US Bottlers Machinery Co.

Creative Custom Packaging Equipment

INSTALLATION • OPERATION • MAINTENANCE
MANUAL

ROTARY CAPPER
(RC12-22)

WO: 82780

Document Release
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INTRODUCTION

- **About The Company**
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ABOUT THE COMPANY

US Bottlers Machinery Company was formed in 1912 in Chicago, Illinois and has remained a private, family owned packaging firm ever since. Currently, it is owned and operated by the fourth generation in this line of succession. While in Chicago, the company developed a tremendously broad line of equipment including the industry leading Sanitair Air Cleaner, Rotary Vacuum and Gravity Fillers, Container Feeder, and the Siphon Filler; which are all present in today's production.

The company relocated to Charlotte, North Carolina in 1980, and at the same time began introducing the Rotary Net Weigh Filler and the Rotary Capper. While in Charlotte, the company expanded to approximately twice the size as it had been in Chicago and was able to modernize the facility and the layout.

With the greater capabilities in Charlotte, and the design advantages in the equipment, the company established itself as a leader in the hot pack juice industry in the 1990's. Consequently, the company began to market itself more as a custom packager for unique applications and support. This allowed movement into unique applications along with higher volume machinery. US Bottlers Machinery also became recognized for building some of the largest and strongest stainless steel machinery available.

The company has prided itself on flexibility and thus, has been able to progress forward on designing advanced packaging concepts and options. Over the past decade it has also added equipment lines for snap-on cap applications, ROPP caps, inserts and overcaps, mag-flow filling, rinsing, and the revolutionary volumetric piston filler.

Today the company is poised to maintain progress in the field of packaging yet remain true to its roots of private ownership and traditions of quality and support.

ABOUT THE MANUAL

This Manual is laid out consistent with the product discussed and provides all of the information deemed necessary for machine installation, operation, and maintenance.

A comprehensive Table Of Contents provided at the front of the manual facilitates rapid movement within. The contents identify the different Units, Chapters, and some Sections. Each references the page number of their commencement.

The pages of this manual have embedded headers and footers to assist the user in identifying his or her exact position within the manual. The header provides the unit number followed by its name. The footer provides the applicable US Bottlers Machinery work order numbers on the left, the page number in the center, and the machines manufacturer on the right side of the page.

Page enumeration is two-part with each separated by a hyphen. The first character set references the Unit and the second identifies the page number within that unit. Page numbers begin with the numeral one (1) at the beginning of a new unit and ascend sequentially.

This manual also incorporates the use of special information boxes. Examples of these boxes and the type of information provided in each are below.

WARNING: PROVIDES INFORMATION THAT, IF UNHEEDED, MAY RESULT IN PERSONAL INJURY.

CAUTION: PROVIDES INFORMATION THAT, IF UNHEEDED, MAY RESULT IN EQUIPMENT DAMAGE.

ATTENTION: Provides information that is deemed of special importance but will not result in personal injury or product damage if unheeded.

NOTE: Provides helpful hints to assist in performing the tasks at hand.

ABOUT THE PRODUCT

The product addressed in this manual was designed and manufactured to specific customer defined specifications relative to function and speed.

US Bottlers Machinery has employed decades of expertise, cutting edge technology, and a sense of personal pride in the product's outcome and in the customer's satisfaction. It is for this reason that special attention is paid to material selection to ensure a long, low maintenance life of the machine.

This machine comes to you with all of the necessary attachments for handling the full range of containers on your order. All attachments are marked or identified for each of the containers submitted. If your order involves more than the set of attachments on the machine at the time of shipment, you may rest assured that each set has been properly installed on the machine and properly timed to handle the containers for which it was intended.

For the use of those attachments capable of handling several different containers, refer to the Attachments Reference portion of this manual within the Technical Data unit. For the present, it is quite safe to assume that the attachments on the machine are properly adjusted for handling the container specified on the machine center feed and discharge guide. Therefore, when proceeding with our instructions for acquainting yourself with the machine, you can do so with the knowledge that these attachments have been properly timed for the required containers.

THEORY OF OPERATION

Containers are fed back-to-back to the machine via a conveyor chain. An integrated feed worm conveyor specifically designed to work in time with the infeed star, separates the incoming containers. The feed worm is a cylindrical auger apparatus mounted parallel to the conveyor chain and rotates on axis so that each container, when encaptured, is moved forward within the auger's recess to the infeed star.

The infeed star is a circular plate attachment with cutouts around its periphery that are sized and shaped to accommodate the applicable container. The infeed star turns concentrically on a drive shaft and is positioned so that as each container is presented by the feed worm, becomes caught within the available cutout. The rotating motion of the infeed star transfers containers consecutively to the clamp star.

Simultaneously, the cap feed star presents a single cap to each chuck jaw as it rotated by the capper's turret. A cap limit switch is located at the bottom of cap chute and is actuated by a dual combination of electric sensors. One sensor is located within the cabinet area and the other is located at the feed worm. When the cap feed star picks up a cap, the sensor under the cabinet indicates this timing fact, and the sensor at the worm looks for a container so that the next cap can be released to the cap feed star. A cap chute gate is actuated by an electric air solenoid mounted in the capper's pneumatic panel. This solenoid actuates the air-driven, double-acting gate air piston.

The clamp star is also a circular plate attachment with cutouts around its periphery that are sized and shaped for the same container as the infeed star. The clamp star turns concentrically on a drive shaft in unison with the infeed star and retrieves each container within its respective cutouts as they are presented. As the containers travel in a circular motion, chuck assemblies lower to apply a cap to each container.

As the machine continues to rotate, the cap is torqued onto the container, reaching full torque near the back of the machine as it rotates around the center star. The cap spindle then begins to rise due to the overhead lift cam. At this time, the cap jaw is pulled away from the cap and the capping operation is complete.

Chuck assemblies are suspended vertically around the clamp star's drive shaft and spaced perfectly aligned with the star's cutouts. The chuck assembly shafts spin on axis through a centrally located gear mechanism and are designed so that each chuck jaw clasps a single cap and applies it to a container as rotated into position. Each container is then rotated and transferred to the discharge star.

Like the infeed and clamp stars, the discharge star is a circular plate attachment with cutouts around its periphery that are sized and shaped to accommodate specific containers. The discharge star turns concentrically on a drive shaft and is positioned so that as the clamp star presents each capped container, becomes caught in its available cutout. The discharge star then rotates the capped container to the output end of the conveyor chain.

A series of proximity switches, belts, and gears are utilized to maintain proper timing between its primary components.

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TECHNICAL DATA

- **Facility Requirements**
- **Machine Specifications**
- **Lubrication**
- **Main Drive Motor Specifications**
- **Turret Lift Motor Specifications**
- **Spindle Drive Motor Specifications**
- **Sorter Drive Motor Specifications**
- **Attachment Reference**
- **Spare Parts List**

FACILITY REQUIREMENTS	
Environmental Conditions	Enclosed structure, climate controlled, free of visible atmospheric pollutants.
Electrical Supply	480 VAC, 30 Amps, 3 Phase.
Pneumatic Supply	80 psi, 20 cfm, .50 inch diameter inlet piping.
Water Supply	.50 inch inlet piping, municipal pressure

MACHINE SPECIFICATIONS	
Machine Weight	Machine: 6,000 lbs (estimated) Elevator Sorter: 1,500 lbs (estimated) Electrical Panel: 750 lbs (estimated)
Machine Dimensions	Machine: 120” x 119” x 67” Elevator Sorter: 156” x 80” x 75” Electrical Panel: 82” x 62” x 18”
Production Capacity	240 BPM

LUBRICATION	
Bearing Grease	Lubricate FGL-1 (Food Grade)
Gearbox Oil	APG-80W-140
Chain Lubricant	Customer Determined

MAIN DRIVE MOTOR SPECIFICATIONS	
Volts	230 / 460
Hertz	60
Phase	3
Horsepower	3.0
Revolutions Per Minute (RPM)	1800
Enclosure / Application	Inverter Duty / Washdown

TURRET LIFT MOTOR SPECIFICATIONS	
Volts	230 / 460
Hertz	60
Phase	3
Horsepower	3.0
Revolutions Per Minute (RPM)	1800
Enclosure / Application	Inverter Duty / Washdown / w/Brake

CAPPER SPINDLE MOTOR SPECIFICATIONS	
Volts	230 / 460
Hertz	60
Phase	3
Horsepower	3.0
Revolutions Per Minute (RPM)	1800
Enclosure / Application	Inverter Duty / Washdown

SORTER DRIVE MOTOR SPECIFICATIONS	
Volts	230 / 460
Hertz	60
Phase	3
Horsepower	1.0
Revolutions Per Minute (RPM)	1100
Enclosure / Application	Inverter Duty / Washdown

ATTACHMENT REFERENCE

BOTTLE	CAPS	ATTACHMENT
13.96 OZ Oval Glass 2.938” Thk x 3.366” W x 4.859” Tall	70mm	Feed Worm: A18709 Infeed Star: 12 OZ Infeed Neck Guide: 12 OZ Capper Center Guide: 12 OZ Discharge Star: 12 OZ Clamp Star: 12 OZ Cap Feed Star: 70MM

SPARE PARTS LIST

Part Number	Description	Qty
B11520	Bearing, Main	1
B11982	Gear, Bull, 22” PD	1
A18462	Bearing	1
A16631	Sensor, Proximity	1
B12324	Star Gear	1
A21179	Clutch, Mechanical, 2”	1
A90110	Gearbox, Main Drive	1
A90170	Motor, Main Drive	1
A17726	Sprocket, Worm Drive	1
A17739	Timing Belt	1
A18468	Universal Joint, 1” x 1”	2
A19491	Catch, Female	1
A19492	Ball, Spring Loaded	2
A19490	Catch, Male	1
A91944	Door Switch	1
A16118	Bearing Assembly, Ball, 3-7/16”	1
C11504	Roller Carrier	1
A18957	Bushing, 1-1/4”, Plain Bearing	3
B11989	Shaft, Chuck	2
A17357	Roller Sleeve, Urethane	2
A17744	Bearing, Roller Assembly, SS	2
A19874	Spring, Chuck Release	3
C11533	Chuck Jaw Body	3
C11534	Jaw Stem	3
X80408	Chuck Jaw, Lined	3
A16178	Stop Arm, Cap/No Cap Device	1
A90552	Cylinder, ¾” Bore, 1” Stroke	1
A17446	Bearing, 1” Bore, Adjustable Takeup	1
A10515	Bearing, 2-Bolt Flange	1
A16248	Photo Cell Reflector, 3” Dia.	1
B11502	Belt, Elevator Sorter	1
A92185	Ball, Vibrator	1
A18259	Liner for Chucks	6
A18740	Motor, 1-hp, 1100rpm	1
A91275	Photo Eye, AB	1

A91808	Chute Air Valve	1
A90818	Jog Cord, 12”, H20 Tight	1
A19303	Pin, Drive	9
A19278	Bushing, Garlock, 1-1/8”	2
A19279	Bushing, 7/8”	3
X70837	Stripper	3
A19275	Brass nut	1
A18669	Screw, Brass Nut	3
B11807	Magnetic Clutch	3
A19647	Motor, 3 hp	1
A19645	Gearbox	1
A17722	Sprocket	1
A18958	Bearing, 1-1/4”	2
A18959	Gear, 3”, Pinion	1
A20544	Rod, Knockout	2
A16550	Ball End Knockdown	2
A18173	Spring, Chuck Release	2
A18947	Bushing, 1” ID	2
A16179	Pivot Bushing	2
X70428	Pulley Body	1
X70429	Pulley Cover	1
A17744	Bearing	2
A16197	Clamp Belt	1
A18000	Solenoid Valve	1

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INSTALLATION

- **Unpacking**
- **Transport**
- **Machine Installation**
- **Electricals**
- **Pneumatics**

UNPACKING

Most machines are shipped FOB Charlotte which places the responsibility to the customer to look for damaged equipment due to shipping or weather and to address those issues with the trucking firm and insurance agencies.

Upon arrival, the customer is to obtain a copy of the Bill Of Lading from the trucker and verify that all items are received. Upon unpacking, ensure that all equipment, assemblies, and components are present. If it is discovered that an item or items are missing and those items are not listed as parts delivered, immediately contact US Bottlers Machinery as to their disposition.

All crates and boxes are to be placed right side up as determined by the printing on their sides and opened in manner that does not damage their contents. All such containers are to be placed on a flat and stable surface to prevent property damage or personal injury.

Unpackaged property is to remain organized to assist in their location and identification during the installation process. Do not remove any identifying labeling or tags from the property until it has been installed unless such identification poses a hindrance to their installation.

ATTENTION: It is advised that the machine's feet be located and isolated first to prevent loss and to facilitate a rapid installation.

This machine has been shipped with many of the major electronic components removed. The main power source is separately packaged.

ATTENTION: Do not make any attempt to install these components on the machine. Instruct your shipping and machinery rigging personnel not to attempt to remove any of the items from the containers marked "Open by U.S.B. Service Personnel Only". These boxes contain electronic components and MUST be properly handled to prevent damage.

The U.S.Bottlers service engineer who will be assisting you in setting up the machine will install and check these components for correctness. This engineer will also train your operators and service personnel in the proper care and use of this machinery.

Uncrate the machine carefully checking all attachments and parts against the main packing slip. Use extreme care to see that no instruction tags are lost or parts misplaced in the wrapping or packing material. If the machine has been uncrated in a distant area from the final installation point, move the filler and skid to the final location before removing the machine from the skid.

TRANSPORT

It is very important to observe all transport instructions and safety warnings to prevent possible personal injury or damage to the equipment. Transport and unloading must only be performed by qualified or experienced personnel.

All palletized equipment may only be lifted and moved using a forklift or pallet jack approved for the packaged weight.

Once unpacked, the machinery can usually be lifted from the bottom by a forklift and then moved. If transporting by this method, the forklift operator is to ensure that the forks traverse fully from one side of the machine to the opposite and that the forks only make contact with the machine's frame structure.

If a gantry crane is the transport method, cross members are to inserted through the frame structure at each end and chokers of equal lengths are to be used that comply with weight requirements. All transport equipment, cross members, chokers, and shackles are to be supplied by the customer and are the customer's responsibility in the manner of use and performance ability.

WARNING: NEVER STAND UNDER A SUSPENDED LOAD. THERE SHOULD ALWAYS BE A PERSON STATIONED ON EACH SIDE OF THE EQUIPMENT TO ENSURE THE PATH IS CLEAR OF OBSTRUCTION.

WARNING: ONLY USE LIFTS AND LIFTING GEAR CERTIFIED TO ACCOMMODATE A LOAD CAPACITY THAT EXCEEDS THE EQUIPMENT BEING MOVED.

CAUTION: WHEN TRANSPORTING THE MACHINE FOR THE PURPOSE OF INSTALLATION, IT IS ADVISED THAT THE UNIT BE LIFTED AND POSITIONED AT THE CORRECT ANGLE.

CAUTION: BEFORE MOVING THE EQUIPMENT, ENSURE THERE IS ADEQUATE CLEARANCE IN PASSAGES AND DOORWAYS.

ATTENTION: To prevent possible damage, it is recommended that the machine's doors closest to the forklift be removed prior to lifting.

MACHINE INSTALLATION

Installation must be carried out in accordance with these instructions and must only be performed by experienced contractors or personnel to ensure a safe and correct installation.

Before beginning installation, it is wise to ensure that access to the machine's installation site is clear and reasonably level. Ensure that adequate power supply is available, all lifting equipment and hardware is available, and the work area is free of debris.

WARNING: ONLY BEGIN INSTALLATION AFTER ALL OF THE LITERATURE HAS BEEN REVIEWED. OBSERVE ALL INSTRUCTIONS AS DIRECTED. CONTACT US BOTTLERS MACHINERY IF ANY DRAWINGS OR LITERATURE IS MISSING.

WARNING: KEEP FINGERS AWAY FROM POSSIBLE PINCH POINTS TO AVOID INJURY. WORK WITH CARE.

NOTE: Figure 3-1 below is a representation displaying a typical machine to be transported. The machine displayed is not the machine ordered.

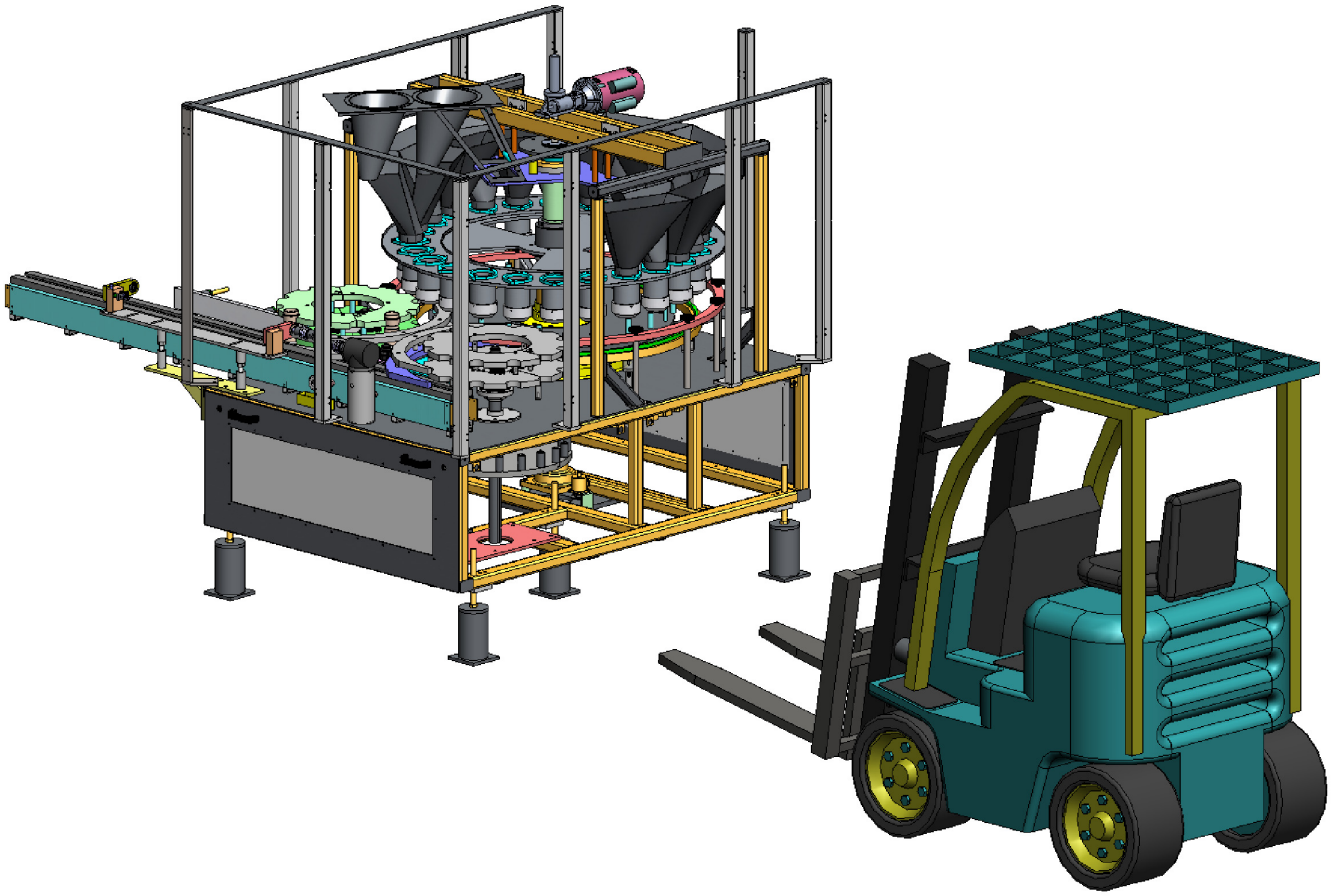

Figure 3-1, Machine Transport with Forklift

Move the uncrated machine into position and, after placing it in line with the proper conveyor, level the filler making use of the jack screws. Adjust the jack screws so that the machine is level using a finished surface such as the filler cabinet or bridge plate as a reference. See to it that the weight of the filler is evenly distributed upon each foot It will not be necessary to attach the machine to the floor when the weight is properly distributed because the machine is heavy enough to eliminate vibrations. Ensure that the jack screws used for leveling the machine are positioned in the center of the foot pedestals and that the load of the machine is equally distributed on each jack screw.

The machine has been provided with the bridge plate built to accommodate the type of conveyor chain that you specified on your order. Connect the feed and discharge conveyor track and check carefully for alignment of these sections of conveyor. Run your conveyor chain through the machine and feed the return back through the return plate support beneath the bridge plate.

After the final machine installation is complete, rotate the filler and observe the action of all rotary or moving parts to see that they move smoothly through their complete cycle. Pay particular attention to cam followers and rollers that should flow smoothly from one cam track into another cam track. Abnormal rapid wear can occur on a machine that has been improperly installed.

After the machine has been installed in the proper position in the packaging line and the conveyor system has been installed, proceed to install the liquid piping system, and the main machine control enclosure, and provide power to the electronic power source and connect this unit to the main machine junction box terminal strip. Ensure that all motor control wires are run in a separate conduit.

After all the primary services have been installed and connected to the filler, the U.S.B. service engineer should be scheduled. This engineer will be able to install the remaining items on the filler and run the necessary diagnostic tests within 1 to 2 days. During this period, the personnel responsible for the service of the machine should be present to work with the U.S.B. engineer and receive instruction in the operation and maintenance of the system. Bottle handling and product testing should be scheduled for the third day and, generally, the service engineer should complete his work on the fourth day.

ELECTRICALS

A wiring diagram and cable schedule is provided as part of the literature package included with this machine. All cable work between the machine, control panel, junction box, and the power supply connection must be in accordance to the information provided in the wiring diagram.

WARNING: ENSURE THE POWER SUPPLY IS DISCONNECTED AND FOLLOW ALL LOCKOUT/TAGOUT PROCEDURES WHEN PERFORMING ANY ELECTRICAL ACTIVITY.

WARNING: ALL ELECTRICAL ACTIVITY MUST BE PERFORMED IN ACCORDANCE WITH APPLICABLE REGULATIONS BY LEGALLY QUALIFIED PERSONNEL.

WARNING: DO NOT APPLY POWER TO THE MACHINE UNTIL ALL WIRING CONNECTIONS HAS BEEN VERIFIED. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR COMPONENT FAILURE.

CAUTION: ANY TERMINAL SLEEVES REMOVED DURING LEAD CONNECTION MUST BE REPLACED AFTERWARD.

CAUTION: ENSURE TO USE ONLY THE RECOMMENDED WIRING AND CABLING SPECIFICIED IN THIS DOCUMENT OR IN OTHER MATERIAL PROVIDED WITH THE MACHINE.

CAUTION: TO ENSURE PROPER MACHINE OPERATION, EACH LEVEL OF WIRING MUST BE RUN IN ITS OWN CONDUIT OR SEPARATED IN THE WIREWAY WITH THE APPROPRIATE BARRIERS TO ENSURE ADEQUATE ISOLATION.

CAUTION: ENSURE ALL GROUND WIRES ARE CONNECTED AS DIRECTED IN THE SCHEMATICS PROVIDED.

PNEUMATICS

Exercise care in running the facility airline to the machine. This line should not have pockets or bends that will permit the collection of moisture or oil vapors that may be carried over from the compressor.

CAUTION: IF THE MAIN AIR LINE PRESSURE IS IN EXCESS OF OUR MAXIMUM RECOMMENDED OPERATING PRESSURE OF 100 PSI, A REDUCING VAVLE MUST BE USED AT THE MACHINE.

Carefully select a good air and oil filter and separator of sufficient capacity to handle nearly double the volume of your air requirements. Install it as close to the cleaner as possible and provide it with a well-located blow-down valve.

ATTENTION: If you have doubts as to the proper installation, it is recommended that you contact a local field engineer supplying compressors and filters. A good field engineer should be fully acquainted with your requirements and be able to provide the proper recommendations.

CAUTION: DO NOT EXCEED 15 PSI AT ANY BLADDER STYLE BOTTLE STOPS. THE BLADDERS WILL BURST.

CAUTION: SUPPLY ONLY CLEAN, DRY AIR TO THE MACHINE - NEVER SUPPLY LUBRICATED AIR.

4

OPERATION

- **Operator Panel**
- **Setup / Changeover**

OPERATOR PANEL

This chapter identifies the operator panel's display, controls, and features and also, explains how they are used to operate the machine. The LCD screen utilizes touch-screen technology.

OPERATOR PANEL BUTTONS	
BUTTONS	**DESCRIPTION**
CAPPER START	Initiates machine operation when pressed. Pressing the CAPPER STOP button will pause machine operation.
CAPPER STOP	Ceases machine operation when pressed. Pressing the CAPPER START button will activate machine operation.
CAPPER RESET	Clears the machine's memory of a fault condition if it has been corrected. If a fault exists and it hasn't been corrected, the machine will not be reset and the fault condition will not be cleared from memory.
EMERGENCY STOP	Shuts the machine down in emergency situations where expediency is required.
CAPPER JOG & HOIST CORD	Used during testing and changeovers for metered movement. When the LCD hoist button is off, the button on the side rotates the turret. When LCD hoist button is selected for up or down, the button on the side raises and lowers the hoist.

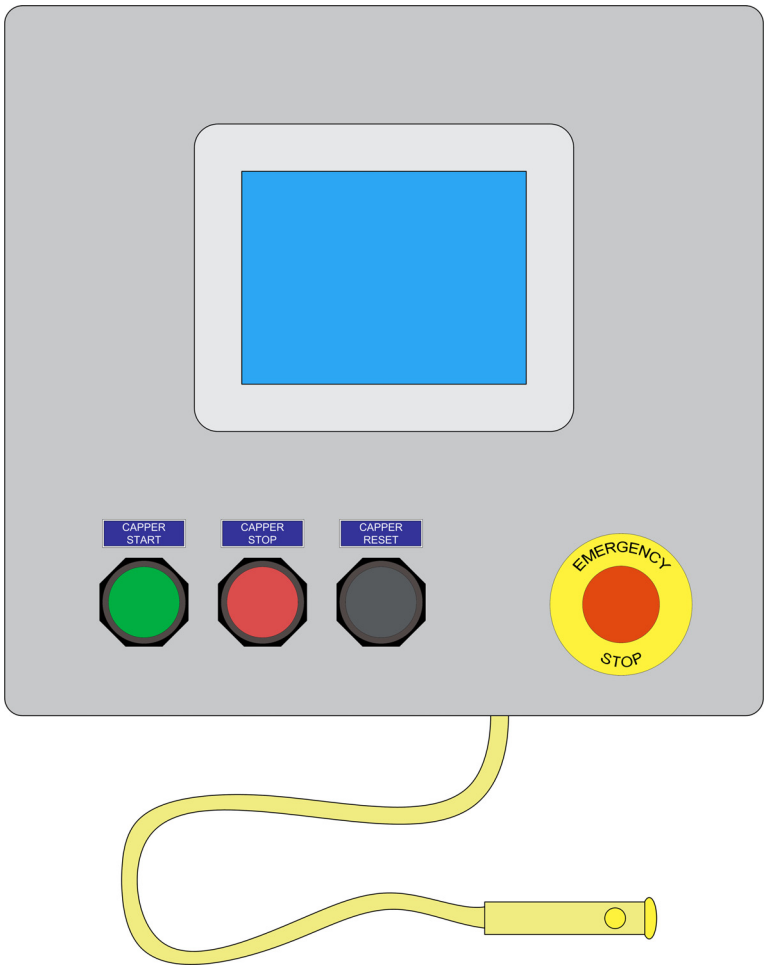

Figure 4-1, Operator Panel

MENU SELECTION SCREEN	
BUTTONS/DISPLAYS	**DESCRIPTION**
RUN SCREEN	When pressed, advances to the Run Screen menu. Is the primary screen for machine operation.
E-SYNC	Advances to the E-Sync menu screen.
MAINTENANCE SCREEN	When pressed, advances to the Maintenance menu. This menu allows features to be bypassed and counters to be reset. Contains controls for machine setup and troubleshooting.
CAPPER TIMING	When pressed, advances to the Capper Timing menu. This menu allows adjustment of the timers for the machine.
SORTER TIMING	When pressed, advances to the Sorter Timing menu. This menu allows adjustment of the timers for the machine.
CONFIGURATION SCREEN	When pressed, advances to the Configuration menu. Allows access to the touch screen configuration functions.
LOGIN	Advances to the Login menu screen.

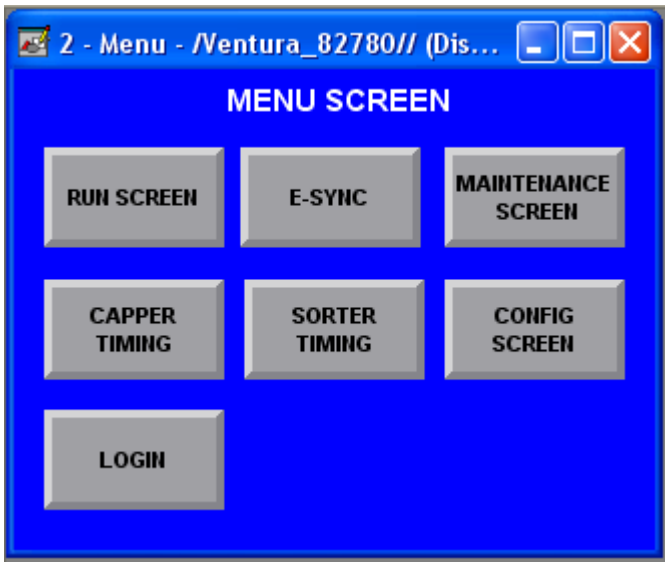

Figure 4-2, Menu Selection Screen

RUN MENU SCREEN	
BUTTONS/DISPLAYS	**DESCRIPTION**
MACHINE SETPOINT SPEED	Displays the desired capper speed in bottles per minute.
MACHINE ACTUAL SPEED	Displays the actual machine production speed.
CONVEYOR OFF/ON/AUTO	ON: Conveyor run continuously. OFF: Discontinues conveyor operation. AUTO: Follows machine operation.
CAPS ON/OFF	ON: Allows caps to be released for bottles. OFF: Does not allow caps to be released.
MENU SCREEN	Advances the operator to the Menu screen.

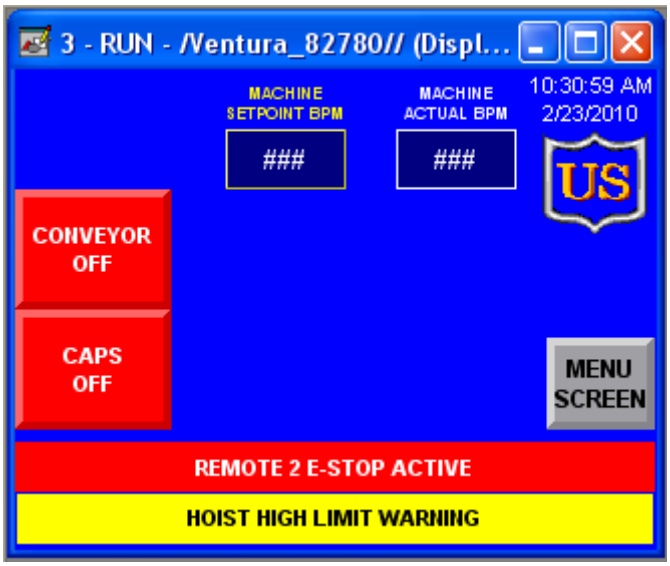

Figure 4-3, Run Menu Screen

CAPPER TIMING SCREEN	
BUTTONS/DISPLAYS	**DESCRIPTION**
DISCHARGE BACKUP DELAY	Sets length of time the Discharge Backup sensor has to be blocked before engaging bottle stop. Numbers in 1/100 second.
DISCHARGE BACKUP CLEAR DELAY	Sets the length of time the Discharge Backup sensor has to be clear before releasing the bottle stop. Numbers in 1/100 second.
NO CAPS FAULT DELAY	Sets the length of time the upper chute eye has to be clear and the cap sorter running before stopping the machine and indicating a No Cap Fault. Numbers in 1/100 second.
MENU SCREEN	Advances the operator to the Menu screen.

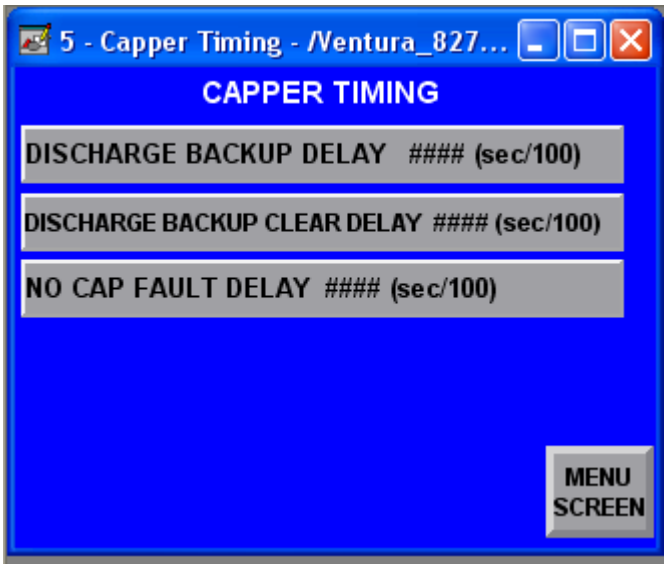

Figure 4-4, Capper Timing Screen

SORTER TIMING SCREEN	
BUTTONS/DISPLAYS	**DESCRIPTION**
SORTER START DELAY	Sets the length of time the Upper Chute Eye has to be clear before starting the cap sorter. Numbers in 1/100 second.
SORTER STOP DELAY	Sets the length of time the upper chute eye has to be blocked before stopping the cap sorter. Numbers in 1/100 second.
CHUTE AIR STOP DELAY	Sets the time length the air remains on after no more caps are needed. Numbers in 1/100 second.
VIBRATION ON DELAY	Sets the time length that the sorter will wait before beginning. Vibrates once the upper chute eye is clear of caps.
MENU SCREEN	Advances the operator to the Menu screen.

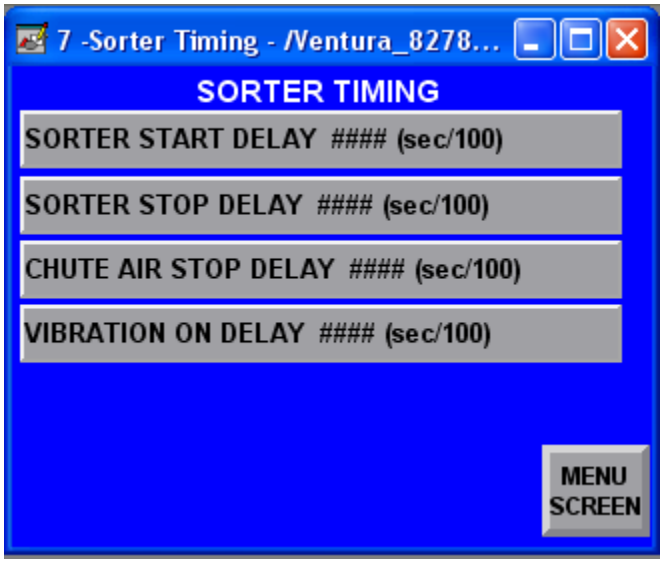

Figure 4-5, Sorter Timing Screen

PANELVIEW CONFIGURATION SCREEN	
Is a transition screen only. Allows for the confirmation of whether to advance to the Configuration screen.	
BUTTONS/DISPLAYS	**DESCRIPTION**
YES	Advances to the Panelview Configuration Screen.
NO	Returns to the Main Menu Screen.

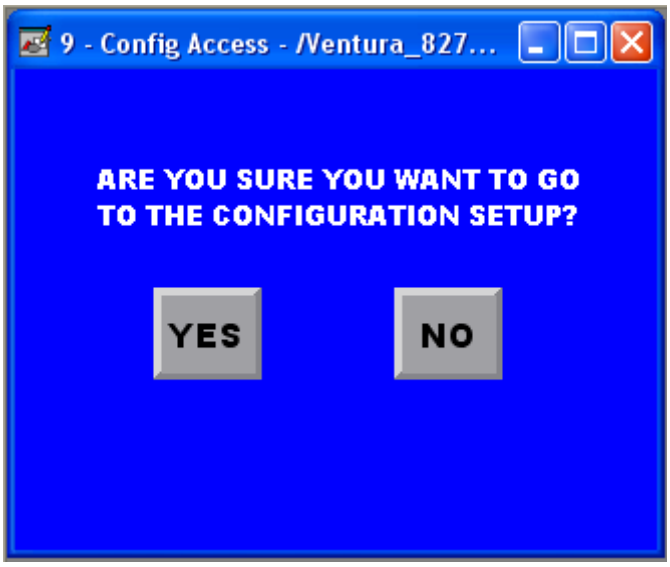

Figure 4-6, Configuration Screen

MAINTENANCE MENU SCREEN	
BUTTONS/DISPLAYS	**DESCRIPTION**
CAPPER SHIFT REGISTER	This number sets the delay from the bottle present sensor to the release of the cap. This number should not normally change, once set at startup.
SORTER SPEED	Sets the belt speed of the cap sorter.
SPINDLE OFF/ON/AUTO	ON: Runs regardless if the machine is stopped. OFF: Discontinues spindle operation. AUTO: Follows machine operation.
CAPPER HOIST OFF/UP/DOWN	When in the UP or DOWN position, the jog cord is used to activate the hoist for the capper. Once the capper is at the proper height, turn the button to OFF or just go back to the main menu.
DOOR BYPASS ON/OFF	Allows the machine to operate with one or more doors open.
OPERATION TIME	Total operation time of the machine.
MAINTENANCE TIME	A resettable timer for scheduling maintenance.
HOURS RESET	Resets the maintenance timer to zero.
MENU SCREEN	Advances the operator to the Menu screen.

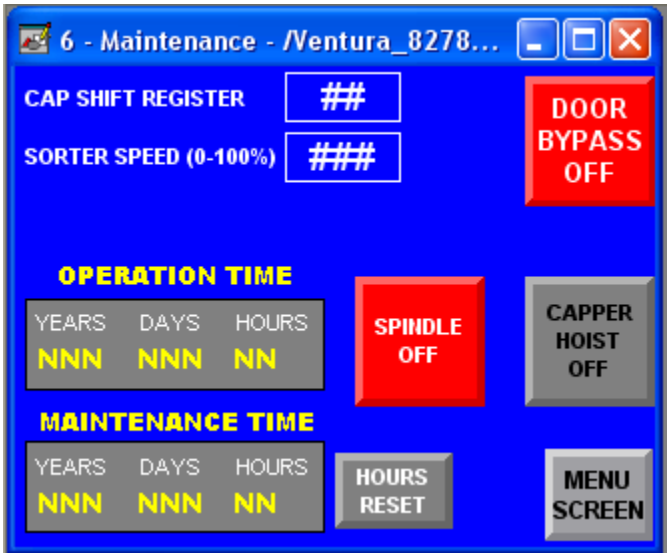

Figure 4-7, Maintenance Menu Screen

LOGIN MENU SCREEN	
Allows the entry of a login password to enter other machine menus. Also advances to the Password Edit screen.	
BUTTONS/DISPLAYS	**DESCRIPTION**
LOGIN	Activates the popup screen to allow entry of a username and password.
LOGOUT	Sets the current user to “Default”
EDIT PASSWORD	Active only when the security level is at an administrator level. This allows the user to modify the current passwords.
CURRENT USER	Shows the name of the Current user
MENU	Returns the operator to the Menu screen.

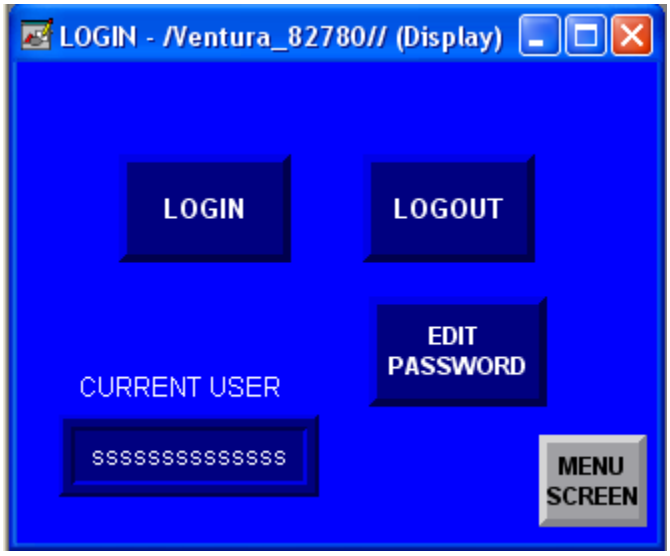

Figure 4-8, Login Menu Screen

PASSWORD EDIT SCREEN	
Allows for changing and/or editing of password protected passwords.	
BUTTONS/DISPLAYS	**DESCRIPTION**
LOGIN	Activates the popup screen to allow entry of a username and password.
LOGOUT	Sets the current user to “Default”.
CHANGE PASSWORD	Activates the popup screen to allow the current password to be changed.
CURRENT USER	Shows the name of the Current user.
MENU	Returns the operator to the Menu screen.

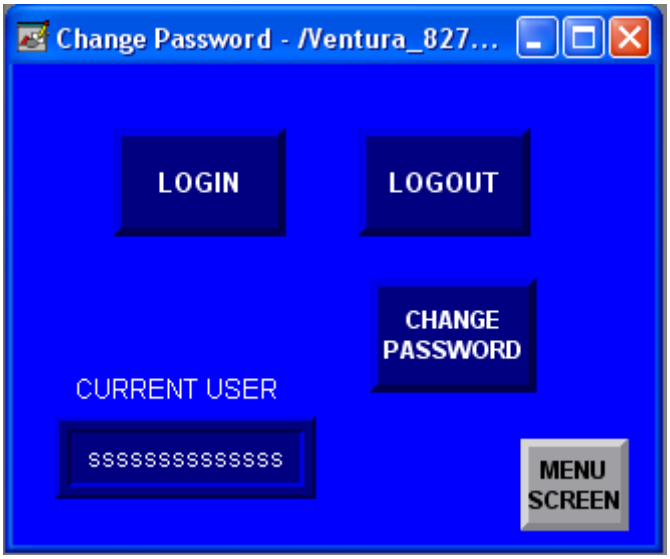

Figure 4-9, Password Edit Menu Screen

E-SYNC MENU SCREEN	
BUTTONS/DISPLAYS	**DESCRIPTION**
CAPPER ADVANCE	Advances the timing of the capper to the capper infeed star.
CAPPER DISABLED	Disables the timing of the capper to the capper infeed star.
CAPPER RETARD	Retards the timing of the capper to the capper infeed star.
MENU SCREEN	Returns the operator to the Menu screen.

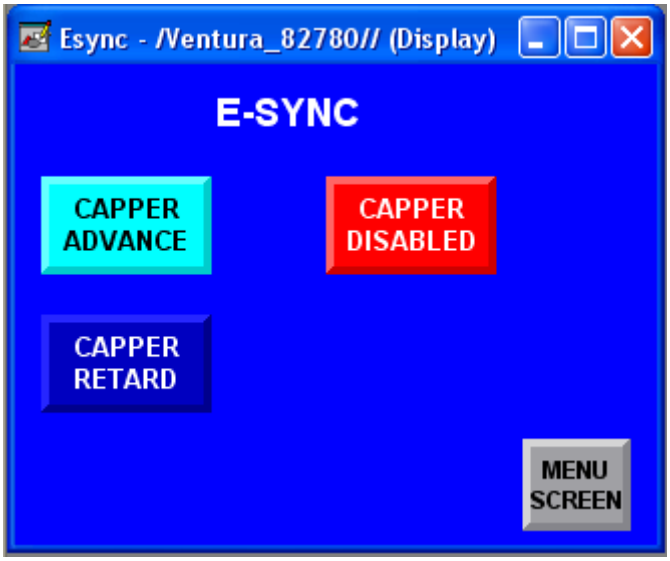

Figure 4-10, E-Sync Menu Screen

SETUP / CHANGEOVER

This chapter covers the physical activities required to prepare the machine for a product change. The changeover process is separated into three different activities: Attachment Change, Height Adjustment, and Bottle/Can Loading. Each activity is addressed below.

ATTACHMENTS

Each product change requires the substitution of certain machine attachments to allow for bottle and cap variations. Each set of attachments is stamped with their applicable container/cap identifiers to assist in the changeover process.

Attachment Change

1. Power down the machine.

> **WARNING: ENSURE THE POWER SUPPLY IS DISCONNECTED AND FOLLOW ALL LOCKOUT/TAGOUT PROCEDURES BEFORE PERFORMING ANY MAINTENANCE ACTIVIES.**

2. Open safety doors as necessary to access the changeover attachments.
3. As applicable, change the setting of the operator panel for the changeover.

> NOTE: Refer to the OPERATOR PANEL chapter of this unit for specific menu details.

4. Remove three knob bolts securing **LH Neck Guide**. Lift away **LH Neck Guide**.
5. Remove two knob bolts securing **RH Neck Guide**. Lift away **RH Neck Guide**.
6. Remove six knob bolts securing **Capper Center Star**. Lift away **Capper Center Star**.
7. Rotate four **Knob Assys** securing **Infeed Star**. Lift away **Infeed Star**.
8. Rotate four Knob Assys securing Discharge Star. Lift away Discharge Star.
9. Rotate three Knob Assys securing Infeed Center Guide and Discharge Center Guide. Lift away guides.
10. Install alternates as described in steps 4 through 9.
11. Remove feed worm as necessary and install alternate.
12. Adjust rear rail adjustment plate.
13. Adjust height of cap slide plate.
14. Restore power and test cycle to ensure proper function.

MACHINE SETUP PARAMETERS		
CONTAINER	**SLIDEPLATE SPACERS**	**CHUCK-TO-PLATE**
12 OZ	.875”	1/4” (70mm Cap)

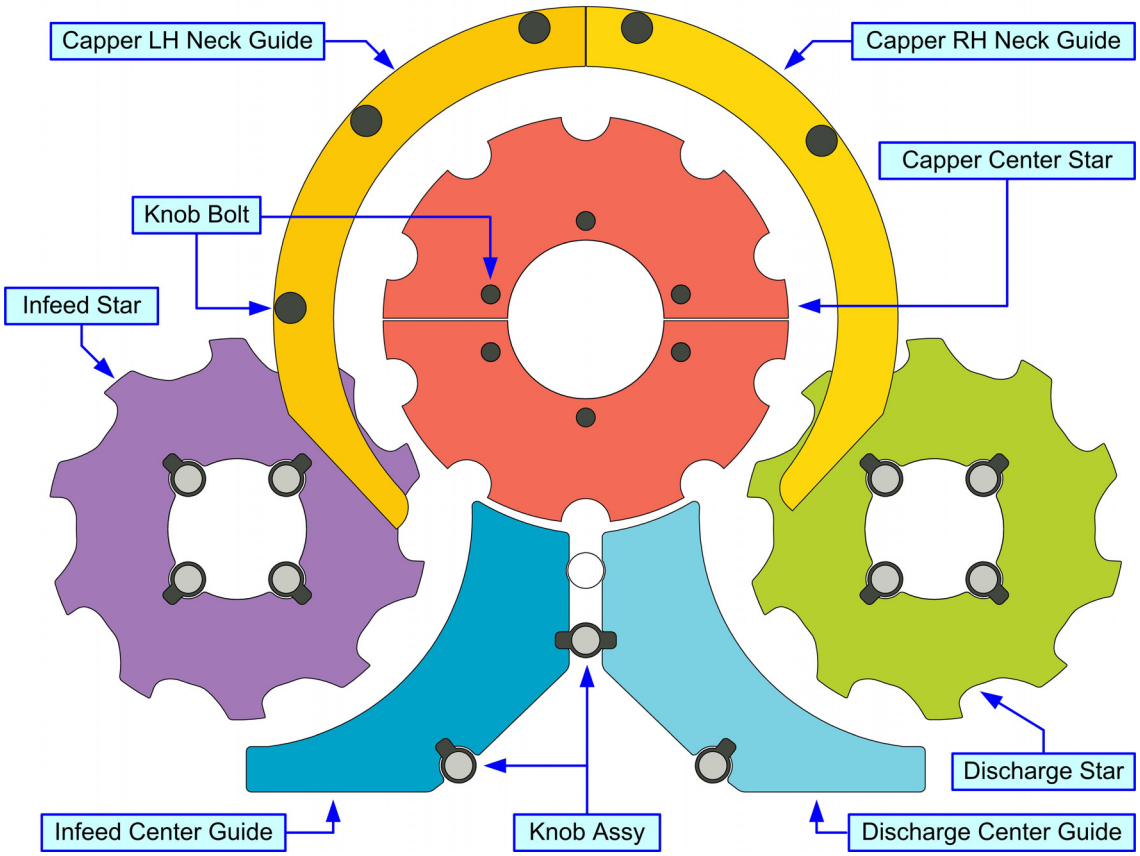

Figure 4-11, Attachments Change

CONVEYOR RAIL ADJUSTMENT

To determine if the conveyor rails are properly set, place a container onto the center of the conveyor at each end of the rail assemblies. Visually regard the rail assemblies in relation to the container to determine if the spacing and height is desirable.

> NOTE: Properly adjusted conveyor rails will allow the containers to move freely and in single file without applying pressure on either side. A 1/8 to 1/4 inch space on either side of the container will suffice.

If horizontal adjustment is required, loosen the knob set bolts and manually adjust the rails assemblies inward or outward as necessary to achieve equal and proper spacing to the bottles on each end. Retighten the knob set bolts onto their respective rail assembly shafts when complete.

If vertical adjustment is required to improve container stability while being conveyed, loosen the height set bolts to vertically free the conveyor rails and manually raise or lower as desired. Hold each rail assembly in position while retightening the height set bolts.

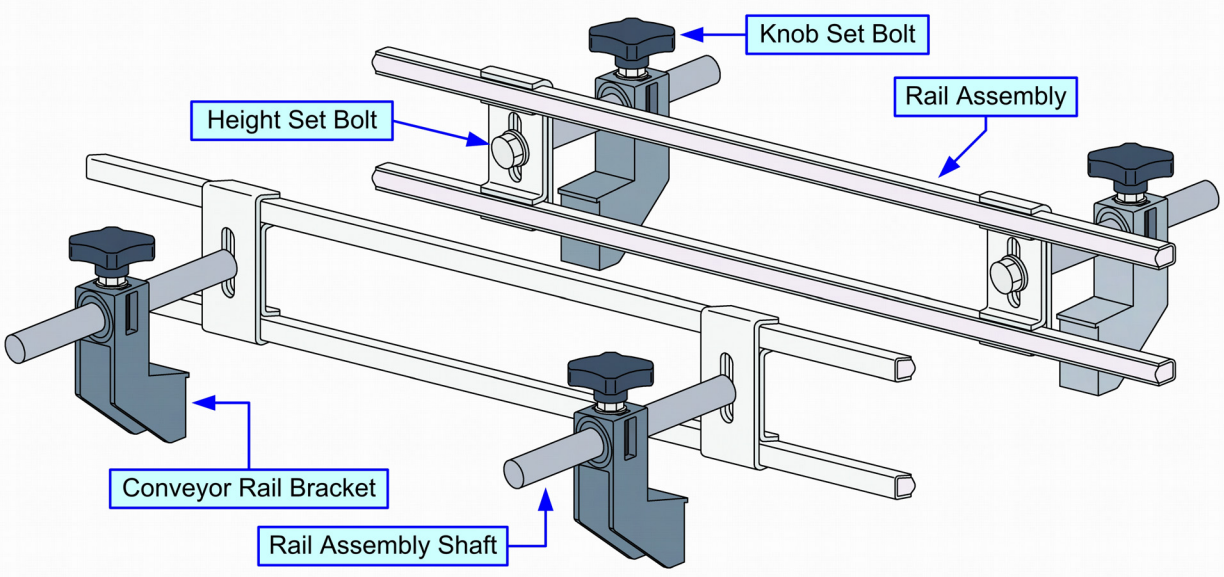

Figure 4-12, Conveyor Rail Adjustment

LIMIT RAIL & FEED WORM ADJUSTMENT

Most product size changes will require the position adjustment of the limit rail and the worm conveyor. Their proper positioning should allow the container to travel on the conveyor chain without any lateral movement due to contact with either components.

The limit rail is secured into position by two knob bolts located underneath their respective brackets. Slightly loosen these bolts to freely move the limit rail inward or outward as required. Retighten the bolts when proper positioning is achieved.

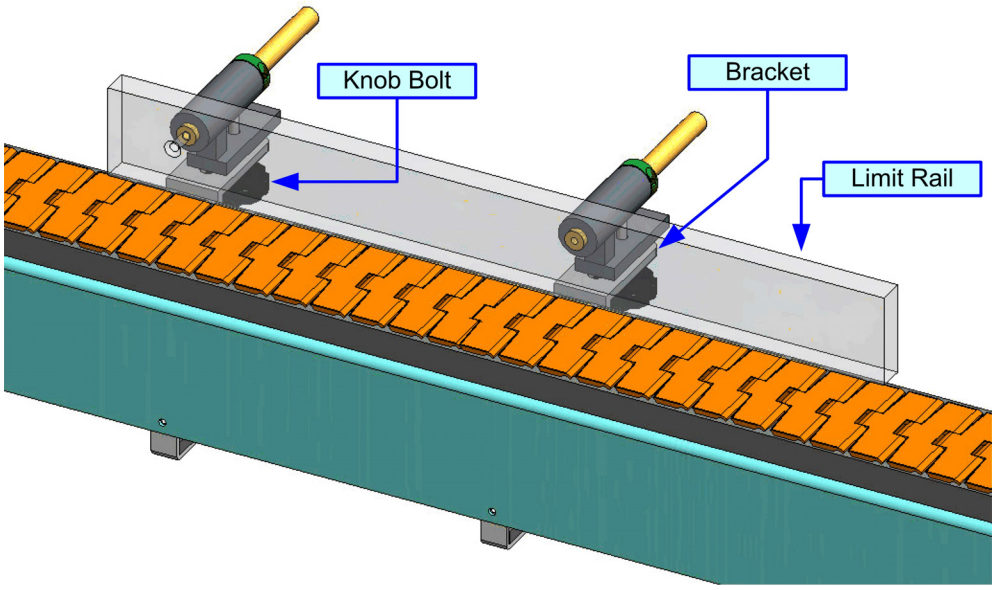

Figure 4-13, Limit Rail Adjustment

The feed worm is secured into position by two quick release levers. Slightly loosen these levers to freely move the worm conveyor inward or outward as required. Retighten the levers when proper positioning is achieved.

ATTENTION: Properly adjusted limit rail and worm conveyor will allow the containers to move freely and in single file without applying pressure on either side. A 1/8 to 1/4 inch space on either side of the container will suffice.

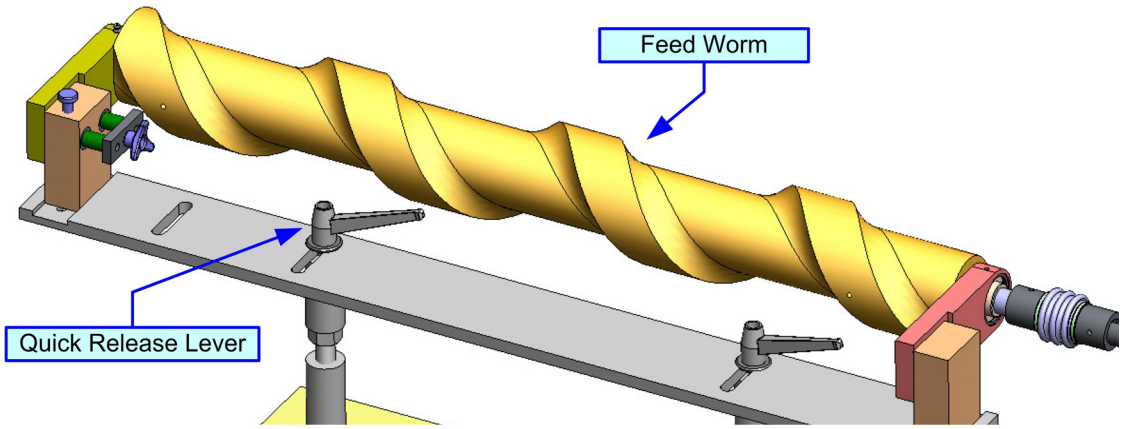

Figure 4-14, Feed Worm Adjustment

CAPPER CHUCK ADJUSTMENT

This chapter provides instruction on how to independently increase/decrease the chuck's gripping strength and tightening strength.

Torque Adjustment (Mechanical Clutch Only)

On the magnetic clutch, loosen the clutch setscrew and then adjust the torque adjustment ring to the desired torque setting. The exterior housing has numbers laser-etched in the stainless steel exterior, and each number represents an increase in the amount of available applied torque based on the internal magnetic components. These numbers represent rough settings for each chuck and can be used as a starting point when attempting to set chuck jaw torque. After testing, a particular chuck may need to be fine-tuned so that the entire machine runs at a consistent torque setting from chuck to chuck. Retighten the clutch setscrew following adjustment.

Grip Adjustment (Single Piece Jaws/Mechanical Clutch Only)

To adjust the chuck's gripping and releasing strength of the cap, unscrew the chuck body from the chuck housing to access the threaded jaw stem. Loosen the two chuck setscrews, then turn the grip adjustment ring to increase/decrease tension on its pressure spring. Retighten the two chuck setscrews, then thread the chuck body onto the chuck housing when complete.

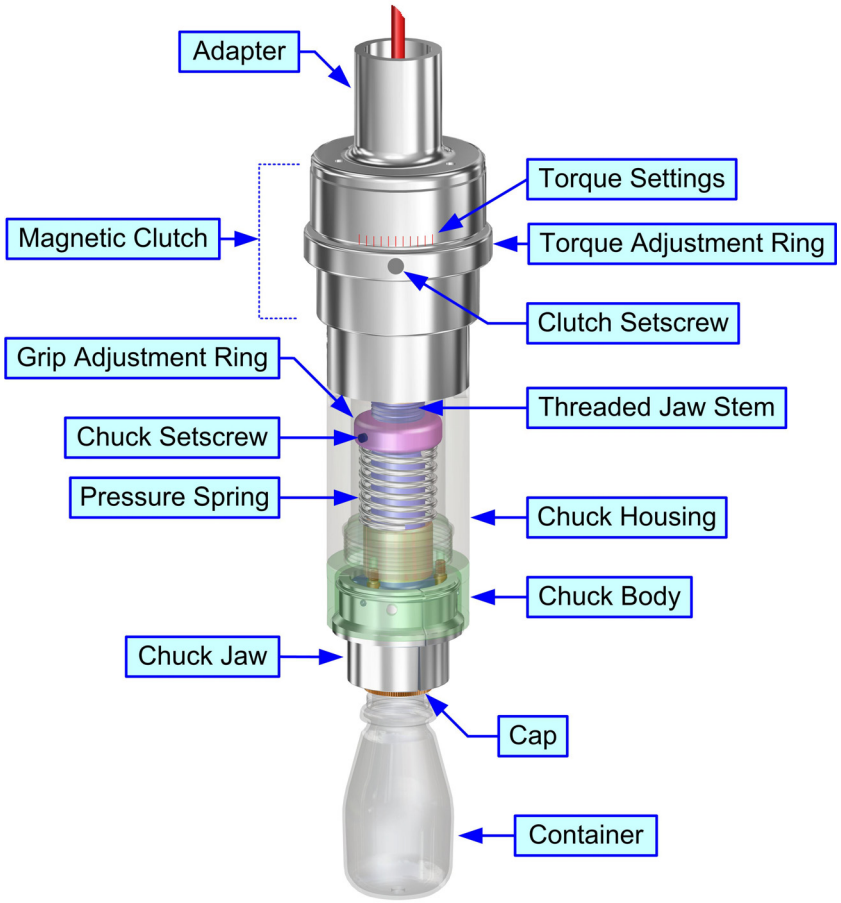

Figure 15, Chuck Assembly

CAP FEED & CHUCK HEIGHT ADJUSTMENT

To establish the height adjustment of the capper chucks, the correct cap slide plate must be mounted to the slide plate posts. Position a chuck over the cap slide plate on the last drop of the lifting cam and lowered to the cap retrieve depth and with the jaw closed.

> **CAUTION:** EXERCIZE CARE WHEN PERFORMING THIS PROCEDURE. IF THE CHUCKS ARE NOT SET AT THE PROPER HEIGHT, MECHANICAL DAMAGE CAN OCCUR WHEN ROTATING THE MACHINE UNDER POWER.

1. Open safety doors as necessary to access the cap feed assembly.
2. Use the jog & hoist cord of the machine's operator panel to fully raise the chuck assembly.
3. Remove the height spacers from each of the three cap slide plate posts.
4. Loosen the friction clamp locking levers of each cap slide plate post.
5. Insert alternate height spacers to upper portion of each cap slide post to establish proper plate height. Retighten each friction clamp locking lever to secure.

> NOTE: A set of height spacers has been supplied to accommodate each changeover configuration. Ensure to select the applicable set.

> NOTE: For some applications each of the height spacers of a given set may be of different lengths. For those applications, ensure that each spacer is placed onto its respective post.

6. Use the jog & hoist cord to rotate a chuck assembly over the cap slide plate stopping at its lowest point.
7. Place the thickness gauge flatly onto the top surface of the cap slide plate centered beneath the chuck assembly.
8. Use the jog & hoist cord to lower the capper's chuck assembly toward the cap slide plate until almost making contact. Remove thickness gauge.

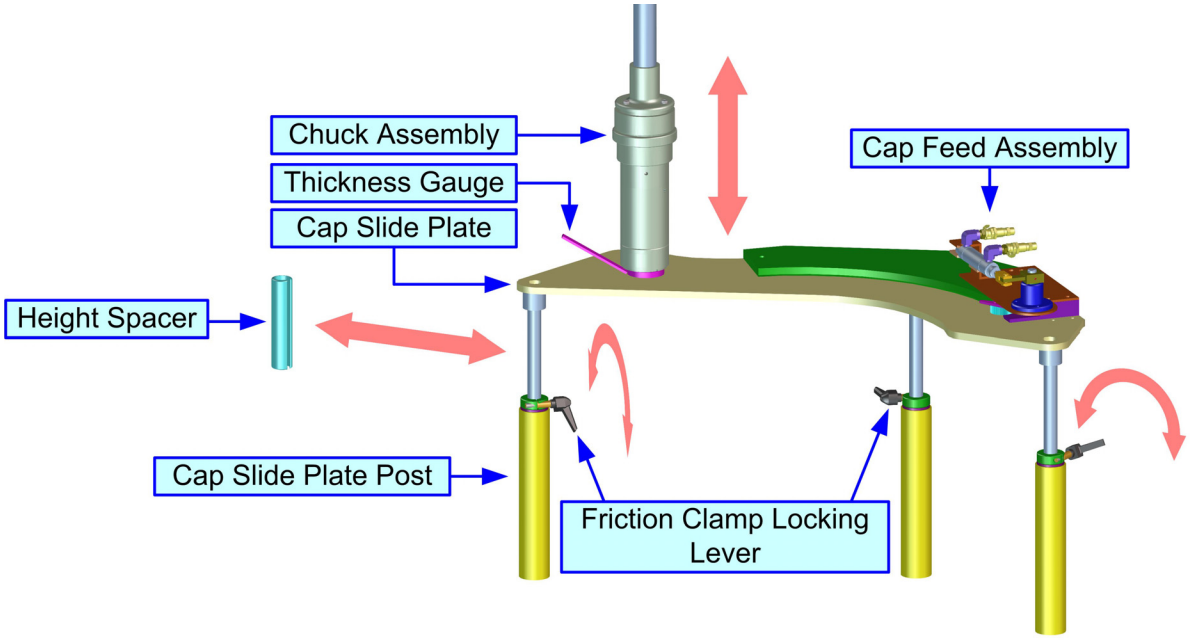

Figure 16, Cap Feed & Chuck Height Adjustment

CAPPER LIFTING HOIST ADJUSTMENT

The capper incorporates a lifting jack on the roof of the machine to enable a quick change-over for bottle height adjustment. When the capper is not rotational, the switch on the front of the operator panel can be used to raise or lower the lifting jacks by activating the reversing motor on the roof of the machine. There is only a total of six inches of adjustment and the rotary actuator limit switch will signal when the limit has been reached and will not allow the operator to move further in that direction. At this point, the only other option is to reverse the motor direction and run the other way.

To establish the height adjustment of the capper chucks, the correct cap transfer slide plate must be set to the correct height. Positioned a chuck over the cap slide plate on the last drop of the lifting cam and lowered to securely retrieve a cap with the chuck jaw at the appropriate depth and with the jaw closed.

At this point, the chuck jaw should have the cap fully encapsulated. This is to be considered the proper setting so that when the capper is rotated forward, the roller will move along the cam and lift up off of the cap slide plate. Then, when it descends in the rear of the machine, it will fully and properly apply the cap to the container with the roller 1/32” above the cam.

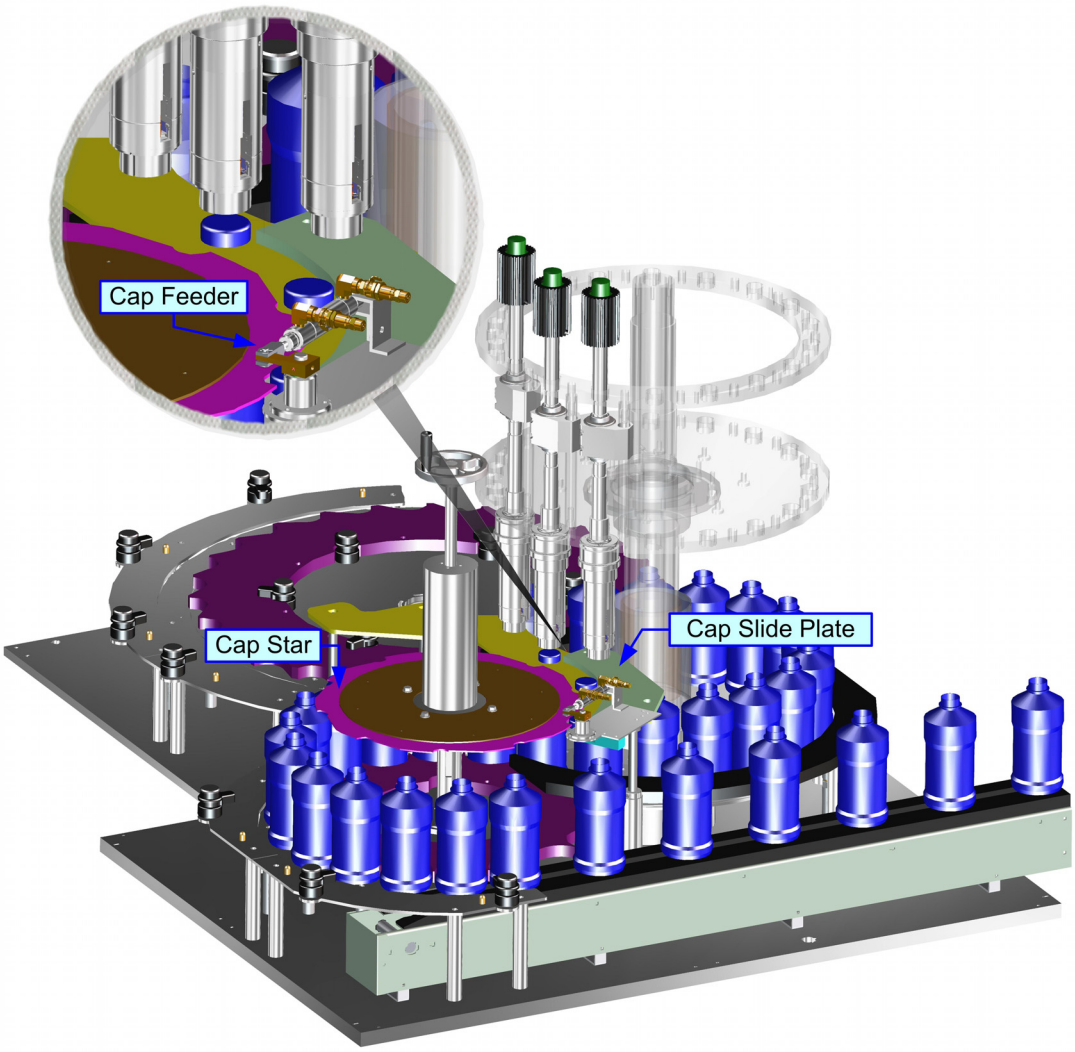

Figure 4-17, Capper Lifting Hoist Adjustment

CAUTION: EXERCIZE CARE WHEN PERFORMING THIS PROCEDURE. IF THE CHUCKS ARE NOT SET AT THE PROPER HEIGHT, MECHANICAL DAMAGE CAN OCCUR WHEN ROTATING THE MACHINE UNDER POWER.

For the capper lift mechanism to operate, the:

- capper must be stopped,
- direction selector switch must be set to the correct direction,
- capper lift light must be off,
- button on the cord must be pressed for operation.

If a limit switch is encountered during operation, the PLC will stop movement in that direction and initiate movement in the opposite direction for one second and then stop. This action will clear the limit switch and another operation may then be started.

ATTENTION: During normal operation, the lift limit light should never be continuously illuminated. If so, the operator controls will become inoperable until corrective action is taken to eliminate this condition.

INDEPENDENT SPINDLE SPEED ADJUSTMENT

This feature allows the capper's spindle rotational speed to be independently adjusted from the turret's rotational speed to accommodate the application profile of various cap types through the increase or decrease of spindle/chuck revolutions.

This procedure requires the use of the Allen-Bradley, PowerFlex, 4-Class, Series A Human Interface Module. Connect the module to the drive controller within the machine's electrical panel.

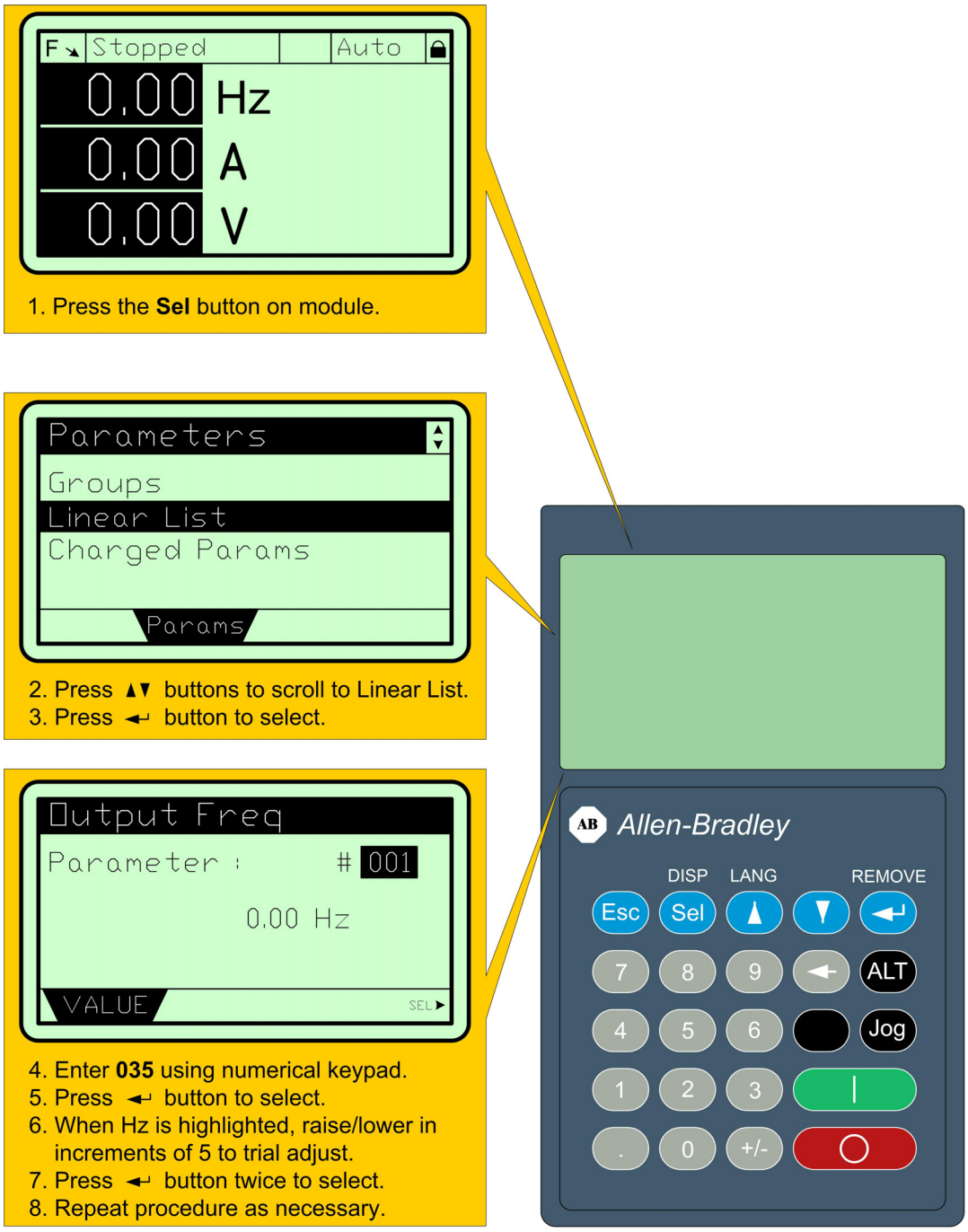

Figure 4-18, Independent Spindle Speed Adjustment

PNUEMATIC REGULATOR BLOCK

The minimum desired input air supply pressure to the regulator is 80psi. Its respective pressure adjustment dial allows manual pressure regulation by turning the dial clockwise until the desired or optimum pressure is achieved. The pressure level may be read by the supply pressure gauge attached to the face of the regulator.

Supply Air
The input pneumatic regulator is equipped with a filter vessel to catch excess fluids from the air supply lines. Periodically, the vessel must be emptied to continue to provide service. Unscrew the knurled, filter bleed valve located at the bottom of the vessel to drain the accumulated fluids.

Low Air
The low air pressure switch is preset at a little less than 50 psi and should not require adjustment unless the switch is replaced.

Cap Gate
Regulates the positioning of individual caps for the cap chuck. This switch setting will vary depending on the pressure required for proper positioning.

Capper Chute Air
Controls the supply of air to the capper cap chute to assist the movement of caps through the chute.

Flow Regulator Valves
There is an adjustment knob for the upper and lower valve control. These thresholds may require adjustment from one cap type to another.

Belt Tension
Controls the tension of the bottle clamping belt located on the capper.

Main Air Solenoid
Supplies air to system when all doors and e-stop is clear.

Supply Air Lockout
Provides manual shutoff for air.

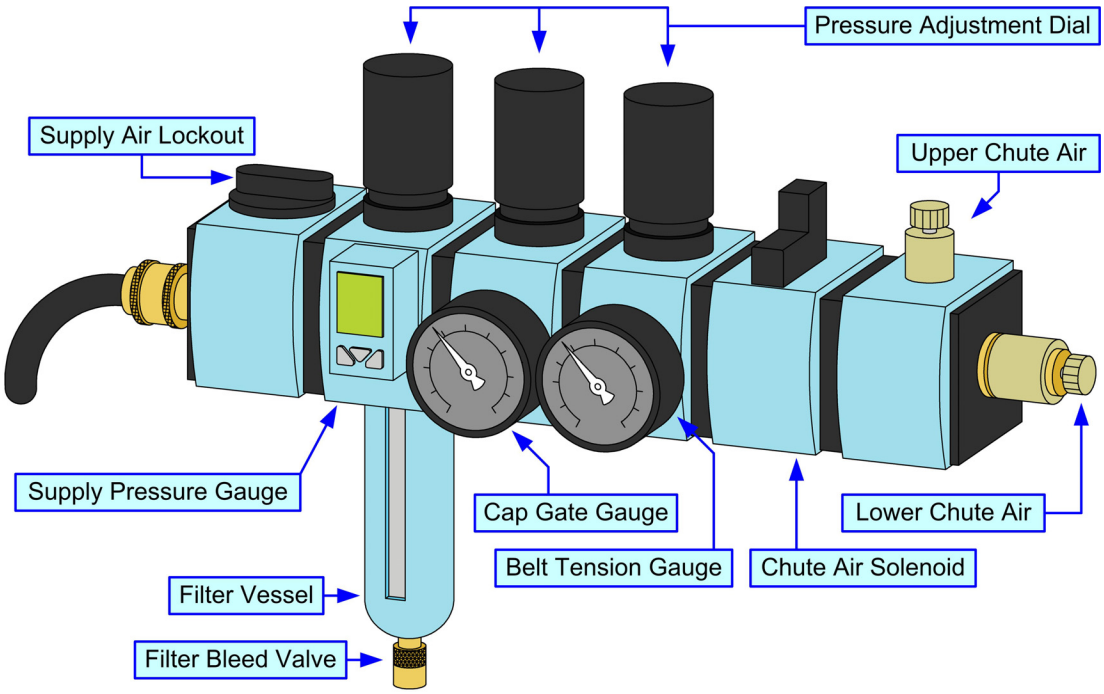

Figure 4-19, Pneumatic Block

FEED WORM CHANGE

To remove the feed worm, lift upward on the knurled release pin, then push outward on the adjustment knob while supporting the feed worm. When the adjustable bracket is clear of the feed worm, lift upward on its free end and pull it outward from the stationary bracket.

To install the alternate feed worm, insert one end into the stationary bracket, then lower the worm's free end to align with the adjustable bracket. Grasp the adjustment knob and pull inward to move the adjustable bracket to couple with the feed worm. Lower the knurled release pin.

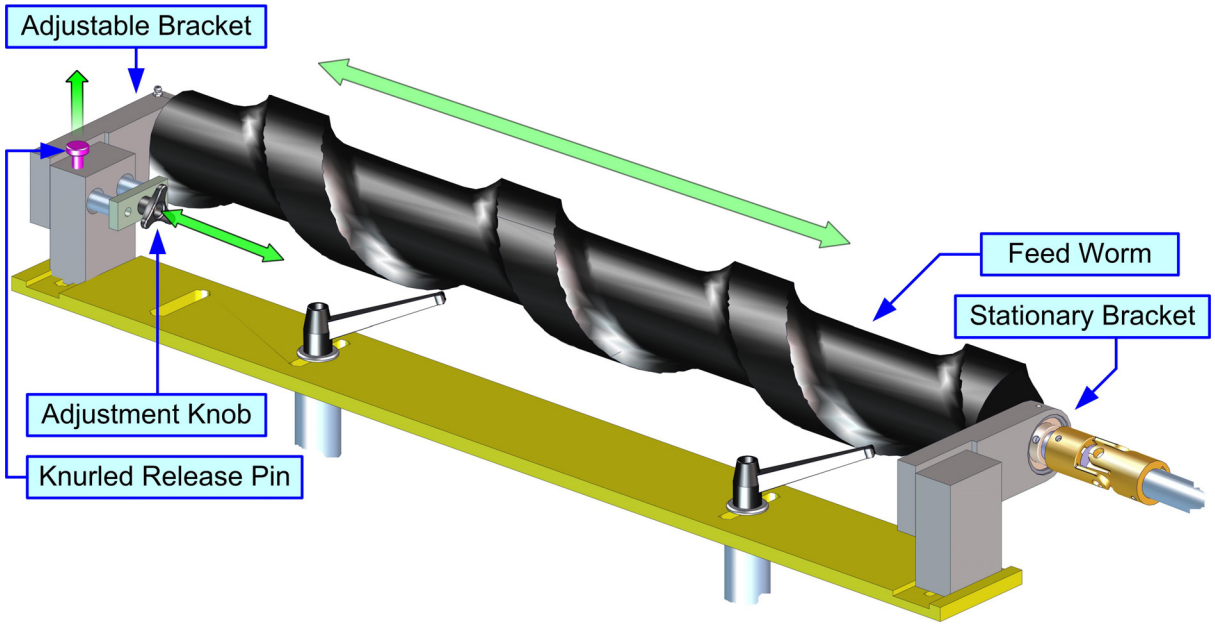

Figure 4-20, Feed Worm Change

MACHINE TIMING & HOMING PROCEDURE (E-Sync)

The following machine synchronization and homing procedure applies to most of US Bottlers machines that are driven by a SEW E-Sync system. The drive system consists of a master drive, usually the filler, and one or more slave drives. Homing is an automatic way to get the master and slaves timed without having to do it manually.

> ATTENTION: THIS PROCEDURE IS ONLY APPLICABLE TO MACHINES WITH THE E-SYNC FEATURE PROVIDED. THIS IS VERIFIABLE BY THE PRESENCE OF THE E-SYNC MENU SCREEN ON THE MACHINE'S OPERATOR PANEL.

Step 1: Ensure the machine is in a state ready to operate – there cannot be any alarms present, etc.

> NOTE: Some machines may require them to be in Jog mode to operate. If unable to initiate homing activity, place the machine in Jog mode and reinitiate.

Step 2: Press the Home button.

> NOTE: The Home button is located on the E-Sync Menu Screen of the machine's operator panel.

Step 3: The entire machine, master and all slaves, will slowly begin to move forward. They will move at this very slow speed until the master sees the leading edge of the filler's Home proximity sensor, then will stop.

Step 4: Each of the machine's slave drives will automatically to advance incrementally every second until each slave has detected the leading edge of its respective home proximity sensor, then will stop. Once all the slaves have stopped, homing is complete.

The accuracy of the Homing system is absolutely dependent on the position of the Home sensors and their sprockets. The capper usually uses the capper timing proximity sensor as its home sensor, therefore it cannot be adjusted or it would affect the cap release. So to adjust the Home timing between the filler and capper, the filler sprocket must be adjusted. Once the filler and capper can be homed to be in time, then move on to the next slave closest to the filler, and so on.

Once all the Homing sensors and sprockets are set, you should be able to home the machine and get all drives in time. Problems with the system could happen if the Home sensors are not correctly positioned. If a sensor gets a double signal due to vibration or backlash, then the position will not be correct. Either retry to Home or adjust the sensor. If any of the stars or worms are manually adjusted by changing their position on the shaft, then this could make the position of the homing sensors incorrect and they would need to be set again.

5

PREVENTIVE MAINTENANCE

- **Schedule**
- **Cleaning**
- **Lubrication**
- **Adjustment Procedures**
- **Preventive Maintenance Guides**

MAINTENANCE SCHEDULE

The preventive maintenance schedule below is subjective and is provided as a guide based on typical applications and conditions.

PREVENTIVE MAINTENANCE SCHEDULE	
DAILY	
Limit Switch & Mounting Bracket	❑ Verify electrical control logic.
Clutch Keyways	❑ Inspect for wear. ❑ Tighten screws and keyless bushings.
Bull Gear & Pinion Gear	❑ Inspect for worn or missing teeth. ❑ Inspect for corrosion. ❑ Check for excessive backlash.
Roller Bearings	❑ Check for flat spots. ❑ Ensure proper positioning on cam lift sections.
Crossover Plate	❑ Inspect for wear. ❑ Ensure proper shimming in relation to rotary table segments and conveyor chain.
Guard Doors, Switches, Hinges	❑ Verify switches are properly functional. ❑ Inspect hinges for damage. ❑ Hand clean.
Feed Worm Gearbox	❑ Inspect for vibration, grinding, or excessive heat. ❑ Check for increasing backlash between input and output shaft. ❑ Check shaft rotation for tight spots.
Chuck Assembly	❑ Inspect for loose hardware.
Feed Worm Drive Assembly	❑ Check u-joints for wear, binding, excessive slop, backlash. ❑ Check bearing for wear. ❑ Ensure feed worm mounting bracket is secure. ❑ Ensure limit switches are functional & properly positioned. ❑ Inspect gearbox for vibration, grinding, or excessive heat. ❑ Check gearbox for backlash between input/output shafts. ❑ Check shaft rotation for tight spots.
WEEKLY	
Entire Machine	❑ Hand rub light covering of oil to all unpainted surfaces. ❑ Check for bent knobs, broken plates, and damaged attachments.
Detent Clutch	❑ Ensure slippage during high speed motor starts. ❑ Check for proper mechanical function. ❑ Check keyless bushings for tightness. ❑ Check shaft key and keyway for excessive wear.
Main Chassis	❑ Inspect cam stud shafts for corrosion. ❑ Ensure roller chains are not excessively stretched. ❑ Ensure cam ring and studs are level. ❑ Ensure cam adjusting hardware moves freely. ❑ Inspect bed plate covers for wear. ❑ Check pinion shaft for excessive looseness. ❑ Ensure static charge eliminator ground strap is connected.

Main Bearing	❑ Check for deterioration by slowly rotating machine and checking for jerking or rumbling noise.
Head Assembly	❑ Check for loose, worn, or broken roller assemblies.
Cap Feed Assembly	❑ Inspect air connections and lines for pinching, damage, and degradation. ❑ Inspect the pivot bushing for swelling and ream. ❑ Check pistons fro proper stoking and cleanliness.
Chuck Assembly	❑ Check for broken or damaged chuck release springs.
Chuck Shaft Assembly	❑ Check for bent shafts. ❑ Check rollers and bearings for wear, corrosion, and flat spots.
Conveyor Assembly	❑ Inspect conveyor wear strips for wear. ❑ Ensure guide rail hardware is firmly tightened. ❑ Ensure limit switches are functional and that the electronic control circuits are active. ❑ Check the parallel shaft reducer for backlash between input and output shafts. ❑ Check parallel shaft reducer for corrosion on top housing plate. ❑ Check universal joints and slide couplings for wear. ❑ Check timing belt for wear and excessive stretching. ❑ Inspect the worm idler end bearing for wear. ❑ Check worm mounting for binding between worm and support hardware. ❑ Check feed worm gearbox for backlash between input and output shaft. Rotate input shaft and check for tight or rough spots.
Star Drive	❑ Check micro-switch for correct setting and proper electronic control logic. ❑ Ensure lubricant lines are in place and without leaks. ❑ Ensure star and drive shaft bearings for sloppy contact.
SEMI-ANNUALLY	
Entire Machine	❑ Check gears for uneven wear or broken teeth. ❑ Check for excessively sloppy bushings.
Feed Worm Gearbox	❑ Rebuild or replace.
Clamping Belt Assembly	❑ Check pulley bearings for wear and corrosion. ❑ Check take-up assembly for wear, corrosion and damage.
Head Assembly	❑ Check lifting jack for binding. ❑ Check pneumatic cam for wear. ❑ Check roller carrier bearings for wear, corrosion, and damage.
Main Gearbox	❑ Replace gearbox oil.
Capper Independent Spindle Gearbox	❑ Replace gearbox oil.

CLEANING

Due to customer specific requirements relative to machine cleanliness, the information here as to the method and type of cleaning activity, is intentionally vague. However, cleaning activities and their frequency should minimally be sufficient so as to not inhibit proper machine functionality.

WARNING: ALWAYS WEAR SAFETY GOGGLES WHEN USING COMPRESSED AIR TO CLEAN THE MACHINE.

ATTENTION: The specific process for cleaning solutions, temperatures, concentrations, etc, must be established by the customer's own quality control and cleaning standards. The definition of what is clean varies widely from plant to plant dependent on the unique local requirements. The following are tips to assist in the cleaning process.

WARNING: DO NOT PRESSURE WASH THE OPERATOR PANEL, DRIVE MOTORS, OR ANY OTHER ELECTRICAL CIRCUITRY. COMPONENT DAMAGE AND/OR ELECTRICUTION MAY OCCUR.

LUBRICATION

This chapter provides basic information relative to maintaining proper lubrication of the machine. Whereas the information provided here is as specific as possible, much of the information is intentionally vague so as to not conflict with customer requirements or governmental regulations.

CAUTION: DO NOT APPLY ANY LUBRICANT TO ANY PART OF THE MACHINE THAT ATTACKS NYLATRON GSM. COMPONENT DAMAGE WILL OCCUR.

CAUTION: DO NOT ALLOW CORROSION AND RUST TO BUILD UP TO DESTROY NON-STAINLESS STEEL COMPONENTS SUCH AS GEARS, SLIDE RINGS, SPROCKETS, AND GEARBOXES.

LUBRICATION POINTS

Part Name	Lubrication Type	Method	Points/Frequency	Location
Conveyor Bearings	Grease	Alemite	2 / Daily	Conveyor End
Capper Main Bearing	Grease	Alemite	1 / Daily	Cabinet Front
Star Shaft Bearings (top)	Grease	Alemite	2/ Daily	Above Cabinet
Star Shaft Bearings (bottom)	Grease	Alemite	2 / Daily	Cabinet Front
Feed Worm Brackets	Grease	Alemite	2 / Daily	Feed Worm Brackets
Capper Independent Spindle Gears	Grease	Brush	1 / Weekly	Upper Turret Cover
Upper Bearings	Grease	Alemite	1 / Daily	Upper Guard Rail
Lower Bearings	Grease	Alemite	1 / Daily	Upper Guard Rail
Capper Chuck Shaft Spindle Gears	Grease	Brush	1 / Weekly	Upper Capper
Capper Independent Spindle Gearbox	Spirex Exp 140	Oil Bath	1 / Weekly	Capper Roof
Center Column	Grease	Alemite	1/ Monthly	Lower Turret
Lifting Gearbox	Spirex Exp 140	Oil Bath	2 / Year	Capper Roof
Carrier Bearing Blocks	Grease	Alemite	2xN / Weekly	Lower Turret Cover
Capper Independent Spindle Gears	Grease	Brush	1 / Weekly	Upper Turret Cover
Main Gearbox	Spirex Exp 140	Oil Bath	1 / Monthly	Main Gearbox
Worm Drive Gearbox (upper)	Spirex Exp 140	Oil Bath	1 / Monthly	Cabinet Top
Worm Drive Gearbox (lower)	Spirex Exp 140	Oil Bath	1 / Monthly	Within Cabinet
Bull/Star Gears	Grease	Brush	1 / Monthly	Bull/Star Gears

Chuck Open/Close Cams	Grease	Brush	1 / Monthly	Upper Turret Cover
Spindle Drive Shaft Bearings (upper)	Grease	Alemite	1 / Monthly	Turret Roof
Spindle Drive Shaft Bearings (lower)	Grease	Alemite	1 / Monthly	Upper Turret Cover

GEARBOXES

Each of the machine's gearboxes has a lubrication fill port with an associative over-fill port. The fill port is the location where lubrication is applied to the gearbox, and the over-fill port lets the technician know when the proper fill quantity is reached.

To fill a gearbox, remove the fill port and over-fill port plugs. Pour the specified lubricant into the fill port until it begins to run from the over-fill port. Then replug each port. Refer to the Technical Data unit of this manual for the required lubricant type.

GREASE FITTINGS

The most severe point for a bearing assembly is immediately following machine operation under high temperature conditions. As the machine cools to room temperature, the bearing housing cavity which is already full of moist ambient air, begins to cool generating additional moisture through condensation. This accumulative moisture will inevitably find its way into the bearing housing and if allowed to remain, will eventually mix with bearing lubricants and ultimately reduce its corrosive resistant characteristics. Therefore, the type of lubricant is of upmost importance, especially regarding the main bearing.

CAUTION: ONLY GREASE THAT CONFORMS TO MILITARY SPECIFICATION G-81322 IS TO BE APPLIED TO THE MACHINE'S GREASABLE LOCATIONS.

This machine has grease gun fittings integrated to provide ease of bearing lubrication. Figure 5-1 identifies the location of each fitting. Refer to the Technical Data unit of this manual for the required lubricant type.

EXPOSED GEARS

All exposed gears are to be located and have grease either sprayed or brushed onto their contact surfaces.

CAUTION: ONLY GREASE THAT CONFORMS TO MILITARY SPECIFICATION G-81322 IS TO BE APPLIED TO THE MACHINE'S GREASABLE LOCATIONS.

OIL POINTS

There are points on this machine that would benefit from periodically having oil applied as either a lubricant or rust inhibitor. However, due to unique applications and possible governmental regulations, the determination if to lubricate, the method of lubrication, and the type of lubrication is left to customer discretion.

CAUTION: NEVER APPLY ANYTHING TO SLIDE ROD SURFACES THAT WILL BUILD UP A STICKY RESIDUE AND ULTIMATELY ATTRACT SUGAR AND DEBRIS. THE PRESENCE OF SUCH RESIDUE WILL SCORE ITS BUSHINGS AND BIND THE MACHINE.

ADJUSTMENT PROCEDURES

This chapter provides detailed instructions on how to make common machine adjustments that do not fall within the realm of operational or changeover adjustments. For instructions relative to those activities, refer to their respective units and chapters.

FEED WORM DRIVE BELT

Over operational time, the worm belt will stretch and require tension adjustment. To tension the belt, loosen the four bolts securing the pancake gearbox to its mounting plate and manually pull the gearbox to increase the distance between its two pulleys. Retighten the four bolts.

WARNING: ENSURE THE POWER SUPPLY IS DISCONNECTED AND FOLLOW ALL LOCKOUT/TAGOUT PROCEDURES BEFORE PERFORMING ANY MAINTENANCE ACTIVITIES.

NOTE: A properly adjusted belt will be tensioned so as to prevent slippage, but not provide excessive drag on the drive mechanisms.

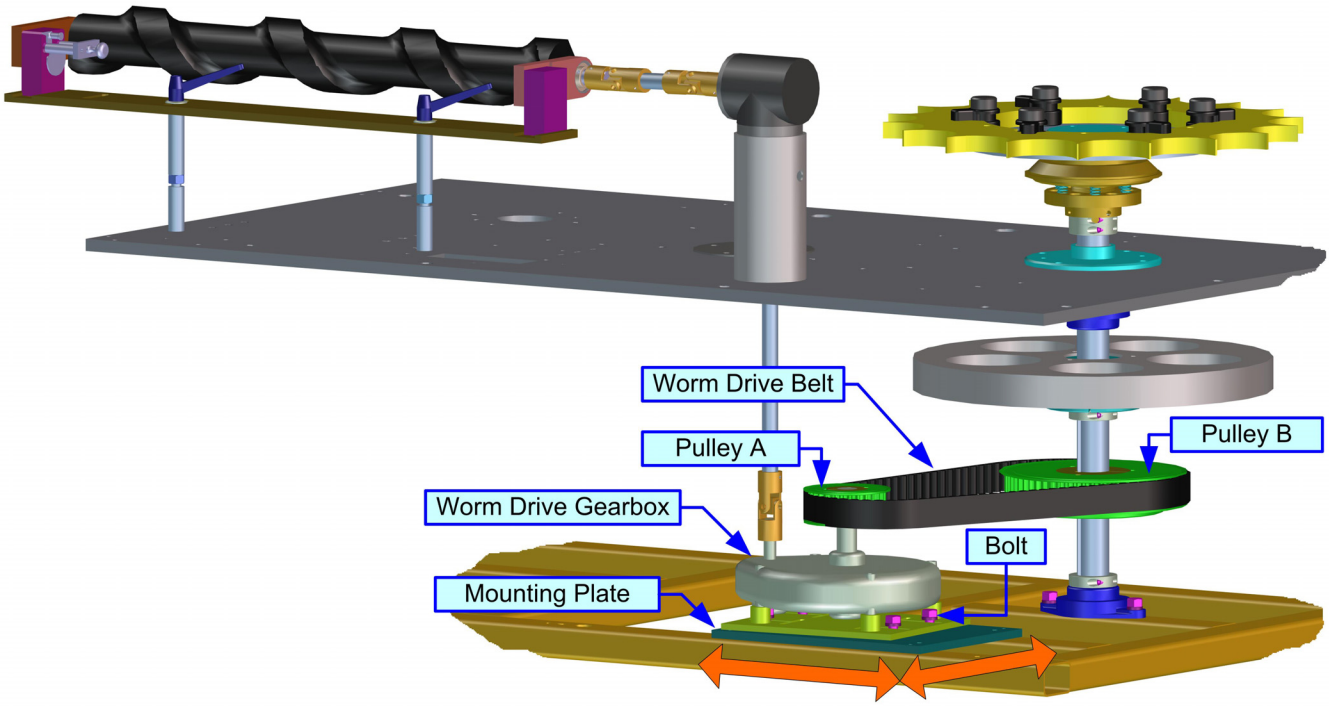

Figure 5-1, Feed Worm Drive Belt Adjustment

SPINDLE DRIVE BELT ADJUSTMENT

Over operational time, the drive belt will stretch and require tension adjustment. To tension the drive belt, loosen the four set nut/bolts securing the motor/gearbox to its mounting plate and manually pull the assembly to increase the distance between its pulleys A and B. Retighten the four set nut/bolts.

WARNING: ENSURE THE POWER SUPPLY IS DISCONNECTED AND FOLLOW ALL LOCKOUT/TAGOUT PROCEDURES BEFORE PERFORMING ANY MAINTENANCE ACTIVIES.

NOTE: A properly adjusted belt will be tensioned so as to prevent slippage, but not provide excessive drag on the drive mechanisms.

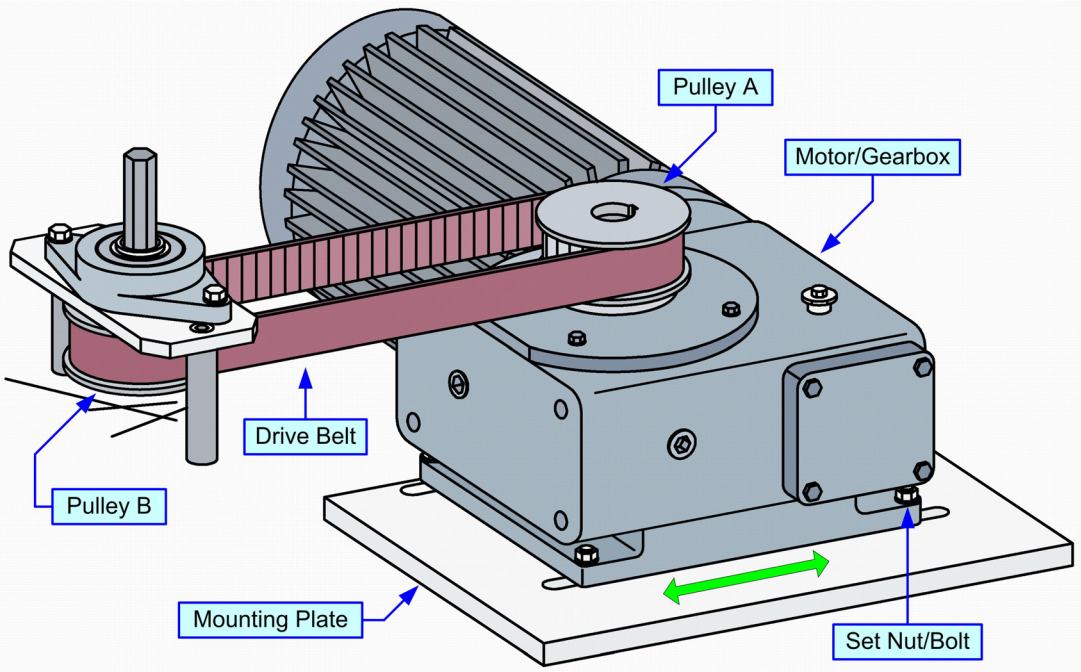

Figure 5-2, Spindle Drive Belt Adjustment

DETENT CLUTCH ADJUSTMENT

To adjust the detent clutch, simply loosen its two setscrews located on the unit's lower flange. Apply a spanner wrench to one of it's respective bores also located on the detent clutches lower flange and turn horizontally to adjust.

WARNING: ENSURE THE POWER SUPPLY IS DISCONNECTED AND FOLLOW ALL LOCKOUT/TAGOUT PROCEDURES BEFORE PERFORMING ANY MAINTENANCE ACTIVIES.

NOTE: Adjustment of the detent clutch is a trial and error process. Test cycle the machine following each adjustment until the correct setting is found.

CAUTION: RETIGHTEN AT LEAST ONE SETSCREW BEFORE TEST CYCLING THE MACHINE.

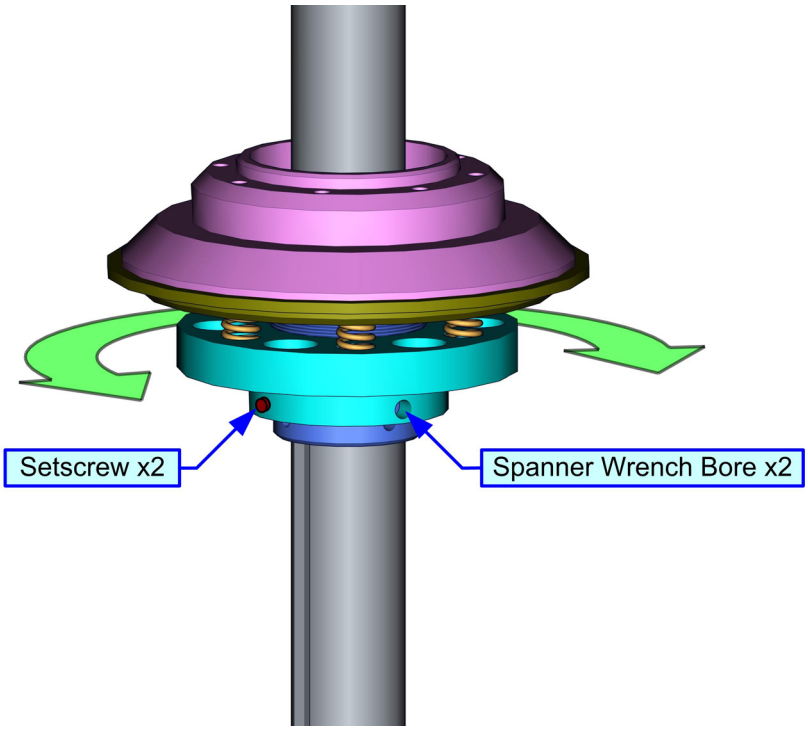

Figure 5-3 , Detent Clutch Adjustment

PREVENTIVE MAINTENANCE GUIDES

This chapter provides guidance on the performance of general preventive maintenance inspections as identified in the Preventive Maintenance Schedule. For Troubleshooting or Repair Maintenance instructions, refer to their respective units of this manual.

CAPPER CHUCK ASSEMBLY

The maintenance areas to review deal with wear surfaces and the single spring.

> **ATTENTION:** Ensure that plenty of spare springs are available should the spring wear or break over an extended period of operation.

Wear areas at the chuck jaw, in particular where the stripper contacts the backside of the jaw and the body closes on the exterior of the jaw, should be evaluated. A small amount of lubrication is to be added to these surfaces to help prevent excessive wear. The serrations of the jaws themselves are be evaluated since these will wear over time; particularly if the settings of the gripping pressure and the release point are out of tune.

Ensure the nylon-tipped setscrews do not need replacement. If metal-to-metal set screws are used on the threads, they can damage the jaw stem.

Another wear area to review is the jaws themselves. Naturally, some wear will occur from the original sharpness of the jaw, but it is important to ensure that they hold the cap properly when reaching their final torque. While running the capper, view the operation from the capper. Assuming that all the magnetic clutches are correctly set and the bottle is not spinning and the cap jaws grip the cap tightly, you would normally see all magnetic clutches come to a slip point at approximately the same angle based on the thread of the cap and the appropriate applied torque. If you continue to see a particular chuck assembly that does not reach its torque, it should be evaluated as to whether the chuck is slipping on the cap or the bottle is rotating in the pocket.

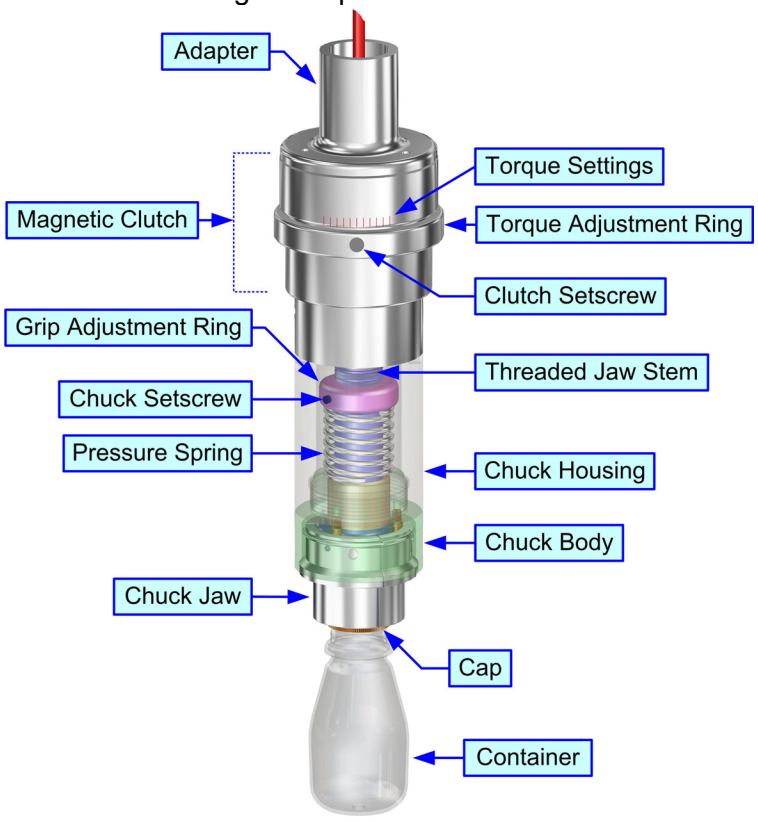

Figure 5-4, Capper Chuck Assembly

FEED WORM DRIVE ASSEMBLY

Periodically inspect the timing belt and pulleys for wear and replace them as necessary. Ensure that both the drive gearbox and right-angle gearbox are both lubricated regularly as prescribed. The worm shaft bearings are to be checked often to ensure that the internal bearing is rotating and has not seized. If the bearing appears to run hot, consider replacing the unit with a new bearing. Also ensure that the keys are not worn and that backlash in the gearboxes isn't excessive.

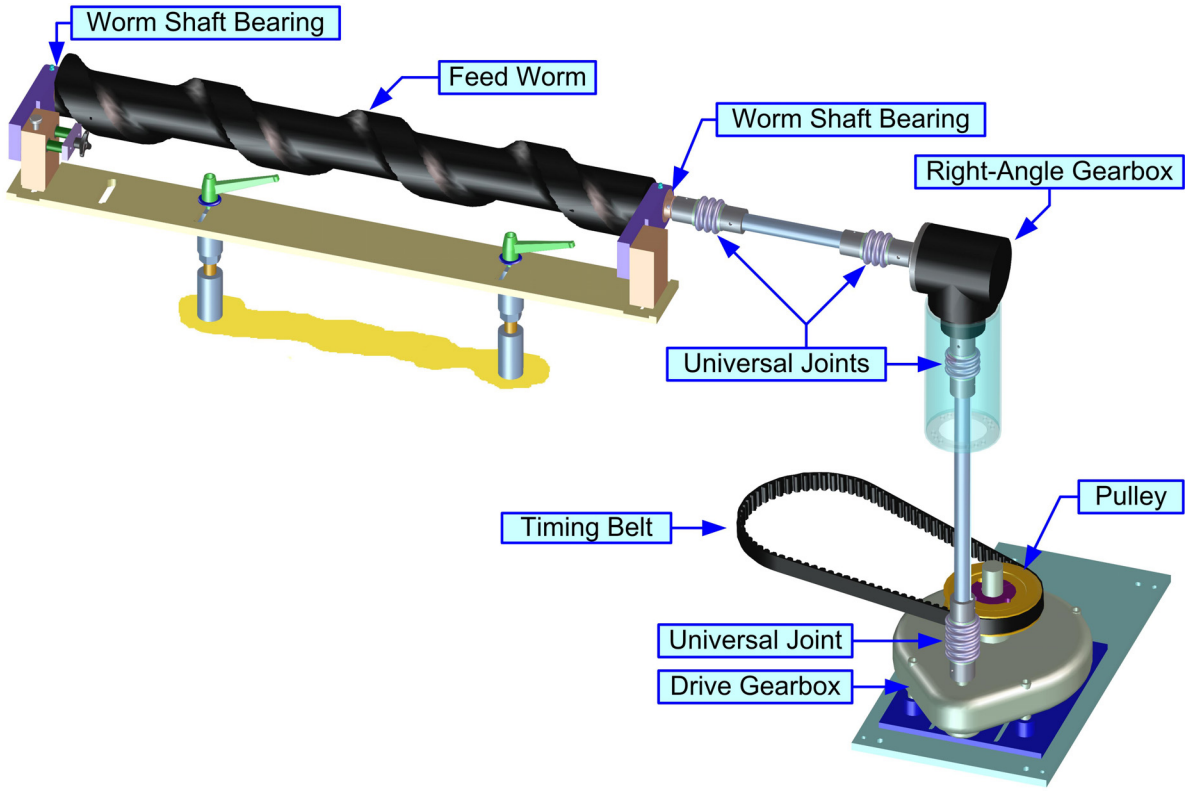

Figure 5-5, Feed Worm Drive Assembly

PINION & BULL GEARS

The pinion drive gears and bull gear are to be inspected to ensure that wear or corrosion has not reduced the surface areas of these gears, and that they have not developed cracked or broken teeth.

Pay particular attention to the strength of pinion gear teeth when reviewing because they turn multiple times that of the bull gear. Replace pinion gears as soon as wear is identified.

The bull gear of the machine is subjected to less wear than the pinion gears. Replacing a bull gear is a big job, but if properly serviced, it should have a long operational life. Normally, it is considered good practice to change all gears of any gear set whenever the drive is overhauled. In this case, since the bull gear is so large and costly, and requires so much effort to replace, every attempt should be made to service the pinion gears and replace them separately before they can damage the bull gear.

Use a brush to apply a heavy coating of grease that resists water and steam to the teeth of the gears. If the gears are plastic, do not use a lubricant that will attack nylatron GSM. Inspect the existing grease on the gears for broken glass or any other object that could damage the teeth if left in place.

Check the drive system for backlash. Increasing backlash indicates tooth wear and suggests a possible need for pinion gear and/or bull gear replacement.

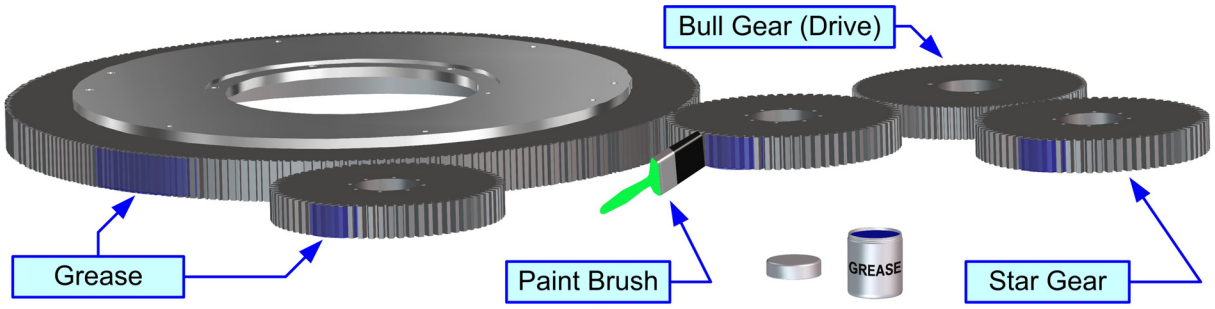

Figure 5-6, Pinion & Bull Gears

CROSSOVER PLATES, BEDPLATES, and CONVEYOR WEAR STRIPS

Review the crossover plate to ensure that the bottle action of moving on and off the conveyor is smooth. When necessary, replace the crossover plate or adjust it upwards to ensure proper transfer. The crossover plate is to always be vertically positioned so that it is slightly higher so the container traveling off the plate doesn't trip.

If the bedplates are badly worn, three things can occur:

1) the containers will jostle on the bed plate when entering the filler causing the filling tube to have difficulty aligning with the opening of the bottle;
2) 2) spilled liquid can become trapped on the bed plate and drip down through the attachment screws accelerating corrosion; and
3) 3) properly filled bottles will not smoothly exit the machine.

Conveyor wear strips that support the conveyor motion and the return conveyor chain section must be inspected to ensure that they have not worn through. Only chain lubricant is necessary for the conveyor wear strips.

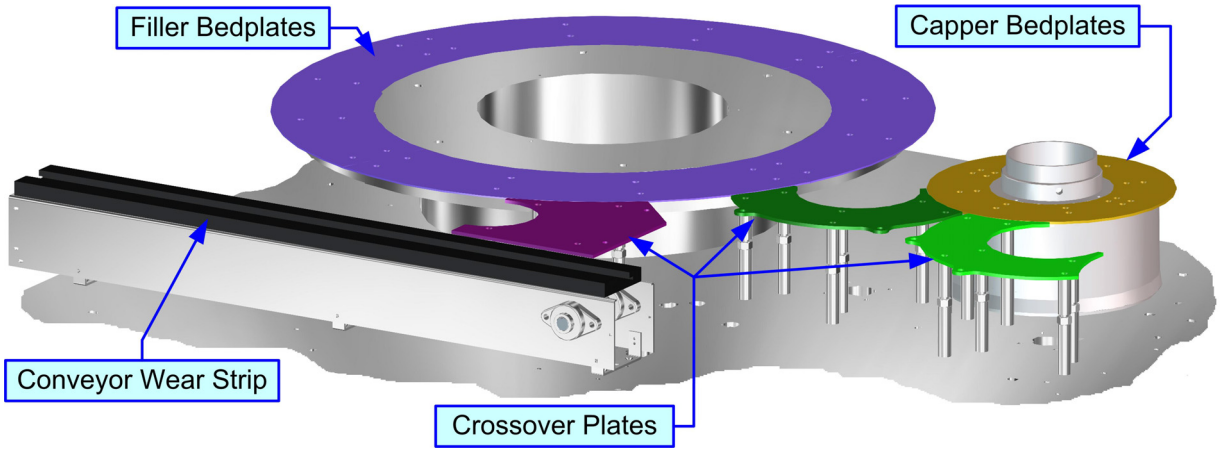

Figure 5-7, Crossover Plates, Bedplates, & Wear Strips

CAPPER CHUCK SHAFTS & ROLLERS

There are numerous preventive maintenance activities that must be performed relative to the capper's chuck shaft and rollers. Perform the activities identified below in the frequency identified in the preventive maintenance and lubrication schedules of this chapter. Refer to the Repair Maintenance unit of this manual if determined that components or sub-assemblies must be replaced.

- Visually inspect the cam rollers for excessive wear and flat spots on their cam contact surfaces. If flat spots are present on a cam roller, this is an indication that the roller is seizing. Ensure that all rollers rotate freely and that their attaching hardware is not loose.
- Visually inspect the head spindle gear for tooth wear and brush grease onto their full lengths. The gear must properly engage its mate without slippage or sloppiness.
- Visually inspect the ball-end knockdowns (if present) for excessive wear. The knockdowns require replacement if the chuck jaws cease to fully open and close. If deemed acceptable, brush grease onto their button ends.
- Visually inspect the cap and lift cams to ensure that the roller hardware has not worn a groove in their contact surfaces. If the cam begins to show signs of wear, it can be reshaped in order to ensure proper rolling action – they can also be adjusted downward since they are slotted. Also, since the width of the knockdown cam is wider than the contact point; it can be spaced out or moved in to wear on unworn surfaces to extend its life. In the event that it is worn excessively, the lift section is to be replaced. Brush a slight film of grease onto the roller and knockdown contact surface of the cams to reduce friction, corrosion, and wear.
- Visually inspect the chuck shafts and head plate pillars for scratches and grooves indicating that their bushings are worn. Manually shake each shaft and pillar for play in the bushing area, this is also a sign that wear is occurring and that the bushings may require replacement.

  Note that the shaft bushings do not require lubrication and more specifically, it is recommended that they are not lubricated so as to prevent the attraction and retention of debris. Indeed, some bushing materials may adversely react to the chemical compositions of some lubricants and also, impede desired material transfer for some bushing types.

  NOTE: If flakes of material is noticed around the capper's bushings, this is not cause for concern. Some types are designed to transfer part of its material composition to the shaft during normal operation.

- Apply a straight edge to the shafts and pillars to determine if any have become bent. Any shafts or pillars discovered to be bent, must be replaced immediately to ensure proper capping and to prevent damage to other components during operation.
- Manually shake each chuck shaft in the area of the carrier block bearings. Movement in this area is indicative of worn bearings. If these are determined to be in acceptable condition, fill with grease if fittings are present.
- Visually inspect the upper and lower head plates metal shavings indicating that abnormal wear is incurring. If none is detected, wipe down their surfaces, then rub oil onto them to prevent rust.

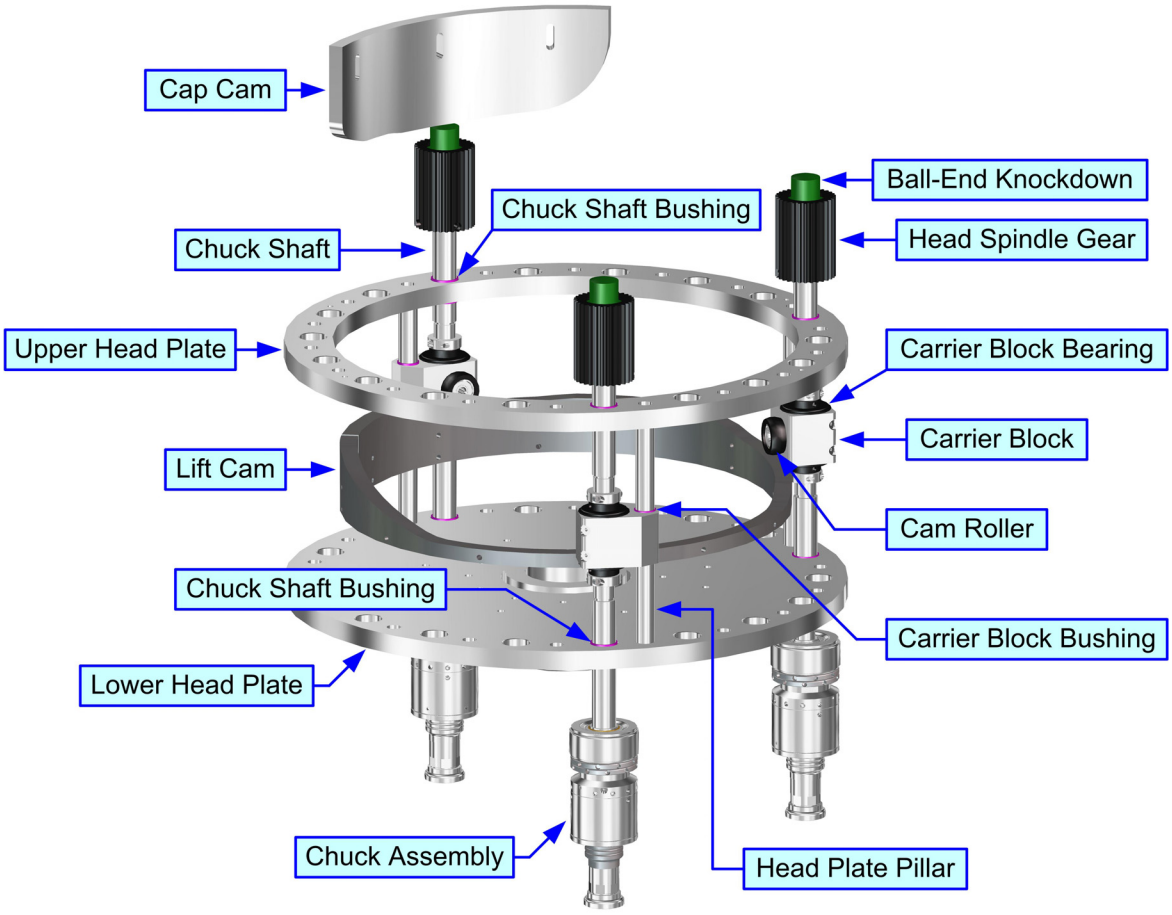

Figure 5-8, Capper Chuck Shafts & Rollers

MAIN MACHINE DRIVE

A timing belt and pulley system with a gearbox ratio is integrated so that the maximum input shaft RPM into the gear box never exceeds 2000 RPM and any attempt to increase the machine speed above this design by changing the timing belts or drive pulleys could result in damage to the main drive gearbox. Please contact the factory before making any changes in the drive system.

HOSES, GASKETS, SEALS, AND O-RING MATERIALS

The o-rings, gaskets, hoses, and seals are all rubber components (unless Teflon is used) that must be reviewed. Look for cracking, deformations, and breakdown of integrity with these items and keep spares on hand. When replacing hoses, ensure to make replacements the same length and ensure the fittings are properly secured for cleaning requirements. Do not interchange hose manufacturers without knowing that they are in fact interchangeable. Wall thickness and ID tolerances are critical in working with the supplied fittings. Be careful also not to use non-FDA components in the liquid system.

6

TROUBLESHOOTING

- **Troubleshooting Table**
- **Troubleshooting Guides**

TROUBLESHOOTING

The preventive maintenance schedule below is subjective and is provided as a guide based on typical applications and conditions. This is not intended to be a comprehensive digest of all the problems that might occur to a piece of mechanical equipment, but rather a simple aid in understanding more about your machine.

Should a problem develop with the machine that does not have an obvious solution or cannot be handled by your service personnel, immediately contact the Service Department of US Bottlers Machinery for technical advice.

TROUBLESHOOTING TABLE	
Symptom	**Possible Cause/Solution**
Containers not properly separated by feed worm.	• Incorrect feed worm in use: Ensure the feed worm and the container type match. • Incorrect clearance between worm and limit rail: Ensure positioning with proper spacing. • Leading edge of worm excessively worn: Order replacement sending three sample containers to USB. • Conveyor speed set too low: Adjust the timing speed of the feed worm.
Containers not properly entering feed star.	• Worm improperly timed: Adjust the timing speed of the feed worm. • Conveyor speed too fast or slow: Adjust the conveyor timing speed to work in unison with the feed worm. • Incorrect feed worm in use: Ensure the feed worm and the container type match. • Incorrect infeed star in use: Ensure the infeed star and the container type match. • Feed worm and limit rail improperly positioned: Reposition the feed worm and limit rail. • Limit switch incorrectly set: Reset as necessary. • Uneven worm crossover plate: Check for smoothness and shim if needed.
Container not properly leaving capper.	• Improper timing of discharge star: Adjust discharge star timing. • Improper setting of discharge guide finger: Adjust guide finger setting. • Improper conveyor speed: Adjust the conveyor timing speed to work in unison with the feed worm. • Improper crossover plate height: Ensure flush height, shim or adjust shim as required.

Cap not centering on container opening.	• Improperly adjusted feed star: Adjust as necessary. • Use of incorrect attachments: Change as required. • Head improperly timed: loosen clamp bolts, adjust as required, retighten. • Clamp belt not holding container in pocket: Increase air pressure to clamp belt. • Clamp belt distorting container: lower air pressure to clamp belt. • Cap cocked in chuck jaws: Check for proper gripping. Inspect for excessive flash on cap. Lower air pressure to cap jaw.
Low cap torque.	• Low air pressure to cap belt: Increase air pressure to cap belt. • Clutch slipping: Increase torque on cap clutch. • Jaw slipping: Tighten grip pressure. • Machine running below setup speed: Increase machine speed.
Scored cap.	• Low cap jaw grip: Increase air pressure to cap jaw. • Over torquing: Decrease torque on cap clutch. • Incorrect chuck jaws: Install proper chuck jaws. • Machine running above setup speed: Decrease machine speed. • Foreign material on jaws: clean jaw assemblies.
Chuck jaw dropping caps.	• Low air pressure to chuck jaws: Increase air pressure. • Chuck jaw not closing: Disassemble, clean, and polish. • Machine running above designated speed: Decrease speed. • Discharge star out of time: adjust timing.
Missing caps.	• Jammed cap chute: clear jam. • Cap gate not releasing caps: Incorrect gate assembly. Gate air lines not connected. Photo eye not seeing container in worm. Defective sensors on discharge star. • Use of incorrect attachments: change as required. • Incorrect cap for container: Load as required.
Rocking condition in capper.	• Worn keyways on drive shaft: Replace all worn parts. • Loose keyless bushings: Tighten as required. • Worn detent clutch: Replace as required. • Worn drive pinion gear/bull gear: Replace as required. • Worn main gearbox components: Rebuild as required.
Jerking action while capper rotates.	• Slides binding on lift cam: check for bent shafts and rods. Check for worn bushings.
Noise at certain capper station.	• Slide binding: Check for bent shaft and bushing. Clean and lubricate. • Worn or high point in gear: inspect and adjust or replace as required. • Interference between rotating table and a fixed piece: eliminate interference as required.

Unable to turn machine under power.	• Malfunctioning detent clutch: Replace as required. • Capper slides binding on lift cam: Inspect for bent slides and worn bushings. Clean. • Main bearing failure: ensure adequate clearance between capper cabinet top and rotary base. Replace bearing as required. • Feed worm binding: Check for worn bearings.
Noise in center of machine when not cycling.	• Main bearing failure: Replace as required. Ensure proper lubrication.
Machine as a whole goes out of time.	• Stretched chain or belt: Check tension. • Worn gear teeth: Replace gears as required.
Machine as a whole very erratic.	• Electronic short possible: Inspect for machine short to ground. Inspect all electrical devices for shorts to ground.
Sorter not feeding caps.	• Low air pressure: Replace kinked air lines. Open flow valves. Replace supply with larger pipes. • Incorrect sorter wheel: Install correct sorter wheel. • Incorrect discharge guide: Install correct guide. • Upper chute eye not detecting caps: Eye not aligned with reflector. Eye not aligned and sensing chute rails. Blocked or defective chute eye.

TROUBLESHOOTING GUIDES

This chapter provides useful information about certain machine features intended to help evaluate and resolve various performance problems.

FEED WORM/CONVEYOR TIMING

There are two socket head cap screws located in the worm-driving flange. Loosen these setscrews so that the feed worm can be revolved by hand.

Time the feed worm so that when a container is in the last thread of the worm (closest thread to the feed star), and the machine is rotated by hand, the bottle moves into the pocket of the feed star with about 1/8 or 1/4 inch clearance behind the back of the preceding star pocket at the instant the last worm thread releases the container. When proper timing is achieved, retighten the setscrews.

> NOTE: Container shape differences may have an affect on the proper timing setting.

The conveyor speed is to be slightly faster than the final lead of the feed worm so the bottle is always held against the leading front edge of the worm.

Set the feed worm so that its diameter is in line with the radius of the center guide. Adjust the worm bracket so as to achieve a smooth transition from the worm to the center guide. Adjust the feed worm parallel with the conveyor and the limit rail, and then retighten all setscrews.

> NOTE: Following feed worm adjustment, the limit switch may also require adjustment.

DISCHARGE STAR TIMING

A properly positioned discharge star is oriented so that the star's pocket is aligned 1/16" behind the bottle. To adjust, loosen two set bolts to rotate the star to the proper position on the core plate and retighten the set bolts.

DISCHARGE GUIDE POSITIONING

An adjustable discharge guide is provided to assist the discharge star in transferring filled containers to the capper. The discharge guide is to be positioned so that approximately an 1/8 inch clearance exists between it and the container's side.

LIMIT RAIL ADJUSTMENT

A properly positioned limit rail is oriented so that its face rests just behind the deepest portion of the infeed star's pocket. Loosen the quick release levers located on each adjustment bracket to adjust the limit rail forward or backward as required. Retighten the levers to secure its position.

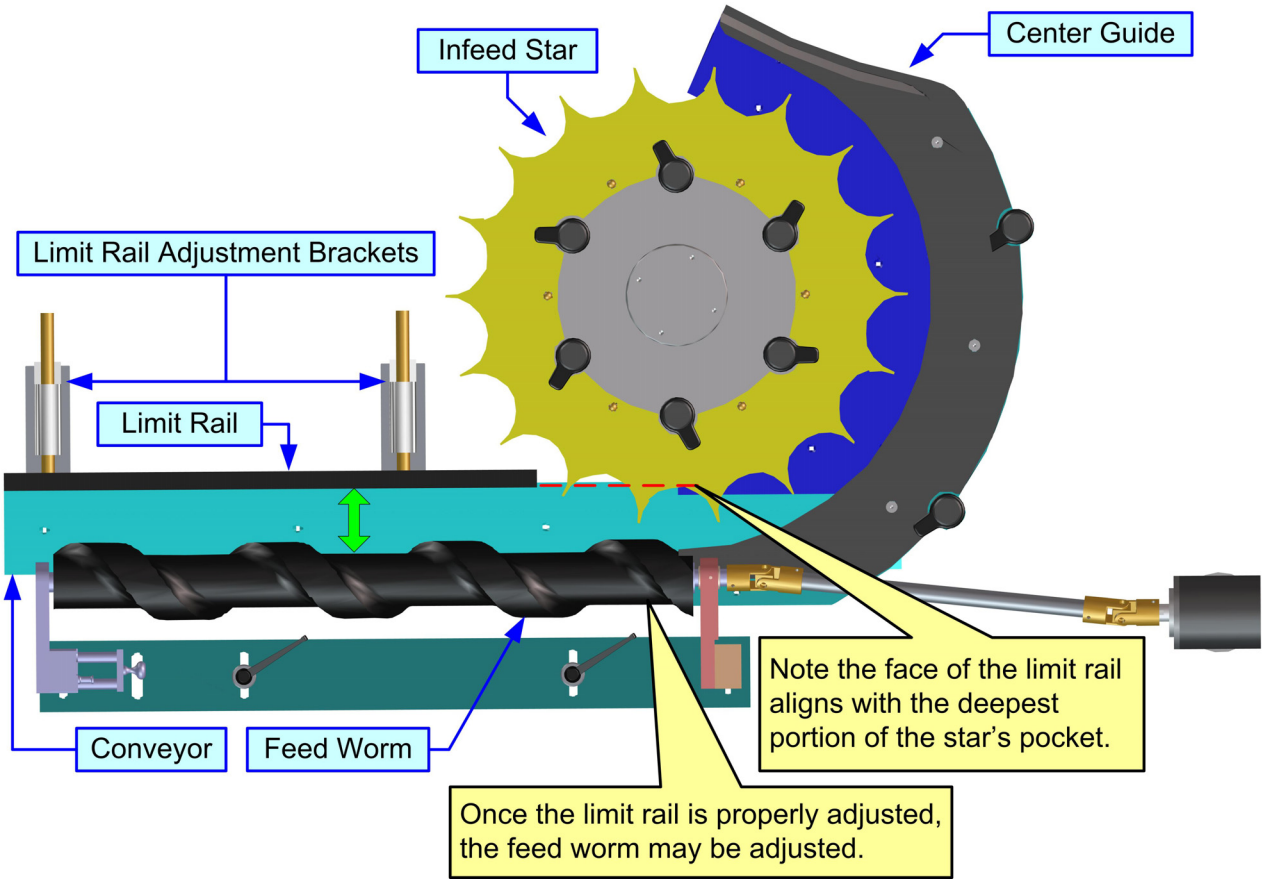

Figure 6-1, Limit Rail Adjustment

HOSES, GASKETS, SEALS, AND O-RING MATERIALS

Depending on your particular product, the machine has been selected with what was felt to be the correct materials. However, it is very difficult to anticipate all of the chemicals and products that the customer may choose to use throughout the lifetime of the machine that may have an adverse affect on these materials.

For example, a typical gravity juice filler will be supplied with silicone tri-clamp gaskets and silicone hosing material and sealer rubbers, since these are best suited for the citrus acid environment, and a lightweight flexible material is required in the hosing material. However, silicone can be attacked by various chemicals in cleaning solutions, and these should be reviewed prior to use on the equipment.

For applications such as the liquor industry, Teflon-lined hosing may be incorporated. In unique applications, unusual style o-rings and seals have been customized for each individual job. It is the guarantee of U.S. Bottlers Machinery Company to provide materials of quality, free of defects or faults in workmanship. However, it is the customer's responsibility that they do not adversely affect these materials with chemicals or caustics, which may lead to their degradation. All of these items are, in their nature, wear items and eventually will need to be replaced.

CAPPER CAP FEED ASSEMBLY

The cap feeder consists of a cap gate system that allows the opening and closing action of a small stainless steel gate. When this gate is open, the cap attempts to move through the chute into the cap star due to the pressure of the gravity-fed caps, as well as the air pressure of chute air jets. However, the cap will not be able to penetrate the pocket of the star until a pocket presents itself. If at that point the gate is still open, the cap will move out into the cap star and rotate between the cap star and the backup guide rail until it moves into position under the chuck jaw.

The chuck jaw will lower itself onto the cap and close around the exterior surface to pull the cap out of the cap star and away from the capping star plate. The logic of the cap gate is such that a signal will be provided for the cap gate to open only when a bottle is present on the conveyor and the timing sprocket below the capper indicates that the time has come to open the gate.

The cap gate is powered by compressed air and can be adjusted for the appropriate speed of the gate, as well as the pressure to close back against incoming caps. Excessive cap gate air pressure can slam the gate against the cap with such force that cap damage can occur. A flat cap star is critical in ensuring that the appropriate stack-up allowing a cap star and a gate to come in contact with the small surface of the cap will allow cap retrieval and proper placement underneath the chuck assembly. This system allows a nice, no bottle, no cap feature to exist. The cap gate will remain open when bottles are continuously present, yet still have the ability to hold back a cap randomly as required when a container is not available for capping purposes. The bottle-present eye should always be used, and caps should not be allowed to be continuously fed when containers are not present.

If the capper is slowly rotated by hand until a single cap is released from the cap chute into the cap star pocket, the operator will observe that an additional small angular movement of the cap star will allow the arm of the air actuator at the chute to move forward and stop the next cap from entering into the following cap star pocket. The cap star must have turned enough to prevent the arm from striking the cap that has just been released into the star pocket. This represents the angular position when the signal for the "no bottle/no cap" logic should be transmitted to the air solenoid that operates the air piston used to control the cap flow into the cap star.

Two pieces of hardware are required to provide the logic that operates the "no bottle/no cap" mechanism. When required, the bottle present sensor looks for the presence of a container so that a cap can be delivered.

At the same time that the bottle present sensor searches for a container, a sensor mounted on underneath also checks a timing tooth in an adjustable sprocket mounted on the star shaft. This sprocket contains one tooth for each of the capper pockets. This sprocket can be turned forward or backward to advance or retard the signal as required for proper fine tuning of the signal.

Since the cap arm must move quickly, the power is provided by a double acting air piston. The signal is controlled through an electrical solenoid mounted in the pneumatics panel which pilots a 5 port air valve. The air valve then routes the proper air signals to the air piston.

If the cap gate appears not to function properly, the first concern should be with the timing of the bottle-present eye and the timing sprocket underneath the capper. These two signals must exist together to ensure that the gate opens.

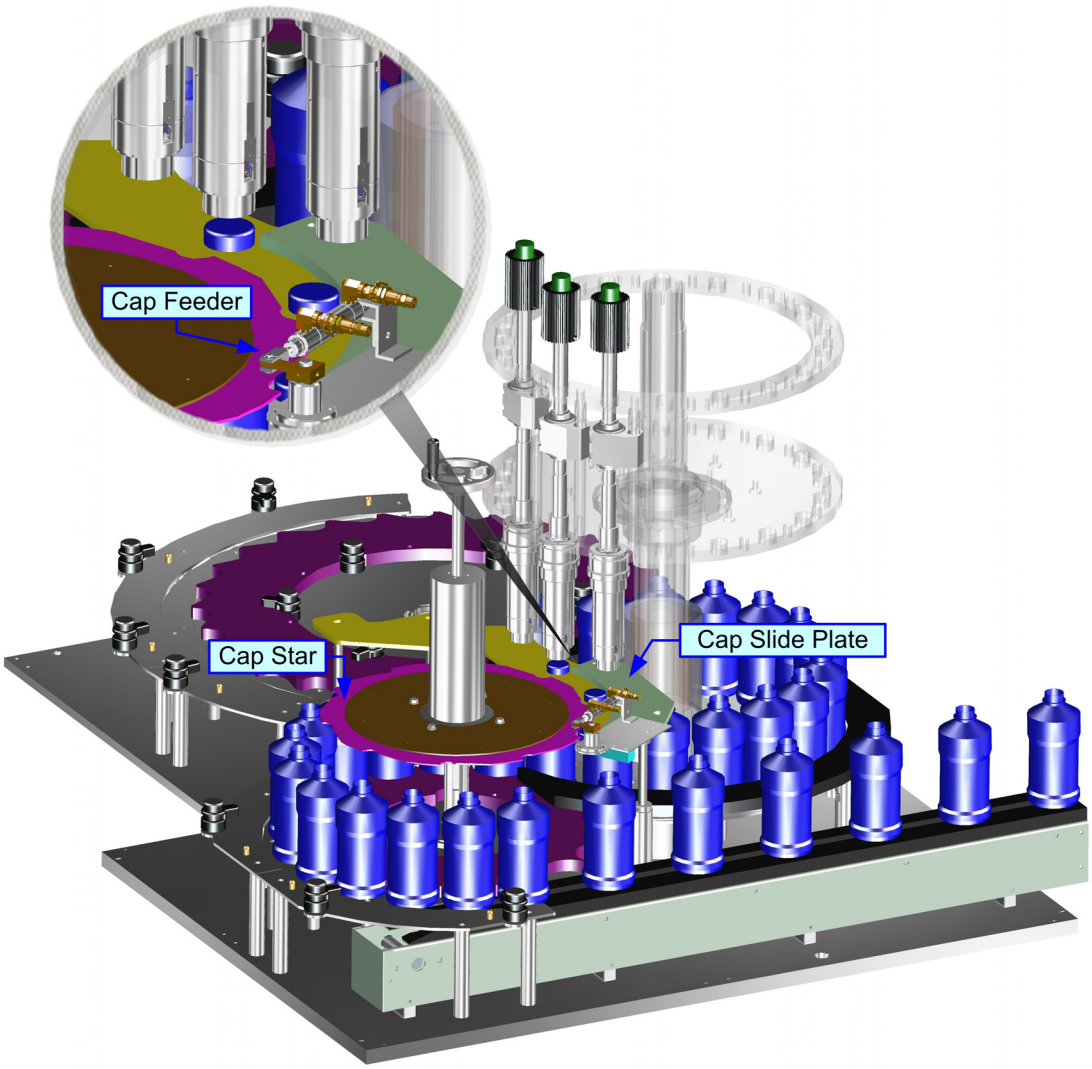

Figure 6-2, Cap Feed Assembly

The bottle-present eye can be obstructed to maintain the cap gate in the open position in order to ensure that caps flow properly from the chute, transfer plate, and into the cap star. Any tight-fitting areas may be enough to prevent the caps from flowing properly into the cap star. It is also important that the appropriate cap back pressure be available for top rated machine speed on a given cap to ensure their flow through the chute.

CAUTION: DO NOT ALLOW THE CAP CHUCK ASSEMBLIES TO COME IN CONTACT WITH THE CAP STAR. COMPONENT DAMAGE WILL OCCUR.

It also must be evaluated as to how the chuck assembly properly locates above the cap at jog speed as well as full speed, since the pneumatic system activating the closure of the chuck assembly will change slightly as speeds increase.

If the customer has steam in the area of the cap gate, the cap pivot arm bushing should be checked to determine if it is swollen and ream this I.D. as necessary to ensure that it does not bind the capping gate pivot arm. The Bimba cylinder should also be reviewed to ensure that it has not developed any corrosion along the stroking piston, so that it properly strokes.

CAPPER SHAFTS & ROLLERS

Improper cap applications can be the result of worn or damaged capper head components. It is critical that each chuck shaft remain straight and undamaged for proper vertical movement of the head assembly. Inspect the cam rollers to ensure that they have not developed flat spots and that they properly roll on the cam.

> **ATTENTION:** In a reverse capper application, it is critical to ensure that these have not become loose and remain tight to the carrier roller block so that the rollers do not disengage, causing the chuck shaft to drop.

Ensure the bushings that are pressed into each head plate where the chuck shafts and head plate pillars slide in and out, are not worn and are free of product. Excessive slop in these areas will also lead to improper cap applications.

Review the cam and cam lift sections to ensure that the roller hardware has not worn a groove in the cam. If the cam begins to show signs of wear, it can be reshaped in order to ensure proper rolling action. In the event that it is worn excessively, these sections are to be replaced.

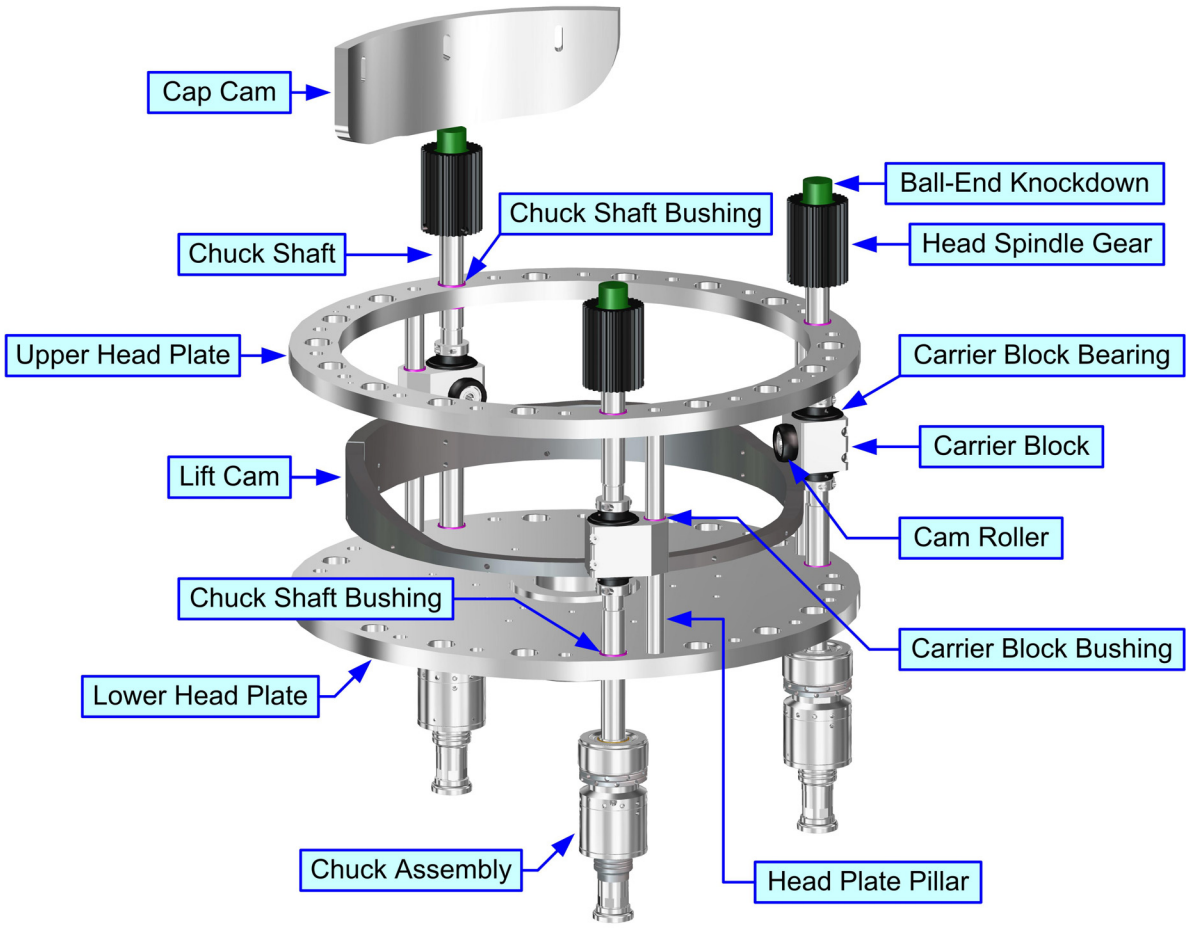

Figure 6-3, Capper Shafts & Rollers

MECHANICAL DETENT CLUTCH

The detent clutch provides a means of varying the break away torque. Two flange units are attached to each of two concentrically located shafts. These two flanges are pushed together and connected by a number of balls resting in dimples in the flanges. Manual adjustment determines the amount of torque required to force the balls from the dimples that holds the flanges apart.

The clutch is factory lubricated and normally requires very little maintenance except occasional lubrication through fittings located on the side of the unit.

CAUTION: LUBRICATION OF THE CLUTCH IS TO BE PERFORMED IN ACCORDANCE WITH ITS PREVENTIVE MAINTEANCE SCHEDULE. LUBRIATE LIGHTLY TO PREVENT SLIPPAGE DURING OPERATION.

A proximity switch and mounting bracket is provided with the detent clutch. This switch must be accurately positioned in order to register the disengagement of the clutch. It is important that the detent be checked occasionally to ensure that when the detent clutch does disengage, it trips the proximity switch to stop the machine.

Under normal operation, when the clutch is under high pressure, there is a slight separating of the two clutch flanges. The design of the feed star shaft is such that a small vertical movement of the star shaft is not detrimental to the equipment. There are not any limiting devices on the star shaft that will pose problems. Loads are not transmitted to the input or output shaft due to this allowable float. The vertical movement of the shafts should be minimal - no more than 1/32 inch.

If the machine can be rocked forward and back with a large amount of backlash, one may assume that the detent clutch is beginning to wear or is loose. When the clutches' dimpled driving flange plate begins to wear, the angular alignment between the input shaft and the output shaft becomes excessive. Since the clutch no longer positions the load balls in a perfectly round dimpled pocket, the flange, as it wears, produces a groove in the pocket and the clutch turns greater amounts without disengaging. As the wear continues, the clutch allows backlash, and larger amounts of tension is necessary for the same engagement pressure.

CAUTION: OPERATION OF THIS EQUIPMENT WITHOUT PROPER ELECTRICAL CONTROLS MAY RENDER THIS HARWARE INOPERABLE AND VOID ALL WARRANTIES RELATIVE TO THESE DRIVE TRAIN COMPONENTS.

WARNING: FAILURE TO PROPERLY USE THIS SAFETY SYSTEM MAY RESULT IN PERSONAL INJURY.

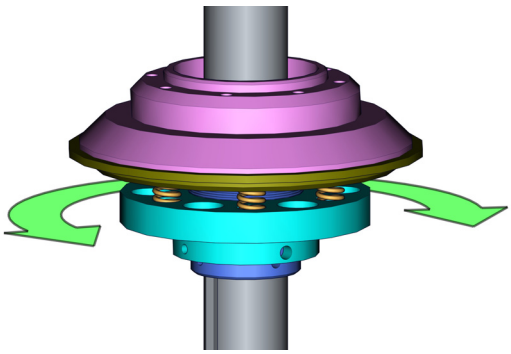

Figure 6-4, Mechanical Detent Clutch

CROSSOVER PLATES, BEDPLATES, and CONVEYOR WEAR STRIPS

Review the crossover plate to ensure that the bottle action of moving on and off the conveyor is smooth. When necessary, replace the crossover plate or adjust it upwards to ensure proper transfer. The crossover plate is to always be vertically positioned so that it is slightly higher so the container traveling off the plate doesn't trip.

If the bed plate covers become worn or warped, they should be replaced. If the bedplates are badly worn, three things can occur:

1) the containers will jostle on the bed plate when entering the filler causing the filling tube to have difficulty aligning with the opening of the bottle;
2) 2) spilled liquid can become trapped on the bed plate and drip down through the attachment screws accelerating corrosion; and
3) 3) properly filled bottles will not smoothly exit the machine.

Conveyor wear strips that support the conveyor motion and the return conveyor chain section must be inspected to ensure that they have not worn through. Only chain lubricant is necessary for the conveyor wear strips.

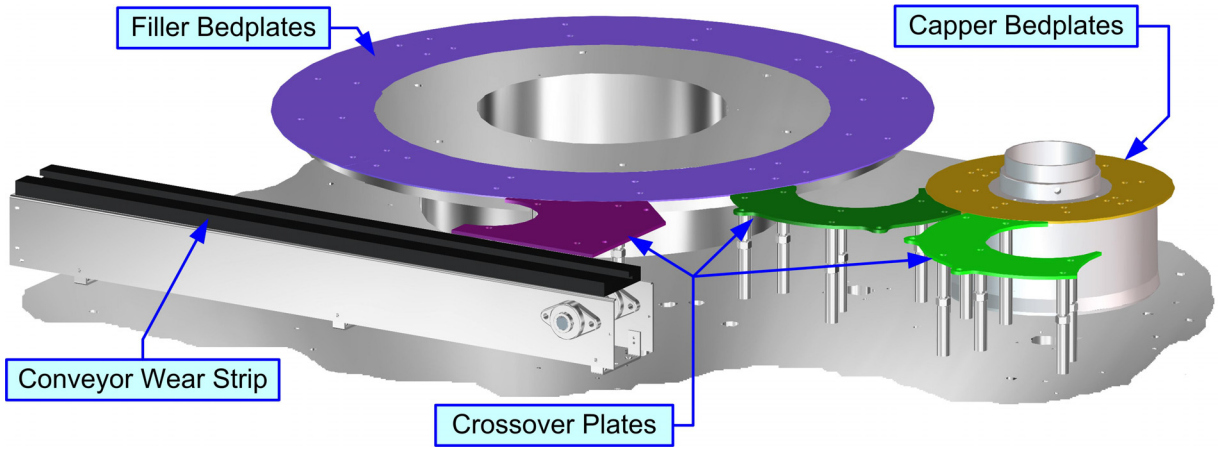

Figure 6-5, Crossover Plates, Bedplates, & Wear Strips

BOTTLE STOP

Being able to control the flow of containers to the machinery can provide a better method of operation rather than starting and stopping the main equipment. It is always best to run the filler and capper full of containers rather than intermittingly due to the added wear and tear on the drive train as well as, providing less fluctuation in filling pressures and torque variations. The option of a bottle stop or other method to control bottle flow can be programmed to always maintain a backlog of containers against the feed screw for proper bottle handling. This can also be used with a series of sensors to protect against a downed bottle before it jams the equipment. If the bottle stop is engaged for a long period, consider slowly ramping the speed of the equipment down and then bringing it back up to speed just after the bottle stop opens. This will smooth out the bottle transfer process and reduce wear on the equipment. Tying this into a restrictor valve system on the supply product side can also reduce waste.

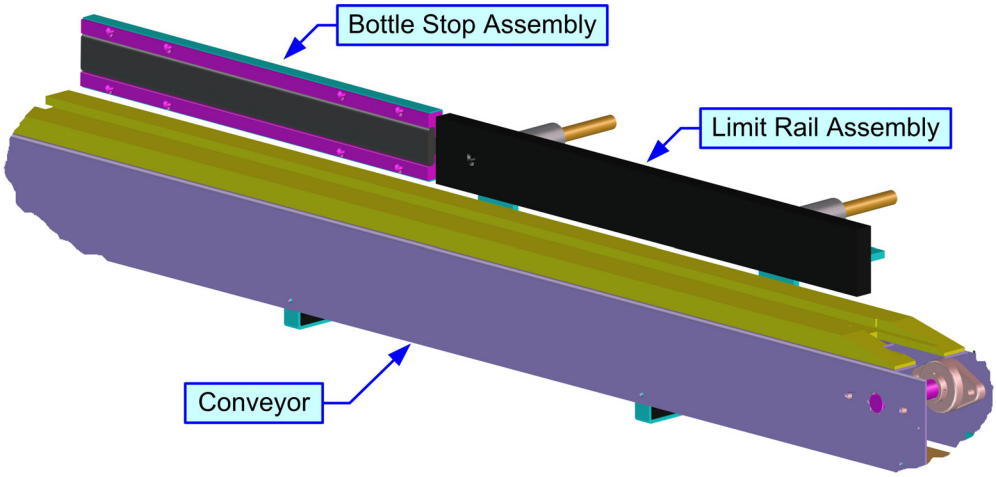

Figure 6-6, Bottle Stop Troubleshooting

7

REPAIR MAINTENANCE

- **Proximity Switch Replacement**
- **Feed Worm Drive Belt Replacement**
- **Spindle Drive Belt Replacement**
- **Cap Gate Setup Procedure**

PROXIMITY SWITCH REPLACEMENT

1. Power down the machine and remove pneumatic supply.

> **WARNING: ENSURE THE POWER SUPPLY IS DISCONNECTED AND FOLLOW ALL LOCKOUT/TAGOUT PROCEDURES BEFORE PERFORMING ANY MAINTENANCE ACTIVIES.**

2. Locate defective proximity switch (1).
3. Unscrew power cord (2) from defective switch (1).
4. Unscrew front nut (3) securing defective switch (1) to bracket (4).
5. Withdraw defective switch (1) from bracket (4).
6. Adjust rear nut (5) of replacement switch (1) to an equal distance from the sensor's front edge as that of defective switch (1).
7. Insert replacement switch (1) into bracket (4) so that rear nut (5) rests against bracket (4).

> NOTE: A properly installed switch will be oriented so that its sensor faces the surface to be detected.

8. Secure replacement switch (1) to bracket (4) from the front using nut (3).
9. Thread power cord (2) onto switch (1).
10. Restore power and pneumatic supply to the machine and test cycle to ensure proper function.

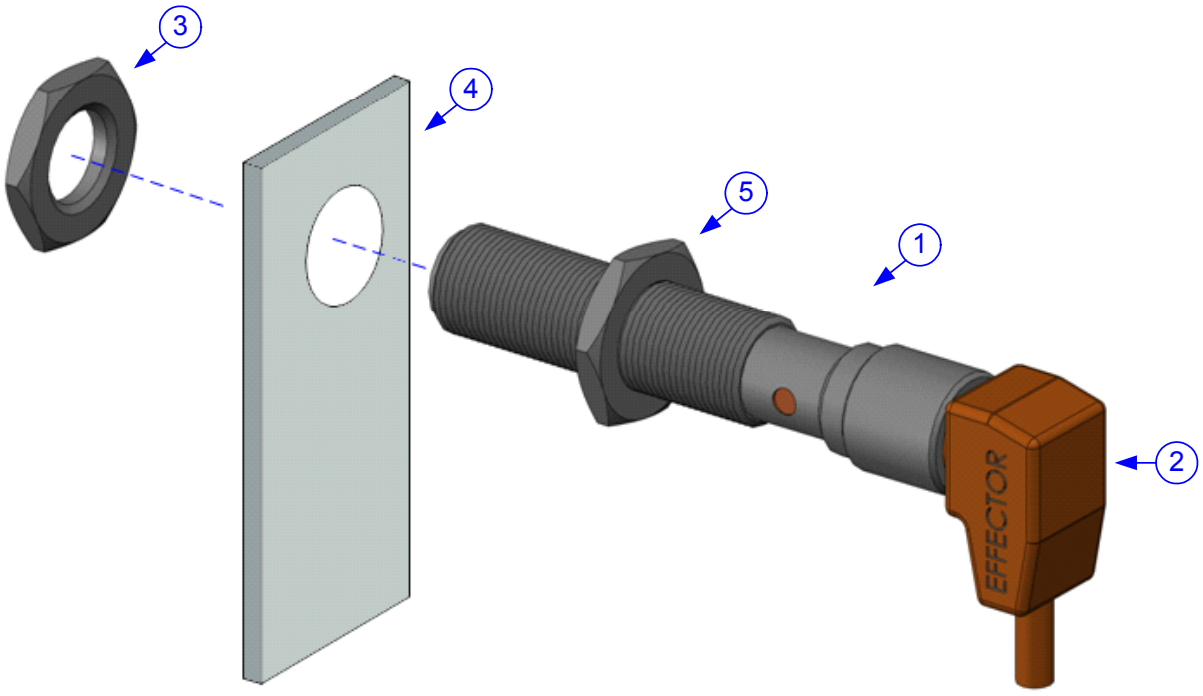

Figure 7-1, Proximity Switch Replacement

FEED WORM DRIVE BELT REPLACEMENT

1. Power down the machine.

> **WARNING: ENSURE THE POWER SUPPLY IS DISCONNECTED AND FOLLOW ALL LOCKOUT/TAGOUT PROCEDURES BEFORE PERFORMING ANY MAINTENANCE ACTIVIES.**

2. Open cabinet doors to access worn belt (1).
3. Loosen four bolts (2) securing gearbox base (3) to mounting plate (4).
4. Manually slide gearbox & base (3) inward to relieve belt (1) tension.
5. Loosen set collar (5) and raise upward on star shaft (6).
6. Disconnect grease line connector (not shown) from flanged bearing (7).
7. Remove two bolts (8) securing flanged bearing (7) to chassis (9). Lift flanged bearing (7).
8. Manipulate worn belt (1) from pulleys (A) and (B) then through the gap between flanged bearing (7) and chassis (9).
9. Compare worn belt (1) with its replacement to ensure they are the same. Discard worn belt (1).
10. Manipulate replacement belt (1) through the gap between chassis (9) and flanged bearing (8).
11. Lower flanged bearing (7) and secure using two bolts (8).
12. Connect grease line (not shown) to flanged bearing (7).
13. Lower set collar (5) to rest upon flanged bearing (7) and tighten to star shaft (6).
14. Apply replacement belt around pulleys (B) and (C), hold in place while manually pulling gearbox base (3) outward.
15. Tighten four bolts (2) to secure gearbox base (3) to mounting plate (4).

> NOTE: A properly adjusted belt will be tensioned so as to prevent slippage, but not provide excessive drag on the drive mechanisms.

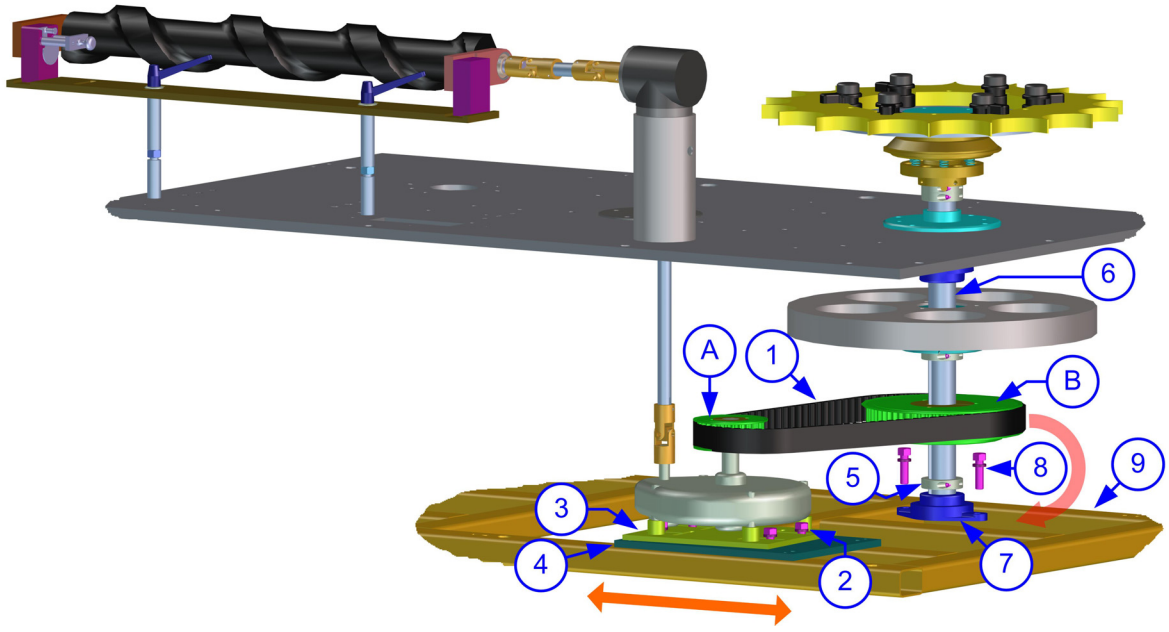

Figure 7-2, Feed Worm Drive Belt Replacement

SPINDLE DRIVE BELT REPLACEMENT

1. Power down the machine.

> **WARNING: ENSURE THE POWER SUPPLY IS DISCONNECTED AND FOLLOW ALL LOCKOUT/TAGOUT PROCEDURES BEFORE PERFORMING ANY MAINTENANCE ACTIVIES.**

2. Loosen four set nuts/bolts (1, Figure 6-3) securing motor/gearbox (2) to mounting plate (3).
3. Manually move motor/gearbox (3) inward to relieve tension on worn drive belt (4) between pulleys (A) and (B).
4. Remove two bolts (5) securing bearing assembly (6) to spacers (7). Lift away assembly (6).
5. Withdraw worn drive belt (4) from pulleys (A) and (B) and install replacement belt (4) in its place.
6. Apply bearing assembly (6) onto spindle (9) and secure to spacers (8) using two bolts (5).
7. Manually maneuver motor/gearbox (2) outward to provide tension on replacement belt (4) between pulleys (B) and (A).

> NOTE: A properly adjusted belt will be tensioned so as to prevent slippage, but not provide excessive drag on the drive mechanisms.

8. Tighten four set nuts/bolts (1) to secure motor/gearbox (2) in position on mounting plate (3).

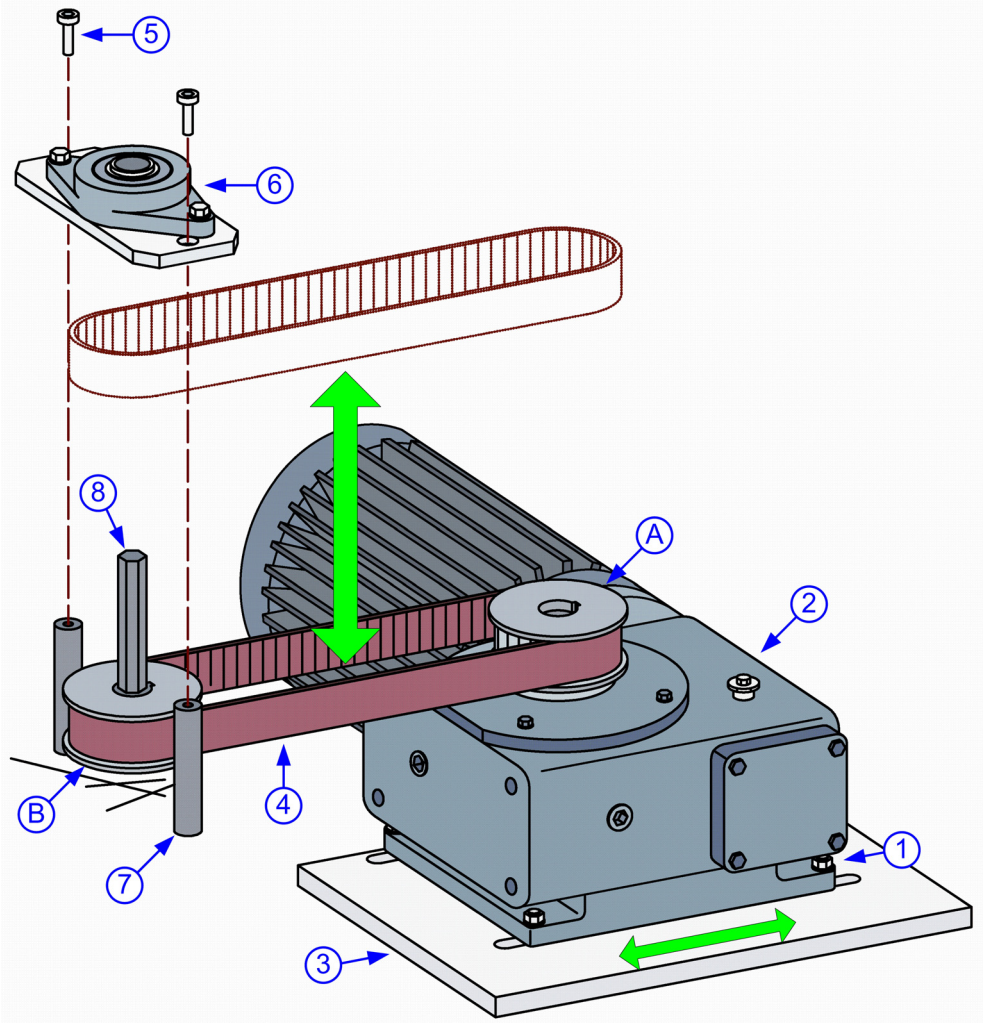

Figure 7-3, Independent Spindle Drive Belt Replacement

CAP GATE SETUP PROCEDURE

This procedure allows synchronization of the cap release with the infeed of containers. All machines are shipped with correct synchronization, so this procedure should not be required unless the sensors have been relocated due to the addition of another container type that requires a feed worm change.

> **ATTENTION:** Only perform this procedure after it has been absolutely determined to be necessary. Refer to the Cap Gate Troubleshooting procedure for determination.

1. Rotate the capper so the trailing edge of a pocket in the cap star just stops a cap from entering a pocket.
2. Position the timing proximity sensor (sync prox) so that it triggers with the cap at the trailing edge of the cap transfer star pocket.

> NOTE: This is the point at which the cap release solenoid will open and close.

3. Without moving the capper, position the bottle present sensor so that it is between bottle pockets.
4. Determine the shift register number by subtracting the number of closures between the cap stop and the application point from the number of bottles between the bottle present sensor and the application point.

> NOTE: The shift register number is the number of pockets from the bottle detect point to the cap release point, also taking into account the number of pockets required to get the cap in the chuck over the bottle.

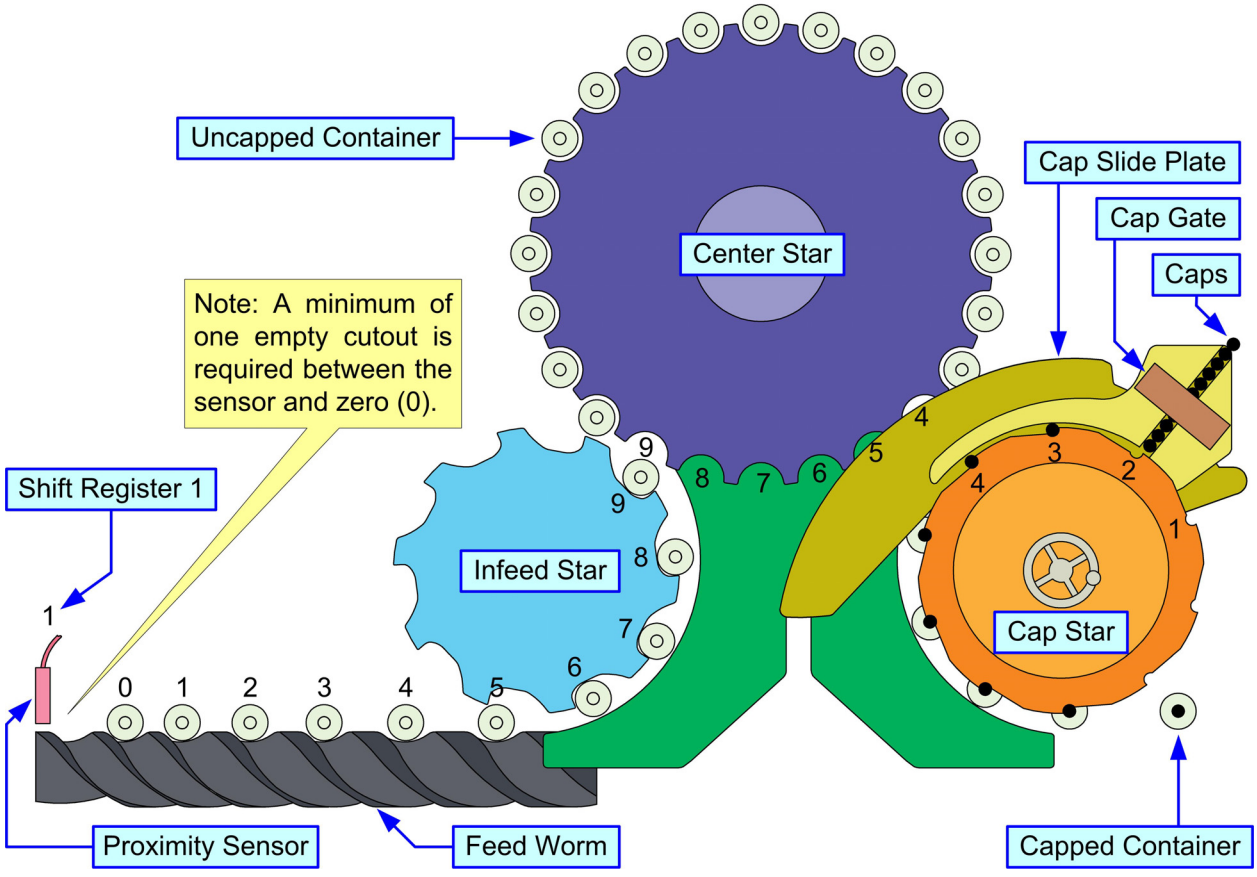

Figure 7-4, Cap Gate Setup