove the strap from the machine and open the door of the accumulator to clean it properly. Also take the time to blow out around the strap track and the feed and retract rollers.
3. Check the air filter of the air compressor for the air blowgun and let any water out of the filter that has accumulated.

**DANGER:** During the next steps, power will be applied to the machine.

**Extreme caution should be exercised anytime the machine is running or power is applied.**

### GENERAL MAINTENANCE (CONT.)

Run the machine. Listen for any noises not normally associated with the machine. Look to see that all illuminated switches and lights are operational. Test the safety circuits by sliding the doors open and lifting the conveyors. The machine should stop immediately. If it does not, or one of the circuits has been disabled, contact a supervisor.

### PERIODIC MAINTENANCE, TEARDOWN, AND CLEANING (Every 150,000 to 250,000 cycles):

The air cylinders, valves and guide bearings are the latest lubricated for life design.

Because of this there is no lubricator to fill. The dust and dirt should still be wiped off the shafts and slides occasionally.

The grippers should be removed from the machine, cleaned, and lightly coated with a lubricant similar to white lithium grease. (Do not use heavy fibrous style grease)

While the grippers are out, clean the casting that the grippers fit into. Also clean the cam surfaces that the gripper bearings ride on. Coat both the casting slides and cam surfaces with this same grease. Rotate the gripper bearings to feel for rough spots (replace bearings if roughness is found).

Reassemble the grippers and test to make sure they can move up and down freely with no binding.

**Note: When applying grease, make sure not to apply grease to any areas that may contact the strap. Grease on the strap will cause sealing and feeding problems.**

Remove the two bolts and the spring fastening the seal anvil. Slide the seal anvil out of its guides. Clean the seal anvil and coat the sides with the same white lithium grease. Check to make sure the strap end detect switch is clean and moves freely. Reassemble.

Remove the remaining strap guides, strap feed pinch roller, and high tension arm. Check for strap fragments, blow the area out, and then check the feed pinch roller bearing spins easily. (Always replace this bearing with the same rubber shielded, low drag, bearing.) Coat the pivot shafts of the feed pinch roller assembly and the high tension arm with white lithium grease and reassemble.

Visually check and feel the surface of the two pinch rollers that feed strap into the accumulator box. If grooves



or other wear is present replace them.

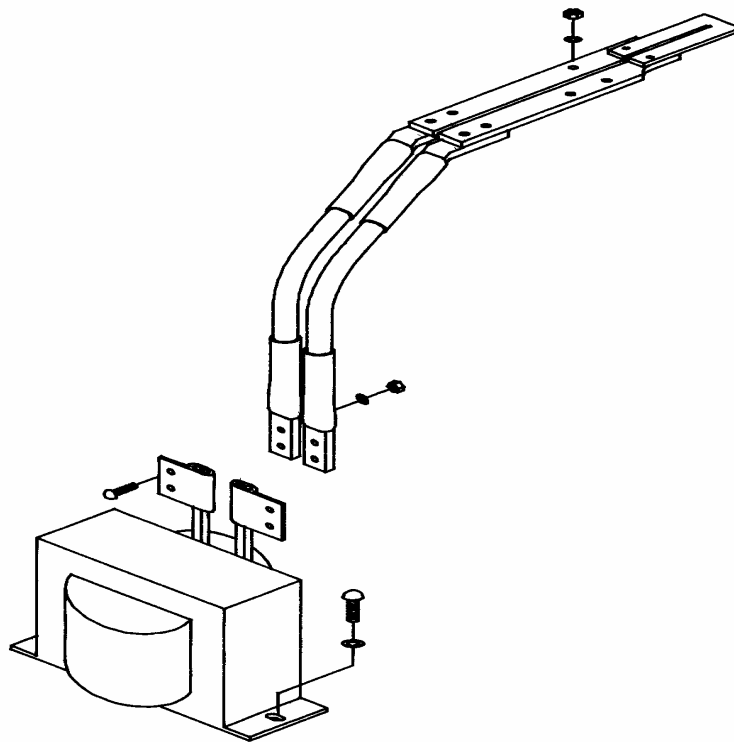
Visually check accumulator box fill level after strapping approximately 50 packages. Adjust spring as needed.

Visually check the timing of the machine. Machine should stop consistently in the timing mark. Adjust timing if needed.

Remove some of the covers and thoroughly clean the dust and paper from the machine. Use a rag or brush to loosen stubborn dust and dirt.

PREVENTIVE MAINTENANCE

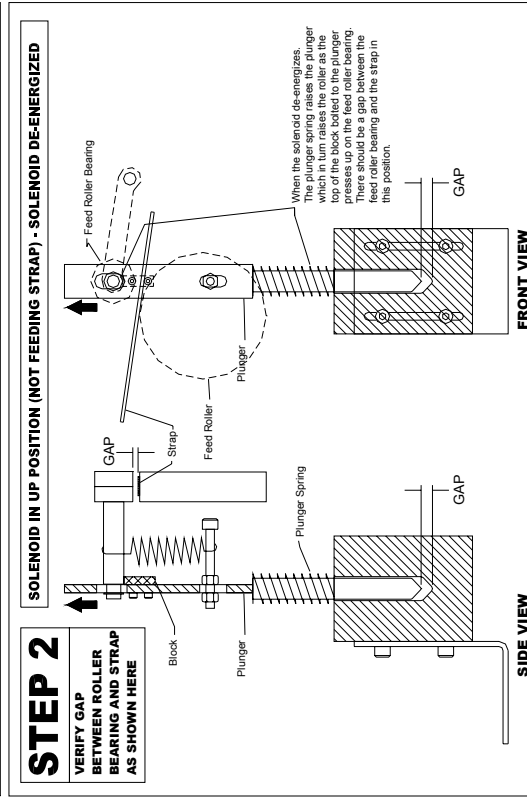
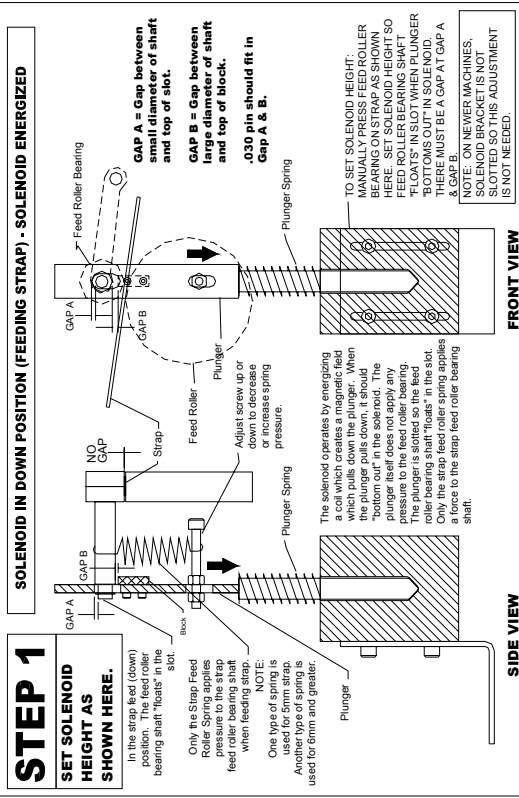
Clean the surface of the heater (both sides) by sand paper once a month



## TOOL KIT

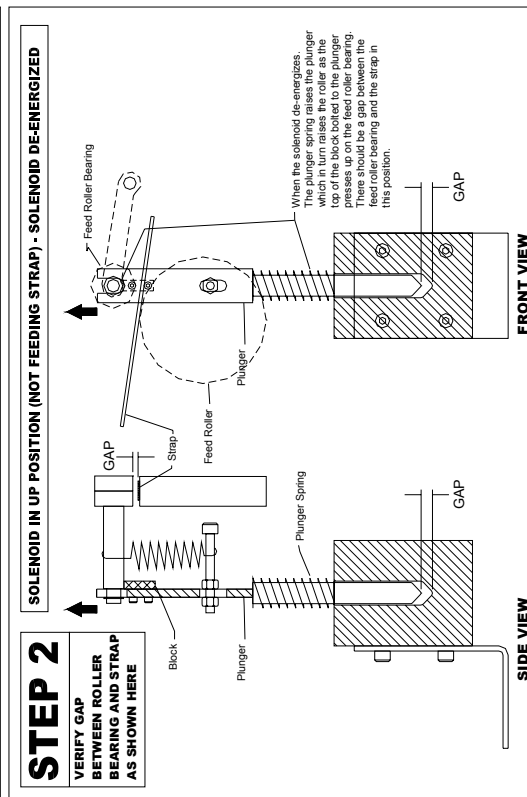
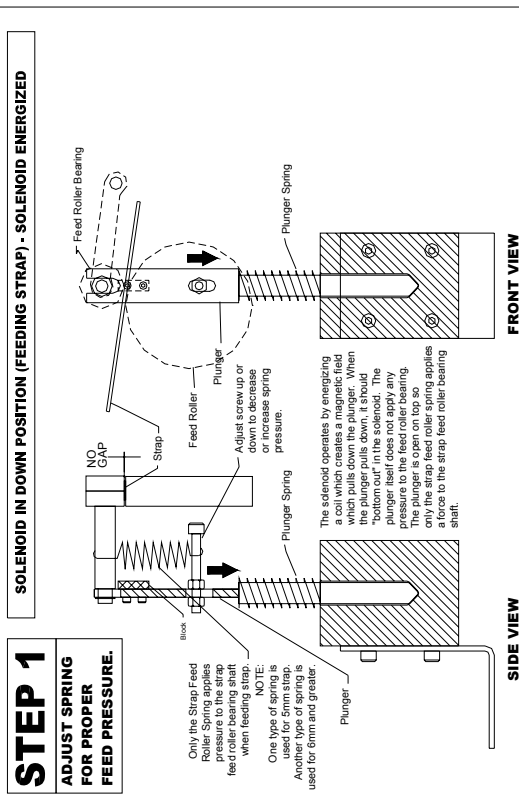
Part name
2.5mm Allen Wrench
3mm Allen Wrench
4mm Allen Wrench
5mm Allen Wrench
6mm Allen Wrench
8mm Allen Wrench
14mm Allen Wrench
10mm×13mm Open End Wrench
5.5mm×7mm Open End Wrench
19mm×21mm Open End Wrench
17mm Open End Wrench
Standard Screw Driver
Phillips Screw Driver
Adjuster for Photo Eye
Fine Grit Sandpaper
Scissors
Lithium Grease

### CLOSED TOP PLUNGER STRAP FEED SOLENOID ADJUSTMENT



### OPERATION

### OPEN TOP PLUNGER STRAP FEED SOLENOID ADJUSTMENT



### ADJUSTMENT OF HEATER TEMPERATURE

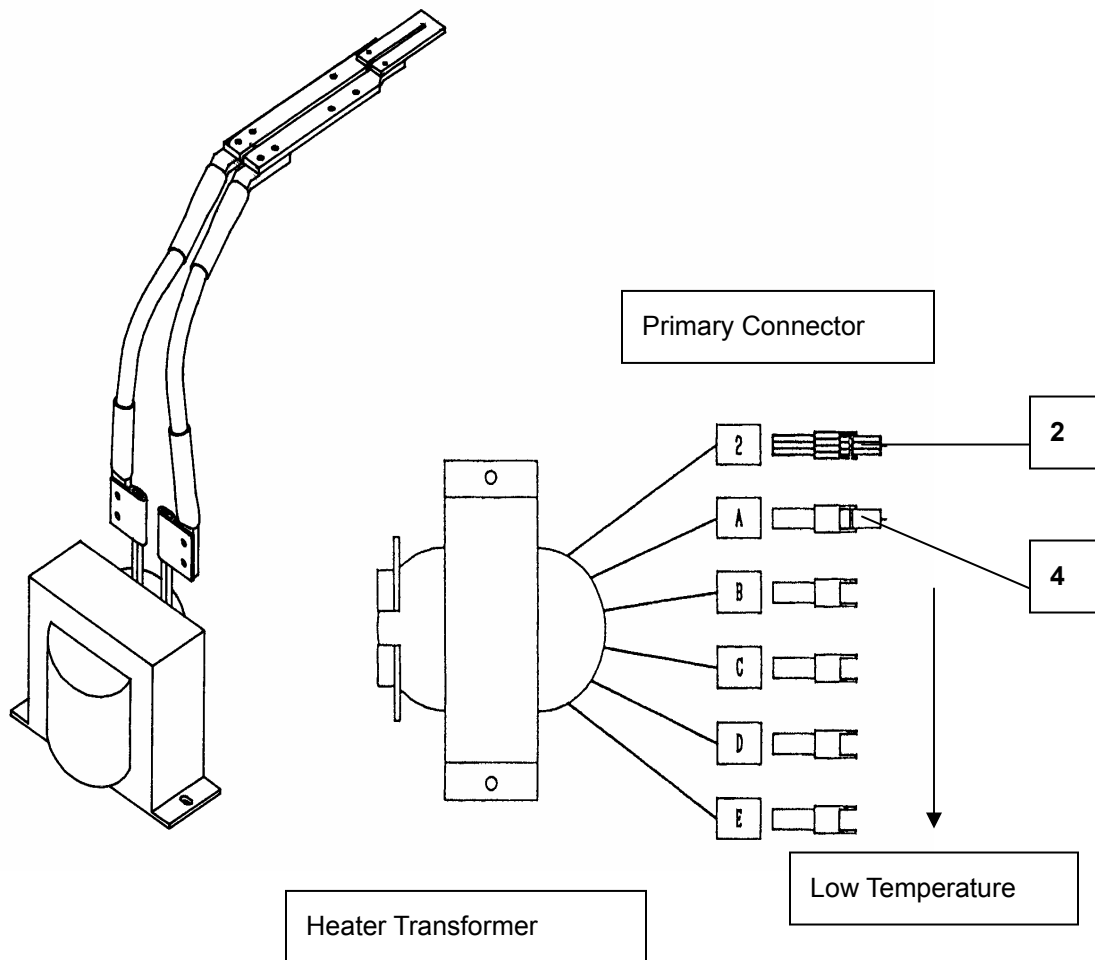
There are connectors E,D,C,B & A on the primary side of heater transformer.

Connector A is the highest temperature and E is the lowest one.

Adjust accordingly.

NOTE: Do not change wire No.2.

NOTE: Before making this adjustment, make sure 100 volt circuit is maintained at 100-105 VAC, as set by transformer T2.

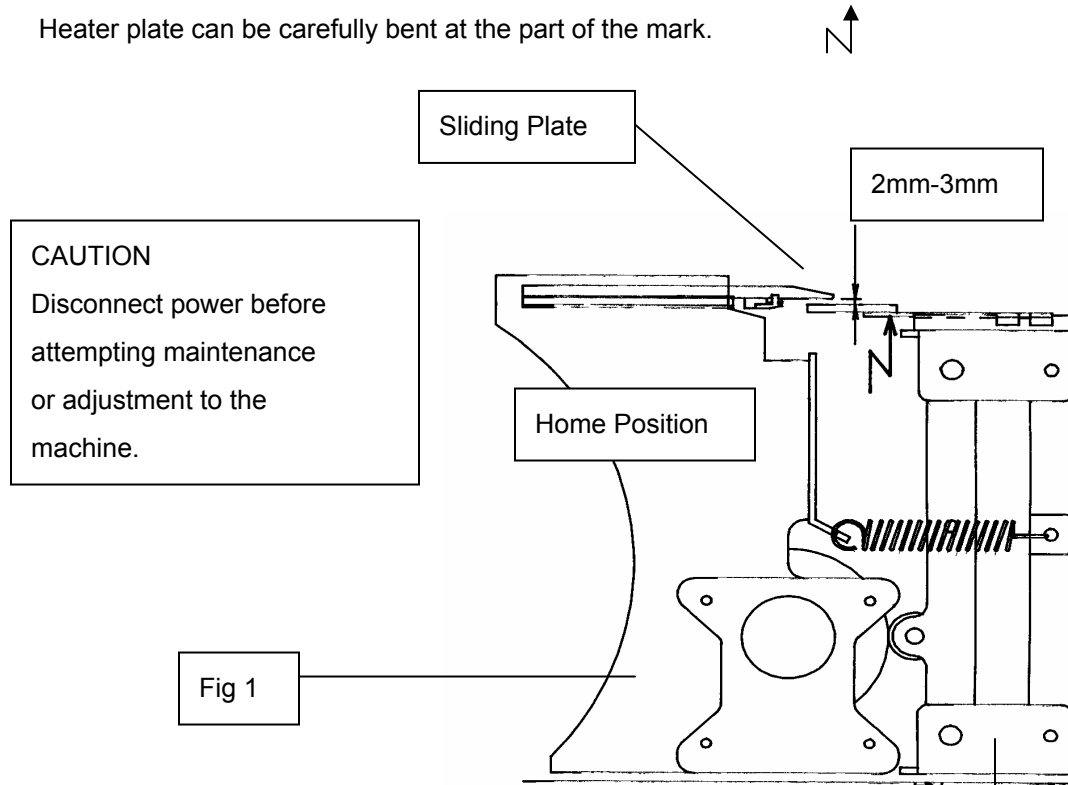


**ADJUSTMENT OF HEATER BLADE POSITION**

**1. Height of heater plate**

The clearance between heater plate and slide plate must be 2mm –3mm.

Heater plate can be carefully bent at the part of the mark.



**CAUTION**  
Disconnect power before attempting maintenance or adjustment to the machine.

Fig 1

**2. Adjustment to right and left.**  
Adjust heater plate when it goes to the back position by cam.  
Heater plate must be paralleled to the left side of 1<sup>st</sup> clamp.  
The tip of heater plate stands out 0.5mm from the end of compression.  
Heater plate can be adjusted by moving heater rod bracket. (Refer to fig 1)

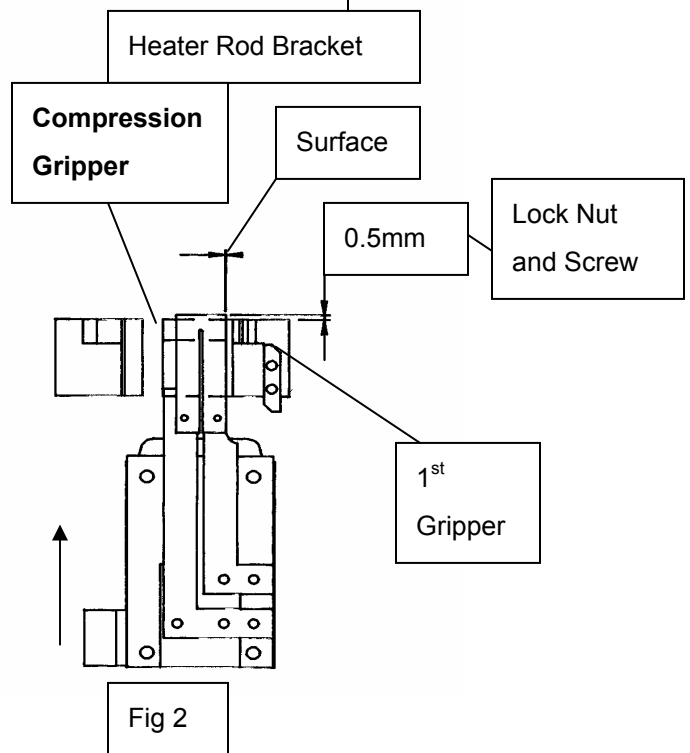
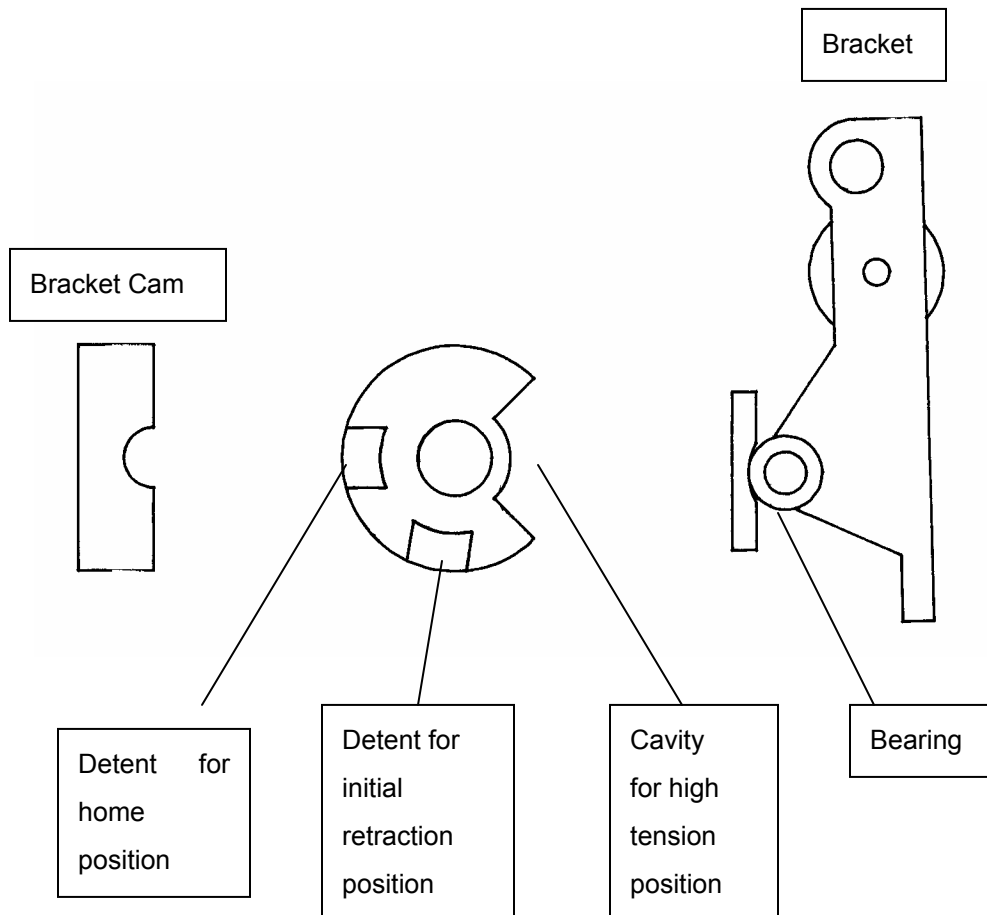


Fig 2

**OPERATION**

HOME POSITION AND INITIAL RETRACTION POSITION FOR CAM SHAFT

1. There are two detents on the bracket cam.
2. When bracket bearing comes into the detent, home position and initial retraction position of cam shaft is decided.
3. When bracket bearing comes into the cavity for high tension position, high tension is made.

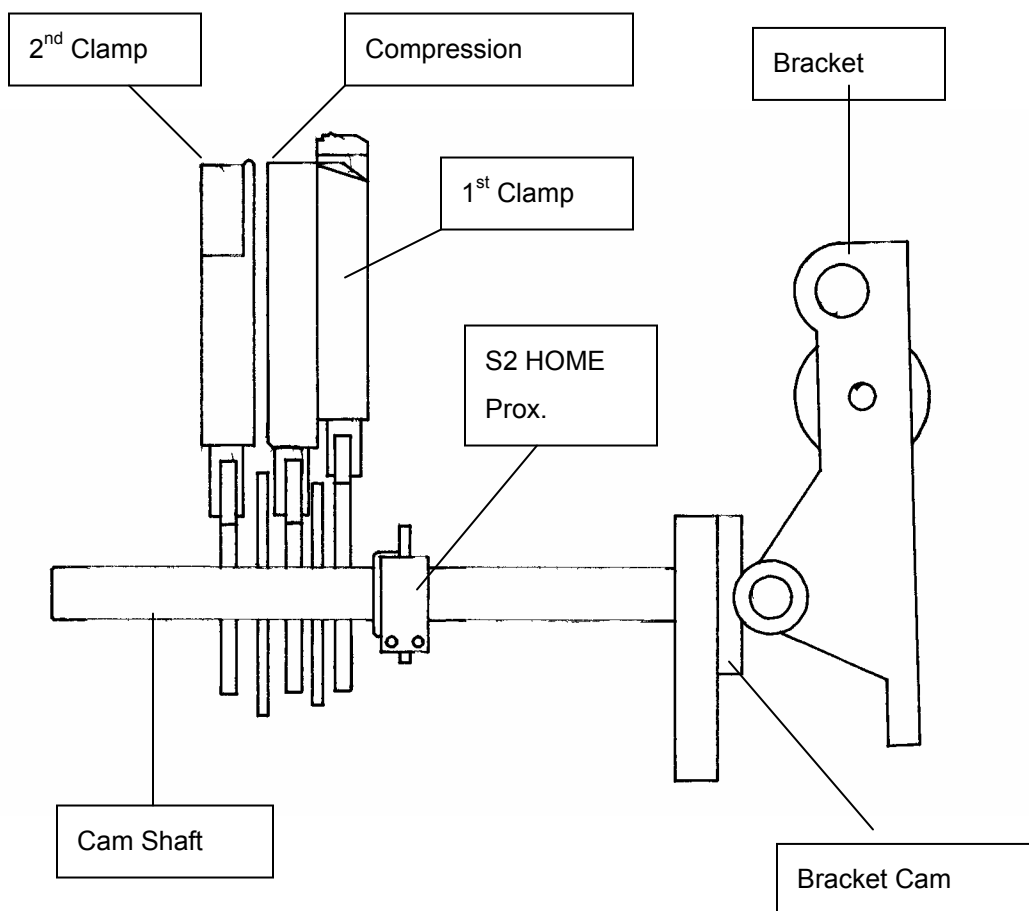


SETTING HOME POSITION & INITIAL RETRACTION POSITION FOR CAM SHAFT

1. S2: Sets stopping position for home position and initial retraction position.

NOTE: Home position delayed by TR12 (in PLC) after S2 turns off

Initial retraction position delayed by TR93 (in PLC) after S2 turns on





## ADJUSTMENT OF ELECTRO MAGNETIC BRAKE ON THE MOTOR

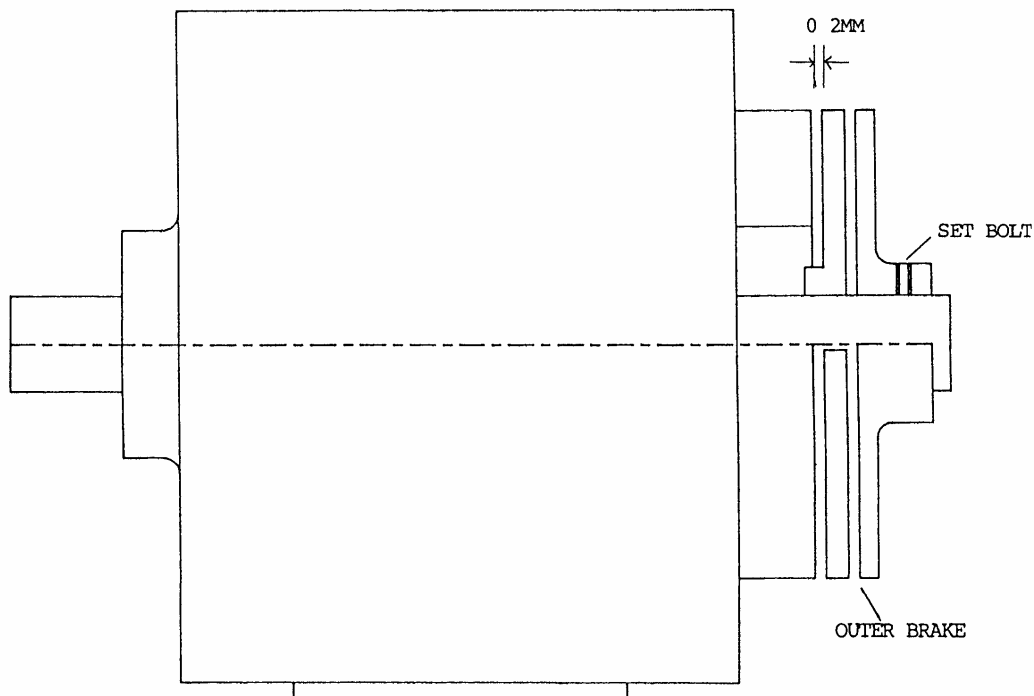
1. There is brake on the motor and conveyor motor.

If brake on the cam motor does not work correctly, camshaft does not stopping in the home position and the right gripper being up.

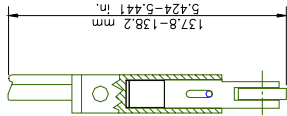
If brake on the conveyor motor does not work correctly, a parcel does not always stop at the strapping position.

2. The clearance between each brake must be 0.12~0.20mm.

In order to adjust the clearance, loosen set bolt and move the outer brake.

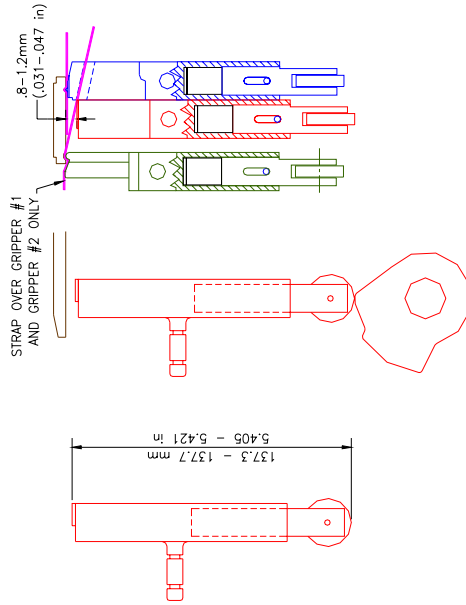


## GRIPPER #2 (LEFT) GRIPPER



**GRIPPER #2 (LEFT) SHIMMING PROCEDURE**  
 SHIM UNTIL HEIGHT IS WITHIN RANGE SHOWN ABOVE.  
 2ND GRIPPER SHOULD LEAVE A 5-7mm SCAR ON THE STRAP.  
 IF SCAR IS <5mm, REDUCE SHIM SIZE.  
 IF SCAR IS >7mm, INCREASE SHIM SIZE.

## COMPRESSION GRIPPER



**COMPRESSION GRIPPER (MIDDLE) SHIMMING PROCEDURE**  
 INITIALLY SET GRIPPER TO HEIGHT SHOWN ABOVE.

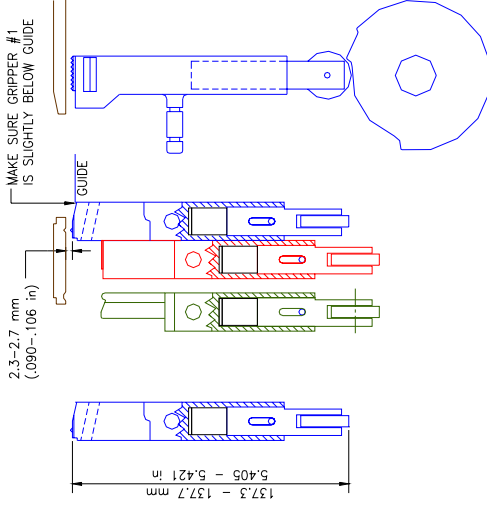
**NOTE:**  
 MEASURE FROM HIGHEST POINT ON GRIPPER (THE SURFACE THAT CONTACTS THE STRAP)

**NOTE:**  
 IN THIS POSITION, GRIPPER IS COMPRESSING TWO THICKNESSES OF STRAP AND THE HEATER BLADE (APPROX. .090" OF MATERIAL).

**NOTE:**  
 IN THE FULLY COMPRESSED POSITION THE GRIPPER IS COMPRESSING TWO THICKNESSES OF STRAP (APPROX. .060" OF MATERIAL).

**SYMPTOMS:**  
 IF COMPRESSION GRIPPER IS TOO TIGHT, IT MAY CRACK SLIDE PLATE.  
 IF COMPRESSION GRIPPER IS TOO LOOSE, IT WILL LEAD TO INCONSISTENT SEAL.

## GRIPPER #1 (RIGHT) GRIPPER



**GRIPPER #1 (RIGHT) SHIMMING PROCEDURE**  
 INITIALLY SET GRIPPER TO HEIGHT SHOWN ABOVE.

**NOTE:**  
 MEASURE TO THE HIGHEST FLAT SURFACE (JUST BELOW THE POINTS) ON GRIPPER. DO NOT MEASURE TO THE POINTS.

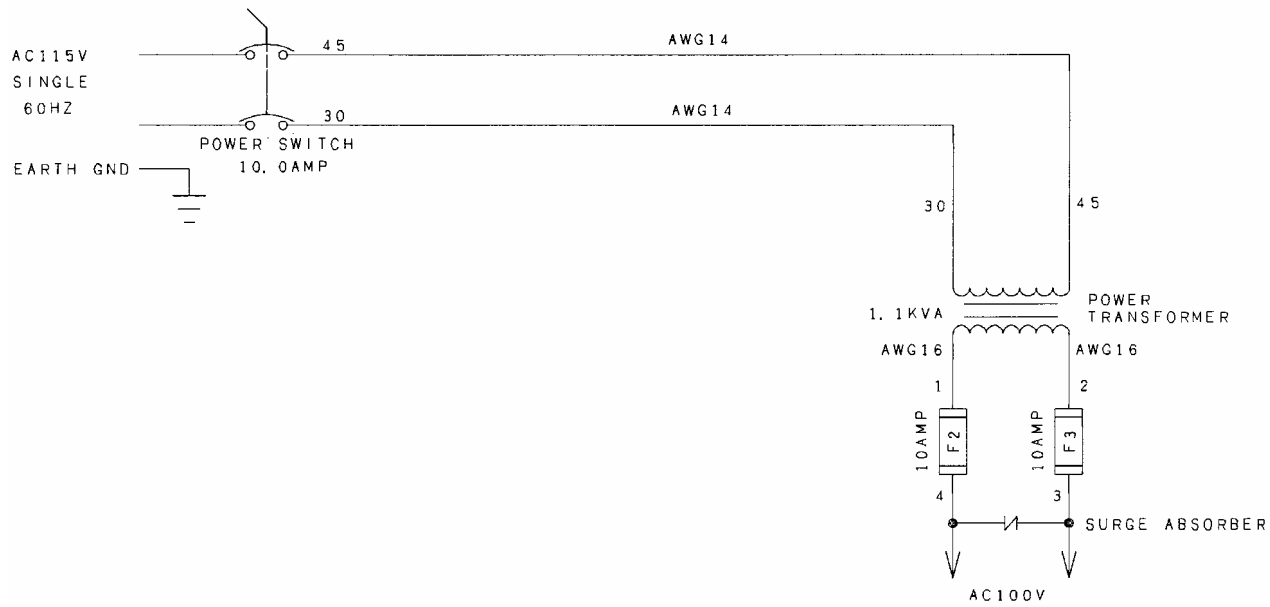
**NOTE:**  
 MAKE SURE THERE IS A STEP DOWN FROM THE GUIDE TO THE GRIPPER IN HOME POSITION. IF THERE IS A STEP UP, THE STRAP WILL INTERFERE WITH THE GRIPPER AS IT FEEDS.

**SYMPTOMS:**  
 IF GRIPPER #1 IS TOO TIGHT, IT MAY CRACK SLIDE PLATE AND/OR DAMAGE/CUT THE STRAP.  
 IF GRIPPER #1 IS TOO LOOSE, IT WILL NOT HOLD THE STRAP END DURING RETRACTION. POOR WELD AND POOR SEAL ALIGNMENT.

**DWG. NO. PC00014**

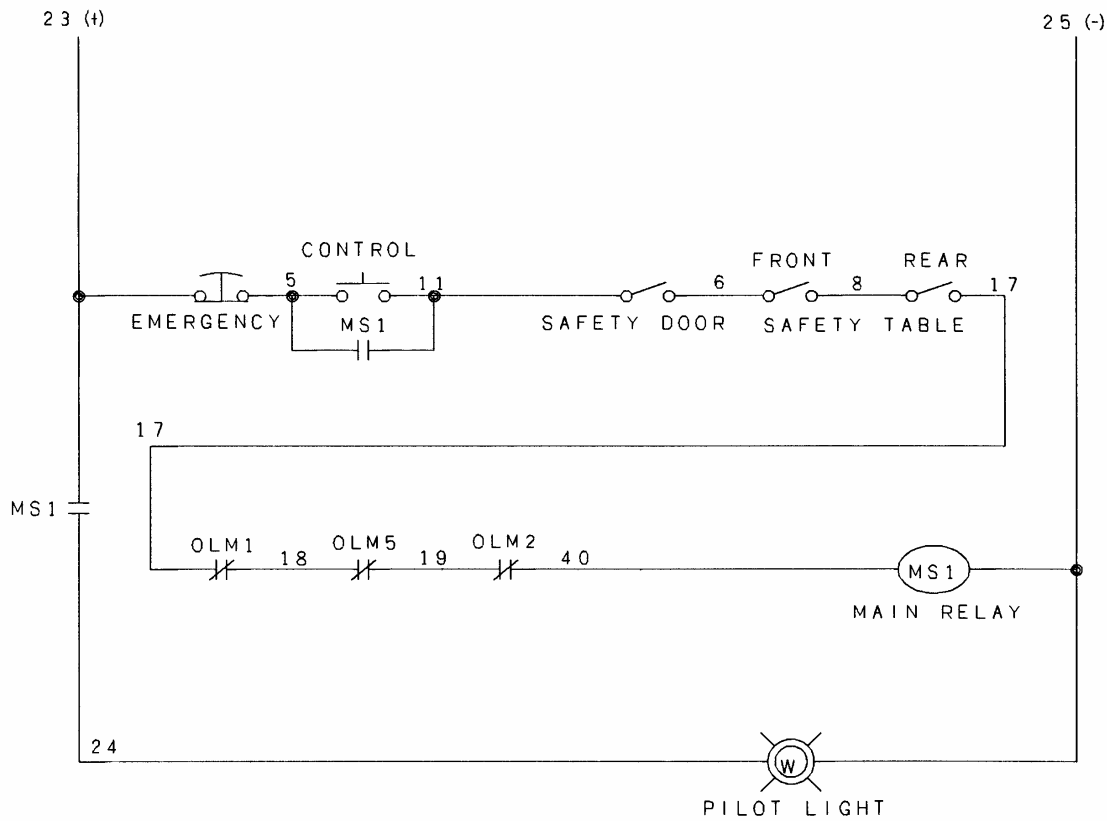
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<b>POWER (AC115V)</b>	<b>Model: GP44</b>	<b>POW-010</b>
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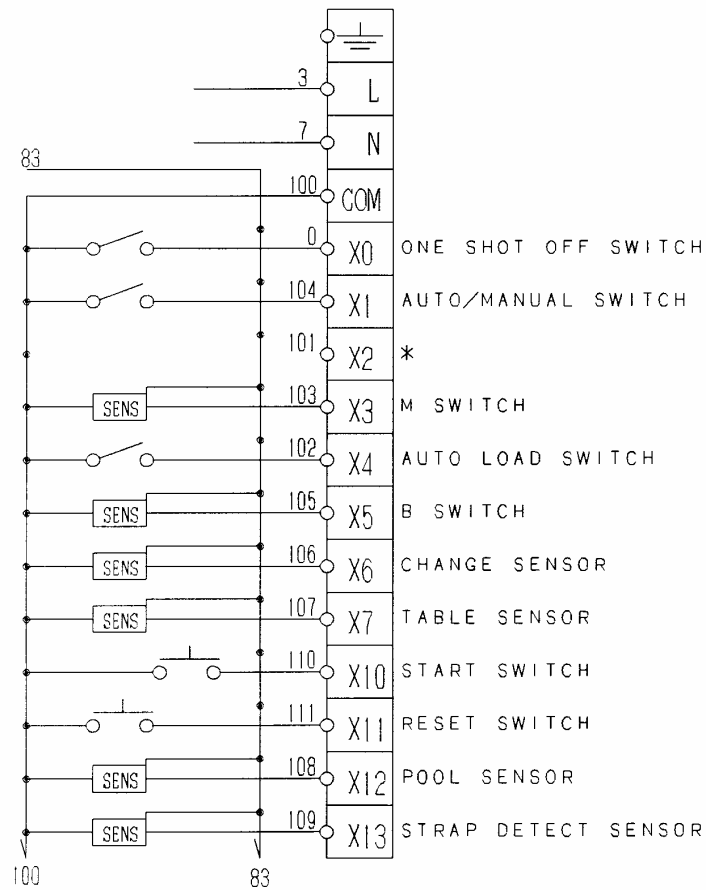


CONTROL	Model: GP44	CON-031
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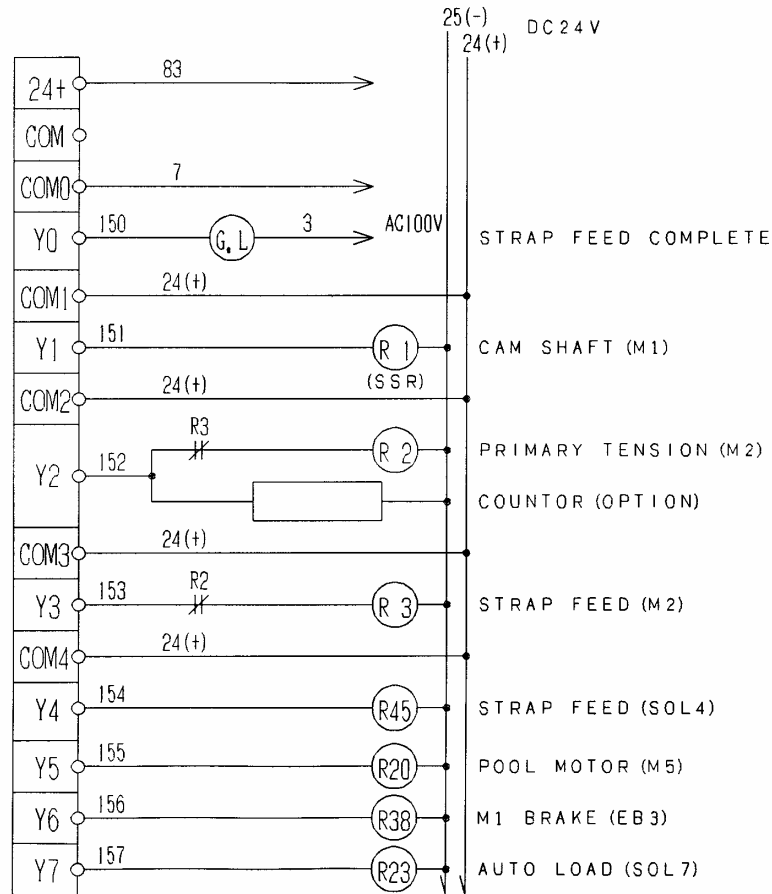
AC115V 60HZ  
ALL WIRES ARE AWG16.



PLC INPUTS FX1S-20MR



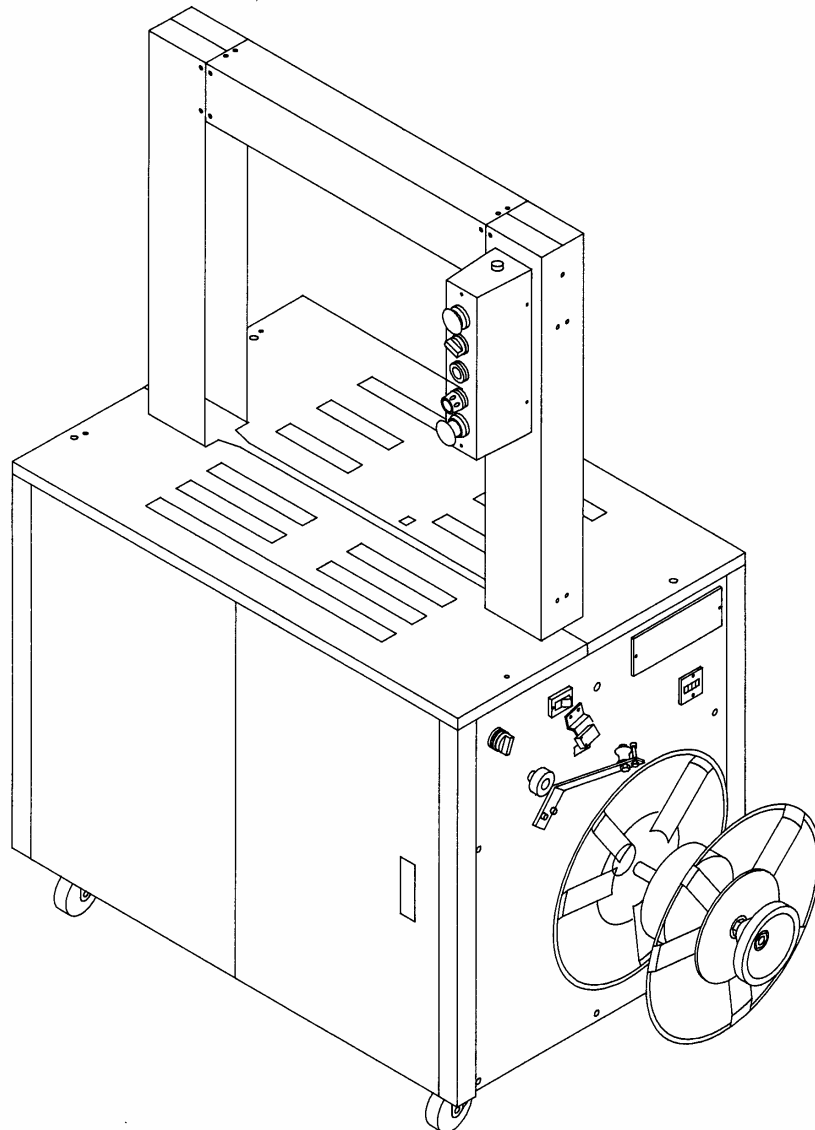
## PLC OUTPUTS FX1S-20MR



# GP44

## Automatic Strapping Machine

### Spare Parts Manual





REVISION HISTORY

<b>REVISION</b>	<b>DATE</b>	<b>DESCRIPTION</b>
-	4/12/2005	Original release

## SPARE PARTS CATALOGUE

### INTRODUCTION

**SCOPE** This spare parts catalogue has been prepared to allow the identification of the spare parts needed to carryout the routine and preventive maintenance of the STRAPPING MACHINE. The illustrations and tables contained are reserved technical information, and may not be reproduced either partially or in total without the written authorization of Polychem Corporation who are the exclusive owners of the information. Polychem Corporation reserves the right to make any modifications they deem necessary to the previously mentioned information. Maintenance personnel and operators are forbidden from disclosing the information contained in this catalogue and from using it for any purpose other than the identification of spare parts. It is suggested that this catalogue should be kept in good condition and in an easily accessible place, where it can be reached quickly in case of an emergency. Apply to Polychem Corporation for any further information.

**CAUTION** Use Polychem Corporation original spare parts only. Polychem Corporation declines all responsibility for machine malfunctions that may be caused by the use of non-original spare parts.

**VALIDITY** The contents of this catalogue apply to the GP44 machines.

**NOTE** As each machine may have been subjected to variations with respect to the standard configuration, any order for spare parts should include the following identification data:

Plant/Contract No. \_\_\_\_\_ Machine Serial No. \_\_\_\_\_  
End User \_\_\_\_\_ Denomination \_\_\_\_\_ Qty. \_\_\_\_\_  
P/N \_\_\_\_\_ Fig. \_\_\_\_\_ Pos. \_\_\_\_\_

**Pay particular attention to the notes included in the spare parts listing.**

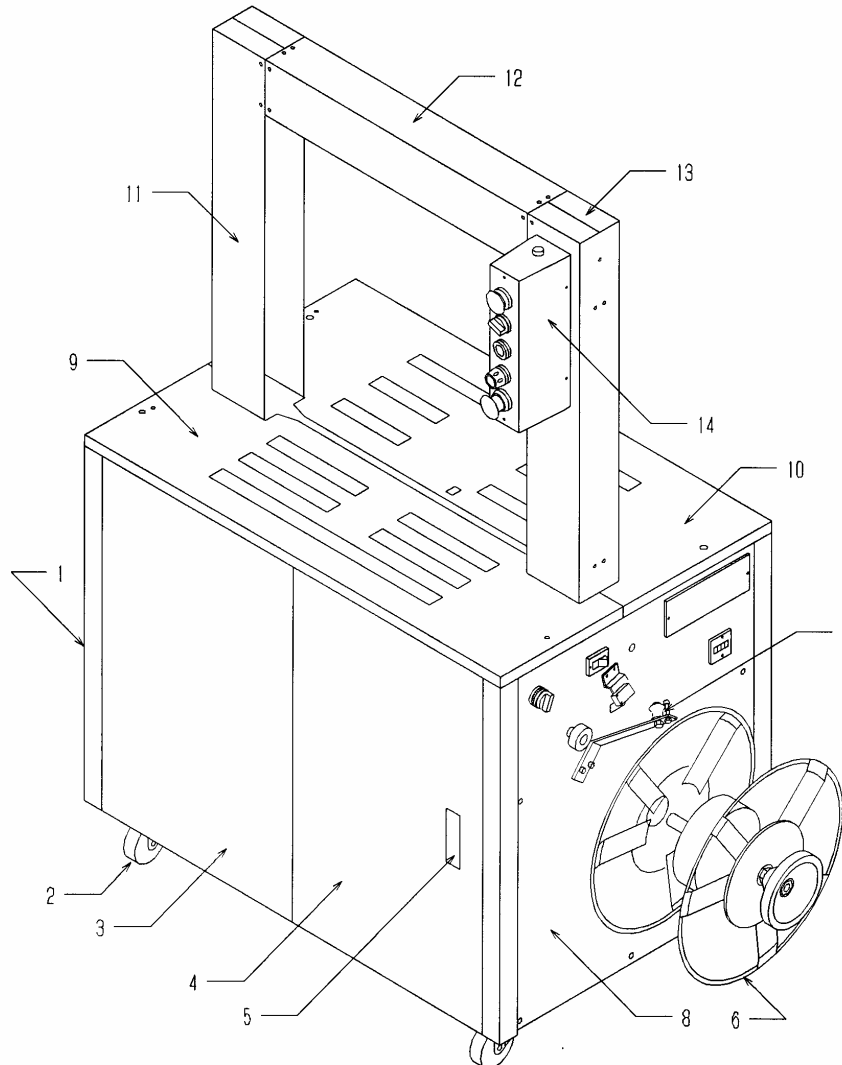
**FIGURES** The figures included in this catalogue are updated to the time of its edition. Following the technical or commercial updating to which the machine enclosed with this catalogue undergoes, some components might have an external shape different than the shape depicted, although operation and interchangeability of the parts are the same.

**UP-DATES** This catalogue is up-to-date on the issue date of its publication. For any further updates, modifications or copies apply to:

Polychem Corporation  
6277 Heisley Road  
Mentor, Ohio 44060

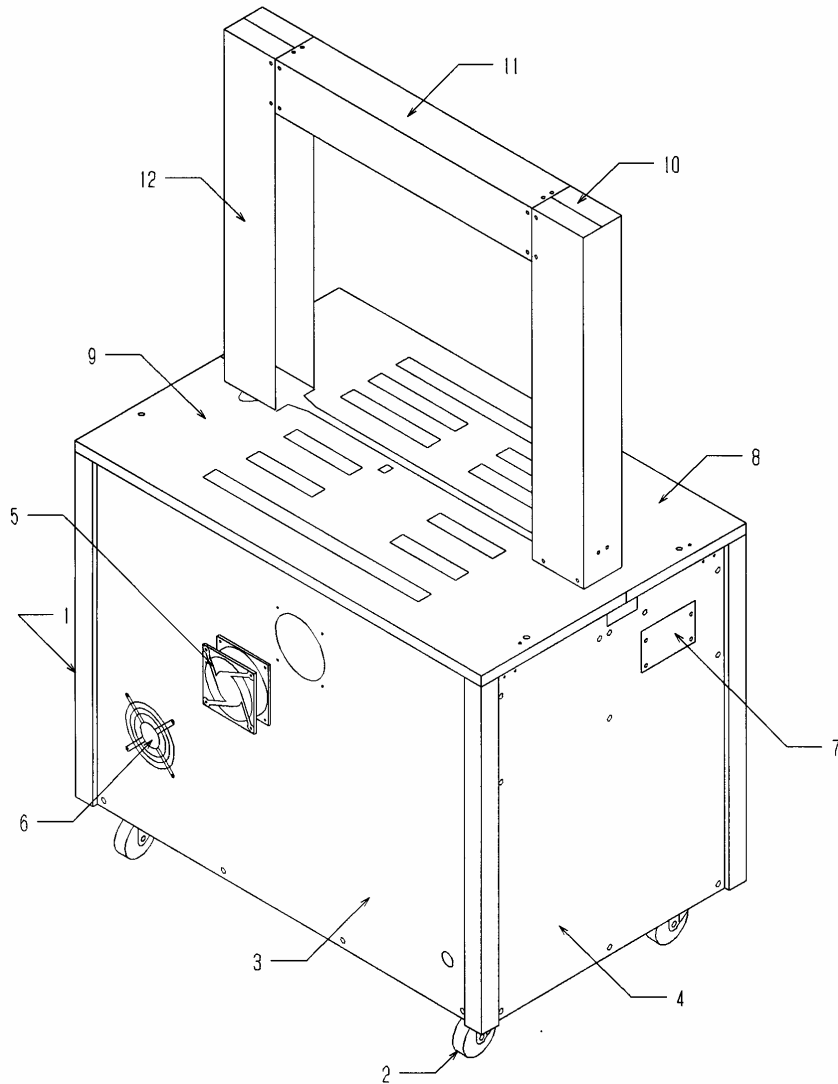
PART LIST	FRONT OF MACHINE	FIG. GP44-08
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Key	Part-No	Description	Key	Part-No	Description
1	A03039	Frame	12		See→ FIG. A-15-001
2	R04007	Caster With Brake (SG-75CS)	13		See→ FIG. A-15-001
3		See→ FIG. PANEL-14	14		See→ FIG. ELEC-017
4		See→ FIG. PANEL-14	15		
5		See→ FIG. PANEL-14	16		
6		See→ FIG. A-1-1 □ □	17		
7		See→ FIG. D-1P	18		
8		See→ FIG. RIGHT-02	19		
9		See→ FIG. A-19-002	20		
10		See→ FIG. A-19-002	21		
11		See→ FIG. A-15-001	22		



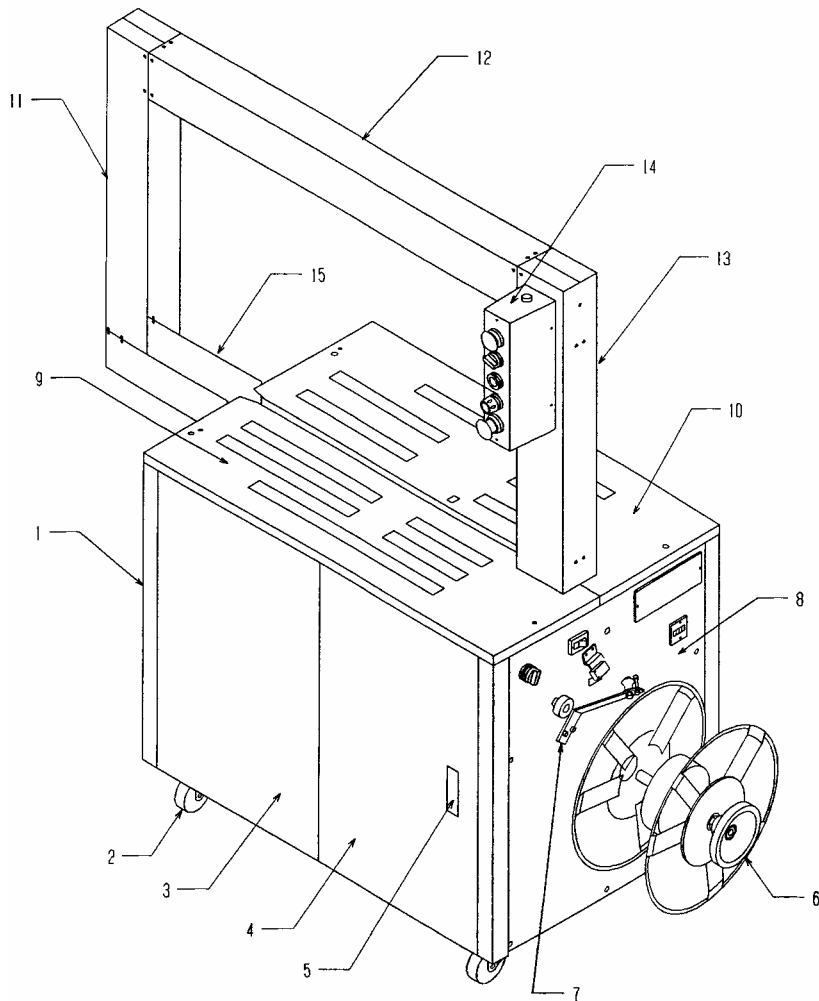
PART LIST	REAR OF MACHINE	FIG. GP44-09
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Key	Part-No	Description	Key	Part-No	Description
1	A03039	Frame	12		See→ FIG. A-15-001
2	R04003	Caster (SG-75C)	13		
3		See→ FIG. PANEL-14	14		
4		See→ FIG. PANEL-14	15		
5	E21049	Blower (109S005)	16		
6	E98011	Lower Cover	17		
7		See→ FIG. PANEL-14	18		
8		See→ FIG. A-19-002	19		
9		See→ FIG. A-19-002	20		
10		See→ FIG. A-15-001	21		
11		See→ FIG. A-15-001	22		



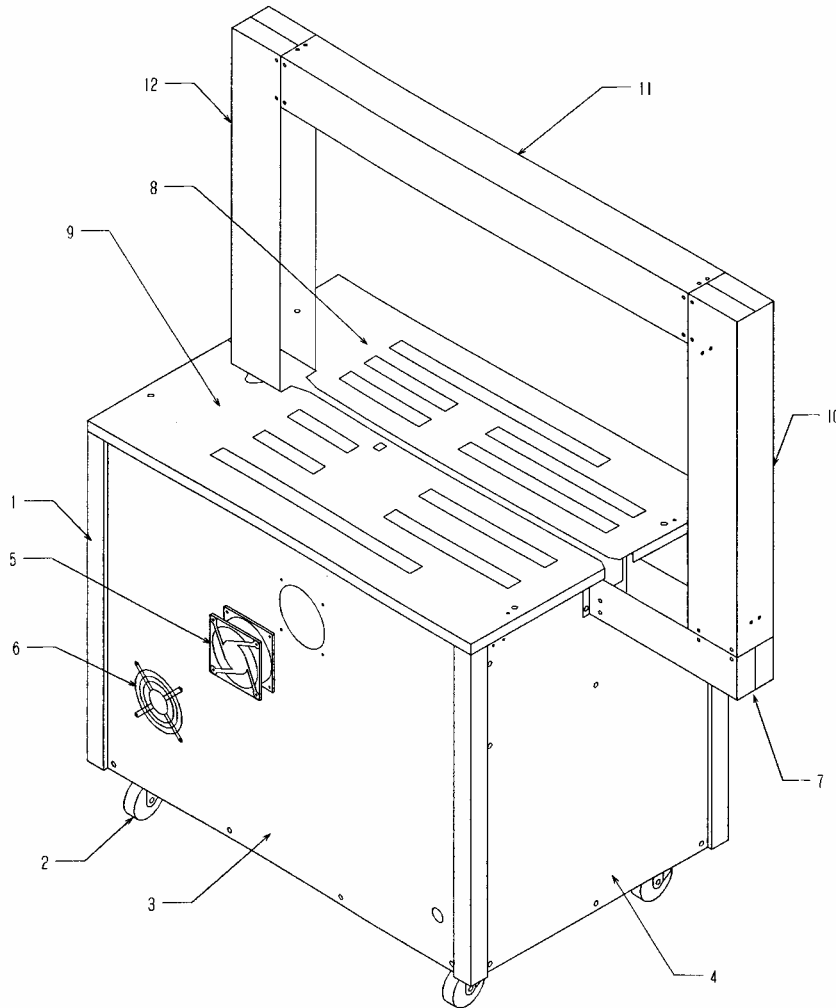
PART LIST	FRONT OF MACHINE	FIG. GP44-10
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Key	Part-No	Description	Key	Part-No	Description
1	A03039	Frame	12		See→ FIG. A-15-014
2	R04007	Caster With Brake (SG-75CS)	13		See→ FIG. A-15-014
3		See→ FIG. PANEL-14	14		See→ FIG. ELEC-017
4		See→ FIG. PANEL-14	15		
5		See→ FIG. PANEL-14	16		
6		See→ FIG. A-1-1□□	17		
7		See→ FIG. D-1P	18		
8		See→ FIG. RIGHT-02	19		
9		See→ FIG. A-19-003	20		
10		See→ FIG. A-19-003	21		
11		See→ FIG. A-15-014	22		



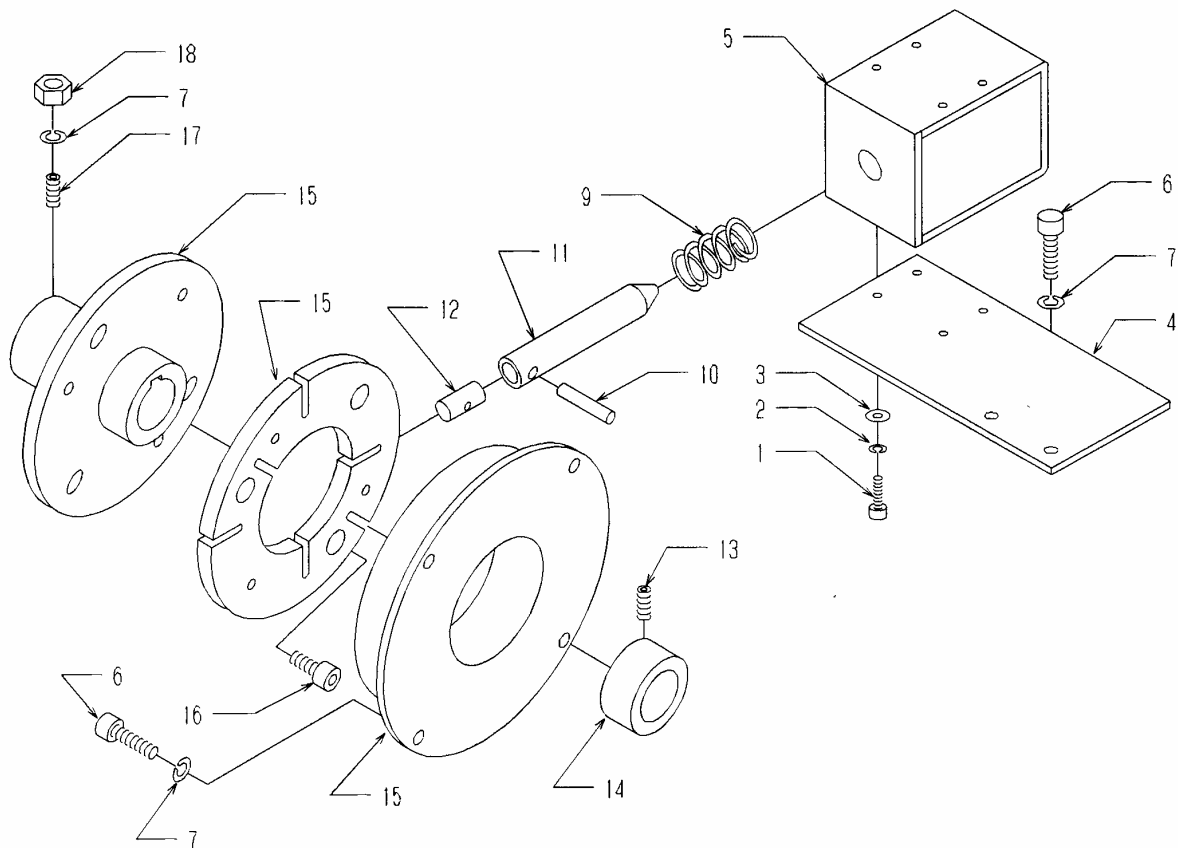
PART LIST	REAR OF MACHINE	FIG. GP44-11
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Key	Part-No	Description	Key	Part-No	Description
1	A03039	Frame	12		See→ FIG. A-15-014
2	R04003	Caster (SG-75C)	13		
3		See→ FIG. PANEL-14	14		
4		See→ FIG. PANEL-14	15		
5	E21049	Blower (109S005)	16		
6	E98011	Blower Cover	17		
7		See→ FIG. A-15-014	18		
8		See→ FIG. A-19-003	19		
9		See→ FIG. A-19-003	20		
10		See→ FIG. A-15-014	21		
11		See→ FIG. A-15-014	22		



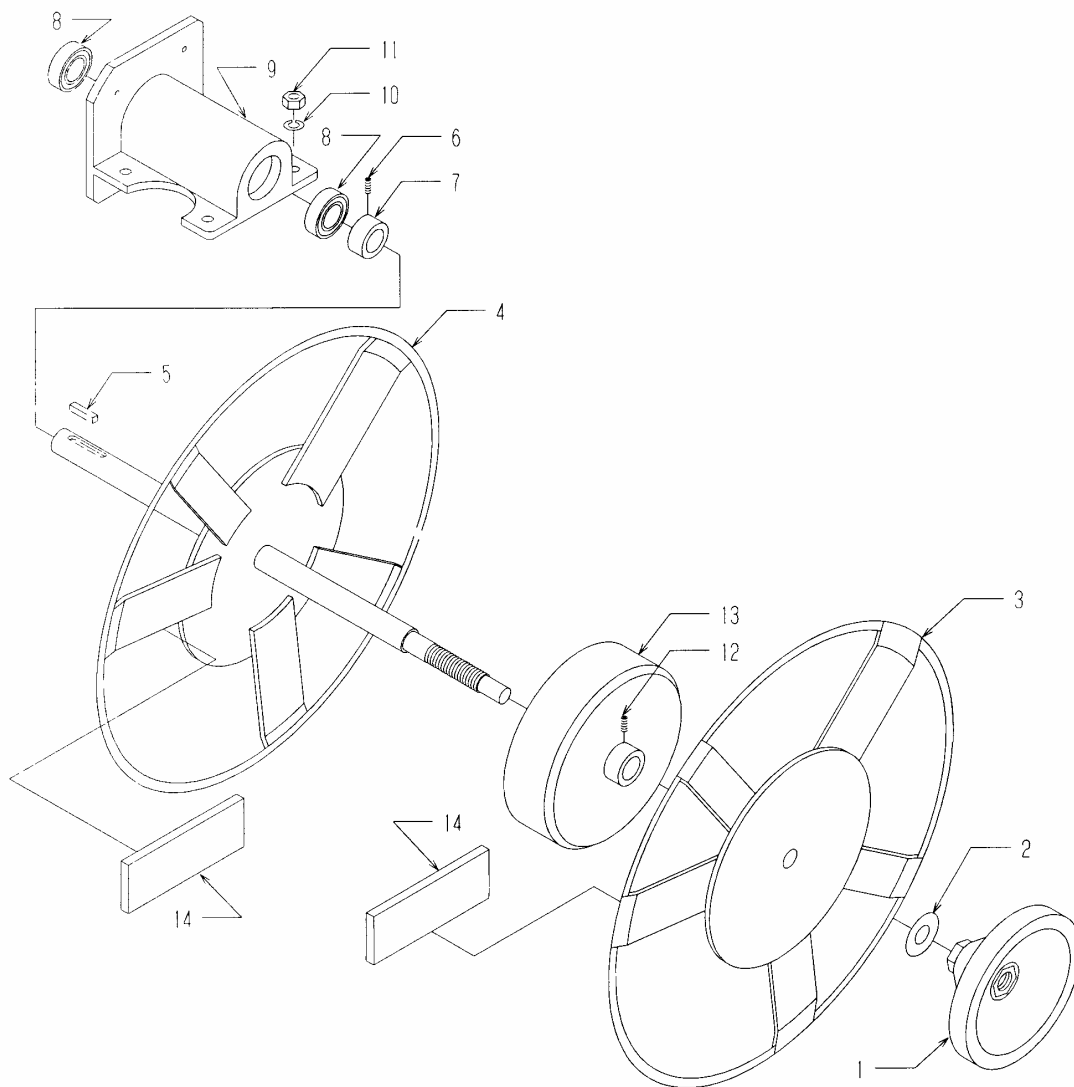
PART LIST	REEL BRAKE	FIG. A-1-002
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Key	Part-No	Description	Key	Part-No	Description
1	B04110	Cap Screw M4×10	12	N01014	Plunger Rubber
2	B27100	Spring Washer M4	13	B10306	Set Bolt M6×6
3	B26100	Flat Washer M4	14	L00008	Reel Shaft Collar
4	P03118	Reel Solenoid Base	15	E30054	Magnetic Brake TMB5H DC90
5	E30006	Solenoid MD191 DC100V	16	B99032	Cap Screw
6	B04315	Cap Screw M6×15	17	B10315	Set Bolt M6×15
7	B27300	Spring Washer M6	18	B17300	Nut M6
8			19		
9	S06010	Solenoid Spring	20		
10	B31125	Roll Pin $\Phi 4 \times 25$	21		
11	L12021	Brake Plunger	22		



PART LIST	REEL ASSY.	FIG. A-1-1P1
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Key	Part-No	Description	Key	Part-No	Description
1	N00033	Reel Shaft Nut 1	12	B10308	Set Bolt M6×8
2	N02000	Fiber Washer	13	A00234	Reel Support 8 inch
3	A00247	Reel Cover Front	13	A00248	Reel Support 9 inch
4	A00246	Reel Shaft	14	N01008	Rubber for Reel
5	M06006	Key 7×7×25			
6	B10306	Set Bolt M6×6			
7	L00008	Reel Shaft Collar			
8	T04029	Ball Bearing 6005LLU			
9	C00024	Reel Shaft Bearing Block			
10	B27500	Spring Washer M10			
11	B17500	Nut M10			



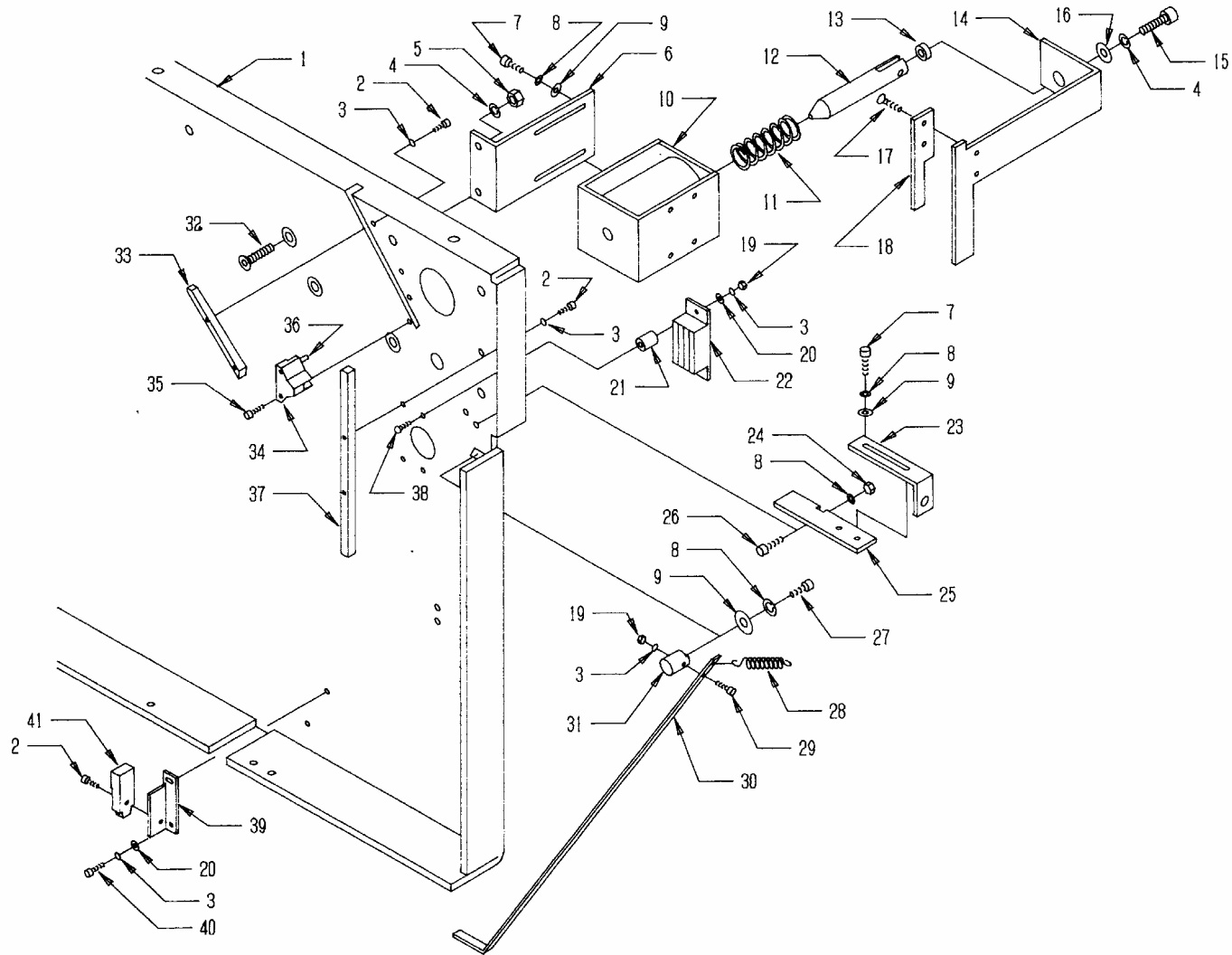


PART LIST	POOL BOX	FIG. A-7-2-H
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The different parts for strap size and the arch size.

Key	Part-No	Description	Key	Part-No	Description	Key	Part-No	Description
1	P30221	Pool Box	31	L24012	Pool Switch Supporting Metal	18	P03178	Stopper for Loading Guide (All size except 14mm strap)
2	B04008	Cap Screw M3×8	32	B06315	Flat Head Screw M6×15	18	P03357	Stopper for Loading Guide (14mm strap exclusive)
3	B27000	Spring Washer M3	33	M00070	Upper Guide			
4	B27300	Spring Washer M6	34	*	*	34	C03074	Strap Guide for 5mm
5	B17300	Nut M6	35	*	*	34	C03073	Strap Guide for 6mm
6	A00147	Solenoid Bracket	36	B31010	Roll Pin 3×10	34	C03072	Strap Guide for 7mm
7	B04110	Cap Screw M4×10	37	M00048	Vertical Guide	34	C03071	Strap Guide for 9.5mm
8	B27100	Spring Washer M4	38	B00020	Pan Head Screw M3×20	34	C03070	Strap Guide for 12mm
9	B26100	Flat Washer M4	39	P00115	Proximity Switch Base	34	C03132	Strap Guide for 14mm
10	E30006	Solenoid MD191 DC100V	40	B04010	Cap Screw M4×10	34	C03069	Strap Guide for 15mm
11	S06022	Spring for Plunger	41	E06025	Proximity Switch GL-12F			
12	L12073	Plunger for Solenoid MD191	42			35	B04020	Cap Screw M3×20 (5-6mm Strap)
13	L00055	Spacer	43			35	B04025	Cap Screw M3×25 (7-9.5mm Strap)
14	P00121	Loading Guide	44			35	B04030	Cap Screw M3×30 (12-15mm Strap)
15	B04330	Cap Screw M6×30	45					
16	B26300	Flat Washer M6	46					
17	B06106	Flat Head Screw M4×6	47					
18	*	*	48					
19	B17000	Nut M3	49					
20	B26000	Flat Washer M3	50					
21	L00012	Spacer for Magnet	51					
22	R00000	Magnet for Pool Box	52					
23	P00085	Pooling Adjuster Base	53					
24	B17100	Nut M4	54					
25	P00144	Pooling Adjuster Bracket	55					
26	B04112	Cap Screw M4×12	56					
27	B04106	Cap Screw M4×6	57					
28	S03059	Spring for Pool Box	58					
29	B04018	Cap Screw M3×18	59					
30	A00352	Detect lever	60					Drawing FIG. A-7-2-D

PART LIST	POOL BOX	FIG. A-7-2-D
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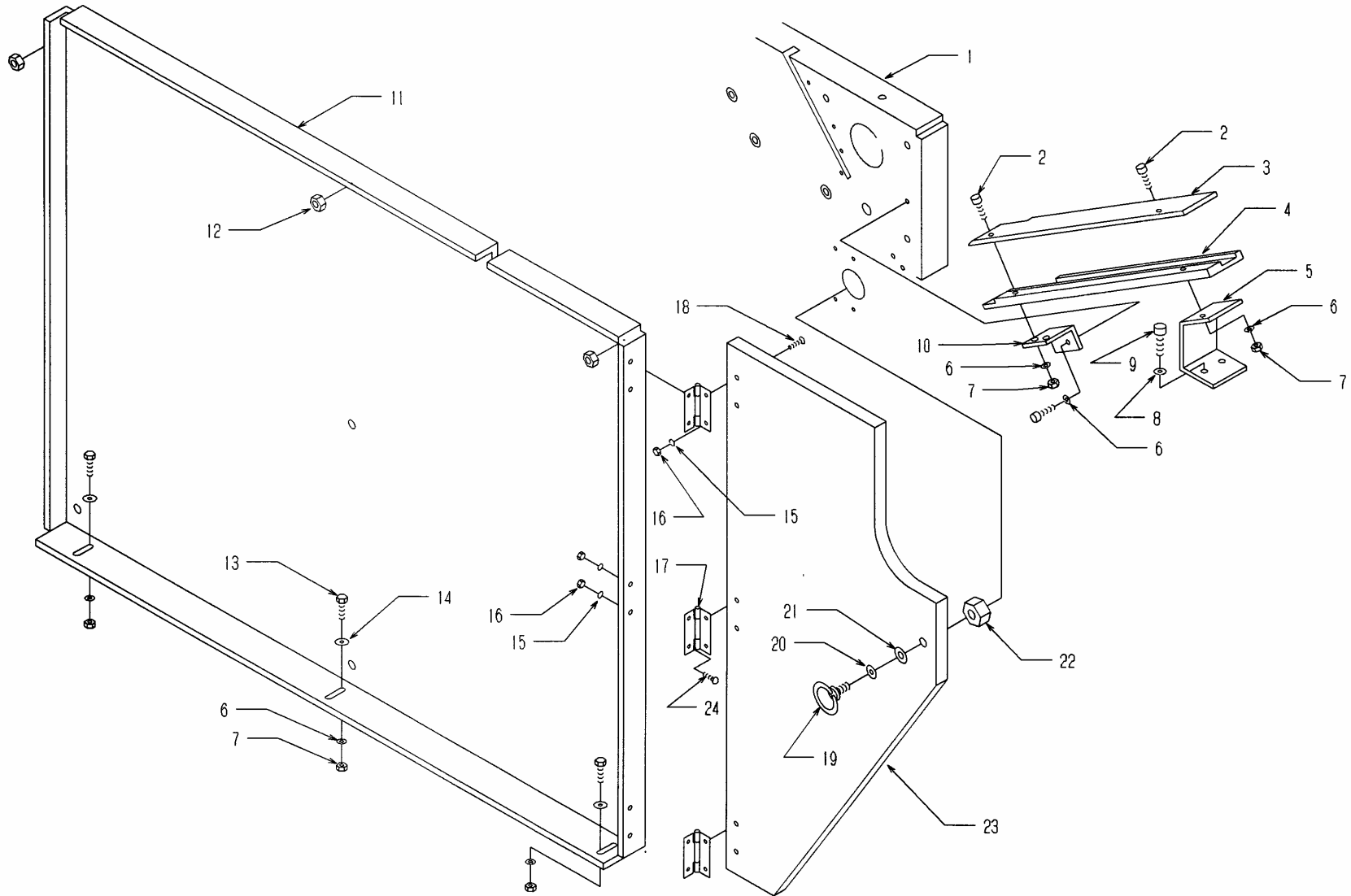
PART LIST	POOL BOX	FIG. A-7-3-H
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Key	Part-No	Description	Key	Part-No	Description	Key	Part-No	Description
1	P30221	Pool Box	31			4	M09090	Rail 5mm Strap
2	B04120	Cap Screw M4×20	32			4	M09328	Rail 6mm Strap
3	M09100	Rail Cover	33			4	M09329	Rail 7mm Strap
4	□	□	34			4	M09330	Rail 9.5mm Strap
5	P06056	Rail Bracket	35			4	M09331	Rail 12mm Strap
6	B27100	Spring Washer M4	36			4	M09336	Rail 14mm Strap
7	B17100	Nut M4	37			4	M09332	Rail 15mm Strap
8	B27200	Spring Washer M5	38					
9	B04210	Cap Screw M5×10	39			22	L21029	Knob Nut 5mm Strap
10	NEWS-409	Left Bracket for Rail	40			22	L21030	Knob Nut 6mm Strap
11	P30222	Pool Box Cover	41			22	L21031	Knob Nut 7mm Strap
12	B17300	Nut M6	42			22	L21032	Knob Nut 8mm Strap
13	B08110	Hexagon Bolt M4×10	43			22	L21033	Knob Nut 9.5mm Strap
14	B26100	Flat Washer M4	44			22	L21034	Knob Nut 12mm Strap
15	B27000	Spring Washer M3	45			22	L21054	Knob Nut 14mm Strap
16	B17000	Nut M3	46			22	L21035	Knob Nut 15mm Strap
17	P39001	Hinge	47					
18	B02010	Flat Head Bolt M3×10	48					
19	B12315	Eye Bolt M6×15	49					
20	B27300	Spring Washer M6	50					
21	B26300	Flat Washer M6	51					
22	□	□	52					
23	N00037	Pool Door	53					
24	B00008	Pan Head Screw M3×8	54					
25			55					
26			56					
27			57					
28			58					
29			59					
30			60					Drawing FIG. A-7-3-D

PART LIST

POOL BOX

FIG. A-7-3-D

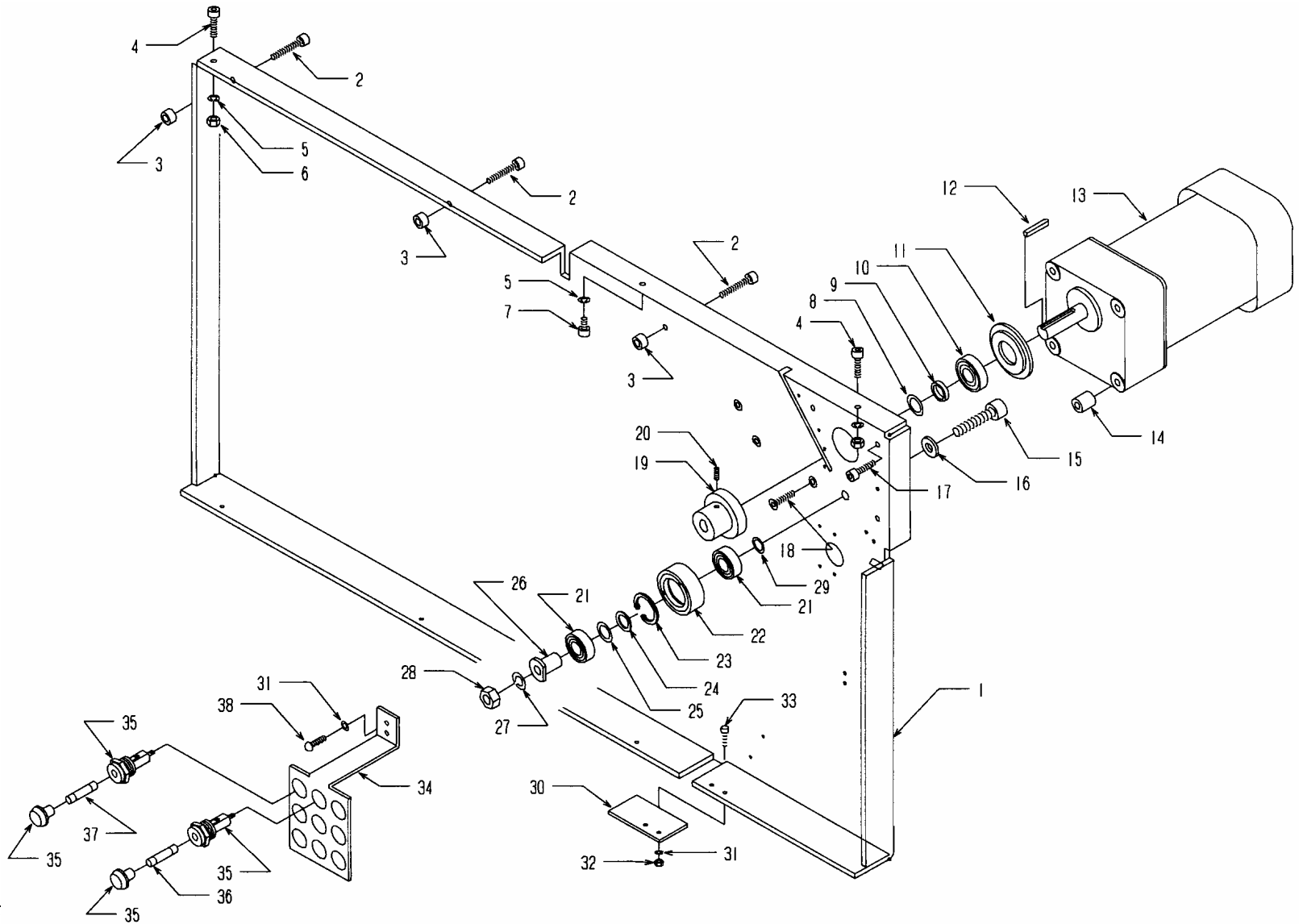


PART LIST	POOL BOX	FIG. A-7-64-H
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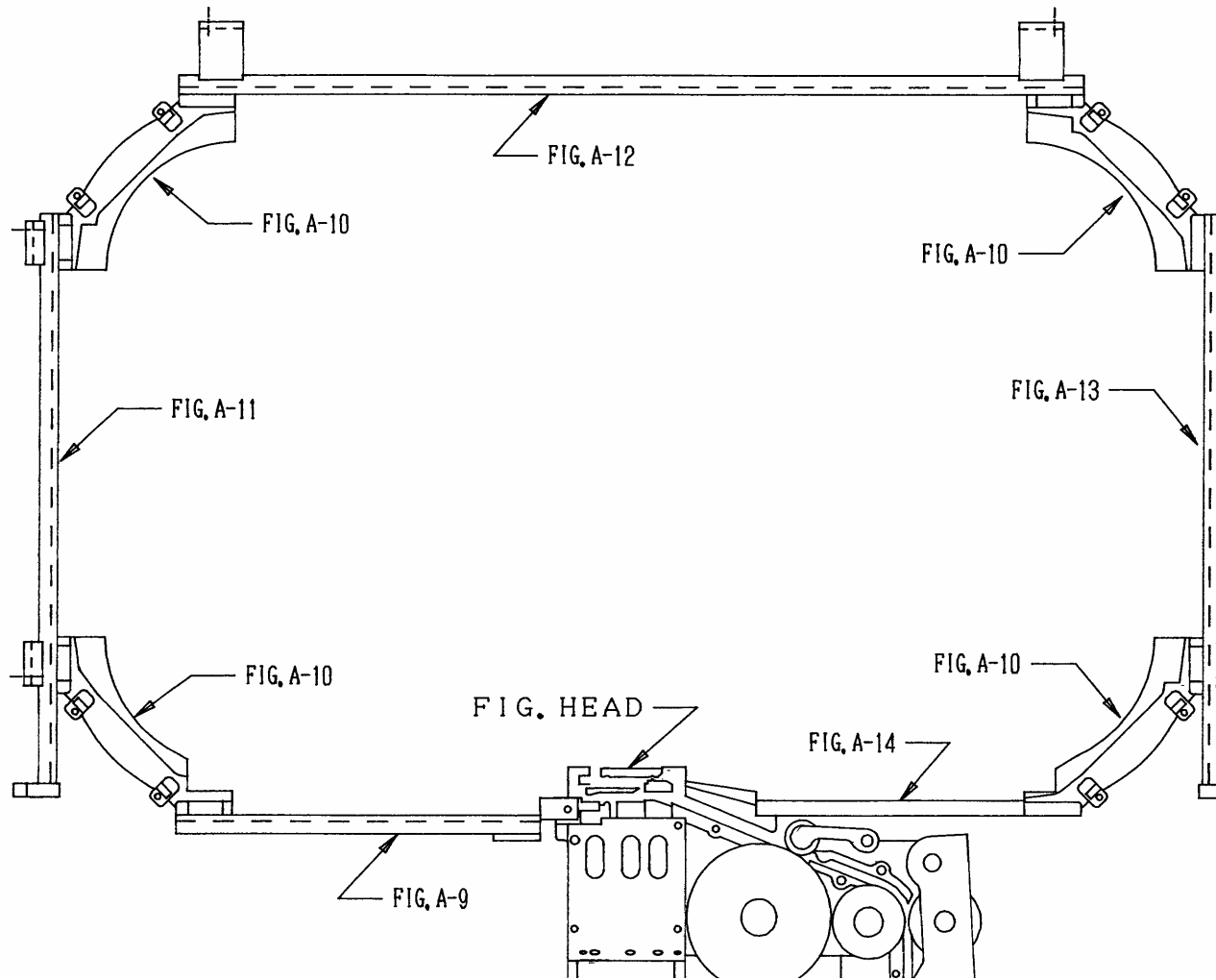
The different parts for strap size and the arch size.

Key	Part-No	Description	Key	Part-No	Description	Key	Part-No	Description
1	P30221	Pool Box	31	B27100	Spring Washer M4	3	L00044	Spacer 5mm Strap
2	B04330	Cap Screw M6×30	32	B17100	Nut M4	3	L00045	Spacer 6mm Strap
3	*	*	33	B04112	Cap Screw M4×12	3	L00035	Spacer 7mm Strap
4	B04320	Cap Screw M6×20	34	NEWS-251	Circuit Protector Base	3	L00046	Spacer 8mm Strap
5	B27300	Spring Washer M6	35	E09034	Fuse Holder F-120B	3	L00047	Spacer 9.5mm Strap
6	B17300	Nut M6	36	E09071	Fuse MDA-10	3	L00048	Spacer 12mm Strap
7	B04315	Cap Screw M6×15	37	E09048	Fuse MF65-ACD10A	3	L00104	Spacer 14mm Strap
8	P18060	Shim	38	B00110	Pan Head Screw M4×10	3	L00049	Spacer 15mm Strap
9	L00053	Collar	39					
10	T04043	Ball Bearing 6001LLU	40					
11	P33015	Bearing Stopper	41					
12	M06010	Key 5×5×25	42					
13	E21035	M5 Motor (Strap Loading) 2ph 80W	43					
14	L00051	Collar	44					
15	B05540	Cap Screw M10×40	45					
16	B26500	Flat Washer M10	46					
17	B04330	Cap Screw M6×30	47					
18	B06330	Flat Head Screw M6×30	48					
19	L03051	Chamber Feed Roller	49					
20	B10208	Set Bolt M5×8	50					
21	T04031	Ball Bearing 6002LLU	51					
22	N01065	Rubber Roller	52					
23	B30032	C Ring R-32	53					
24	P18057	Shim	54					
25	P18058	Shim	55					
26	L00040	Rubber Roller Collar	56					
27	B27500	Spring Washer M10	57					
28	B17500	Nut M10	58					
29	P18061	Shim	59					
30	P03177	Detect Lever Guide	60					Drawing FIG. A-7-64-D

PART LIST	POOL BOX	FIG. A-7-64-D
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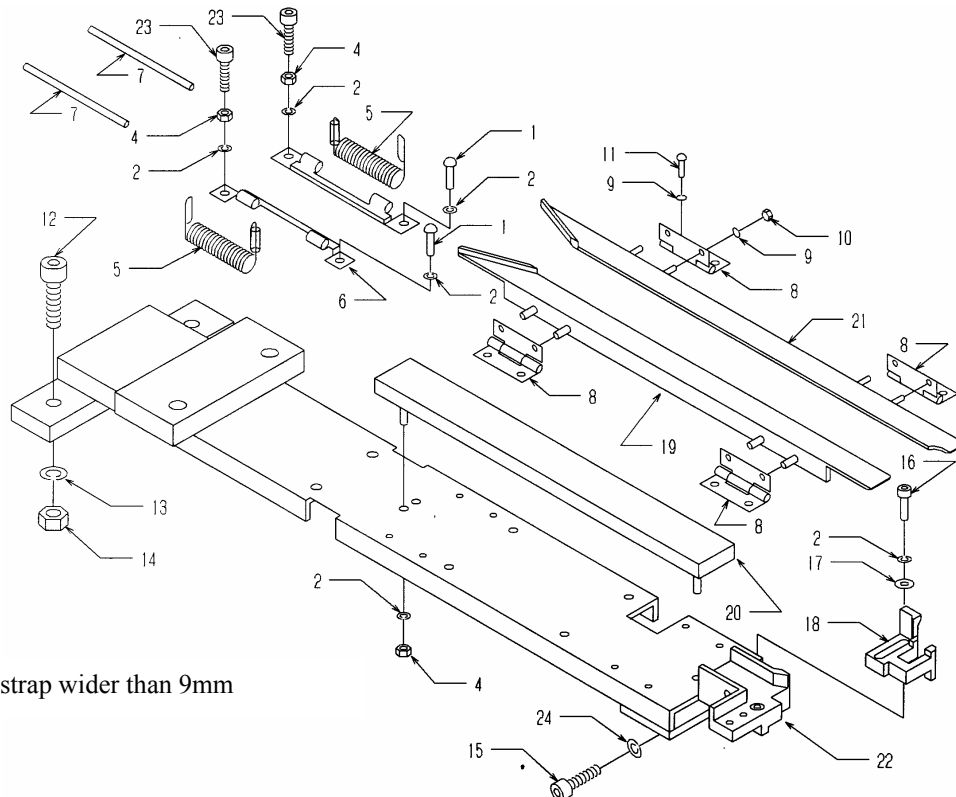


PART



PART LIST	ARCH A	FIG. A-9P-1
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Key	Part-No	Description	Key	Part-No	Description
1	B00108	Pan Head Screw M4×8	19	M09269	Arch Front Hinge 600A
2	B27100	Spring Washer M4	19	M09270	Arch Front Hinge 800A
3			19	M09271	Arch Front Hinge 1000A
4	B17100	Nut M4	19	M09272	Arch Front Hinge 1200A
5	A00299	Spring	19	M09273	Arch Front Hinge 1400A
6	P15059	Spring Base	19	M09274	Arch Front Hinge 1600A
7	L12023	Spring Pin	20	M09252	Arch Rail 600A
8	P39001	Hinge 2	20	M09253	Arch Rail 800A
9	B27000	Spring Washer M3	20	M09254	Arch Rail 1000A
10	B17000	Nut M3	20	M09255	Arch Rail 1200A
11	B00006	Pan Head Screw M3×6	20	M09256	Arch Rail 1400A
12	B04425	Cap Screw M8×25	20	M09257	Arch Rail 1600A
13	B27400	Spring Washer M8	21	M09289	Arch Rear Hinge 600A
14	B17400	Nut M8	21	M09290	Arch Rear Hinge 800A
15	B04335	Cap Screw M6×35	21	M09291	Arch Rear Hinge 1000A
16	B04115	Cap Screw M4×15	21	M09292	Arch Rear Hinge 1200A
17	B33100	Flat Washer M4	21	M09299	Arch Rear Hinge 1400A
18	C03052	Left Guide	21	M09300	Arch Rear Hinge 1600A
19	*	*	22	A00225	Arch Rail Base 600A
20	*	*	22	A00227	Arch Rail Base 800A
21	*	*	22	A00251	Arch Rail Base 1000A
22	*	*	22	A00492	Arch Rail Base 1200A
23	B04110	Cap Screw M4×10	22	A00493	Arch Rail Base 1400A
24	B27300	Spring Washer M6	22	A00494	Arch Rail Base 1600A



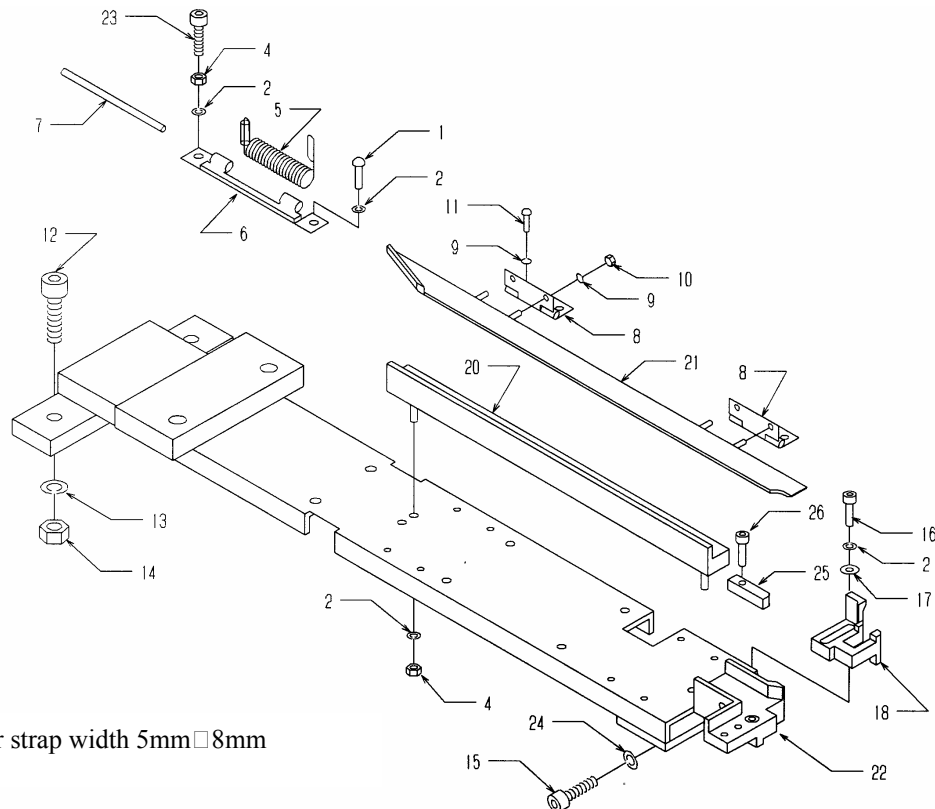
Parts used for strap wider than 9mm



PART LIST	ARCH A	FIG. A-9P-2
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The different parts for strap width or the arch size.

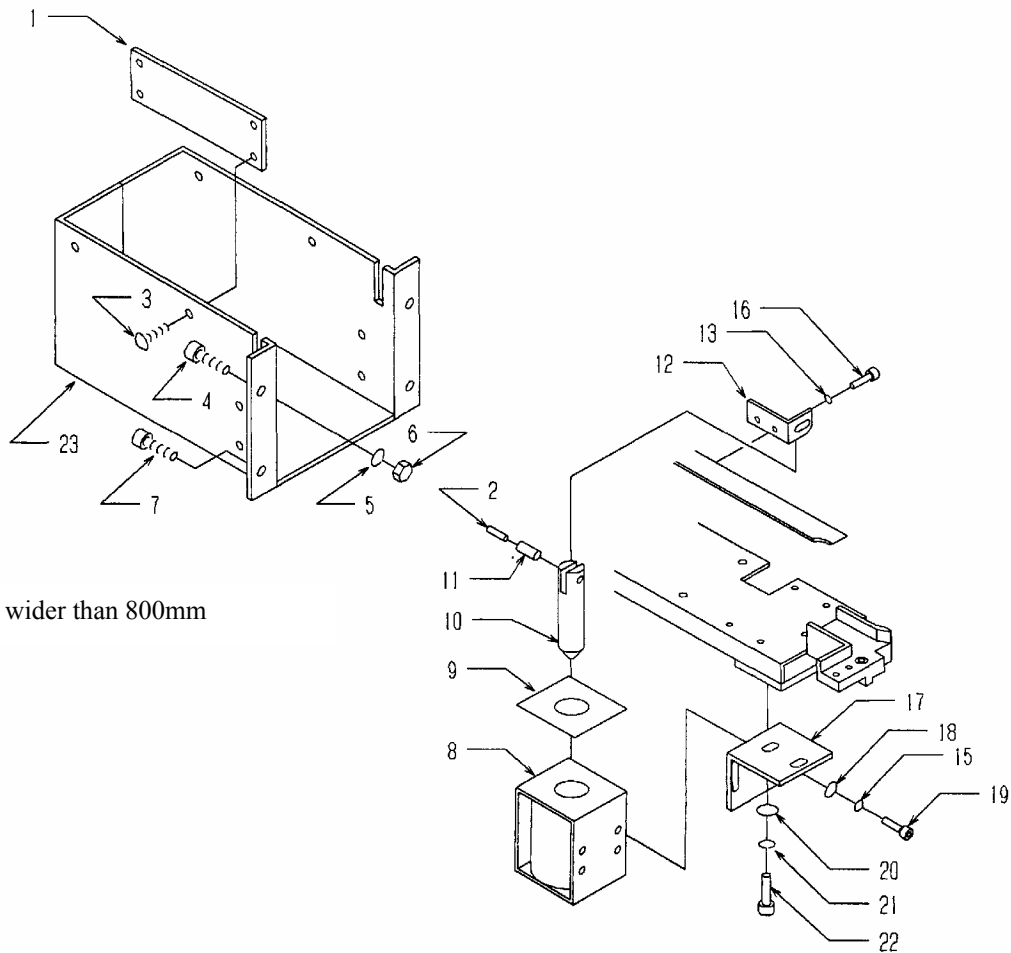
Key	Part-No	Description	Key	Part-No	Description
1	B00108	Pan Head Screw M4×8	25	M00226	Arch A Entrance Metal
2	B27100	Spring Washer M4	26	B04112	Cap Screw M4×12
3					
4	B17100	Nut M4			
5	A00299	Spring			
6	P15059	Spring Base			
7	L12023	Spring Pin	20	M09173	Arch Rail 600A
8	P39001	Hinge 2	20	M09174	Arch Rail 800A
9	B27000	Spring Washer M3	20	M09175	Arch Rail 1000A
10	B17000	Nut M3	20	M09178	Arch Rail 1200A
11	B00006	Pan Head Screw M3×6	20	M09250	Arch Rail 1400A
12	B04425	Cap Screw M8×25	20	M09251	Arch Rail 1600A
13	B27400	Spring Washer M8	21	M09289	Arch Rear Hinge 600A
14	B17400	Nut M8	21	M09290	Arch Rear Hinge 800A
15	B04335	Cap Screw M6×35	21	M09291	Arch Rear Hinge 1000A
16	B04115	Cap Screw M4×15	21	M09292	Arch Rear Hinge 1200A
17	B33100	Flat Washer M4	21	M09299	Arch Rear Hinge 1400A
18	C03052	Left Guide	21	M09300	Arch Rear Hinge 1600A
19			22	A00225	Arch Rail Base 600A
20	*	*	22	A00227	Arch Rail Base 800A
21	*	*	22	A00251	Arch Rail Base 1000A
22	*	*	22	A00492	Arch Rail Base 1200A
23	B04110	Cap Screw M4×10	22	A00493	Arch Rail Base 1400A
24	B27300	Spring Washer M6	22	A00494	Arch Rail Base 1600A



Parts used for strap width 5mm □ 8mm

PART LIST	ARCH A	FIG. A-9-017
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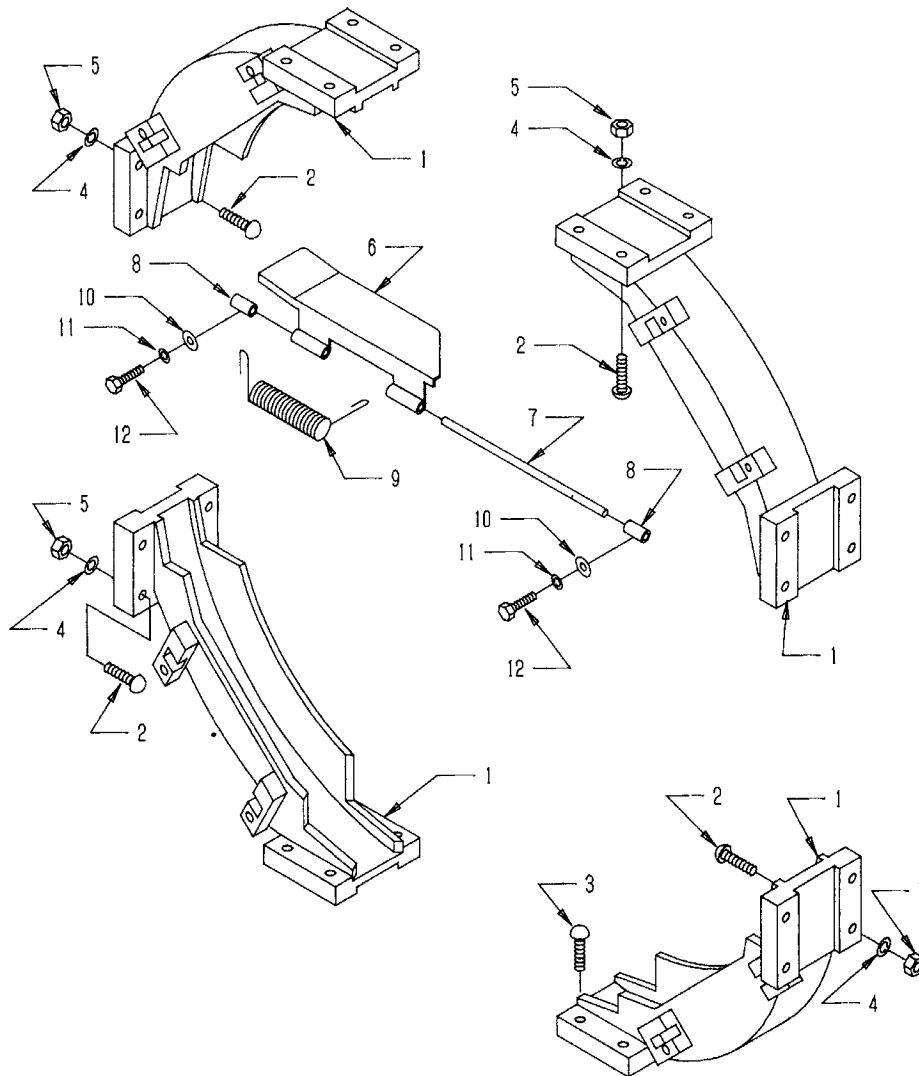
Key	Part-No	Description	Key	Part-No	Description
1	P03189	Arch Plate	16	B04006	Cap Screw M3×6
2	B99029	Roll Pin 3×12	17	P00111	Arch Solenoid Base A
3	B07208	Pan Head Screw M5×8	18	B26100	Flat Washer M4
4	B04315	Cap Screw M6×15	19	B04110	Cap Screw M4×10
5	B27300	Spring Washer M6	20	B26200	Flat Washer M5
6	B17300	Nut M6	21	B27200	Spring Washer M5
7	B04310	Cap Screw M6×10	22	B04215	Cap Screw M5×15
8	E30008	Solenoid MD181 DC48V			
9	N01050	Solenoid Packing	23	P30238	Arch Cover 800A
10	L12081	Solenoid Plunger	23	P30257	Arch Cover 1000A
11	B31212	Roll Pin $\Phi 5 \times 12$			
12	P00103	Hinge Release Metal			
13	B27000	Spring Washer M3			
14					
15	B27100	Spring Washer M4			



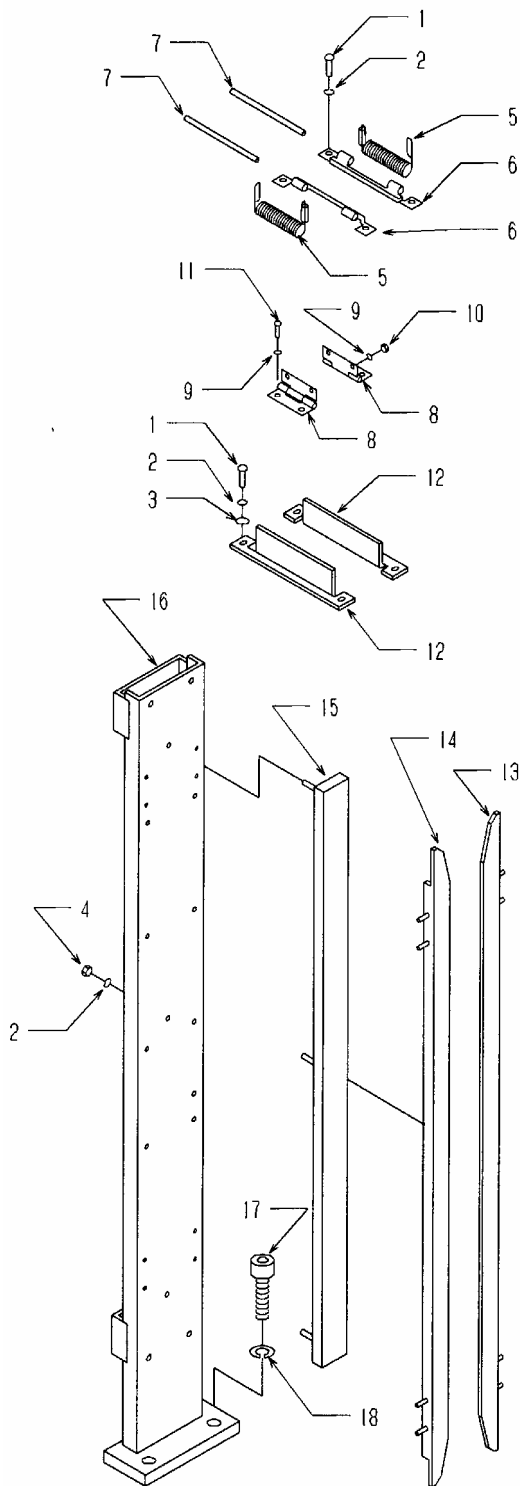
Parts used for arch wider than 800mm

PART LIST	ARCH CORNER	FIG. A-10P
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Key	Part-No	Description	Key	Part-No	Description
1	C12026	Arch Corner 15	12	B08108	Hexagonal Bolt M4×8
2	B00225	Pan Head Screw M5×25	13		
3	B00218	Pan Head Screw M5×18	14		
4	B27200	Spring Washer M5	15		
5	B17200	Nut M5	16		
6	P39008	Arch Corner Hinge	17		
7	L12019	Hinge Support Pin	18		
8	B31210	Roll Pin 5×10	19		
9	S00008	Arch Corner Spring	20		
10	P18042	Flat Washer	21		
11	B27100	Spring Washer M4	22		



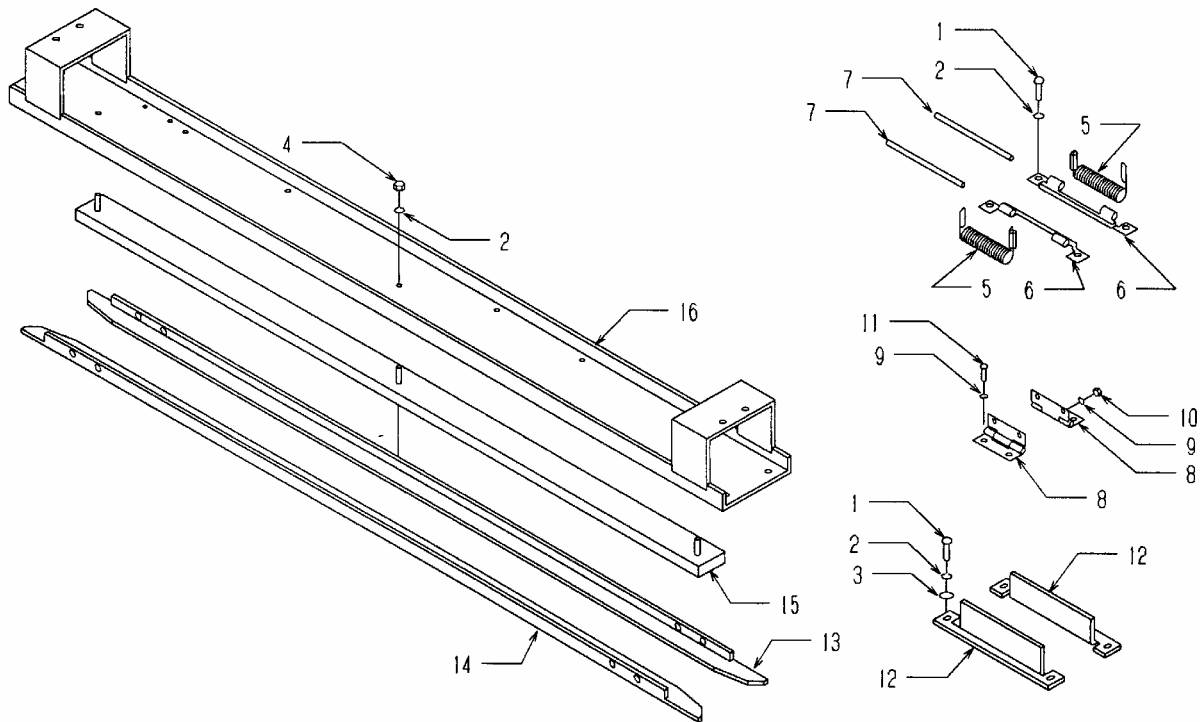
PART LIST	ARCH B	FIG. A-11P
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Key	Part-No	Description
1	B00108	Pan Head Screw M4×8
2	B27100	Spring Washer M4
3	B26100	Flat Washer M4
4	B17100	Nut M4
5	A00299	Spring
6	P15059	Spring Base
7	L12023	Spring Pin
8	P39001	Hinge 2
9	B27000	Spring Washer M3
10	B17000	Nut M3
11	B00006	Pan Head Screw M3×6
12	P00077	Stopper for Arch Hinge
*	*	*
*	*	*
*	*	*
*	*	*
17	B04520	Cap Screw M10×20
18	B27500	Spring Washer M10
*	*	*
*	*	*
*	*	*
*	*	*
13	M09306	Arch Rear Hinge 400BD
13	M09327	Arch Rear Hinge 500BD
13	M09307	Arch Rear Hinge 600BD
13	M09308	Arch Rear Hinge 800BD
13	M09309	Arch Rear Hinge 1000BD
13	M09310	Arch Rear Hinge 1200BD
*		
14	M09301	Arch Front Hinge 400BD
14	M09326	Arch Front Hinge 500BD
14	M09302	Arch Front Hinge 600BD
14	M09303	Arch Front Hinge 800BD
14	M09304	Arch Front Hinge 1000BD
14	M09305	Arch Front Hinge 1200BD
*	*	*
15	M09258	Arch Rail 400BD
15	M09325	Arch Rail 500BD
15	M09259	Arch Rail 600BD
15	M09260	Arch Rail 800BD
15	M09261	Arch Rail 1000BD
15	M09262	Arch Rail 1200BD
*	*	*
16	A00224	Arch Rail Base 400B
16	A00276	Arch Rail Base 500B
16	A00185	Arch Rail Base 600B
16	A00255	Arch Rail Base 800B
16	A00256	Arch Rail Base 1000B
16	A00257	Arch Rail Base 1200B

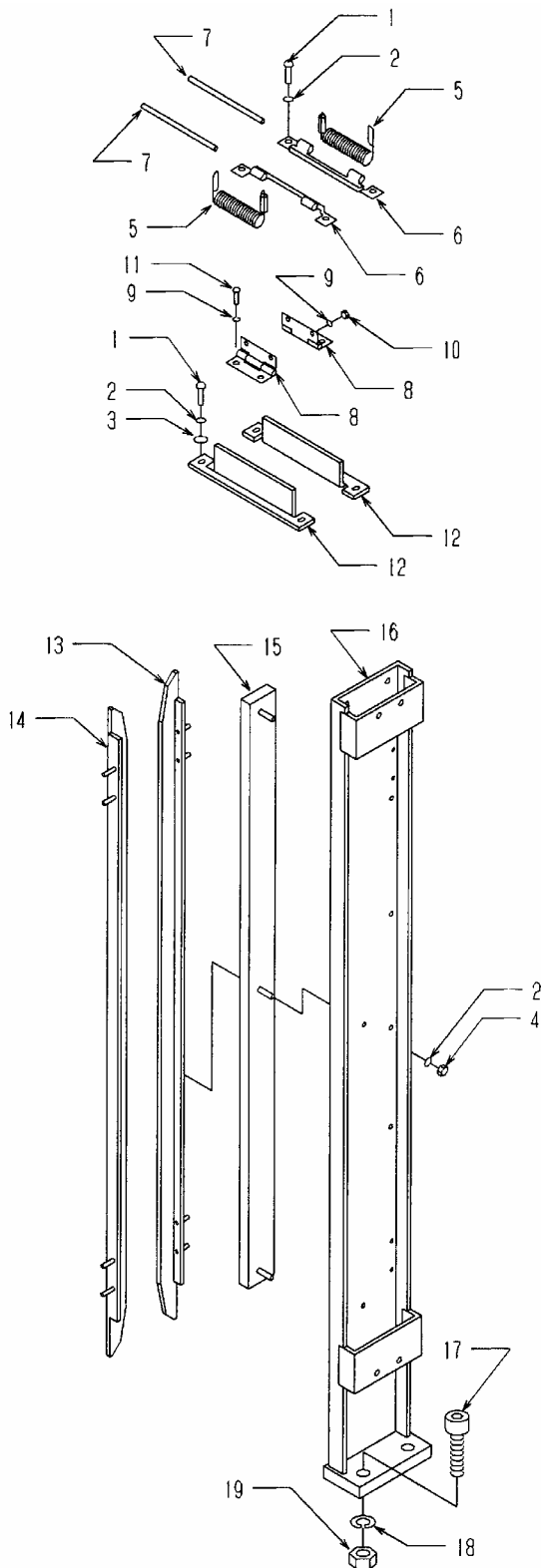
PART LIST	ARCH C	FIG. A-12P
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Key	Part-No	Description	Key	Part-No	Description
1	B00108	Pan Head Screw M4×8	14	M09311	Arch Front Hinge 600C
2	B27100	Spring Washer M4	14	M09312	Arch Front Hinge 800C
3	B26100	Flat Washer M4	14	M09313	Arch Front Hinge 1000C
4	B17100	Nut M4	14	M09314	Arch Front Hinge 1200C
5	A00299	Spring	14	M09315	Arch Front Hinge 1400C
6	P15059	Spring Base	14	M09316	Arch Front Hinge 1600C
7	L12023	Spring Pin			
8	P39001	Hinge 2	15	M09263	Arch Rail 600C
9	B27000	Spring Washer M3	15	M09264	Arch Rail 800C
10	B17000	Nut M3	15	M09265	Arch Rail 1000C
11	B00006	Pan Head Screw M3×6	15	M09266	Arch Rail 1200C
12	P00077	Stopper for Arch Hinge	15	M09267	Arch Rail 1400C
			15	M09268	Arch Rail 1600C
13	M09317	Arch Rear Hinge 600C			
13	M09318	Arch Rear Hinge 800C	16	A00151	Arch Rail Base 600C
13	M09319	Arch Rear Hinge 1000C	16	A00155	Arch Rail Base 800C
13	M09320	Arch Rear Hinge 1200C	16	A00159	Arch Rail Base 1000C
13	M09321	Arch Rear Hinge 1400C	16	A00163	Arch Rail Base 1200C
13	M09322	Arch Rear Hinge 1600C	16	A00259	Arch Rail Base 1400C
			16	A00260	Arch Rail Base 1600C





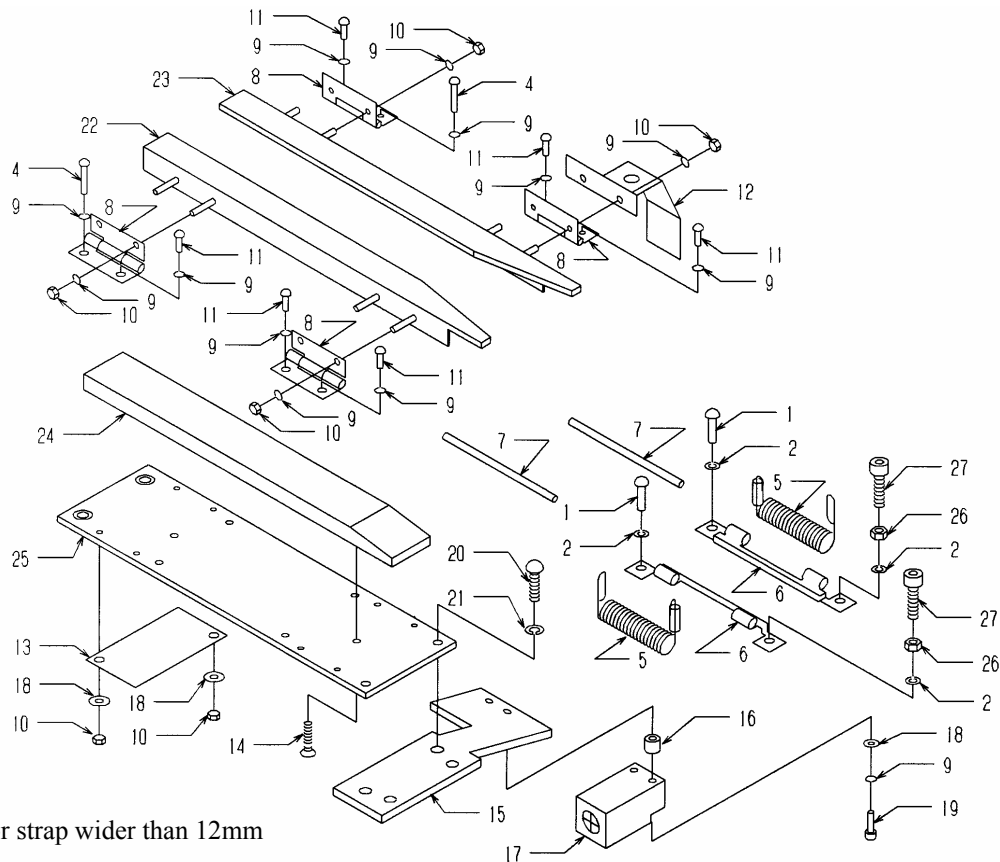
PART LIST	ARCH D	FIG. A-13P
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Key	Part-No	Description
1	B00108	Pan Head Screw M4x8
2	B27100	Spring Washer M4
3	B26100	Flat Washer M4
4	B17100	Nut M4
5	A00299	Spring
6	P15059	Spring Base
7	L12023	Spring Pin
8	P39001	Hinge 2
9	B27000	Spring Washer M3
10	B17000	Nut M3
11	B00006	Pan Head Screw M3x6
12	P00077	Stopper for Arch Hinge
*	*	*
*	*	*
*	*	*
*	*	*
17	B04530	Cap Screw M10x30
18	B27500	Spring Washer M10
19	B17500	Nut M10
*	*	*
*	*	*
*	*	*
13	M09306	Arch Rear Hinge 400BD
13	M09327	Arch Rear Hinge 500BD
13	M09307	Arch Rear Hinge 600BD
13	M09308	Arch Rear Hinge 800BD
13	M09309	Arch Rear Hinge 1000BD
13	M09310	Arch Rear Hinge 1200BD
*	*	*
14	M09301	Arch Front Hinge 400BD
14	M09326	Arch Front Hinge 500BD
14	M09302	Arch Front Hinge 600BD
14	M09303	Arch Front Hinge 800BD
14	M09304	Arch Front Hinge 1000BD
14	M09305	Arch Front Hinge 1200BD
*	*	*
15	M09258	Arch Rail 400BD
15	M09325	Arch Rail 500BD
15	M09259	Arch Rail 600BD
15	M09260	Arch Rail 800BD
15	M09261	Arch Rail 1000BD
15	M09262	Arch Rail 1200BD
*	*	*
16	A00228	Arch Rail Base 400D
16	A00277	Arch Rail Base 500D
16	A00226	Arch Rail Base 600D
16	A00261	Arch Rail Base 800D
16	A00262	Arch Rail Base 1000D
16	A00263	Arch Rail Base 1200D

PART LIST	ARCH E	FIG. A-14P-1-01
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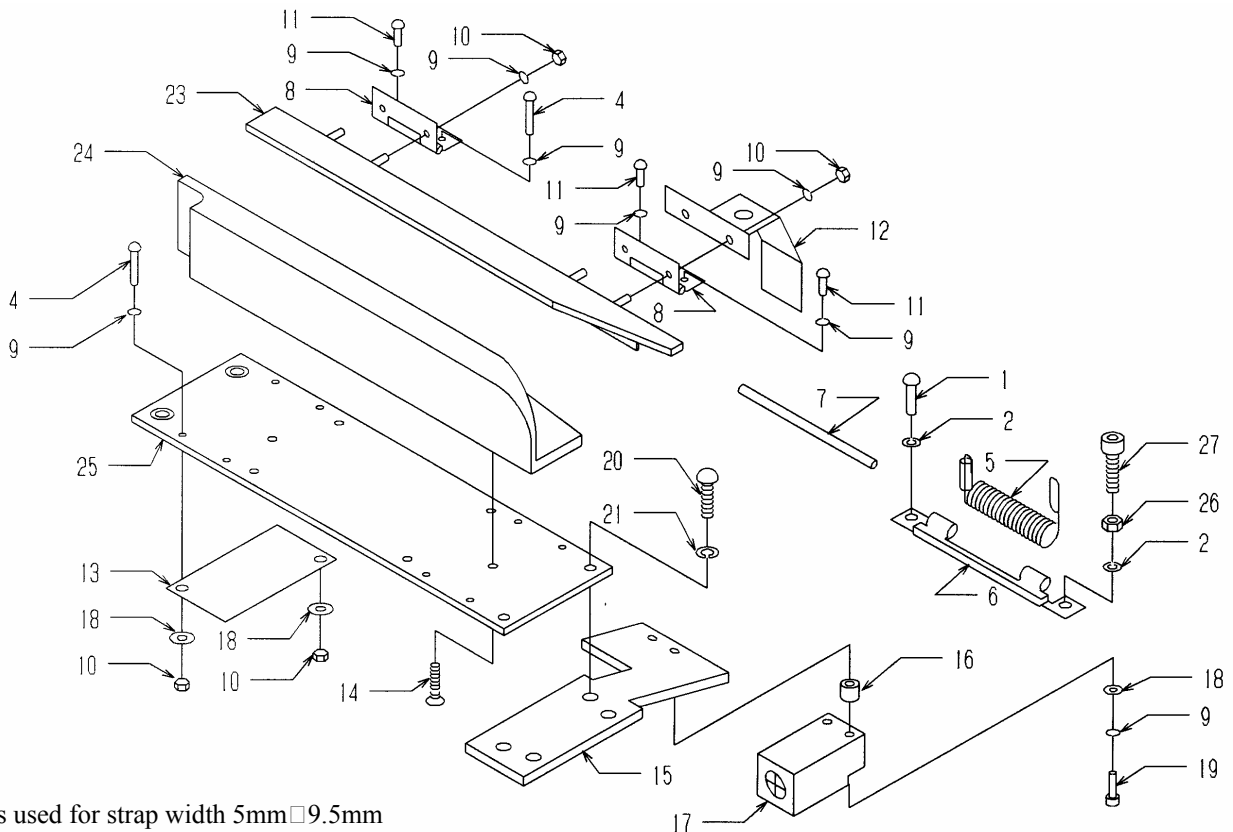
Key	Part-No	Description	Key	Part-No	Description
1	B00108	Pan Head Screw M4×8	22	P00130	Arch Front Hinge 600E
2	B27100	Spring Washer M4	23	P00319	Arch Rear Hinge 600E
3			24	M09324	Arch Rail 600E
4	B00010	Pan Head Screw M3×10	25	P03169	Arch Rail Base 600E
5	A00299	Spring	26	B17100	Nut M4
6	P15059	Spring Base	27	B04110	Cap Screw M4×10
7	L12023	Spring Pin			
8	P39001	Hinge 2			
9	B27000	Spring Washer M3			
10	B17000	Nut M3			
11	B00006	Pan Head Screw M3×6			
12	P06041	Select Detect Metal			
13	N01064	Roller Stopper			
14	B06106	Flat Head Screw M4×6			
15	P21042	Select Switch Bracket			
16	L15011	Wire Clip			
17	E06000	Prox. Switch APS12A-4N			
18	B26100	Flat Washer M4			
19	B04030	Cap Screw M3×30			
20	B00212	Pan Head Screw M5×12			
21	B27200	Spring Washer M5			





PART LIST	ARCH E	FIG. A-14P-2-01
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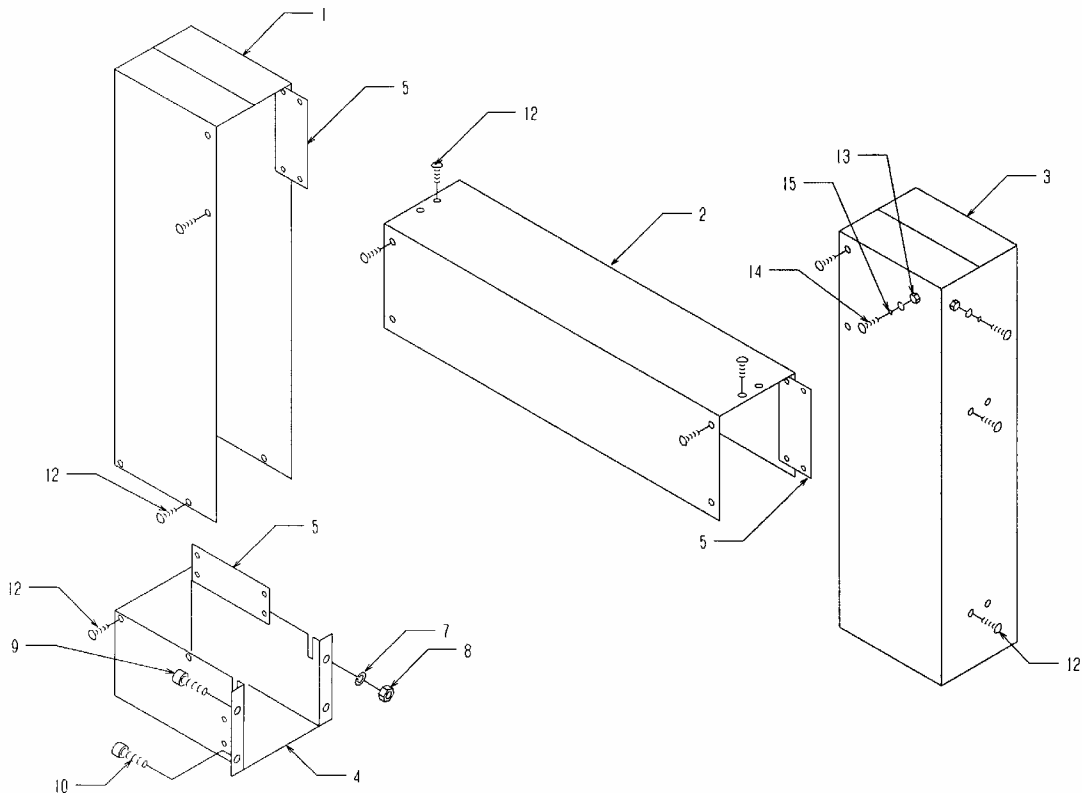
Key	Part-No	Description	Key	Part-No	Description
1	B00108	Pan Head Screw M4×8	22		
2	B27100	Spring Washer M4	23	P00319	Arch Rear Hinge 600E
3			24	M09323	Arch Rail 600E
4	B00010	Pan Head Screw M3×10	25	P03169	Arch Rail Base 600E
5	A00299	Spring	26	B17100	Nut M4
6	P15059	Spring Base	27	B04110	Cap Screw M4×10
7	L12023	Spring Pin			
8	P39001	Hinge 2			
9	B27000	Spring Washer M3			
10	B17000	Nut M3			
11	B00006	Pan Head Screw M3×6			
12	P06041	Select Detect Metal			
13	N01064	Roller Stopper			
14	B06106	Flat Head Screw M4×6			
15	P21042	Select Switch Bracket			
16	L15011	Wire Clip			
17	E06000	Prox. Switch APS12A-4N			
18	B26100	Flat Washer M4			
19	B04030	Cap Screw M3×30			
20	B00212	Pan Head Screw M5×12			
21	B27200	Spring Washer M5			



Parts used for strap width 5mm □ 9.5mm

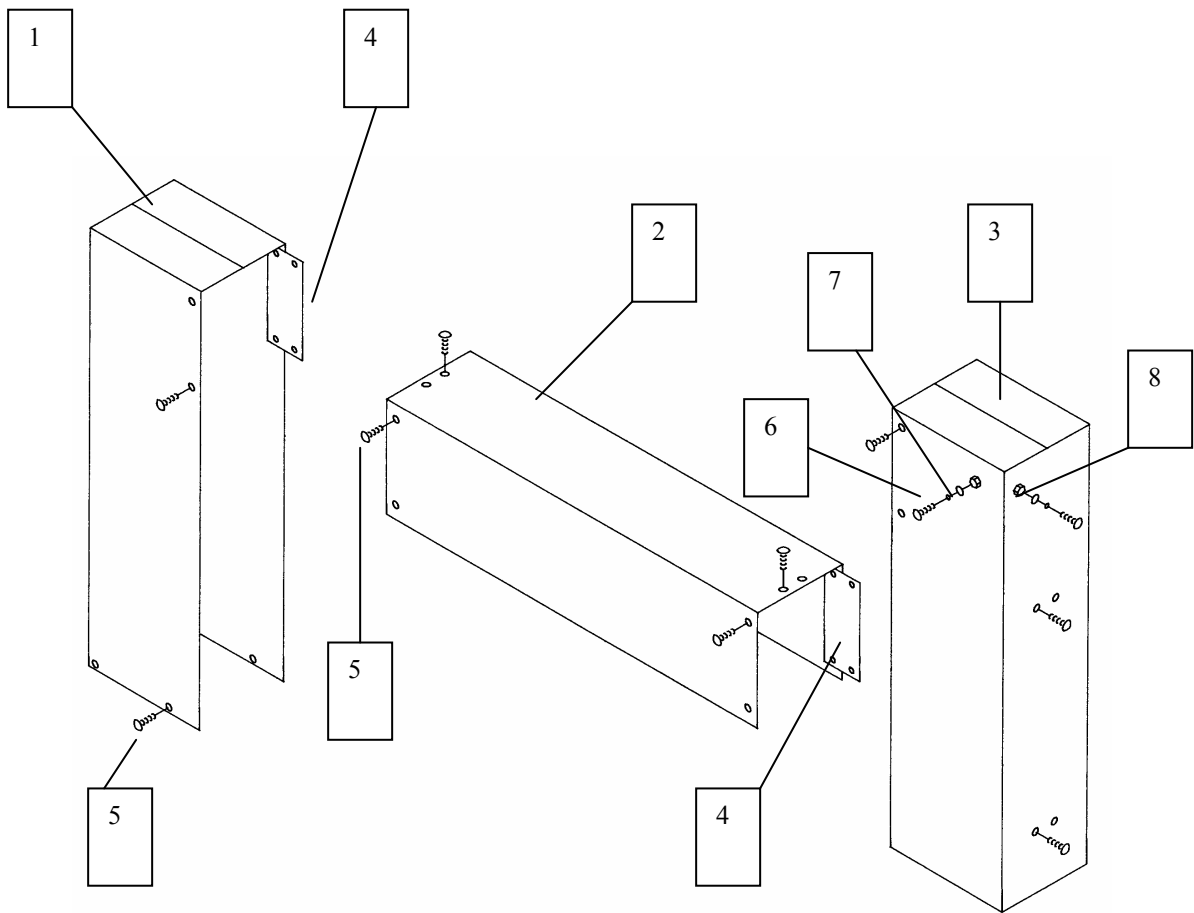
PART LIST	ARCH COVER	FIG. A-15-014
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Key	Part-No	Description	Key	Part-No	Description
1	P30237	Arch Cover B600			
1	P30261	Arch Cover B800	5	P03189	Arch Plate
1	P30262	Arch Cover B1000			
1	P30263	Arch Cover B1200	7	B27300	Spring Washer M6
2	P30264	Arch Cover C800	8	B17300	Nut M6
2	P30265	Arch Cover C1000	9	B04315	Cap Screw M6×15
2	P30266	Arch Cover C1200	10	B04310	Cap Screw M6×10
2	P30267	Arch Cover C1400	11		
2	P30268	Arch Cover C1600	12	B07208	Screw M5×8
3	P30225	Arch Cover D600	13	B17200	Nut M5
3	P30269	Arch Cover D800	14	B07212	Screw M5×12
3	P30270	Arch Cover D1000	15	B27200	Spring Washer M5
3	P30271	Arch Cover D1200	16		
4	P30238	Arch Cover A800	17		
4	P30257	Arch Cover A1000	18		
			19		
			20		



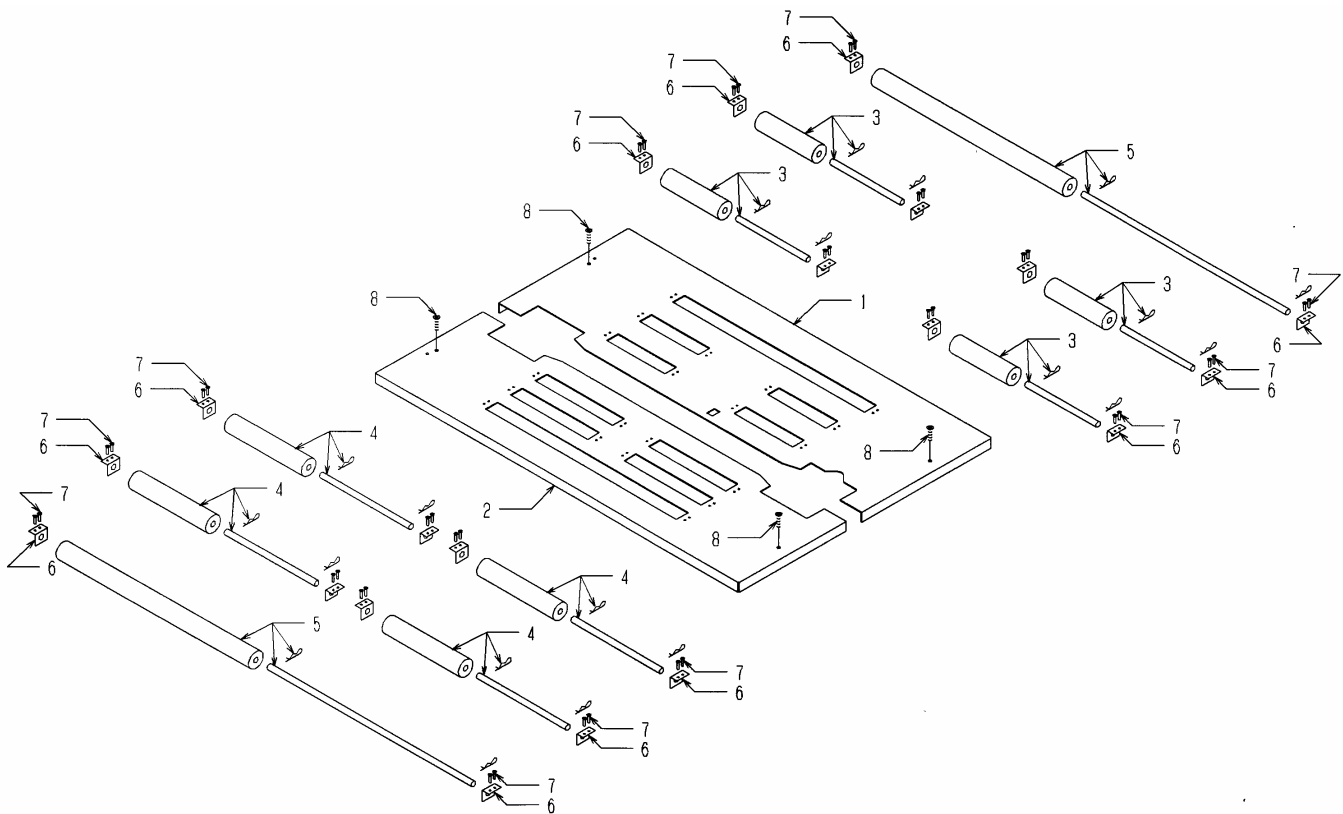
PART LIST	ARCH COVER	FIG. A-15-001
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Key	Part-No	Description	Key	Part-No	Description
□	P30272	Arch Cover B400	6	B07212	Screw M5×12
1	P30305	Arch Cover B500	7	B27200	Spring Washer M5
1	P30237	Arch Cover B600	8	B17200	Nut M5
1	P30261	Arch Cover B800	9		
1	P30262	Arch Cover B1000	10		
1	P30263	Arch Cover B1200	11		
2	P30226	Arch Cover C600	12		
3	P30273	Arch Cover D400	13		
3	P30304	Arch Cover D500	14		
3	P30225	Arch Cover D600	15		
3	P30269	Arch Cover D800			
3	P30270	Arch Cover D1000			
3	P30271	Arch Cover D1200			
4	P03189	Arch Plate			
5	B40208	Button Bolt M5×8			



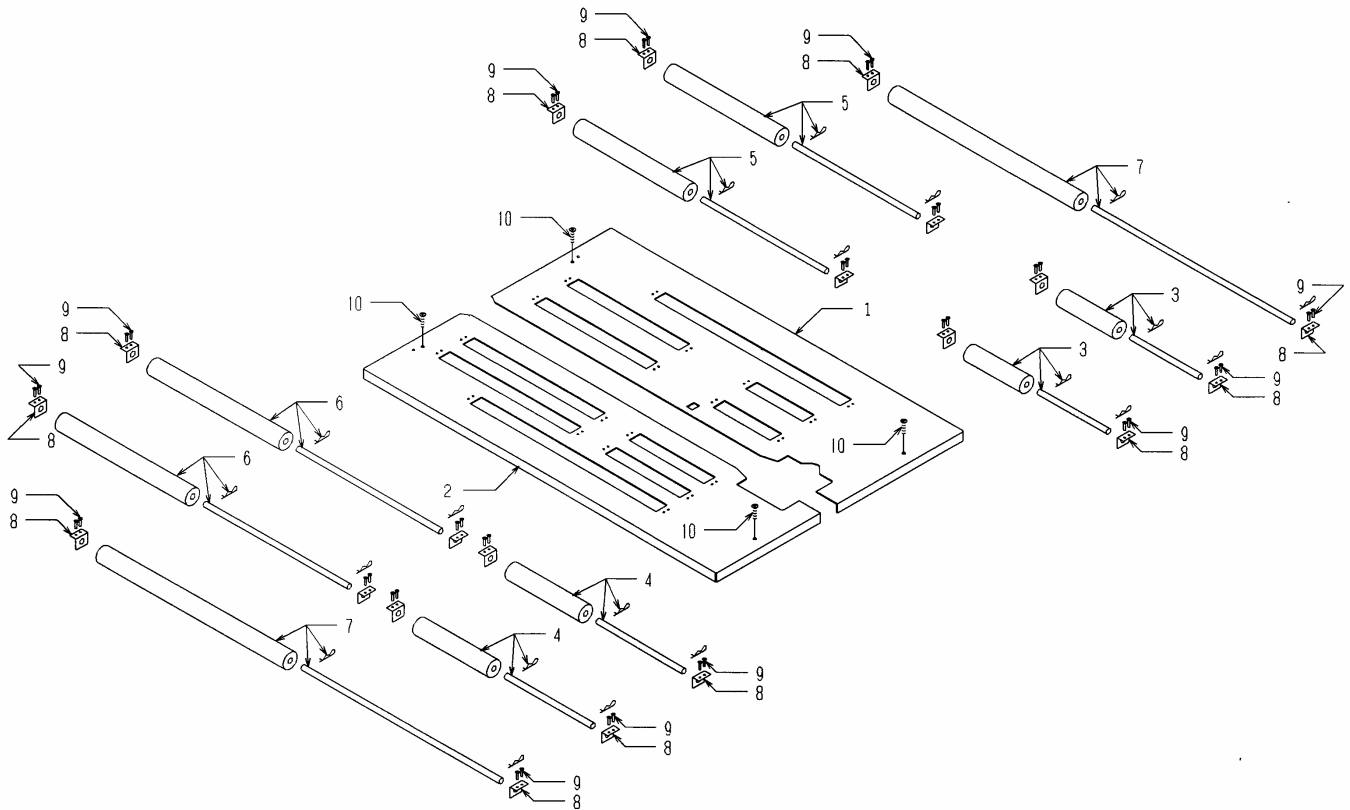
PART LIST	TABLE 600	FIG. A-19-002
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Key	Part-No	Description	Key	Part-No	Description
1	P30300	Rear Table 600	9		
2	P30301	Front Table 600	10		
3	R08002	W150 Roller Assy.	11		
4	R08003	W200 Roller Assy.	12		
5	R08009	W500 Roller Assy.	13		
6	P00145	Roller Bracket	14		
7	B02108	Flat Head Screw M4×8	15		
8	B07208	Bolt M5×8	16		



PART LIST	TABLE 800	FIG. A-19-003
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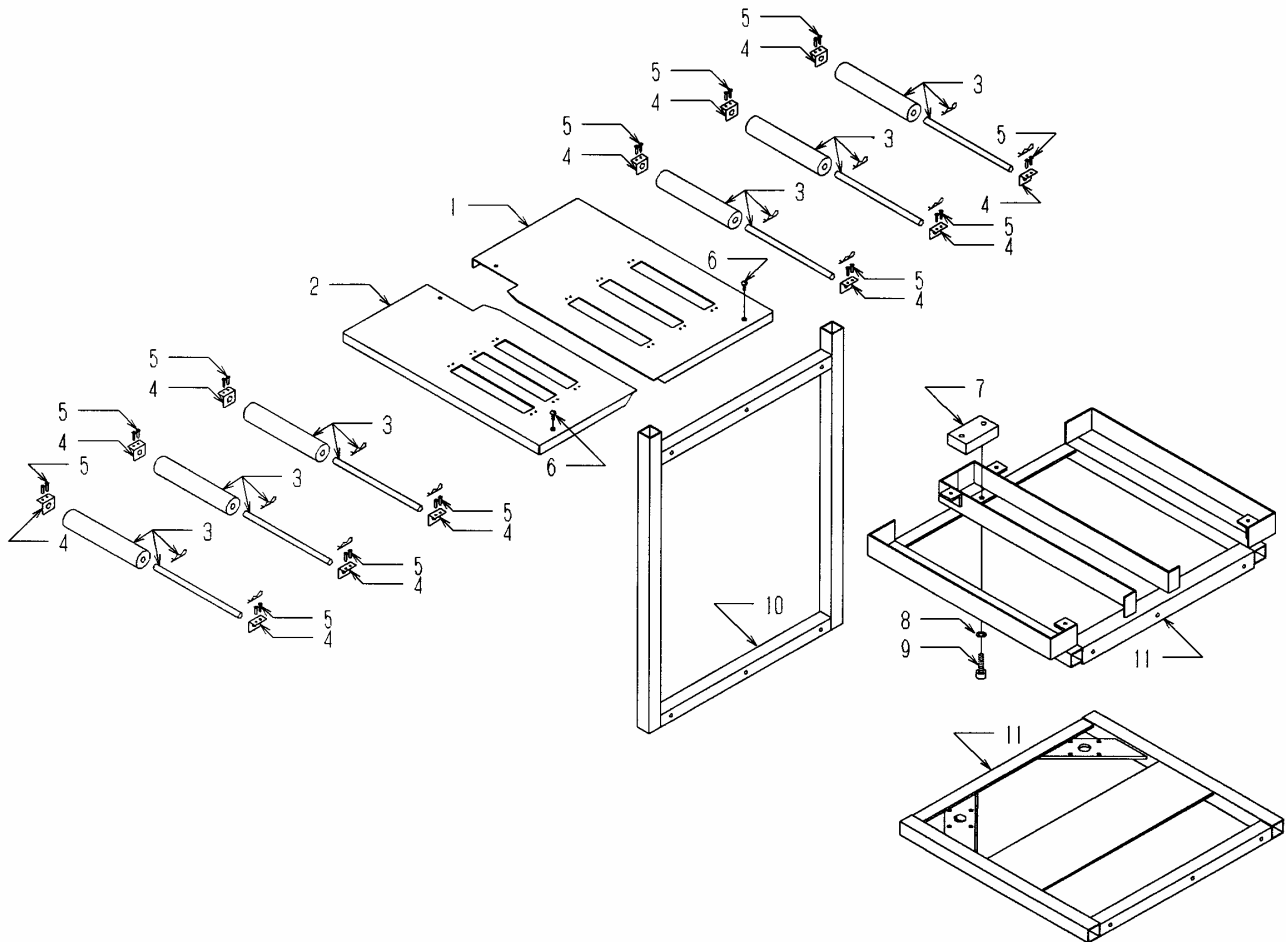
Key	Part-No	Description	Key	Part-No	Description
1	P30303	Rear Table 800	9	B02108	Flat Head Screw M4×8
2	P30302	Front Table 800	10	B07208	Bolt M5×8
3	R08002	W150 Roller Assy.	11		
4	R08003	W200 Roller Assy.	12		
5	R08005	W300 Roller Assy.	13		
6	R08006	W350 Roller Assy.	14		
7	R08009	W500 Roller Assy.	15		
8	P00145	Roller Bracket	16		



PART LIST	SUPPORT TABLE	FIG. A-19-004
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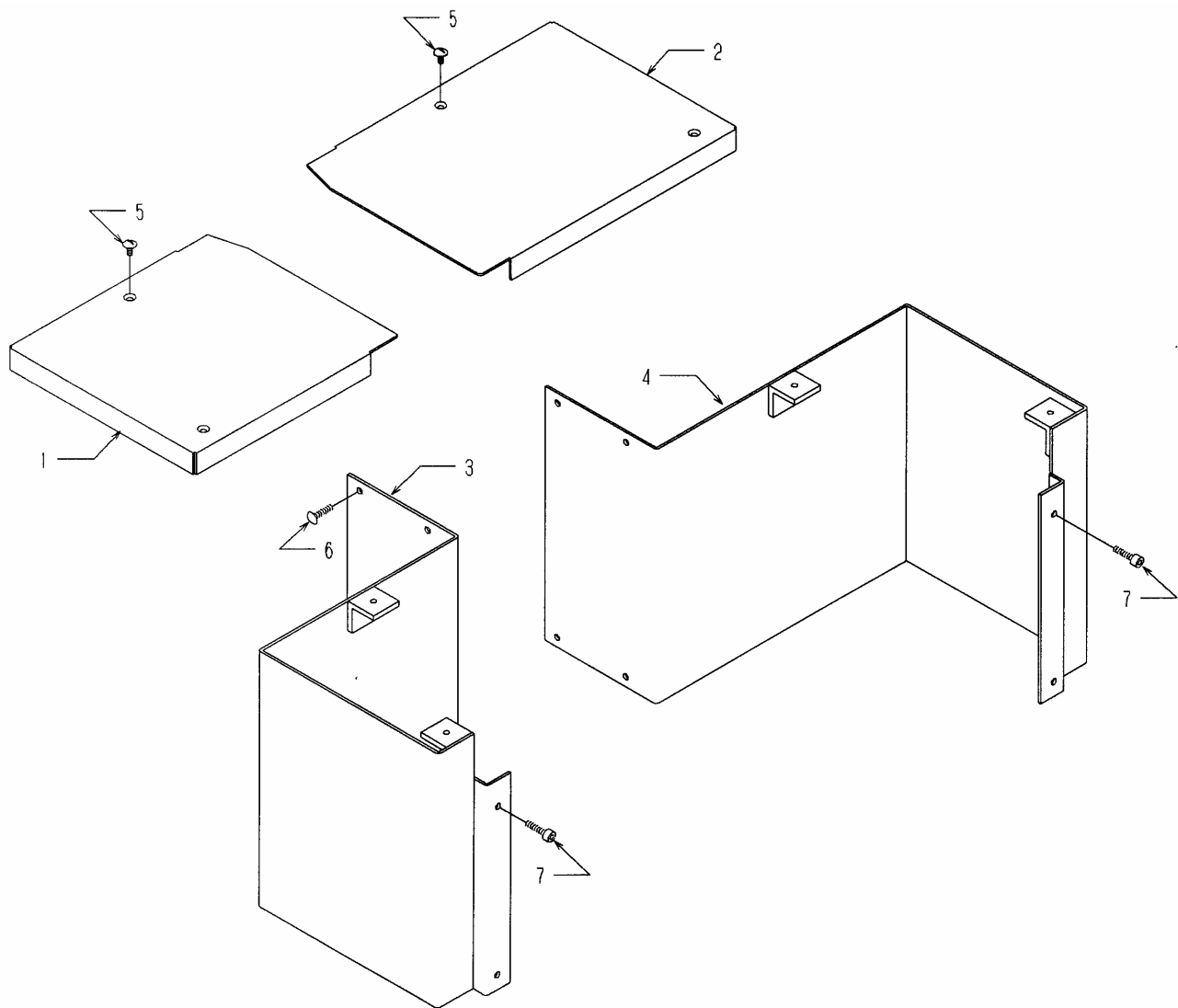
The different parts for strap size and the arch size.

Key	Part-No	Description	Key	Part-No	Description
1	*	*	1	P30495	Rear Support Table 1200
2	*	*	1	P30358	Rear Support Table 1600
3	*	*	2	P30494	Front Support Table 1200
4	P00145	Roller Bracket	2	P30357	Front Support Table 1600
5	B02108	Flat Head Screw M4×8	3	R08003	W200 Roller Assy.
6	B07208	Bolt M5×8	3	R08011	W600 Roller Assy.
7	M00399	Arch Rail Bracket	11	A03067	Frame 1200
8	B27500	Spring Washer M10	11	A03069	Frame 1600
9	B04515	Cap Screw M10×15			
10	A03074	Frame			
11	*	*			
12					
13					
14					
15					



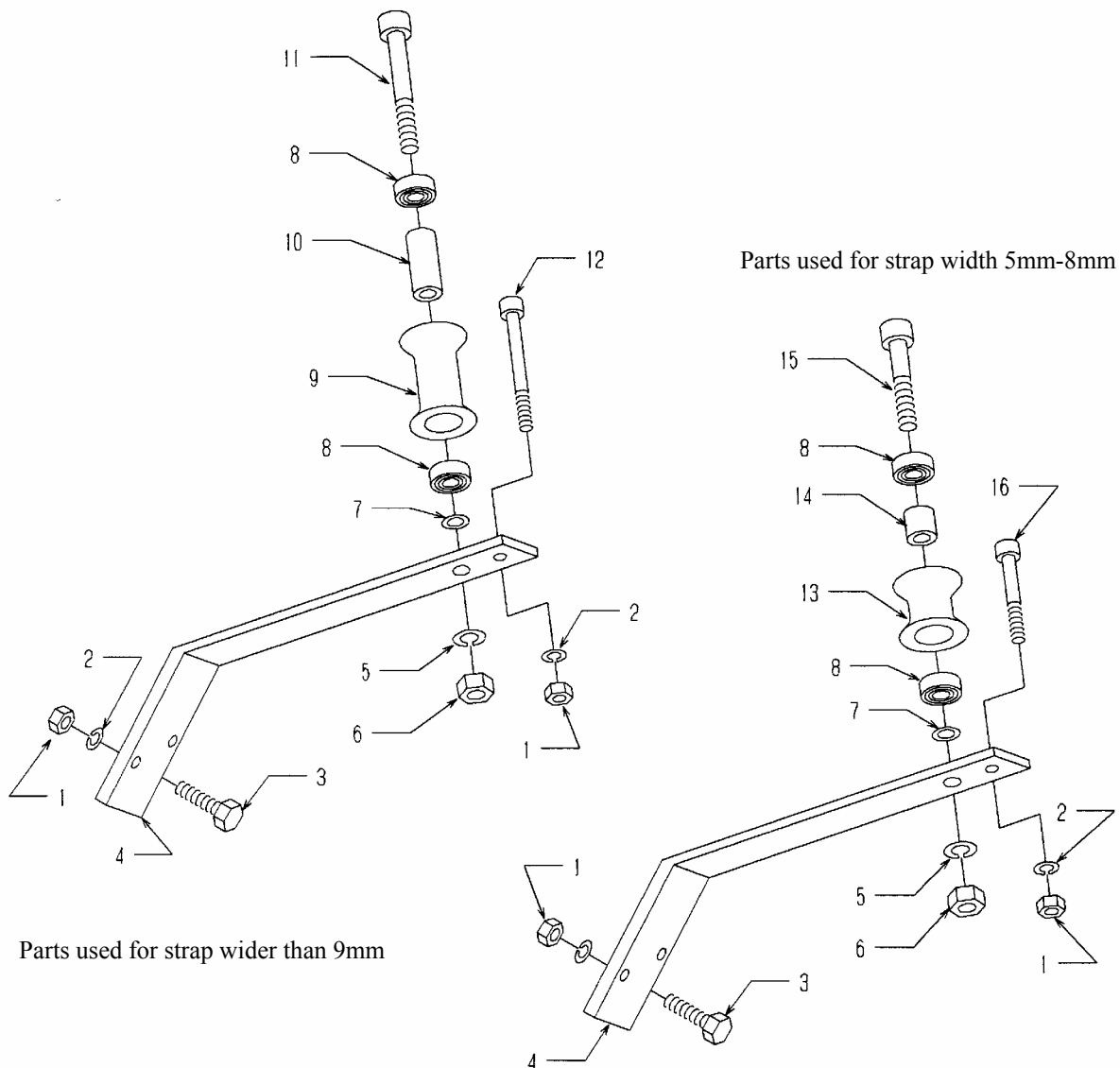
PART LIST	SUPPORT TABLE	FIG. A-19-006
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Key	Part-No	Description	Key	Part-No	Description
1	P30334	Front Table 1000	9		
2	P30335	Rear Table 1000	10		
3	P30332	Front Table Bracket	11		
4	P30333	Rear Table Bracket	12		
5	B07208	Bolt M5×8	13		
6	B40212	Button Head Screw M5×12	14		
7	B04212	Cap Screw M5×12	15		
8			16		



PART LIST	V ROLLER	FIG. D-1P
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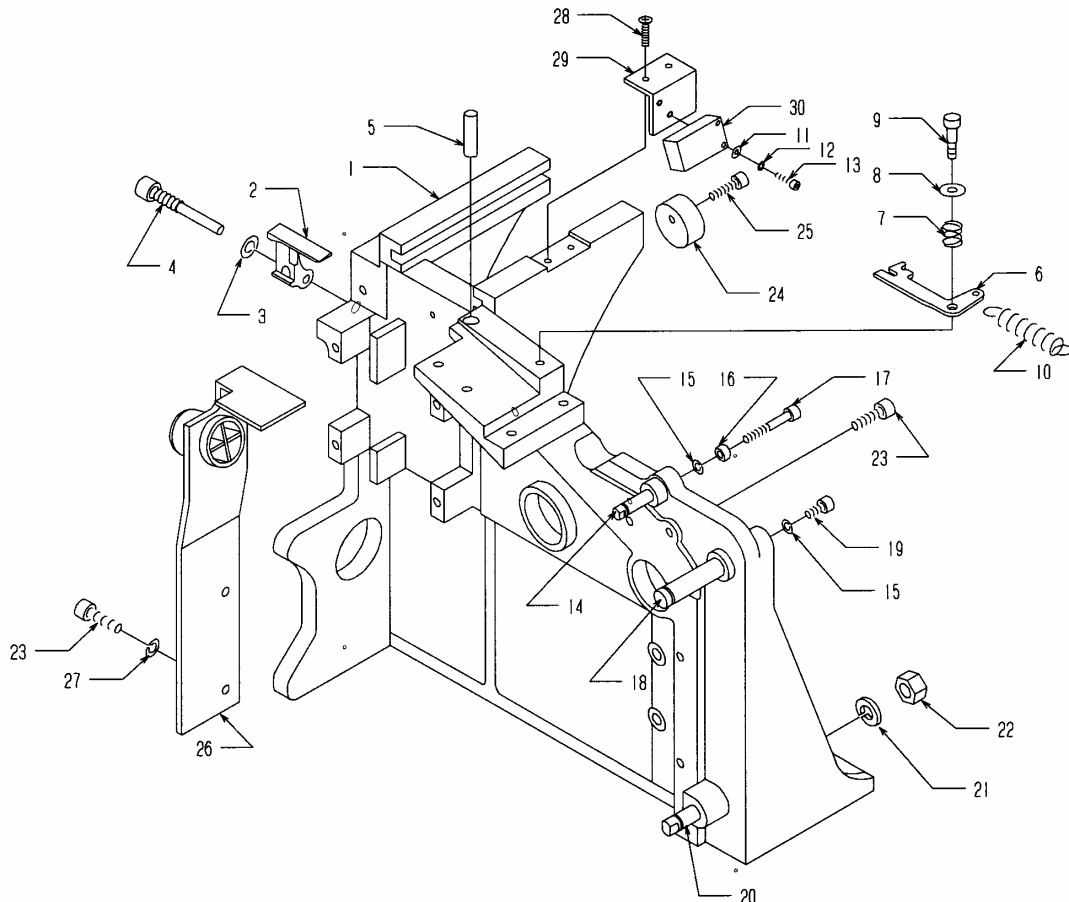
Key	Part-No	Description	Key	Part-No	Description
1	B17300	Nut M6	12	B04355	Cap Screw M6×55
2	B27300	Spring Washer M6	13	NEWS-249	V-Roller
3	B99038	Hexagon Bolt M6×25	14	NEWS-250	Spacer Collar
4	P21048	V-Roller Base	15	B04440	Cap Screw M8×40
5	B27400	Spring Washer M8	16	B04340	Cap Screw M6×40
6	B17400	Nut M8	17		
7	P03114	Flat Washer	18		
8	T04024	Ball Bearing 698LLU	19		
9	L03052	V-Roller	20		
10	L00052	Spacer Collar	21		
11	B04455	Cap Screw M8×55	22		





PART LIST	HEAD ASSY. 1	FIG. H0-000-2-01
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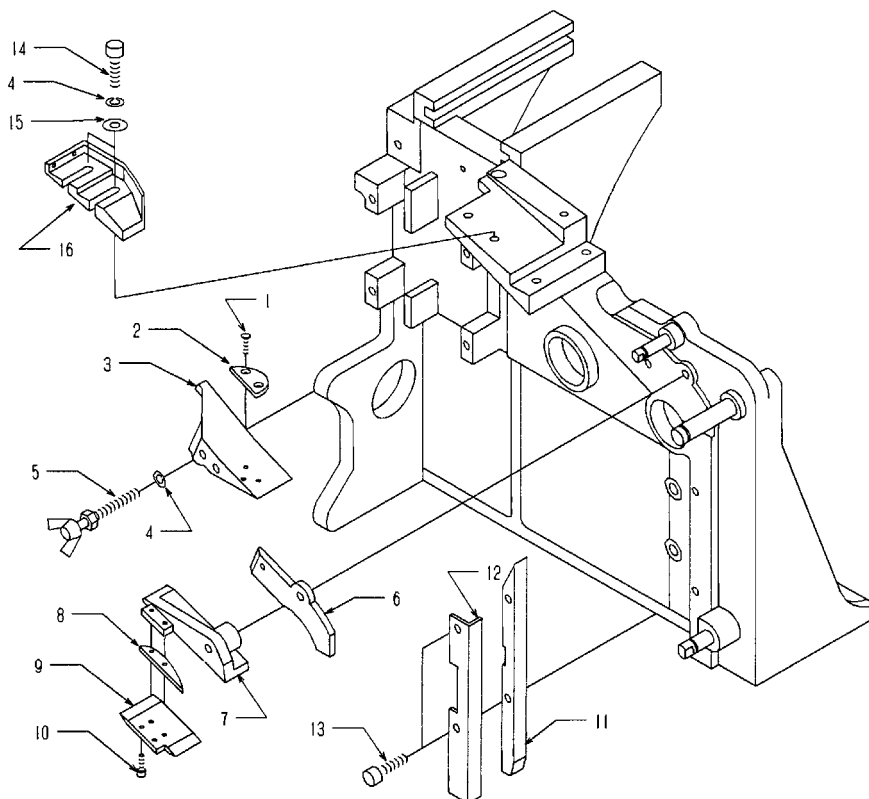
Key	Part-No	Description	Key	Part-No	Description
1	C00049	Head	16	B17200	Nut M5
2	C03041	Strap Guide	17	B04230	Cap Screw M5×30
3	B27400	Spring Washer M8	18	L09000	Support Pin for Bracket
4	L21018	Strap Guide Support Bolt	19	B04210	Cap Screw M5×10
5	L24013	Guide Pin for Head	20	L09008	Support Pin for Tension Adjust
6	P21117	Stop Lever for Floating Strap (5□12mm Strap)			
6	P21108	Stop Lever for Floating Strap (14□15.5mm Strap)	21	B27500	Spring Washer M10
7	S06025	Spring	22	B21500	Nut M10
8	B26300	Flat Washer M6	23	B04315	Cap Screw M6×15
9	B16310	Shoulder Bolt 6×10	24	N01073	Silencer Rubber
10	S03000	Spring	25	B04220	Cap Screw M5×20
11			26	OP-468	Table Supporting Bracket
12			27	B27300	Spring Washer M6
13			28	B02106	Flat Head Screw M4×6
14	L09005	Feed Arm Pin	29	P00124	Sensor Bracket
15	B27200	Spring Washer M5	30	E06051	Photo Cell SA1B-DP1



PART LIST	HEAD ASSY. 2	FIG. H0-001-1
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The different parts for strap size and the arch size.

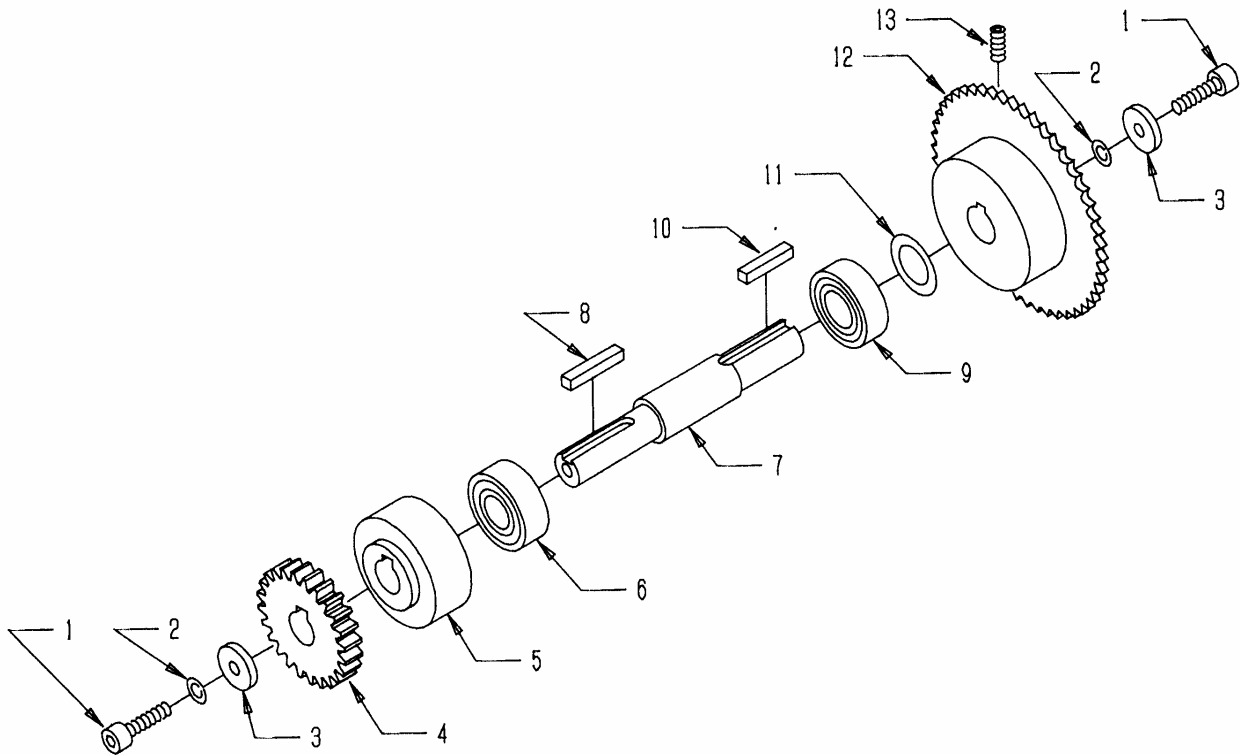
Key	Part-No	Description	Key	Part-No	Description
1	*	*	1	B02006	Flat Head Screw M3×6 5-7mm Strap
2	*	*	1	B04010	Cap Screw M3×10 9.5-15.5mm Strap
3	C03043	Center Guide for Head	2	P03163	Spacer 5-7mm Strap
4	B27300	Spring Washer M6	2	P03324	Spacer 8-9.5mm Strap
5	A00286	Wing Bolt	2	L00050	Spacer 12-15.5mm Strap
6	P03164	Strap Guide Rear Plate for Head	8	P03162	Spacer 5-7, 14-15.5mm Strap
7	C03097	Strap Guide for Head	8	P03325	Spacer 8-9.5mm Strap
8	*	*	8	P03163	Spacer 12mm Strap
9	M00107	Under Guide	11	M00114	Vertical Guide 5-7mm Strap
10	B04008	Cap Screw M3×8	11	M00115	Vertical Guide 8-9.5mm Strap
11	*	*	11	M00116	Vertical Guide 12-15.5mm Strap
12	*	*	12	P00309	L Type Guide 5-7mm Strap
13	*	*	12	P00313	L Type Guide 8-9.5mm Strap
14	B04315	Cap Screw M6×15	12	P00310	L Type Guide 12-15.5mm Strap
15	B26300	Flat Washer M6	13	B04320	Cap Screw M6×20 5-7mm Strap
16	*	*	13	B04325	Cap Screw M6×25 8-9.5mm Strap
17			13	B04330	Cap Screw M6×30 12-15.5mm Strap
18			16	C03076	Right Strap Guide 5-9.5mm Strap
19			16	A00309	Right Strap Guide 14mm Strap
20			16	A00310	Right Strap Guide 12, 15.5mm Strap





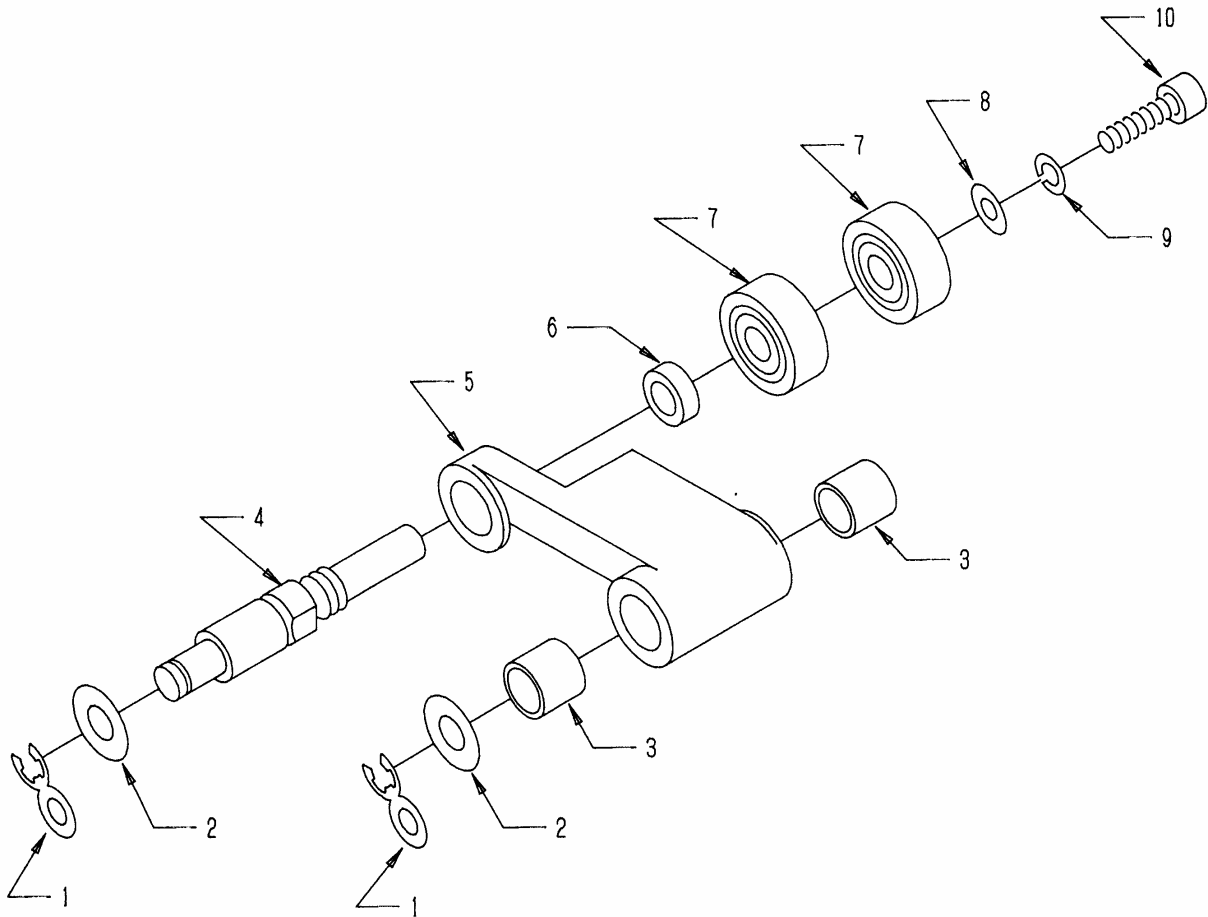
PART LIST	MAIN SHAFT UNIT	FIG. HEAD-1P
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Key	Part-No	Description	Key	Part-No	Description
1	B04315	Cap Screw M6×15	16		
2	B27300	Spring Washer M6	17		
3	P18004	Washer for Primary Tension Roller	18		
4	L18000	Flat Gear for Main Shaft	19		
5	L03012	Min Shaft Roller	20		
6	T04027	Ball Bearing 6202LLU	21		
7	L06009	Main Shaft	22		
8	M06000	Key 5×5×28	23		
9	T04028	Ball Bearing 6003LLU	24		
10	M06011	Key 5×5×18	25		
11	P18027	Spacer	26		
12	T02014	Sprocket RS25-T50	27		
13	B10310	Set Bolt M6×10	28		
14			29		
15			30		



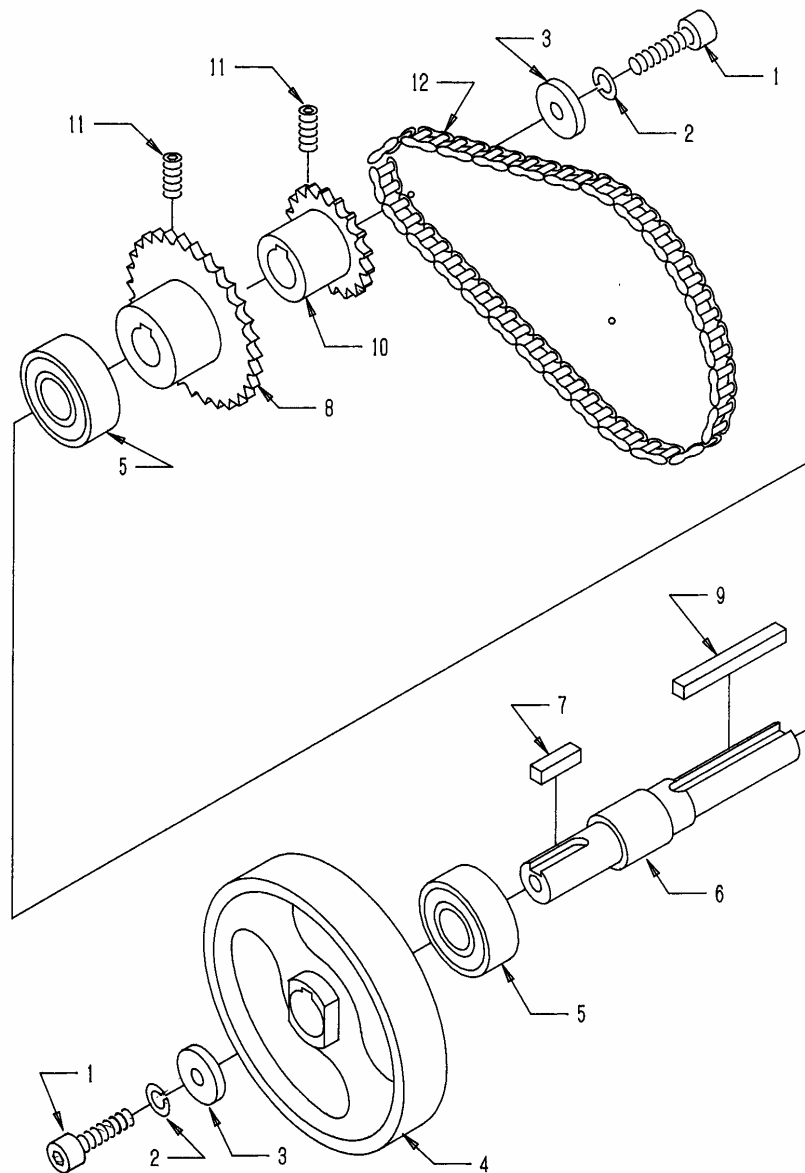
PART LIST	PIVOT ROLLER UNIT	FIG. HEAD-2P
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Key	Part-No	Description	Key	Part-No	Description
1	P03113	Snap Ring E-6	9	B27200	Spring Washer M5
2	B26400	Flat Washer M8	10	B04210	Cap Screw M5×10
3	T05001	Needle Bearing TLA810	11	*	*
4	L09034	Feed Roller Long Pin	12	*	*
5	C03044	Strap Feed Arm	13	*	*
6	L00061	Collar	14	*	*
7	T04033	Ball Bearing 628LLB	15	*	*
8	B26200	Flat Washer M5	16	*	*



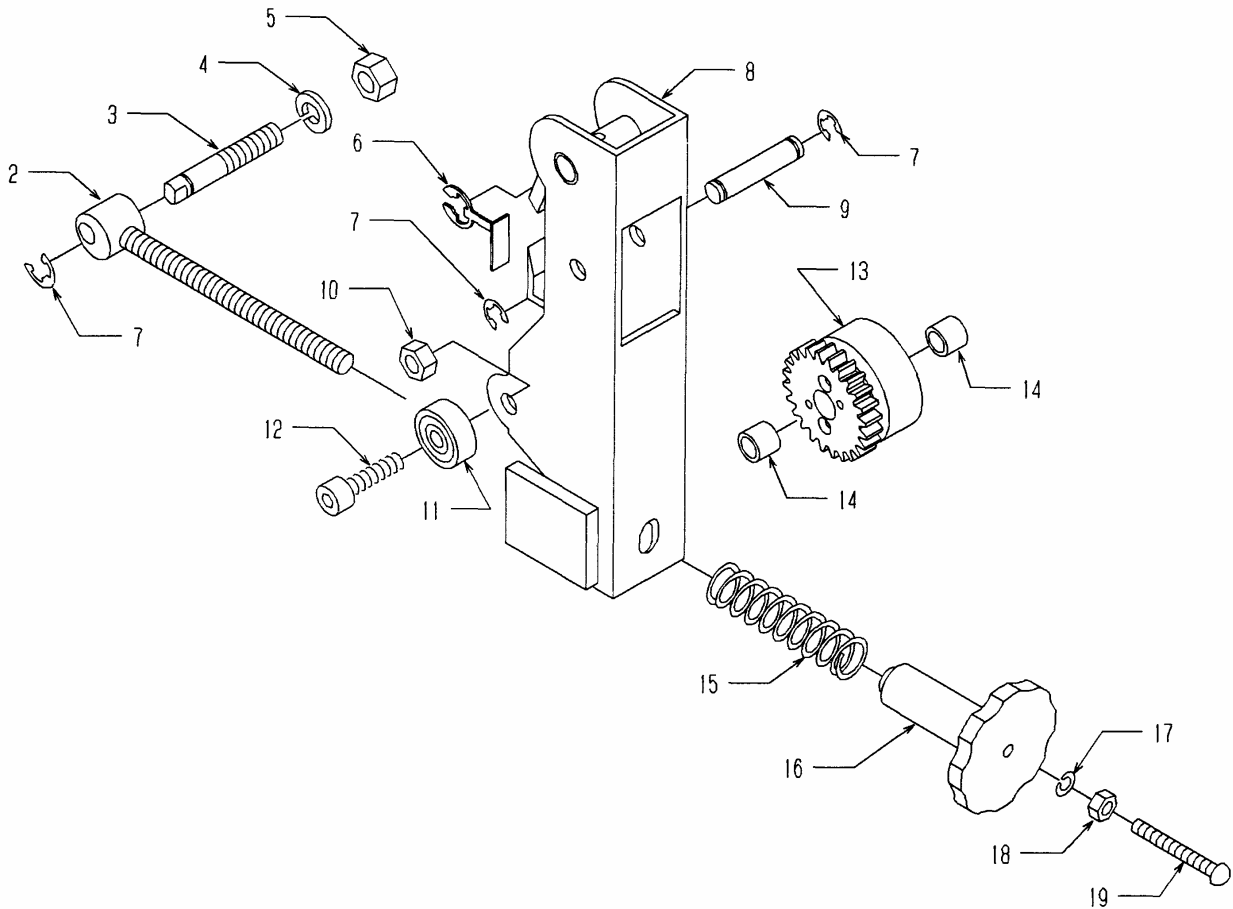
PART LIST	FEED ROLLER ASSEMBLY	FIG. HEAD-3P1
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Key	Part-No	Description	Key	Part-No	Description
1	B04315	Cap Screw M6×15	9	M06025	Key 5×5×38
2	B27300	Spring Washer M6	10	T02000	Sprocket RS25-T18
3	P18004	Flat Washer	11	B10306	Set Bolt M6×6
4	L03059	Feed Roller	12	T00062	Chain L60
5	T04027	Ball Bearing 6202LLU	13		
6	L06008	Strap Feed Shaft	14		
7	M06001	Key 5×5×15	15		
8	T02052	Sprocket RS25-T24	16		



PART LIST	TENSION ASSY.	FIG. H4□□□□
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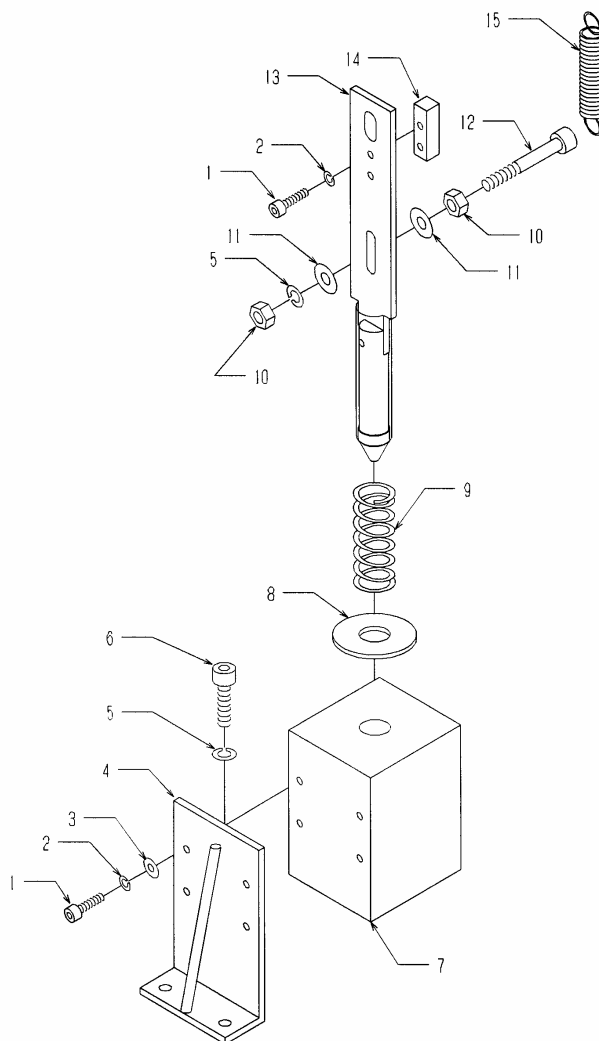
Key	Part-No	Description	Key	Part-No	Description
1			12	B04420	Cap Screw M8×20
2	A00249	Tension Adjust Bolt	13	A00287	Main Shaft Drive Roller
3	L09008	Support Pin for Adjust Bolt	14	T05000	Needle Bearing TLA1010
4	B27500	Spring Washer M10	15	S06012	Tension Adjust Spring
5	B21500	Nut M10	16	A00250	Tension Adjust Nut
6	P00009	E-ring (L Type)	17	B27300	Spring Washer M6
7	B28008	E-ring E8	18	B17300	Nut M6
8	A00484	Bracket With Guide	19	L21019	Stopper Bolt
9	L12003	Drive Shaft	20		
10	B21400	Nut M8	21		
11	T04032	Ball Bearing 638LLU	22		



PART LIST	FEED TENSION UNIT	FIG. H6-002
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The different parts for strap size and the arch size.

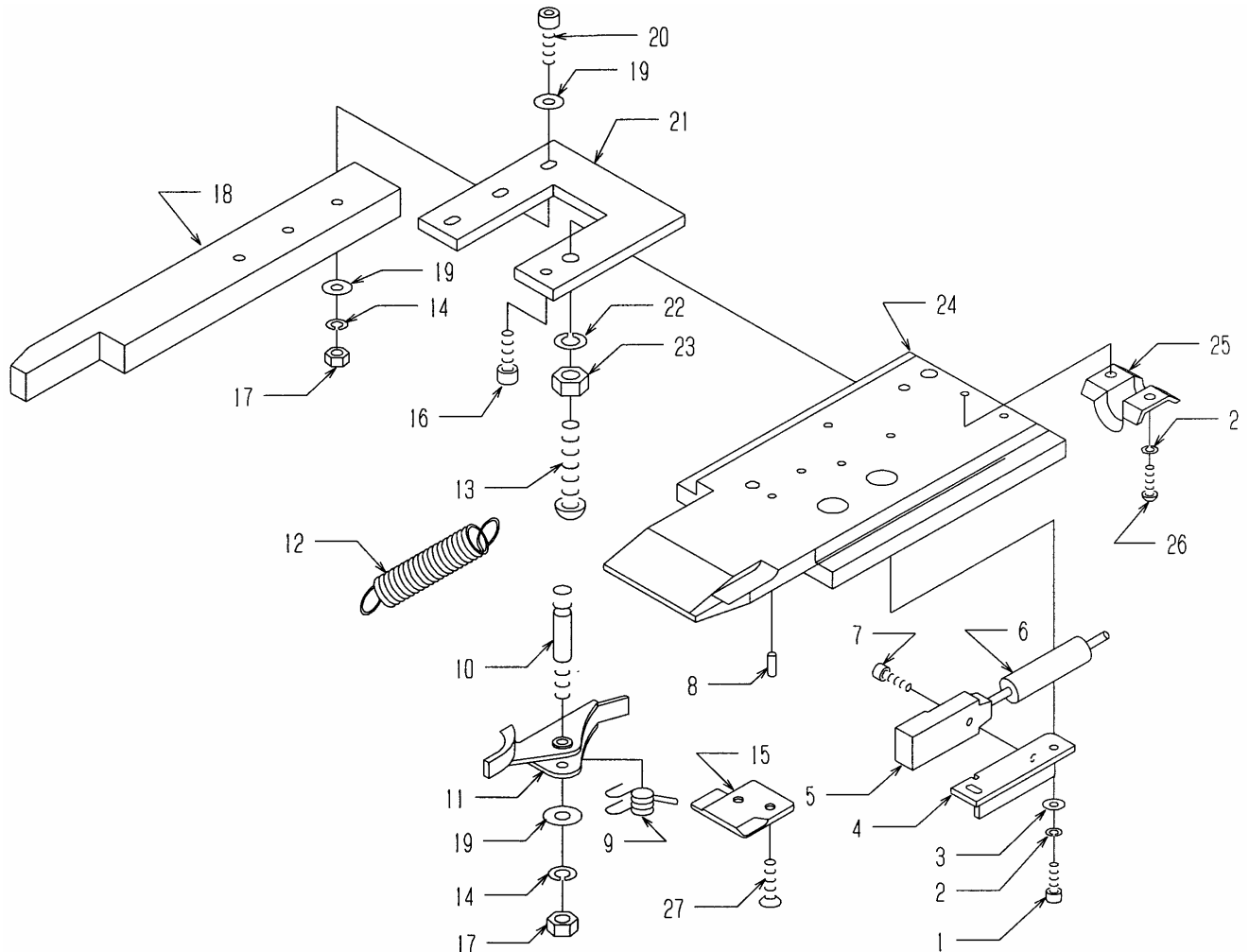
Key	Part-No	Description	Key	Part-No	Description
1	B04110	Cap Screw M4×10	15	S03065	Spring 5mm Strap
2	B27100	Spring Washer M4	15	S03060	Spring 6-15.5mm Strap
3	B26100	Flat Washer M4			
4	A00610	Feed Solenoid Bracket			
5	B27300	Spring Washer M6			
6	B04310	Cap Screw M6×10			
7	E30016	Solenoid MD292 DC48V			
8	N01100	Solenoid Packing			
9	S06022	Spring			
10	B17300	Nut M6			
11	B26300	Flat Washer M6			
12	B04330	Cap Screw M6×30			
13	A00621	Plunger for Strap Feed			
14	M00067	Solenoid Rod Metal			
15	*	*			





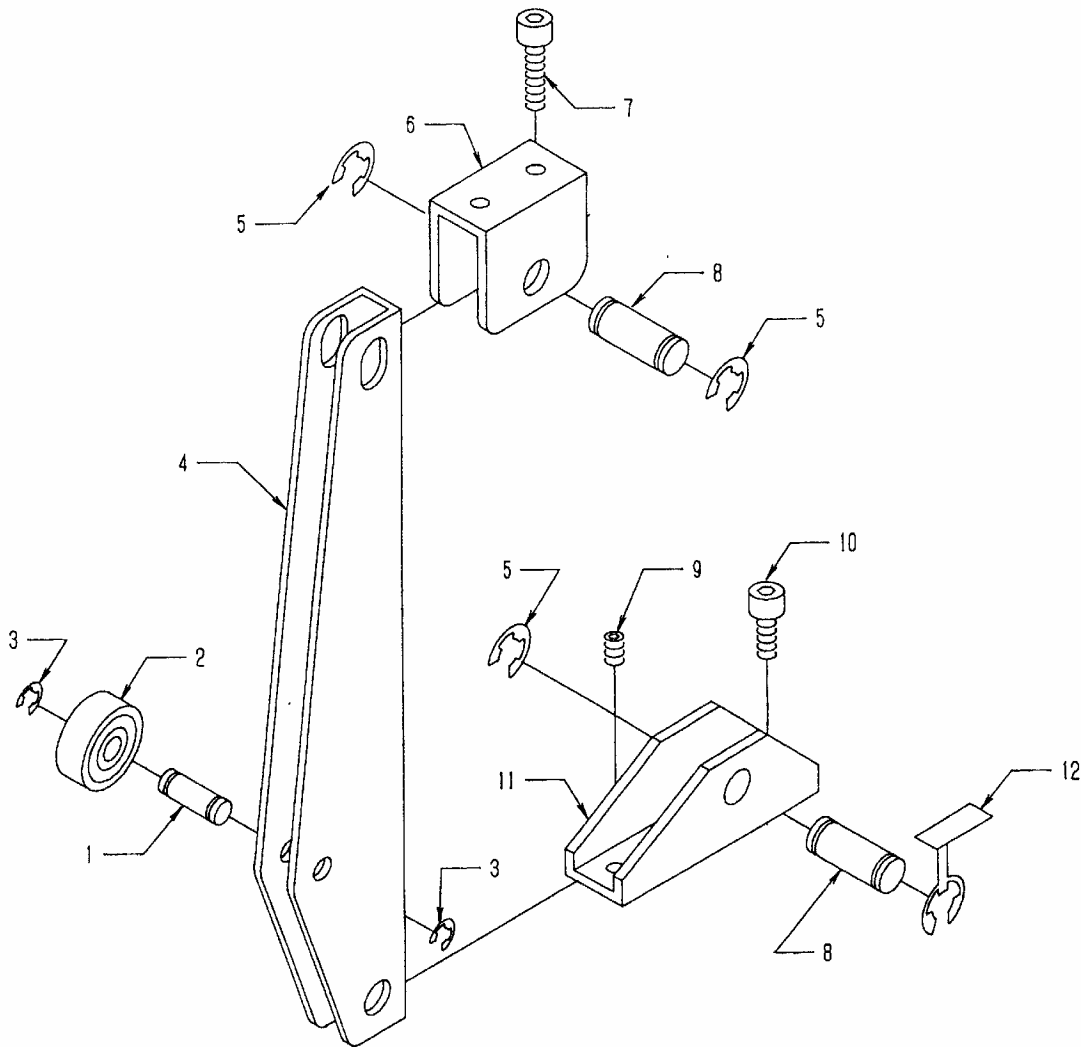
PART LIST	SLIDING PLATE UNIT	FIG. H7-018-02
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Key	Part-No	Description	Key	Part-No	Description
1	B04010	Cap Screw M3×10	16	B04108	Cap Screw M4×8
2	B27000	Spring Washer M3	17	B17100	Nut M4
3	B26000	Flat Washer M3	18	N01060	Hinge Rubber Stopper
4	P00115	Metal for M Switch GL-12F	19	B26100	Flat Washer M4
5	E06025	Proximity Switch M	20	B04120	Cap Screw M4×20
6	E00033	Rubber Cover	21	P03046	Hinge Plate
7	B04008	Cap Screw M3×8	22	B27300	Spring Washer M6
8	B31020	Roll Pin φ3×20	23	B17300	Nut M6
9	S00017	Spring for M Switch (5mm Strap)	24	M00443	Sliding Plate
9	S00012	Spring for M Switch (6□15.5mm Strap)	25	P36001	Fixing Metal for Wire
10	L09056	Pin for Limit Lever	26	B00008	Pan Head Screw M3×8
11	C03080	Limit Switch Lever	27	B02008	Flat Head Screw M3×8
12	S03008	Return Spring	28		
13	B00345	Pan Head Screw M6×45	29		
14	B27100	Spring Washer M4	30		
15	P03523	Plate	31		



PART LIST	SLIDING PLATE ROD	FIG. HEAD-8
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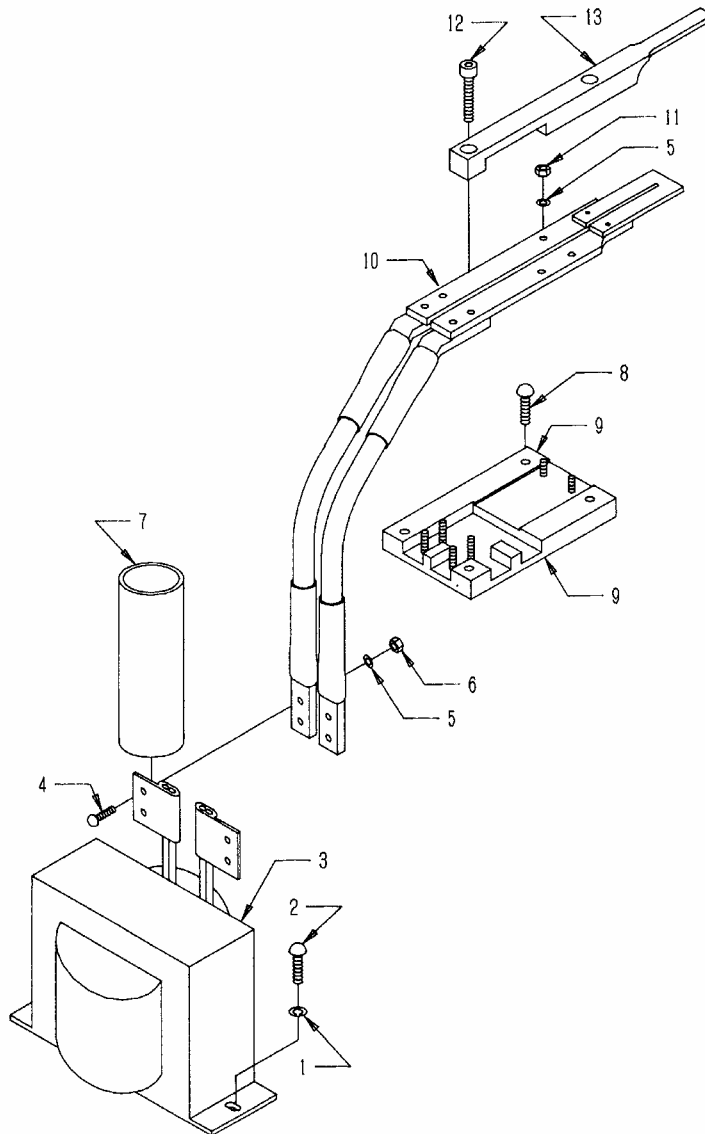
Key	Part-No	Description	Key	Part-No	Description
1	L12008	Pin for Sliding Plate Bearing	9	B10306	Set Bolt M6×6
2	T04032	Ball Bearing 638LLU	10	B04308	Cap Screw M6×8
3	B28006	E-ring E6	11	P06031	Lower Support for Sliding Plate Rod
4	P06033	Rod for Sliding Plate	12	P00009	E-ring (L Type)
5	B28010	E-ring E10	13		
6	A00090	Upper Support Sliding Plate Rod	14		
7	B04312	Cap Screw M6×12	15		
8	L12061	Pin for Sliding Plate Rod	16		





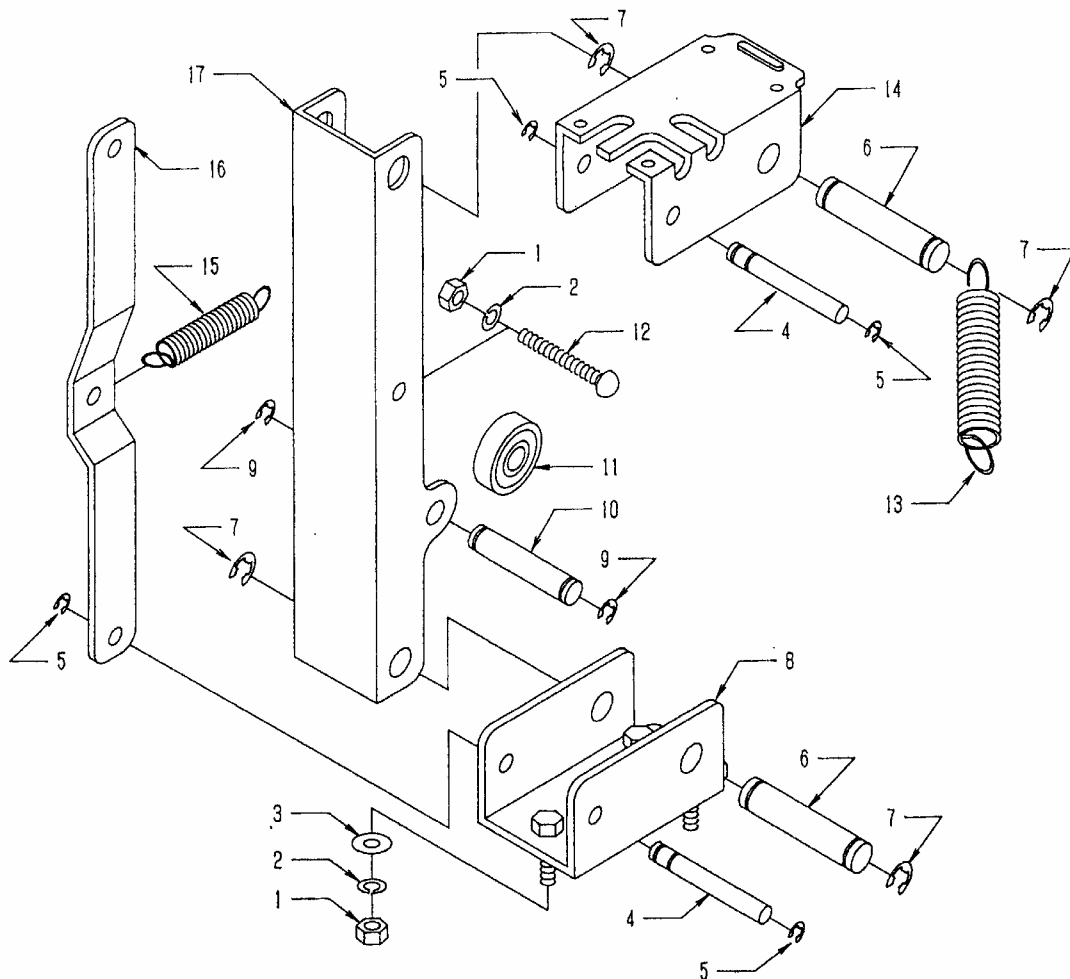
PART LIST	HEATER ASSY.	FIG. HEAD-9P
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Key	Part-No	Description	Key	Part-No	Description
1	B27100	Spring Washer M4	9	A00298	Insulating Block Assy.
2	B00108	Pan Head Screw M4×8	10	A00294	Heater
3	E24026	Heater Transformer LA-76HC	11	B21000	Nut M3
4	B00012	Pan Head Screw M3×12	12	B04120	Cap Screw M4×20
5	B27000	Spring Washer M3	13	M00109	Loop Ejector bar
6	B17000	Nut M3	14		
7	E00038	Tube	15		
8	B00112	Pan Head Screw M4×12	16		



PART LIST	HEATER ROD ASSY.	FIG. HEAD-10
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Key	Part-No	Description	Key	Part-No	Description
1	B17300	Nut M6	16	P36000	Heater Rod B
2	B27300	Spring Washer M6	17	A00128	Heater Rod A
3	B26300	Flat Washer M6	18		
4	L12006	Heater Support Pin	19		
5	B28005	E-ring E5	20		
6	L12005	Heater Pivot Pin	21		
7	B28008	E-ring E8	22		
8	A00099	Heater Rod Terminal	23		
9	B28006	E-ring E6	24		
10	L12015	Heater Rod Bearing Pin	25		
11	T04033	Ball Bearing 628LLB	26		
12	B00340	Pan Head Screw M6×40	27		
13	S03003	Heater Spring B	28		
14	P06005	Heater Base	29		
15	S03002	Heater Spring A	30		

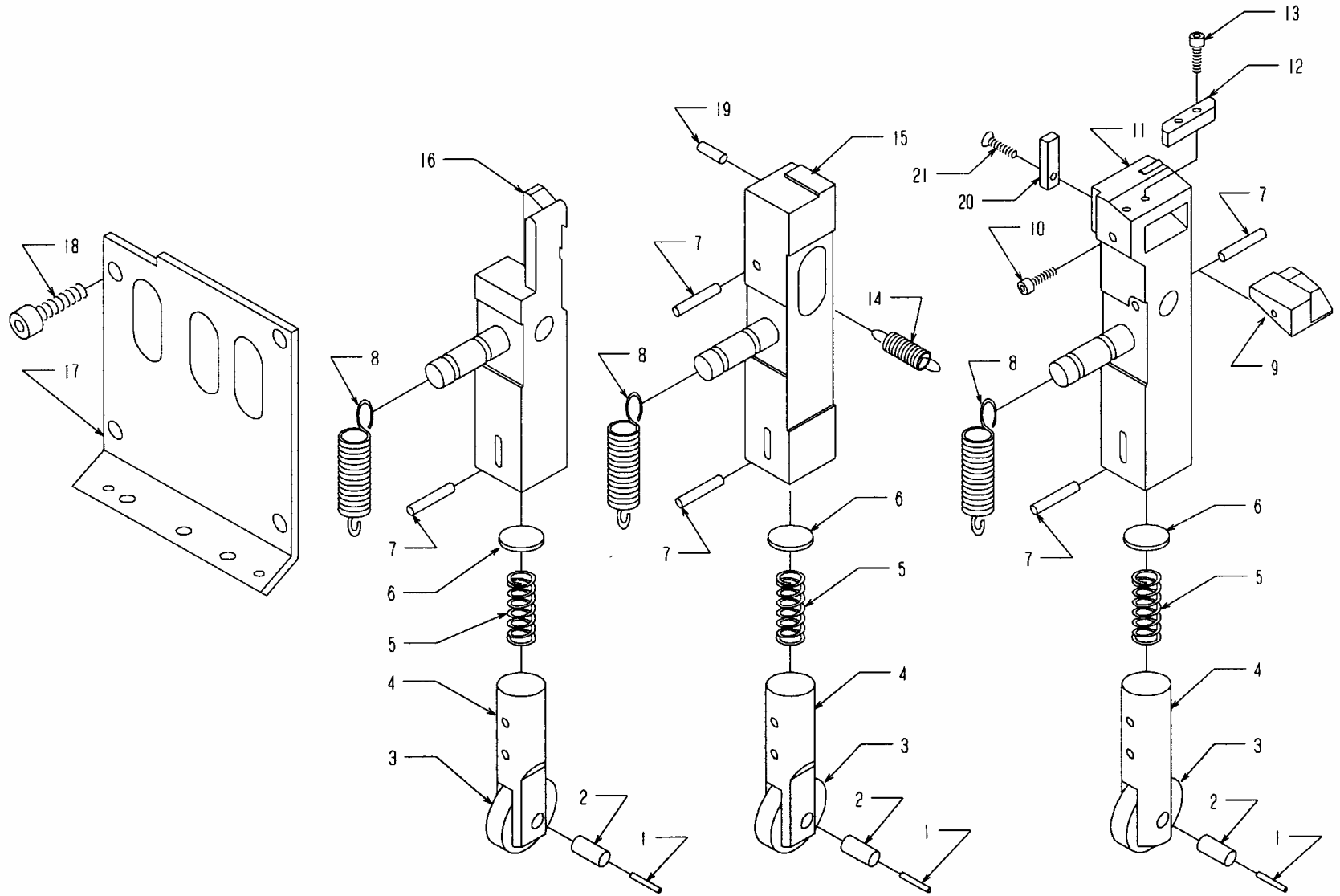


PART LIST	CLAMP ASSY.	FIG. H11-011-H
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The different parts for strap size and the arch size.

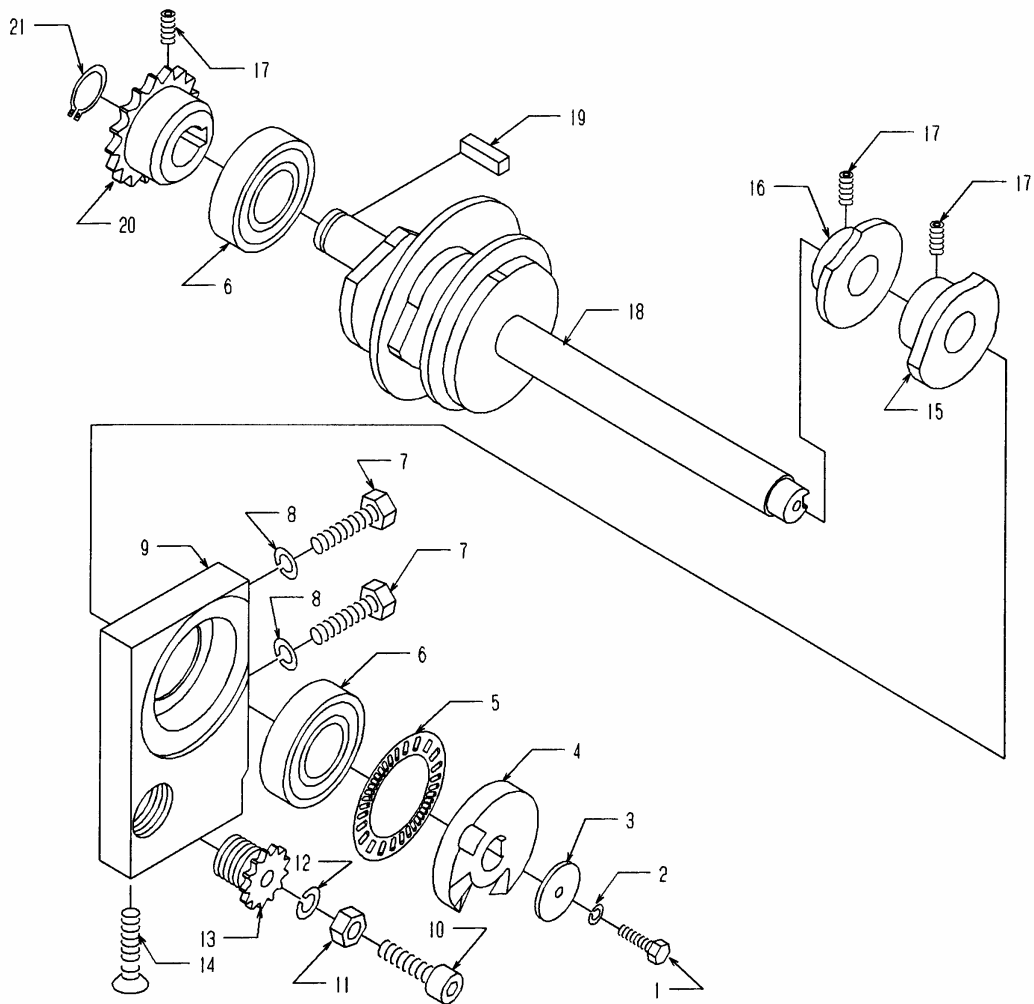
Key	Part-No	Description	Key	Part-No	Description	Key	Part-No	Description
1	B31012	Roll Pin $\phi 3 \times 12$	31			9	M00355	First Clamp Guide (5mm strap)
2	B31212	Roll Pin $\phi 5 \times 12$	32			9	M00006	First Clamp Guide (6,7mm strap)
3	T04015	Ball Bearing 635zzs	33			9	M00007	First Clamp Guide (8,9mm strap)
4	L12000	Compression Lower	34			9	C03019	First Clamp Guide (12,15mm strap)
5	S06046	Spring	35			9	C03077	First Clamp Guide (14mm strap)
6	P18041	Shim	36					
7	B31018	Roll Pin $\phi 3 \times 18$	37			11	C03134	First Clamp (5mm strap)
8	S03009	Compression Spring	38			11	C03049	First Clamp (6,7mm strap)
9	*		39			11	C03018	First Clamp (8,9,12mm strap)
10	B04010	Cap Screw M3 $\times$ 10	40			11	C03067	First Clamp (14mm strap)
11	*		41					
12	*		42			12	M00088	Upper Guide (5mm strap)
13	B04008	Cap Screw M3 $\times$ 8	43			12	M00072	Upper Guide (6,7mm strap)
14	*	*	44			12	M00073	Upper Guide (8,9mm strap)
15	*		45			12	M00074	Upper Guide (12mm strap)
16	*		46			12	M00075	Upper Guide (14mm strap)
17	P21004	Compression Cover	47			12	M00076	Upper Guide (15mm strap)
18	B04308	Cap Screw M6 $\times$ 8	48					
19	B31112	Roll Pin $\phi 4 \times 12$	49			14	S03004	Cutter Spring (5,14mm strap)
20	M00354	First Clamp Guide (5mm strap)	50			14	S03024	Cutter Spring (6,7,8,9,12mm Strap)
21	B02008	Flat Head Screw M3 $\times$ 8 (5mm strap)	51					
22			52			15	C03014	Compression (5,6mm strap)
23			53			15	C03013	Compression (7,8,9mm strap)
24			54			15	C03012	Compression (12,14,15mm strap)
25			55					
26			56			16	C03055	Second Clamp (5,6,7,8,9,12mm strap)
27			57			16	C03054	Second Clamp (14,15mm strap)
28			58					
29			59					
30			60					Drawing FIG. H11-011-D

PART LIST	CLAMP ASSY.	FIG. H11-011-D
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PART LIST	CAM SHAFT	FIG. HEAD-12P-1
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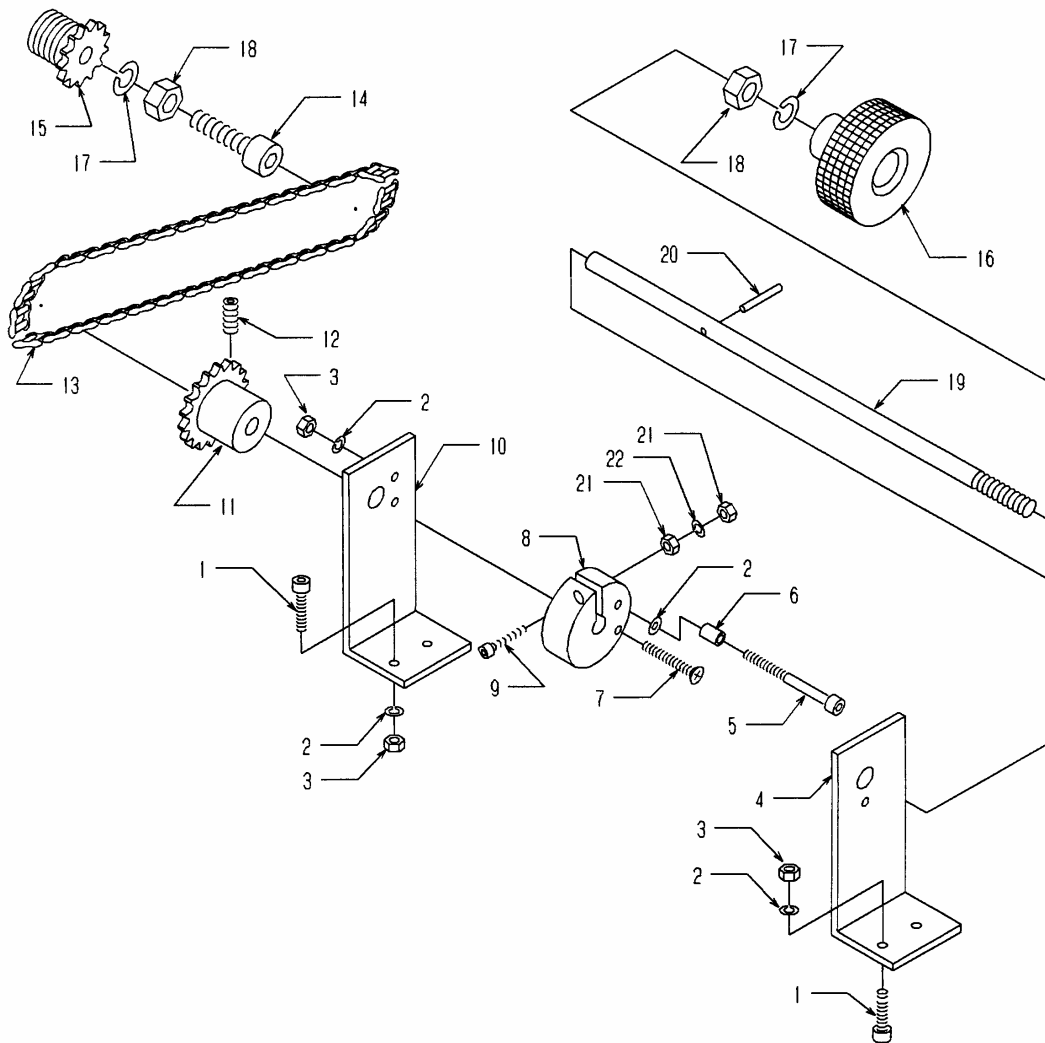
Key	Part-No	Description	Key	Part-No	Description
1	B99031	Hexagon Bolt M5×10 SCM	12	B27400	Spring Washer M8
2	B27200	Spring Washer M5	13	T02011	Bracket Stopper
3	P18001	Washer	14	B06415	Flat Cap Screw M8×15
4	P98015	Bracket Cam	15	L98015	Strap Feed Cam
5	T05011	Thrust Bearing NTB40603	16	C00060	B Switch Cam
6	T04023	Ball Bearing 6004LLU	17	B10308	Set Bolt M6×8
7	B08425	Hexagon Bolt M8×25	18	A00302	Cam Shaft
8	B27400	Spring Washer M8	19	M06005	Key 7×7×20
9	M00040	Cam Shaft Bearing Block	20	T02034	Sprocket RS35T15
10	B04420	Cap Screw M8×20	21	B29020	C-ring S-20
11	B17400	Nut M8	22	*	*





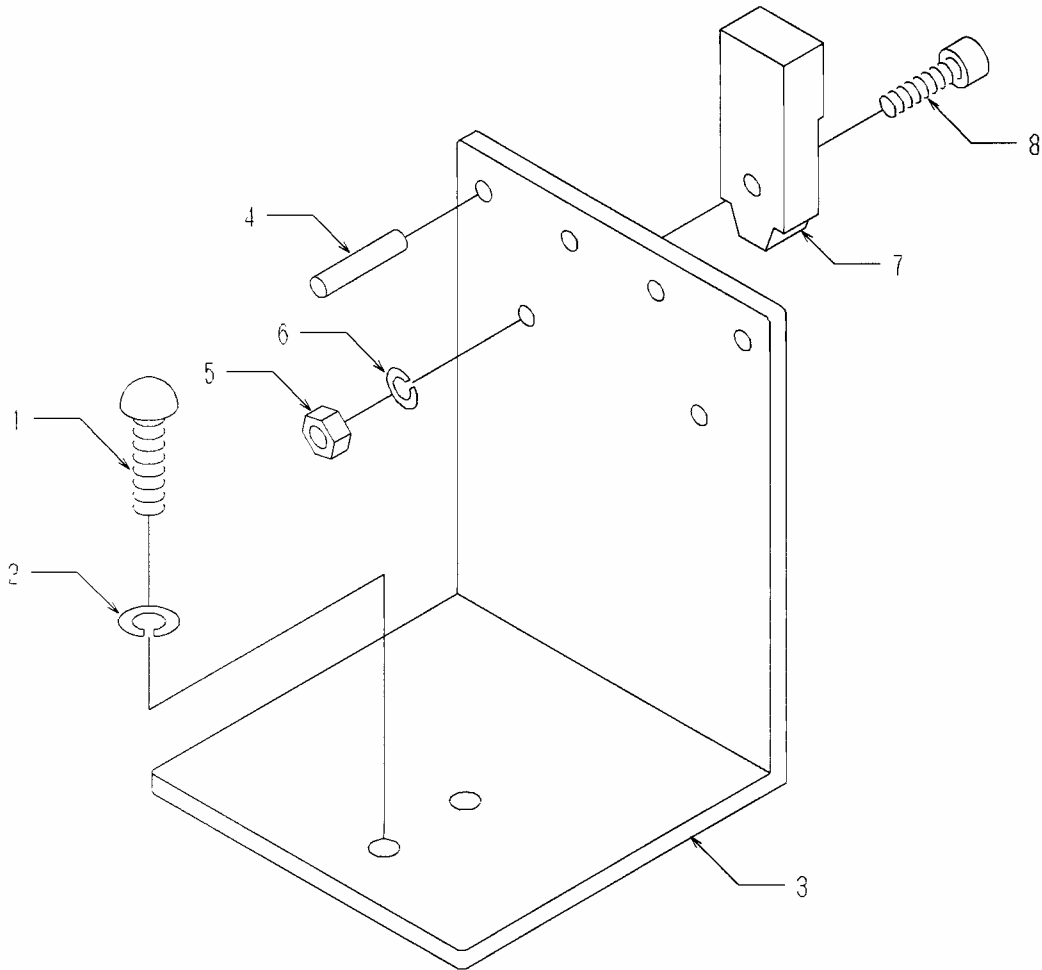
PART LIST	TENSION CONTROL ASSY.	FIG. HEAD-13P
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Key	Part-No	Description	Key	Part-No	Description
1	B04115	Cap Screw M4×15	12	B10308	Set Bolt M6×8
2	B27100	Spring Washer M4	13	T00078	Chain RS25 L64
3	B17100	Nut M4	14	B04420	Cap Screw M8×20
4	CN-086	Right Bracket	15	T02011	Sprocket RS25-T13
5	B04140	Cap Screw M4×40	16	N00028	Tension Adjust Nut
6	L15011	Stopper Tube	17	B27400	Spring Washer M8
7	B02125	Flat Head Screw M4×25	18	B17400	Nut M8
8	N01051	Friction Rubber	19	L09035	Tension Adjust Shaft
9	B04025	Cap Screw M3×25	20	B31018	Roll Pin 3×18
10	P00119	Left Bracket	21	B27000	Spring Washer M3
11	T02016	Sprocket RS25-T18	22	B17000	Nut M3



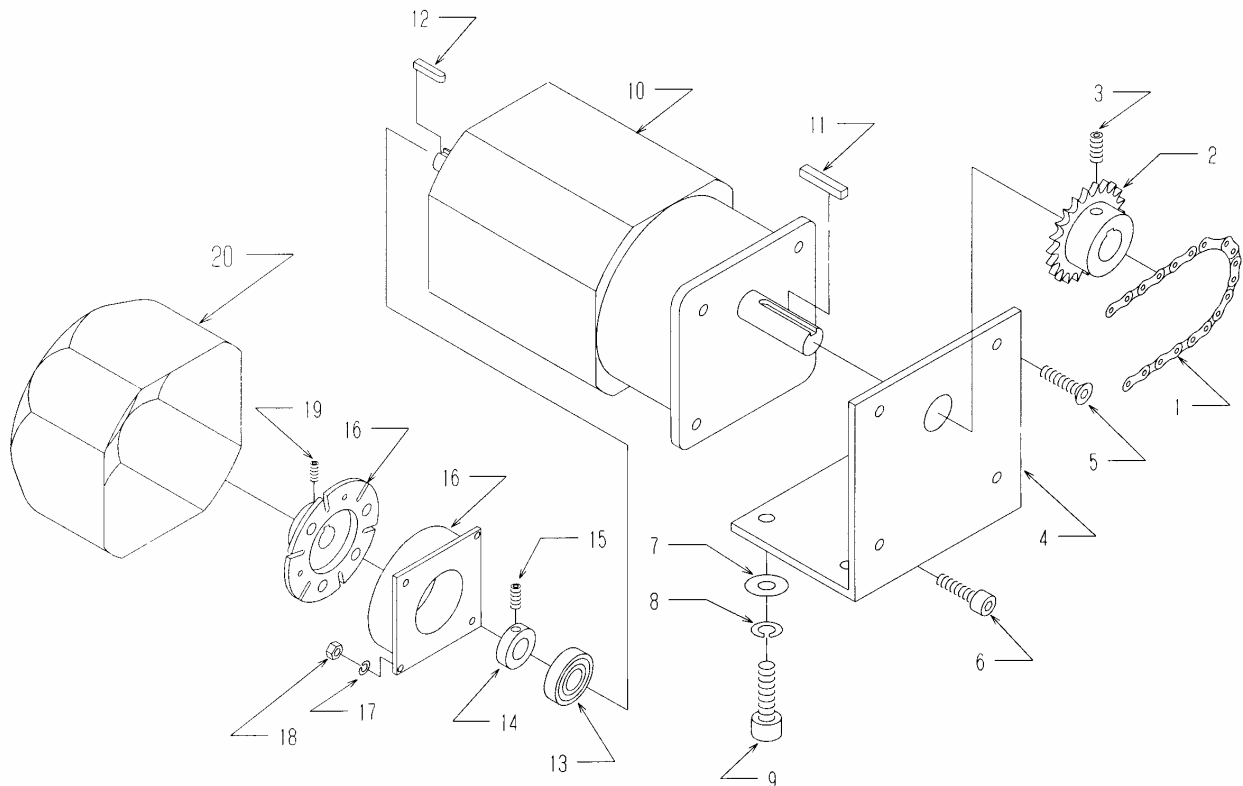
PART LIST	CAM SWITCH	FIG. H15-000
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Key	Part-No	Description	Key	Part-No	Description
1	B00110	Pan Head Screw M4×10	9		
2	B27100	Spring Washer M4	10		
3	P00133	Cam Switch Bracket	11		
4	B31015	Roll Pin $\phi 3 \times 15$	12		
5	B17000	Nut M3	13		
6	B27000	Spring Washer M3	14		
7	E06025	Proximity Switch M GL-12F	15		
8	B04012	Cap Screw M3×12	16		



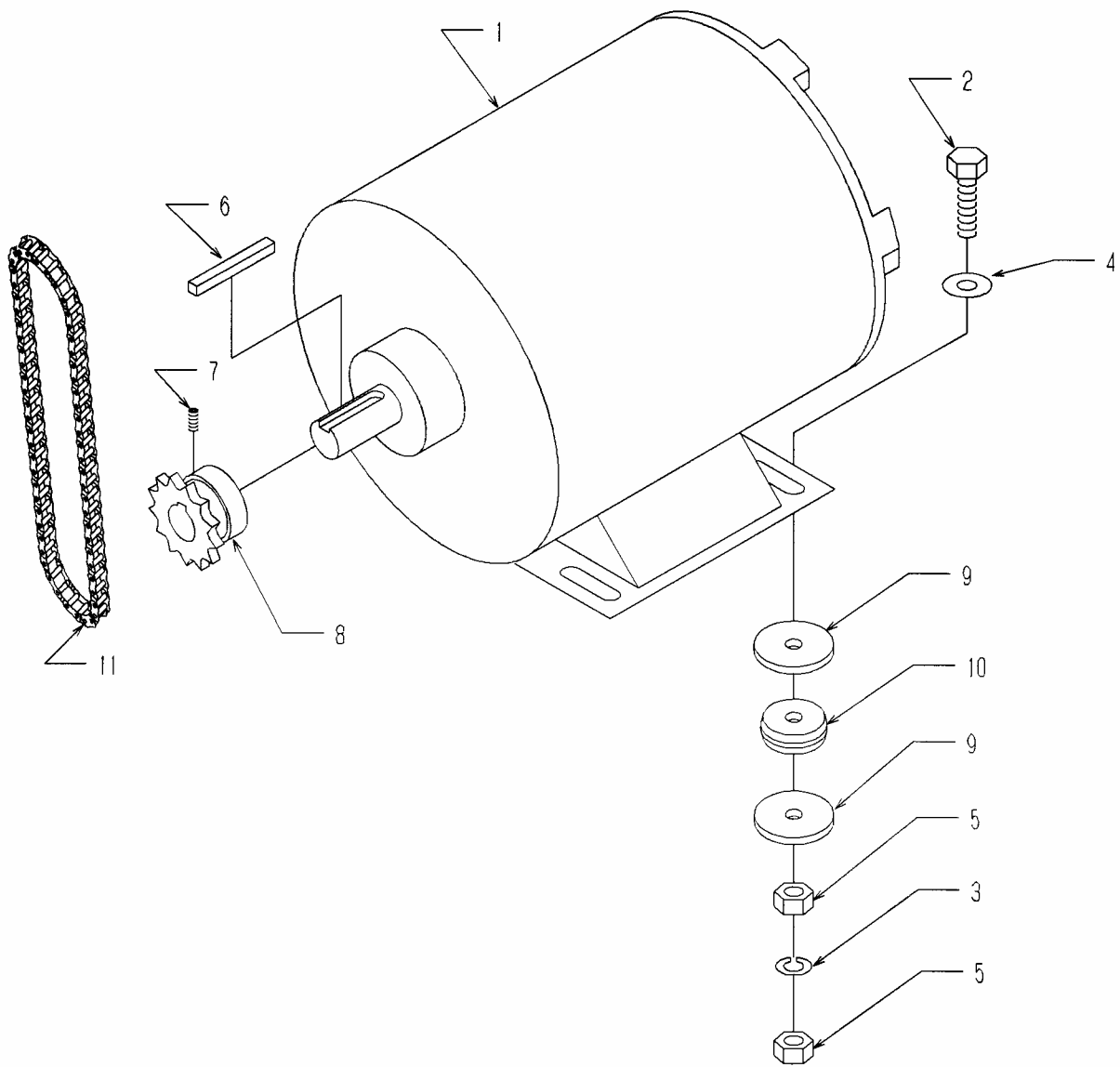
PART LIST	CAM MOTOR	FIG. M1-11
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Key	Part-No	Description	Key	Part-No	Description
1	T00032	Chain RS 35L60			
2	T02017	Sprocket RS35-t18			
3	B10310	Set Bolt M6×10			
4	P00073	Motor Bracket			
5	B06320	Flat Head Screw M6×20			
6	B04320	Cap screw M6×20			
7	B26400	Flat Washer M8			
8	B27400	Spring Washer M8			
9	B04420	Cap Screw M8×20			
10	E21061	M1 Motor (Cam Shaft) 100V 100W YEF0G-KP4P			
11	M06020	Key 5×5×30			
12	M06033	Key 4×4×20			
13	T04043	Bearing 6001LLU			
14	L00071	Collar			
15	B10206	Set Bolt M5×6			
16	E30053	Electromagnetic Brake			
17	B27100	Spring Washer M4			
18	B17100	Nut M4			
19	B10106	Set Bolt M4×6			
20	P99000	M1 Motor Cover			



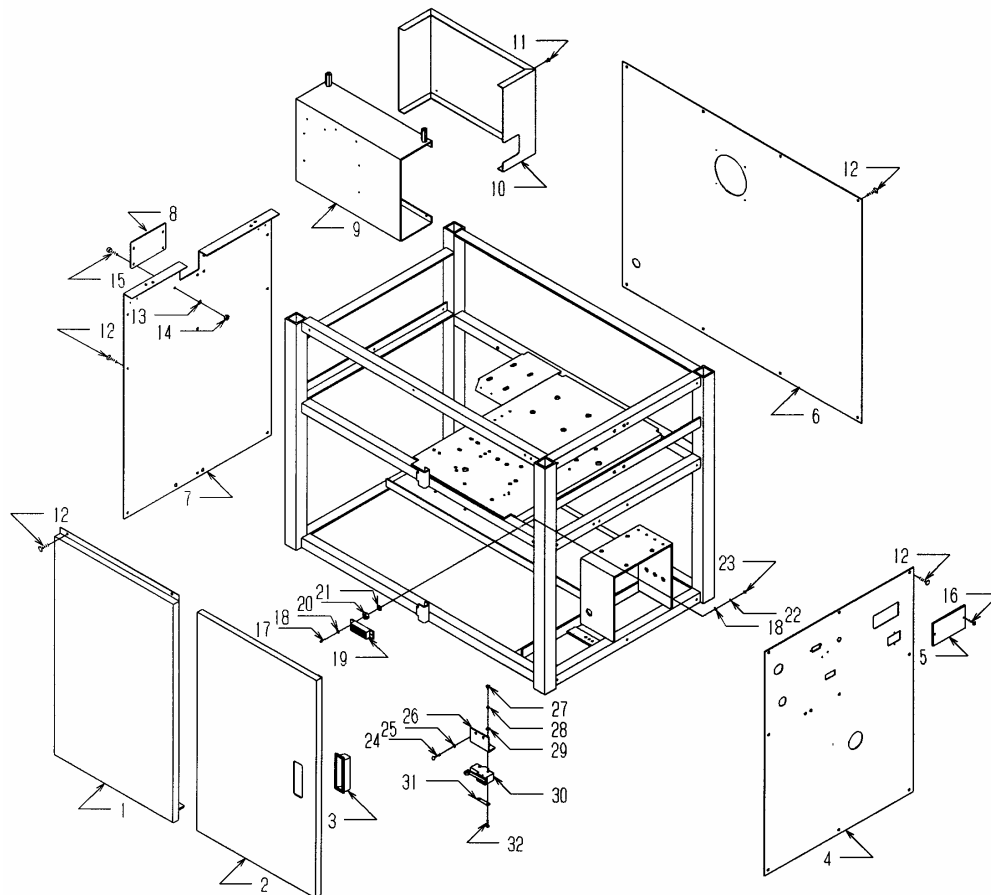
PART LIST	M2 MOTOR	FIG. M2-02
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Key	Part-No	Description	Key	Part-No	Description
1	E21060	M2 Motor 100V 150W EF0P-KP-4P	9	P18002	Flat Washer
2	B08325	Hexagon Bolt M6×25	10	N01092	Rubber
3	B27300	Spring Washer M6	11	T00114	Chain L46
4	B26300	Flat Washer M6	12		
5	B21300	Nut M6	13		
6	M06010	Key 5×5×25	14		
7	B10206	Set Bolt M5×6	15		
8	T02025	Sprocket RS25 T20	16		



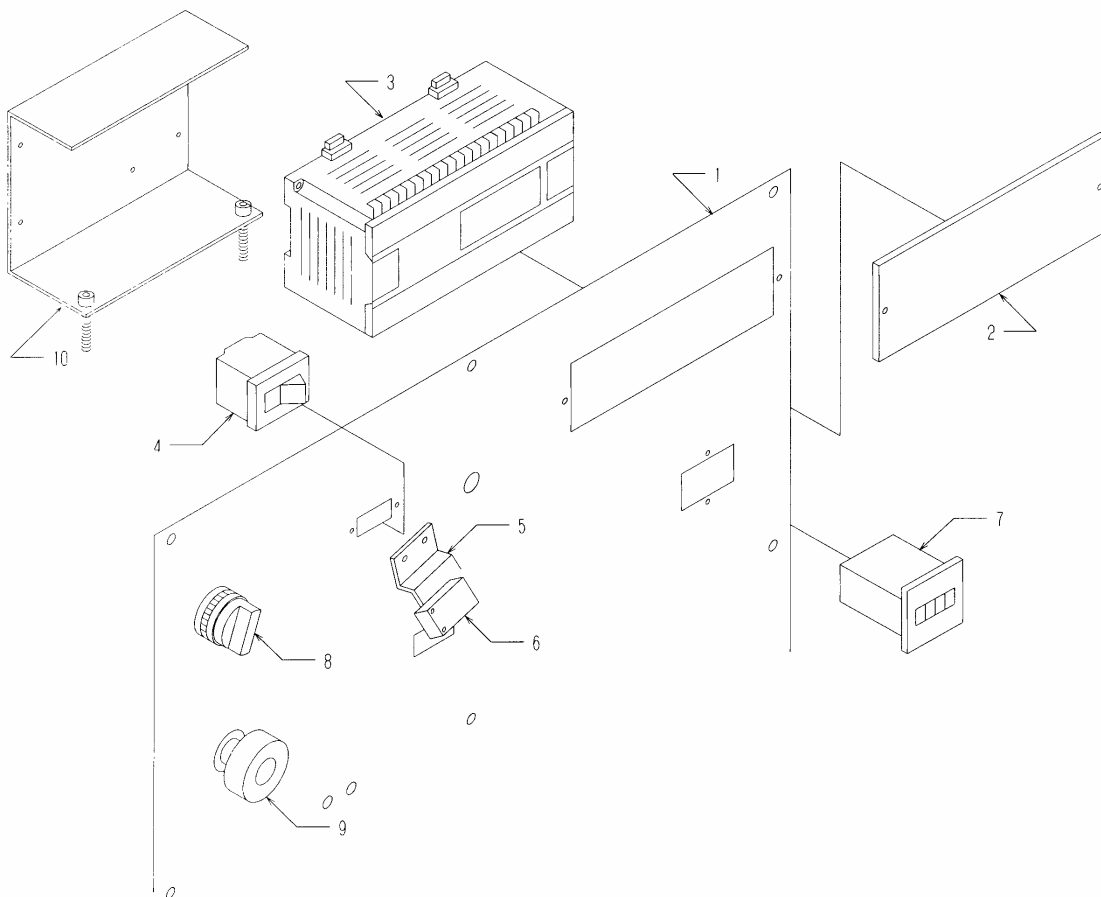
PART LIST	PANEL	FIG. PANEL-14
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Key	Part-No	Description	Key	Part-No	Description
1	P30234	Front Panel	21	B26300	Flat Washer M6
2	P30235	Front Door	22	B27000	Spring Washer M3
3	N00003	Door Knob	23	B17000	Nut M3
4	P30762	Right Panel	24	B00210	Pan Head Screw M5×10
5	N00070	Clear Cover	25	B27200	Spring Washer M5
6	P30232	Rear Panel	26	P00023	Safety Switch Bracket
7	P30236	Left Panel	27	B17100	Nut M4
8	P30231	Panel Cover	28	B27100	Spring Washer M4
9	A00342	Relay Box	29	B26100	Flat Washer M4
10	P30410	Relay Box Cover	30	E06018	Micro Switch BA-2RV22-T4-J
11	B07106B	Bolt M4×6	31	P03009	Switch Plate
12	B40208	Button Bolt M5×8	32	B00130	Pan Head Screw M4×30
13	B27300	Spring Washer M6	33		
14	B17300	Nut M6	34		
15	B04315	Cap Screw M6×15	35		
16	B40212	Button Bolt M5×12	36		
17	B00018	Pan Head Screw M3×18	37		
18	B26000	Flat Washer M3	38		
19	R00001	Magnet 100A-1	39		
20	B17400	Nut M8	40		



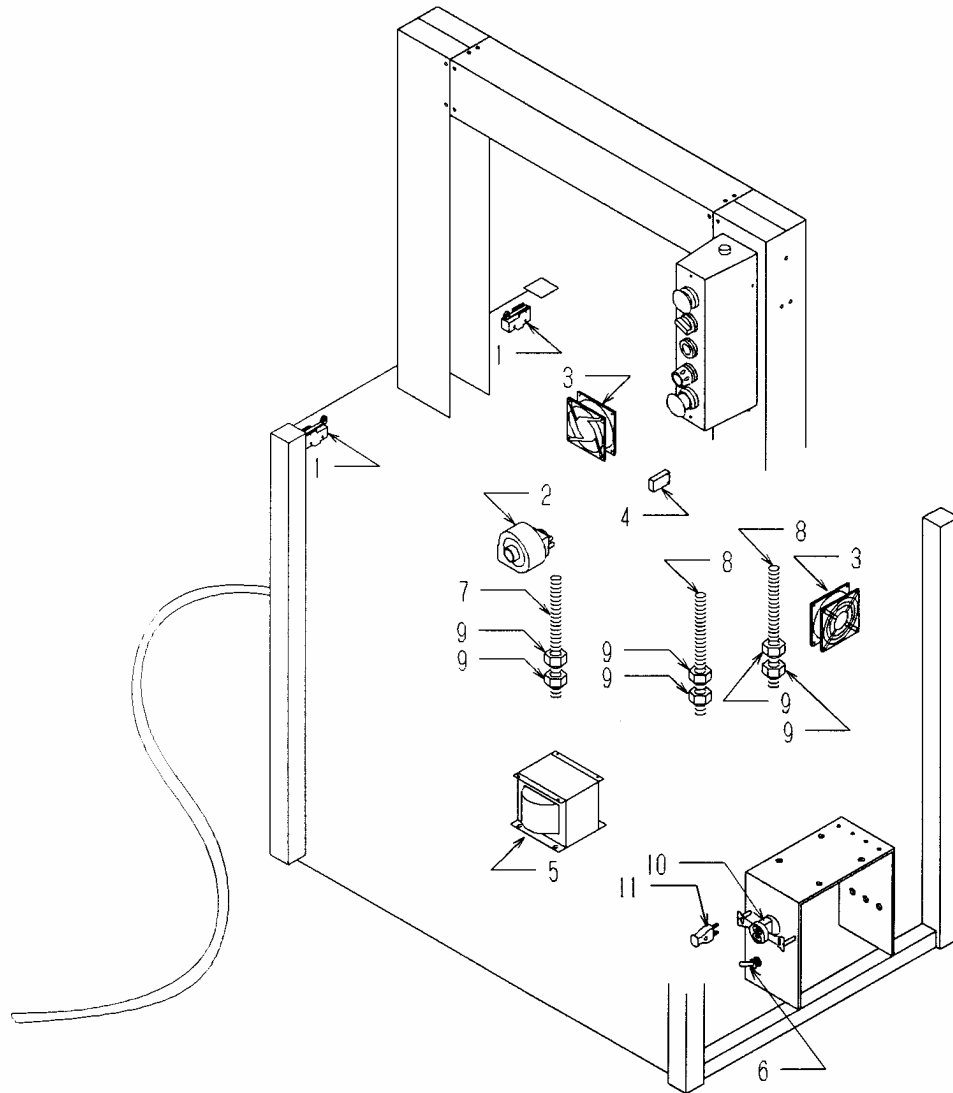
PART LIST	RIGHT SIDE	FIG. RIGHT-02
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Key	Part-No	Description	Key	Part-No	Description
1	P30762-2	Right Panel	12		
2	N00070	Clear Cover	13		
3	E12031	Programmable Controller	14		
4	E09033	Power Switch (10Amp)	15		
5	P09027	Sensor Bracket	16		
6	E06020	Photo Cell (SA1B-DN1)	17		
7	E27017	Counter (MCU7P DC24V)	18		
8	E03129	Auto Load Switch (ASN311)	19		
9		See FIG. HEAD-13P	20		
10	A00223	Programmable Controller Bracket	21		
11			22		



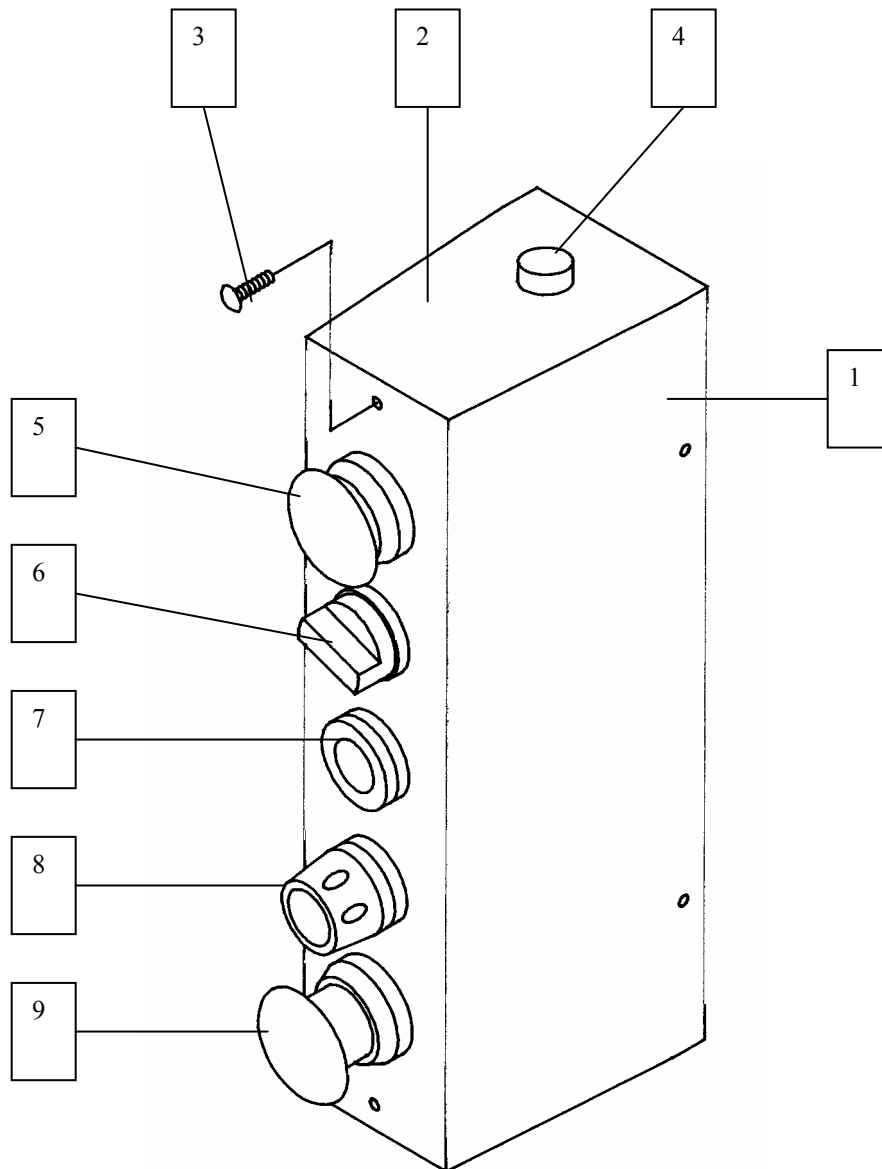
PART LIST	CONTROLS	FIG. ELEC-035
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Key	Part-No	Description	Key	Part-No	Description
1	E06010	Micro Switch BZ-2RW82-T4-J	12		
2	E21023	Exhaust Fan SF2034-3	13		
3	E21049	Blower 109S005	14		
4	E06020	Photo Cell SA1B DN1	15		
5	E24004	Transformer 1KVA P110-115V S100V	16		
6	E03033	Toggle Switch WD1001	17		
7	L21027	Table Supporting Screw	18		
8	L21022	Table Supporting Screw	19		
9	B17800	Nut M16	20		
10	E18255	Outlet WF1025EK	21		
11	E18257	Plug WF-4215	22		



PART LIST	CONTROL BOX	FIG. ELEC-017
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Key	Part-No	Description	Key	Part-No	Description
1	P30764	Control Box	12		
2	P30763	Control panel	13		
3	B00108	Pan Head Screw M4×8	14		
4	E03009	Strap feed complete light	15		
5	E03039	Manual strap switch	16		
6	E03129	Auto/Manual select switch	17		
7	E03040	Reset switch	18		
8	E03137	Circuit power switch (DC24V)	19		
9	E03119	Emergency stop switch	20		
10			21		
11			22		





PARTS LIST		RELAY BOX (GP44)		FIG. RB-008
Key	Part-Nr	Ladder-Diagram	Part-Name	Form
1	E24031	Power Supply	Power Supply	S82J-0124 10W
2	E30015	Capacitor	35 $\mu$ F	SH-P2
3	E30028	Capacitor	25 $\mu$ F	SH-M
4	E30012	Capacitor	30 $\mu$ F	SH-M
5	E15034	R20	Relay (M5 Motor) Strap Pull	SJ-OWG 1.4A
6	E15042	R3, R2	Relay (M2 Motor) Strap Feed Primary Tension	SJ-06GRM
7	E15040	R45	Relay (Strap Feed) SOL4	SJ-OG
8	E15040	R38	Relay (M1 Motor Brake)	SJ-OG
9	E15040	R23	Relay (Auto lead) SOL7	SJ-OG
10	E15040	MS1	Relay (Main Control)	SJ-OG
11	E30017	Rectifier	Rectifier unit (S2VB60 and ZNR10K221)	
12	E09010	Surge Absorber		ERV14D221
13	E18131		Terminal Block	CTW-15S2
14	E09036	OLM1	Circuit Breaker	BAC111305
15	E09035	OLM2	Circuit Breaker	BAC111705
16	E15010	R1	Solid State Relay (M1 Motor) Cam Shaft	AQR256

