Butler

Non-Stop Production

Automatic Sleeve Splicer
MODEL SP3HSL

Operation and Maintenance Manual

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NOTICE

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A copy of the Operators' Manual is furnished with each Splicer. Additional copies can be purchased from the Customer Service / Parts Department, Butler Automatic Inc., 41 Leona Drive, Middleborough MA 02346. (508) 923-0544

We suggest that you copy the information from your machine nameplate into the space above label.

DISCLAIMERS

Information in this document is subject to change without notice.
Butler Automatic Inc., reserves the right to make changes to machine features, specifications, components and/or control systems, without notice.

These machines are constructed for maximum operator safety when used under standard operating conditions, for the purpose intended, when recommended instructions are followed.

All personnel engaged in the use of the machine should become familiar with its operation as described in this manual.
PROPER OPERATION OF THE MACHINE PROMOTES SAFETY FOR THE OPERATOR AND ALL WORKERS IN THE VICINITY.
Particular attention MUST be paid to the appropriate pages of this manual where WARNINGS and CAUTIONS are clearly written for your protection. Becoming familiar with materials, machine inspection, speed limitations, guard maintenance and total user responsibility, will assist you in learning potential areas in need of observation for danger.
In reading the guidelines for safety in the manual, it should be recognized that it is the responsibility of each individual to observe the safety rules as outlined. ALL WARNING and CAUTION labels must be observed and obeyed. ALL ACTUAL or POTENTIAL danger areas must be reported. Butler Automatic disclaims all liability for any damages, which may result from disregard of safety and operator instructions detailed in this manual.

WARNING!

CARELESS OR INCORRECT LOADING AND UNLOADING OPERATIONS CAN CAUSE HAZARDOUS CONDITIONS, WHICH MAY RESULT IN SERIOUS INJURYTO PERSONS OR EQUIPMENT.

Table of Contents

1. TECHNICAL CHARACTERISTICS OF SP3HSL SPLICER 1-4

2. HEALTH AND SAFETY PRECAUTIONS 2-5

3. GENERAL SAFETY INSTRUCTIONS 3-5

3.1. Warning and Caution Label 3-6
3.2. Operating Safety 3-10
3.3. Security During Maintenance 3-11

4. INSTALLATION 4-12

5. INTRODUCTION 5-13

5.1. Description 5-14
5.1.1. General Elements 5-14
5.1.2. Operational Overview 5-14

6. OPERATION OF SPLICER 6-16

6.1. Operator Controls 6-16
6.2. Main Operator Screen 6-19
6.3. Main Menu Screen 6-20
6.4. Parameters Screen 6-21
6.5. Set Up Screen 6-22
6.6. Alarm Screen 6-23
6.7. Input Display Screens 6-24
6.8. Output Display Screens 6-25
6.9. Alarm & Fault States 6-26
6.10. Roll Loading 6-27
6.11. Web Up 6-31
6.12. Web Guiding 6-33
6.13. Registration Sensor Adjustment 6-34
6.14. Starting the Downstream Process 6-35
6.15. Loading the Next Roll 6-36
6.16. Splice Preparation 6-36
6.16.1. Preparing the Splice Joint 6-37
6.16.2. Preparing the Second Side Tape 6-40
6.17. Splice Cycle 6-42

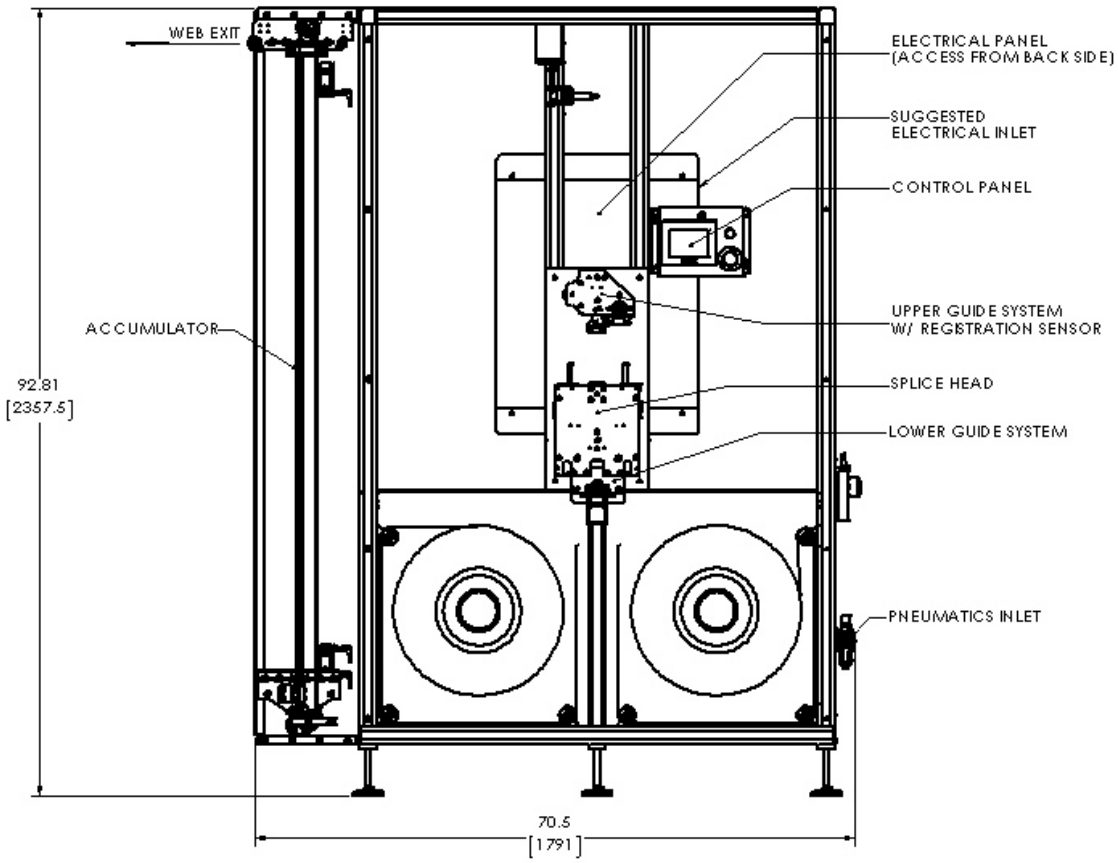
7. SPLICER MAINTENANCE 7-43

7.1. Splice Head 7-43
7.1.1. Nip bar replacement 7-43
7.1.2. Cutting System Maintenance 7-44
7.2. Register Sensor Information 7-54
7.2.1. Positioning the Sensor 7-54
7.2.2. Sensor Programming 7-55
7.3. Dancer Adjustment 7-57
7.4. Electrical Enclosure 7-58
7.5. WIF & WOF Sensors 7-59
7.5.1. WIF and WOF Calibration 7-60
7.6. Dancer Sensors 7-61
7.7. System Faults 7-62
7.8. SP3HSL Splice Head Set-Up and Troubleshooting Guide 7-63
7.8.1. FAQ - Splice Head Trouble Shooting Guide 7-65
7.9. List of Checks and Periodic Maintenance 7-66
7.10. Frequency of Control and Cleaning Operations 7-67

8. DECOMMISSIONING 8-68

9. APPENDIX A- GLOSSARY OF GENERIC SPLICER TERMS 9-69

1. TECHNICAL CHARACTERISTICS OF SP3HSL SPLICER



AUTOMATIC SLEEVE SPLICER SP3HSL

EMPTY WEIGHT:	1100 lbs, (500 kg)
POWER SUPPLY:	230 VAC 1-Phase – 50/60Hz – 8 Amps
AIR :	100 PSI (7 bar) CLEAN AND DRY
SPEED RANGE:	100 -450 fpm
MATERIAL:	Heat shrink sleeve material tube
MAX ROLL DIAMETER:	20” (500mm)
CORE DIAMETER:	5” (10” with optional adaptors)
MAXIMUM ROLL WEIGHT:	30 lbs.
WEB THICKNESS RANGE:	0.004” (double-ply) min. – 0.030” (double-ply) max.
MINIMUM WEB WIDTH :	1.5“
MAXIMUM WEB WIDTH :	8“ (traverse wound roll maximum width 8.5“)
MAX REG MARK REPEAT:	Consult Factory

2. HEALTH AND SAFETY PRECAUTIONS

This splicer has been made to maximize operator safety provided the machine is used under the specified operating conditions and the recommended instructions in this manual are followed.

Any operators using this machine must familiarize themselves with the operating procedures and set forth in this manual. Correct operation of the machine will help insure the safety of the operator and those near the machine.

Special attention must be paid to those pages in this manual which describe warnings and precautions necessary for your protection.

It is the responsibility of the operators to familiarize themselves with all aspects of this manual to properly utilize the equipment and to gain better understand the areas of the machine which demand particular attention to insure operator safety.

It is each operator's responsibility to read and follow all safety and operational indications contained in this manual. The zones of real and potential danger are indicated in this manual. Butler Automatic refuses all responsibility for damages caused by operator inattention or misuse of the equipment excepting indications contained in this manual.

3. GENERAL SAFETY INSTRUCTIONS

To avoid accidents or damage to the equipment:
Be vigilant and use common sense.
Familiarize yourself with the safety and operating instructions contained in this manual. Learn the zones of the equipment which require extra precautions for security.
All personnel using the equipment must be properly trained and follow the operating procedures contained in this manual which help guard safety of the operator and those around the equipment. All personnel engaged in the use of the splicer must learn its operation prior to attempting any splicing.
PROPER OPERATION PROMOTES SAFETY FOR THE OPERATOR AND ALL WORKERS IN THE VICINITY.
For your own protection, pay particular attention to all WARNING and CAUTION LABELS, on the machine, and those noted in this manual.
For your safety pay particular attention to all safety related items in this manual
Take care near moving equipment. Never touch a moving web or part of the machine.
Never leave tools or objects on a running machine, as they may fall and cause damage.
Never make machine adjustments while the equipment is in use.
Use caution around the machine when it is in operation. Do not place your hands close to moving rollers. Use some other means to clear the machine.
Do not make any adjustments or repairs to the equipment, unless you are qualified to do so.
Do not make any modifications to the equipment, or attempt to defeat any safety features.
Do not remove any guards, machine covers, or other parts of the splicer.
Keep machine doors closed and secured at all times.
Report any accidents to your supervisor immediately.
Report any missing guards or machine damage to your supervisor immediately.

3.1. Warning and Caution Label

As with any machinery within an industrial environment, certain precautions must be observed and performed to avoid personal injury or damage to the machine! Some of the illustrations within this manual may show components without the machine guards in place or the warning and caution labels affixed. This has been done for illustrative purposes only!

DO NOT ALLOW THE SPLICER TO BE OPERATED WITH ANY OF THE GUARDS REMOVED OR ANY LIMIT SWITCHES BYPASSED OR INOPERATIVE!

FOLLOW THE INSTRUCTIONS ON THE WARNING AND CAUTION LABELS AT ALL TIMES!

IF ANY LABELS OR GUARDS ARE MISSING FROM THE MACHINE, DO NOT OPERATE THE SPLICER! CONTACT BUTLER AUTOMATIC INC. FOR REPLACEMENT PARTS.

The graphics in the following section show the Safety, Warning, Caution and Danger Labels that may appear on the Butler Splicers. The purpose of the label will be explained following the illustration.

IN ADDITION THERE ARE PHOTOGRAPHS OF TWO LOCK-OUT/TAG-OUT POINTS ON THE SPLICER.

P071898
Caution, Mechanical Hazard.

Pinch Point/Crush Hazard
Keep hands and fingers clear of this area. The machinery parts, in this area, could cause an injury by compression of hands or fingers.

P071900
Danger, Mechanical Hazard.

Cut Hazard
Keep hands and fingers clear of this area while operating the machinery. The machinery parts, in this area, could cause an injury by cutting hands or fingers.
Lock out power and compressed air sources before servicing the machine.

P071902
Warning, Mechanical Hazard.

Entanglement Hazard (Belt Drive)
Moving parts can crush and cut.
Keep guards in place.
Lock out power and compressed air sources before servicing the machine.

P071903
Caution, Burn Hazard

Hot Surface
Some Splicers may be equipped with Heat-Seal Splicing Heads. These Splicing Heads contain parts that may reach temperatures that could cause a burn.
Allow these parts to cool before servicing.

P071905
Energy Hazard(s)

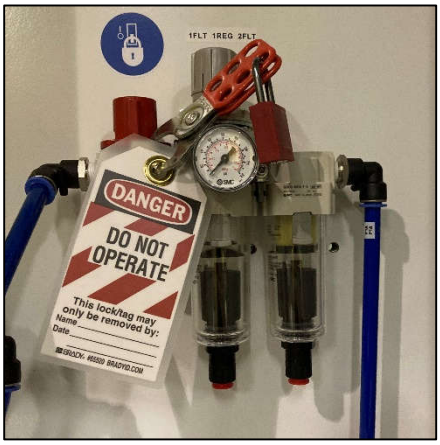
Lock Out in the De-Energized State
This equipment is supplied with an electrical disconnect that may be locked (Locked Out) with the power kept in the OFF (De-Energized) state.
Always shut off and lock out the electrical power before servicing the machinery.

Main Power Switch

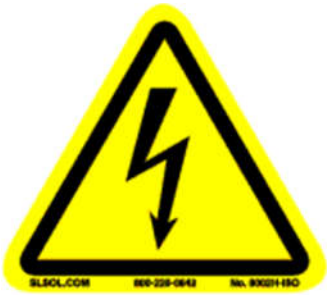
This switch controls the incoming power to the splicer.

Electrical System Locked Out

This equipment is supplied with a pneumatic disconnect that may be locked (Locked Out) with the compressed air kept in the OFF (De-Energized) state. Always shut off and lock out the pneumatic supply before servicing the machinery.

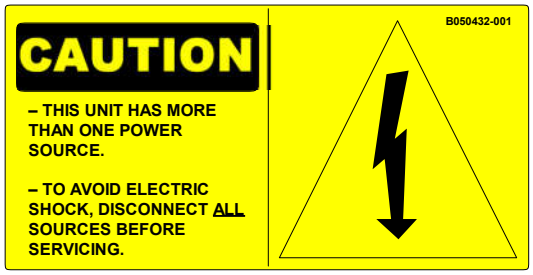


Pneumatic System Locked Out



P071897
Electrical Hazard

Electrical Shock Hazard
This equipment is supplied with High-Voltage Electricity. Contact with electrical components will cause electrical shock or burn. Turn off and lock out power before servicing.



B050433-001 English
Electrical Hazard

Electrical Shock Hazard – Multi-Source Power
This equipment is supplied with Electrical Power from more than one source. (Example: Process Machine power for Emergency Stop Circuit). Contact with electrical components will cause electrical shock or burn. Turn off and lock out power from ALL sources before servicing.

Turn off and lock out ALL POWER before servicing
P071906

General Hazard
No access for unauthorized persons. Avoid injury. This unit is to be serviced by trained personnel only.

3.2. Operating Safety

A good machine operator is always conscious of safety. Long hair should be bound up, jewelry and watches should be removed, and loose clothing should be secured.
The following areas of potential hazard should be noted:

A. WEB-UP

DO NOT touch any roller until you are sure that it has stopped rotating. Rollers may appear to be stationary while they are still rotating. Touching a moving roller can cause injury to hand or arm.

B. SPLICE PREPARATION

DO NOT touch the Running Roll Lead-in Roller(s) until you are sure they have stopped rotating. Touching a moving roller can cause injury to hand or arm. Stay away from moving SPLICING HEAD PARTS. Wait for completion of cycle before attempting SPLICE PREPARATION. DO NOT attempt any correction to a Prepared Splice while a splicing cycle is under way. Splice head knives are protected by guards, but operators should use caution when in their proximity. When cutting the web for splice preparation take all precautions to avoid cutting yourself. Use gloves or follow your plants standard safety procedures.

C. MACHINE GUARDS

Never remove the machine guarding and interlocking protections. Be aware of all guards and the dangers they are guarding. Report any missing or damaged guards.

D. LEFT AND RIGHT ROLL AREAS

The design and configuration of the roll drive system minimizes any risk to the operator. It is the responsibility of the operators to keep clear of the roll drives.

E. ACCUMULATOR / DANCER AREA

The dancer is a gravity powered system which is designed to minimize any operator risk. The operator should be prudent and use common sense to avoid any moving parts in this area of the machine.

F. SPLICE HEAD PROTECTIONS

The splice head is composed of right and left half. For proper splicing, the two halves of the splice head must remain closed after the splice has been prepared. Opening the head during the splice cycle will interrupt and stop the action of the nip and or cut knife. The mechanical design of the splice head nip action causes the head to stay locked closed while the nips are actuated and the knife can be energized. The tip of the knife is rounded to minimize cut risk from direct contact.

G. LOCKOUT/TAGOUT SAFETY PRECAUTIONS

Both the Electrical System and the Pneumatic System have been provided with lockable disconnects. These disconnects must be secured with whatever devices and tags your company provides. The electrical disconnect interrupts the High Voltage Supply to the Splicer. The pneumatic valve not only interrupts the compressed air supply to the Splicer, it also vents air pressure from within the splicer to atmosphere.

H. E-STOP

The Splicer E-Stop button must be joined to the process E-Stop circuit allowing the splicer and production line to be rapidly stopped in case of danger. To restart the machine the E-Stop switch must be mechanically deactivated by turning it, and then the reset button must be pressed.

3.3. Security During Maintenance

It is the responsibility of maintenance personnel, as with machine operators, to familiarize themselves with all aspects of machine operation. Maintenance personnel must follow the instructions found in the section OPERATING SAFETY. All personnel concerned with maintenance of this equipment must pay particular attention to the following:

A. General

Never lubricate or clean a machine which is in operation.
Never make adjustment to the machine under power or in operation.
Always use appropriate lock out procedures as prescribed by your company for machinery. A machine that is not locked out must be considered dangerous and may start as part of the process machine to which it is connected.
Only trained, qualified and authorized personnel should perform work of any kind on this machine.
Replace defective parts with Butler standard parts only.
Never replace fuses with fuses of a higher rating.

B. Electrical Danger

Certain elements of the splicer are always under power and dangerous. Cut the electric circuit before starting work on the splicer. The main interrupter is lockable and must be locked out to make certain that the machine stays safe during maintenance, and avoid power being restored to the machine during repair or maintenance. Lockout tag out is provided on the exterior of the electrical control enclosure as well as on the disconnect mounted inside the enclosure.

C. Security during work on the pneumatic system

Extreme attention must be given to any work performed on tubing and the pneumatic system of the splicer. Air must be removed and locked out before any service is performed on the pneumatic system. If a tube detaches, compressed air or particles many cause injury.

D. Dancer zone

Never work in the dancer zone when it is moving or under tension. The dancer should be blocked in position by unwinding web to fill the dancer and removing any tension from the web. If work must be performed with the dancer raised, the dancer must be blocked in position. Never rely on the web to hold the dancer in position.

E. Splice head zone

The cut knives are very sharp. Use extreme care when working with or around the knife assembly. The knives may be accessible during a maintenance intervention on the splicing head. Place a shield around the knives or remove the knife assembly before starting work in the splice head. Be careful to follow plant safety rules and use protective gloves if required.

4. INSTALLATION

The splicer is a compact unit which is fully self-contained and sits upon four adjustable feet. The weight of the machine is approximately 1100 lbs. The machine can be moved by a standard fork lift capable of carrying this weight. The SP3HSL should only be lifted by the upper cross-frame. Please see electrical schematics for interconnection electrical and with the process. The machine is equipped with a pneumatic disconnect and must be connected to plant air.

It is important that proper rigging equipment is used to move the equipment and that riggers with proper safety training are responsible for moving and erecting the machine.

The installation site must be fully prepared before the machine is brought into position. A centerline must be drawn on the ground where the splicer will be installed. The must be centered on this center line. The leveling feet of the machine are used to level the splicer. We recommend that level is made to within .003 per foot. The tram of the machine is also critical for proper web tracking. The tram must be within .003" per foot. The alignment tolerance is affected by material being run. It is very important when installing this machine that the entire web path is leveled and tram for proper web tracking.

The splicer includes outputs to signal to the process that the machine is in the ready state for run. This signal and the E-stop signal must be connected to the process machine control. Please refer to interconnection diagram for more details.

It is highly recommended that a Butler Technician inspect the machine installation before it is finally bolted to the floor.

5. INTRODUCTION

The automatic splicer from Butler is a machine which permits rolls of materials to be unwound into a production line and automatically spliced to eliminate process stops and associated waste from roll change over. The splicer automatically controls unwinding process tension and joins in a new roll assuring a continuous flow of paper into the production process.

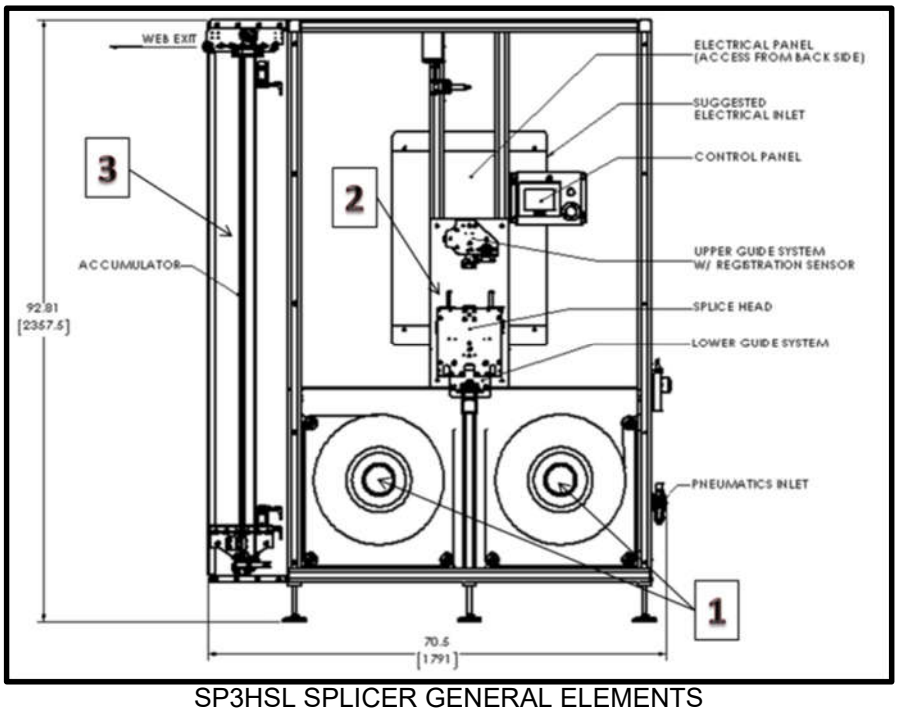
The Butler SP3HSL splicer is known as a “zero speed splicer” due to the fact that the splice is performed with the running web stopped and the process fed from the integral accumulator.

This manual and instructions presents the technical characteristics and proper usage, control, installation and maintenance of the Butler Series SP3HSL splicer.

This splicer is designed for Low Tension operation. With the In-Register Option, splices can be made to precisely keep the printed image alignment through roll change over.

This machine has an integral drive system used to drive the rolls of material for unwinding and control of the web feed at low tension. The Splicing Head is configured to provide tape to both sides of the splice joint for sleeve material. The Splice Joint is prepared on the same Vacuum Nip Bar that is used to seal the webs together at Splice Time. A secondary, offset set of nip bars provide the application and backing force for the second side tape.

5.1. Description



SP3HSL SPLICER GENERAL ELEMENTS

5.1.1. General Elements

The SP3HSL splicer is composed of three primary elements:

1) The roll unwind
2) The splice head
3) The accumulator

5.1.2. Operational Overview

The Butler Automatic Sleeve Splicing system is designed to provide a non-stop supply of sleeve material to the downstream application systems.

The Butler system consists of two roll drives; one for the running roll of material and one for the new roll. The system includes a guiding system for precise cross-web alignment, an automatic splice head with the ability to apply tape to both sides of the butt splice joint, a registration sensor to provide in-registration splices, and an accumulator capable of providing the downstream process with a continuous supply of material at speeds up to 450 feet per minute (fpm) during the product registration and zero-speed splice process.

The splicer is loaded with the material which is webbed through the guiding system, splice head, nip advance, and accumulator closely following the web path provided on the web-up diagrams on the splicer and as replicated below. The material is taken and provided to the downstream process equipment. The upper and lower guides are adjusted to suit the width of the material being run on the machine.

Using encoders before and after the accumulators, the control system drives the core-driven roll shafts at the appropriate speed to maintain a pre-defined level of storage in the accumulator. The speed at

which the core is driven is calculated based on feedback from the encoders on the drive system and the encoders before and after the accumulator. An estimated time before the running roll expires is provided on the user interface and is based upon the speed-related control items and user-input caliper of the web.

While the running roll is supplying material to the process, the operator loads the next roll of material onto the opposite core drive shaft. The material is webbed through the system and to the splice head. The non-running side of the splice head is opened, upon which vacuum is turned on automatically to only the preparation and nip bars. The operator webs the new material through the associated side of the lower guide system and over the idler roll on the head to the preparation bar. The splice is prepared using the cutting edge guides and lateral alignment scales provided on the preparation bar. The vacuum to the preparation and nip bars hold the splice in place. The non-running side of the head is closed.

The operator then opens the running side of the head where the vacuum has been automatically turned on to the second side tape application nip bars. The operator places a piece of tape, adhesive side up, over the vacuum holes, using the alignment scales provided to ensure proper positioning relative to the running web. The operator then closes the running side of the head.

Using line speed data collected from the encoders on the system and the user-input material caliper, the system will initiate an automatic splice when the calculated outside diameter of the running roll becomes less than a user-defined minimum value.

If in-registration splice mode has been selected on the user interface, the system will automatically slow the drives down to a pre-defined scan speed. Using an optical sensor, the system will find a registration mark on the running material. Once the mark is located, the system will advance the web a user-defined distance such that the splice takes place at the desired location on the web. If in-registration is not selected, the drive will decelerate to zero speed at the predetermined minimum outer roll diameter.

During the deceleration, scan, and splice sequences the downstream process will continue to be supplied material at the process-defined line speed by consuming material stored within the accumulator.

When the web is properly positioned for the splice and the drives have decelerated to zero speed, the accumulator/web advance nip will close on the web thereby isolating the splicing activities from the downstream process tension and material flow.

The splice head will then fire the primary nip on the running side of the head, thereby compressing the running web against the exposed tape on the prepared splice to join the two webs of material. A knife on a moving shuttle then cuts the expiring web in a precise location to provide a butt splice at the user-specified location. With the expiring web cut and the running web now adhered to the new roll, the primary nip will retract.

The upper accumulator/web advance nip will then advance the web by moving a predefined distance in the in-web direction. Sensors in the nip advance provide confirmation of the completed motion.

Upon completion of the web advance the second side tape nip bars extend from both sides of the head to apply the tape and backing force for the opposite side of the web. The second side tape nip bars then retract to complete the splice and two-side tape application process.

The accumulator/web advance nip then opens and the new running roll is accelerated to a value higher than the calculated line speed until the accumulator has returned to a pre-defined fill state, as indicated by sensors within the accumulator that monitor the position of the moving dancer. Once the pre-defined fill state is achieved the drive speed returns to a value that matches the process line speed.

6. OPERATION OF SPLICER

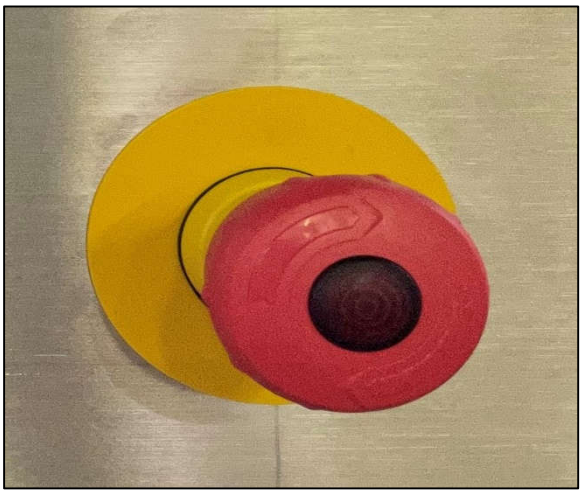
6.1. Operator Controls

MAIN POWER SWITCH

This switch controls the incoming power to the splicer.

MAIN POWER SWITCH LOCK-OUT

The switch may be locked in the off position, while the splicer is being serviced or an operator is entering unsafe zones in the machine. We recommend that operators consult with their plant safety personnel and rules to ensure they use this feature in accordance with plant safety regulations.



EMERGENCY STOP BUTTON

The RED, Emergency Stop pushbutton is the Splicer Stop Button. It **MAY** also be used to stop the Process Line. **(This function requires additional wiring on the part of the customer)**. To stop your splicer, push the button IN. The button assembly has a locking (detent) arrangement. Once the button has been pushed in, it will remain locked in. Before re-starting the machine, rotate the button clockwise, to allow it to spring OUT, and restore normal operations. After releasing the Emergency Stop Button, push the RESET Button.

RESET BUTTON

This BLUE Push-button is used to start or restart the splicer. If power to the splicer is interrupted or if the Emergency Stop Pushbutton is used, the RESET Button must be pushed IN to return to an operational state.

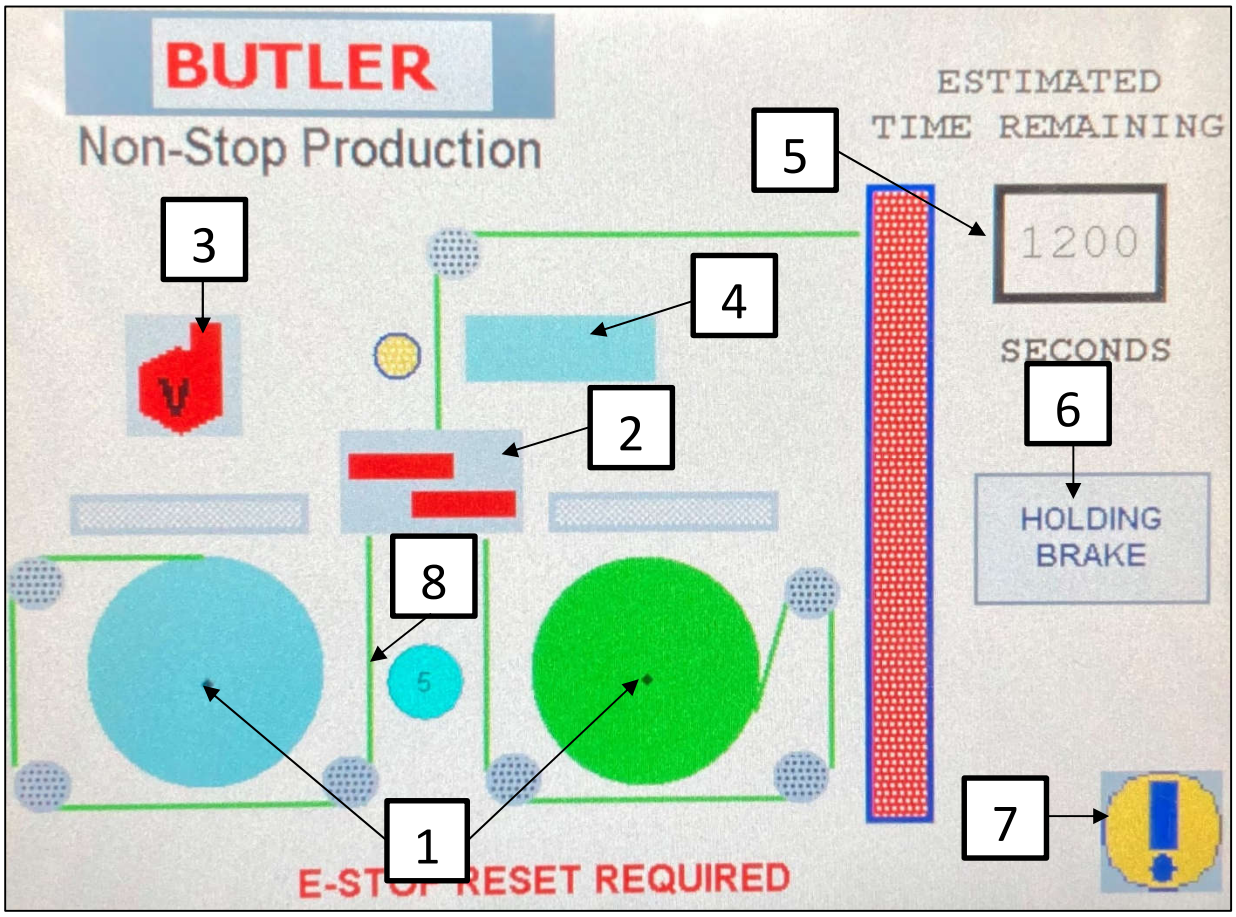
The operator control panel must be used for operation of the splicer, including splice preparation and running the machine. For ease of use, the control panel is located next to the splice head. Each feature and operational function is indicated on the running screen. In general, the color coding for screen icons is as follows;

Green = Active
Red = Off or Not Ready
Gray = Inactive or Safe Condition

OPERATOR INTERFACE PANEL

WARNING: NEVER USE A HARD OR SHARP OBJECT ON THE PANEL. USE YOUR FINGERS ONLY FOR SWITCH OPERATION.

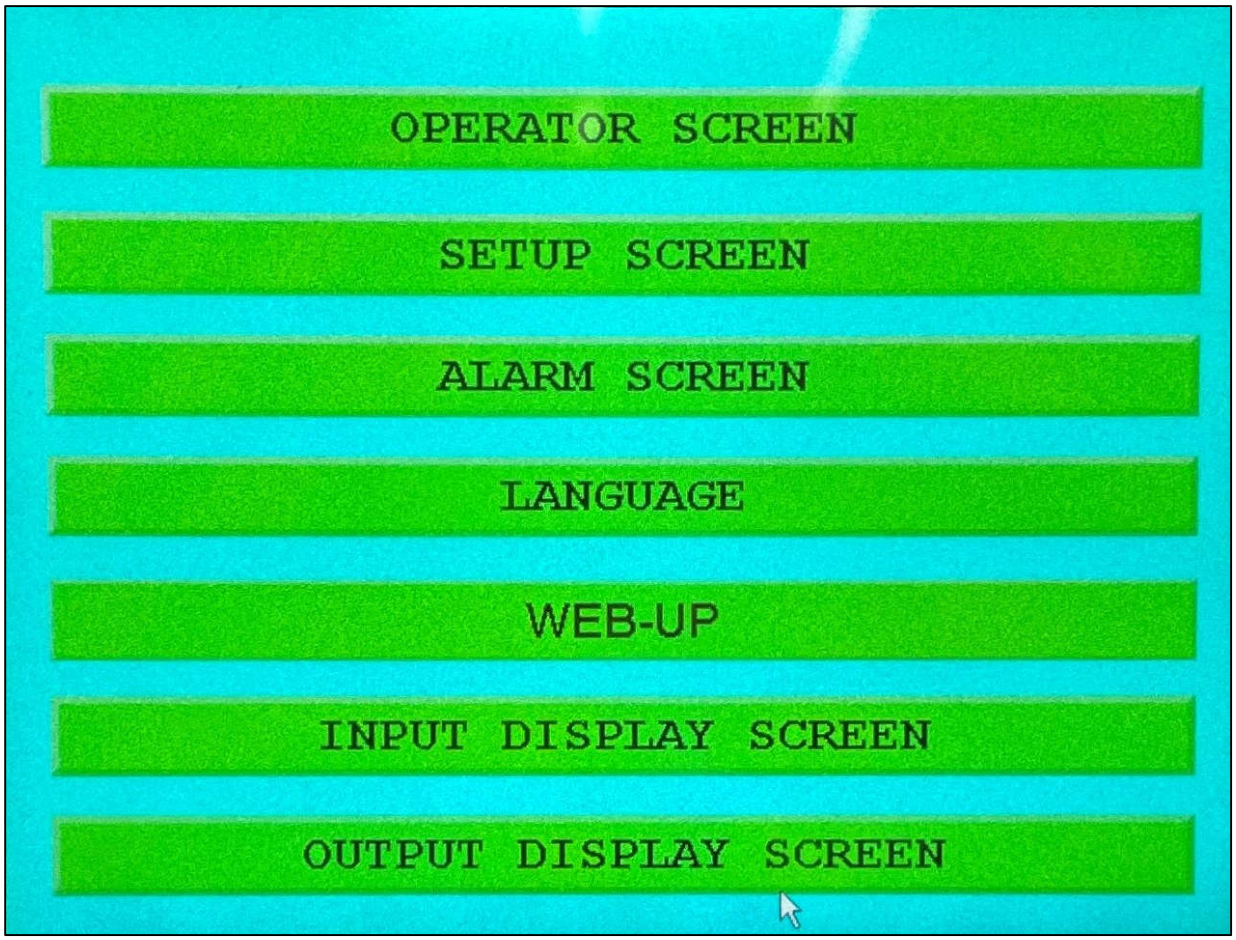
6.2. Main Operator Screen



MAIN OPERATOR SCREEN

1. **Roll Drive Status** – Touch to Toggle
   Green = Active Gray = Inactive
2. **Manual Splice/Splice Status** – Touch for Manual Splice
   Red = Splice Not Prepared Green = Splice Ready
3. **Vacuum Status** – Touch to Toggle (head must be open to turn vacuum off)
   Red = Off Green = On
4. **Registered Splice Status** – Touch to Toggle
   Large Box: Gray = Off Green = On Small Box: Illuminates with registration mark
5. **Countdown Timer** - ESTIMATED time to next splice (seconds)
6. **Holding Brake Status** (non-active roll) – Touch to Toggle
   Gray = Holding Brake Active Red = Holding Brake Off (inactive roll can rotate freely)
7. **Information** - Access to Alternate Screens
8. **Web Path**

6.3. Main Menu Screen



MENU SCREEN

The menu screen is used to navigate the set up and troubleshooting screens. The available screens to selects are:

Operator Screen – Return to main operation screen.

Setup Screen - Password protected set up screen for machine configuration and access to parameters screen. Parameters – Access to Input parameters associated with material being run

Alarm Screen – Access to alarm history

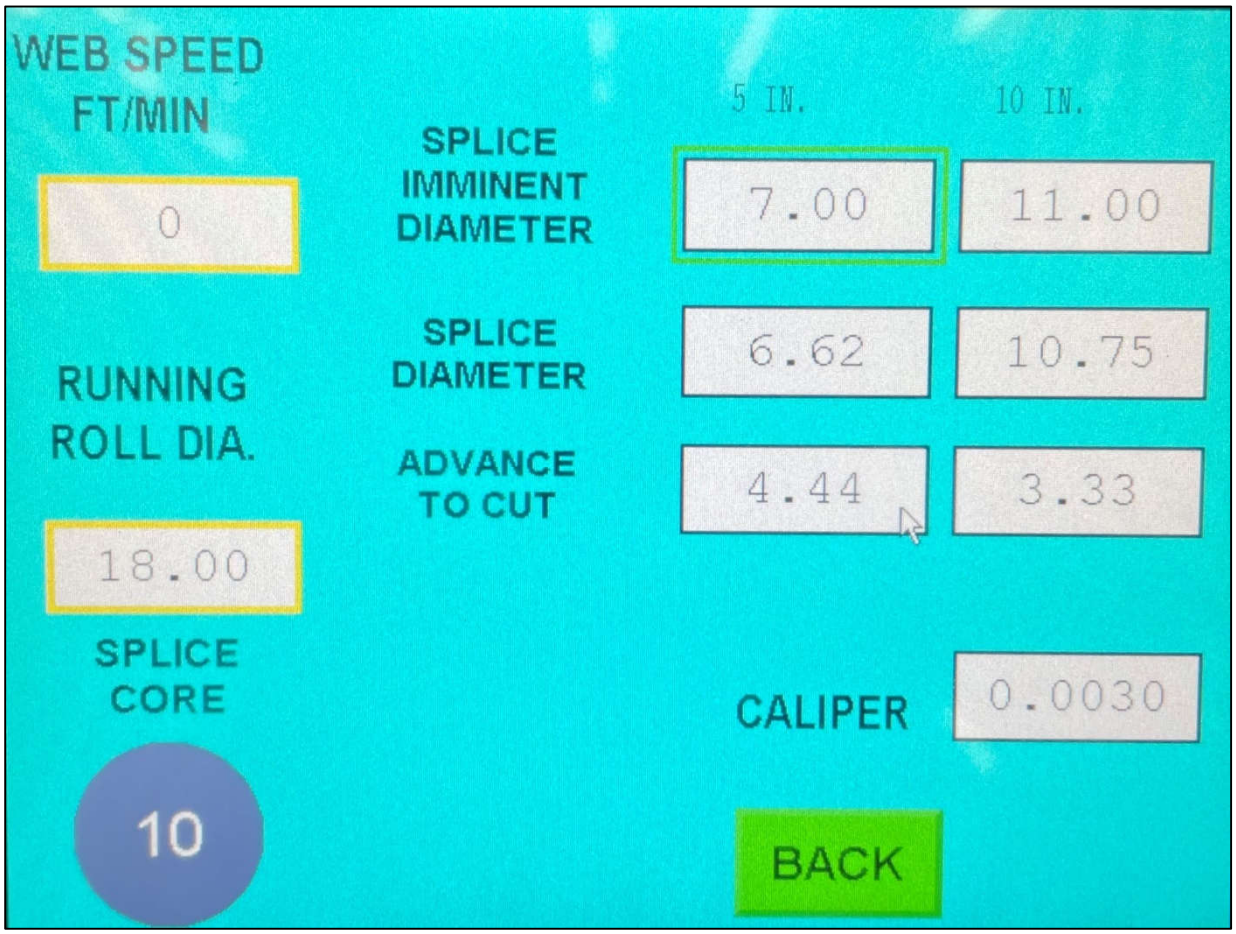
Language Screen - Select the language for display.

WEB-UP – Press to enter Web up mode

Input Display Screen - Shows the status of all PLC inputs

Output Display Screen - Shows the status of all PLC outputs

6.4. Parameters Screen



PARAMETERS SCREEN

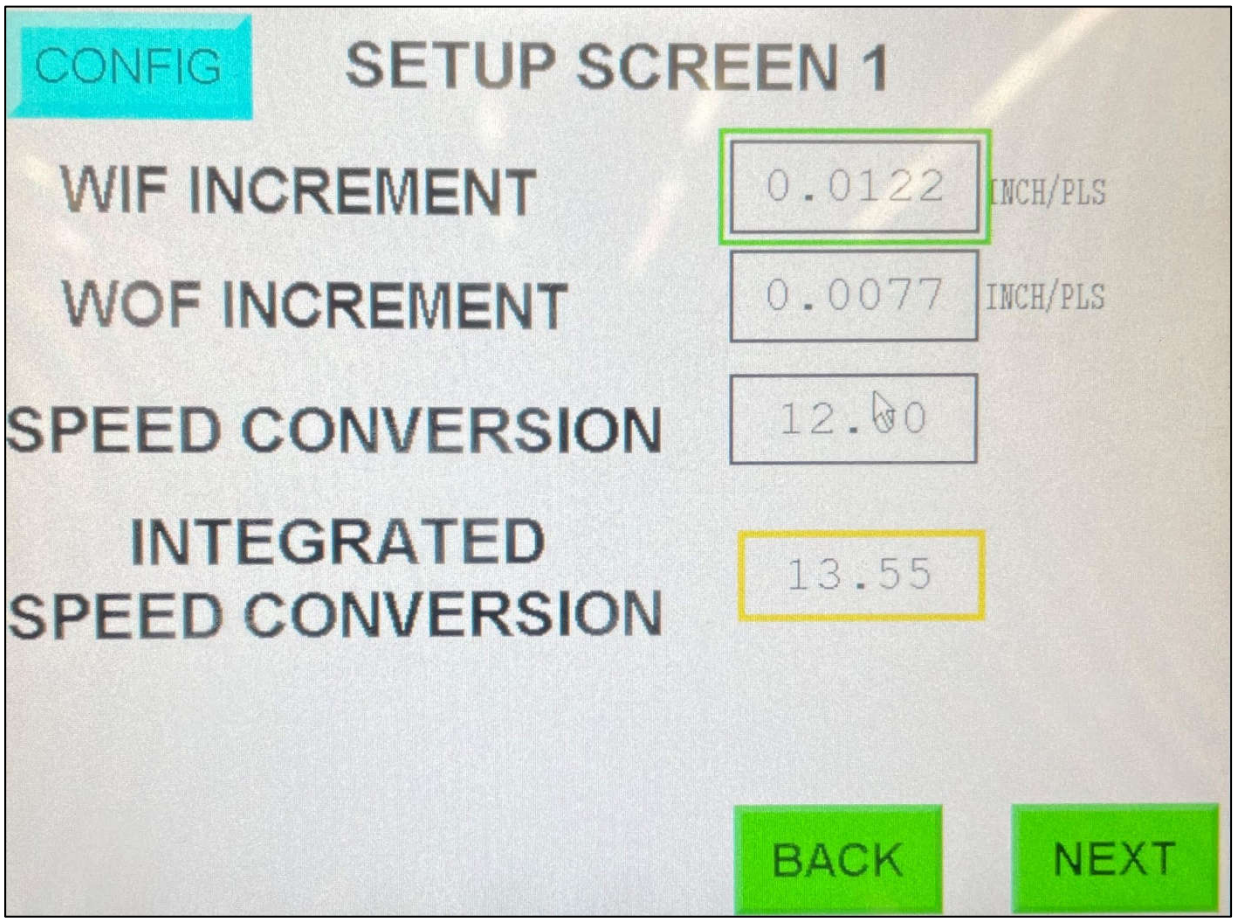
To reach the parameters screen, press the “Setup Screen” on the main menu screen. Once selected, an option for the parameters screen will present itself. Press the parameters screen tab to reach the parameters screen.

The operator touches the buttons on this screen to change the values as required for the material being run on the splicer.

Advance to Cut – This is the offset (inches) from the cut when set to zero to the desired cut location
Core Shaft Diameter – Touch to toggle between 5 inches and 10 inches (Note: Other default values change automatically to preset defaults based upon the selected core size
Splice Imminent Diameter– Diameter (inches) for running roll at which to send Splice Imminent signal
Splice Diameter - Diameter (inches) for running roll at which to automatically splice in new roll
Running Roll – Diameter (inches) calculated for roll currently supplying material to process (estimated)
Caliper – Operator input (inches to 3 decimal places) for caliper (two-ply) of material being run
Back – Returns to Main Menu Screen

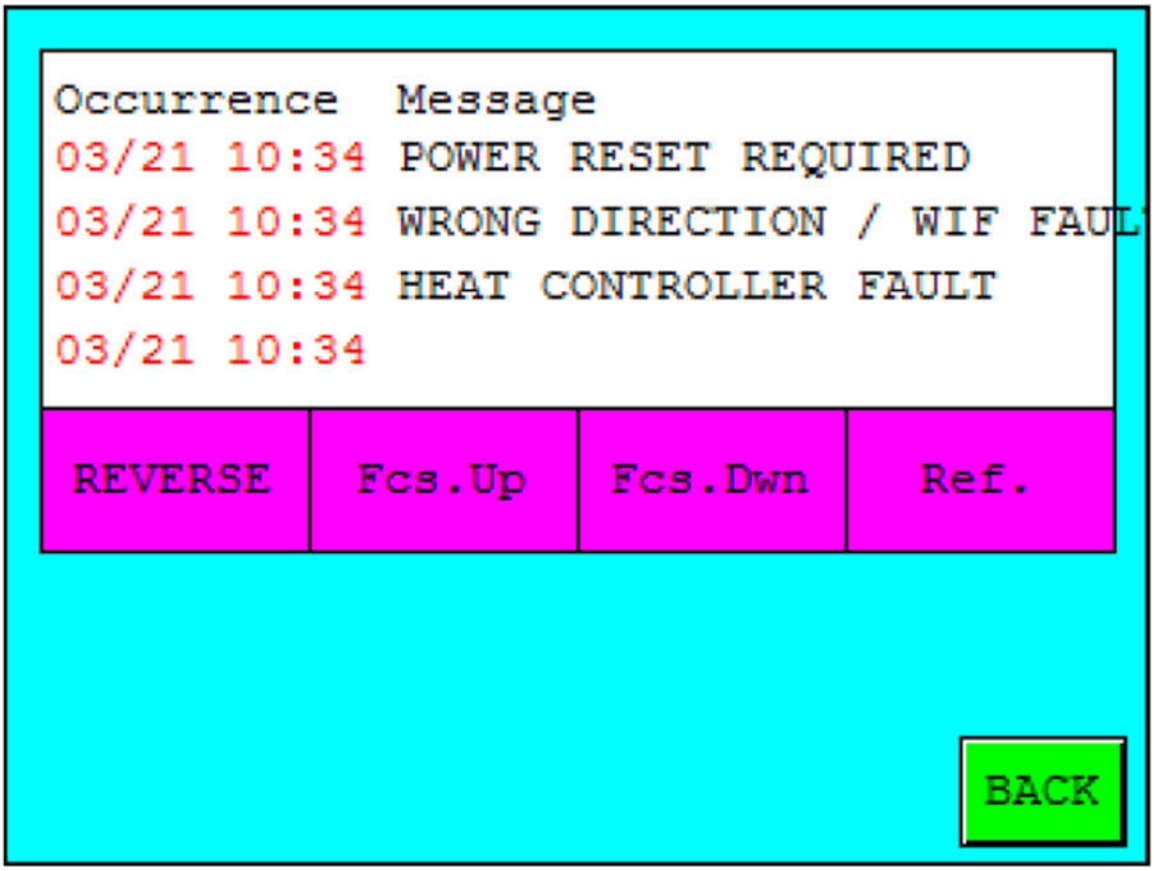
6.5. Set Up Screen

This selection brings you to the password protected screens used by Butler manufacturing personnel to configure the splicer for proper operation. There are no operator-accessible parameters on these screens. Contact Butler Service for your password and help if you need access.



SETUP SCREEN

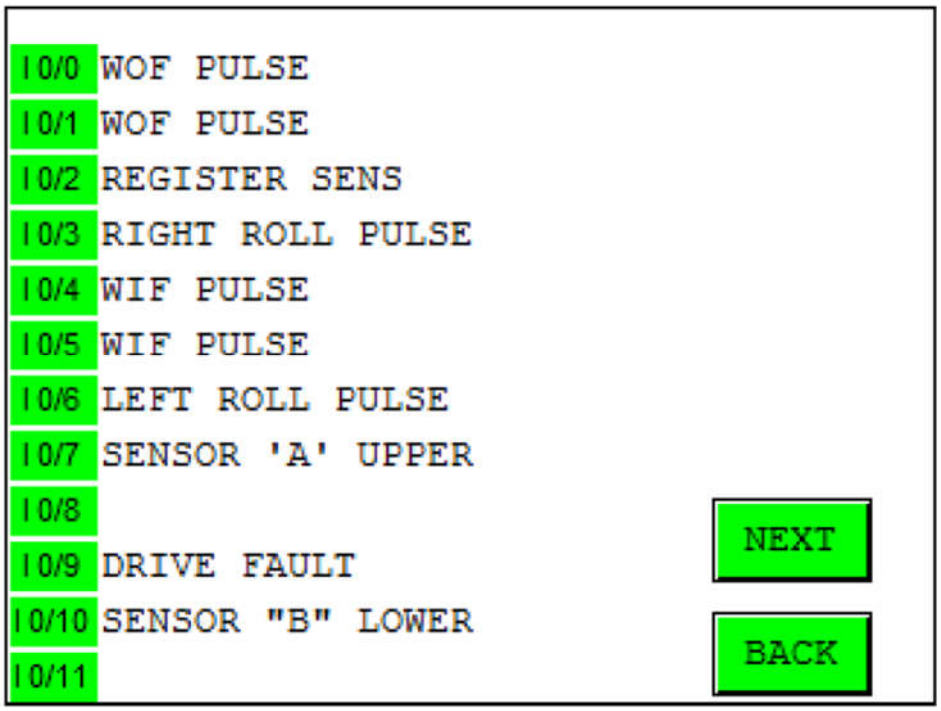
6.6. Alarm Screen



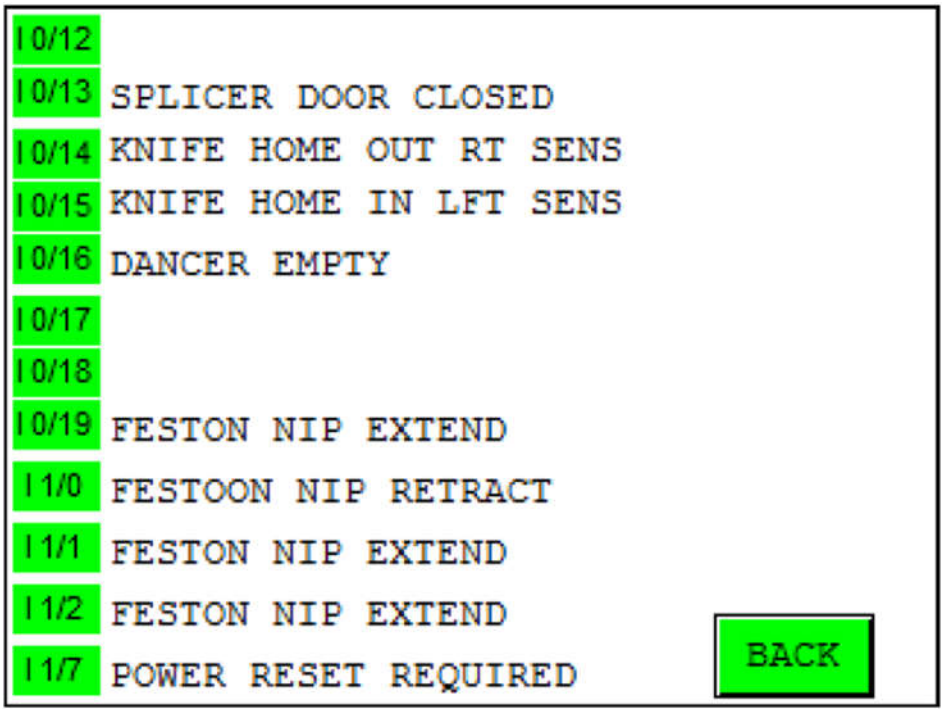
ALARM SCREEN

This screen provides a list of faults and on-screen messages with timing to help in trouble shooting.

6.7. Input Display Screens



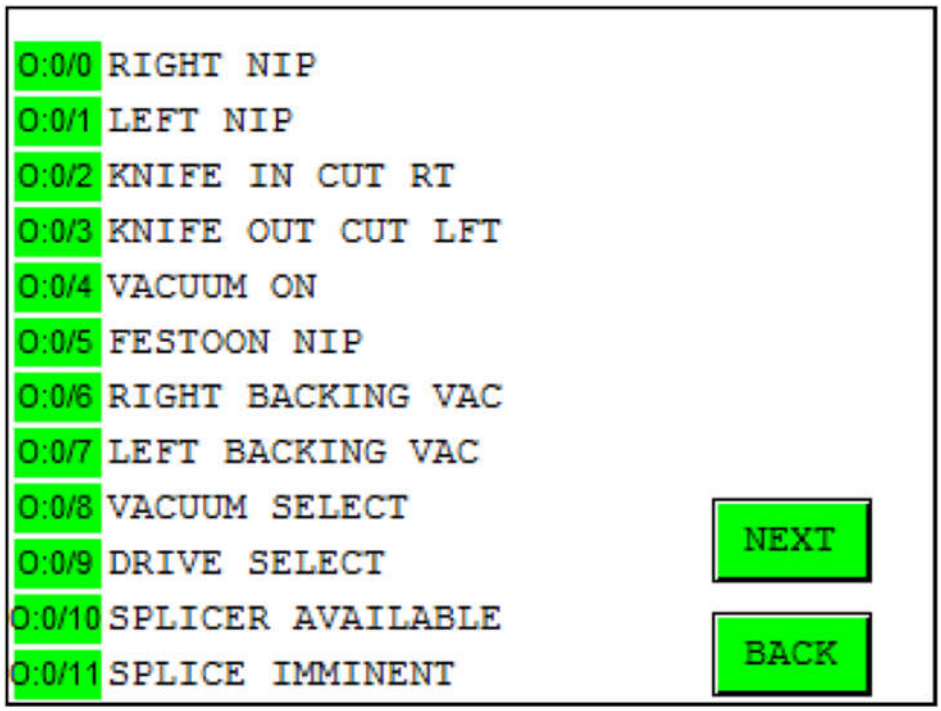
INPUT DISPLAY SCREEN 1



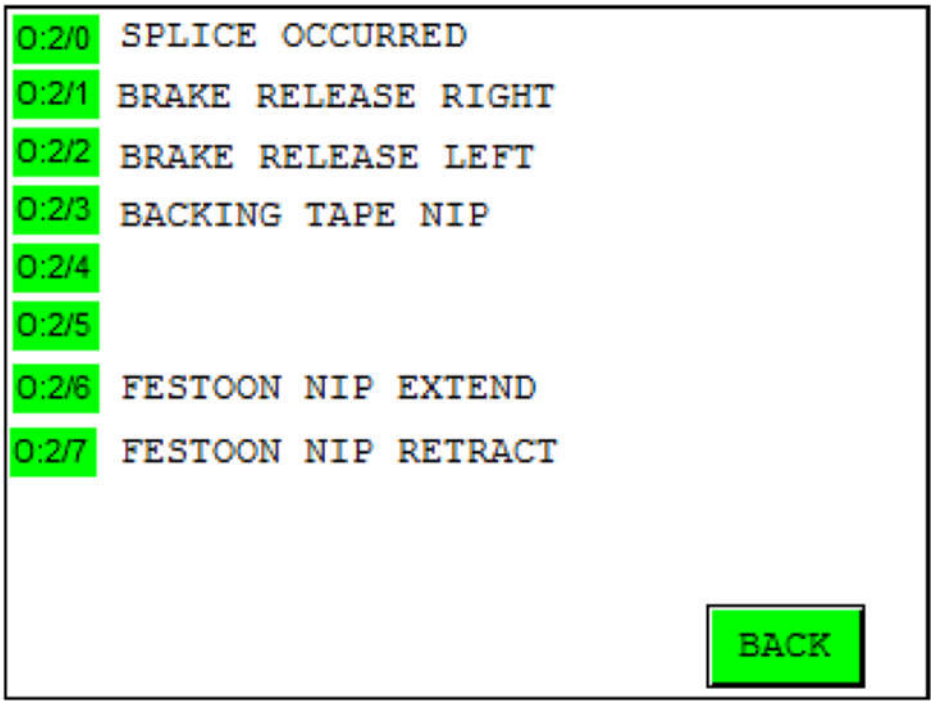
INPUT DISPLAY SCREEN 2

These screens display the PLC inputs. Red indicates the input is activated. These screens can be used for troubleshooting purposes.

6.8. Output Display Screens



OUTPUT DISPLAY SCREEN 1



OUPUT DISPLAY SCREEN 2

These screens display all PLC outputs. Red indicates the output is energized. These screens can be used for troubleshooting purposes.

6.9. Alarm & Fault States

The following fault states will remove the “ready” signal being provided by the splicer to the downstream processes. The faults can be seen by accessing the Alarm Screens.

Drive Not Ready: Shows that the motor drive has a fault which must be corrected. Press Reset to clear. If it does not immediately clear, press E-Stop wait 20 seconds and then remove E-Stop and press reset.

Dancer Empty: Signals that the accumulator is empty and has reached its top stop. To clear this condition the operator must manually unwind sufficient material from the running roll to lower the dancer below the upper proximity sensor. Once the dancer is below the upper limit the operator can press reset. The splicer will refill and be ready to run.

Web Break: The web has broken, causing the dancer to drop to the bottom stops. Web up the machine and press reset to put the splicer back into the ready state.

E-STOP: The E-Stop button has been pressed triggering the E-Stop of the machine. Disengage the E-Stop switch and press reset. The splicer is then back in the ready state.

Register Mark Fault: This fault shows that the splicer is not properly reading the register marks on the film when register splice has been selected. The splice ready light on the operator touch panel will now flash until the fault is corrected. If the fault is not corrected before the running roll reaches the auto-splice diameter, the splicer will make a time out splice which will not be in register. The fault must be manually corrected (verify eye is correctly positioned, printed register marks are OK, eye is clean, or reset register eye) and then the splicer will automatically clear the fault.

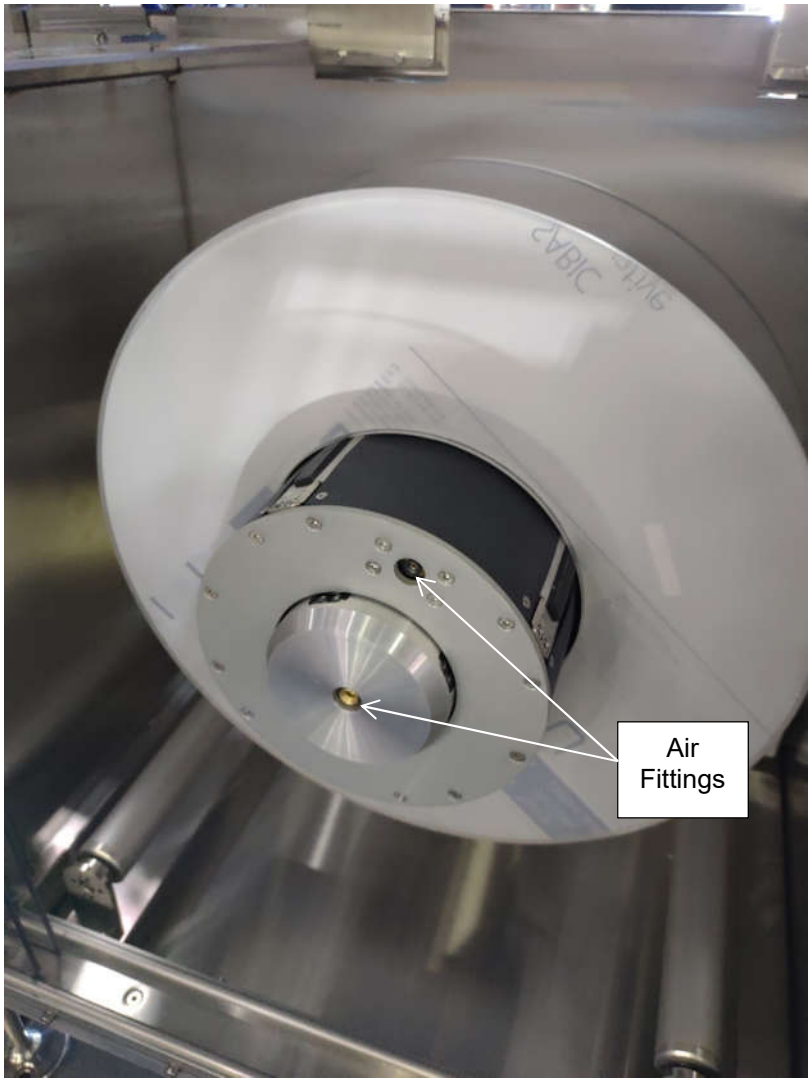
Splice not ready: This signals that the splice head is open or has not been opened at all and that the preset splice diameter has been reached. The splicer ready signal is removed causing the process to stop. The splice must now be prepared in the splice head and reset must be pressed. When the process is restarted an automatic splice will be made.

6.10. Roll Loading

Prior to loading rolls of material on the splicer the operator must make sure the system is configured for the proper core diameter. The system has a default configuration suitable for 5 inch diameter material cores. If the material to be run is on 10 inch cores the core adaptors must be installed prior to loading the material

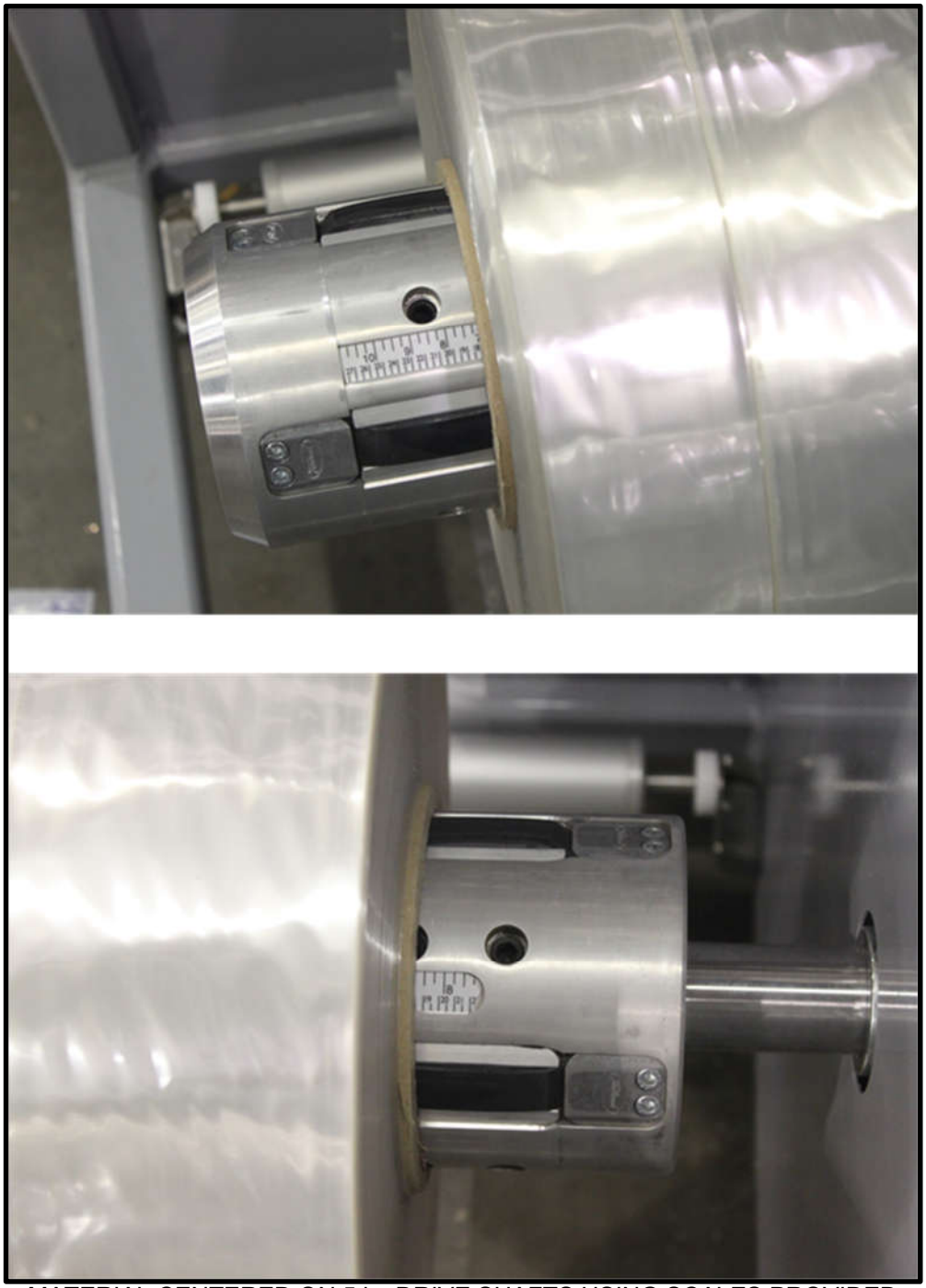
CAUTION: THE CORE ADAPTORS ARE HEAVY. APPROPRIATE CARE SHOULD BE TAKING WHEN HANDLING THESE ADAPTORS.

The Butler sleeve splicer is configured with inflatable air shafts with expanding rubber cleats used to securely hold the inner diameter of the material cores. The system is provided with pneumatic filler suited to the fittings on the air shafts and adaptors.



AIR FITTINGS – 5 in. & 10 in.

To install material on the 5-inch shafts, ensure the shaft has been fully deflated by pressing in on the fitting with your finger. Hold the fitting in until air can no longer be heard escaping. Slide the core of new material over the shaft and center the material using the scales provided on the shaft. The material is centered when THE SAME NUMBER is shown against the edge of each side of the core.



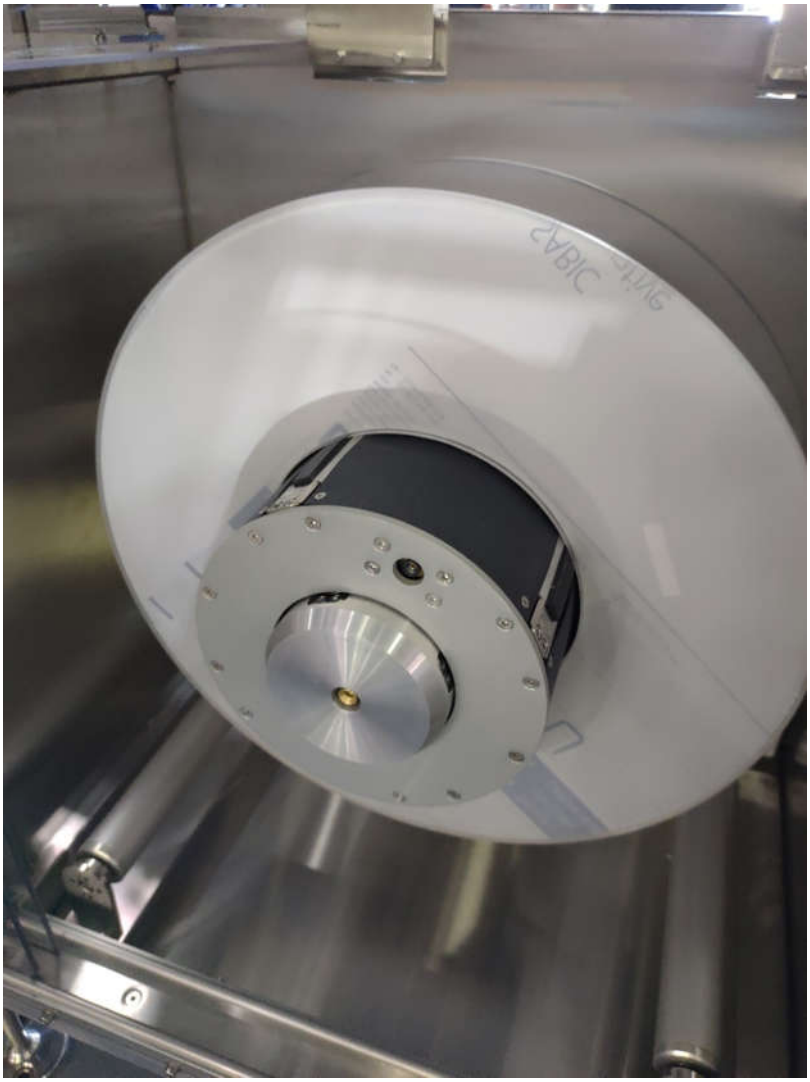
MATERIAL CENTERED ON 5 in. DRIVE SHAFTS USING SCALES PROVIDED

Once the material is centered the core must be inflated to secure the core on the shaft. The shaft is inflated by using the pneumatic filler provided. The filler is aligned with the fitting on the shaft (or adaptor) and pressed directly inward until air can be hear filling the bladder. The rubber cleats will extend outward against the inside of the core to secure the material in place.

USE PNEUMATIC FILLER PROVIDED TO INFLATE AIR SHAFT BLADDERS

If 10-inch adapters are required, carefully slide the adapter over the deflated primary shaft until it is centered. Be sure the air fitting used to fill the adaptor is facing outward when installing the adaptor. The primary shaft (5-inch) is then inflated to hold the 10" adapter shaft in place. See the figure below.

CAUTION: THE CORE ADAPTORS ARE HEAVY. APPROPRIATE CARE SHOULD BE TAKEN WHEN HANDLING THESE ADAPTORS.



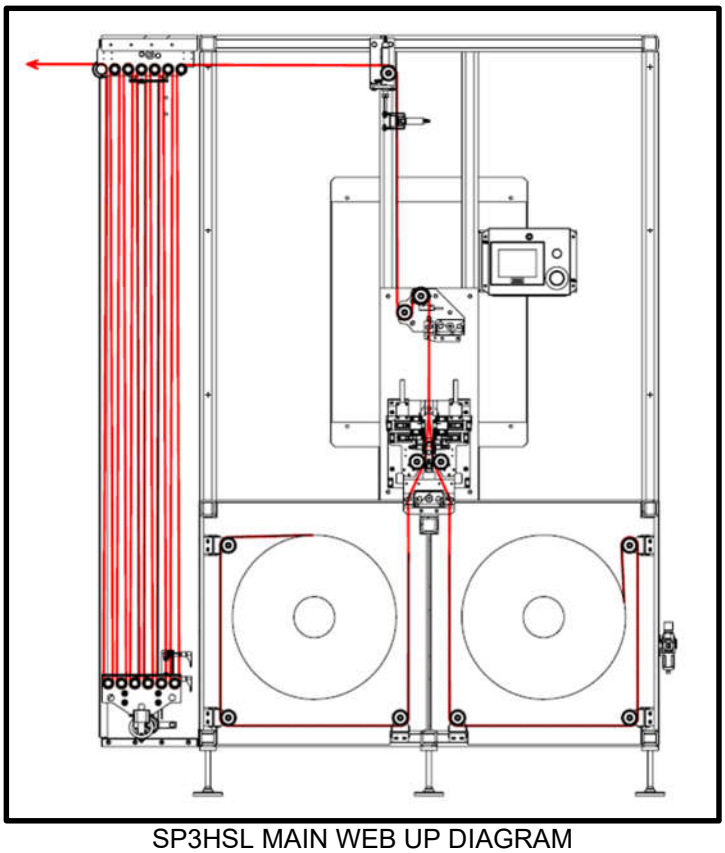
10 in. ADAPTOR CENTERED AND MOUNTED TO THE 5 in. SHAFT

Once the 10-inch adaptor centered and mounted to the 5-inch shaft. The operator can now load the new material over the shaft and center the material using the scales provided on the shaft. The material is centered when the same number is shown against the edge of each side of the core. The air fitting on the 10” adaptor is used to inflate/deflate the 10” adaptor to install/remove the larger core material rolls while the adaptor is retained in place on the primary shaft.

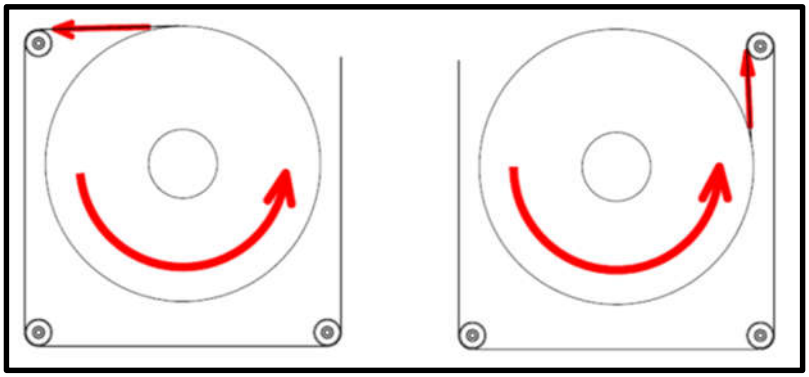
To remove the adaptor, simply deflate the primary shaft and slide it off.

6.11. Web Up

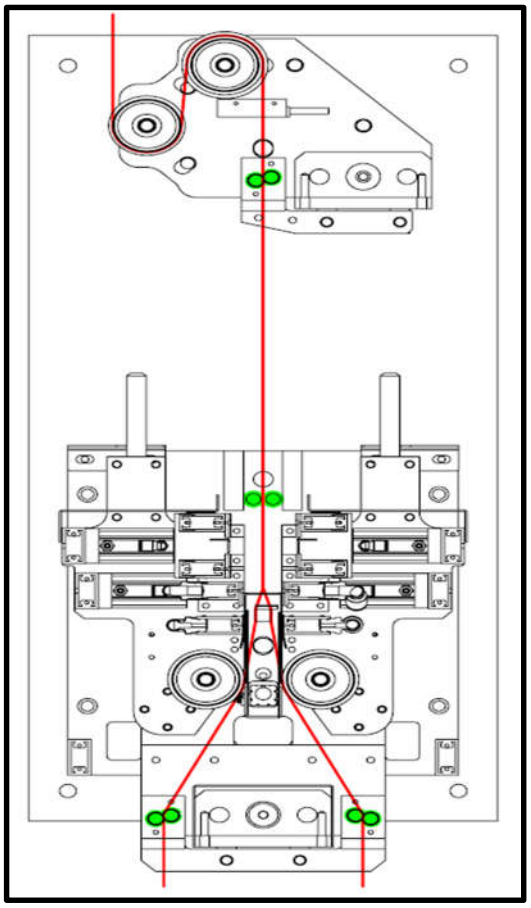
The E-stop should be activated prior to webbing up the machine to ensure operator safety. The operator should then follow the web-up diagrams provided on the splicer. The various diagrams (roll direction, guiding system and head, and accumulator) are replicated here. The web is unwound and passed through the splice head, through the register sensor and accumulator clamp and finally the accumulator. It is critical to respect the exact web path for the splicer to function properly. For material using splice registration the material must be passed through the splicer such that the marks used for registration are visible to the registration sensor.



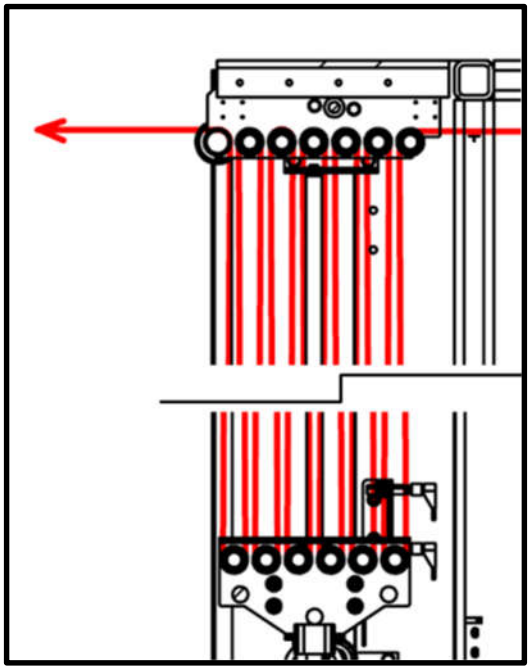
SP3HSL MAIN WEB UP DIAGRAM



LEFT ROLL WEB-UP RIGHT ROLL WEB-UP



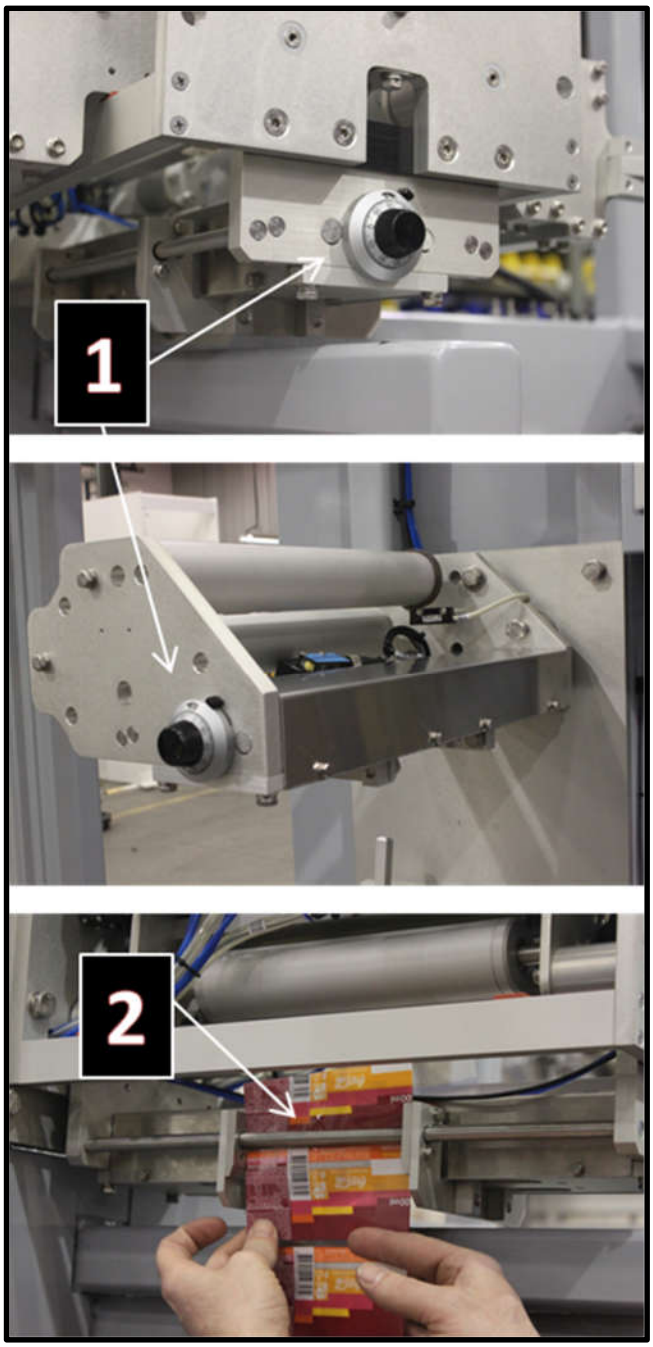
LOWER GUIDES, HEAD, AND UPPER GUIDE WEB UP



UPPER AND LOWER ACCUMULATOR WEB UP

6.12. Web Guiding

The SP3HSL splicer is provided with auto-centering lower and upper web guides. For the system to create optimal splices it is critical for the guiding system to be set up correctly for the process material. First the web must be run between the fixed, offset rods attached to the edge guides. Using the knobs on the front of the lower and upper guides the operator should adjust the edge guides such that each side of the guide is barely touching the edge of the web. For the upper guide, ensure the registration sensor is not in a position that impedes the movement of the guides. Adjust as necessary. The web may need to be manually centered during this process to ensure each edge is touching.

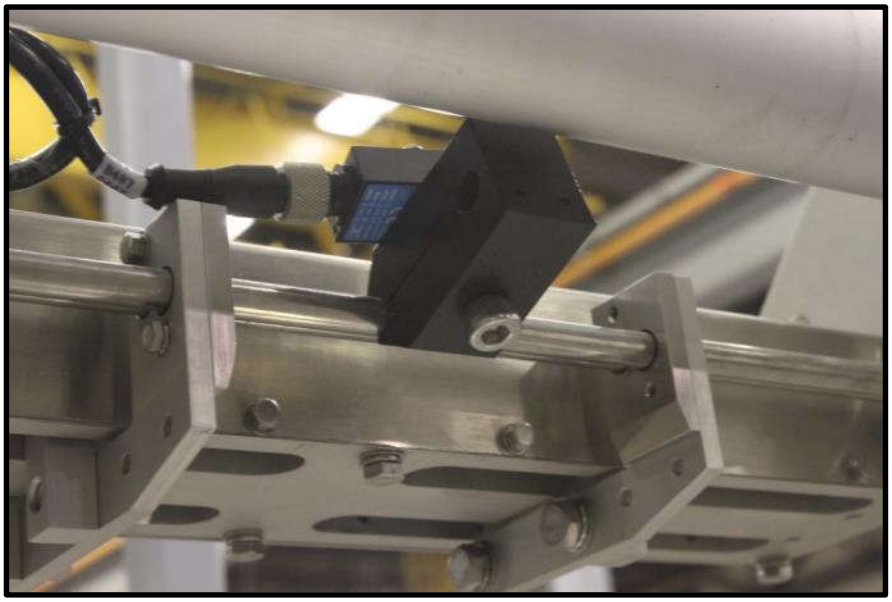


1 – LOWER AND UPPER GUIDE ADJUSTING KNOBS
2 – PROPERLY ADJUSTED WEB GUIDE (lower)

6.13. Registration Sensor Adjustment

The SP3HSL splicer is provided with a optical contrast sensor for provided in-registration splice capability. When new material is webbed into the system the registration sensor may require positional adjustment and may need to be retaught to properly detect the new repeat pattern.

The angular and cross-web postioning of the sensor may be adjusted by loosening the hex head bolt on the Delrin mounting block and sliding the sensor to the preferred location. Ensure the sensor and cabling do not interfere with the movement of the guides or come in contact with the web. Reteaching the sensor for the new material is covered in another section of this manual. The sensor should be taught such that the indicator on the sensor is illuminated when only the repeat registration mark is sensed. The accuracy of the sensor can be visually checked by manually moving the web and verifying the yellow indicator light on the sensor is illuminated when the repeat mark is sensed. It is important to verify no other markings on the product on this in-web path also trigger the yellow sensor to illuminate or the registration will not be repeatable.

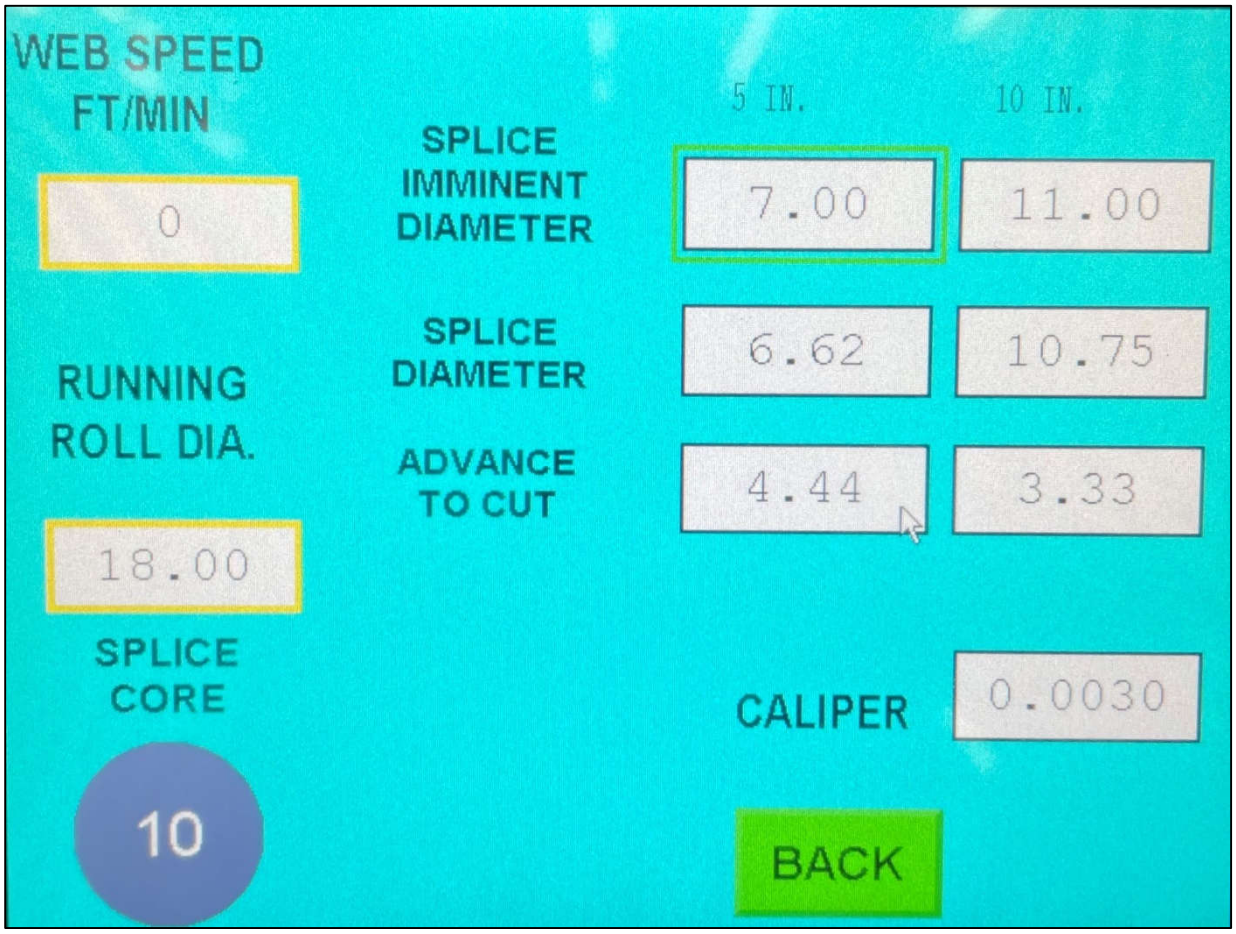


REGISTRATION SENSOR MOUNTED TO UPPER WEB GUIDE

The SP3HSL splicer has a user-adjustable offset for the distance from the registration mark to the cut (accessed via the Parameters screen). It is suggested a trial cut is made with the offset at zero to determine the location for the specific material. The distance from the actual cut at zero and the desired location (in inches) should be measured and entered as the offset value on the Parameters screen in the user interface. This should then be verified by making a registered splice based on the offset value entered and, if necessary, adjusting the value based on the result. It is highly recommended an operator log be created to note the section of the web used for registration and the optimal offset value for each material to be run on the system to optimize operator efficiency when performing a material changeover.

6.14. Starting the Downstream Process

Prior to starting the downstream process it is HIGHLY RECOMMENDED to navigate to the Parameters screen on the user interface. Here the operator should verify that all of the preset values are correct for the material being run in the process. To change any of the preset values, simply touch the value to be changed and input the new value using the keypad that will appear. Be sure to hit enter (ENT) to input the new value.



PARAMETERS SCREEN

ATTENTION: VERIFY AFTER WEB UP THAT THE PROPER RUNNING ROLL IS SELECTED ON THE OPERATOR CONTROL PANEL PRIOR TO RESETTING THE SPLICER

Once the splicer has been webbed up, the material passed to the downstream process, and all material-specific parameters verified, the operator should release the E-stop and press Reset.

NOTE: If the dancer on the accumulator is above the running sensor the running roll will begin turning immediately upon reset until the accumulator reaches the lower fill sensor.

The splicer is now ready to provide the downstream process with a continuous supply of material. Using encoders that monitor the amount of material entering and exiting the accumulator, the drive on the running roll with match the process speed such that the accumulator remains in the filled state. Stopping the process will automatically stop the splicer roll drive once the accumulator has reached the lower stop sensor.

6.15. Loading the Next Roll

While the running roll is actively supplying material to the process the operator can remove the expired roll, load the next roll, and prepare the splice.

To remove and expired roll the operator must first release all air from the air shaft holding the core securely to the drive. This is accomplished by pushing on the fitting on the front of the shaft (or adaptor is running 10-inch cores) until the sound of escaping air ceases. The core may then be easily slid off the drive.

RELEASE AIR FROM SHAFTS BY PRESSING ON FITTING

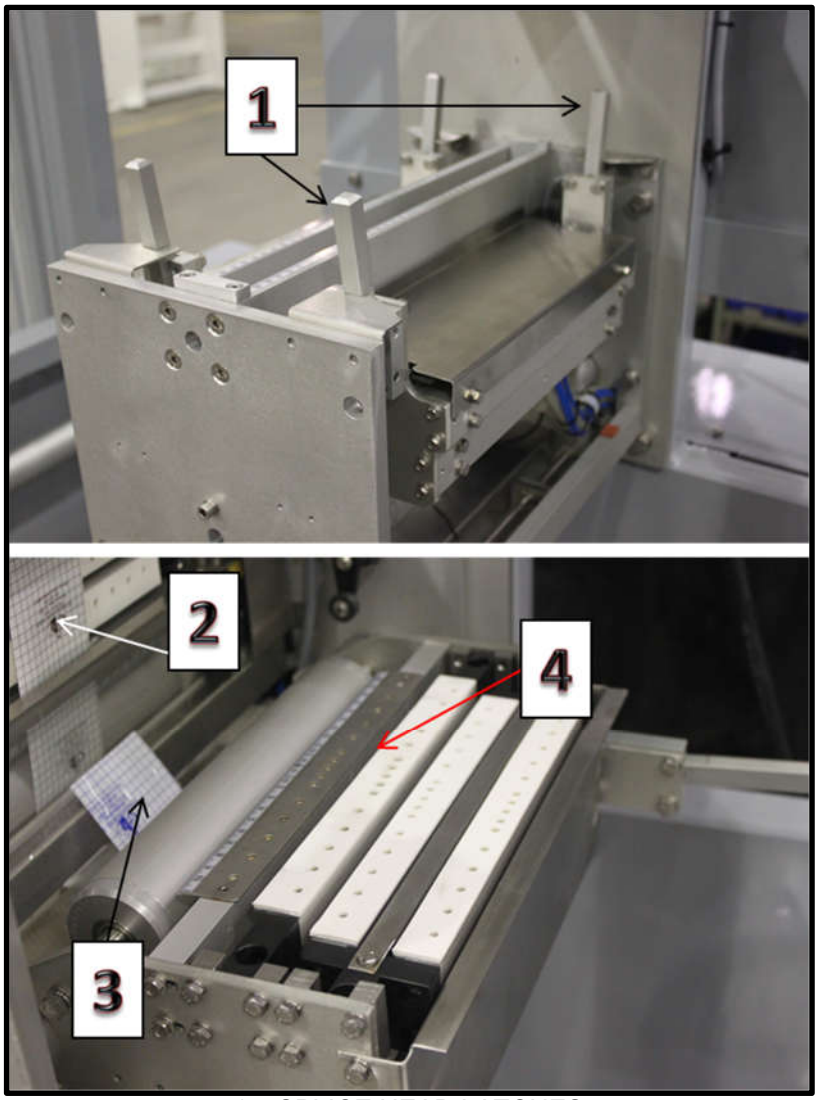
The next roll of material can then be loaded on the non-running drive. Care should be taken to avoid shifting the web on the core during the loading process. Once the core is centered on the shaft using the scales provided the shaft should be inflated to securely hold the core to the drive. The material should then be webbed around the drive section and into the splice head as shown in the web up diagrams.

6.16. Splice Preparation

Preparing the splice on the SP3HSL splicer is a two-stage process. The first stage involves preparing the splice joint on the new roll of material. The second stage prepares the system for the application of the second side tape that will be applied to the splice joint.

6.16.1. Preparing the Splice Joint

After webbing the new material through the drive section of the splicer the operator should guide the material through the lower web guides on the non-running roll side of the splice head, feeding through enough material so it does not fall back out of the guides. Ensure the material is passing between the two fixed, offset guide rods. Open the non-running side of the splice head by pulling the two spring-loaded latches toward the each other and pivoting the head open until it reaches its stops. After approximately a two-second delay the vacuum will automatically turn on to the nip and preparation bars on this side of the splice head. NOTE: When preparing the first splice after a power reset it may be necessary to manually turn the vacuum on after opening the splice head. This can be achieved by pressing the red vacuum icon on the user interface. The vacuum will then turn on and the vacuum icon will turn green.



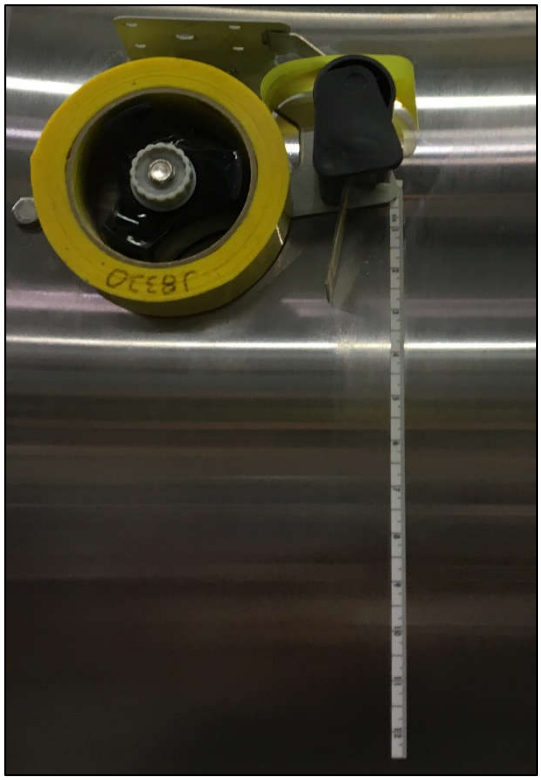
1 – SPLICE HEAD LATCHES
2 – RUNNING WEB
3- NEW WEB
4 – PRIMARY NIP AND PREPARATION BARS

Pull the new web previously threaded through the lower guide, up and over the head idler and onto the preparation and nip bars. The vacuum will hold the web in place. Ensure the web is aligned with the running web and square to the splice head by using the scales provided on the preparation bar. Manually turn the non-running roll drive to provide slack it the web during the preparation process. It may be necessary to deactivate the holding brake to the drive.

NEW WEB ALIGNMENT ON SPLICE HEAD AND CUT ALONG PREPARATION BAR

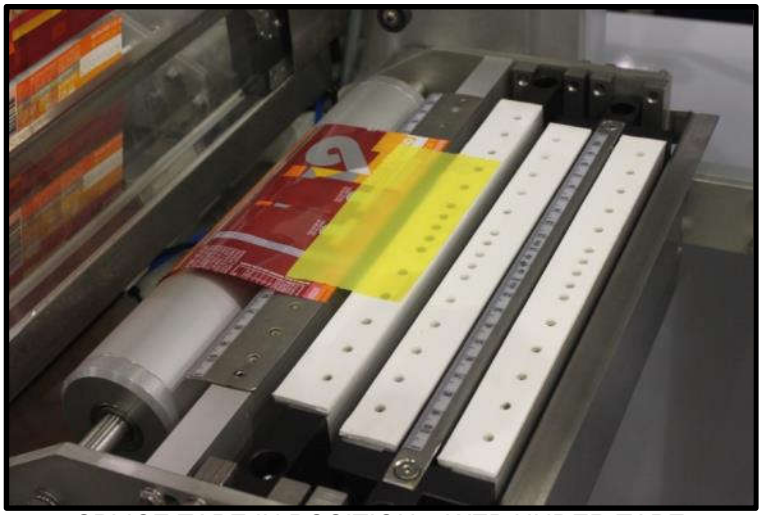
Carefully and precisely cut the edge of the new web even with the preparation bar, using the edge of the bar as a knife guide. Remove the excess web and discard.

Using the tape dispenser and scales provided on the side of the accumulator, cut a piece of splice tape to a length slightly narrower than the running web of material. If the tape is too wide the exposed adhesive may catch on idlers in the splicer or other downstream process equipment.



TAPE DISPENSER AND SCALE

The tape should be placed ADHESIVE SIDE UP on the exposed vacuum holes on the nip bar. The edge of the tape should be aligned to the edge of the nip bar and the tape should be centered on the web, using the web and scales on the head for reference. When placed on the nip bar approximately half of the tape will be held in place with vacuum. The other half will lie on top of the prepared end of the new material.



SPLICE TAPE IN POSITION – WEB UNDER TAPE

The new material should then be carefully slid from under the tape. The tape will then be completely held in place using the vacuum holes exposed when the web is removed. The web should then be PRECISELY positioned on the exposed adhesive of the tape, ensuring the edges of the web are centered in the head using the scales and running web as guides. The leading edge of the material

must be PRECISELY aligned with the edge of the preparation bar. If the leading edge of material is does not completely cover the preparation bar (slides toward the idler roll) the resulting splice will have a gap between the material. If the leading edge is too far forward (extends beyond the edge of the preparation bar) the splice will have an overlap of material.

NOTE: The alignment of the web as noted above is CRITICAL to the success of the splice joint passing through the production process as this alignment has a direct impact on the cross-web alignment and the gap at the splice joint.

WEB ATTACHED TO TAPE AND PROPERLY ALIGNED

When the web is fully prepared and aligned, close the splice head such that the latches securely hold the head closed. Manually rewind the non-running roll drive to remove excessive slack between the roll and the splice head. DO NOT remove all of the slack as it is critical to not put any tension on the prepared splice.

6.16.2. Preparing the Second Side Tape

To prepare the second side tape, open the running side of the splice head. The vacuum will already be active on the tape nip bars.

Using the tape dispenser and scales cut a piece of splice tape slightly narrower than the running web. Center the tape on the tape nip bars ADHESIVE SIDE UP using the scales provided on the tape nip bars as shown in the photo below.

SECOND SIDE TAPE PREPARED ON RUNNING WEB SIDE OF HEAD

Close the running side of the head and ensure that it properly latches. The system is now prepared for an automatic or manual splice as indicated by the green splice prepared icon on the user interface.

6.17. Splice Cycle

The Butler SP3HSL Automatic Sleeve splicer has two modes to splice material from a running roll to a new roll. Once a splice has been fully prepared the system can either splice manually or automatically.

A manual splice takes place as soon as the operator presses the prepared splice button on the user interface. An automatic splice will take place based on a user set value for the minimum outer diameter of the running roll. Regardless of the manner by which the splice is initiated the sequence of operations will be as follows;

1. The running roll drive will decelerate to scan speed for in-register splice or to zero speed – the process will be supplied material at line speed from accumulator
2. For in-register splice, the drive will advance to a registration mark and any offset set in the Parameters screen before decelerating to zero speed
3. The upper nip will close isolating the splice head from the process tension
4. The splice nip will close from the running web side of the head to adhere the running web to the exposed tape on the new web
5. The splice head knife will actuate across the web precisely cutting the expiring web for a butt splice
6. The splice nip will retract and the upper nip will advance the web a predefined distance in the in-web direction to a fixed stop
7. The second side tape nips will extend from both sides of the splice head to apply the tape (and backing force) to the opposite side of the splice joint
8. The splice head and upper nips will retract
9. The new roll drive will accelerate to a value higher than line speed (as calculated from the accumulator output encoder) to backfill material in the accumulator that had been consumed by the process during the splice cycle
10. When the accumulator reaches a predefined fill state the drive will decelerate to match the process line speed and maintain the accumulator fill state

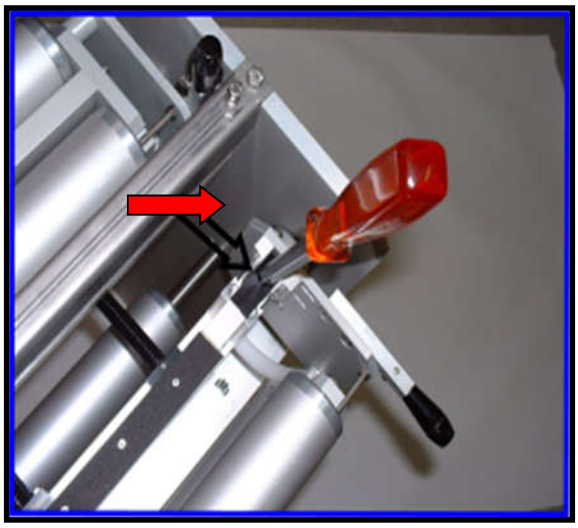
7. SPLICER MAINTENANCE

Before using this section of the manual it is critical to familiarize yourself with the safety warnings and directions at the beginning of the manual. We highly recommend using safety gloves when working near the cutting knife, and all lock out and other safety procedures must be followed when performing maintenance of any kind on this machine.

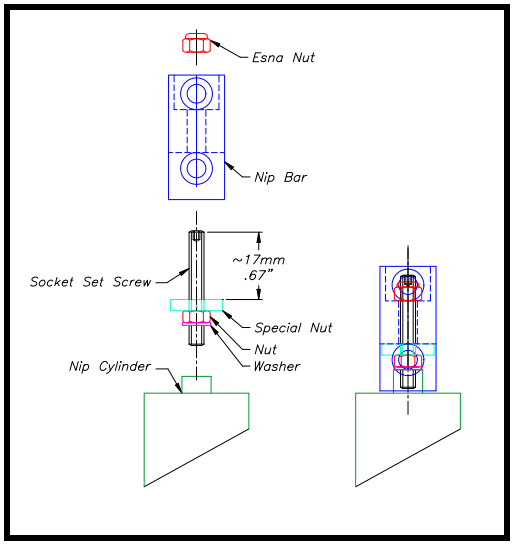
NOTE: Some images in this section represent similar aspects of the SP1 product.

7.1. Splice Head

7.1.1. Nip bar replacement



Unscrew the two outside nylstop M4 fasteners. Remove the air connected to the bar. Remove the nip bar and replace. Replace the pneumatic (vacuum) tube. Screw back in the two fasteners. After fully fastening the screws, back them out 1/3 turn to leave some play in the system to avoid mechanical binding.



7.1.2. Cutting System Maintenance

7.1.2.1. Knife Holder Assembly Replacement

ATTENTION! KNIFE BLADES ARE EXTREMELY SHARP. TAKE PARTICULAR CARE NEAR THE KNIFE AND WEAR GLOVES OR PROTECTION.

The knife blades should not be replaced while the knife assembly is inside the splicing head. Butler Automatic recommends having an extra knife holder assembly for faster knife replacement.

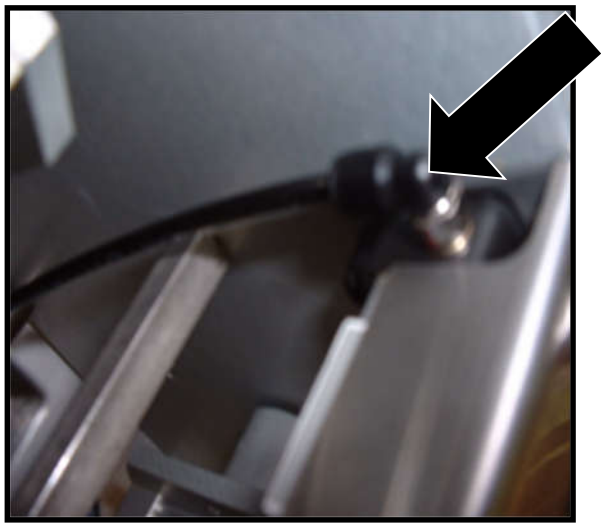
KNIFE HOLDER (Ref. Butler # L064994-601)

The existing holder can be reused by replacing the worn blades with new blades (ref. Butler # A064692-001) The knife holder is then ready for an easy replacement if the knives should be worn again.

Cut all electric and pneumatic power to the machine. Lock out and tag out the splicer before you attempt any service on the splice head. Verify that no stored energy is in the pneumatic circuit.

SP1 SPLICE HEAD SHOWN FOR CLARITY

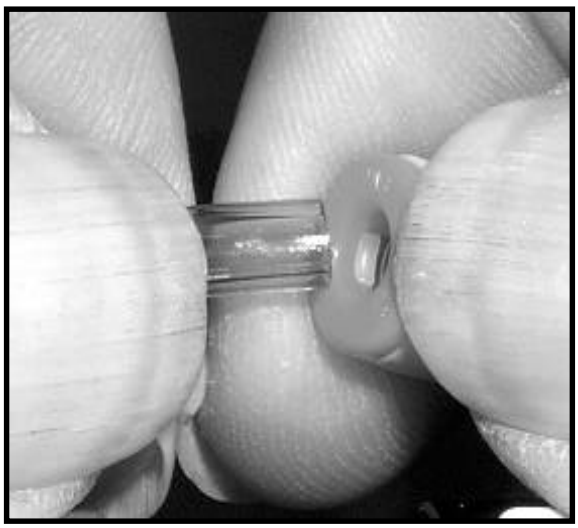
KNIFE HOLDER SHOWN AT ONE END OF TRAVEL



PNEUMATIC CONNECTIONS AT EACH END OF KNIFE CYLINDER

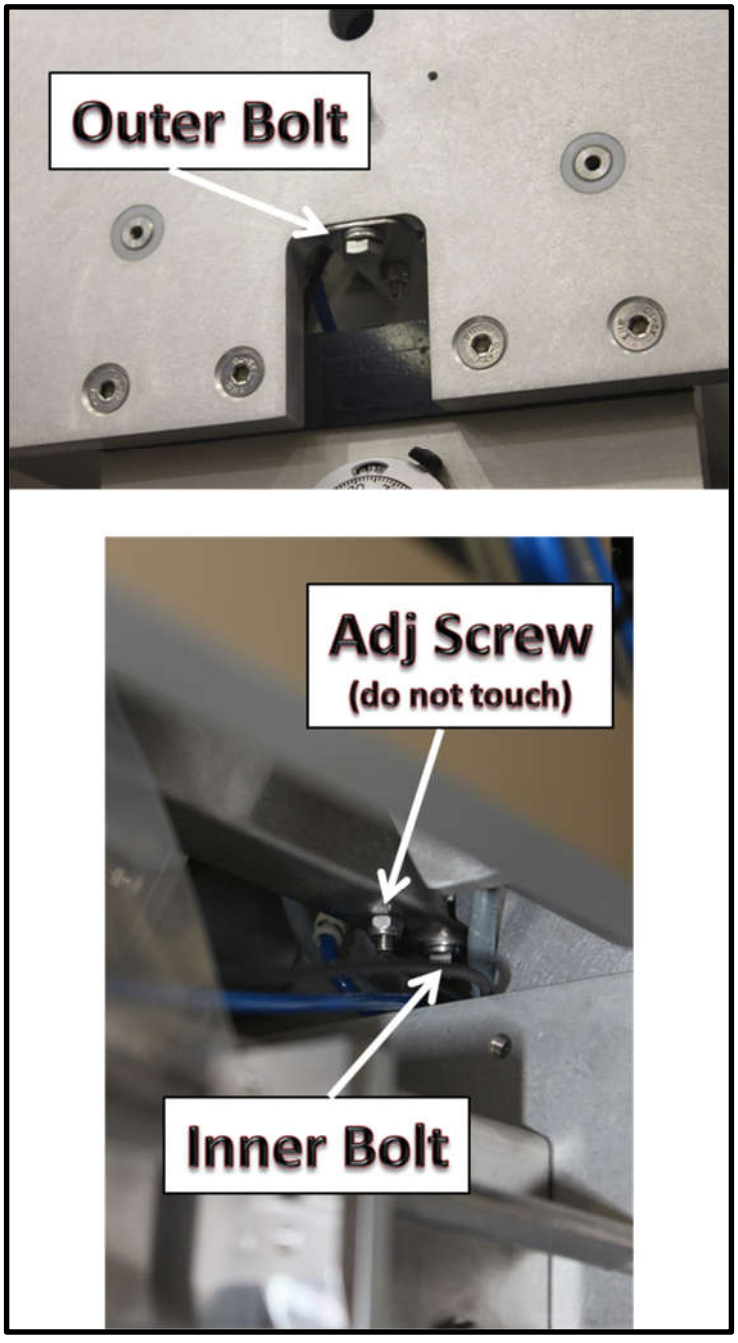
The knife holder must be at one or the other side of the cylinder stroke.

There are two pneumatic connections on the knife cylinder which must be disconnected. (One on each end of the cylinder) Remove the blue pneumatic tubing by simultaneously pushing in on the collar of fitting and pulling on the tube.



REMOVE PNEUMATIC TUBING

Remove outside large diameter bolt on each end of the knife cut cylinder.


Outer Bolt
Adj Screw
(do not touch)
Inner Bolt

KNIFE ADJUSTING SCREWS (SP1 SHOWN)

KNIFE HOLDER ON ANVIL/GUIDE INSIDE SPLICE HEAD

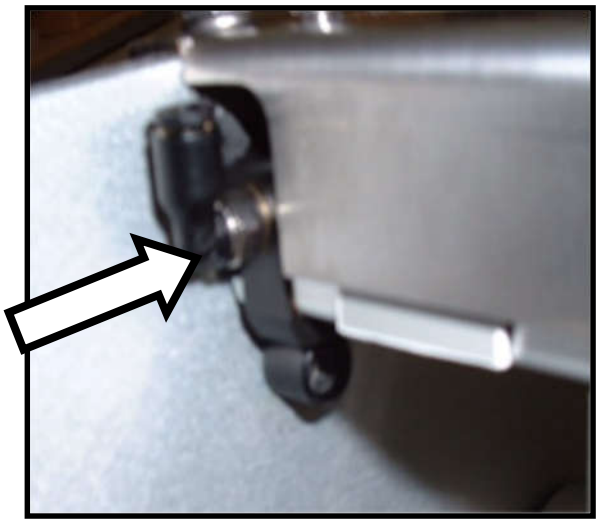
WARNING: Do not change the adjustment of the screws on the front of the knife cylinder support. These are factory set and should not need adjustment.

Lower the knife cylinder and support from the splice head and place on a bench. The knife holder may remain attached to the anvil in the splice head. If this happens remove the knife holder separately using care due to the exposed sharp blades.

KNIFE CYLINDER AND SUPPORT

The Knife cylinder is supported by a set of plastic supports and a rubber strip inside the support. During knife holder replacement there should be no need to remove the cylinder from the support. If this happens care should be taken to not damage the supports or rubber strip within the cylinder support.

KNIFE CYLINDER AND GUIDE SEPARATED



ECCENTRIC ADJUSTMENT

An eccentric is used to align each end of the knife cylinder. This is a factory setting and should only be adjusted by a Butler technician.

The knife holder can then be replaced as a unit with a spare holder assembly.

KNIFE HOLDER ASSEMBLY

Reinstall the knife and cylinder assembly using the procedure shown below.

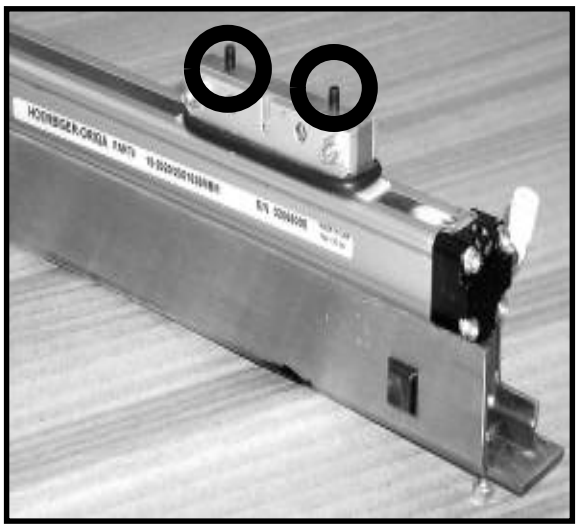
7.1.2.2. Knife Cylinder Replacement

Remove the knife cylinder following the instructions provided in the Knife Holder Assembly Replacement section of this manual.

Remove the pneumatic fittings from the old cylinder and attach them to the replacement cylinder. Slide the new cylinder into the support taking care not to damage the plastic strips and rubber supports.

INSTALL THE CYLINDER INTO THE SUPPORT

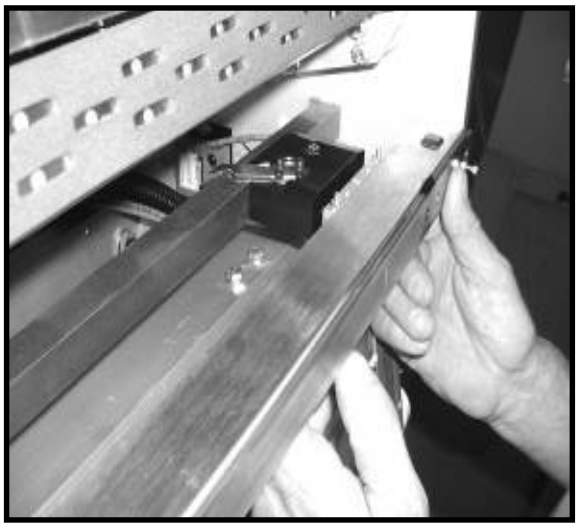
Remove the two screws from the cylinder slide from the old cylinder. Install these screws on the new cylinder.



CYLINDER SLIDE SCREWS

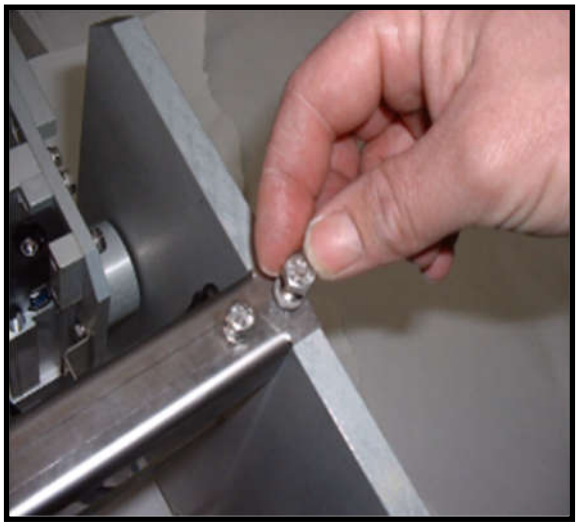
7.1.2.3. Reinstallation

Reinstall the knife support, the knife cylinder, and knife holder. Move the knife cylinder and support to align the cylinder with the knife and reattach.



REINSTALLATION OF CYLINDER

Install the two large screws to the knife cylinder support. Replace the pneumatic pipes. Test the pneumatic connection by pulling gently on the tube into the fitting. The tube must remain firmly in place. Restore pneumatic pressure to the machine. Restore electricity.



REINSTALL BOLTS

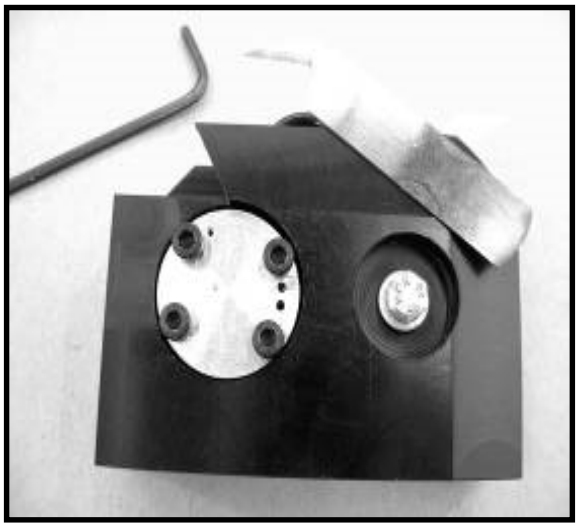
7.1.2.4. Replacement of Cutting Knives

ATTENTION! The Knife Blades are extremely sharp. Take every possible precaution when working with or around the knife.

The cut knives (2) (Ref. Butler # A064692-001) are fixed on a rotating pivot (Ref. Butler # B064485-001) by four screws. Under each pivot is a rotary spring (Ref. Butler # A064523-001).

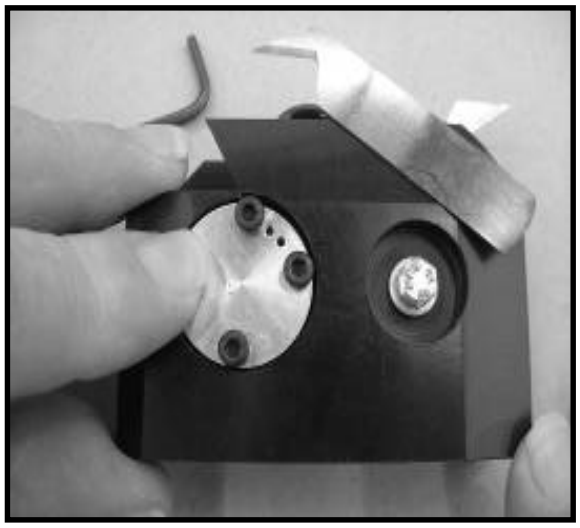
KNIFE HOLDER WITH TWO KNIVES

Gently unscrew the four knife screws. Carefully slide the knife out and remove it from the assembly.

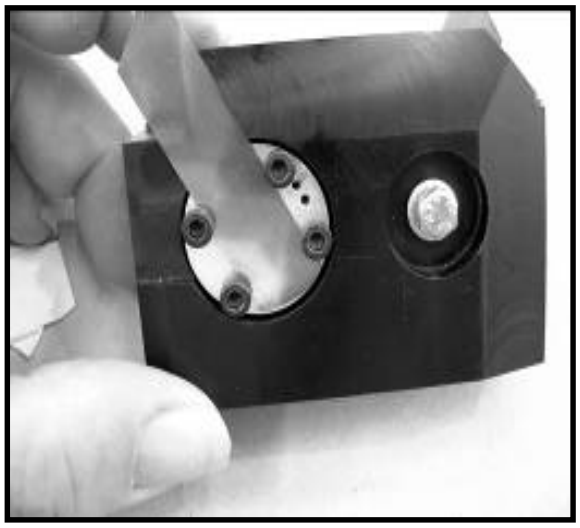


ROTARY PIVOT

When the knife is removed from the assembly, the pivot will turn approximately 90 degrees. Prior to reinstalling the new knives the pivots must be turned back to the original position as shown below. Gently turn the pivot counter clockwise until it is in the proper alignment.



ROTARY PIVOT ALIGNED



REPLACE KNIFE

Slide the new knife into the screws attached to the pivot. The knife must be facing left. Always leave clearance between the end of the knife and the knife holder. To verify knife position use a 10 mm X 10 mm bar. The cutting edge of the knife should come down just below the edge of this square bar. The top of the knife should extend 6-7mm above the bar.

PROPER POSITIONING OF KNIFE WITHIN HOLDER

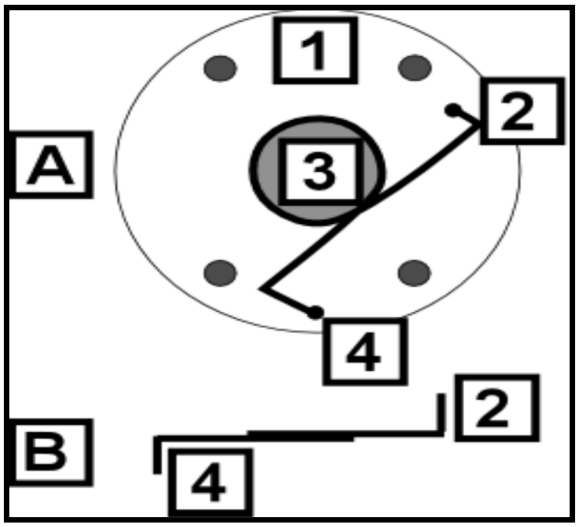
With the knife properly positioned the screws must be tightened. The assembly should then be checked for free rotation and spring return. The knife assembly is then ready to be used as a replacement.

7.1.2.5. Replacement of Knife Pivot Spring

There is a torsion spring attached to each knife pivot. The torsion spring is located under each knife pivot. The torsion spring (Ref. Butler # A064523) is centered under the rotary pivot. (Ref. Butler # B064485)

KNIFE HOLDER

If the spring must be changed, first remove and restock the knife. Unscrew the screw holding the pivot from the opposite side of the assembly. Do not lose the washer. Remove the rotary pivot. The torsion spring sits around the rotary pivot and each end of the pivot is inserted into a 1 mm hole, one side on the pivot and one side on the knife holder assembly.

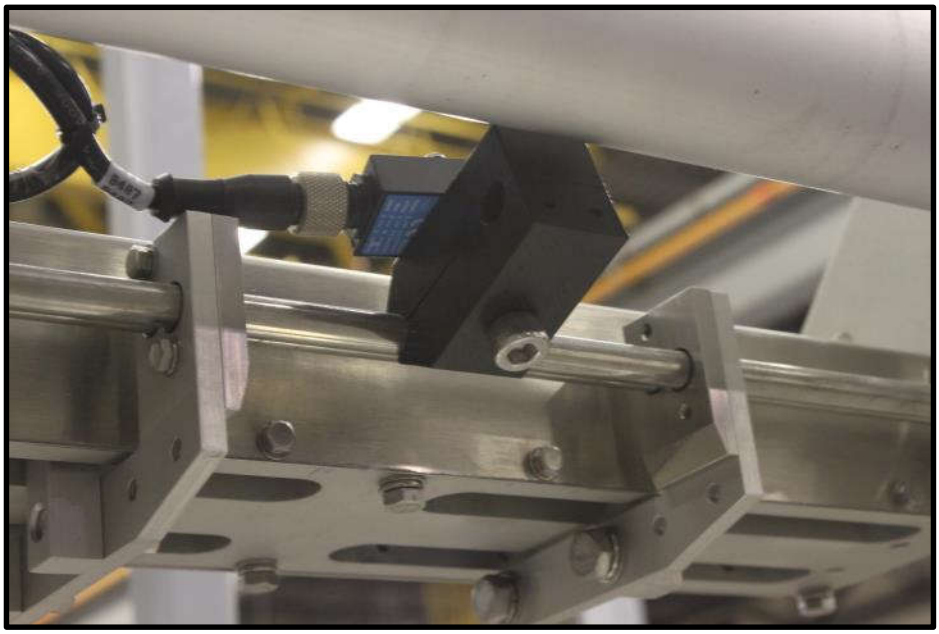


KNIFE HOLDER PIVOT ASSEMBLY

Identification:

A - Representation of Rotary Pivot
1 - Rotary Pivot
3 - Center of Rotary Pivot
B - Representation of Rotary Pivot
2 - Upper end of Spring
4 - Lower end of Spring

7.2. Register Sensor Information



REGISTRATION MARK SENSOR INSTALLED ON UPPER GUIDE

The Register Mark Sensor is mounted to one of the fixed, offset bars that are part of the upper guide system. The sensor is a retro-reflective photocell sensor, with a visible beam of light. The color of the light beam (red, white, blue, green) is automatically selected by the sensor, during the set-up “Teach” operation

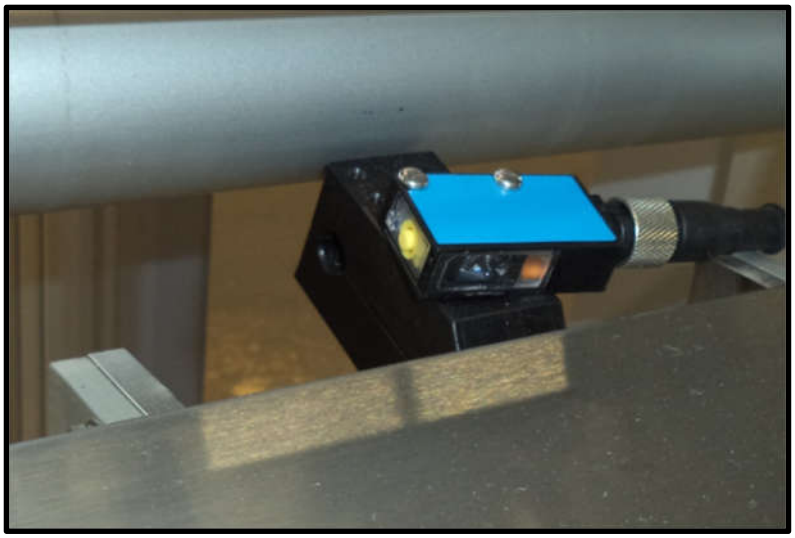
7.2.1. Positioning the Sensor

The sensor should be positioned such that the emitter is approximately ½” from the web. The sensor is installed on the mounting block at an optimal angle of 15° laterally to the web. Moving the mounting block also allows the sensor to be mounted at a vertical angle to the web. It is recommended that the distance and vertical to the web be adjusted to optimize the reliability of sensing the registration mark on each material. Note that adjusting the vertical angle may require a change to the offset distance set on the Parameters screen when running the material as this will result in a change in the distance from the sensing point of the beam to the cutting edge of the knife.

7.2.2. Sensor Programming

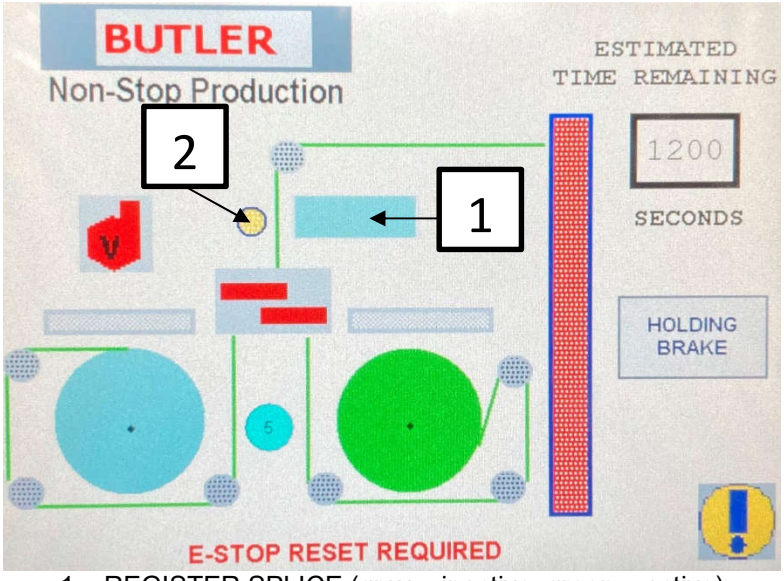
The “TEACH” button is located on the end of the sensor closest to the front of the splicer. Ensure the web is under tension to provide a flat surface for the beam. Move the web until the beam is clearly seen in the area to be used for registration. With the web positioned properly, press the TEACH button until the LED on the sensor begins to flash slowly.

Next move the web to an area OTHER THAN that to be used for registration. With the web positioned in the non-registration area of the web, press the TEACH button again.



REGISTRATION SENSOR (TEACH button in yellow)

Once the registration has been programmed, move the web several times back and forth through the entire distance through 2 or 3 pattern repeats to ensure nothing else within the sensor path will trigger a false registration. The LED on the sensor will illuminate whenever the sensor “see” the registration area. If the sensor illuminates during any other sections of the pattern it may be necessary to reteach and/or relocate the sensor to a different path on the web.



1 – REGISTER SPLICE (gray = inactive green = active)
2 – REGISTRATION MARK SENSOR (yellow = on gray = off)

7.2.2.1. Register Splice Alarm Conditions

If the GREEN Register Splice ON/OFF button is on and a register fault occurs- the Registration Mark Sensor has not “found” a continuous group of Registration Marks. Missed marks could be due to a number of causes. The following actions should be taken;

- Check position of the sensor to the marks
- Clean the lens
- “Teach” the sensor again
- Have the Maintenance Department to check the operation of the sensor and the PLC

The Registration Fault will occur under the following conditions:

- Register Splicing must be selected ON.
- The web must be running at a speed greater than 25% of normal speed.
- Registration Marks must be missed for two minutes

Unless conditions are corrected, the roll will run down and an Automatic Splice will be initiated at the pre-set diameter. The Registration Marks will not be used to position the Splice Joint.

7.3. Dancer Adjustment

The dancer rollers must always remain parallel with the fixed top rollers. If a web jam or web break causes misalignment in the dancer, a level must be used to restore the level by adjusting the connection of the dancer support belts to the movable dancer system.

DANCER SUPPORT

The dancer level can be adjusted by loosening the two connection bolts to the Delrin belt connection and adjusting them up or down as needed.

DANCER SUPPORT

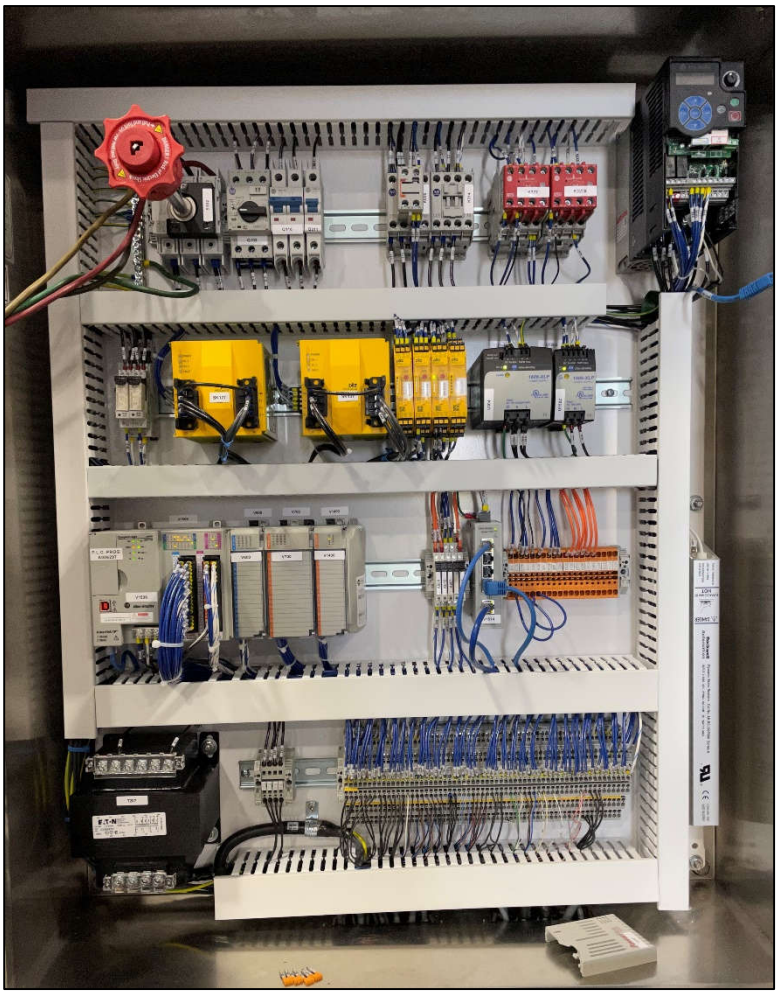
The dancer drive belts can also be tightened if required, using the tightener at the bottom of the belt course. The lower drive belt sprocket is attached to a pivot bar which acts as a tightening device. See sensor adjustment section later in the section for information on dancer sensor adjustment.

7.4. Electrical Enclosure

Any work on the electrical systems of this machine must only be performed by trained and qualified personnel, taking all precautions to avoid injury or damage to the machine. If any qualified personnel modify the equipment to perform a functional test, proper precautions must be taken and the machine must be returned to original state immediately after. Refer to the electrical schematics and program listing.

The electrical enclosure contains:

- A Frequency controller for control of the drive motor- roll is driven at a varying speed to control dancer position.
- A PLC to control the functions of the machine and different cycles of operation.
- A 24 volt power supply feeding power to the relays and controls required for machine functions.



ELECTRICAL CABINET

7.5. WIF & WOF Sensors

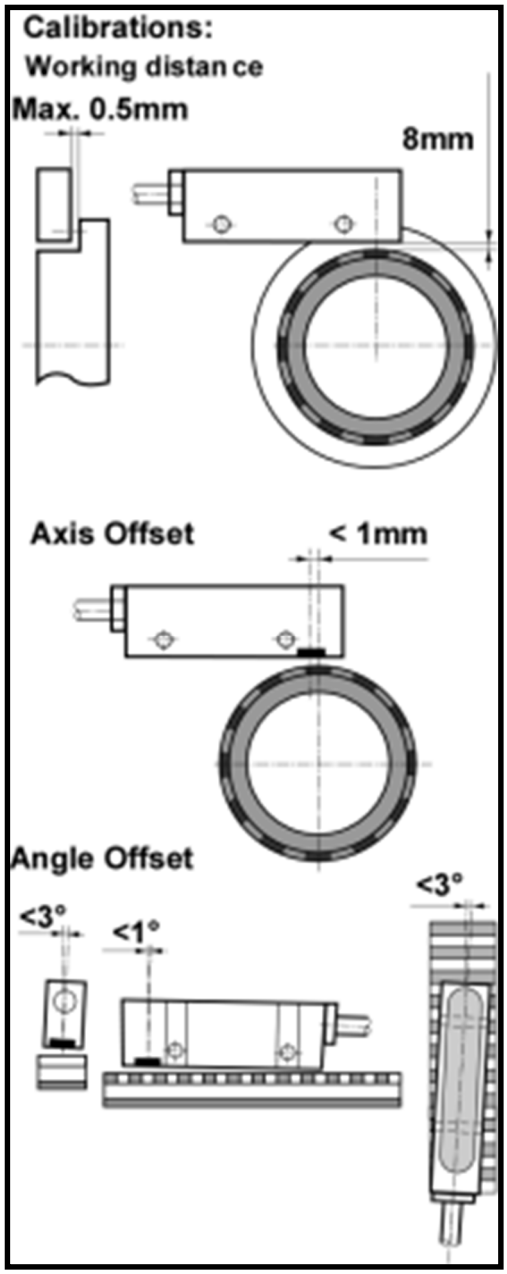
The SP3HSL splicer has magnetic ring encoders attached to specific idlers within the splicer. The first roller above the upper web guide is the WIF (**W**eb **I**nto **F**estoon) roller. Feedback from the encoder attached to this roller is used to calculate the diameter of the unwinding roll by comparing idler roll pulses (541 per revolution) with roll pulses (3 per revolution). This comparison allows the splicer to quickly calculate the actual diameter of the unwinding roll for precise speed control of the unwinding roll. The last roller in the fixed rollers at the top of the accumulator is the WOF roller (**W**eb **O**ut of **F**estoon). The encoder attached to this roller provides pulses to give a precise reading of process speed. The running roll drive uses the information from these two sensors and the calculated diameter of the running roll to precisely match the unwind speed to the process line speed. These encoders can also provide direction of web movement and be used for detection of fault conditions.

MAGNETIC WIF ENCODER ON UPPER GUIDE

MAGNETIC ENCODER AND SENSOR

7.5.1. WIF and WOF Calibration

The gap (space) between the sensor and the “Ring Magnet” must be set to.03” [.8 mm]. The sensor must be centered over the Code Wheel.



MAGNETIC ENCODER AND SENSOR SET-UP

7.6. Dancer Sensors

Proximity sensors are used to verify the location of the dancer and change the drive output state in the program. The dancer sensors have a range of 4 mm and are normally set at a distance of .020 - .030" from the flag attached to the dancer.

The top dancer sensor senses that the splicer has run out of storage. This causes the splicer to send a "Not Ready" signal to the downstream process. The Alarm log will indicate a "Dancer Empty" fault message.

UPPER DANCER POSITION SENSOR

LOWER DANCER POSITION SENSORS

The dancer has two lower sensors. When the dancer is above these sensors, the PLC gives the drive a command to run faster than the process. When the dancer reaches the top sensor the drive is commanded to match the process speed. When two sensor are actuated the unwind speed is slowed to a value less than the process speed. When only the lower sensor alone detects the flag on the dancer the roll is stopped.

7.7. System Faults

The SP3HSL Automatic Splicer has a number of fault conditions. These are listed below. When a fault occurs the faults will appear in the message window at the bottom of the user interface. A log of the faults can be found by accessing the Alarm Screen by pressing the information icon in the bottom right of the user interface.

Drive Fault – Drive Not Ready: Indicates that the motor drive has a fault which must be corrected. Press the blue Reset button on the operator panel to clear the fault. If it does not immediately clear, press E-Stop wait 20 seconds and then remove E-Stop and press Reset.

Dancer Empty: Signals that the accumulator is empty and has reached its top stop. Manually unwind enough film to allow the dancer to drop below the top of travel sensor. Press Reset. The splicer will refill and be ready to run.

Web Break: The web has broken causing the dancer to drop to the bottom stops. Web up the machine and press Reset to put the splicer back into the ready state.

E-STOP: The E-Stop button has been pressed triggering the E-Stop of the machine. Disengage the E-Stop switch and press Reset. The splicer is then back in the ready state.

Registration Lost: This fault shows that the splicer is not properly reading the register marks on the film when register splice has been selected. The splice ready light on the operator touch panel will now flash until the fault is corrected. If the fault is not corrected when the autosplice diameter is reached the splicer will actuate a splice after it has timed out during the registration mark scan mode. The fault must be corrected (verify eye is correctly positioned, printed register marks are OK, eye is clean, or reset the register eye). This fault automatically clears when the register eye starts working again.

Splice not ready: This signals that the splice head is open or has not been opened at all and that the preset splice diameter has been reached. The splicer ready signal is removed causing the process to stop. The splice must now be prepared in the splice head and reset must be pressed. When the process is restarted an Automatic splice will immediately be made.

7.8. SP3HSL Splice Head Set-Up and Troubleshooting Guide

The SP3HSL splice head is designed to be reliable and easy to use. If it is properly maintained, it will deliver years of trouble free service. If wear items are not replaced often enough, the head will start to jam when the material is not cut properly. This can lead to mis adjustments and require service to return the machine to proper function.

Proper function of the head requires that the nip fires from the side of the splice head which has the running web onto the opposite side nip which is static with tape waiting for the splice to be performed. The nipping action causes a cut slot to be formed behind the nip bar so the web can be severed very close to splice joint which has been formed in the nip area. This action allows a butt splice to take place.

If the splice head is having trouble making splices check the following items:

NOTE: Use proper safety precautions when working on the splicer. All energy (air and power) should be removed before doing any maintenance. Special attention must be used when working around knives. We recommend gloves or other protective devices. The end of the knife is rounded to minimize cut risk.

Verify that the nip bars are not bent
Unscrew each nip bar. Remove the pneumatic connectors and place the nip on a flat bench or use a straight edge to see that the bar is not bent or damaged.

Verify that the knives are sharp and cutting easily
Also verify that knife is free and does not have excess play or binding.

Verify the knife is firing from the correct side
The knife will be under the cover guard which covers the knife when the non-running half of the splice head is opened. The nip fires from the running web side to the prepared web side of the splice head. The knife shuttle will be situated so that the knife is on the side closest to the prepared web.

Verify that nips are fully retracted and do not stick up above level of prep bar beside nip
The nips should be exactly at the same height as the prep bar which is located beside it. If the nip bar is sticking up for any reason, it may cause the knife to jam when the opposite side nip extends onto this nip.

Verify nips are free to extend when actuated
Actuate the nips and verify that both halves extend easily and then retract immediately.

Verify splice head closed interlocks are functioning properly

INTERLOCKS

Check that the interlocks come on and consistently show the correct orientation of the head (closed and open).

Verify condition of nip pads and vacuum

Look at the nip pads. The nips rubbers should be well adhered to the nip bar without cuts or other leaks. Verify that the nip bar is creating strong vacuum. If there does not seem to be sufficient vacuum, check pneumatic lines for a restriction.

Verify cut cylinder run smoothly and quickly

Fire the knife in both directions and check that it is running smoothly.

Verify proper accumulator nip operation

Check the tension on the web when the accumulator nip is closed. This functionality is required to stop the web movement and isolate the process tension from the splice head.

7.8.1. FAQ - Splice Head Trouble Shooting Guide

Symptom	Verification	Action Required
Knife Becomes stuck during travel	Air Pressure input to system at 80 PSI.	Make sure that the system has 80 psi of clean dry air and adjust as required.
Knife Becomes stuck during travel	Check Small Screws in Origa splice head cylinder that they are tight.	If lose tightens and verify free movement with air.
Knife Becomes stuck during travel	Check knives are not dull	Replace knives with new knives as needed.
Knife Becomes stuck during travel	Check cylinder and knife travel are free and unobstructed.	If loose, tighten and verify free movement with air. If binding loosen and verify that anvil and knife carriage are sliding freely for entire travel.
Knife Becomes stuck during travel	Check that nip is at exact level of stainless prep bar.	Adjust prep bar at ends to bring to appropriate height so that nip pad does not protrude above level of prep bar.
Knife Becomes stuck during travel	Check that nip is at exact level of stainless prep bar and that compensator rolls at the front of head are fully extended and parallel with the front edge of the head frame.	If one side or both side of the compensator seem to be stuck slightly in and not fully returning out after splice, the compensator locks may have become bent and are now catching and causing the nips not to fully retract. The compensator lock arms may be bent at the point of their attachment and thus would need to be removed and straightened in a vice. The half of the splice head clam shell is removed to make this repair.
Knife becomes stuck during travel	Check that upper and lower halves of the splice head are exactly in parallel.	Adjust the head stops which rest on the knife cylinder support to make each half of the head clam shell perfectly parallel.
Knife becomes stuck during travel	Verify nip rubbers are smooth complete and well adhered to the nip bar.	Replace or resurface as needed. It is extremely critical for proper function that the nips are the exact height and compressibility as factory supply for proper function.
Web seems to lag during acceleration	Verify that nips are fully retracting	Check nip travel and adjust as needed.

7.9. List of Checks and Periodic Maintenance

The following presents the different precautions, verifications and checks required to keep your splicer in good running condition. When verifying, cleaning, and maintaining the production line, particular attention should be paid to the following points:

Cleaning (50-100 hrs): Due to the open nature of the machine design, it is normal that a certain amount of dust may accumulate. A periodic cleaning of the machine is therefore required. Particular attention should be paid to vacuum bars and all sensors (optical, proximity, magnetic). This cleaning must be done after each 50 – 100 hours of operation.

Splice Head (every 200 hrs): Visual control of the splicer nips (condition of nips and adhesion of silicone rubber pads), inspection of two knives for upper and lower cut, verify free movement of knife carriage assembly, verify movement and return of knife pivot assemblies. It is necessary to change the knives after approximately 1500 hours of operation depending on material, or if the knife fails to cut. At the same time function of the mechanical pivot rollers at the front of the splice head, free movement of the two halves of the splice head and visual inspection for lose or misaligned items should be performed.

Pneumatics (every 500 hrs): Verification of good function of all pneumatic circuits is required after 500 hours. Verification includes air leaks, function of valves, function of cylinders, and good function of vacuum system.

Register sensor (each shift): At the start of each shift, the proper position of the register sensor and the cleanliness of the lenses should be checked.

Festoon (every 200 hrs): Block the web into the festoon and pull the web to raise and lower the dancer rollers, verifying free movement of the dancer system. If the dancer is not free moving, the pulleys and bearings may be adjusted. The level is adjusted through the connection of the belts to the dancer. Verify (every 500 hours) the condition of the idler rollers and free rotation of the roller bearings.

Drive shafts (every 500 hrs): Verify proper function and verification that the rubber cleats do not have excess wear.

Electrical Enclosure (every 1000 hrs): Visual inspection of all electronic components.

7.10. Frequency of Control and Cleaning Operations

	Shift	100 h	200 h	500 h	1000 h
General Cleaning	/	X			
Splice Head Checks			X		
-Nip bars			X		
- Knife support assembly				X	
- Knife cylinder				X	
- Change knives					X
- Pneumatic functions				X	
- Mechanical functions				X	
Register Sensor Checks					
- Position and cleanliness	X				
Accumulator Checks					
- Guides and dancer movement			X		
- Idler rollers and bearings				X	
Check Electrical Enclosure					
- Inspect all components					X

8. DECOMMISSIONING

Decommissioning (scrapping) of the splicer must be done according to usual machine scrapping and recycling procedure.
The splicer is considered to be an electrical/electronic/mechanical device, which must be disposed of in accordance with the current legal requirements.
Scrapping is generally entrusted to specialized company.
All components can be sort for recycling:

- Components (Frame, Rollers, Sections, Cabinet …. are Mid Steel, Stainless steel or Aluminium).
- systems (motors and gear box …)

Pneumatic Electronic and Electrical components (contactors, starter, power supply, PLC, solenoid valve, boards…) Plastic pneumatic tubing.

9. APPENDIX A- GLOSSARY OF GENERIC SPLICER TERMS

While using this manual or discussing Butler products with technical support, you may see some terms or part names with which you are not familiar. Some of the terms may be used in a manner different than that to which you are accustomed. Most definitions reflect their usage within the Butler Automatic Inc. splicers. As this glossary includes all terms, many may not be applicable to your specific Butler product or the product for which this manual was prepared.

ACCELERATOR SYSTEM: The control, drive, motor, and rollers that are used to pull on the Web to get the New Roll up to speed. This system is typically used in large roll over roll zero speed splicers.

ACCUMULATOR (aka FESTOON): This refers to the material buffer which feeds the process during the splice cycle. This system is made from web running over fixed rollers to the moveable dancer rollers. The system is also referred to as the festoon.

AUTO-SPLICE: When the Control calculates that the Running Roll has unwound down to a pre-determined size, an Auto-Splice command is issued to start the Splice cycle.

BRAKE SYSTEM: The group of controls and components used to apply Braking Torque to the roll. The Butler brake system is a dual disc ventilated brake oversized for the application and thus very reliable for many years of trouble free service.

BRAKING TORQUE: The force applied to the roll of material to control its speed in order to apply tension to the web and control unwind velocity.

BUTT ROLL: A term used to describe a roll of material usually smaller than 10 inches in diameter.

BUTT SPLICE: A term used to describe a splice made with tape on one side without any overlap of the material being joined.

CORE ADAPTER: This term refers to the Delrin adapters used on the SP-1 splicer to support the unwinding roll on the roll support shaft.

CORE SHAFT: This term refers to the pneumatic shaft or arbor used to support the roll of unwinding material.

CORE SPLICE: Refers to the system added to enable the splicer to actuate a splice when the last wrap of film on the unwinding roll is reached.

DANCER: The vertically movable carriage containing a number of rollers that are used with the Fixed Fingers to form the Festoon (accumulation).

DANCER NESTED: The term used in a 1000 style splicer when the dancer is nested in the festoon and ready to have a new web passed through.

DANCER OSCILLATION: Random, apparently uncontrolled movement of the Dancer during a normal run is called oscillation.

DANCER RUNNING POSITION: The position which the machine commands the dancer to run at during normal unwinding and running of a roll.

DECELERATION BRAKE: The amount of Braking Torque applied to the Running Roll, during the Splice Cycle, to bring the roll to Zero Speed in order to make the Splice.

EXPIRED ROLL: The roll of material that has just been cut off by the Splicing Head.

FIXED FINGERS: The NON-movable section of rollers that are used with the Dancer to form the accumulator.

HOLDING BRAKE: The amount of brake force applied to the Standby Roll.

IDLER ROLLER: The passage rollers used in the system to pass the web through. These are typically very light low inertia idlers with special low break away force characteristics.

INCOMING ROLL: See New Roll.

INERTIA: 1. Physics. The tendency of a body to resist acceleration, as the tendency of a body at rest to remain at rest or of a body in motion to stay in motion in a straight line unless disturbed by an external force. 2. Resistance to change or motion.

LED (Light Emitting Diode): An electronic component designed to illuminate when power is applied to it.

LIFT AND LOAD: The pneumatic device used to lower the upper shaft position on an SP1 splicer down to an ergonomic loading and unloading height.

MANUAL SPLICE: When the operator wishes to splice out of the Running Roll, before an Auto-Splice command is issued.

NEW ROLL: The roll of material that is waiting to be spliced into the Running Roll during the Splice Cycle.

OLD ROLL: The roll of material that is no longer connected to the press. (See Expired Roll, Butt Roll).

PLC: Programmable Logic Controller- Refers to the purchased computer which runs the splicer. Typically either a Siemens or Allen Bradley Device.

POWER SUPPLY: A component used to convert standard 120 Volt AC electricity to some lower voltage DC level.

REWINDER: Refers to a machine made to rewind material to create rolls which can then be unwound into secondary processes.

ROLL DRIVE SYSTEM: This refers to the motor and drive system and integral air shaft which serve as the fixed connection with the unwinding roll as well as the drive which turns the roll for unwind.

ROLL SENSOR: An electronic switch or sensor used to count the revolutions of the Running Roll, for calculations of Running Roll Size.

ROLL SHAFT: The shaft through the roll of material that is used to support the roll while in the splicer. The Roll shaft grips the inside of the Core that the material is wound around so that motor power may be transmitted to the roll of material. The Roll shaft may be supplied by various manufacturers and may operate differently as designed by the manufacturer.

ROLL SHAFT COUPLING: The device at the end of the Brake shaft that couples or connects the Roll shaft to the Brake shaft.

ROLL SHAFT SUPPORTS: The area of the machine that the Roll shaft rests on while it is in the machine.

ROLL SHAFT HOLDDOWNS: The devices used to keep the Roll shaft secure on the Roll shaft Supports.

RUNNING BRAKE: The Braking Torque applied to the Running Roll.

RUNNING ROLL: The roll of material that is presently connected to, and supplying web to, the press.

SIDELAY: The action of moving the position of the roll across the centerline of the press for web positioning.

SIDELAY SYSTEM: The group of controls and components that are used to move the roll of material across the press centerline for positioning the web.

SPLICE: The action of sealing the running web to the leading edge of the New Roll and cutting off, or severing, what has become the old web.

SPLICE CYCLE: The sequence of events that makes the Splice happen.

SPLICING HEAD: The portion of the machine that seals the leading edge of the new, incoming roll to the old, running roll and cuts off (severs) the old web when required. This is where the operator prepares the new roll leading edge for splicing.

STANDBY ROLL: See New Roll.

REWINDER: This is a splicer used to rewind paper and make splices. Also called an automatic turret rewinder.

TRAM (TRAMMING): Aligning parts to precise parallel measurements in the horizontal plane.

TRANSDUCER: A device that converts one type of energy to another type. As used in the Butler Splicer, a Transducer converts an Electronic signal to Pneumatic pressure for use by the Brake System and Dancer Control System.

VACUUM SYSTEM: As used in the Butler Splicer, the High Volume, Low Pressure Blower and associated tubing and valve that applies Vacuum to the Splice Preparation Bars in order to hold the leading edge of the New Roll in place for splicing.

VERTICAL FORM FILL SEAL: The name for the type of packaging machine which has the web fed through it and then down a forming tube to be filled and cut into sealed bags.

WIF SENSOR: The WIF (Web Into Festoon) Sensor is an electronic switch used by PLC controls to count the pulses per revolution of an idler roll turned by the web as it enters the Festoon (Accumulator). This information along with the Roll Sensor information, is used by the control to calculate the size of the Running Roll and other aspects of machine control.

WEB GUIDE: Refers to the system used to keep the running web in alignment with a fixed reference point.

ZERO SPEED SPLICER: Refers to an automatic splicer which performs the roll change while the web is brought to a stop and the process is fed from an integrated accumulator. The process never is stopped for this type of splice, only the actual splice joint is made at zero speed for excellent reliability and consistency of splicing.