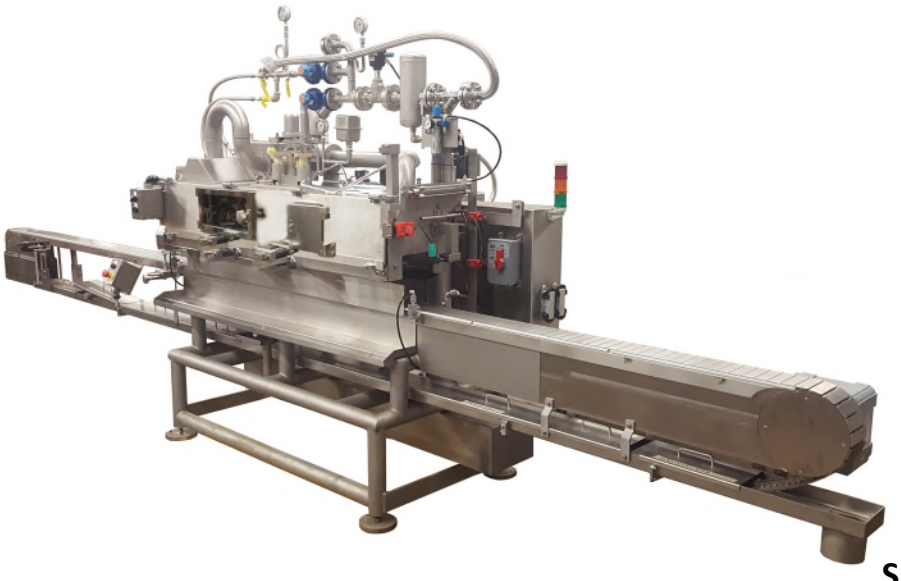
WC600
Stainless Steel Capper
Operating Manual

November 2021



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WC600 - OPERATING MANUAL TABLE OF CONTENTS

WC600 - OPERATING MANUAL TABLE OF CONTENTS

WC600 - OPERATING MANUAL TABLE OF CONTENTS

1. INTRODUCTION

1.1 Introduction

The purpose of this document is to acquaint you with procedures and adjustments that are necessary to operate the Silgan WC600 Stainless Steel Capper. These recommendations are a culmination of many years of experience with the sealing machines, operating under a wide variety of conditions and situations. To obtain the most efficient and trouble free capping operation, use this document along with Silgan equipment, and closures. Don't forgot about our outstanding service personnel.

Warning: When adjustments and setups are made on equipment, make sure that the power is shut off and the machine is not running.

1.1.1 General Safety Rules

Read all instructions and information supplied with equipment before attempting installation or operation.

1. Keep electrical boxes closed at all times, unless servicing the machine.
2. Ensure the correct electrical cables and connectors are in use per local codes.
3. Shut down and disconnect main electrical power prior to making fuse changes or wiring connection repairs.
4. Use only the correct fuse for the job. Do not use fuses larger or smaller than specified.
5. Do not by-pass fuses or safety lock-outs.
6. Do not run production with temporary electrical power lines.
7. Do not allow anyone, other than qualified personnel, to service electrical components.
8. Remove electrical power to equipment that will be shut down for an extended time.
9. Only perform proper repairs, using the correct components. Do not run production with improvised repairs or non-standard parts.
10. When working on the equipment, follow a Lock-Out-Tag-Out procedure.
11. To observe capper at the cap pick-up, ensure the steam supply is shut off then use the small panel door on the head.
12. Do not attempt adjustments inside capper head while steam is on.
13. Do not attempt to install or remove belts while equipment is running.

1. Do not work on equipment while wearing loose clothing, exposed jewelry, rings, or any articles in shirt pockets.
2. Do not climb on machine or use a ladder at any time.
3. Use proper lifting techniques when lifting the door.
4. Avoid contact with all steam-heated machine parts.
5. Ensure other personnel in the work area are advised of your presence.
6. All safety guards must remain in position unless removal is necessary for repairs.
7. Maintain steam system in proper repair. Leaking connections can cause injury.
8. Verify the safety relief valve is working properly, and traps are functioning. Inspect every 30 days.
9. Do not attempt to free stuck caps with hands. Stop the capper and hopper first.
10. Keep the area around the capper clear of all unnecessary articles or debris.
11. Stop the machine. Then remove glass and other sharp objects with gloves or tools.
12. While cleaning the machine, wear protective clothing and safety glasses.
13. Use safe cleaning compounds and solutions recommended for the job.

1.1.2 General Description

Combining the durability of corrosion resistant stainless steel with the latest sealing technology, Silgan has developed the WC600 to be easy to operate, easy to clean, and easy to maintain. It can accommodate the full range of Silgan's Twist-Off and Press-On/Twist-Off (PT) closures.

Features include: All stainless steel construction
Right or left hand configuration
Plc controlled with safety interlocks
Electronic head height adjustment
Touchscreen operator station
Electronically controlled c.i.p. System
Steam quality temperature control
Adjustable cap control assembly
Modular cap control assembly

As the leader in vapor vacuum sealing technology, silgan is proud to offer the WC600 Stainless Steel Capper engineered to fit with today's modern packaging lines.

1.1.3 Guidelines For A Well-Sealed Product

To achieve a properly sealed and secure package, follow the basic set up procedures and fundamental adjustments found in this document. The following guidelines will assist in achieving a well-sealed product.

Product: The product should be placed in the container in such a way that the container's finish is unobstructed. The container spacing is important. It should always be greater than the cap diameter. This allows for enough time for each cap to come to a complete stop for pick up.

Glass: A uniform and a consistently good quality container is important.

Cap: The quality of the closure is also important. The cap lugs must engage the thread of the glass without hesitation or cross-threading. It is important when running lug caps to maintain the cap and jar top in a parallel condition at the application point. When seating all press-on type caps a parallel condition between cap and glass top is also required. A uniform pressure while completing the seal must be maintained. Use only caps that are supported by experienced and qualified personnel.

Machine: Properly set up the machine and install a quality preventive maintenance program.

Electrical Requirements 480VAC, 60Hz, 3 Phase, 7.5Kw
Power Consumption 18A (30A Service Recommended)
Conveyor Gearmotor 3hp
Head Gearmotor 3hp
Height Adjustment Motor 1/2hp
Exhaust Blower Motor 3/4hp

Steam 5-8bar (70-115psi)
connecting flange: DN 25
steam consumption: 50-160 kg/h
(110-330 #/hr) depending on
product and vacuum level.
exhaust fan capacity: 22 m/minute (735 cfm)
exhaust pipe: minimum ø150mm (6.0")

1.1.4 Requirements

Air (for capper door assist and steam regulator)

7 bar (100 psi)

pipe size g 1/4"

air consumption 0.1 m/h (0.059 cfm)

Air (for capper control panel)

3.5 bar (50 psi)

pipe size 1/4 - 18 npt

air consumption (3cfm)

Water (for belt lubrication)

use soft water, if possible.

pipe size g 1/4"

water consumption: 0.25 m/h (8.8 ft /h) or 55 gal/h)

conveyor drain water connection DN 65

splash plates drain water connection DN 32

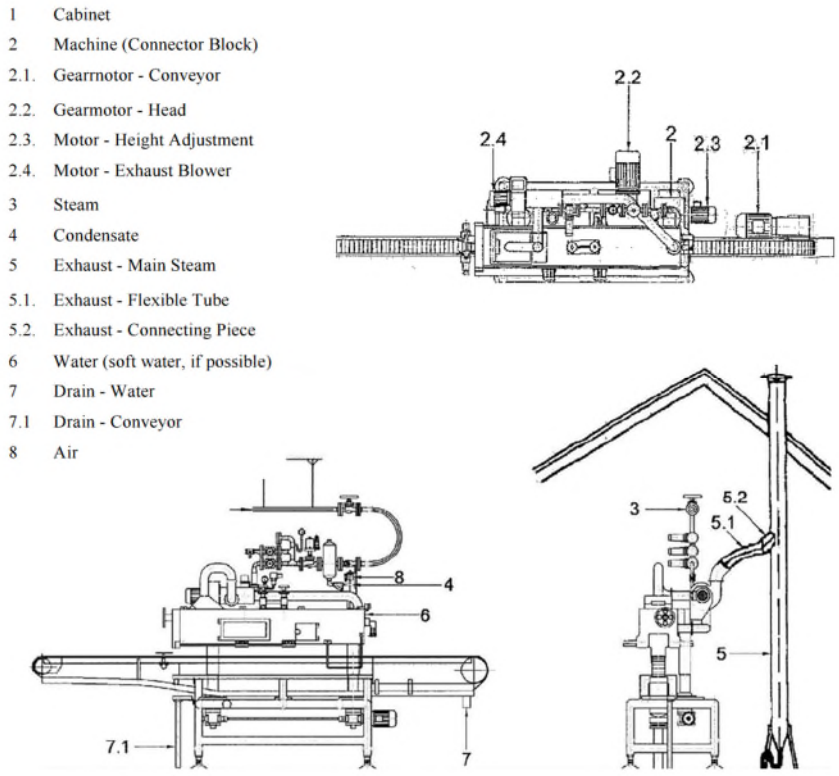


Figure 1-1: WC600 Utility Reference Points

1.1.5 WC600 Floor Plan General Dimensions

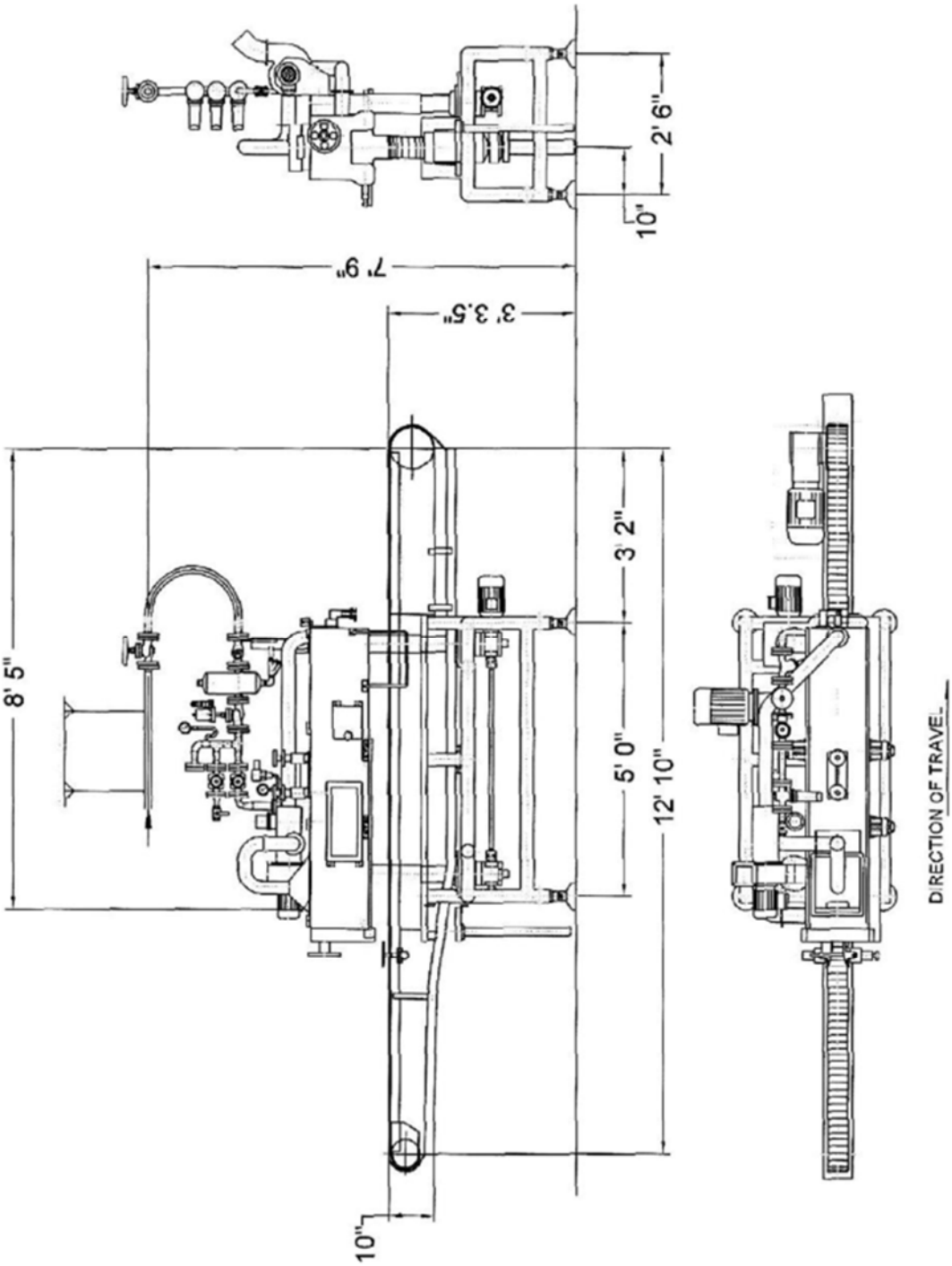


Figure 1-2: WC600 Floor Plan Multi-View

1.2 Installation Recommendations

1.2.1 Prior To Installation

When planning the line layout, the capper should be selected based on the required performance data and the range of products to be packed. High speed lines above 500 cpm (Caps Per Minute) require that the filler and capper be synchronized for optimum performance. This is most commonly accomplished using a VFD (Variable Frequency Drive) to control the filler drive motor. The capper and filler can then be electrically interfaced acting in a master-slave relationship. Proper installation of the capper, downstream conveyors, and attention to transfer point construction are prerequisites for smooth operation and high line efficiencies. Transfers from the filler should always be made directly onto the capper conveyor. Side or butt transfers with liquid filled, open containers should not be used.

1.2.2 Installation

The capper must be mounted on substantial flooring with a level surface under each of the four leveling pads. Optional capper leg extensions can be provided to achieve the proper conveyor height requirement. Care must be given to leveling the capper in both the horizontal and vertical axis for efficient operation. It is normally not necessary to bolt the machine to the floor.

1.2.3 Capper Utilities

The required supply lines and connections must be provided by the customer. The complete steam control system is mounted on the capper head. Use a three foot long flexible, metal steam hose to connect the steam supply to the control. The hose allows height adjustments to the head. Adjusting the head height accommodates containers of varying heights. To establish the height of the steam supply line, position the capping head midway between the highest and lowest container height setting. Never tap the capper steam supply from the bottom of the supply header.

2. ELECTRICAL OPERATION

2.1 Lockout/Tagout (LOTO)

2.1.1 Compressed Air Energy

A compressed air supply lockout valve is provided near the regulator at the capper door. The valve shuts off the air supply to the capper, and vents the air lines to eliminate energy stored in these lines. Shutoff, lockout, and tagout of this valve is required before and during the following actions:

- Repair or replacement of any part on the machine
- Clearing jams or making adjustments inside the capper head
- Work on steam system components
- Cleaning out the machine, including clearing debris and product after a jam

2.1.2 Electrical Energy

Cutting off electrical energy from the machine should be done by shutting off the main power enclosure disconnect switch. This switch can be locked and tagged in the off position. Shutoff, lockout, and tagout of the main power enclosure disconnect switch is required before and during the following actions:

- Repair or replacement of any part on machine
- Work on steam system components
- Clearing jams or making adjustments inside the capper head
- Cleaning out the machine, including clearing debris and product after a jam

2.1.3 Steam Energy

A steam supply lockout valve must be installed at the capper. It will shut off the steam supply to the capper. Shutoff, lockout, and tagout of this valve is required before and during the following actions:

- Repair or replacement of any part on machine
- Clearing jams or making adjustments inside the capper head
- Work on steam system components
- Cleaning out the machine, including clearing debris and product after a jam

2. ELECTRICAL OPERATION

2.2 Installation Instructions

480V, 3Phase, 60Hz, 13.4A full load (Service protected at 30A max. recommended)
Short circuit current rating of capper controls: 65kA RMS symmetrical at 480V max.

2.2.1 Connection Requirements

Control Cabinet to Machine: 3 phase power must be run to the control cabinet on the rear of capper.

Capper Control Cabinet to Filler Controls: Connections to interface between the capper and filler controls are optional. The capper is able to run in a standalone mode, independent of a filler. It can also be run in Slave Mode, which means the speed is synchronized to the filler. Slave Mode is the most common setup. It provides better product handling during starting, running, and stopping situations.

StandalOne Mode Connections: If intending to run in standalone mode, no interconnections are needed between capper and filler controls.

Slave Mode Connections: If intending to run in slave mode, the following connections are needed:

Analog Speed Signal: The capper needs to receive a signal from the filler representing the actual running speed of the filler. The capper responds to instantaneous changes in the filler speed. For this reason, a hardwired analog signal exchange is recommended, to avoid network data delays. The capper accept an analog signal in the form of 0-5V, 0-10V, 0-20mA, or 4-20mA. The capper signal conditioner SC1 provides electrical isolation between the filler and capper control circuits. A typical source for the speed signal is the filler machine motor's variable frequency drive, configured to output the drive's actual running speed. Run the signal with 2-conductor shielded cable. At the capper, if the signal is current, connect it to terminals A1(+) and A2(-), and jumper A1 to A3. If the signal is voltage, connect it to terminals A3(+) and A2(-), with no jumper used. Configuration switch settings in the SC1 module must match the signal format used. The factory default setting is 4-20mA. If a different format signal is used, DIP switches 1 thru 4 must be set to appropriate positions, as is shown on the side of the SC1 module. DIP switches 4 thru 7 must always be set for 0-10V.

2. ELECTRICAL OPERATION

Filler Feed Control: Connect wires X5 and X6 from the capper control cabinet to the filler feed control circuit. Isolated relay contact CR3 at the capper indicates when the capper is running and ready to accept product from the filler. Filler controls should be arranged to allow product feed only when CR3 contact is closed. When CR3 opens, the filler should stop feeding product, and ramp down in speed. The filler may be either be ramped down to a stop, or it may continue to run at a slow idle speed. When the capper sees that its speed (which is synchronized to the filler speed) has dropped down to a minimum, the capper will wait for the SHUTDOWN DELAY to time out, then stop.

Filler Immediate Stop Control (optional): Some capper fault conditions will result in an immediate shutdown of the capper. The conveyor situation between the filler and capper should be evaluated. Verify product flow when the capper shuts down with no warning. The filler may need to be stopped immediately to prevent product jams and breakage. If needed, connect wires X1 and X2 from the capper control cabinet to the filler control circuit. Isolated relay contact CR2 at the capper indicates when the capper is running. Filler controls should allow product feeding only when CR2 is closed. When CR2 opens, filler should stop as quickly as is needed to prevent product backed up at capper entrance from jamming and/or breaking.

Capper Control Panel to Hopper Controls (optional): Interface points are provided for the capper. These monitor and control the hopper. Hopper start and stop buttons are provided to arm and stop the hopper. The running status of the hopper can also be monitored. These connections are optional based on customer need.

Start/Stop Control Connections: Connect wires from capper terminals H1 and H2 (an isolated N.O. contact) from the capper to the hopper, in a parallel connection to the hopper's start button. This will enable the hopper start button on the capper's workstation to arm the hopper. Connect wires from capper terminals H3 and H4 (an isolated N.C. contact) from the capper to the hopper, in a series connection with the hopper's stop button. This will enable the hopper stop button on the capper's workstation to turn off the hopper. Terminals H3 and H5 are available if a N.O. contact is needed instead.

Hopper is Armed/Running Connections: Connect capper terminals 24V and H12 from the capper to the hopper, to an isolated relay contact that closes when the hopper is armed or running. The capper then will not be allowed to run in auto mode unless the hopper is armed/running. If this interface connection is not used, terminal H12 must be jumpered to 24V.

Other Optional Interfaces

Line Conditions are Ready Connections: Connect capper wires 24V and 1106 from the capper to the hopper, to an isolated relay contact that closes when line equipment is ready to run production. The capper then will not be allowed to run in AUTO mode unless this equipment is ready. If this interface connection is not used, terminal 1106 must be jumpered to 24V.

Emergency Stop Interface Connections: Additional emergency stop buttons may be connected into the capper safety circuit, using terminal connections S11 to S12, and S21 to S22. If not used, these terminal connections must be jumpered. A set of N.O. contacts from the emergency stop safety relay is available at terminals S7 and S8.

2.2.2 Configurations and Settings

Auto Rinse System Option: If capper is equipped with an auto rinse system, pull out configuration switch CS1. When no auto rinse system is used, push in CS1.

Standalone Operation: If capper is to be operated in standalone mode, pull out configuration switch CS2, and set capper drive to using parameter set 1.

Slave Mode Operation: This mode synchronizes the capper speed to the filler. If capper is to be operated in slave mode, push in configuration switch CS2, and set capper drive to using parameter set 2.

Stop Selection Configuration: CS3 is a configuration stop switch. Pull out CS3 to immediately stop the capper. Push in CS3 to perform a coordinated, controlled stop. The controlled stop will stop the filler feed and allow product in filler to run out before capper will stop. Configuration switch CS3 selects the type of stop initiated when any of the following faults occur:

- Caps have run out at the inlet chute
- Low steam pressure occurs while running
- Low temperature in capper occurs while running

Password Protection Selection: Configuration switch CS4 selects the ability to adjust machine parameters with or without a password. Pull out CS4 to adjust the machine parameters without a password. Push in CS4 to adjust the machine parameters with a password. The default password programmed at the factory is “wc600”. The password may be changed if the current, valid password is known.

2. ELECTRICAL OPERATION

2.3 Pushbuttons Control Functions

2.3.1 HMI Station

Emergency Stop: The E-Stop will immediately stop the machine, disengage the safety circuit, and prevent the restart the capper. Use this button to stop the machine when it is necessary to maintain personal safety, or to protect against equipment damage. Do not use this button to stop the machine under normal conditions. The shutdown of production may not be orderly. The E-Stop remains engaged after being pressed and must be pulled back out before the machine can be restarted.

Caution: When performing maintenance, do not use the emergency stop as a substitute for locking out themachine's energy systems. It may be used as anddditional safety measure.

Safety Reset: This button will reset and energize the safety circuit, as long as safety conditions are fulfilled. The safety conditions are: Emergency stop button is pulled out, Capper door is closed, engaging the guard switch

The blue light being on solid indicates both safety conditions are fulfilled. The blue light flashing indicates the door guard switch is open. If the emergency stop button is pressed, the blue light will not turn on.

Hopper Start: If the hopper controls are interfaced with the capper, this button will start the hopper. The indicator will light up when the hopper is ready to run, as is indicated by
PLC input 09 (Terminal H12).

Hopper Stop: If the hopper controls are interfaced with the capper, this button will stop the hopper. It will perform an orderly shutdown of production when used under normal conditions.

Figure 2-1: HMI Station

2. ELECTRICAL OPERATION

Steam Start: This turns on the steam flow into the capper head. The exhaust blower will turn on first. Then the steam control valve will turn on. A few seconds later the valve will let steam flow into the head chamber. When in the AUTO mode, the steam must be turned on. The steam startup cycle must be completed before the capper will start. The green light of this button will be lit when the steam is on.

Steam Stop: This turns off the steam flow through the capper head. In the AUTO mode, it will also stop the capper. First the steam control valve stops the steam flow into the capper head. The exhaust blower remains on for several seconds to evacuate steam from the capper head, then lastly, the exhaust blower shuts down.

Capper Start: This button starts the capper motion. When in AUTO mode, the capper will not start unless the following conditions are met:

- Steam is on
- Steam Pressure switch is closed and indicating adequate steam supply pressure
- Capper head temperature meets or exceeds programmed setpoint
- An adequate supply of caps at the inlet chute is present
- The hopper is armed and ready

When the capper is slaved to the filler, and is started in the AUTO mode, the speed will be synchronized with the filler. If the filler is stopped, or running at a very slow idle, the capper will run at its minimum speed (approximately 60 ft/min.). When the capper is not slaved to the filler, or is started in the MANUAL mode, it will run at the speed setpoint entered into the operator display.

Capper Stop: This will turn off the capper. When in MANUAL mode, or when the capper is not slaved to the filler, the capper will down immediately. When in the AUTO mode and slaved, the capper will wait for the filler to come to a stop or reach a minimum speed before shutting down. However, if a maximum wait time is exceeded before the filler speed winds down, the capper will shut off regardless of the filler speed. The steam will perform a shutdown sequence after the capper has stopped motion. If capper stop is pressed whilethe steam is on, but the capper is not running, the steam will begin its shutdown immediately.

2. ELECTRICAL OPERATION

Manual/Auto: Setting the selector switch to AUTO enables all monitoring features designed to ensure good product quality. If the capper is slaved to the filler, the capper speed will track the speed of the filler. In AUTO mode, the capper will shut down, or will not start unless all of these conditions are confirmed:

Capper is up to temperature
Steam pressure switch indicates steam is on
Caps are available at inlet chute
Missing caps on jars do not exceed limit
Hopper is armed/ready (PLC input I-09)
Line equipment is running (PLC input ExpMod1 I-06)
No jar jams detected at inlet or exit jar sensors

With MANUAL mode selected, the capper speed will be determined by the capper speed entry on the operator display.

Elev/Jog/Run: Setting the selector switch to ELEVATION disables capper running, and enables raising or lowering the capper head under power. Setting to JOG only enables the low speed momentary jogging of the capper. Setting to RUN allows capper to run either in AUTO mode or MANUAL mode.

Jog: When the selector switch is in JOG position, pressing the JOG button runs the capper at slow speed for the time the button is pressed. If the capper door is open, both JOG and 2-HAND JOG/UP/DOWN buttons must be pressed at the same time to jog the capper.

Up: When the selector switch is in ELEV position, pressing the UP and 2-HAND JOG/UP/DOWN buttons at the same time will move the capper head up under power.

Down: When the selector switch is in ELEV position, pressing the DOWN and 2-HAND JOG/UP/DOWN buttons at the same time will move the capper head down under power.

Caution: Before moving the head up or down under power, look to see if the up or down head movement will cause a damaging collision with anything that may lie in its path.

2.3.2 Pushbutton Box On Conveyor

Two Hand Jog/Up/Down: This pushbutton provides the safety feature of 2-button operation when a free hand can be exposed to harm. Press this button simultaneously with the UP or DOWN buttons to raise or lower the capper head under power. Press this button simultaneously with the JOG button to jog the capper when the door is not down and secured. The 2 buttons must be pressed at the same time within 1/2 second of each other, or the function will not engage.

2.3.3 Special Functions

Head Height Auto Adjust: When the head elevation is being lowered under power, if the MISSING CAP prox sensor sees metal, a very short time delay will time out, then the head down motion will stop. This is used as a quick way to set the head height for a new jar/bottle height setup as follows:

- Place capped jar centered directly underneath the MISSING CAP prox sensor.
- If the sensor is too low to fit the jar underneath, raise the head height to about 1" higher than the top of the capped jar.
- With the jar underneath the sensor, lower the head by pressing the DOWN and 2-HAND JOG/ UP/DOWN buttons. Continue pressing the buttons until the head stops automatically, when the prox sensor sees the jar cap.

Check to verify the head height is in the correct position for cap application. Make fine adjustment, if necessary.

Missing Cap Detection: The 2 sensors at the capper exit work together to determine is a jar is missing a cap. If the optical jar sensor sees a jar, but the proximity sensor does not see a cap on the jar, a missing jar is detected, and the signal horn gives an audible "burp". When caps runout or get jammed at the capper inlet chute, then consecutive jars will be missing caps. If the number of consecutive missing caps exceeds the limit, the capper will shut down. This limit can be adjusted on the HMI screen.

Elevation Jam Detection: When the capper head is lifted or lowered under power, the 2 threaded spindles in the support posts will turn at equal rotations. Timing vanes and sensors at each spindle monitor the rotations. If one or both of the spindles jam, and stop rotating for a short moment, it will be detected and the elevation motor will be stopped. If this fault is detected, be very careful before trying to lift or lower under power again. Check for a jammed spindle visually, and when lifting/ lowering using the handwheel.

2.3.4 HMI Touchscreen Display

The operator display defaults to the main screen. Capper fault and status messages are displayed along with the capper head temperature, the temperature setpoint, and the manually set capper speed setpoint. Pressing NEXT will step you through a sequence of screens where you can change setpoints and operating parameters.

Fault/Status Messages: T his field displays messages from currently occurring fault or status conditions. If multiple faults are occurring at the same time, the messages will sequence through displaying all occurring messages. Some fault conditions latch, and will reset only when a START, STOP, or RESET button is pressed.

Press NEXT to advance the display.

Capper Head Temperature Setpoint Adjust: When the capper is in AUTO mode, it will not start until the head temperature reaches or exceeds the setpoint. Change the setpoint here by touching the temperature value. A keypad display will pop up and a new value can be entered *(Figure 2-3)*.

Press NEXT to advance the display.

Capper Speed Manual Entry: If the capper is slaved, or speed synchronized to the filler, and the capper is in AUTO mode, then the filler speed governs the speed of the capper. But when in MANUAL mode, or when not slaved to the filler, the capper will run at the speed entered here. Change this speed value as needed, between the values of 65 and 313 feet per minute *(Figure 2-4)*.

Press NEXT to advance the display.

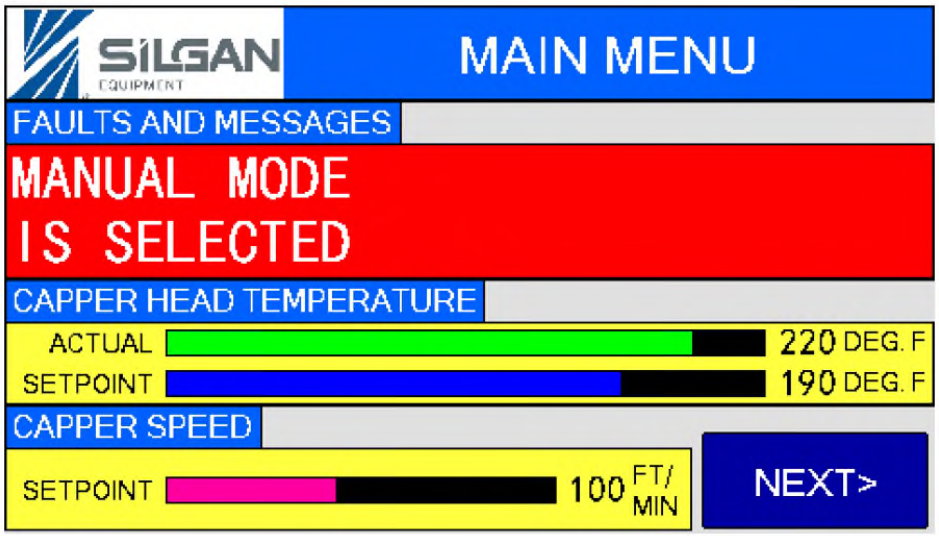


Figure 2-2: HMI Touchscreen Display

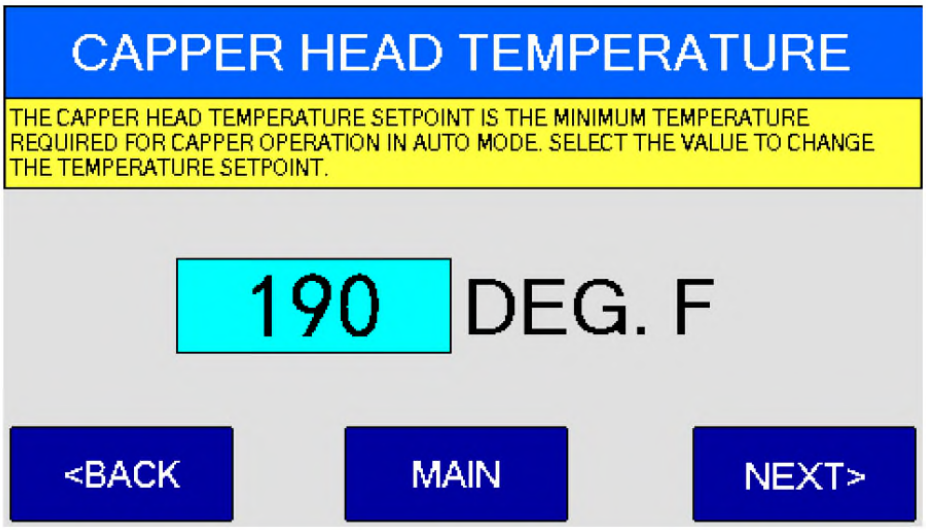


Figure 2-3: Capper Head Temperature

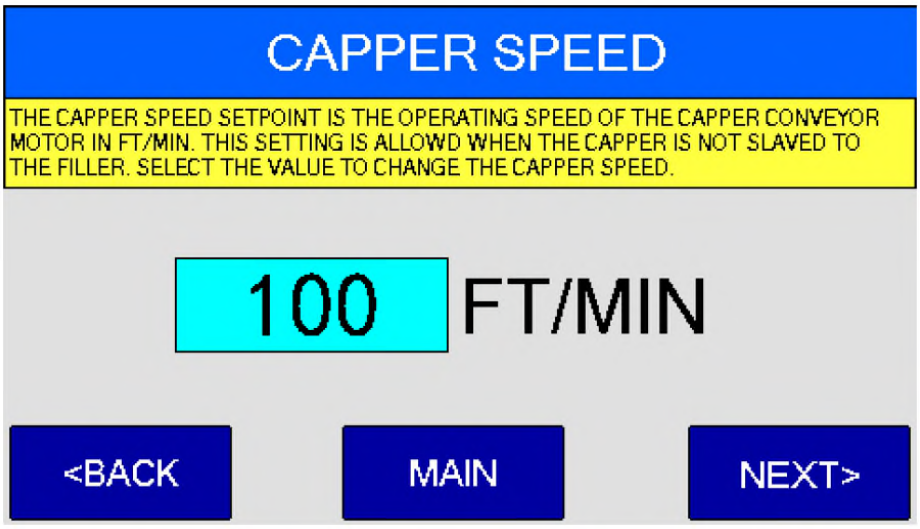


Figure 2-4: Capper Speed

Bypass Mode: This running mode is intended for production lines where there is more than one capper (or canner) in the line. Turning on the BYPASS mode will allow the capper conveyor to run, without running sealing belts in the head. The head can be lifted up out of the way to allow jars/ bottles/cans to pass through the capper, when this capper is not applying the cap. Toggle the mode by pressing the red/green field *(Figure 2-5)*.

Press NEXT to advance the display.

Consecutive Missing Caps to Shutdown Capper: Enter the desired number of missing caps detected to result in the capper being stopped. A value of 1 stops the capper on every missing cap. A value of 0 (zero) disables the function so that the capper will not stop from any amount of missing caps *(Figure 2-6)*.

Press NEXT to advance the display.

Capper Shutdown Delay: In STANDALONE mode, this is the delay from the point where the CAPPER STOP button is pressed, or a shutdown fault is detected, to the point where the capper begins to stop. In SLAVE mode, this is the delay from filler slowing down to a stop or idle speed, to the capper stopping. Its main purpose is to allow jars/bottles to fully run through the filler and capper before the capper stops. If a delay to stop is not needed, set this value to a minimum *(Figure 2-7)*.

Press NEXT to advance the display.

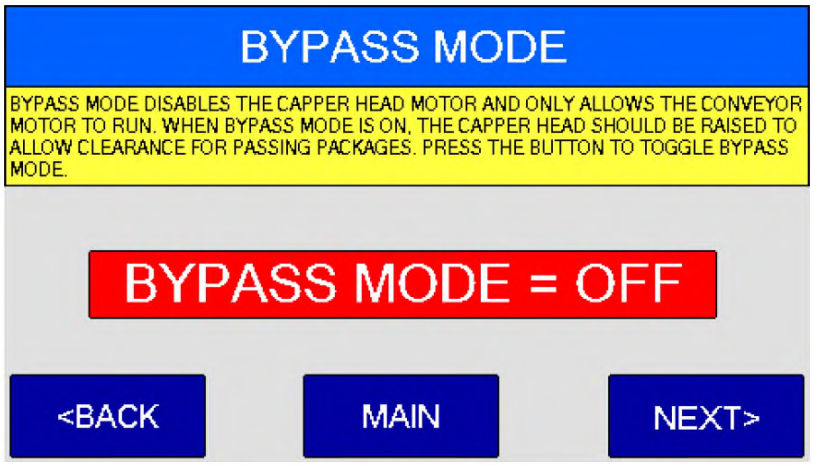


Figure 2-5: Bypass Mode

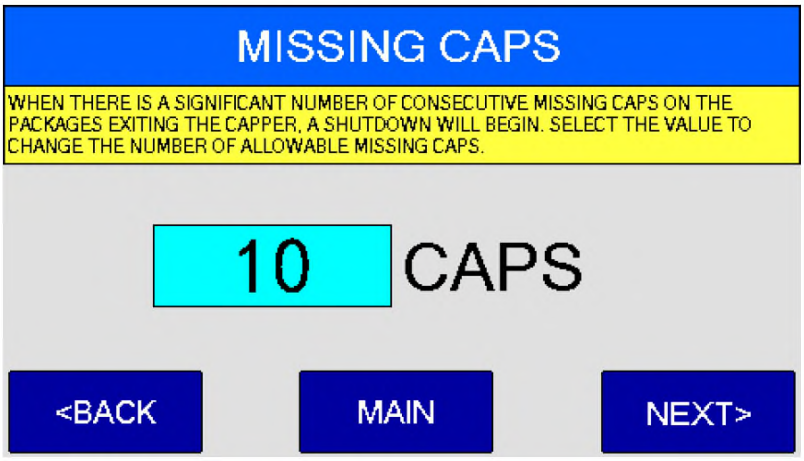


Figure 2-6: Missing Caps

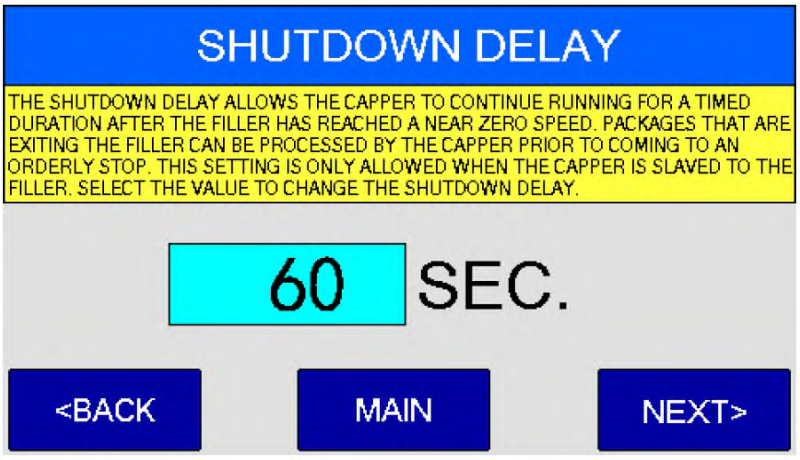


Figure 2-7: Shutdown Delay

Maximum Allowed Time to Shutdown: This parameter is only active in SLAVE mode. When a CAPPER STOP is initiated, the capper waits for the filler to stop the jar/bottle flow, then slow down to a stop or idle speed. When the slow speed is reached, then the (previous) SHUTDOWN TIME times out, then the capper stops. If the capper never sees the filler speed come down, then this MAX SHUTDOWN delay times out and stops the capper. This delay prevent the capper from the possibility on not stopping after the stop was initiated. If configuration switch CS1 is open (as for STANDALONE operation), this screen will not appear *(Figure 2-8)*.

Press NEXT to advance the display.

Filler/Capper Speed Ratio: This parameter is only active in SLAVE mode. It scales the capper speed to the MASTER filler speed, to achieve speed synchronization. Adjust this ratio so that the capper speed matches the filler speed. If in STANDALONE operation, this screen will not appear *(Figure 2-9)*.

Press NEXT to advance the display.

Head Height Stop Delay: This delay determines the precise stopping position when using the auto head height adjustment feature. When the capper head is being lowered under power, this timer starts timing when the prox sensor (at capper exit) first sees the metal cap on the jar/bottle. When the timer times out, the head lowering stops. This delay was preset at the factory. For more information on this, refer to section 2.5 ELECTRICAL SYSTEM ADJUSTMENTS *(Figure 2-10)*.

Press NEXT to advance the display.

Control Panel Temperature: The actual temperature of the inside of the control cabinet is shown on the first bargraph display. If the temperature reaches or exceeds the setpoint, a warning alarm is displayed on the HMI screen, but does not shut off the capper, or interrupt production. The key components in the control panel are rated to operate in ambient temperatures of 122 deg F or higher. Adjust the setpoint as appropriate to give an alert if temperatures get too high *(Figure 2-11)*.

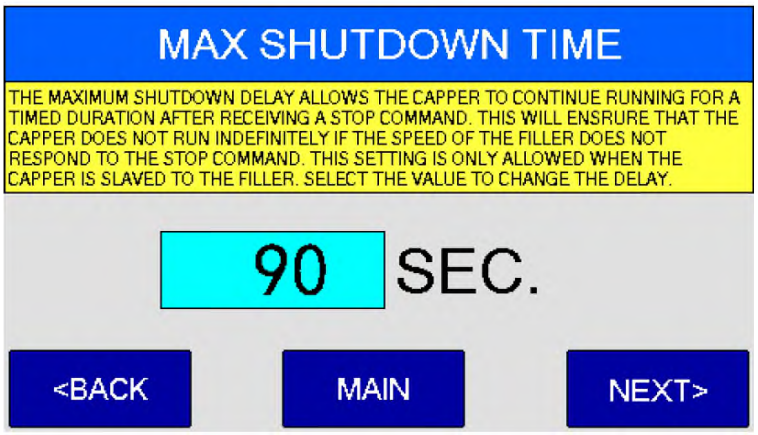


Figure 2-8: Max Shutdown Time

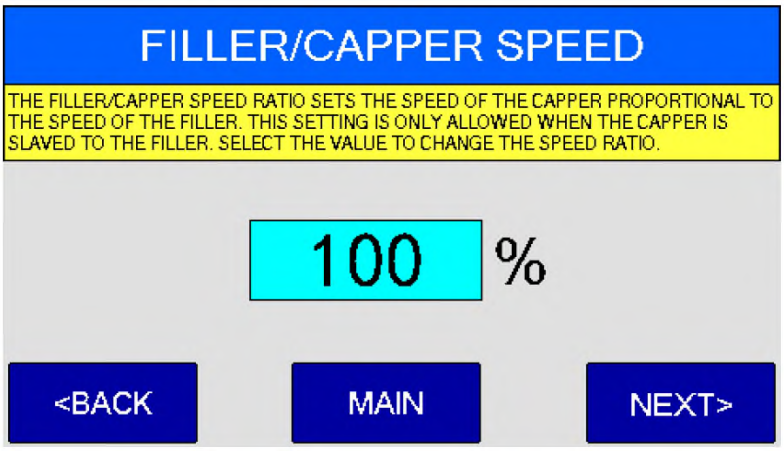


Figure 2-9: Filler/Capper Speed

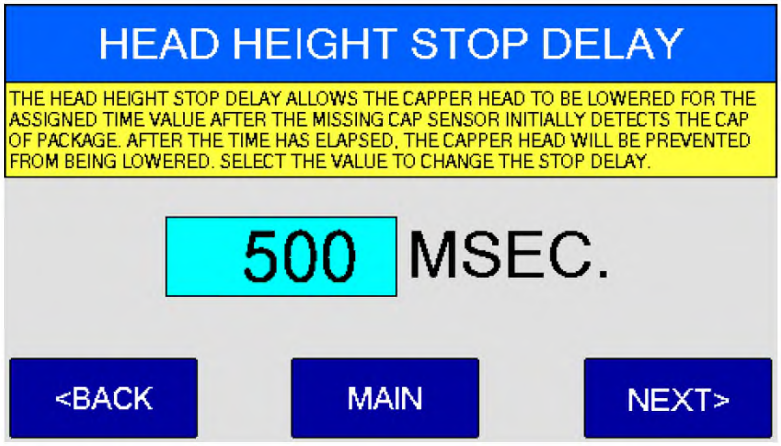


Figure 2-10: Head Height Stop Delay

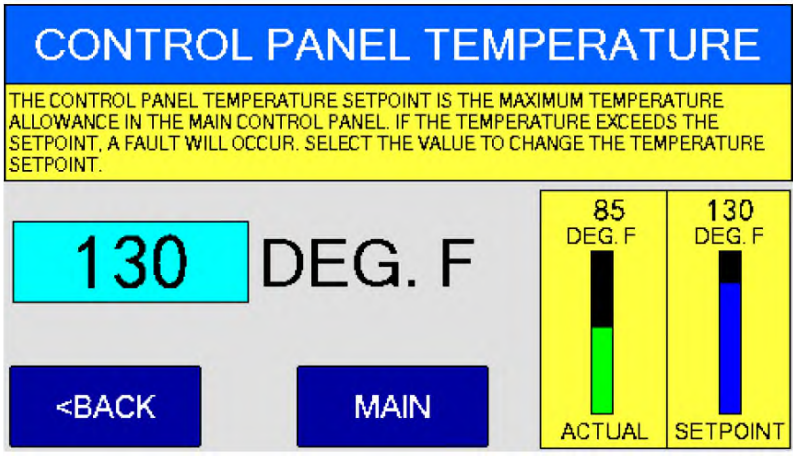


Figure 2-11: Control Panel Temperature

2.4 General Start Up Procedures

The following steps outline the requirements to start the capper/hopper system:

- Turn on the main power at the main power enclosure. Lift the power disconnect lever.
- Verify all **E-stop** buttons are pulled out.
- Secure the capper door. Verify the hand screw lockdowns are tight.
- Press the **Safety Reset** button on the HMI station. Ensure that the blue light is illuminated, indicating the safety circuit is engaged.
- Ensure the **Manual/Auto** switch is in the desired position. If **Auto** mode is selected: When **Slave** mode is used, the capper will run with the conveyor speed in sync with the filler. When **Standalone** mode is used, the capper will run the conveyor at the capper's manually adjusted speed setting. If the filler is stopped or idle, the capper will run at minimum speed.
- If **Manual** mode is selected: This mode is used for adjustment and/or testing. This mode may also be used any time the capper needs to run independently from the filler or the rest of the production line. In **Manual** mode, the capper will run at the capper speed setting. The capper will run regardless of whether any of the following is running: steam, filler, hopper, or the rest of the production line.
- Verify the **Hopper Start** button is lit. If it isn't, press the **Hopper Start** button. This starts the cap flow to the capper inlet chute.
- Press the **Steam Start** button. This starts the exhaust system and steam flow to the capper. The **Steam Start** button light should be lit and the steam system should start. If not, check the fault/status messages on the HMI screen.
- Press the **Capper Start** button. This starts the conveyor motion. If **Run** mode is selected, there are system requirements that must be met prior to the capper start: The minimum steam pressure must be met, reference pressure switch **PS1**. The capper temperature must meet the minimum low temperature limit. The operator screen can display the capper temperature, and low temperature limit. Caps must be present and sensed by the cap runout sensor **PHOTO3**. Bottle jams must not be detected at entrance and exit sensors **PHOTO6** and **PHOTO8**.

2.5 Electrical System Adjustments

Capper Speed: In Manual mode, the capper will run at the speed programmed into the HMI operator screen. To change this setting, navigate to the capper speed screen. Start at the main screen and press NEXT (x2). Speed settings can range from 65 to 313 fpm (feet per minute).

Jars With No Caps Shutdown: Jars with missing caps are detected at the capper exit. This is accomplished with PHOTO6 photo sensor and PROX3 proximity sensor. When a jar with a missing cap is detected, a momentary alarm is sounded by HORN1. A limit may be set for a maximum number of consecutive jars with missing caps. If this threshold is reached, the capper will shutdown. To change this limit, sequence through the HMI display screens to locate this adjustment. If this limit is set to 1, every jar with a missing cap will shut down the capper. If this limit is set to 0, the shutdown function is disabled. Even while disabled, HORN1 will still sound when a missing cap is detected.

Low Temperature Limit: The capper temperature must be equal to or greater than this limit to run in Auto mode. This is monitored by the thermocouple TC1. If the temperature is at the proper level and the Manual/Auto switch is set to Auto, the capper will run. If the temperature is below this limit, the capper will not start. If the temperature drops below this limit while the capper is running, it will shutdown. To change this setpoint sequence through the HMI screens to locate the low temperature limit. Press on the temperature, and use the keypad to change this setpoint.

Steam Pressure Switch: Switch PS1 is a steam pressure switch. It requires that steam pressure is detected feeding into the capper head before the capper will be allowed to run in AUTO mode. The Turn On Point and Turn Off Point can be adjusted when the switch cover is removed. Adjust these setpoints as necessary. Usually, setting these to detect a low amount of steam pressure is enough to verify that steam is indeed fed into the head.

Jar Detect Sensor Sensitivity: Jar detection sensitivity can be adjusted with two optical jar sensors Photo6 and Photo8. One is located at the inlet and the other at the exit. Each has a sensitivity adjustment located on the body of the sensor. Adjustments are best made when the product is running under steam. The adjustment screw is located under a watertight cover. It can be accessed by loosening the watertight cover screw. The adjustment screw allows an increase or a decrease in sensitivity. The sensor should trigger when a jar is between the optics, and free of false readings caused by steam. If the sensor doesn't reliably detect the jar, increase the sensitivity by turning the adjustment screw clockwise. If steam triggers the sensor, decrease the sensitivity by turning the adjustment screw counterclockwise.

The LED bar graph on the sensor face helps visualize the sensor activity. If the package contains a clear or nearly clear liquid, sensitivity may need to be reduced. When a jar is centered between the optics, the light between the sensor optics is prone to see through the product. Ensure one jar will not produce two sensor pulses. This could happen if the sensor turns off for a moment at the center of the jar. One of the optic heads is mounted about a quarter inch higher than the other. This offset helps prevent the sensor from retriggering in the center of the jar.

The fiber optic heads for these sensors are mounted in air ports that blow compressed air to keep steam and water away from the heads, and blows steam away from the light path, helping to reduce false triggers by steam blocking the light paths. The air blows while the capper is running, and turns off shortly after the capper stops. Adjust the air valve at each optical head for a small amount of air flow out of the port. Only a small air flow is needed. Too much air flow is unnecessary and wasteful.

Cap Runout Sensor: A sensor at the inlet chute detects the presence of a cap. This sensor is Photo3 and the adjustment screw is located on the sensor body. Adjustments are best made when the product is running under steam. The sensor should trigger when a cap is between the optics, and free of false readings caused by steam. The best setting is usually maximum sensitivity. A reduced sensitivity may be required if false positive occurs due to light bounce. In some situations, the light from the emitter may bounce off surfaces and not hit the receiver. This could cause a “caps present” condition look like a “no caps present”condition.

Capper Shutdown Delay: When the capper is not slaved to the filler, this is the delay before the capper will stop from the point when the Capper Stop button is pressed, or a stop is triggered by a fault condition. When the capper is slaved to the filler, this is the delay before the capper will stop from the point when controlled stop is triggered and the filler speed has ramped down to minimum or zero. Adjust this delay to the smallest value that will provide for safe and orderly stops when the capper is running product through it. The delay is necessary most often to allow for product to run through the machine so the capper will not stop with open product containers inside or before the capper.

Maximum Shutdown Delay (Slave mode only): In Slave mode, a normal controlled capper stop sequence includes the filler being required to slow its speed to minimum, or to come to stop. If the filler slow speed or stop never occurs, and this maximum delay times out, then the capper will stop regardless. This prevents a capper stop from being triggered but never stopping because the filler never slowed down. This delay is most cases should be set between 60 and 120 seconds.

Capper/Filler Sync Ratio (Slave mode only): This setting adjusts the capper conveyor speed with respect to the filler speed. This is only used when the capper is slaved to the filler. The adjustment range is 10% to 999%. A smaller number reduces the capper speed. A larger number increases the capper speed. Adjust this number for proper container spacing, or for smoothest transition from the filler exit dial to the capper conveyor.

Delay Before Head Lowering Stops: This setting assists with setting up a new jar size. This is usually adjusted only when the capper is installed and during setup. It is not typical to adjust this setting afterward. A sample jar with cap on it is placed on the capper conveyor under the missing cap proximity sensor (PROX7). The head is then lowered using the Head Elevation Down/Up switch. When the proximity sensor sees the cap on the jar, the head will stop. A short delay times out before the head lowering actually stops (0-1000msec.). The delay is adjustable using this setting. The proper setting will allow the head to stop at the correct location to seal the jars.

Setting the Head Height Stop Delay

- Start with the capper head height properly set to run a particular jar/bottle.
- Make sure PROX7 is mounted with face flush to the surface of its mounting block.
- Using a small piece of material 0.14” thick as a gauge, set the position of PROX7 to 0.14” above the top surface of a capped jar/bottle directly underneath it.
- Leaving the capped jar/bottle underneath PROX7, raise the head height about 1”.
- Lower the head under power until it comes to a stop when PROX7 sees the cap.
- Check whether the head height is in the correct position to run production. If the head is too high, increase the Head Height Stop Delay. If the head is too low, decrease the head height stop delay.
- Repeat the last 3 steps until the head height stops at the correct position to run production.

2.6 Electrical Maintenance

Remember Lock Out Tag Out (LOTO) procedures before conducting maintenance.

Daily Service:

- Clean the Photo3, Photo6, & Photo8 lenses. Verify detection of jars and caps.

Yearly Service:

- Verify proper illumination of each pushbutton light, and the red/yellow/green stack lights. Replace lighting components if inoperative.
- Shut off main power enclosure disconnect. Check the components inside the control panel and the terminal box. Look for dirt buildup or corrosion. Clean, repair, or replace components as necessary.
- Detach and inspect each cable connector. Do this for the main power enclosure and the machine terminal enclosure. Inspect contacts for corrosion. Clean contacts and replace components as necessary.
- Corrosion inhibitors in main power enclosure and machine terminal enclosure should be replaced every two years. Purchase new corrosion inhibitors prior to installation. Do not store replacement corrosion inhibitors for long periods of time.

2. ELECTRICAL OPERATION

2.7 Troubleshooting

The machine can detect faults. The computer will display these explanatory fault messages on the operator display. Remember Lock Out Tag Out (LOTO) procedures when working on the machine.

Troubleshooting		
Problem	**Possible Cause**	**Action**
Main control panel disconnect is on, but the control power isn't energized. No lights are on at the workstation or machine.	No power, bad fuse(s), circuit breaker tripped	Check for the presence of supply power at the control cabinet. Check the circuit breaker **CB81, CB82,** and fuse **F1, F8**. Reset the circuit breaker or replace the fuse as necessary.
Exhaust blower motor and/or head elevation motor does not operate. There is no fault message at the display.	Short circuit or bad fuse	Check fuse **F9**. Replace it if necessary. Check motors for short circuits before reapplying power.
Capper always runs at minimum speed in **Run** mode regardless of filler speed.	Bad fuse	Check fuse **F11**. This is the power to signal conditioner **SC1**. Replace the fuse if necessary.
Capper head does not reach the required temperature after steam runs for a sufficient amount of time.	Incorrect current draw at **HTR6**.	Have a qualified electrician check the current draw at the steam super heater element **HTR6** while the steam is on. Current draw should be approximately 2A. If no current is measured, power the system down. Check for continuity through the **HTR6** element. Replace the unit if no continuity. Check for proper temperature and pressure of plant steam supply.
Operator display shows message **Elev Mechanical Fault**.	Possible mechanical obstruction/failure **Prox4** and/or **Prox5** out of position or bad sensor cables	Do not attempt to raise or lower the head under power. Inspect the screw lifting spindles for jammed or restricted operation. Lift or lower the head manually using the hand wheel. Check for smooth and unobstructed operation. Check the spindle sensors **Prox4** and **Prox5**. Ensure both pulse when seeing timing vanes rotate. Adjust sensor positions if needed. Replace sensors, or sensor cables if needed.
Capper is running. No jars are running through the capper or passing **Photo6**, yet the missing cap horn **Horn1** sounds.	Steam is possibly triggering sensor **Photo3**.	Sensor **Photo6** may be seeing steam escaping from the capper. Reduce the sensitivity on **Photo6**.

Table 2-12: Troubleshooting

3. CAPPER HEAD AND SEALING PARTS

3.1 Overview Diagram of the Capper System

1 – Cap Acceleration	7 – Sealing Shoe Height Adj.	13 – Rear Roller Brackets	19 – Belt Water Nozzle
2 – Cap Heating	8 – Roller Bracket Adj	14 – Sealing Belt	20 – Side Belt Idler
3 – Cap Chute	9 – Side Belt Take-up Pulley	15 – Side Belt	21 – Side Belt Drive Pulley
4 – Cap Track Assembly	10 – Condensate Trap	16 – Sealing Shoe	22 – Sealing Shoe Spring Pressure
5 – Duck Bill Assembly	11 – Top Guide	17 – Sealing Shoe Take Up	
6 – Hold Down Assembly	12 – Drag Arm	18 – Sealing Step Pulley	

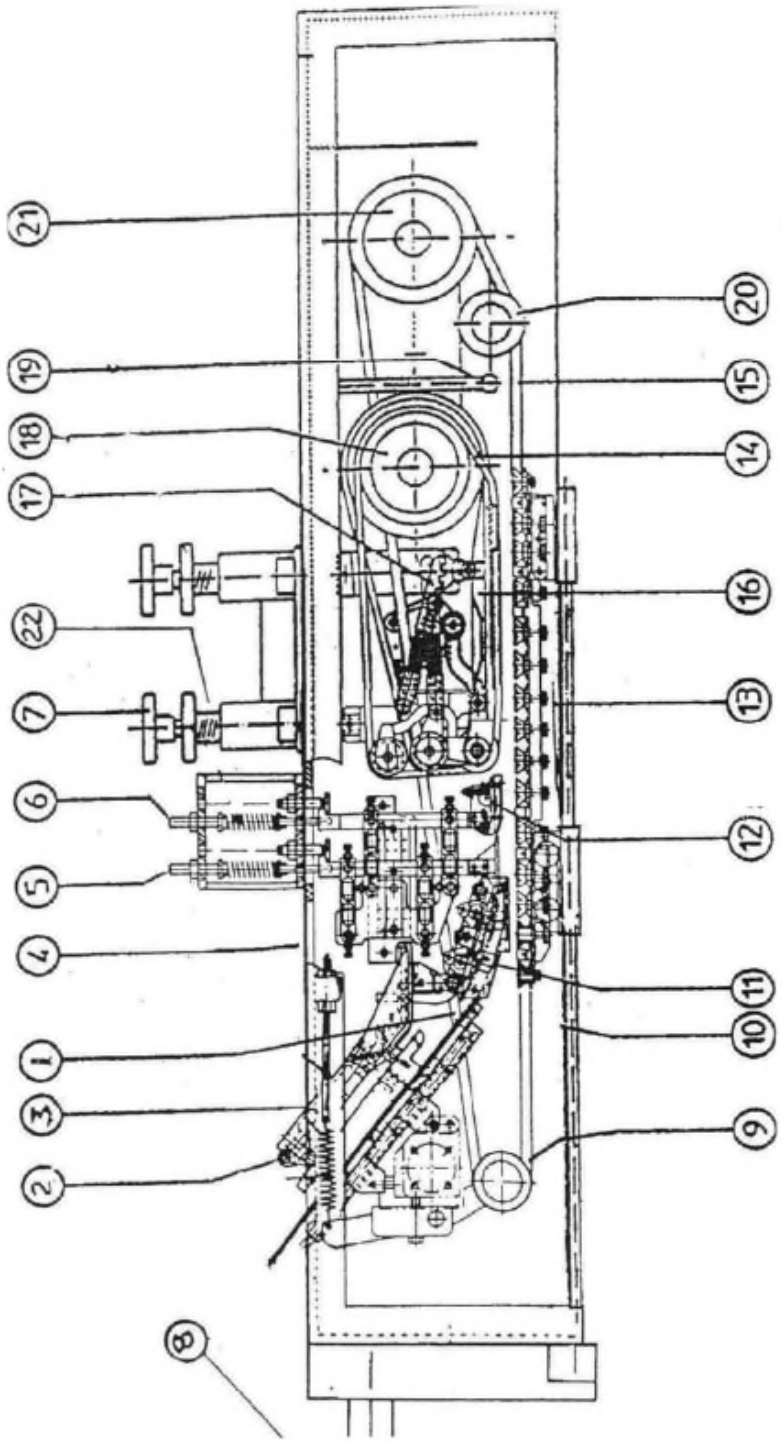


Figure 3-1: Overview Diagram of the Capper System

3.2 Centering Containers on the Conveyor Chain

The centering device centers the container on the capper conveyor. This occurs prior to entering the head unit. The container must be centered prior to engaging the side belts. If the container is off-center, it could be captured in a tilted orientation. This could create a misapplication at the cap pick-up station.

Container Centering Procedure: Adjust the centering device to the width of the container. Allow a minimum amount of clearance. Loosen the four 5/16 bolts that attach the centering device to the conveyor. This should allow the device to move laterally without fully removing the screws. Open the roller brackets. Check the cap track for side movement. Ensure it moves freely. Remove all caps. Place the container on the capper entrance conveyor just before the centering device. Run the conveyor. Observe the container. It should pass through the centering device and cap track without making contact. If the container makes contact with the cap track, adjust the centering device.

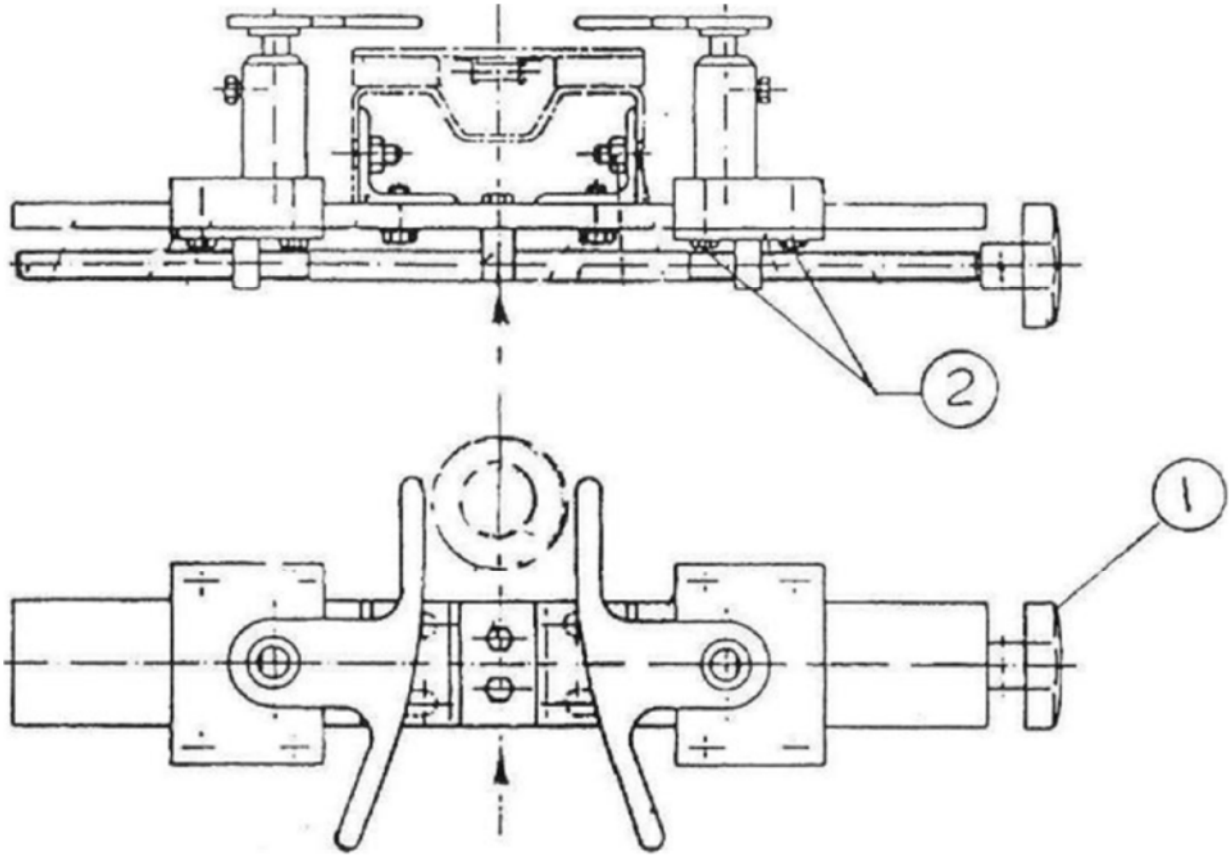


Figure 3-2: Centering Device

3.3 Standard Lower Cap Track parts - Right Hand

1– Cap Track Leveling Screw	6 – Width Adjustment Slide Bar	10 – Top Guide
2 – Cap Track Top Guide	7 – Width Adjustment Screw	11 – Rear Cap Track Support
3 – Drag Arm with Drag Rubber	8 – Front Cap Track Support	12 – Rear Cap Track
4 – Drag Arm Leaf Spring	9 – Front Cap Track	13 – Width Locking Screw
5 – Cap Track Support	**Bottom edge of cap track support. Adjust parallel to conveyor	

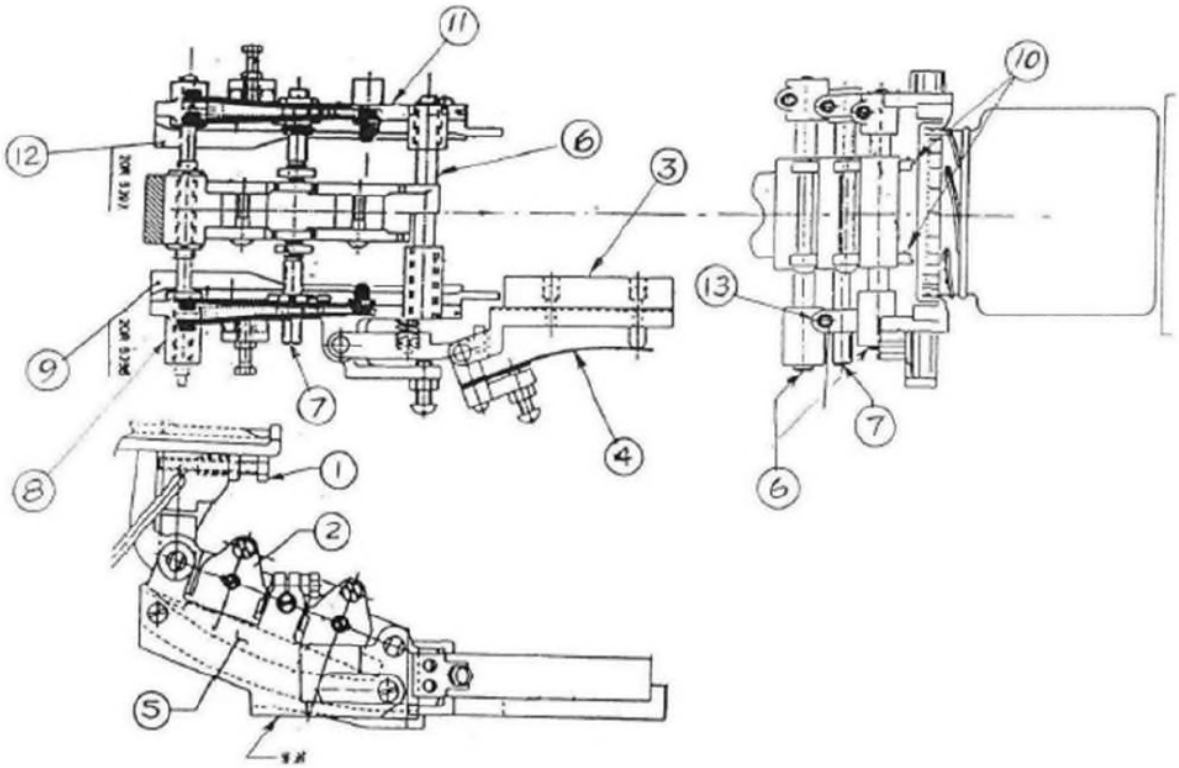


Figure 3-3: Standard Lower Cap Track Parts - Right Hand

4. CAPPER SET UP & ADJUSTMENT

4.1 Standard Upper Cap Track Parts and Set Up

Set up the upper cap track height as follows *(Figure 4-1)*. Set the Cap Heater Top Guide (*Item 6*) height. Loosen the wing nut *(Item 5)*. Then raise the heater using the adjusting knob *(Item 4)*. The height should be adjusted to the point where a cap can drop freely without binding.

Set the guide rail *(Item 1)* spacing to allow for the cap width. Loosen the wing nut *(Item 2)*. Adjust the guide rail width as needed by using the adjusting knob *(Item 3)*.

1– Cap Guide Rails	4 – Cap Height Adjusting Knob
2 – Cap Width Wing Nut Lock	5 – Cap Height Adjusting Wing Nut Lock
3 – Cap Width Adjusting Knob	6 – Cap Steam Heater Top Guide

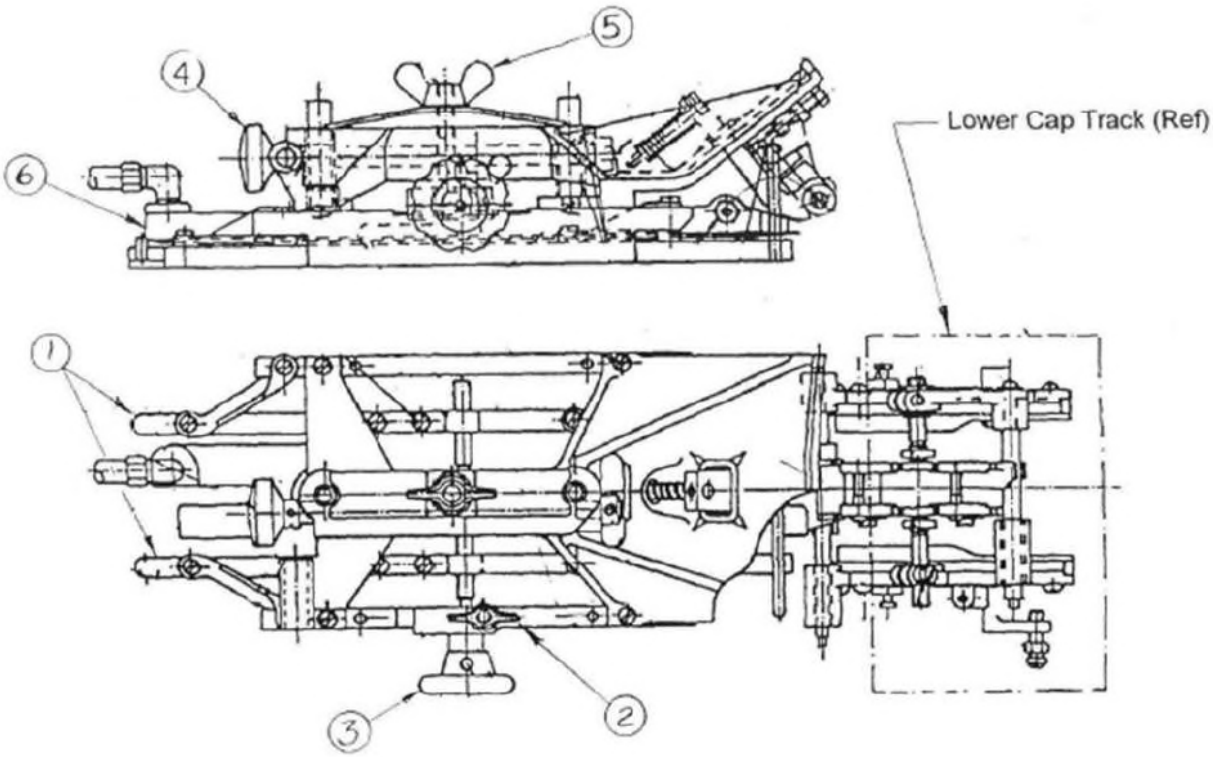


Figure 4-1: Standard Upper Cap Track Parts

4.2 Drag Arm Adjustment - Right Hand

Adjust the side belts. The glass jars should run smoothly through the machine. Then adjust the drag arm. On the entrance end, the drag arm angle should allow the drag rubber to make contact with the closure. The drag arm should not touch the closure before it leaves the cap track. It should not touch the closure before it falls onto the jar's finish. Verify the drag arm pivot *(Item 2)* allows the drag arm to move freely *(Figure 4-2)*. The cap lugs must engage the jar's thread. When running small caps, the spring pressure on the drag arm and drag rubber should be as low as possible. Increase the drag pressure for larger caps such as 100-110mm sizes. Adjust the drag arm bump. It should be set approximately 1/8". On higher speeds, a second leaf spring may be necessary.

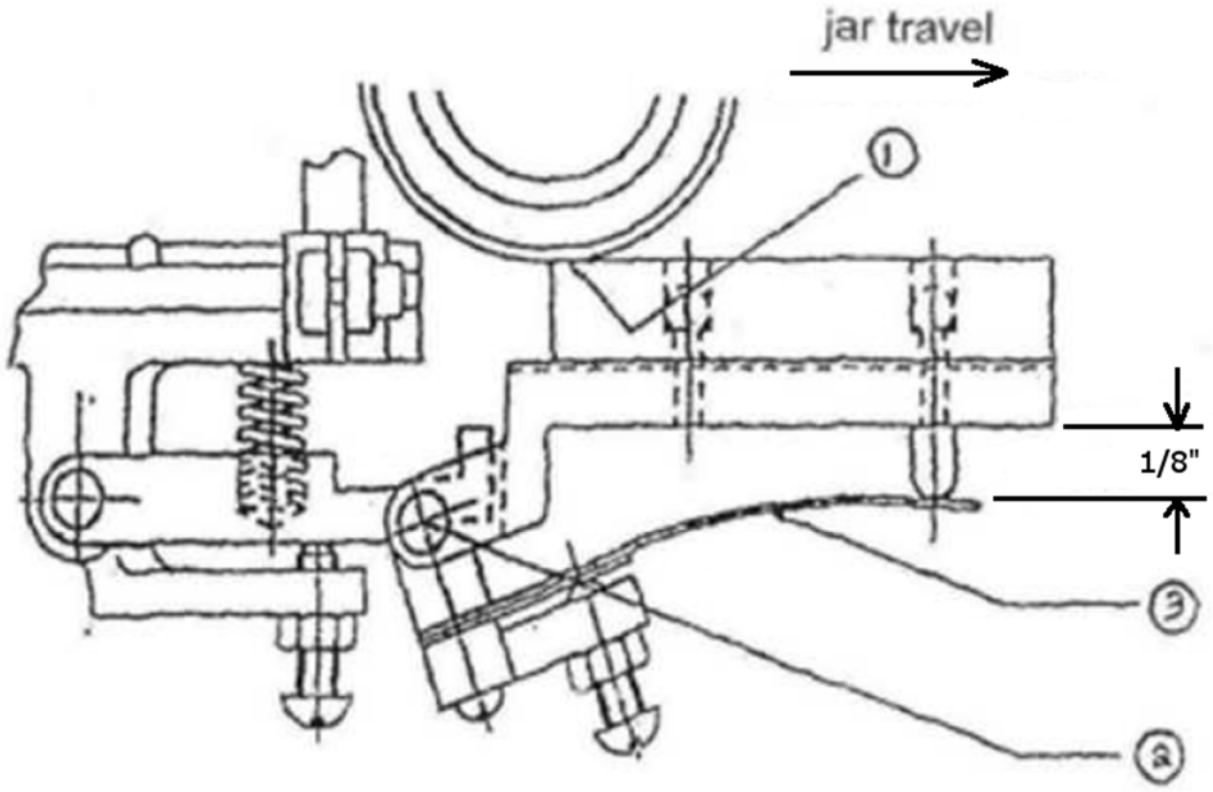


Figure 4-2: Drag Arm Adjustment - Right hand

4.3 Lower Cap Track Set Up (38-110mm)

Adjust the lower track *(Figure 4-3)*. The bottom edge of the cap track should be parallel to the conveyor. Use the levelling screw (Item A) when a parallel adjustment is required.

Adjust the cap width *(Figure 4-3)*. Loosen the lockscrew *(Item D)* and use the adjusting screw *(Item C)* to obtain a good cap width. Place a cap between the lower cap tracks *(Item B)* and turn the screw *(Item C)* clockwise. Keep turning until the cap is snug in the tracks. Loosen the adjusting screw *(Item C)* a little over half a turn to provide sid clearance. Secure the lockscrew *(Item D)*.

Adjust the top guide *(Figure 4-3)*. Loosen the locking screws *(Item 2)* just enough to make adjustments. Don't allow it to move when the second eccentric is turned. The top guide is adjusted using the two eccentrics *(Item 3)*. Turn the first eccentric until the cap clears the entrance end of the top guide. It should clear it by 1/16" (1~2mm). Tighten the locking screws. Turn the second eccentric until the discharge end clears the closure. It should clear by 1/32" (0.8mm). Pull the closure past the stop pins. Do not pull the closure outside of the tracks. The cap should turn free without binding. If the top guide is set too high at the entrance, the cap will bind at the discharge.

Note: The above procedure also applies to top guides with adapters.

The adapter for the 38-53mm RTO is 3mm thick. The adapter for the 53-89mm RTO is 5mm thick. Remove the 53-89mm adapter to run 100-110mm closures.

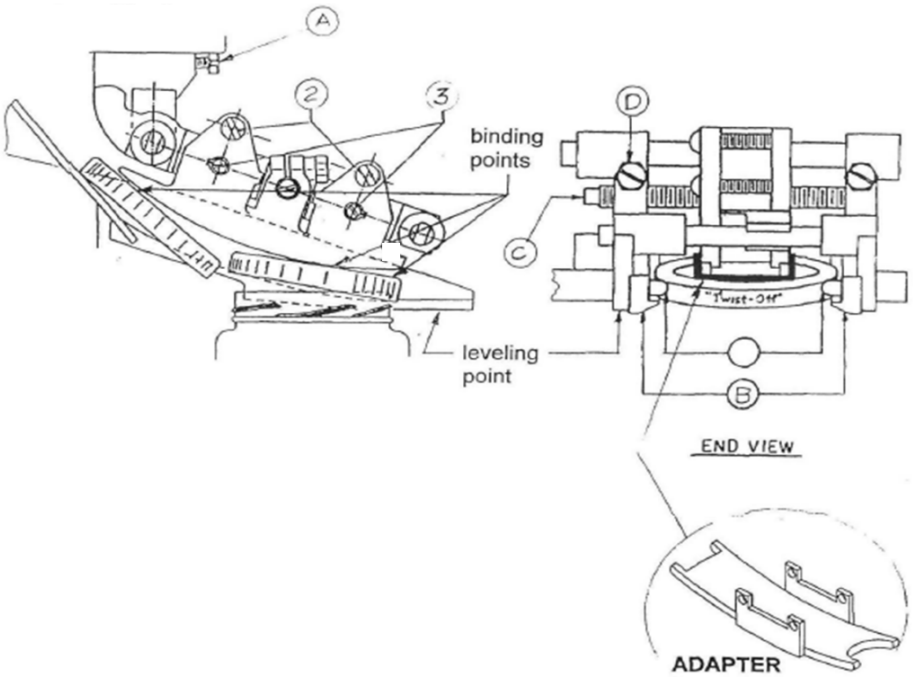


Figure 4-3: Lower Cap Track Set Up

4.4 Verify Cap Track Adjustments

The cap track side clearance should be large enough to accommodate normal glass finish and container body eccentricity *(Figure 4-4)*. The side belt adjustments must allow a proper container fit. The container must be able to run through the cap track and under the sealing shoe. Verify the containers are not lifted from the conveyor chain as they pass through the cap track. The side clearance should be equal on either side of the glass finish. Verify the V-Belts are in good condition. Friction characteristics deteriorate over time. Rotate the belt inventory to ensure proper capper operation.

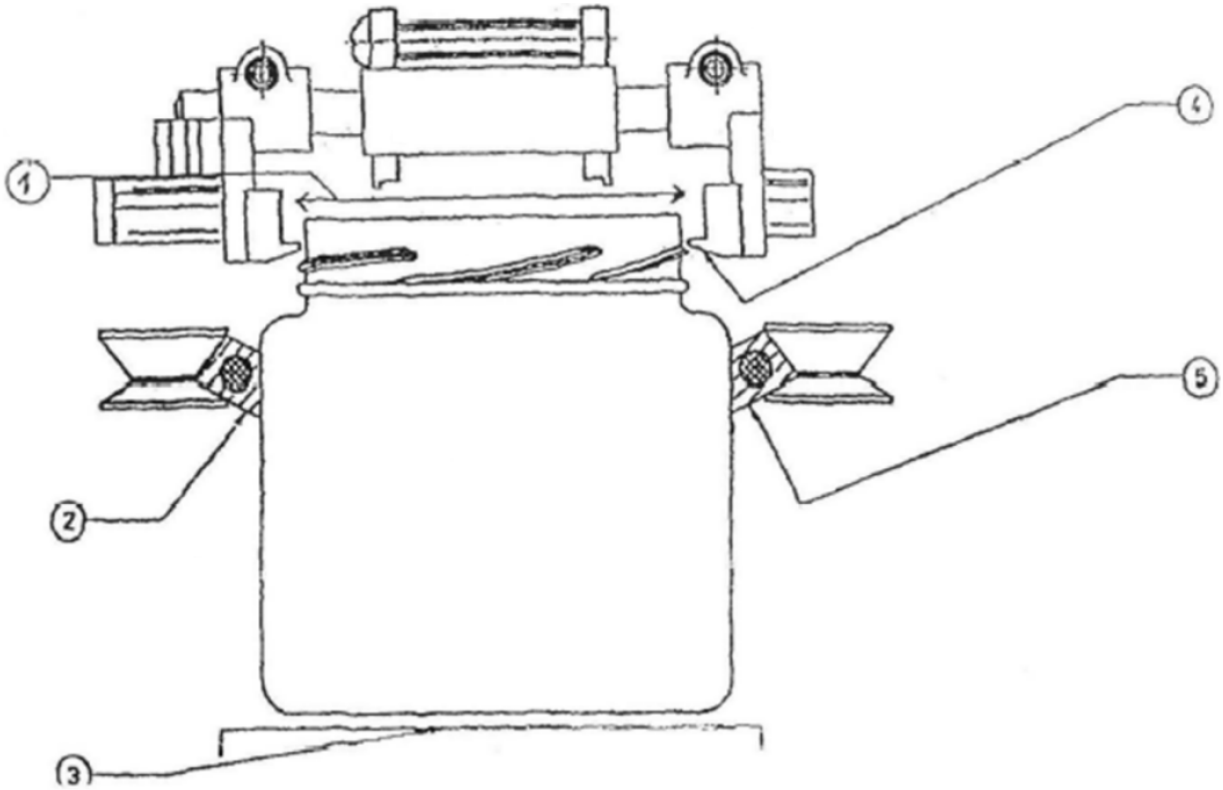
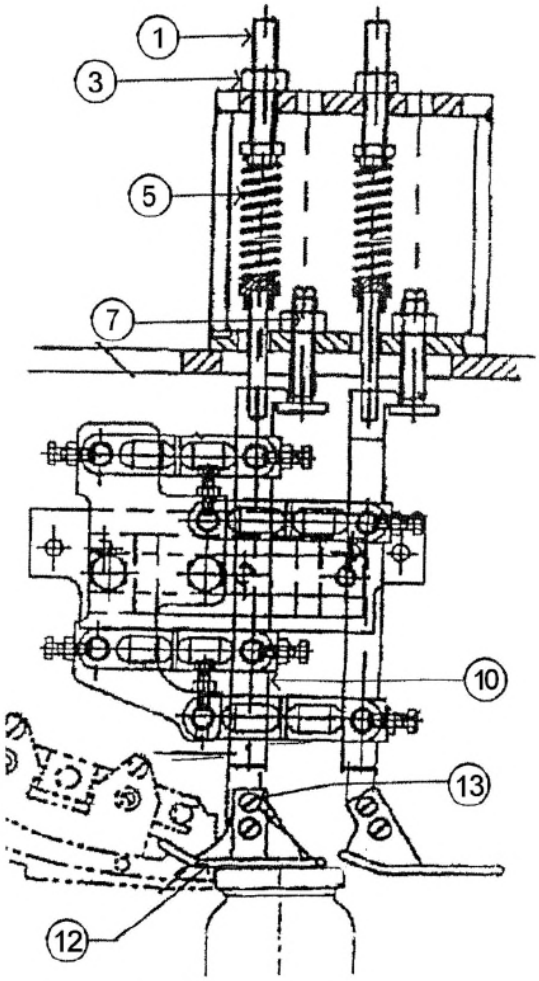


Figure 4-4: Cap Track Adjustments

4.5 Duckbill Adjustments

Apply a cap to the glass container by hand. Make sure it is finger-tight. Don't over-tighten it *(Figure 4-5)*. Place the container under the duckbill plate. The plate should be set flat on top of the cap. Use the leveling screws *(Item 13)* to level the plate. Lock down the leveling screws. Verify the duck bill is parallel to the top of the capped container. There should be no drop off. Use the adjustment screw *(Item 7)* to raise or lower the vertical duckbill arm. Adjust this until there is no drop off *(Figure 4-5)*. Locate the springs *(Item 5)*. Loosen the locking nut *(Item 3)*. Set the spring pressure using the adjusting screw *(Item 1)*. The spring should be at a minimum amount of tension. The spring pressure is directly related to the line speed. The faster the line speed, the more spring tension is required.



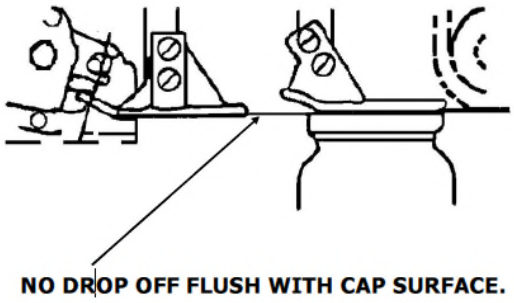


Figure 4-5: Duckbill Adjustments

4.6 Hold Down Adjustments

Apply a cap to the glass container by hand. Make sure it is finger-tight. Don't over-tighten it *(Figure 4-6)*. Place the container under the hold down plate *(Item 14)*. The plate should be set flat on top of the cap. Use the leveling screws *(Item 1)* to level the plate. Lock down the leveling screws. Raise or lower the vertical hold down arm *(Item 11)*. The hold down plate should be 1/64" above the cap. Adjust the height with the height adjustment screw *(Item 8)*. Locate the springs *(Item 6)* Loosen the locking nut *(Item 4)*. Set the spring pressure using the adjusting screw *(Item 2)*. The spring should be at a minimum amount of tension. The spring pressure is directly related to the line speed. The faster the line speed, the more spring tension is required.

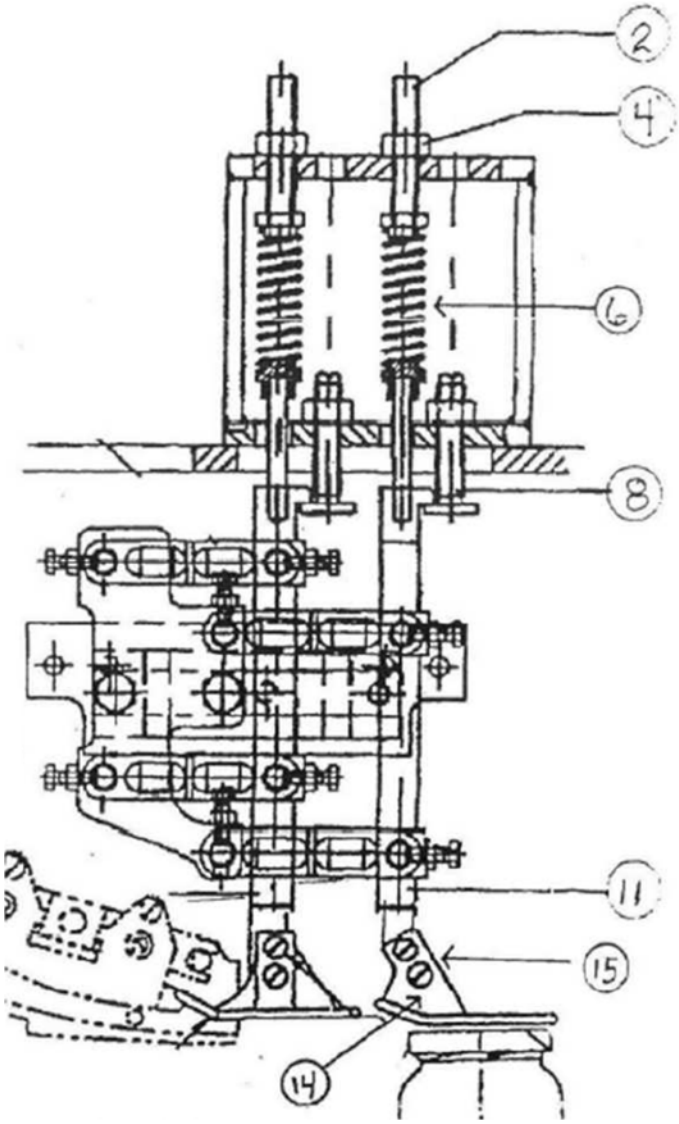


Figure 4-6: Hold Down Adjustments

4.7 RTO Sealing Shoe

Adjust the sealing shoe *(Figure 4-7)*. Place a capped container under the entrance post. Raise or lower the sealing shoe entrance post using the adjustment knobs *(Item 7)*. The post (Item A) should have a minimum amount of movement. At this point, the spring pressure at the entrance should have a minimum amount of tension. The final spring pressure settings will take place during later adjustments.

Note: The entrance height and spring pressure should never be more than the discharge post. When jars are run, a slight "jiggle" should be observed at the entrance post.

Jog the capped container under the discharge post. Raise or lower the sealing shoe discharge post using adjustment knob *(Item 7)*. The discharge post should have a 1/8" bump (approximation). This is a starting point for further adjustments. Final adjustments should be made when the production has started. The discharge post should always have a visual bump. The product specification and line speed will determine the final settings. The spring pressure on the discharge post should have a minimum amount of tension. The tension should be greater than the tension on the entrance post. The final spring pressure settings will take place during later adjustments.

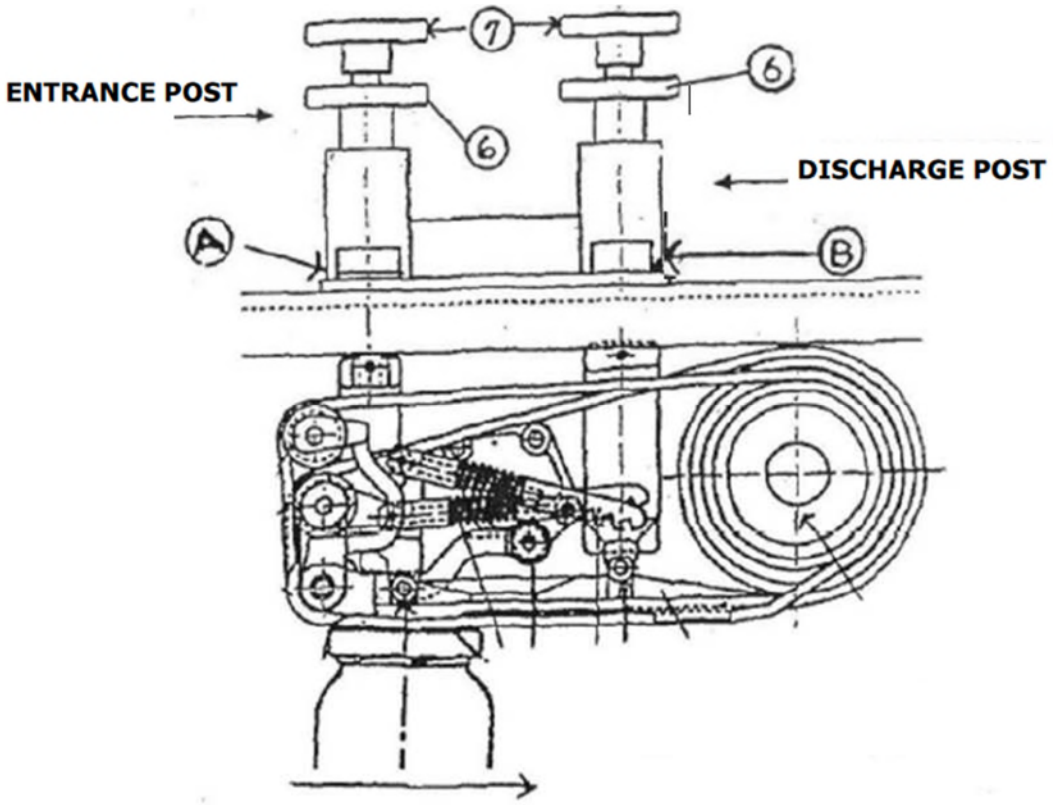


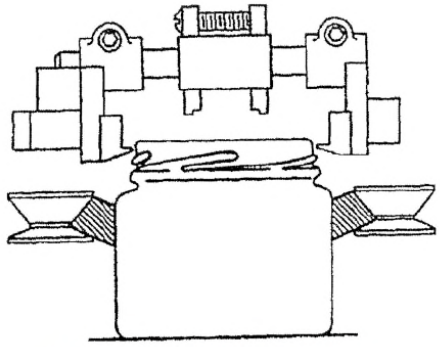
Figure 4-7: RTO Sealing Shoe

4.8 Roller Bracket Adjustments

Adjust the roller bracket. Remove all caps from the cap track. Place an uncapped container between the cap tracks. Close the capper door and lock it. Ensure the side belts are in place. They should be positioned on the front and rear roller brackets and the side belt idlers. Turn the hand wheel. Verify both belts contact the container at the same time. If one belt touches the container before the other, improper jar centering will be the result. Pull out the hand wheel. This disengages the gears that control both roller brackets. The front brackets can be adjusted when the gears are disengaged. Several indicators suggest the side belts are adjusted. The jars should be held firmly in place. The jars should have an equal amount of clearance between the cap tracks and glass.

Adjust the side belt width. When the jar is between the cap tracks, the screw heads should move out or bump 1-32~1/16 (1~2mm)..Make the adjustment with the hand wheel.

Note: Replace the side belts on a regular basis. Keep side belts free of oil and grease. Worn or slippery side belts cause misapplication. Replace the front and rear belts at the same time.



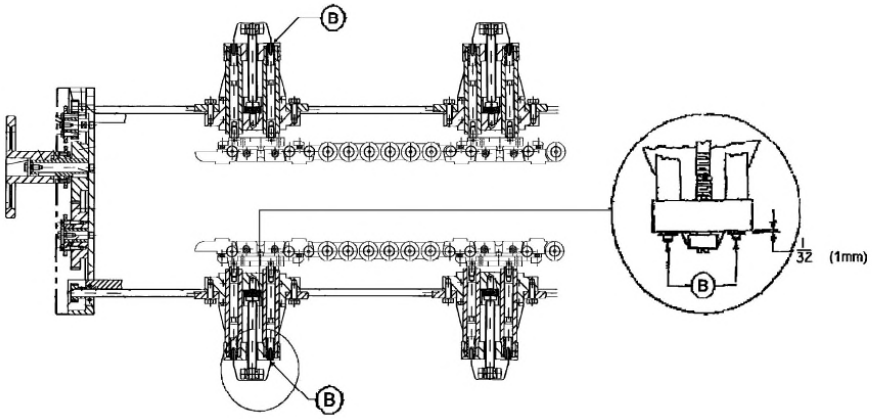


Figure 4-8: Roller Bracket Adjustments

4.9 Head Height Adjustment

The height adjustment is made by an electric motor through a spindle worm gear *(Figure 4-9)*. Adjust the height using the Glass Height Sensor *(Item 3)*. Fine adjustments must be made using the hand wheel *(Item 2)*. One turn of the hand wheel is equal to 1/64" (0.25mm) vertical adjustment.

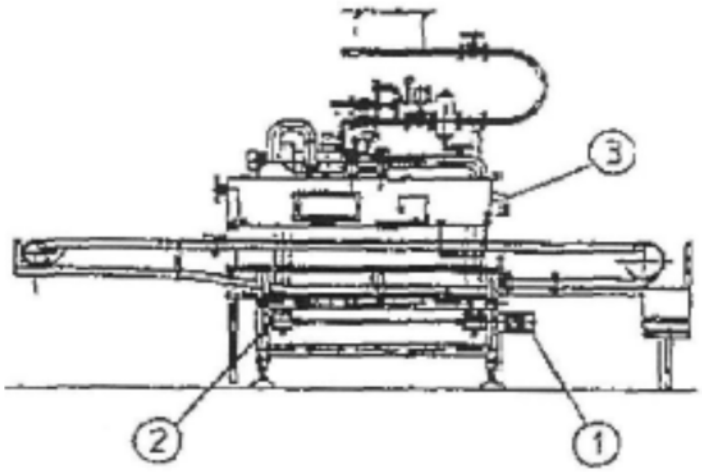


Figure 4-9: Capper Head Height Adjustments

4.9.1 Container Height Adjustment

To adjust the head height to a new container, place caps in the cap track. Then ensure a cap is resting against the stop pins. Set the selector switch to **Set Up**. Place the container on the conveyor chain, just before the cap track entrance. This helps assess the approximate height. Adjust the approximate height by pressing either the **Head Up** or **Head Down** push buttons on the panel.

Note: When the push button is released, the head height adjustment drive stops immediately.

Push the container into the cap track until it touches the cap. The clearance between the bottom of the cap curl and the highest point of the container thread is important. The clearance must be 1/32" (0.79mm) for Ø43-89mm caps. The clearance must be 1/16" (1.59mm) for Ø100-110mm caps. Make small adjustments to reach these clearances by using the **Head Up** or **Head Down** push buttons.

After adjusting the height for the container, the **Automatic Height Adjusting Sensor** may be set. Apply a cap to a container by hand. At the discharge end, place the container on the conveyor chain. The center of the cap should be positioned under the inductive proximity sensor *(Figure 4-10)*.

For a coarse adjustment, loosen the M8 sensor arm lock screw on the head. This should allow the sensor arm to move vertically in the slotted holes (*Item 2)*. Move the sensor arm from top to bottom. Watch the proximity sensor LED. The adjustment is accurate then the LED illuminates.

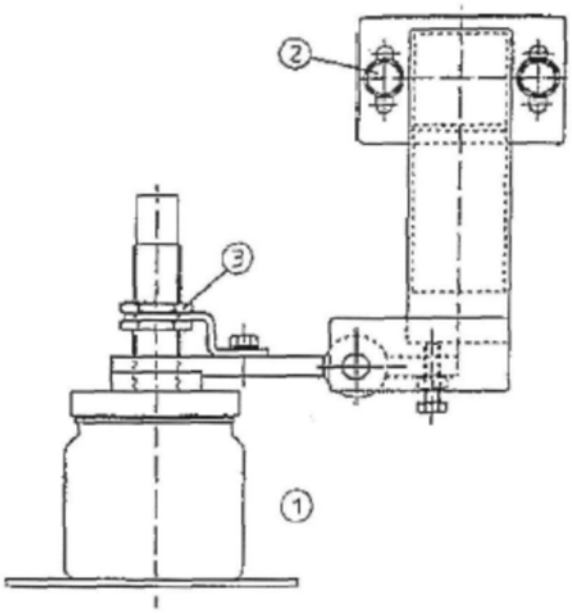


Figure 4-10: Sensor Arm Height Adjustments

4.9.2 Verify the Adjustment

Place the container under the proximity sensor. Use the **Head Up** button to move the head up approximately 3/4" (19mm). Then use the **Head Down** button until the downward movement automatically stops. The LED will illuminate. Minor adjustments may be made using the two hex nuts on the inductive proximity sensor *(Figure 4-10)*. If the head is too low, move the sensor down. If the head is too high, move the sensor up. One turn of the hex nut translates to approximately 1/32" (0.79)mm vertical travel. Repeat the automatic adjustment procedure.

The automatic height adjustment can be repeated as necessary. Changing over to another container/ closure style/size may require another series of adjustments.

5. CAPPER EFFICIENCY CHECKLIST

5.1 Capper Set Up

5.1.1 Prior to Production Start Up

Perform the **Cold Water Vacuum Check** *(Section 5.3)*. Check the container's fill level for proper head space and temperature. Verify container size and ensure that production personnel are informed of which container manufacturer is being used. Maintain the same manufacturer and production date until completed. Verify the proper caps are loaded in the cap feeder. Ensure caps are in good condition. They should be clean with no dents, scuffs, or scratches. Do not mix caps from different manufacturers. Check the capper set up and the daily check list.

5.1.2 Production Run

Check the capper set up. Perform the Security and Pull Up checks *(Section 5.2)*. Save the 'set up' container. The 'set up' container can be used as a control container if problems occur.

5.1.3 After Capping

Perform quality checks on capped containers. Check for proper vacuum. Perform the Security and Pull Up checks *(Section 5.2)*. If necessary, check the Closure Operating Procedure Manual for specific cap requirements. Check for good transfer and spacing of packages at the entrance and exit of the capper.

5.1.4 After Cooling

Check package for temperature, headspace, and vacuum. Perform the Security and Pull Up checks *(Section 5.2)*. Check the operation of the dud detector. Establish line efficiency.
Identify root cause(s) of any rejected packages. Remedy the situation if possible.

5.1.5 After Production

Open the capper door. Wash the inside of the head with hot water. Perform the daily check list. Replace all worn or broken parts as required. Properly store all change parts. Keep supplies of spare parts. Lubricate and check the gear box. Empty the cap feeder. Store any remaining closures in the original cartons and seal the carton.

5.2 Security and Pull Up Checks

Note: See the Closure Operating Manual for specific closure security and pull up measurements.

5.2.1 Security Check

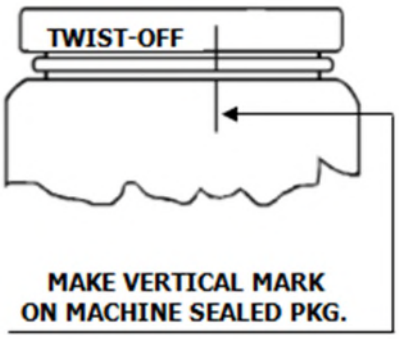


Figure 5-1: Security Mark

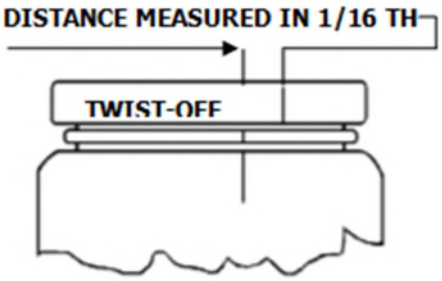


Figure 5-2: Security Mark Distance

5.2.2 Pull-Up Check

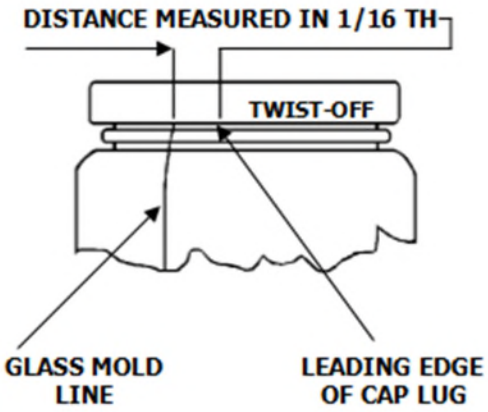


Figure 5-3: Pull Up Check

5.3 Cold Water Vacuum Check

5.3.1 Purpose

The vacuum check helps monitor fluctuations in vacuum efficiency. These fluctuations can be caused by many things. Most notably, the fluctuations are caused by changing steam conditions and/or malfunctioning parts.

5.3.2 Procedure

There are three types of vacuum checks that can be performed. These are: Maximum Cold Water Vacuum Efficiency, Operating Vacuum, and Cold Water Operating Vacuum.

Maximum Cold Water Vacuum Efficiency: This test establishes a base line, free of variables introduced by the product. Open the steam supply valve. Open the high/low valve to the high position. Allow the machine to warm up. Fill four glass containers with water at 70°F. Allow for 1/4" equal headspace in each container. Run the containers through the capper three times. Check the vacuum each time with a closed gauge.

Note: The first two runs de-aerate the water. Record the minimum, maximum, and average readings of the third run (Figure 5-4). Record these readings on a daily basis. 53-110mm closures should obtain a vacuum of 23-27 inHg.

Operating Vacuum: The operating vacuum refers to the vacuum on the product immediately after leaving the capper. Remove four capped containers as they exit the capper. Check the vacuum with a closed gauge. Disregard the first reading. The readings will depend on many factors. These could be product temperature, headspace, steam flow, and individual vacuum requirements for a specific product. The individual operating vacuums should remain relatively constant throughout the run. Record these readings daily.

5. CAPPER EFFICIENCY CHECKLIST

Cold Water Operating Vacuum: This test monitors vacuum levels during a production run. Fill four glass containers with water at 70°F. Allow for 1/4" equal headspace in each container. Run the containers through the capper three times. Check the vacuum each time with a closed gauge.

Note: The first two runs de-aerate the water. Record the minimum, maximum, and average readings of the third run (Figure 5-4). Record these readings on a daily basis.

The individual operating vacuums should remain relatively constant throughout the run. Record these readings daily or in any of the following situations:

At the start of each shift and after prolonged stops.

After changeovers from one size to another.

When there is a jam in the capper.

Whenever a significant change in measured vacuum is detected.

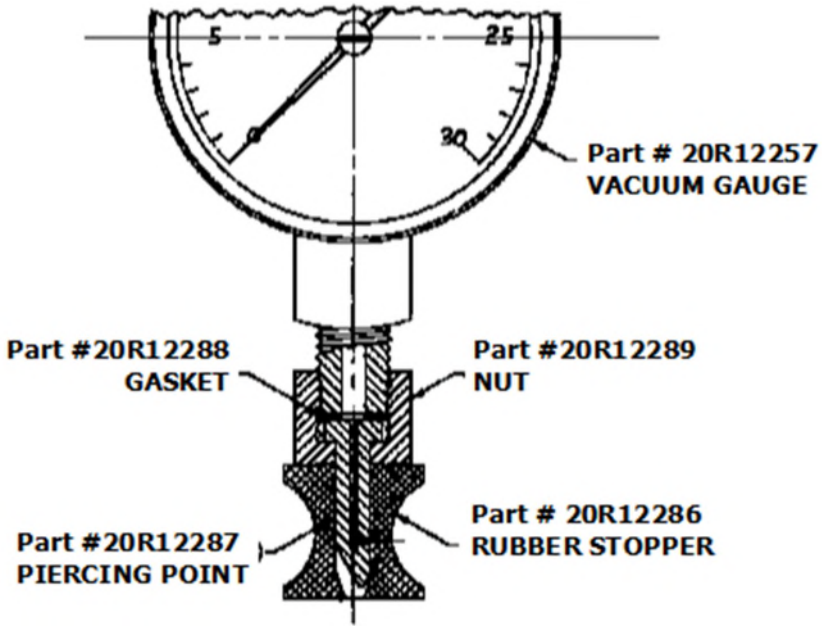


Figure 5-4: Vacuum Gauge

6. CAP MISAPPLICATION & TROUBLESHOOTING

6.1 Cap Misapplication - RTO

There are four major types of misapplied closures. This guide assists in classifying a misapplied closure. This can assist with troubleshooting and correcting the issue. The following applies to the RTO style closure.

Cocked Caps: This is a closure that appears cross-threaded when initially applied and was snapped over the finish threads under the sealing shoe. Half of the lugs are crushed and deformed. The other half appears normal or slightly pulled. The compound impression is uneven.

Crushed Lugs: This is a closure which was not spun into the threads during initial application. It was snapped over the threads under the sealing shoe. All of the lugs are crushed or marred, but not as severely as a cocked cap. The compound impression is even, but relatively light.

Stripped Cap: This is an over-applied closure. It has been twisted beyond the ends of the threads. All of the lugs are marred and pulled. The cap appears to be squared, or pulled out of shape.

Loose Cap: This is an under-applied closure. The closure has the appearance of an uneven cap. The lugs are not marked. The compound impression is very light or not compressed.

Hiked Lugs: The lugs of the cap tend to climb up and over the glass threads. One or more lugs have pulled over the top of the thread.

6. CAP MISAPPLICATION & TROUBLESHOOTING

6.2 Troubleshooting - RTO

Troubleshooting - RTO		
Problem	**Possible Cause**	**Action**
Cocked Caps	Poor adjustments Worn components Poor steam settings Product protrudes above finish Side belts are not centered with cap chute Track assembly side play is frozen Duck bill set to high/low/tilted Side belts are worn Pick up height is too deep/high Track assembly is not level Conveyor isn't flat at the pick up area Wear strip at pick up area are worn	Inspect: • Cap Track Level • Cap Track Width • Top Guide Height • Cap Pick Up Height • Stop Pin Operation • Duck Bill Angle and Height • Duck Bill Spring Pressure • Drag Arm Bump and Spring Pressure • Steam Settings / Sufficient Cap Temp. • Conveyor, Wear Strips • Container Lean and Height
Crushed Lugs	Poor adjustments Poor steam settings	Inspect: • Duck Bill and Hold Down Pressure • Drag Arm and Spring Pressure • Steam Settings / Sufficient Cap Temp.
Stripped Caps	Poor adjustments Poor steam settings	Inspect: • Bump Pressure on Entrance Sealing Post • Bump Pressure on Exit Sealing Post • Steam Pressure / Too Much Cap Heat • Container Height
Loose Caps	Poor adjustments Worn components Poor steam settings	Inspect: • Sealing Belt Wear • Side Belt Wear • Steam Settings/ Sufficient Cap Temp. • Side Belt Settings • Container Spacing • Container Height • Security and Pull Up
Hiked Lugs	Poor adjustments Poor steam settings	Inspect: • Cap Temperature • Cap Security • Spring Pressure at Sealing Shoe Post • Entrance Sealing Shoe Post

6. CAP MISAPPLICATION & TROUBLESHOOTING

6.2 Troubleshooting - RTO

Troubleshooting - RTO		
Problem	**Possible Cause**	**Action**
Drag Rubber Will Not Turn Cap	Duck bill pressure too high Drag rubber has less than 1/8" bump. Drag arm spring pressure too low Cap cocked leaving the chute Drag rubber is worn or dirty Drag rubber has lost its properties Drag rubber is installed upside down	Inspect • Drag Rubber Installation • Replace Drag Rubber if Needed • Cap Feed and Related Adjustments • Duck Bill Pressure • Drag Arm Spring Pressue
Caps Are Missing From Containers	Duck bill is tilled out of spec Hold down is set too low Upper track top guide is too high at pick up Pick up is too shallow Wear strip at pick up is worn down	Inspect • Duck Bill Adjustments • Hold Down Adjustments • Upper Track Adjustments • Pick Up Adjustments • Wear Strip for wear. Replace if Needed.
Containers Tip Backward	Side belts are slipping Side belts roller brackets are worn Side belt roller brackets poor setting Increased bump on entrance sealing shoe Increased pressure on entrance sealing shoe Stop pins frozen Container is not centered in cap chute	Inspect • Side Belt Adjustments • Side Belt Roller Bracket Adjustments • Entrance Sealing Shoe Bump/Pressure • Stop Pins for Motion • Container Position on Conveyor
Side Belts Slip	Too little/much bump on belts Side belts are: worn out, stretched, too loose, have oil/grease on them Side belt brackets are not parallel	Inspect • Side Belt Adjustments • Side Belt Bracket Installation
Cap Chute / Track Assembly Bump	Pick up is too deep Track assembly is too tight on finish Track assembly is too light on finish Side Belts off center	• Inspect • Track Assembly Width • Pick Up Adjustment • Side Belt Adjustments

Table 6-1: Troubleshooting RTO

7. MAINTENANCE GUIDE

7.1 Preventative Maintenance

Daily Check List

The following is a list of items to be checked on a daily basis.

Cap Chute & Track: Check the freedom of movement, up/down, front/back.. The cap track should center itself due to the side spring force. It must accommodate any glass finish/jar body eccentricity. Check the stop pins by feeling the spring pressure. This should be done by running your finger down the length of the cap tracks and against the pins from entrance to discharge. Repeat this several times on each track. Check the cap width between front and rear cap tracks and check the height of the upper track.

Side Belts & Roller Brackets: Check for wear, slippage, and twisting. Check both side belts for alignment with the pulley grooves. Verify both side belts are properly aligned with the roller brackets. Make sure that the side belts are not slipping on the drive pulley. The side belts should not be loose. Check the spring tension on the side belt take-up idlers. Make sure that the take-up and deflector idlers are free to turn. They should be set to suit the bracket style and position. The side belt rollers must turn freely and the springs should be in tact. The brackets must be free to move in and out under spring pressure. Check the water nozzles for correct alignment. They should be positioned directly over the side belts.

Sealing Belts and Shoe: Check the condition of seating belts, and the sealing belt drive pulley. The seating belts must not slip on the pulley. The sealing shoe assembly axles and bushes should not be worn out. The rollers must turn freely. The sealing shoe must move up and down without hanging up or binding.

Duckbill & Hold Down: Check the movement of the Duckbills and Hold Downs. They must not stick or bind. The cap track must not interfere with the Duckbill movement. Vertical play in Duckbill and Hold Down bushings should not exceed 1mm. Duckbill and Hold Down side play should not exceed 1/16” (1.59mm). The duck bill and hold down plates must be level. They must lay flat on a finger tight capped container.

Conveyor Bed and Conveyor Chain: All conveyor chain links must lie flat on the conveyor bed. Plastic Wear Strips should wear evenly. Replace strips with 1/16” (1.59mm) wear. New wear strips measure 1/4” (6.35mm). Glass or other material should not be present under the conveyor chain or wear strips.

7. MAINTENANCE GUIDE

Weekly Check List

The following is a list of items to be checked on a weekly basis.

Check all gear boxes, Head Drive, Conveyor Drive, Head Drive Gear Box for damage, oil leaks.

Check conveyor chain for damage, binding or frozen links.

Check sealing belt Step Pulley for wear, or slippage. Replace lagging material if necessary.

Make certain that sealing belt and side belt washers are not broken or clogged.

Check cap tracks for wear, make certain tracks are level to conveyor.

Check all bearings in side belt idlers. Make certain idlers are clean. Do not over grease.

Check all springs and rollers on the Roller Brackets. Check for damage or worn parts.

Check centering device on conveyor.

Check the Duckbill and Hold Down Assembly. Be certain all parts are free to move up and down. Check for bent or worn parts.

Check Drag Arm Assembly for worn or broken parts.

Check Steam System for leaks. Perform the cold water check.

Check the exhaust motor.

Check all sensor operation. Replace if necessary.

Using the electric motor, raise and lower head. Head should move up and down freely without binding.

7.2 Lubrication Schedule

The lubrication schedule has been divided into three sections. These are, ten hours, fifty hours, and one hundred hours. Consult the table below. A diagram is included for easy reference *(Figure 7-2)*.

Silgan suggests Lubripiate Lubricants. An equivalent type of food grade USDA approved lubricant may be used if necessary. A high quality high pressure variant will be satisfactory for this machine. Gear oil is similar to the heavy oil used in the automotive transmissions. It is approximately SAE 90 weight oil or any AGMA rating No. 8 oil.

Lubrication Specificatons:

Gear Oil (used above the conveyor line): Lubricant FMO

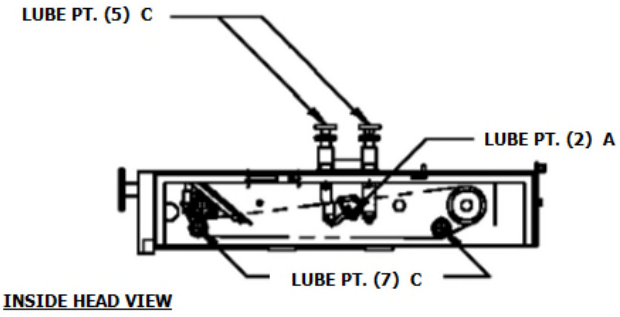
Gear Oil (used below the conveyor line): Lubricant #8

Grease: Lubricant SYNX FG1.

Lubrication Schedules		
10 Hours (A)	**50 Hours (B)**	**100 Hours (C)**
• Conveyor drive idler front • Rear sealing shoe eccentric adjustment • Centering device • Conveyor idler bracket	• Head post entrance • Discharge post • Grease points located on top of head. Head drive gear box • Conveyor drive gear box • Head height gear box • Check all gear boxes for proper oil level and for signs of water condensate. The nature and color of the oil will indicate the presence of water. If allowed to settle, will drain first when removing the drain plug. Replace with 90 weight oil if diluted. Check gear box oil seals for leaks.	• Sealing shoe adjustment post, a few drops of mineral oil is preferred between the adjusting knob and threads on the shaft. • Roller bracket tubes, silicone. Springs and tubs, check condition of springs. • Side belt idler

Table 7-1: Lubrication Schedules

7. MAINTENANCE GUIDE



Lubrication Schedules		
Lube Pt.	Frequency	Description
1	10 Hours	Conveyor Drive Idler
2	10 Hours	Sealing Shoe Eccentric Adjustment
9	10 Hours	Centering Device
10	10 Hours	Conveyor Idler Bracket
3	50 Hours	Head Posts: Entrance and Discharge
4	50 Hours	Head Drive Gear Box
8	50 Hours	Head Light Gear Boxes
5	100 Hours	Sealing Shoe Adjustment
6	100 Hours	Roller Bracket Adj. Front/Rear
7	100 Hours	Side Belt Idler Front/Rear

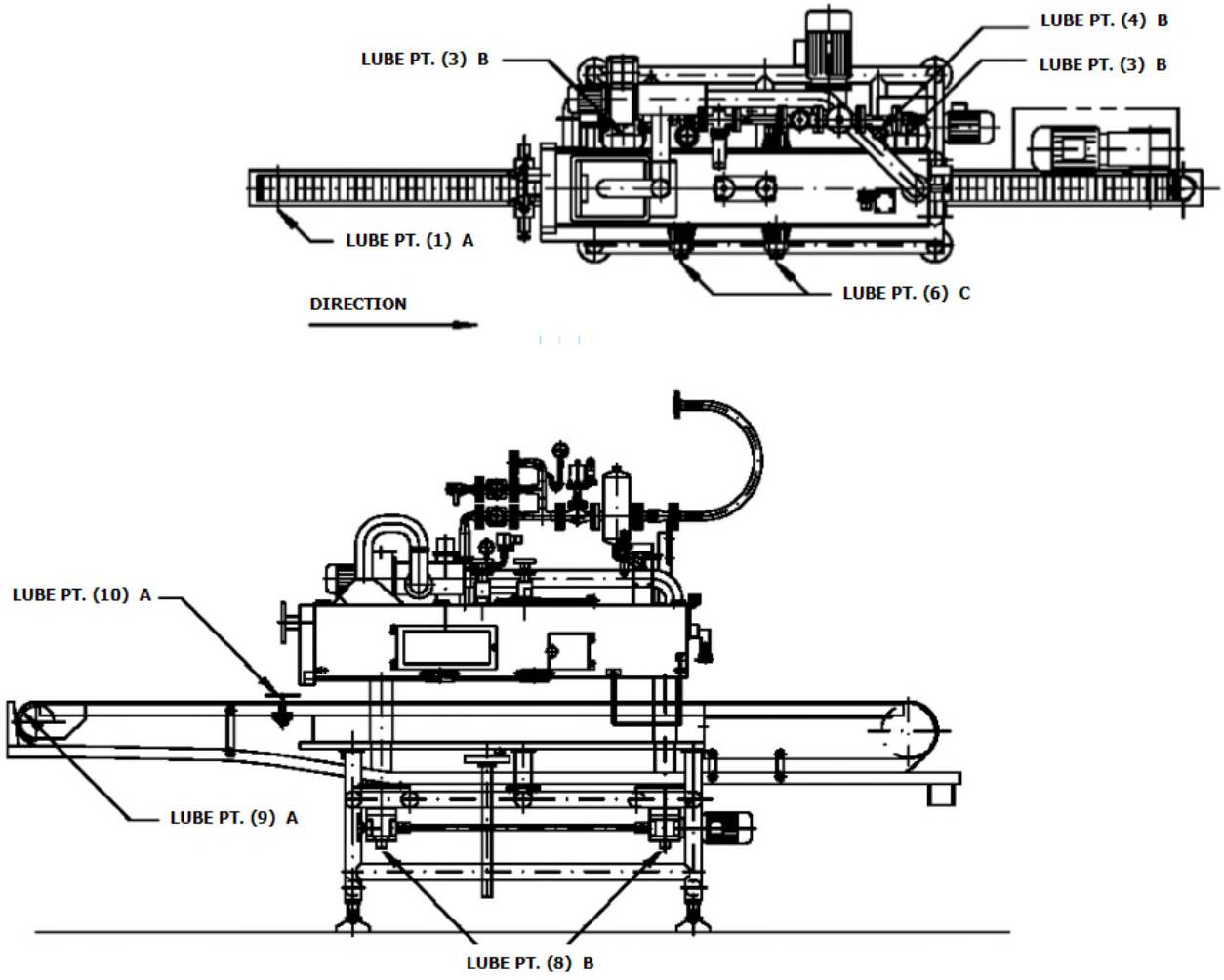


Figure 7-2: Lubrication Points

7.3 Cleaning Requirements

It is absolutely essential that the capper be thoroughly cleaned as often as necessary. It should be cleaned at least once daily after production. This keeps the machine in perfect operating condition. Cleanliness and sanitation are indispensable requirements in the food processing business.

Most of the components used in the capper construction are made of corrosion resistant materials, such as 304 and 316 stainless steel. Corrosion is still a factor in the premature wear of machine components. Hot Water and an FDA/USDA approved cleaning agent are recommended for cleaning the WC600. Care should be taken with any electronic components when washing down the machine. Check with your Silgan Technical Service Engineer on recommendations to prevent water damage to the machine.

Note: Any signs of surface rust should be taken care of immediately. Light oil and light graded steel wood or Scotch Guard will remove the surface rust.

During over-haul, once a year if a seasonal pack or twice a year for year round operation, remove all stainless steel covers and conveyor chain. Lay these out and wash thoroughly with hot water or steam. Clean motor, post, chain and inside base with a strong mixture of detergent and water to wash away accumulation of grease, dirt and product. Rinse and coat moving parts with a light coat of FDA/USDA oil or grease. After washing, immediately run capper for five minutes to air dry motor. This is also a good time to lubricate and check all gear boxes on the capper and hopper before resuming production. The capper and its component parts must be kept as clean as possible at all times. This allows the machine to maintain performance at peak efficiency and to meet the sanitary standards required in handling food products.

8. MECHANICAL SPARE PARTS

Part Number	Quantity	Part Description
		Basic Machine Parts
20R3111	12	Sealing Belts 27-89mm
16SP108-3	12	Side Belts
15SP6-6	6	Spring – Extension Side Belt
15SP8-17	1	Spring – Compression
15SP8-18	1	Spring – Compression
20RA21935	1	ASM – Tension Pulley
11SP3-1	4	Ball – Bearing–Idler
20RA21937	1	ASM – Pulley Idler
80309221	1	Steam Pressure – Gauge 0-16 bar
86044255	1	Steam Pressure Gauge G-4 bar
82003477	1	Element – Superheater
20R11247	1	Cable Fiber Optic
20R20162	1	Sensor – No Cap
20R11224	1	Block Power Omni Beam
20R11829	1	Sensor – Head–Omni Beam
20R11820	1	Thermocouple
20R11226	1	Cable
		Side Belt Roller Bracket Assembly
97R65	1	Repair Kit
15SP3-47	12	Spring – Compression
15SP2-51	12	Spring – Compression (Light)
15SP2-52	12	Spring – Compression (Med)
15SP2-54	12	Spring – Compression (Heavy)

8. MECHANICAL SPARE PARTS

Part Number	Quantity	Part Description
		38-110mm RTO Style Cap Chute/Track
97R100	1	Repair Kit
86040986	2	Slide Bar Long
88125946	2	Slide Bar Short
86040985	2	Screw – Adj Width
82001711	4	Stop Pin & Spring
20R11614	4	Leaf Spring
8SP2-2	12	Retaining Spring
8SP4-12	4	Retaining Spring
15SP3-48	12	Spring Compression
15SP3-46	12	Spring Compress (Center)
82001744	1	Lower Track – Front 38-53
82001743	1	Lower Track – Rear 38-53
82001742	1	Track – Front 53-110
82001745	1	Track – Rear 53-110
		Drag Arm Assembly 38-110mm RTO - Right Hand
88397285	2	Pin – Stick
15SP2-53	4	Spring Compression
20R11806	4	Spring – Drag Arm
20X1185-1	6	Drag Rubber 53-110mm
20X1185	6	Drag Rubber

8. MECHANICAL SPARE PARTS

Part Number	Quantity	Part Description
		Drag Arm Assembly 38-110mm RTO - Left Hand
19SP7-3	2	Shoulder Screw
15SP2-59	4	Spring Compression
20X1185-4	6	Drag Rubber 38-110mm
	2	M6 x DIN85A4 Pan Head Screw
		Top Drag Assembly 38-110mm RTO
15SP2-37	4	Spring – Compression
20R4732	6	Drag Rubber (50 Durometer)
		Sealing Shoe 38-110mm RTO
97R134	2	Repair Kit
15SP5-4	2	Spring-Compression
88397995	2	Sleeve – Top Pulley Shaft
20R12134D	2	Pulley – Belt Tightening
20R12136D	2	Pulley
20R12137D	2	Roller
88397775	6	Washer (Thrust)

8. MECHANICAL SPARE PARTS

Part Number	Quantity	Part Description
		7 Degree Sealing Shoe Assembly
97R120	1	Repair Kit
		Step Sealing Pulley – ALL RTO
20R7317	2	Band – Belt Drive (Large)
20R7318	2	Band – Belt Drive (Small)
20R9691	2	Band – Belt Drive (Large/High Ratio)
20R9690	2	Band – Belt Drive (Small/High Ratio)
	16	#10 x 1.0" Lg. Rivet
		Duck Bill Control Assembly – ALL RTO
97R104	2	Repair Kit
15SP5-21	2	Spring – Compression
		Drive Motors & Gear Boxes – All Models
82002312	1	Motor – Head Gear Drive
82002311	1	Motor – Conveyor Drive
82002728	1	Motor – Head Elevating
82000506	1	Motor – Exhaust Blower ASM

9. START UP PROCEDURES

9.1 Start Up Procedures

9.1.1 Prior to Energizing the System

Prior to energizing the capper control panel, measure the 3-phase voltage to the control panel. Verify all 3-phase to phase voltages read near 480V. If the reading is at or above 525V, do not energize the control panel. If the reading is at or below 450V, running issues may occur. If one or more incoming lines has no voltage, do not energize the control panel. Equipment damage may be the result. Regulate and supply the proper voltage to the system.

Measure the 3-phase to ground voltage to the control panel. Each voltage should read near 277V. If any voltage varies significantly from that value, a ground fault can exist. This can damage the capper equipment. Ground faults should be remedied by the customer's installation electricians. If the available 3-phase power is on a grounded-phase system, remove the MOV jumper to ground on the PowerFlex525 VFD drive.

9.1.2 Verify Configuration Switches

Check the control panel configuration switches CS1 thru CS4. These switches are factory set for the capper's intended operation. They are often altered by the time the capper is started up. Pushing the center blade in closes the switch. Pulling the center blade out opens the switch.

The most common setting is:

- CS1 out - ON for **Slave Mode** / OFF for **Standalone Mode**
- CS2 out - not used
- CS3 out - not used
- CS4 out - ON for immediate stops on jar jams / OFF for controlled stops on jar jams

9.1.3 Verify Terminal Connections

Visually check terminal connections in the main control panel. If no extra emergency stop pushbuttons are interfaced with this control panel, there should be 4 jumpers installed at these terminals: S10 to S11, S11 to S12, S20 to S21, S21 to S22.

A PLC input at terminal H12 is available to tell the capper controls that the hopper is active and ready for production. Input at 0 volts indicated hopper is not ready. Input at 24V indicated hopper is ready. If hopper controls are not interfaced into the capper control panel, then a jumper should be connected between H12 and 24V.

A PLC input at terminal 1106 is available to tell the capper controls that other line equipment is active and ready for production. Input at 0 volts indicated equipment is not ready. Input at 24V indicated equipment is ready. If other production line equipment (conveyors, machines, etc.) are not interfaced into the capper controls, then a jumper should be connected between 1106 and 24V.

9.1.4 Energize the System

Turn on the power switch at the capper control panel. Indications of a good power up include lights on the PLC rack, a series of power up messages on the operator station display.

Check the operator station display for a message: It should display the conveyor speed and capper head temperature. This is the default message. If this message does not come up, check the communication cable connections. These connections are between the operator station and the control panel.

Check motor direction: Jog or otherwise operate each motor momentarily. If any motor is found to be rotating in reverse, power down and have an electrician swap any two of the three wires going to that motor. Perform this check for each motor.

- A list of motors include:
- capper conveyor motor
- sealing belt motor
- steam exhaust motor
- elevator motor
- capper-mounted hopper motor, if used

Check jar detection sensor at the capper inlet: Verify that it sees containers filled with product. Adjust the sensitivity as needed. Perform the same checks for the jar sensor at the capper exit and the cap run out sensor.

Check all capper control system functions to verify proper operation.

Interface the capper with the filler if:

1. The conveyor between the filler and capper does not allow for containers to accumulate or exit the line in the event that the capper stops while the filler is still running.
2. The filler does not have an exit backup sensor, or would otherwise not shut itself down if the capper does stop.
3. The capper speed needs to be synchronized to the filler speed, no matter what speed the filler may be running, to keep a consistent spacing between containers.

If the first two situations apply and the filler needs to stop when the capper stops, but speed synchronization is not needed. Perform the following steps: Connect capper relay contact CR2 (terminals X1 and X2) to the filler controls. The filler should stop immediately when contact CR2 is opened. Set capper for Master Mode by opening configuration switch CS1.

If the third situation applies, and capper/filler speeds must be synchronized, perform these steps: Connect capper relay contact CR2 (terminals X1 and X2) to the filler controls. The filler should stop immediately when contact CR2 is opened. Connect capper relay contact CR3 (terminals X5 and X6) to the filler controls. When CR3 opens, the filler's bottle stop must engage. The filler should stop when the remaining containers have run completely through the filler and capper. Connect a 2-conductor shielded cable from capper terminals (either A1 and A2, or A3 and A2) to a filler speed analog output. The preferred source of this analog output is the filler's main AC drive, setting up the output to reflect the drive's actual output frequency. Available signal formats that can be used are 0-5 V, 0-10 V, 0-20 mA, and 4-20 mA. Refer to the circuit diagram for your machine for the correct wiring. Set up the configuration switches inside the signal conditioner module SC1 for its input to conform with the filler speed analog output and for the signal conditioner output of 0-10 V. Set capper for **Slave Mode** by closing configuration switch CS1. Run the capper and filler. Set the capper to the **Auto** position. Verify that capper speed increases and decreases along with filler speed *(Section 2.5)*.