ALPINE®

AN ITW COMPANY

The Latest Evolution of the Industry's Leading Linear Saw

The **Alpine ALS 4.0** takes linear cutting to the next level. The *ALS 4.0* is designed for production efficiency, only requiring one sawyer for operation. The result is a reduction in labor, a boost in production and an increase to your bottom line.

This is not only an operation manual, but a tool that can be utilized to gain the maximum potential from your *ALS 4.0* linear saw. Each plant runs differently and the *ALS 4.0* stands up to the challenge—providing ultimate flexibility in setup and operation.
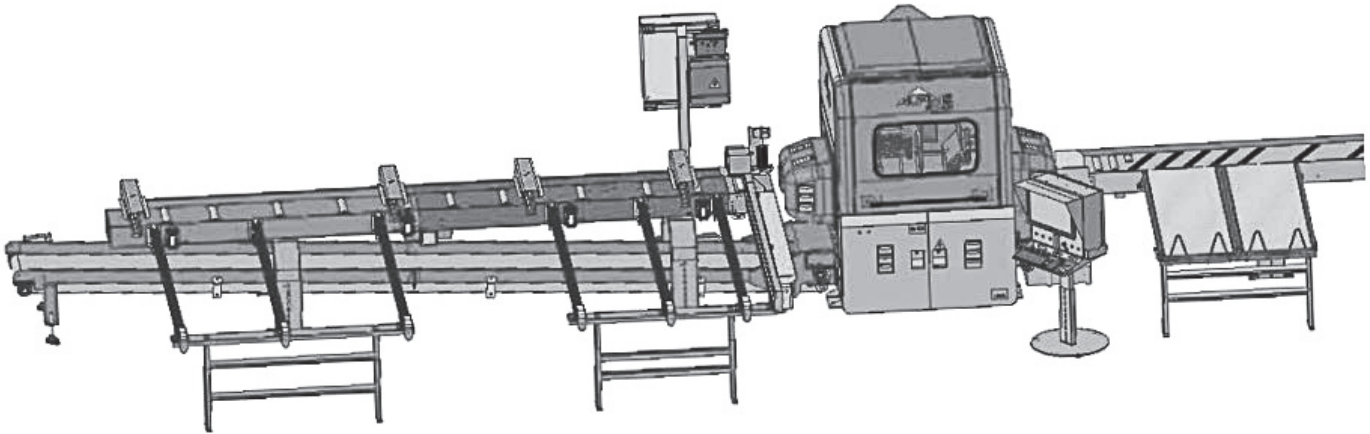
IMPORTANT! DO NOT DESTROY!

It is the customer's responsibility to have employees read and understand this manual.
Read instructions completely before using the equipment.

ALS 4.0 XE
Product Manual

Read the following safety information before using this equipment:

In this installation guide, the words **WARNING**, **CAUTION** and **NOTE** are used to emphasize important safety information as follows:

⚠ WARNING	⚠ CAUTION	NOTE
Hazards or unsafe practices that could result in severe personal injury, death or substantial property damage.	Hazards or unsafe practices that could result in minor personal injury, product or property damage.	Important installation, operation or maintenance information.

⚠ WARNING

Read the following warnings before using this equipment.

READ THE MANUAL
Before operating equipment, read and understand all safety, operation and maintenance information provided in the operation manual.

OPERATOR TRAINING
All personnel must be trained before operating equipment.

KNOW WHERE AND HOW TO SHUT OFF THE EQUIPMENT IN CASE OF AN EMERGENCY

INSPECT EQUIPMENT DAILY
Broken or worn machine parts can cause damage to equipment.

NEVER MODIFY EQUIPMENT
Modification could damage equipment or cause it to operate improperly. Modified equipment could cause a safety risk to operators.

EQUIPMENT MISUSE HAZARD
Equipment misuse can cause the equipment to rupture, malfunction, or start unexpectedly and result in serious injury.

ELECTRICAL EQUIPMENT
High voltage equipment is utilized. Arcing in areas of flammable or combustible materials may occur. Personnel are exposed to high voltage during operation and maintenance. Protection against inadvertent arcing that may cause a fire or explosion is lost if safety circuits are disabled during operation. Loose electrical connections could cause damage to components on your Alpine Equipment. Electrical shock can occur while working in the electrical cabinet.

AUTOMATED EQUIPMENT
With automatic equipment, the hazard of an unannounced startup is present.

KEEP EQUIPMENT GUARDS IN PLACE
Do not operate the equipment if the safety devices have been removed.

DE-ENERGIZE, DEPRESSURIZE, DISCONNECT AND LOCK OUT ALL POWER SOURCES DURING MAINTENANCE
Failure to de-energize, disconnect and lock out all power supplies before performing equipment maintenance could cause serious injury or death.

WEAR SAFETY GLASSES
Failure to wear safety glasses with side shields could result in serious eye injury or blindness.

CLOTHING AND JEWELRY
Loose clothing could be caught on moving machine parts. Jewelry, including rings, should never be worn when operating equipment.

CUTTING EQUIPMENT
Cutting hazards are present with Alpine Linear and Component Saws. Be aware of sharp equipment edges and spinning blades.

ASSEMBLY EQUIPMENT
Crush hazard is present with Alpine assembly systems. Failure to inspect safety systems could increase the probability of a crush hazard occurring.

PINCH POINTS
Moving equipment, sliding doors and clamping devices can cause pinch points for operators and maintenance staff.

HOT SURFACE HAZARD
Contact may cause burns. Allow to cool before servicing.

For more information, see Alpine Manual M1002—"Equipment Safety Precautions". Additional copies of the safety procedures can be ordered by calling 800-521-9790.

IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PROVIDE THIS INFORMATION TO THE OPERATOR OF THE EQUIPMENT. ADDITIONAL COPIES ARE AVAILABLE, CALL ALPINE EQUIPMENT CUSTOMER SERVICE: 800-521-9790.

Contents

Contents (continued)

1. Introduction

1.1 Parts List

■ **Suggested Stocking Parts:**
- Emitter 23141
- Receiver 24679
- Door Switch 38207
- Door Switch Key 38208
- Module E-Stop 25990
- Lumber Present Sensor (Infeed) 24664
- Lumber Present Sensor (Printer) 20661
- SMC Valves Solenoid 36758

■ **Common Wear Parts:**
- Belt L1 & L2 29107
- Blade Kit 35127

  Includes: Blade
  Screws
  Nyloc Nuts
  Torx Bit

■ **Motion Control Components:**
- Servo Drive 3/12 amp #APN 37288
  (Used in T Axis)
- Servo Drive 6/18 amp #APN 41075
  (Used in A, B & L1P Axis)
- Servo Drive 10/30 amp #APN 41068
  (Used in L1, L2 & Z Axis)
- Servo Motor 1.78 amp #APN 41010
  (Used in T Axis)
- Servo Motor 3.91 amp without brake #41009
  (Used in A ,B & L1P Axis)
- Servo Motor 3.91 amp with brake #41023
  (Used in Z Axis)
- Servo Motor 7.69 amp #41020
  (Used in L1 & L2)
- Blade Motor Mitsubishi #41027
- Blade Motor Drive Mitsubishi #41032
- Blade Motor Power Cable Mitsubishi 38471 Blade
- Motor Feedback Cable Mitsubishi 38472 Power
- Cable,Low Shield LXM 52 16.4ft 41037
  (Used in T & Z Axis)
- Power Cable,LXM 52,16.4 ft 41039
  (Used in L1 & L2)
- Power Cable,LXM 52,19.68ft 41040
  (Used in A Axis)
- Power Cable,LXM 52, 22.96ft 41041
  (Used in B Axis)
- Power Cable, LXM 52, 32.80ft 41043
  (Used in L1P Axis)
- Feed Back Cable LXM52,16.4 ft 39177
  (Used in L1, L2, T, Z Axes)
- Feed Back Cable LXM52, 19.68 ft 41036
  (Used in A Axis)
- Feed Back Cable LXM52, 22.96 ft 37245
  (Used in B Axis)
- Feed Back Cable LXM52, 32.8 ft 41043
  (Used in L1P Axis)

■ **Quick Reference:**
- Computer 38162
- Belt B1& A1 28979
- Small parts VFD 41069
- Safety Sticker Set 35194

All parts can be conveniently ordered from our website. Visit: shop.alpineitw.com

Or email your order to Order@Alpineitw.com

Throughout this manual, references are made to contact Alpine Equipment Customer Service. They can be reached at 800-521-9790 with any questions.

Disclaimer

The information contained in this document is believed to be accurate in all respects but is not warranted by Alpine. The information is subject to change without notice and should not be construed in any way as a commitment by Alpine. Alpine assumes no responsibility for any errors or omissions in this document. Every reasonable effort is made to keep this document current, but in the event of discrepancy, Alpine engineering documentation, installation and service and safety procedures shall prevail.

1.2 General Specifications

1.2.1 Machine Capacity

■ Lumber Size Range

	Min	**Max**
Width	2.38" (64mm)	14" (355mm)
Thickness	1.38" (35mm)	1.77" (45mm)
Length	6" (152mm)	24' (without additional support)
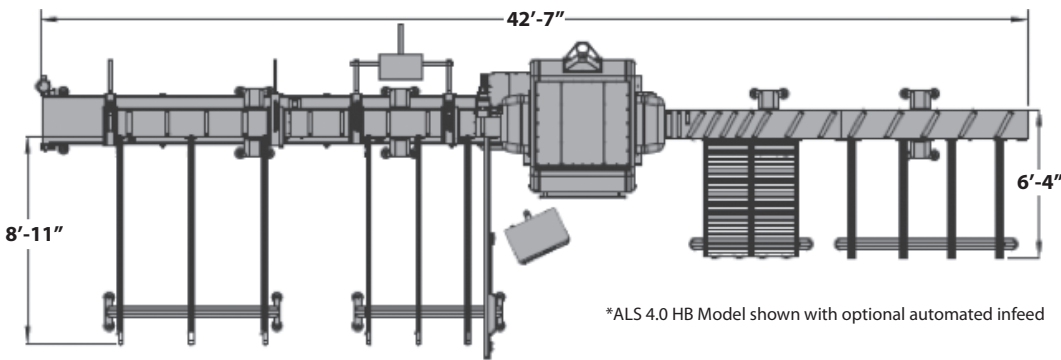
■ **Cut Types:**
- Chords
- Webs
- Scissor bottom chords
- Wedges
- Sliders
- Single and double beveled ends
  (if saw is equipped with optional bevel axis)
- Ripped valley bottom chords
  (if saw is equipped with optional bevel axis)
- Floor truss webs
  (if saw is equipped with optional bevel axis)

■ **Pieces:**
- **Minimum:** 1" (25mm) for all pieces with four angle cuts
- **Maximum Recommended Scarf:** 104 inches at 8 degrees

1.2.2   Equipment Specifications

		High Performance (H/HB)
Saw Blade	Diameter	Custom 20.5"
Spindle Motor (S-axis)	Max RPM	2800 rpm
Infeed (L1-axis)	Accuracy Max Speed	±1/16" 160 in/sec
Outfeed (L2-axis)	Accuracy Max Speed	±1/16" 160 in/sec
Translation Cutting (L1-T1)	Max Speed	28 in/sec
Angle (A-axis)	Travel Accuracy	-0° to +270° ±0.05°
Bevel (optional) (B-axis)	Travel Accuracy	5° (bevel) to 70° (very sharp bevel) ±0.05°
Traverse (T-axis)	Travel Accuracy	-10" to +14" 0" references the fence
Vertical (Z-axis)	Travel Max Speed	7 ½" 13 in/sec
Controller	PC Monitor Communications	Industrial PC w/ Windows 7 Professional Operating System 22" flat panel Ethernet
Operating Temperature		41 to 104°F
Humidity		10-95%, non-condensing
Max Altitude		6500 ft.
Shipping Weight		3500 lbs
Foundation Requirements		≥4" thick
Voltage Draw		480VAC 3PH 60A,WYE, 60 Hz/FLA 48A@460 VAC
Air Draw		25 CFM @100 Psi
Footprint		

*ALS 4.0 HB Model shown with optional automated infeed

1.2.3   Service Requirements

⚠ **CAUTION**

The use of a qualified electrician is required to ensure the following service specifications are properly met.

■ **Electrical**
- • *Main Service*
  - • 480VAC, 60A, 3PH, 60HZ (50 Hz Optional)
  - • Y-configuration preferred (delta acceptable)
  - • Phase Voltage Imbalance – 6 V
  - • e (Vt) – ≤ 50 Vsec @ ≤ 1 occurrence per half hour

    $$V_t = V_i \times t$$

    Where:
    V_t = Transient Voltage (Vsec)
    V_i = Instantaneous Voltage (V)
    t = time (sec)

- • *Secondary Service*
  - • 120 VAC, 20A, 1PH, 60 Hz (50Hz optional)
  - • This must be a dedicated line.
  - • Line conditioner recommended.

■ **Air**
- • Place coalescer immediately prior to machine to insure dry, oil-free air.
- • Machine has a factory installed filter with pressure regulator.

⚠ **CAUTION**

Introduction of oil to air system will damage seals.

NOTE

110 PSI is the minimum recommended pressure in the main air line.

2.   Getting to Know the ALS 4.0

2.1   System Overview

Figure 1 (on page 7) indicates the names of the various major components of the ALS 4.0 system.

NOTE

Standard infeed and small parts conveyor not shown in Figure 1.

2.2   Axes of Motion

Refer to Figure 2 (on page 9).

S	Blade Motor	Spins the saw blade (not shown, motor located inside enclosure)
L1P	Printer Motor	Feeds lumber beneath the printer head and into L1 (not shown)
L1	Infeed	Feeds lumber and measures length
L2	Outfeed	Coordinates with L1 axis to feed lumber and measure length
A	Angle	Sets the cut angle
B	Bevel	Sets the bevel angle (optional)
T	Traverse	Translates the saw blade across the lumber
Z	Vertical	Raises and lowers the blade

2.3   Infeed and Outfeed System

The Pushers and Clamps are sets of rollers attached to the L1 and L2 drives. These rollers help maintain control of the lumber as it moves through the saw to ensure cuts are made accurately.
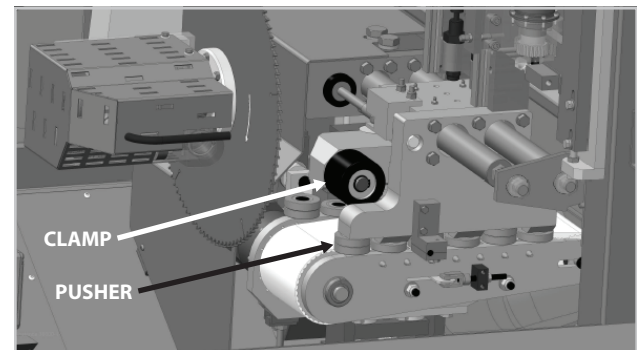
Figure 3

2.3.1   Clamp

The Clamp is a set of three black urethane-coated rollers that "clamp" the lumber down onto the drive belt. The picture on the right shows the L2 Clamp, located directly above the drive belt. L1 contains an identical Clamp.

2.3.2   Pusher

The Pusher is a set of small rollers that that "push" the lumber against the back fence rollers as it is fed through the saw. It is part of the L-drive assembly toward the front of the saw, as shown in the picture of L2 on the right. An identical Pusher can also be found on L1.

Waste Conveyor

Automated Infeed

Printer Cabinet

Cutting Cabinet

Outfeed Conveyor

Electrical cabinet

Operator Console

Figure 1

Figure 2

2.4 Sensors

There are two sensor sets in the ALS 4.0. They are used to control the feeding and clamping of the lumber.

2.4.1 Edge Detect Sensor (EDS)

This is a set of through-beam sensors located in the L1 feeder. The receiver, shown on the left in the picture below, is embedded in the rollers of the L1 Pusher.
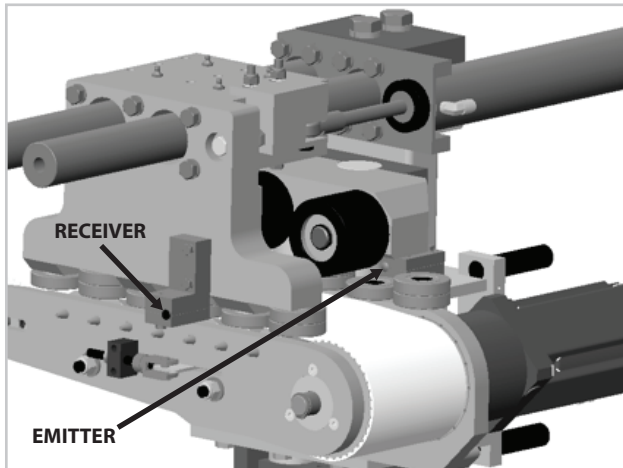
Figure4

The emitter, on the right, is in the rollers of the back fence directly opposite the receiver. When lumber passes it breaks the LED beam between the emitter and receiver which signals the computer that the trailing edge of the lumber has exited L1.

2.4.2 Lumber Present Sensor (LPS)

This is a set of through-beam sensors located in the L2 feeder. The lumber presence sensor detects the presence of lumber in the L2 drive.
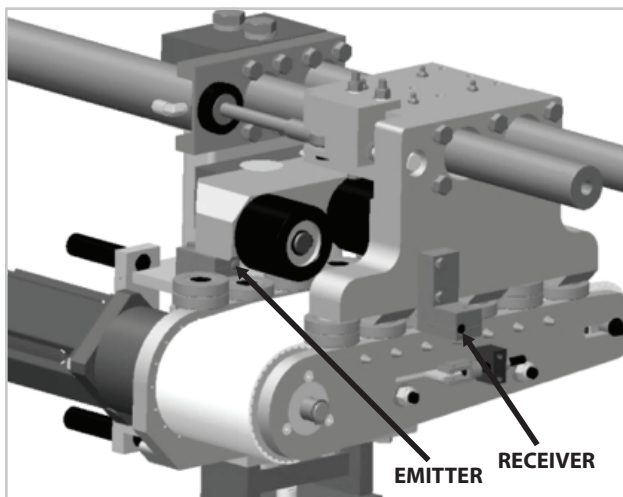
Figure 5

2.5 Operator Console

Major functions of the machine are controlled from the keyboard, mouse, and flat panel or touchscreen monitor (optional) in the Operator's Console.

Figure 6

2.6 Getting Data to the Saw

2.6.1 General

Cutting information must be in the format of TRS files. TRS v3.0 files are required to cut bevels on the HB model saw. H model saws can be operated using TRS v2.0 files as they are not equipped to cut bevels. All major truss engineerin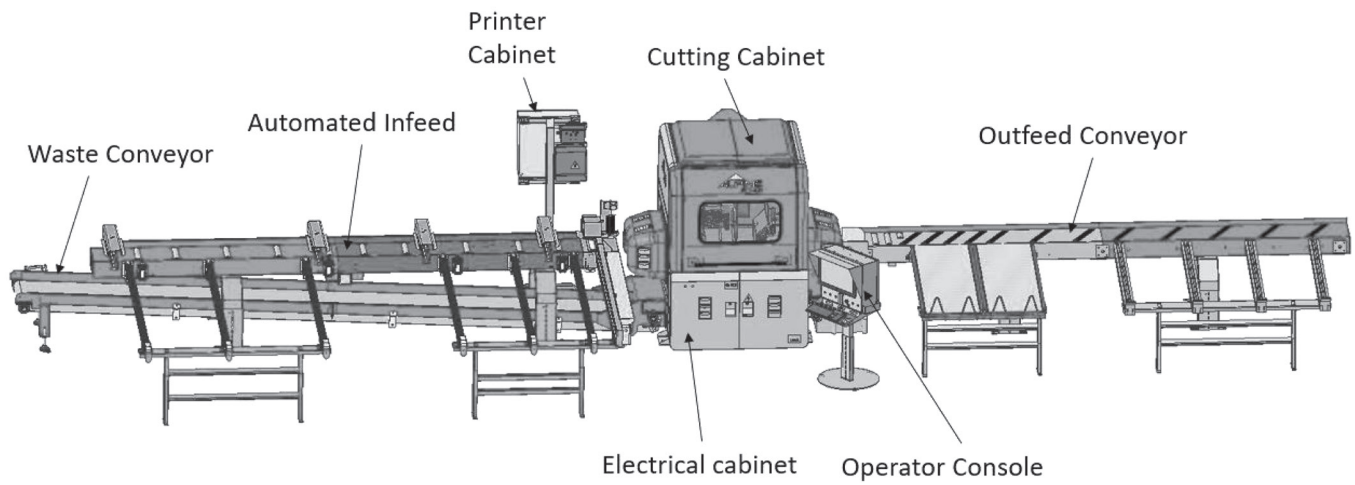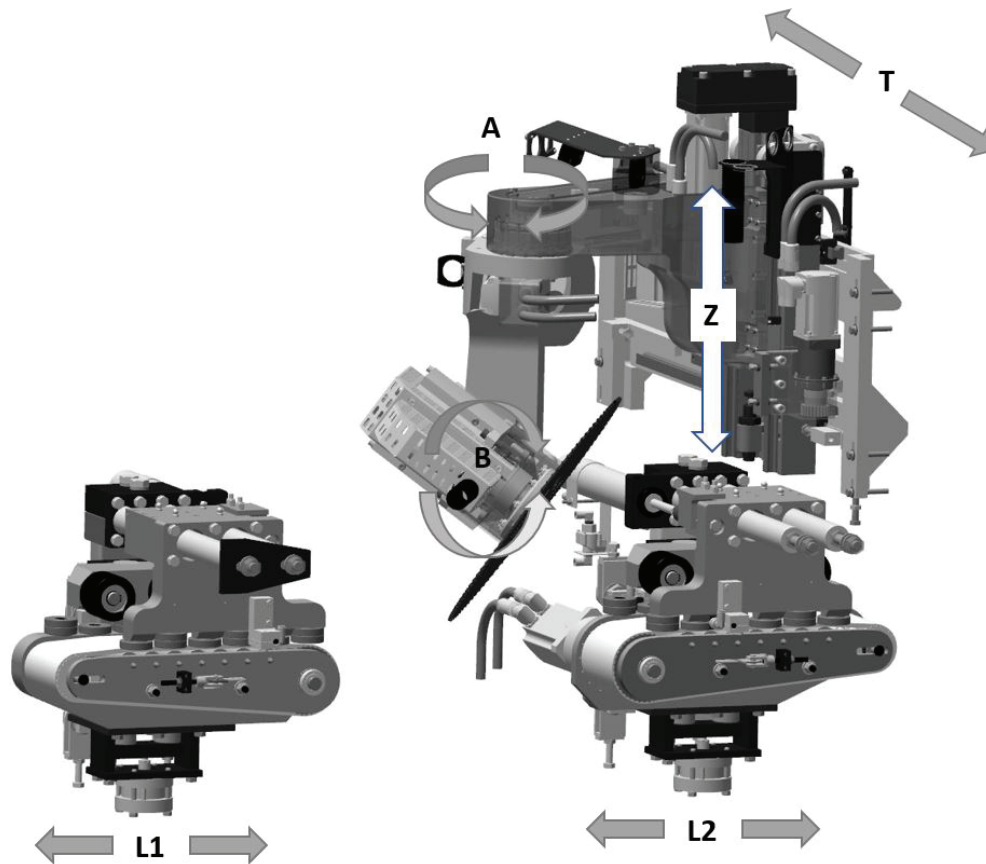g software can develop these files automatically. Contact the supplier for details. Alpine can supply the file specification if necessary.

2.6.2 Network

An Ethernet adapter card is provided with the computer inside the console. The saw can be connected to any network using Cat 5 Ethernet cable. Alpine will not provide the equipment to connect the saw to a network connection by any other means (fiber-optic, wireless, etc.)

Except for its distance from the server, the saw computer is just like most other computers on the network. Distance can be an issue, Alpine recommends that the network cable installed and connected by a network professional.

If TRS files are being sent to the ALS 4.0 over a network connection, it is mandatory that the saw computer be able to write to the TRS files on the network. This is how completed cuts are recorded. However, the saw will require certain network rights. If this is a problem for a network administrator, have them contact Alpine Equipment Customer service for more information.

It is also recommended that the saw computer have internet access. This will allow for remote access by Alpine for troubleshooting and diagnostic evaluation.

2.6.3　USB Device

Sometimes called "jump drives" or "thumb drives", these devices are necessary if the saw is not connected to a network. The ALS 4.0 has a dustproof USB port mounted on the front panel of the operator's console for these devices, or any other USB device. The ALS 4.0 program communicates with these devices in the same manner as it would to a hard drive or network connection.

3.　ALS 4.0 Software

3.1　ALS 4.0 Home Screen
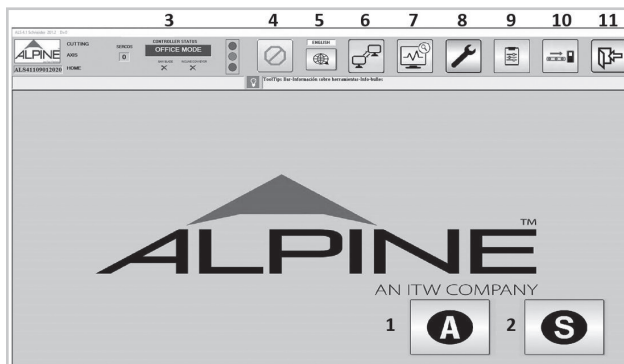
Figure 7

The top bar of the screen is present during most operations of the program. It allows navigation to other parts of the program without closing the screen being used. QUIT can be selected from any screen where the top bar is showing.

1. **AUTOMODE** – Automatic saw operation mode. Data is read from the saw computer, USB drive, or network location (Section 4.2.1).
2. **SEMIMODE** – Semi-automatic saw operation mode. Allows operator entry for cutting data (Section 4.3).
3. **System Status** – Shows the current state of the machine
4. **E-Stop** – Indicates if the E-Stop Button is activated.
5. **Language** – Indicates the current language in use. Trilingual – English,French and Spanish.
6. **Communication** – Opens the team Viewer pop up window to connect remote users for troubleshooting.
7. **System troubleshooting** – Opens the Schneider Control System Status Screen.
8. **Utility Tools** – Opens the Manual Screen menu (Section 3.2)
9. **Options** – Opens the Options Menu (Section 3.3).
10. **Auto-Infeed** – Opens Auto-Infeed Timer Menu (Section 3.4)
11. **Exit** – Closed/Shutdown the ALS 4.0 program.

NOTE
It is strongly advised to cancel out of all active screens and back to the Main screen before quitting as there are times when this procedure will save valuable in-process information.

3.2 Auto Screen
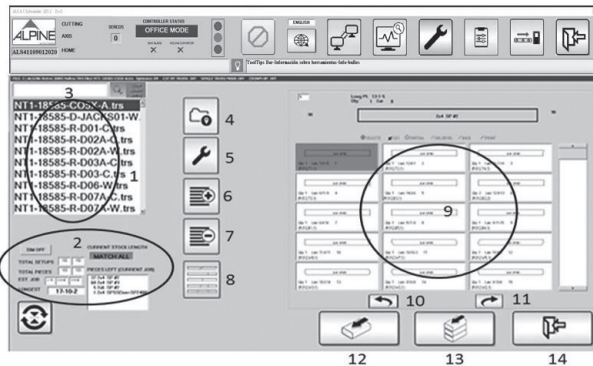
Figure 8

3.2.1 Job Select Menu

The Job Select Menu displays all the information about the job as contained in the TRS file.

1. Indicates all the available TRS files within the Jobs directory.

2. Displays the following information:

   • **TOTAL SETUPS** – The total number of unique setup in the job.

   • **TOTAL PIECES** – The total pieces in the job.

   • **CURRENT STOCK LENGTH** – Shows the size of the stock currently chosen. (Section 3.2.2)

   • **PIECES LEFT IN CURRENT JOB** – The total number of pieces for each grade and size required in the job. It is not a pick list.

3. **JOB SEARCH** – Allows user to search for a TRS file by name within Jobs directory.


NOTE

When running "MATCH ALL", the program MUST find a solution in the lumber definitions for the piece to be cut or the piece will be skipped. Currently, the program allows for a maximum of 112 different combinations of length, grade, and size of lumber.

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4. **CHANGE JOB LOCATION** – Allows user input to specify the computer path to the location where the jobs are stored. This path can be any location that is accessible from the saw computer. The hard drive of the computer, USB, or a network drive can be the source of the job location.

5. **UTILITY** – Allows user to access the utility function which has a lot of different options (Section 3.2.3)

6. **CREATE PICK LIST** – Allows user to create pick list (Section 3.2.4)

7. **DELETE PICK LIST** – Allows user to delete pick list.

8. **GRAPHICAL VIEW** – Allow user to view graphical pick list.

9. **PIECE DETAILS** – This area shows detailed information of all the pieces to be cut from the selected job list

10. **PREV** – Go back to previous piece.

11. **NEXT** – Advances the next piece.

12. **SINGLE PIECE RUN** – Allows user to run one piece at a time (Section 3.2.5).

13. **MULTIPLE PIECE RUN** – Allows user to run more than one piece or the whole job.

14. **CANCEL** – Cancels the current operation and returns the software to the Main Menu.
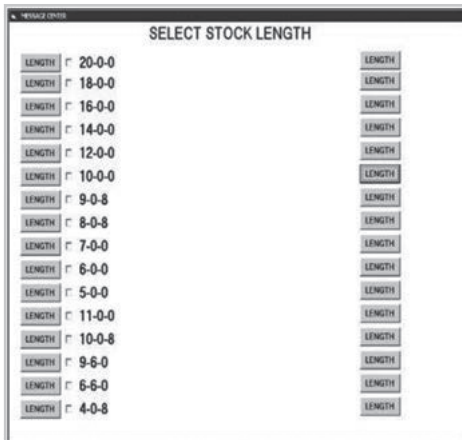
Figure 9

3.2.2   Current Stock Length Menu

This screen is only available if running single stock option and without Auto-Infeed. This screen allows you to select the stock length the user want to use. Touch the white area inside the box to bring the screen up. Select the desired length of stock by checking the small box next to the length.

NOTE

There is no EXIT button for this screen. Selecting any board length from lumber list will exit this screen.

3.2.3   Utility Tools

Click on the utility tool icon ✐ and the following menu screen will appear:

Figure 10

1. **MARK PIECE CUT** – Will mark the piece you have selected as completely cut. The piece will turn red. Be sure you have selected the piece you want to mark before touching this button.

2. **RESTORE PIECE** – Removes any stored cut information for the selected piece restoring it to uncut status.

3. **MARK JOB CUT** – Will mark the job you have selected as completely cut. Be sure you have selected the job you want to mark before touching this button.

4. **RESTORE JOB** – Removes cut information for the selected job restoring it to uncut status.

5. **RESTORE PARTIAL PIECES** – Restores Partial pieces.

6. **CHANGE PIECE QUANTITY** – Allows you to change the quantity of the selected piece. When you touch this button, another screen will pop up. If the selected piece is used in more than one location, you will need to choose the one you want to change. When that is done, a screen will appear that will allow you to set the quantity for that piece to whatever you need.

7. **ADD TO STANDARD PIECES** – Will automatically add the selected piece to the list of Standard Pieces. See 4.4.1.6 for a discussion of Standard Pieces.

8. **DELETE PIECE** – Deletes the selected piece

9. **MERGE JOB** – Merges two or more jobs in to one job.

10. **CHANGE LENGTH** – Allows user to change the selected piece length.

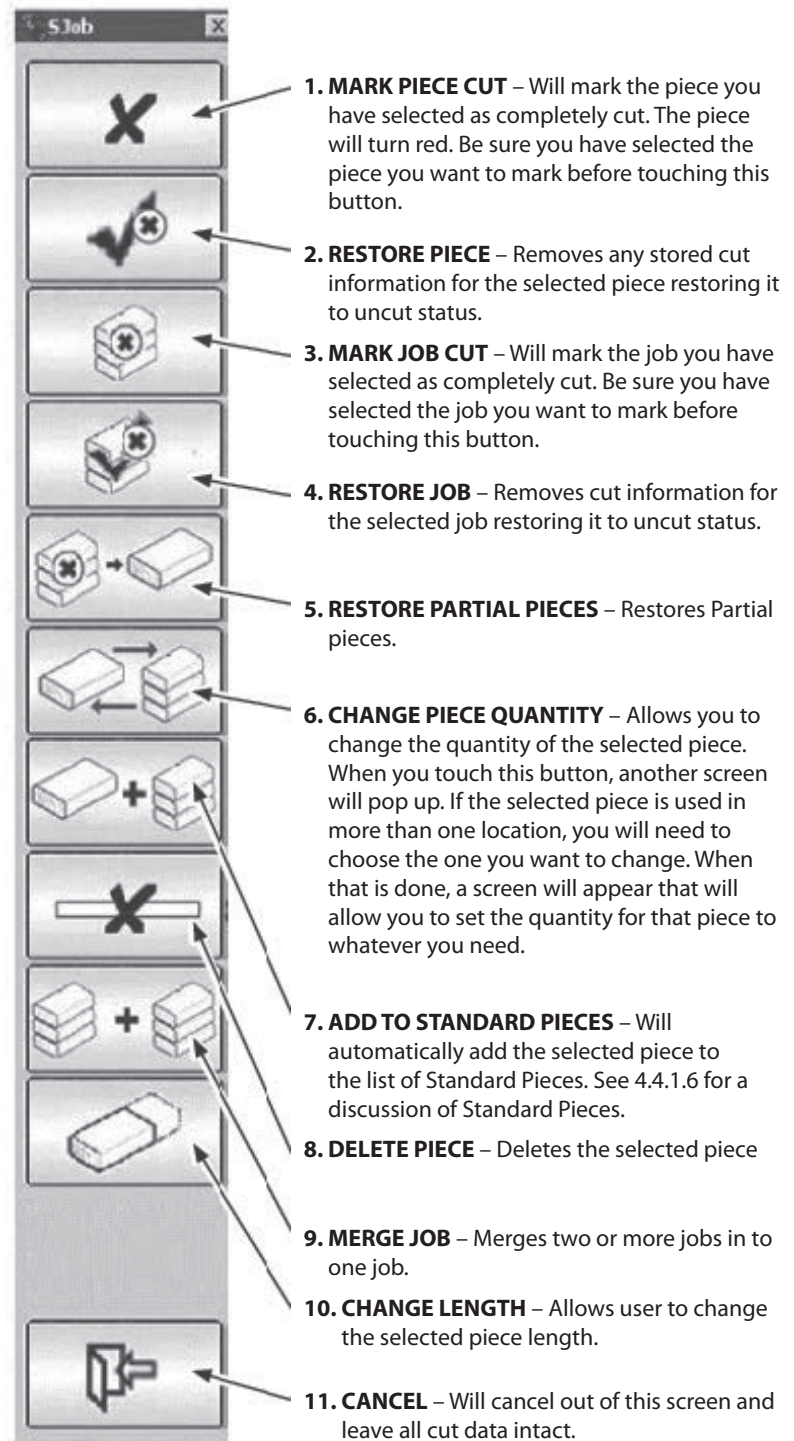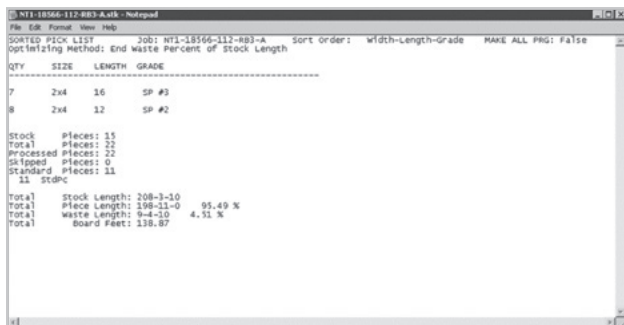11. **CANCEL** – Will cancel out of this screen and leave all cut data intact.

3.2.4 Create a Pick List

When you touch the ▤ button and have the Create Pick List option checked in General Options the program will create a pick list for the current job. You can create the Pick List at the saw in regular operating mode or in the office in Office Mode.

A file will be created with the same name as the job and the extension .STK. The file will be placed in the same directory as the job. You can create two versions of this file. Both versions contain the Pick List and Summary information. If you check Stock File Details under Program Options, the file will also contain details about each piece of stock that will be cut. Each line of these details contains the stock length, lumber description, lumber code, lumber size, and information about the pieces placed on the stock. If desired, you can interface this information with other programs.

Here's an example of the complete file with Stock File Details, Summary, and Pick List:

Figure 11

3.2.5 Single Piece Run

Will cause the saw to cut only the piece that you have highlighted. When you touch this button, the saw will start and the Piece Layout Screen will appear showing the piece placed on the stock you have specified. The computer will place as many of the selected piece on the stock as it can, but it will not look through the file for other pieces to place on the stock. When you push the stock lumber into the feeder, the cutting operation will begin. If the quantity of the selected piece is greater than the number that could be placed on the stock, additional stock pieces will be used until the total quantity of the selected piece has been cut. When all the pieces have been cut, you will be returned to the Piece Select Screen so that you can select another piece for cutting. The OPTIMIZE feature is non-functional in Single Piece mode.
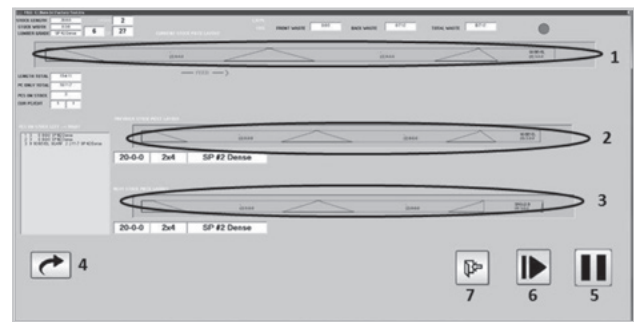
Figure 12

1. The top bar shows the stock board that was just cut or in the process of cutting.

2. The middle bar shows the stock board that was cut previously.

3. The bottom bar shows the stock board that is set up and ready for cutting next.

4. **OK** – This button is used only during Office Mode operation of the program. It switches the program to the Cut Screen simulating detection of a board.

5. **PAUSE** – This button allows you to pause cutting process. Machine will not stop until current cut board is finished. If you need to stop the saw immediately during cutting operations, use the Emergency Stop.

6. **RESUME** – This button allows you to resume cutting the Next Cut Order will be the same as when you pause.

7. **CANCEL** – This button will return you to the Job/Piece Select Screen. All cut status information for all previous cuts will be saved, and you will be able to review it on the Job/Piece Select Screen. If no changes are made to the cut status information or stock length after you CANCEL here, when you touch RUN ALL and return to this screen the Next Cut Order will be the same as when you left.

3.3 Automatic Screen Operations

3.3.1 Load Lumber Screen

FEED 16' 2x4 SP #2 Dense
CUTTING BEGINS WHEN BOARD DETECTED
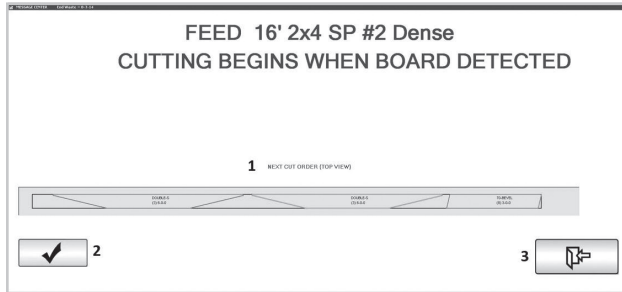
1 NEXT CUT ORDER (TOP VIEW)

2

3

Figure 13

This screen displays what size and grade of stock lumber to feed into the saw.

1. **NEXT CUT ORDER** – Displays a preview of the next board to be cut

The gray bar near the bottom of the screen show how the computer has placed pieces on the stock. The gray bar shows the stock board that is set up, ready and will be cut next. The red and yellow colors of the pieces are alternated so that it noticeable where each board begins and ends. There is no other significance to these two colors.

> ### NOTE
> **When the stock is changed, the Next Cut Order will be recalculated and the new piece layout will be shown. Occasionally, this recalculation will cause the Previous Cut Order layout to go off scale, but that will have no effect on upcoming cuts. It is not possible to make changes to the stocks if a picklist has been created for the job.**

When there are pieces on the stock that have beveled ends, the beveled edges will be green for double bevel, blue for single bevel front, or fuchsia for single bevel back.

- The information shown on the first line on each piece is truss name.
- The second line shows the piece name.
- The third line shows the index of the piece and the piece length.

The index number is assigned by the saw computer when the job is loaded. It corresponds to the position of the piece in the list on the Piece Select screen. It is not the quantity of the piece. It is shown on this screen for reference. It can be used when it is necessary to o find the piece in the job list on the Piece Select Screen (Figure 8).

2. **OK** – This button is used only during Office Mode operation of the program. It switches the program to the Cut Screen simulating detection of a board. When running a single stock length, the OK button will be visible but once the cut is completed the screen will return to the Cut Screen automatically.

> ### NOTE
> **OK is only visible if a single stock length is being run.**
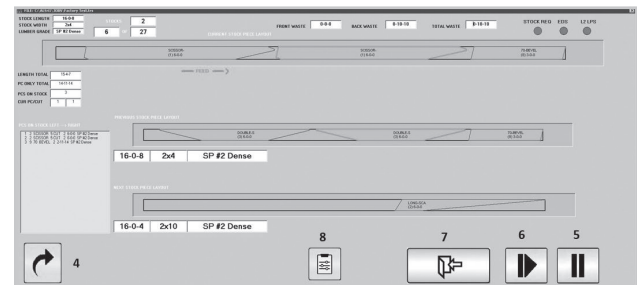
Figure 14

3. **CANCEL** – This button can be used to return to the Job/Piece Select Screen. All cut status information for all previous cuts will be saved. This information can be reviewed on the Job/Piece Select Screen. If no changes are made to the cut status information or stock length click or touch cancel CANCEL. Then, RUN ALL can be used to maintain the Next Cut Order as set previously.

4. **OK** – This button is used only during Office Mode operation of the program. It switches the program to the Cut Screen simulating detection of a board.

3.3.2 Cut Status Screen

Figure 15

This screen will be active while the saw is cutting each stock piece. Its purpose is to display cutting progress information in case there is a problem with the saw or with the motion control system. This information can be useful in diagnosing those problems.

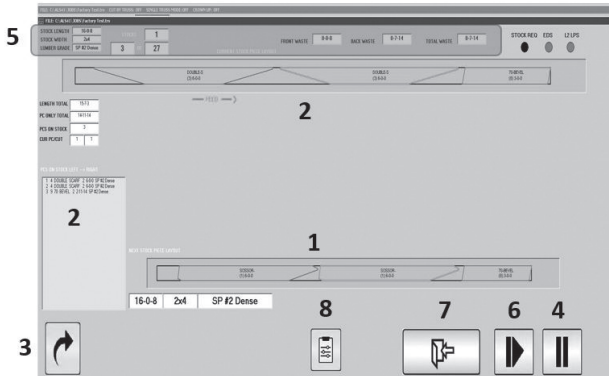1. **NEXT STOCK PIECE LAYOUT** – Provides advance notice of the next piece of stock that will need to be loaded into the saw for cutting. This information is always to view what is coming next. It's essential when the Multiple Stock feature active since the required stock is chosen by the computer from the multiple stock list for each stock that is run. When Multiple Stock is active, the Next Stock Piece Layout will identify which stock has been chosen for the next cut. While the current stock is being cut, the proper stock length for the next cut can be loaded.

2. **PREVIOUS STOCK PIECE LAYOUT** – Indicates the last stock fill the saw cut, if applicable.

3. **NEXT STOCK** – This button is used during Office Mode operation of the program only.

4. **PA USE** – This button allows the cutting operation to be paused and cancel back to the Piece Layout Screen, or to continue cutting when ready. The button label will change to "CONTINUE" and pressing this button will resume the cutting process.

5. **STOCK LENGTH** – Length of the current stock
   STOCK WIDTH – Width of the current stock
   LUMBER GRADE - Grade of Lumber currently used
   CUR PC/ CUT – Current Piece being cut, current cut (1-7)
   FRONT WASTE – Length of Waste on front end of stock
   BACK WASTE – Length of waste at the back end of stock, after all pieces cut
   TOTAL WASTE – Sum of all kerf. Piece to piece plus end waste

6. **NEXT CUT** – Debug Use only, cycles from cut #1 to cut #4 for each piece on stock.

7. **EXIT** - Exits the current Screen and takes you back to job select screen - Figure 8

8. **VIEW CUT DATA** – Used for troubleshooting, it will gather up of the files involved at the time (job file, user configuration file, machine configuration file) and zip them into a single file utilizing the date and time as the file name. This is all of the information needed to recreate the problem, and will be needed by Alpine Equipment Customer Service to troubleshoot a particular cutting problem.

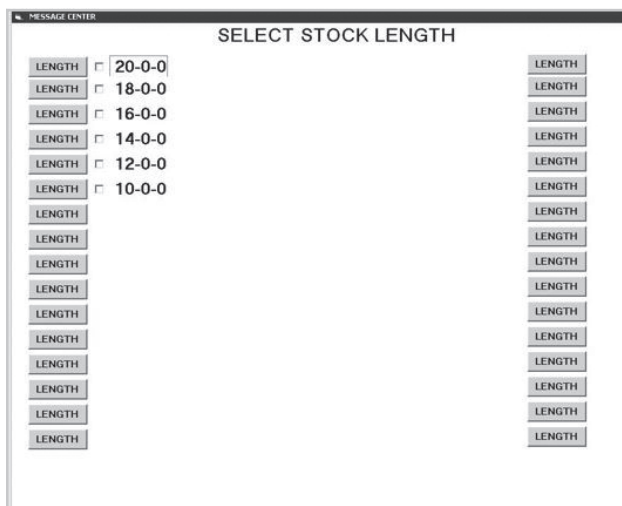### 3.3.3 Change Stock Screen (Single Stock Option)

Figure 16

Figure 17

This screen allows stock length selection. The selection is made by clicking or touching the yellow numbers corresponding to the length located in the column on the left side of the screen. The LENGTH buttons are used when it is necessary to change the value of the stock length in the yellow numbers. It is recommended that this value be the exact length that of the stock being used.

NOTE

The saw will make no judgment on stock overage. For example, when cutting two 8-0-0 boards from a single piece of stock, the minimum length required by the saw is 16-0-12. The saw assumes it must make three cuts (trim at both ends and cut at 8 ft) to get the two 8-0-0 pieces and each of those cuts will remove the ¼" kerf. This is why a 16-0-0 board cannot be used for this cut.

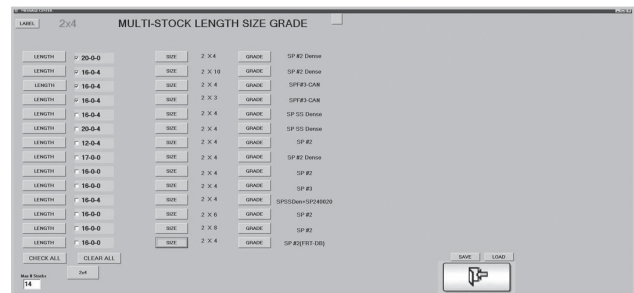### 3.3.4 Change Stock Screen (Multi Stock Option)

Figure 18

When Match Grade-Size is selected, the Multiple Stocks screen will appear as shown in Figure 18. Each line across the page represents one combination of length, size, and grade of stock. Make sure to enter all the possible combinations available. Only the combinations indicated by a check mark will be used by the ALS program. If certain stocks are unavailable click or touch the yellow LENGTH to turn it off.

Figure 19

If there are more than the 14 combinations that will fit on one page, click or touch this button (Figure 19) and enter the total combinations up to 112. The computer will add pages to this screen based on the number of combinations entered. The page names can be left as default or changed. Click or touch LABEL (Figure 18) to add a custom label to the page.

NOTE

Always change the number of max stocks in multiples of 14, since the saw only looks at the total number indicated. For instance, if 105 is selected then the saw will not look at the last 7 stock options on page 8. However, all 14 stocks will be listed on page 8.

The SIZE and GRADE buttons will bring up screens when clicked. Here, the appropriate entries can be chosen.

Within this dialogue box the following can be changed:

- **SPEED** – Allows the system speed to be adjusted per stock entry. It is percentage based with 100% being full speed.
- **CHECK ALL** – Selects all with a single selection
- **CLEAR ALL** – Deselects all with a single selection
- **EXIT** – Exits the dialog

COST can be entered allowing the saw to calculate the lumber cost per the job pick list. Cost is based on board feet. The cost information must be manually entered and updated.

The SAVE button will save all progress.

3.4　Semi-Automatic Operation

Figure 20

Enter the Semi-Automatic Mode by clicking or touching the button shown in Figure 20 on the Main Screen. The following screen will appear (Figure 21):
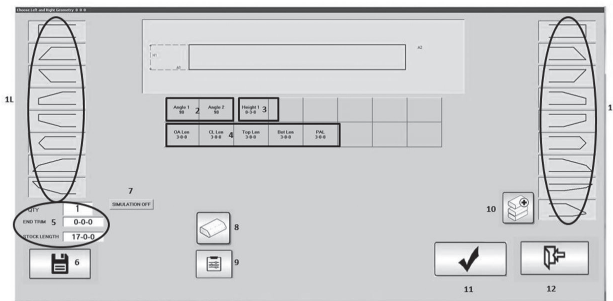

Figure 21

The default piece for this screen has square cuts on each end. Choose the ends that most closely match the piece required. In the example above, the single cut button has been selected for the left end and the single cut for the right end. The selections can be changed at any time as cuts are setup in this mode.

3.4.1　Board Select

Click or touch SEMIMODE ⓢ on the main menu to advance to the Board Select Menu.

1.　**Configuration Buttons** – Click or touch the figure that is closest to the desired cut. The panel on the left "L" controls the left side of the board. The panel on the right "R" controls the right side of the board.

2.　**Angle Buttons** – Click or touch the angle buttons to open the Angle Input Dialog Box. Angles 1 and 2 are shown on the left side of the board. Angles 3 and 4 are shown on the right side of the board
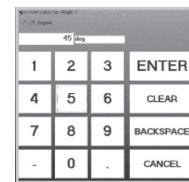
Figure 22

3.　**Height Buttons** – Click or touch the height buttons to open the Height Input Dialog Box. Height 1 is the overall height of the lumber. Heights 2 and 3 correspond to the pivot axis heights.

4.　**Length Buttons** – Click or touch the length buttons to change the various lengths.

- **OA Len** – Overall board length
- **Center Len** – Centerline length
- **Top Len** – Top length
- **Bot Len** – Bottom length
- **PAL** – Pivot axis length

Figure 23

5. **QTY TO CUT** – Click or touch the box and enter the quantity required for the setup.
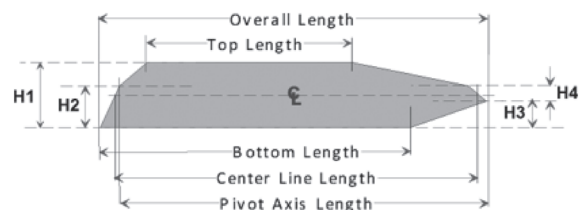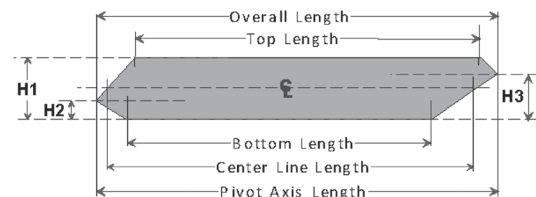
6. **SAVE** – Allows the user to save the Semi Auto Piece to a file (Section 4.3.1.1).

7. **SIMULATION OFF** – Click or touch the button to turn off the simulation of cuts on the board real time.

8. **BEVEL SETTINGS** – Allows user to manually set the Bevel Angles on Individual sides of the lumber (Section 4.3.1.2)

9. **CANCEL** – Cancels the current operation and returns the software to the Main Menu.

10. **SETUP** – Advances the software to Run Menu using the defined cut parameters.

Now follow the instructions to setup the ALS 4.0 Upgrade in Section 4.3.1.3 which covers the Run Menu.

3.4.2   Semi-Auto Save

Entering pieces using Semi Auto is a more flexible method. Use the Semi Auto input process to create the piece you would like to add to your Standard Pieces List. All the Semi Auto options can be used to create whatever piece you may need. Be sure to enter a large quantity to cut. 999 is recommended.

When you have entered all the information, touch on the Semi Auto input screen.

On the pop-up screen, the only entry item that the computer will take is the Piece Name. Enter the piece identification you would like to have printed for the Standard Piece when it is cut.
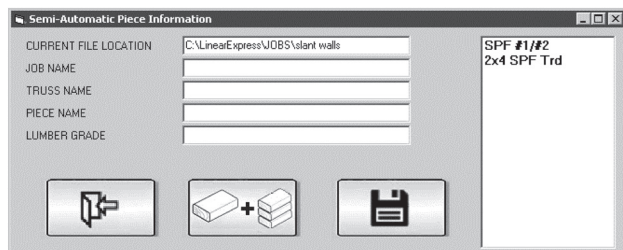
Figure 24

Job Name is ignored for Standard Pieces. The Truss Name is always "StdPc". And the Lumber Grade is ignored.

Add to Standard Pieces will automatically enter your piece information with the Piece Name into the Standard Piece List.

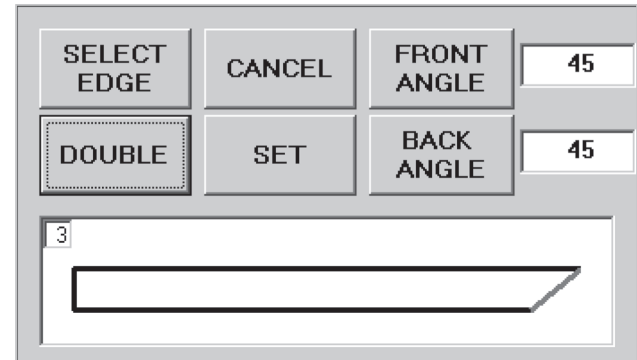### 3.4.3   Bevel

BEVELS brings up the following screen.

Figure 25

Using the popup box, click or touch EDGE repeatedly until the edge of the piece requiring a bevel is red. Then click or touch the NONE button (below the EDGE button) until the bevel condition need is shown. Please note, in Figure 25 the button under EDGE displays DOUBLE. The double bevel condition has been selected for this edge and the display text has changed accordingly.

The condition selected above is for a double 45° bevel on the plumb cut at the right end of the board. If a bevel angle other than 45° is needed, click or touch FRONT ANGLE or BACK ANGLE box and enter the desired angle. Front Angle means the bevel face that is facing up when the board is oriented as shown in the diagram. Back Angle means the bevel face on the opposite face of the board. The saw will cut a single bevel when only a Front Angle or a Back Angle is shown. The button that says DOUBLE above will say SINGLE when a setup is generated to cut a front or back angle bevel only.

Click or touch the SET button after entering all the bevel information. The SETUP button will not appear until this is done.

The SET button will also allow the placement of a bevel on more than one edge of the piece. When the bevel has entered for one of the edges, click or touch SET. This will hold the bevel data for that edge and allow the use of the EDGE button to proceed to another edge of the board where an additional bevel can be entered. This process is necessary when manually entering a floor truss web.

> ### NOTE
>
> When settings have been completed the bevel section, check the remainder of the Semi-Automatic screen to make sure all the other data is correct. Then click or touch SETUP to cut the piece.

> ### NOTE
>
> SAVE a bevel piece in the same manner described above. Just make sure all the data entered correctly before starting the SAVE process.

3.5   Manual Control
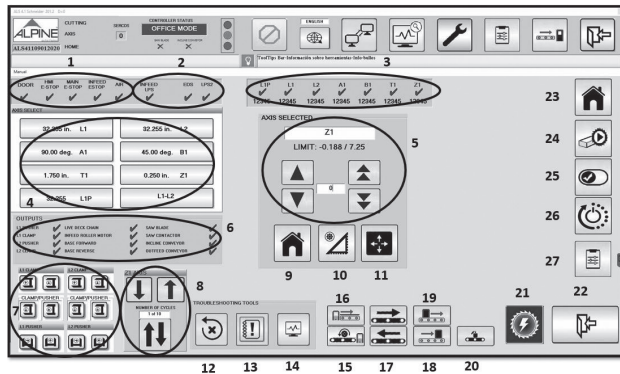
3.5.1   Manual Axis Control

Figure 26

The primary purpose of this screen is to provide manual control of all the axes as well as some other parts of the machine. There are a number of system functions available from this screen as well. The manual controls are on the right and across the bottom, and the system controls are on the left side.

Before we discuss the manual controls, note the red ✖ and green ✔ checkmark above them. This array of checkmarks gives the status of all sensors on the machine. Red means off, green means on. This information may be useful if you are diagnosing certain problems. It is normal for these checkmarks to change. It is also normal for some of them to be red during operation of the machine.

If you think you may be having trouble with one of the sensors on the machine, call Alpine. We will help you diagnose the problem with a combination of the manual controls and this status bar.

1. **SAFETY SENSORS** – This area shows the status of all the Operator Safety sensors .

2. **PROXIMITY BOARD SENSORS** – This area shows the status of all the Lumber sensors.

3. **DRIVE AXIS STATUS** – This area shows the status of all the drive axes.

4. **AXIS POSITION SCREEN** – This area shows the current positions of all the axes, touching any of the individual boxes will show the corresponding axis on area "5".
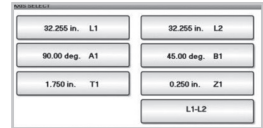
5. **AXIS SELECT** – This area will show the position of the selected axis from area "4" with additional functions to JOG, HOME, CALIBRATE OR MOVE functions.

6. **OUTPUT STATUS** – This area will show the various status of machine components such as the saw, trash conveyor, pusher clamps, live deck and infeed and outfeed conveyors.

7. **L1/L2 CLAMP ICONS**-

   • **L1/L2-CLAMP-UP/DOWN** – These control clamp rollers that grip the top of the board on each drive.

   • **L1/L2-PUSHER-IN/OUT** – These control the pusher fence that locates and maintains the location of the board against the back-fence rollers.

   • **L1-Clamp_Pusher Hold/Release** – These controls both clamp and pusher Up/Down and In/Out.

   • **L2-Clamp_Pusher Hold/Release** – These controls both clamp and pusher Up/Down and In/Out.

8. **Z1 AXIS** – These are short cuts for moving the Z1 axis. UP moves the blade to its normal up position. DOWN moves the blade to its maximum down position. FULL causes the blade to make a full stroke down and back up like it does when cutting lumber. All these moves are performed at full system speed.

9. **HOME Function** – These buttons will cause a single axis to Home. Normally, you should Home the entire system, but certain diagnostic procedures may require homing a single axis.

10. **CAL Functions** – Each of these buttons brings up a message like this:

⚠ CAUTION

Be very careful when using these functions. You can cause serious cutting and operational problems or damage to the saw if calibration is not performed correctly.

You must make certain that the axis is at the stated position before touching OK. Refer to the Calibration Section.
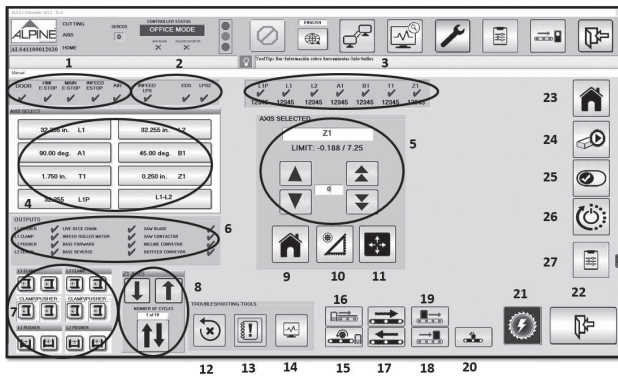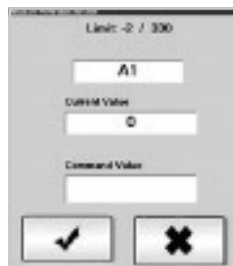

Figure 27

11. **MOVE COMMANDS** – These buttons function similar to the jog commands, except that these allow you to input an exact distance/ location in which to move a specific axis.

This allows for more exact positioning of some axes—but there is no bounds-checking—so be careful that you don't move an axis into a position that will cause a wreck or a crash.

12. **RESET** – Resets Axes Drives and System faults.

13. **ERROR LOG** – Open error log.

14. **TROUBLE SHOOTING GUIDE** – Open troubleshooting manual.

15. **LOAD LUMBER** – Touching this icon will start the load lumber sequence, the gripper jaw extends, the clamp board jaw opens, the livedeck chain will start advancing the lumber to the flat chain.

16. **REJECT LUMBER** – Touching this icon will start the reject lumber sequence and will eject lumber out of the machine.

17. **SORT CONVEYOR** – Controls sort conveyor to front (Short Piece) or to back (Waste).

18. **INFEED CONVEYOR** – Controls the infeed conveyor.

19. **OUTFEED CONVEYOR** – Controls the outfeed conveyors.

20. **WASTE CONVEYOR** – Controls the waste conveyor off or on.

21. **SAW MOTOR** – Controls the saw motor off or on.

22. **EXIT** – Touch this button when you need to close this screen and move to other operations.

23. **HOME SYSTEM** – Will send all axes to home position.

24. **ENABLE/DISABLE CUTTING** – Allows you to ENABLE/DISABLE cutting.

25. **ENABLE/DISABLE DRIVES** – Allows you to ENABLE/DISABLE all drives.

26. **REBOOT CONTROLLER** – Allows you to reboot controller.

27. **SYSTEM PARAMETERS** – Allows you to access system speed parameters.
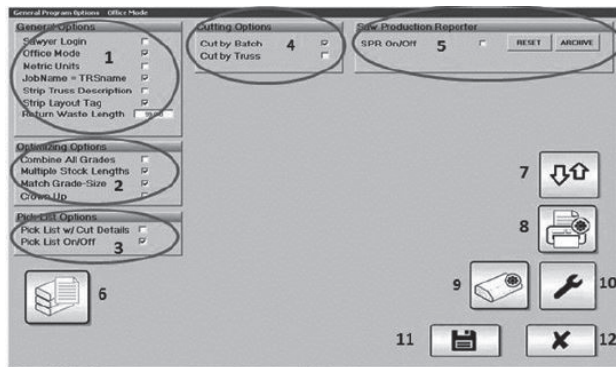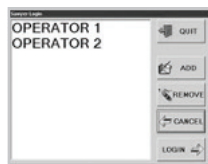
3.6   System Options Menu

Figure 28

3.6.1   General Options (1)

Sawyer Login – Causes the program to ask for a login name before starting.

Office Mode – Enables the program to function on a computer that is not connected to the saw. If this option is checked on the computer at the saw, you will not be able to cut lumber, and you will get error messages about lost communications links.

NOTE

If this option is checked on the computer at the saw, it will not be able to cut lumber.

Metric Units – Enables the saw to receive information and to display in metric units.

JobName = TRSname – Changes the job name that prints out and shows on the screen to be the same as the name of the *.TRS file.

Strip Truss Description – The truss naming convention in some plants can create very long truss names. When these names become too long or contain certain characters, they can interfere with certain operations of the ALS program. This option will strip the truss description from the *.TRS file. Discuss this option with your supervisor before turning it on. Do not check both this option and the Strip Layout Tag option. You must choose one or the other. See Printer Options if you do not want a truss description printed.

Strip Layout Tag – The cut data file (*.TRS) contains two truss ID's. One is automatically assigned by the VIEW Layout Program and the other is assigned by engineers in your office. This option removes the layout ID to reduce confusion. Most companies turn this option on.

Return waste length – This defines if waste ejects to infeed (when waste longer or equal to set value) or outfeed side. For system with auto infeed this setting set to 99-0-0 to make sure it never ejects waste back to infeed side.

3.6.2   Optimization Options (2)

 When this option is checked, the computer will choose from all pieces of the same size without regard to grade requirement. You will need to make sure that the highest grade required for the job is available. This will improve the waste factor but should be used carefully to make sure that lower grade lumber is not used on pieces requiring higher grades.

 Turns on the feature that causes the saw to review multiple stock pieces and choose the stock that produces the least waste. Stock pieces to be used can be chosen or revised from the Change Stock screen.

 This button will allow you to turn off the ability to match grade and size when the Multiple Stock Pieces option is on. This option only affects the way the Multiple Stock option functions. When this option is off, the computer will choose from the multiple stock lists on the basis of the various Multiple Stock lengths only. The saw will tell you when to change sizes of lumber.
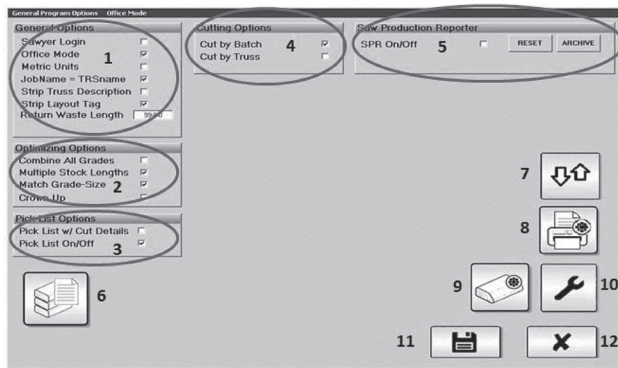
Figure 29

3.6.3 Pick List Options (3)

Turns on the Pick List Option

3.6.4 Cutting Options (4)

3.6.5 Saw-Production Reporter Options (5)

3.6.6 Standard Piece List (6)

 This button will give you access to the Standard Piece List. You will see it on Options. It will bring up a screen containing the Standard Piece List and cutting options. We will look:
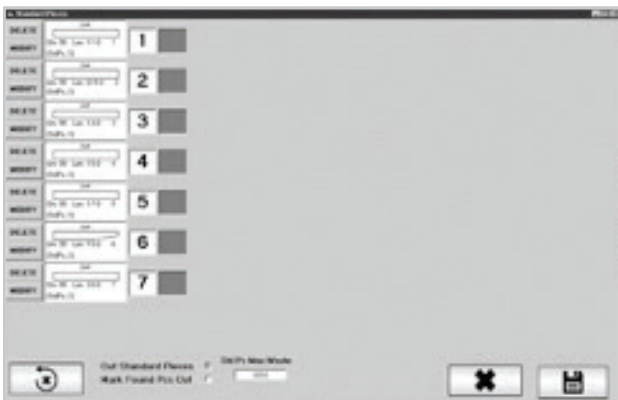

Figure 30

There are seven pieces in the list shown here. You can enter a maximum of 12. These particular pieces are end blocks (EB), ribbon blocks (RB), and diagonal webs (Diag) for 14 and 16-inch-deep Modified Warren floor trusses. Remember, these pieces can be anything. They don't all have to be square ended pieces as shown on this list.

DELETE will remove the piece from the list. **MODIFY** will allow you to change the quantity only. The column of numbers to the right is the priority for each piece and the green and red flags control whether a piece will be cut or not. Proper use of these two columns is discussed later under **Dead Reckoning Inventory System**.

Cut Standard Pieces – Turns the Standard Piece cutting option on or off. When off, no Standard Pieces will be cut.

Mark Found Pcs Cut – When you open a job and Standard Pieces is on, the program searches through the job for any pieces that match those in your Standard Piece List. When it finds them, it marks them cut. This is very important. When the Standard Piece process is functioning properly, you should already have a supply of these pieces that have been previously cut and stored. You don't want to cut them again with the job. If you did, you would never use the pieces you had stored. Mark Found Pcs Cut should always be on when Standard Pieces is on.

Standard Piece Max Waste – All waste lengths shorter than this entry will be cut into Standard Pieces. This will allow you to save long waste pieces (normally found at the end of a job) for purposes other than Standard Pieces.

Path to Standard Pieces – This is reference information only. The location for the StdPcs.trs file cannot be changed.

NOTE
When you need to review the Standard Pieces List, use this button only.

Dead Reckoning Inventory System – This is a simple, common sense system for making sure that the Standard Piece function produces enough, but not too much, of the pieces you need. Let's look at a sample Standard Piece List:

Figure 31

There are two controls that are used in the Dead Reckoning Inventory Control System, and both of them are on this list.

1. **Priority** – Note that the highest priority has been assigned to the longest pieces in the set. That way, these longer pieces will be cut as often as possible. Since they are the longest pieces, they would not be chosen as frequently if the shorter pieces had a higher priority.

2. **Flags** – Also note that one of the pieces (4) is marked with a red flag (darker gray in illustration). As long as that flag is red, that piece will not be cut.
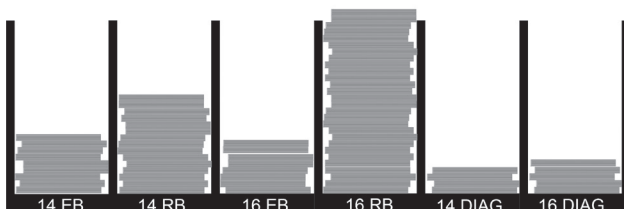

Figure 32

For the example Standard Piece List presented earlier you would need six bins (similar to the diagram above) to store the Standard Pieces when they are cut by the ALS.

When you load a job into the ALS, it looks for any of these six pieces that might be in the job and automatically marks them as already cut on the assumption that the bins have enough in them to build that job.

Each time the assembly crews build a job that needs some of these pieces, they go to these bins and get what they need. But if one of the bins is full, and you don't need any more of those pieces for a while, you can mark that piece with a red flag. The Standard Pieces feature will not cut any more of that piece until you change the mark to green. In the example above, the bin for 16RB is full. That's why its flag is red on the Standard Piece List.

Conversely, let's say one of the bins is chronically low, like the 14DIAG and 16DIAG above. You can correct that situation by setting the priority for that piece higher. That's why these pieces are priority 1 and 2 on the example Standard Piece List. If that fails to cut enough of those pieces to keep the assembly line supplied, it probably means that the piece is not a good candidate for the Standard Piece feature. Remove it from the Standard Piece list, and the ALS program will cut it with every job where it is needed.

You can make changes to the priority or flags at any time and as often as necessary. There will be a period of "tuning" the process to find the combination that works best for your operation. After that, frequent changes will probably not be necessary.

Using this simple Dead Reckoning Inventory system, you will be able to keep an adequate supply of Standard Pieces, but you won't have to maintain a detailed inventory management system. Just keep an eye on the Standard Piece bins and make some common sense adjustments when necessary.

If you try to open StdPcs.trs as a job, all the pieces will be marked cut, and you will not be able to restore them very easily. If this ever happens, use the following procedure. Go to the Standard Piece List, turn OFF Mark Found Pieces Cut, Save, go back to the StdPcs.TRS job file, use the Restore function to remove the red marks, Change Job Location to another directory, go back to Standard Piece List, turn ON Mark Found Pieces Cut, and Save.
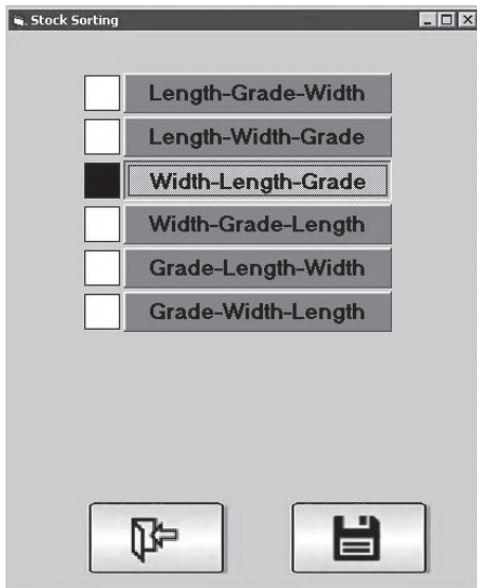
3.6.7 Pick List Sort Options (7)

Figure 33

3.6.8 Printer Setup (8)

The inkjet or label printers can be setup by clicking or touching Printer Setup on the Options menu shown in Figure 28. Select the model printer by clicking or touching MODEL in either section of this screen. The model name is located on the front face of the print controller as well as in the included documentation for the print controller.

Figure 34

3.6.8.1 Ink Jet Setup

Click or touching SETUP in the Ink Jet Setup section (Figure 34) will bring up the following screen:
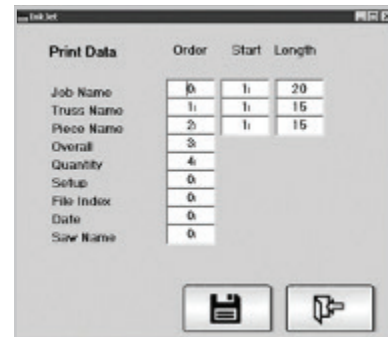

Figure 35

The Print Data information on the right side of this screen allows customization the information that is printed. Up to five of the items in the list under Print Data can be selected. Each time the white box next to each item clicked or touched, the Order number will cycle from 0 to 5. The number determines the order in which the items will print from **left** to **right** by the ink jet printer. On the screen above, four items will print in order from **left** to **right**, they are Truss Name, Piece Name, Overall Length and Quantity (of that piece for that truss).

Repetitive, redundant or unnecessary information in these categories can be eliminated from the message that is printed.

The columns labeled Start and Length control what part of the job, truss and piece names are printed. The information printed on the board will begin with the character number in the Start column and end with the character number in the Length column. In the example above, the printed Job Name will start with the first character and print up to the 255th character if the Job Name is that long.

For example, if the full message for Job Name is "A123456" but the only information that is necessary for identification is A123, set the Start to 1 and Length to 4.

1. **RESET** – Will reset all print Order L-R numbers to 0, all Start numbers to 0 and all Length numbers to 255.

2. **FLUSH** – This button is used to purge ink from the print head.

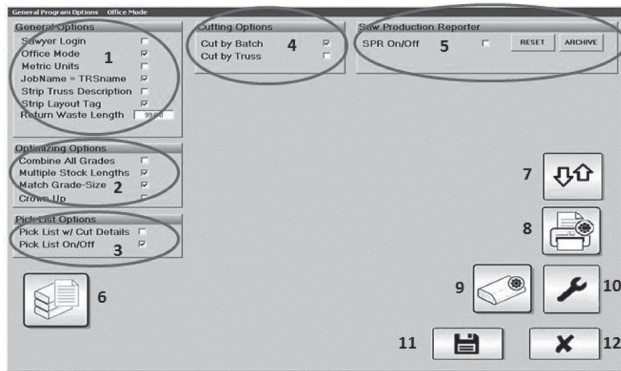| NOTE |
|---|
| It is important that to print only as much information as is needed. Very long messages will often not be completely printed on short pieces as they come out of the machine. Experiment with all these settings when planning to print more than 15 characters (spaces count as characters). |

Figure 36

3.6.9   Bevel Options (9)

These values allow you to make adjustments to bevel cutting. Begin bevel cutting with all these values set to 0 and adjust only if you are having trouble with bevel centerlines or overall length of bevel pieces. Always cut three or four like pieces before deciding about the amount of adjustment. Warped

lumber can significantly affect both centerlines and overall length of bevel pieces. Be very careful that you select the adjustment you need to make, and that you keep track of the bottom and top of the board. It's easy to get confused with this process. Get help if you need it.

Bevel Spacing – Controls the amount of space between pieces when they are laid out on the stock where at least one of the pieces has a bevel condition. Leave this value at 0 unless you are having trouble with bevel cuts that encroach on adjacent pieces.

Floor Web Length Adj – These adjust the overall length of a member that has a double bevel on both ends. The "plunge" adjustments are for members that are long enough that all four bevel cuts use the plunge cutting process. Shorter pieces will require one of the bevels to use the "sweep" cutting process.

CAT Length Adj – This adjustment is for the unique circumstance of single bevels on both ends that are parallel to each other that occurs when cutting CATS (filler members at the pitch break between step down hip trusses).

Adjustments with LEADING and TRAILING Data - A "90 Deg Bevel" refers to a bevel on a square cut end on one end (like the bottom chord of a hip jack). A "Non-90 Deg Bevel" refers to a bevel on one end with a plumb cut (like the top chord of a hip jack).

These adjustments only apply to pieces with a bevel (single or double) on them. The length adjustments control the overall length of the piece and the centerline (CL) adjustments control the bevel centerline on the thickness of the lumber for double bevels. LEADING and TRAILING are for bevels on the front or back ends of the board as it goes through the saw. Positive/negative numbers make the length longer/shorter and the CL higher/lower. The location of the CL is measured from the bottom of the board as it goes through the saw.

Sngl Bev Back Face Len Adj – An adjustment for the length of a piece with a single bevel where the bevel face is on the back (or bottom) as the piece goes through the saw. "Front Face" is the same adjustment for a front (or top) bevel.

Rip Valley Length Adj – Adjusts the length of a piece with a bevel rip along the long side dimension. It would be best to check this length using a ripped valley piece with a butt cut on both ends – even if you don't normally cut these pieces with butt cuts. Feather cuts are very difficult to measure accurately.

Rip Valley Offset – Allows you to control how deep the rip is set on the piece. Normally, the saw will rip these pieces so that the eased edge of the lumber is still on the piece after the rip. If you want it to rip deeper or shallower than that, use this adjustment.

SAVE – Make sure you save all data before exiting this screen.
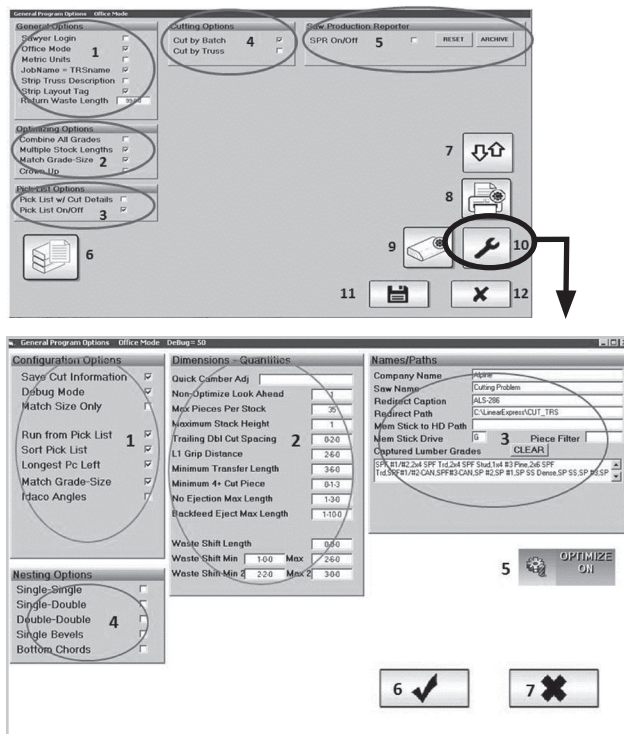
CANCEL – Exit without saving any data.

Figure 37

3.6.10 Advanced Options (10)

Clicking on this icon will bring the General options menu from which you can turn on or off various settings used for optimization.

1. CONFIGURATION OPTIONS

Save Cut Information – Saves information about how many pieces you have cut back to the *.TRS file. It is strongly advised that you turn this option on. When it is off, you will not be able to pause during a job without losing all the status information about pieces that were cut up to the point where you paused.

Debug Mode – This box will be checked if a computer programmer or service technician has placed the program in debug mode to diagnose computer program problems. Do not turn this option on unless instructed to do so by one of these people.

Match Size Only – Checking this box will combine all sizes regardless of the lumber grade.

Run from Pick List – Checking this box will run the jobs from the pick list.

Sort Pick List – Checking this box will sort the pick list

Longest Pc 1st – Causes the Optimizer to look through the job for the longest uncut piece that will fit on the stock each time it places a piece for cutting. This is helpful when your files are not sorted long to short and you want the longer pieces to be cut first for stacking purposes. When this option is off, the Optimizer places the first uncut piece in the file that will fit on the stock regardless of length. Longest Pc 1st also works when Optimize is off and the Look Ahead is set to 2 or greater, but it only looks for the longest piece within the Non-Optimize Look Ahead window.

Match Grade Size – This button will allow you to turn off the ability to match grade and size when the Multiple Stock Pieces option is on. This option only affects the way the Multiple Stock option functions. When this option is off, the computer will choose from the multiple stock lists on the basis of the various Multiple Stock lengths only. The saw will tell you when to change sizes of lumber.

Idaco Angles – Enables the saw to receive and display angles using the Idaco convention where a square cut is 0°.

2. DIMENSION QUANTITIES

Allows user to set values for the listed parameters

3. NAMES/PATHS

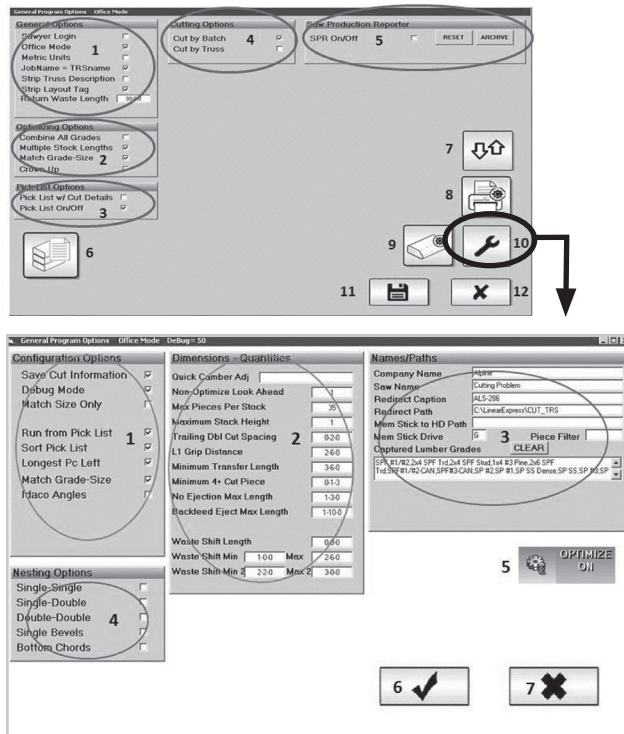Allows user to enter name and file path location

Figure 38

4. NESTING OPTIONS

Single-Single – Turns on the nesting function for piece junctions where both pieces are single cut

Single-Double – Turns on the nesting function for piece junctions where one piece has a single cut and the other is a double cut.

Double-Double – Nesting junctions where both pieces are double cut means that the pieces will be separated only by the kerf of the saw blade. This positioning will be superseded by the Double-Spacing entry in Dimensions and Quantities .

Single Bevels – Similar to Nest Single-Single. If there are two pieces in the file with single bevels that are identical except one is a front single bevel and the other is a back single bevel, this option will nest the two bevels, so they are both cut with a single pass of the blade.

Bottom Chord – Nesting junctions where a single long bottom chord piece may have to be spliced.

Single-Single

Single-Double

Double-Double

Single Bevels

Bottom Chord

NOTE

The default settings for Nesting is currently disabled in the ALS 4.0 Software Settings.

---

5. OPTIMIZER ON

Turns on the optimizer function to reduce lumber waste.

6. ACCEPT OPTIONS

Accept the current option settings.

7. CANCEL OPTIONS

Cancels the current option settings and takes you back to the Main SYSTEM OPTIONS screen.

3.7   Optimizer

3.7.1   Introduction

The ALS Optimizer is an innovative software feature designed to maximize cutting and reduce waste. Using this feature can result in an 8-10% savings in material required by the saw to complete the cutting job. As each plant is run differently, the optimizer is flexible and can be setup to maximize lumber usage, resulting in a reduction in waste. This section will outline all the options available to setup the Optimizer.

Before setting up the Optimizer it is important to evaluate how lumber is purchased. Linear saws differ greatly from component saws in the way jobs are cut. A series of cuts are setup on a board within the software prior to the stock advancing into the saw. The Optimizer function will nest cuts together to maximize lumber usage. Longer lumber stock will accommodate a greater amount of nesting on each board. This being the case, Alpine recommends feeding the ALS 4.0 the longest length of lumber available (see section 1.2). This will allow the Optimizer to nest more pieces on each board.

3.7.2   How it Works

For a given length of stock, the Optimizer looks through a cutting file for a combination of pieces that can be cut from that stock with minimum waste. The computer will analyze thousands of combinations and return the best solution in a fraction of a second.

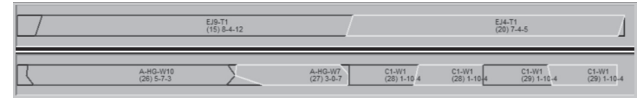Shown in Figure 39 are examples of cuts made using Optimizer:

Figure 39

If the pieces shown above were to cut these pieces on a component saw, an 8' stock would be required for the 7-4-5 piece and a 10' stock would be required for the 8-4-12 piece. The resulting waste would be 2-2-15. By placing both these pieces on a 16-0-0 stock a waste is reduced to 0-5-4. A savings of 1-7-9, or 9.1%.

The pieces in the examples above are "nested". They overlap on the stock. Nesting allows the computer generated length to be larger than the actual stock length. After pieces have been nested on the stock, the computer recalculates the extra material made available by the nesting process and searches the file again for additional pieces that can be added to that stock. Many times the pieces that can be added are fairly short. That is one reason why the Optimizer yields better lumber savings if the job contains a mix of short and long pieces.
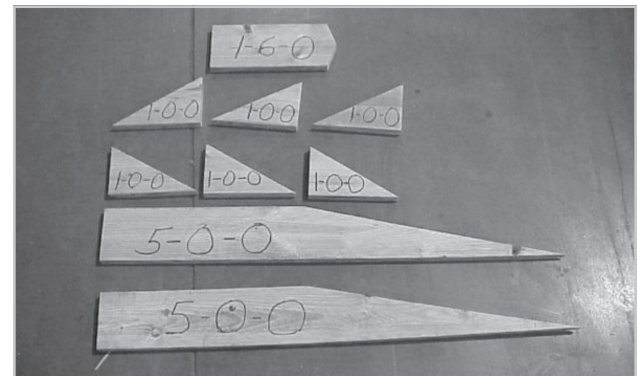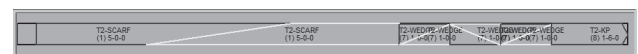

Figure 40

Figure 41

Figure 40 shows 2 pieces 5-0-0 + 6 pieces 1-0-0 + 1 piece 1-6-0 = 17-6-0 total piece length.

The ALS Optimizer automatically combined all these pieces and cut them from a single piece of lumber. The saw was able to cut 17-6-0 worth of pieces from a 12-0-0 stock (as shown in Figure 41).

Using the Optimizer, cutting potential was maximized and waste was minimized.

Below is a comparison of an ALS 4.0 and a component saw. The two photos highlight the advantage of using the Optimizer feature on the ALS 4.0.

Example: The job chosen for this comparison contained 11 trusses and 121 pieces.	
ALS 4.0 Stock lengths of 14, 16, and 18 ft. were used.	**Component Saw** Stocks lengths of 8, 10, and 12 ft. were used in all three runs. The job was cut three times with waste longer than 2-0-0, 2-9-0, and 3-0-0 respectively recycled back through the component saw or a radial arm saw.
ALS 4.0 WASTE = 0.68%	**COMPONENT SAW WASTE** **Recycle 2-0-0: 9.31%** **Recycle 2-9-0** (above)**: 11.79%** **Recycle 3-0-0: 13.87%**

3.7.3 Optimizer Options

The Optimizer yields the **least waste** when the following general conditions exist:

- The number of different pieces in the job file (the selection pool) is large (250 or more)

- There are a wide variety of lengths in the file. The more shorts, the better.

- The number of different sizes and grades of stock required for the job is small.

For the **most effective optimization and material handling** ease, it is recommended to follow the steps below:

- Break jobs down into smaller groups of 6-10 trusses

- Cut all webs together

- Specialty parts (bevels, wedges, sliders, etc.) should all be sent to the ALS 4.0. In most cases, these parts can be cut from one grade/size stock.

Figure 42

Turns on the feature that causes the saw to review multiple stock pieces and choose the stock that produces the least waste. Stock pieces to be used can be chosen or revised from the Change Stock screen (Figure 18, Section 3.3.4).

⚠ **CAUTION**
When using this option the operator will have to pay attention to the user interface as to what length and grade lumber to feed into the saw.

There are several modifiers that affect the operation of the Optimizer. They are all located on the Optimizing Options panel (Figure 28 & Figure 45, Section 3.5.3):

Selecting each option will mark a check in the box. Doing so will result in the following change.

- **Match Grade Size** – With the Multiple Stock Pieces selected (Figure 42), Match Grade-Size can be selected as a modifier. Selecting this feature will request lumber by grade and size. The saw will request like lumber grades and sizes until all of the same stock has been cut.

⚠ **CAUTION**
When using this option the operator will have to pay attention to the user interface as to what length and grade lumber to feed into the saw.

- **Cut all Within Grade** – With Multiple Stock Pieces selected (Figure 42), Cut All within Grade can be selected as a modifier. Selecting this feature will match all grades regardless of size. This will set the cutting order by like grades until a change is required for the remaining stock.

NOTE
Match Grade-Size and Cut All within Grade are mutually exclusive. Both of these features cannot be turned on at the same time.

- **Combine all Grades** – When this option is checked, the computer will choose from all pieces of the same size without regard to a grade requirement. Make sure that the highest grade required for the job is available.

> ### ⚠ CAUTION
> This will improve the waste factor, but should be used carefully to make sure that lower grade lumber is not used on pieces requiring higher grades.

- **Longest Pc Left** – By selecting this option, the Optimizer will look through the job for the longest uncut piece that will fit on the stock each time it places a piece for cutting. This is helpful when TRS files are not sorted long to short and it is desired that the longer pieces to be cut first for stacking.

> ### NOTE
> Longest Pc Left will work when the optimizer is on or off, but its usefulness will be limited by the Non-Optimize Look Ahead setting (refer to Figure 44). Alpine recommends setting this value greater than 2 when using Longest Pc Left without the optimizer on. See section 3.8.5 for more information on the Non-Optimize Look Ahead.

- **Cut All Within Size** – Allows cuts to be organized by width of lumber. All 2x4 pieces will be cut before the saw asks for a 2x6, 2x8, etc.

- **Crown Up** – This option will tell the saw software that top and bottom chords should not be flipped for nesting. It may be useful to select this option so all board labeling will be facing up during assembly on the tables.

- **Truss by Truss Cutting** – Turning this option on will prompt a screen listing the individual trusses within the job. Select the specific truss or trusses required and when cutting begins, the saw will cut all of the pieces from the selected truss regardless of where they are located in the TRS file. This option can be used to simplify the lumber sorting process. Each truss will be cut one at a time and can be sorted and stacked accordingly.

3.7.4   Nesting

Found in Figure 28 of Section 3.5.3, these options turn on the nesting function for the type of joint interfaces shown. If nesting is turned off, the computer will leave a small gap between the pieces.
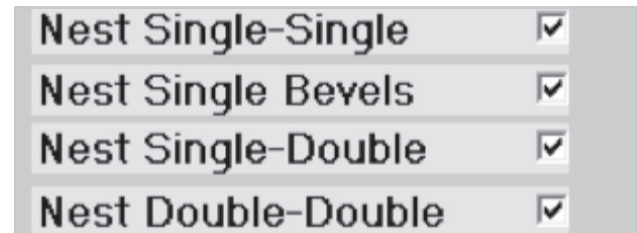

Figure 42

3.7.5   Non-Optimize Look Ahead

Non-Optimize Look Ahead creates a moving window within which the Optimizer is fully functional in the Run All – Optimize Off mode.

Figure 43

Enter a value greater than 1 to limit how far ahead the program will search for optimizarion. As pieces are completed, new pieces take their place in the Look Ahead.

The Optimizer is fully functional, but only within a relatively small section of the TRS file. This means that some optimizing benefit will be available, while restricting the size of the job for easier sorting on the output side of the saw.

> ### NOTE
> Non-Optimize Look Ahead is best used when cutting truss-by-truss, or straight down a cutting list generated by truss design software.

3.7.6　Pick List Options

The following options can be selected on the screen shown in Figure 28, section 3.5.3:

- **Pick List w/Cut Details** – Turning this option on will add additional cut details as they were recorded in the truss design software. This will result in a list that contains more data than only the stock length, width, and grade. The list is limited to what was entered as the trusses were designed.

- **Run From Pick List** – If a pick list has been created for the TRS file, the program will run from the entries in the run list. If sorting is turned on, from the entries in the sorted run list

- **Sort Pick List** – Enables sorting on user defined keys such as Width-Grade-Length, etc. (see Figure 44 in section 3.7.7 for further explanation).
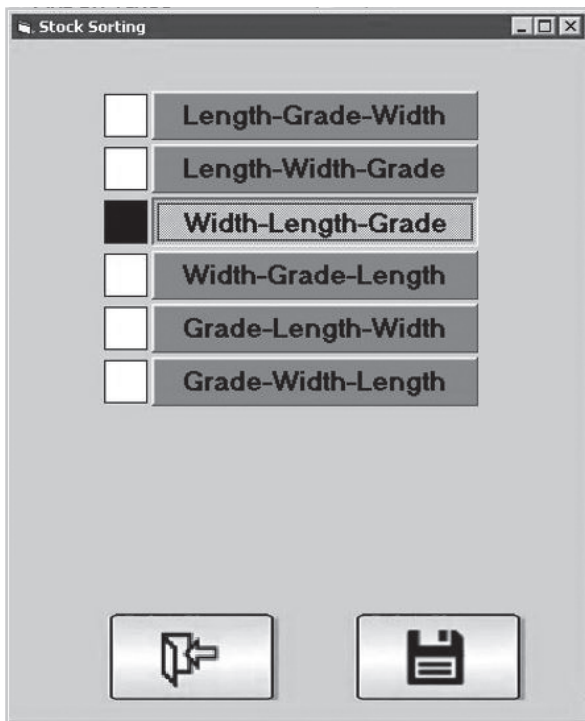
3.7.7　Stock Sorting

Figure 44

- The options shown in Figure 44 can be used to sort any pick list. Each category will be fulfilled before the software advances to the next category.

- Using **Width-Length-Grade**, the priority will be placed on the width. All lengths and grades will be grouped within each differing width.

- This logic is the same for each possible selection on this screen (Primary-Secondary-Tertiary).

3.7.8　Optimizing Example

There are many ways to configure the software options for Optimizing. The purpose of all these options is to provide enough flexibility so that the ALS 4.0 can best maximize production efficiency. However, this many options can be confusing when first beginning to use the saw. The following example is intended to highlight the Alpine recommended settings for maximum efficiency. Follow this example prior to adjusting the optimizing settings any further.

1. First, set up the batching routine in the engineering/cutting software to sort all the pieces for the job by lumber grade from highest to lowest and place them in the TRS cutting file in that order. Next, sub sort by length and size if there are multiple stock lengths.

2. Set the cutting and nesting options in the ALS 4.0 program as shown below in Figure 45:

Figure 45

3. Confirm that Multiple Stock Lengths is checked as shown in Figure 45. Then, click or touch the label reading MULTIPLE as shown below and the Change Stock Screen will open (Figure 18).

4. All of the lengths and grades to complete the cutting job must be available at the saw before beginning the cutting operation. For the best optimization, Alpine recommends using 14 or 20 ft. boards of lumber in all necessary grades. The selection is made on the Change Stock Screen as shown in Figure 18.

5. Click or touch DONE on the screen (Figure 18) to go back to the Piece Select Screen (Figure 8).
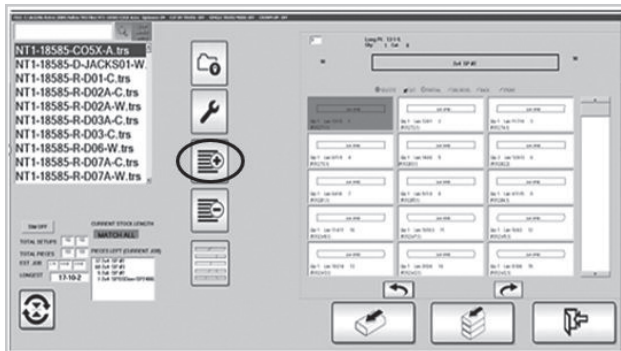
Figure 46

6. Now, click or touch Create Pick List in AUTO (circled in Figure 46).

7. The Pick List will overlay the Piece Select Screen shown in Figure 47.

Figure 47

NOTE
This list can be printed and used to pick lumber in the yard.

8. Most of the material required on this example list (Number 8 on Figure 47) is 2x4 SP #1 and SP #2 in 14 and 20 foot length. In this case it would be advantageous to store one bunk of each grade of lumber at the saw. Other sizes and grades required for the job should be picked before cutting is started. The pick list not only shows the required lumber, but also the order in which it is required.

⚠ CAUTION
It is very important that this order be maintained in the picked lumber as no pieces requiring high grade lumber will ever be placed on lower grade lumber.

When the job used in this example is cut, the 20 ft. 2x4 SP SS boards will be cut first as they are first on the pick list. The saw computer will continue to ask for this size and grade lumber until all 13 boards are cut into the required truss components. At this point the saw computer will ask for the next grade and size lumber listed on the pick list which has been sorted from highest to lowest grade lumber.

3.8 Additional Options:

The options defined below can be found on Figure 28 in Dimensions-Quantities (Section 3.5.3). They are listed to increase familiarity with their purpose. Please heed the caution statement below before changing the default values.

⚠ CAUTION
The following options are used in troubleshooting situations. They should only be changed from their default values per instruction from Alpine Equipment Customer Service.

- **Quick Camber Adj.** – Adjustment input for components where the camber is known
- **Non-Optimize Look Ahead** – Refer to section 3.7.5
- **Max Pieces Per Stock** – Limits the number of pieces placed on each board
- **Trailing Dbl. Cut Spacing** – Spacing between pieces following double cut trailing end
- **L1 Grip Distance** – Distance from L1 to blade
- **Minimum Transfer Length** – Minimum length to transfer control from L1 to L2
- **Minimum 4+ Cut Piece** – Shortest 4 cut piece length
- **No Ejection Max Length** – Length that will drop onto waste conveyor
- **Backfeed Eject Max Length** – Maximum Length of piece that will be sent to small piece conveyor instead of the waste conveyor
- **Return Waste Length** – Minimum length of pieces to be sent to the waste conveyor

NOTE
The waste shift options listed below are used for troubleshooting and should only be adjusted with the assistance of Alpine Equipment Customer Service.

- **Waste Shift Length** – Length (in decimal feet) to transfer to front of stock piece when making squaring cut on the board

- **Waste Shift Min** – The start of an exclusion zone designed to eliminate final moves that place the end of the waste at the edge of the roller nearest the blade

- **Waste Shift Max** – The end of an exclusion zone designed to eliminate final moves that place the end of the waste at the edge of the roller nearest the blade

3.8.1   Names/Paths

The options defined below can be found on Figure 28 in the Names/Paths section. They are defaulted by the INI file when the saw is installed.

- **Company Name** – Name of company
- **Saw Name** – Name of saw
- **Redirection Caption** – Button label
- **Redirect Path** – Path to send uncut piece TRS file
- **Capture Lumber Grades** – Lists all lumber grades found in TRS files
- **CLEAR** – Clears captured lumber grades
- **SAVE** – Saves this options list to file
- **STANDARD PIECE LIST** – Opens Standard Piece List
- **EXIT** – Close this window

3.9   Standard Pieces

3.9.1   Introduction

Standard pieces is a software option that will automatically cut frequently used pieces. It even works without optimizing or nesting. Examples of standard pieces might include chords and webs for short jacks, heel wedges and sliders, blocks for floor trusses, even floor truss webs. The software places Standard Pieces on the stock; they are shown in Figure 48 on the stock layout.
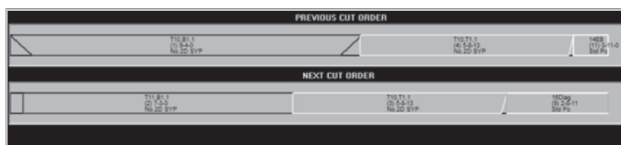

Figure 48

3.9.2   How it works

Once pieces that are used frequently across cutting operations have been identified, they can be set as standard pieces. Doing so will add them to a list used by the ALS 4.0 software. What makes this feature unique is that it does not add lumber stock to the cutting jobs. The standards pieces function simply places the set pieces on any leftover lumber within the job. Using standard pieces will make the best use of material waste, so that the least amount of lumber is left unused.

3.9.3   Entering Standard Pieces

The Standard Piece List can have any cuts on it. The best benefit will result when the set pieces are reasonably short, as they will be placed on the remaining waste in the job. Pieces can be added to the list by creating them in Semi-Auto (Figure 21, Number 6), or they can be selectively extracted from any job file and placed in the stdpcs.trs file (as shown in section 3.9.4).

The standard pieces list can be prioritized by importance as well as temporarily turned off. Priorities can be changed at any time. Additionally, turning off the standard pieces will not eliminate them from storage in the stdpcs.trs file so they will remain available for use at any time.

3.9.4   Capture a Piece from a Job

When viewing the Job/Piece Select Screen (Figure 49), highlight the desired piece by clicking or touching it on the screen.

1. Click or touch Mark Piece.
2. Click or touch Add to Standard Pieces on the popup.
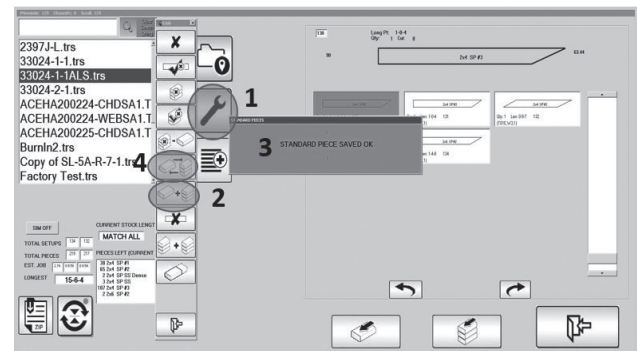3. Verify that standard piece was saved

Figure 49

The selected piece will be automatically added to the Standard Piece List.

4. For each individual piece the quantity can be modified.

3.10   Creating a Pick List

When using the Multiple Stock feature, pick the lumber for each job ahead of time.

The Create Pick List option must also be checked in General Options (Figure 8).

The program will create a Pick List for the current job when the button is clicked or touched (Figure 8).

The Pick List can be created at the saw in regular operating mode or in the office prior to sending the job to the saw.

Figure 50

A file will be created with the same name as the job and the extension ".stk". The file will be placed in the same directory as the job. Chose one of two versions, with or without cut details. Both versions contain the Pick List and Summary information.

1. If the Pick List w/Cut Details are checked under Program Options (Section 3.7.5), the file will also contain details about each piece of stock that will be cut. Each line contains the stock length, lumber description, lumber size, and information about the pieces placed on each stock piece. The file is stored as comma delimited, allowing it to be imported by a spreadsheet software. Figure 51 shows an example of the complete file with Stock File Details, Summary, and Pick List.

2. If the Pick List is generated without Cut Details, it will generate a list of size, length, and grade only.

Figure 51

When selecting a job that has a pick list, the screen will display an alert that a pick list exists. The Create Pick List button will change to View Pick List and a Delete Picklist Data button will appear as circled in Figure 52. If the pick list is deleted, both will return to their original state and the transfer files will be erased. However, any changes that the transfer files made to the options and the lumber file will remain.

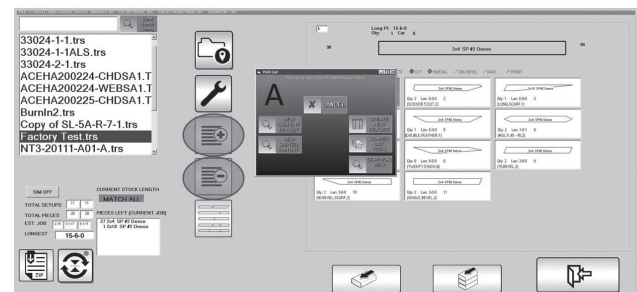The View Pick List button will bring up the popup labeled A in Figure 52:

Figure 52

This screen allows user to view current Pick List, Current Run List (the actual list of stock fills which are sent to the saw to be cut, and in this exact order), and a new feature, the Graphical View (Figure 53).

This is a graphical representation of all of the stock fills for an entire job. The NEXT button can be used to see the following set of stock fills.
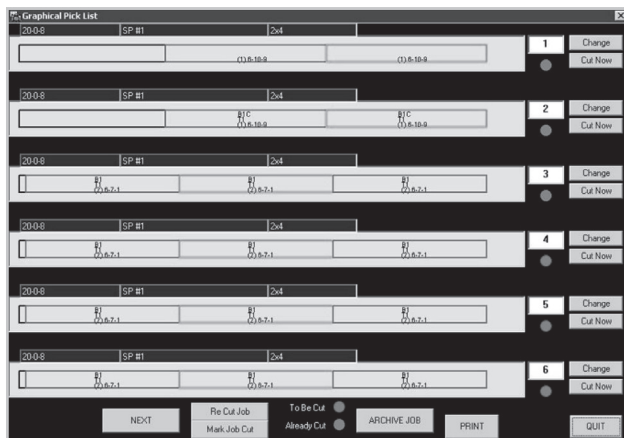

Figure 53

3.11 Auto Infeed System

If the ALS is equipped with the optional Auto Infeed System, the panel panel in Figure 54 will allow control over the system.

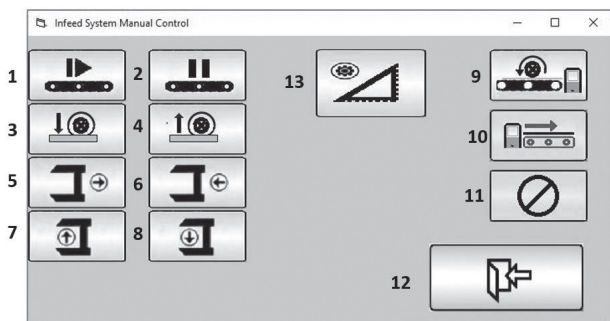This panel can be accessed from the home screen and in all modes of operation.

Figure 54

The following describes the function of each button:

1. **LIVEDECK FWD** – Starts live deck moving to saw
2. **LIVEDECK STOP** – Stops live deck movement
3. **INFEED ROLL CLAMP DOWN** – Lowers infeed roll clamp assembly
4. **INFEED ROLL CLAMP UP** – Raises infeed roll clamp assembly up
5. **CLAMP ARM IN** – Pulls clamp arm in
6. **CLAMP ARM OUT** – Extends clamp arm
7. **BOARD CLAMP OPEN** – Opens clamp jaws
8. **BOARD CLAMP CLOSE** –Closes clamp jaws
9. **LOAD LUMBER FROM LIVEDECK** – Perform complete lumber load sequence
10. **EJECT LUMBER** – Eject any lumber inside of saw
11. **STOP ALL** – Stop all lumber loading operations
12. **EXIT** – Leave this dialog
13. **TIME DELAY SETUP** – Touching this icon will bring up the time delay menu as shown below.

Touching Icon 13 will bring the Auto-Infeed Time Delay Setup Menu. From this menu the operator can enter specific time delay settings for the Roller camp up and down, Board clamp and release time, Conveyor on time, Infeed gripper jaw arm in and out time and L1 Home offset as shown below:

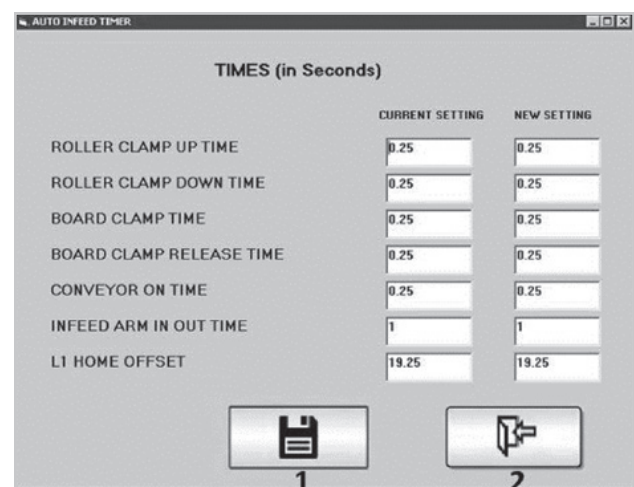

Figure 55

1. **SAVE SETTINGS** – Touching this icon will save the time settings.
2. **EXIT SE TTINGS** – Touching this icon will exit the current screen and brings you back to the Auto-Infeed System manual control screen.

3.12 XML Files

AlpineLE.xml is a file that contains parameters that affect the operation of the ALS 4.0 XE. The settings can only be changed or modified by Alpine Equipment Customer Service. The access to these settings are locked shown only for educational purposes.

Figure 56

The following describes the function of each button:

1. **GENERAL** – This tab has settings related to small part ejection .

2. **SYSTEM** – This tab has various system settings to control speed, offsets and time delays.

Figure 57

3. **AXIS PARAMETER L1-L2-L1P** – This tab has speed, accel, decel, software limits and other mechanical settings for L1,L2 AND L1P Axes.
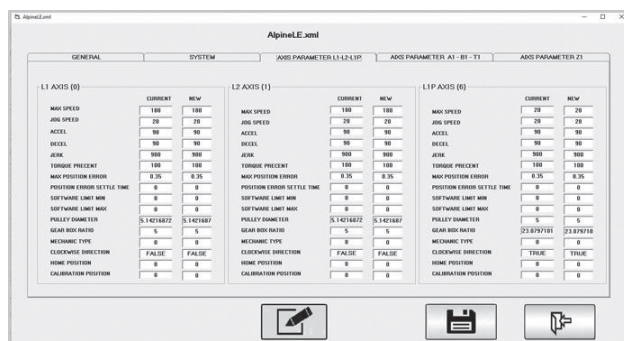
Figure 58

4. **AXIS PARAMETER A1-B1-T1** – This tab has speed, accel, decel, software limits and other mechanical settings for A1,B1 AND T1 Axes.
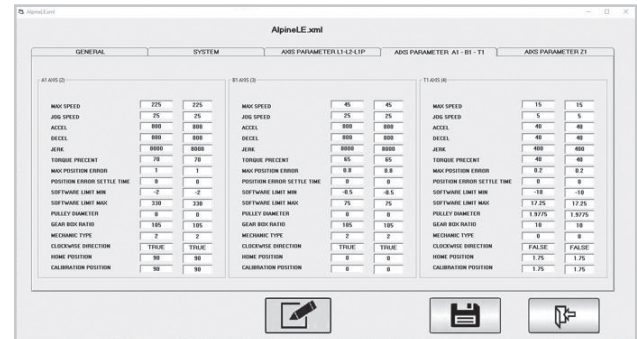
Figure 59

5. **AXIS PARAMETER Z1** – This tab has speed, accel, decel, software limits and other mechanical settings for Z1 Axis.
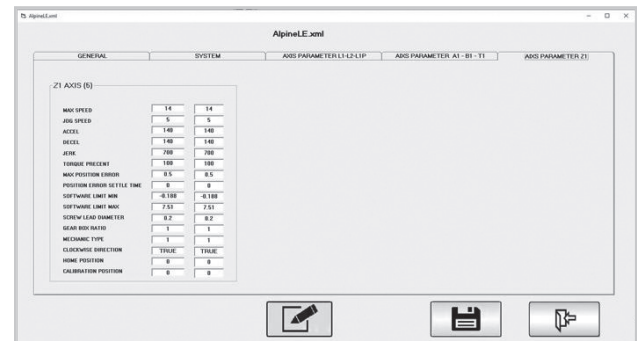
Figure 60

6. **EXPORT CHANGES** – pressing this button or icon will write the parameter changes to the controller.

7. **SAVE CHANGES** – Pressing this icon will save all changes made to the system settings

> **⚠ CAUTION**
>
> **Do NOT change these parameters without specific instructions from an Alpine Equipment Customer Service.**

AlpineLE.xml is a file that contains motion control parameters; these should only be changed by Alpine Equipment Customer Service.

> **⚠ WARNING**
>
> **Changes to settings in this file can damage the machine and will void the warranty.**

4. Calibration Procedure

NOTE
The Manual Control Screen is referenced throughout this section. Please see Figure 26 when this screen in referenced.

4.1 Turn Off Power

Step 1 – Turn off the blade motor and the conveyor

Step 2 – Open the saw cabinet door

Step 3 – Shut down the computer

Step 4 – Disconnect electricity and air supply.

Step 5 – Lock and tag out the electrical and air supply in accordance with OSHA procedures (i.e. OSHA 29 CFR 1910.147).

4.2 L1/L2 Belt Feeder Alignment

⚠ CAUTION
Misaligned belt feeders will cause cutting errors and rapid belt wear.

Step 1 – Use a straight edge (aluminum bar is recommended) on the belt and against the back fence, as shown in Figure 61. There should be no more than 0.010" (.25mm) gap between the straight edge and back fence rollers or belt.
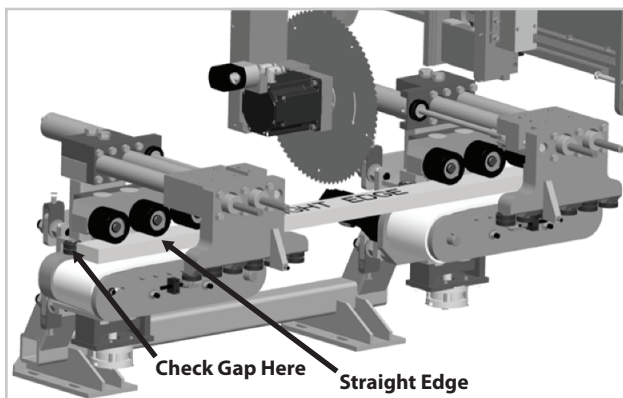

Check Gap Here   Straight Edge

Figure 61

Step 2 – Place the straight edge on the side plates, as shown in Figure 62. Ensure the straight edge has no more than a .010" (.25mm) gap between both side plates.

Step 3 – With the straight edge on both side plates (or using a level), insure both L1 and L2 feeders are level. This is shown in Figure 62.

Check Gap Here

Straight Edge

STRAIGHT EDGE

Side Plates
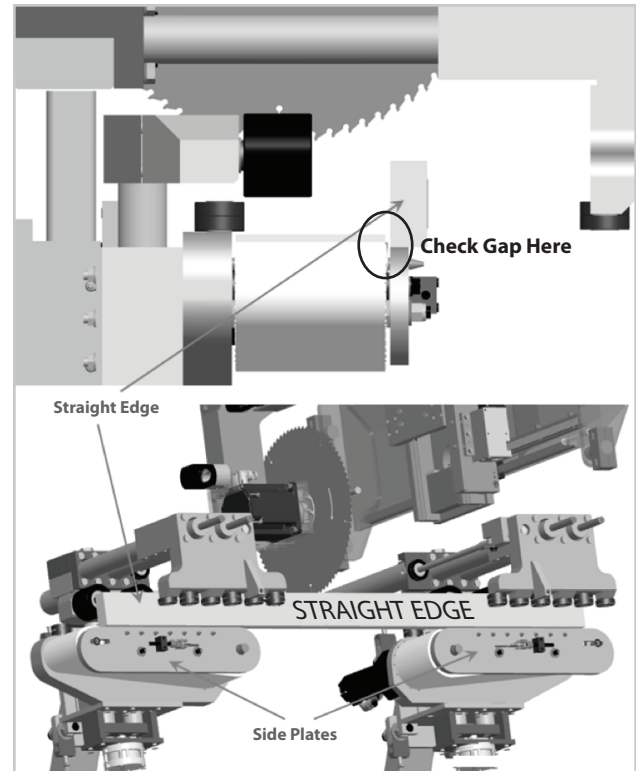
Figure 62

NOTE
If adjustment is required, contact Alpine Equipment Customer Service.

4.3 Infeed & Outfeed Conveyor Alignment

The fence of the infeed conveyor, L1 drive, and L2 drive must be aligned to ensure proper transfer of lumber from the L1 drive to the L2 drive.

Using a string line or machined lumber (dimensional lumber is not adequately straight for this measurement). Measure the distance between the fence of the L1/L2 drives and the fence on the outfeed conveyor. If the distance is no more than 1" behind the L2 drive fence, proceed to the next section.

If the distance is greater than 1" behind the L2 drive fence, adjustment is required, contact **Alpine Equipment Customer Service** for assistance completing this procedure.

4.4   Calibrate Bevel Axis (B1)

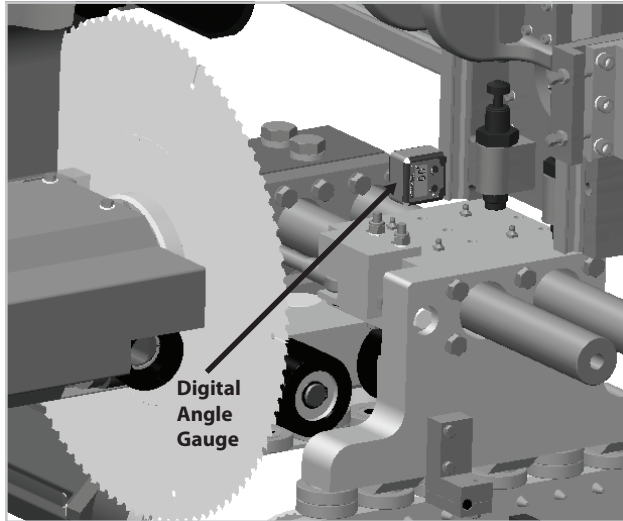**Step 1** – Place a magnetic digital angle gauge on the Z1 linear rails, as shown in Figure 63.

Figure 63

Step 2 – Select the "zero" button on the gauge to set the angle to 0.0.

Step 3 – Once the gauge has been set to 0.0, place it on the blade as shown in Figure 64.
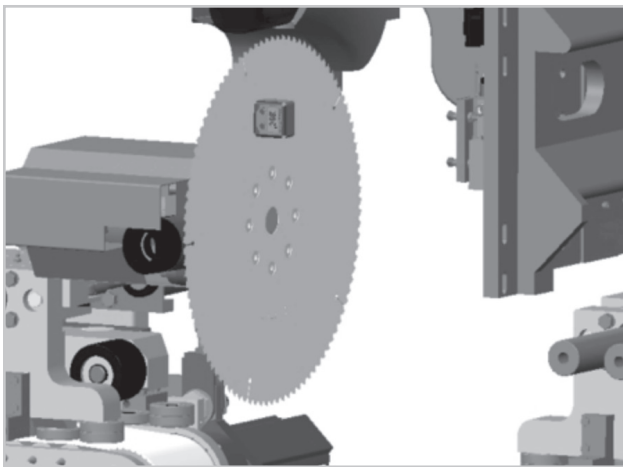
Figure 64

Step 4 – Close the saw door.

Step 5 – Open the main electrical panel.

Step 6 – Locate the blade breaker CB202 (Figure 65)
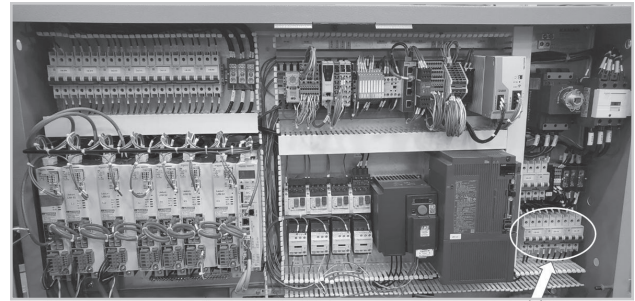
Figure 65

Step 7 – Move the breaker switch CB202 to the off position to disable power to the blade motor (shown in Figure 66).

Figure 66

Step 8 – Close the electrical control panel.

Step 9 – Turn on the main power to the ALS 4.0.

Figure 67

Step 10 – Follow the normal startup and homing procedures (Section 3.1).

Step 11 – In the Manual Control Screen, verify that B1 is registering "0.0".

Step 12 – Read the digital angle gauge. If it shows 180° then the axis is calibrated. If not, using the B1 axis jog buttons on the Manual Control Screen, jog the B1 axis until the gauge reads 180°.

Figure 68

Step 13 – Touch ▱ in the Manual Control Screen.

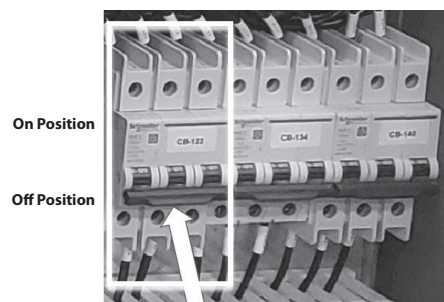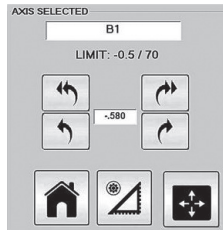**Step 14** – Shut Down the computer.

Step 15 – Open the saw cabinet door.

Step 16 – Disconnect electricity and air supply.

Step 17 – Lock and tag out the electrical and air supply in accordance with OSHA procedures (ie. OSHA 29 CFR 1910.147).

Step 18 – Remove the gauge.

Step 19 – Open the main electrical control cabinet and switch the blade breaker into the "on" position.

Step 20 – Close the main electrical control cabinet.

Step 21 – Turn power on to the ALS 4.0 and follow standard startup & homing procedures (Section 3.1).

4.5 Calibrate the Cut Angle (A1)

Step 1 – Place a piece of engineered lumber (preferably LVL) in the L1 drive axis. This board should be a minimum of 7.25" wide. Ensure the board is firmly against the back fence. The board should extend slightly past the blade.

Step 2 – Engage the L1 pusher by pressing the "L1 Pusher In" button on the Manual Control Screen.

Step 3 – Engage the L1 clamp by pressing the "L1 Clamp Down" button on the Manual Control Screen.
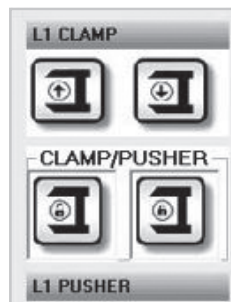
Figure 69
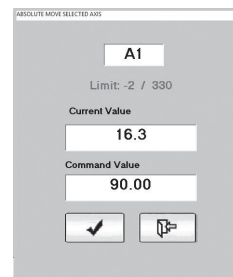
Figure 70

Step 4 – Move A1 axis to 90° using the Move A1 button on the Manual Control Screen.
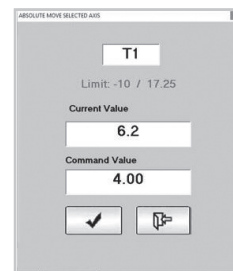
Figure 71

Step 5 – Move T1 to the center of the board.

For example, if the board being used is 8" wide, the position for the T1 axis should read "4.00".

Figure 72

Step 6 – Start blade using "Saw Motor On" button on the Manual Control Screen.
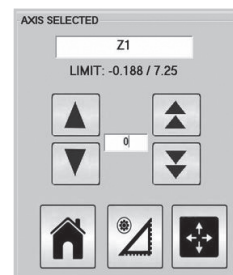
Figure 73

Step 7 – Lower Z1 using "Jog Z1 Down" button on the Manual Control Screen to cut off the end of the board. Be careful not to move Z1 down far enough to trip the software safety, or it will disable the axis. (If the axis is disabled, cycle the power on the machine and repeat Step 7).
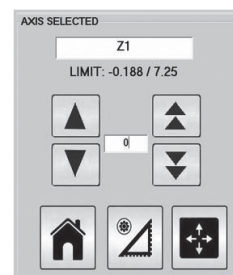
Figure 74

Step 8 – Send Z1 axis to zero using the "Move Z1" button on the Manual Control Screen.

Figure 75

Step 9 – Stop the blade using the "Saw Motor Off" button on the Manual Control Screen.

Step 10 – Release L1 Clamp using "L1 Clamp Up" button.

Step 11 – Release L1 pusher using "L1 Pusher Out" button.

Figure 76

Step 12 – Remove the board from the saw.

Step 13 – Check the 90° cut with a framing square, referencing from back fence side of the board.
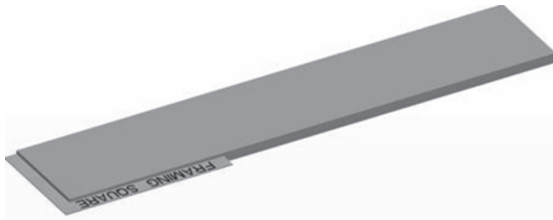
Figure 77

Step 14 – If the cut is square, skip to Step 15. If the cut is not square, determine if the cut is more than or less than 90° by observing the location of the gap next to the blade of the framing square. If the gap is on the inside corner of the square (near the back fence edge of the board), then the cut is more than 90°. Subtract the value that the cut is over 90° from 90 and use the "Move A1" button to correct the angle. If the gap is near the front of the board, away from the inside corner of the square, then the cut is less than 90°. Add the value that the cut is less than 90° to 90 and use the "Move A1" button to correct the angle. Repeat Steps 1-14, using a different value for Step 4.
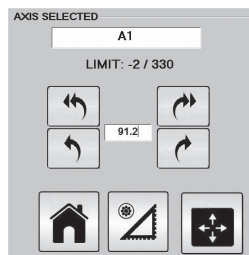
Figure 78

Step 15 – The A1 axis is now ready to calibrate. Touch the CAL A1 button in the Manual Control Screen. This will tell the program that the A1 axis is properly positioned at its calibration point of 90°.
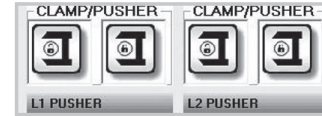
Figure 79

4.6 Calibrate Center of Rotation

The width of the Center of Rotation cut must be 15/32" (11.91mm). This dimension is twice the kerf (width of the cut made by the saw blade).

Step 1 – Place a 2x4 board (dimensional lumber) across L1 & L2.

Step 2 – Engage the L1 & L2 Pushers by pressing the "L1 Pusher In" and "L2 Pusher In" buttons on the Manual Control Screen.

Figure 80

Step 3 – Engage the L1 & L2 Clamps by pressing the "L1 Clamp Down" and "L2 Clamp Down" buttons on the Manual Control Screen.

Figure 81

**Step 4** – Move T1 to "1.75" using the "Move T1" button on the Manual Control Screen.
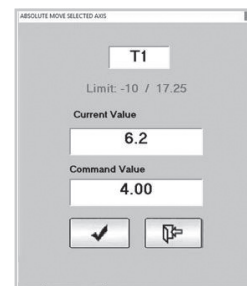
Figure 82

Step 5 – Confirm Z1 is at "0.0".

Step 6 – If the saw is equipped with a bevel axis, confirm that B1 is at "0.0".

Figure 83
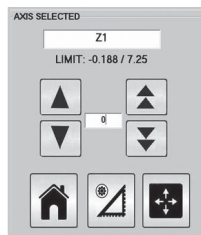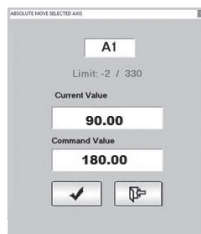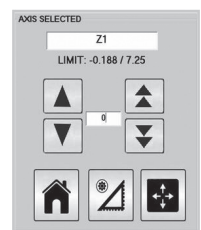
Step 7 – Move A1 to 90° using the "Move A1" button on the Manual Control Screen.

Figure 84

Step 8 – Start blade using "Saw Motor On" button on the Manual Control Screen.

Figure 85

Step 9 – Jog Z1 down using the "Jog Z1 Down" button on the Manual Control Screen until it cuts 3/8" into the board.

Figure 86

Step 10 – Move Z1 back to "0.0" using the "Move Z1" button on the Manual Control Screen.

Figure 87

Step 11 – Move A1 to 270° using the "Move A1" button on the Manual Control Screen.

Figure 88

Step 12 – Jog Z1 down using the "Jog Z1 Down" button the Manual Control Screen until it cuts about 1/4" into the board.
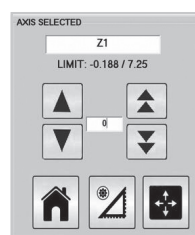
Figure 89

Step 13 – Move Z1 back to "0.0" using the "Move Z1" button on the Manual Control Screen.

Figure 90

Step 14 – Stop the blade using the "Saw Motor Off" button on the Manual Control Screen.

**Step 15** – Release the L1 & L2 Clamps using the "L1 Clamp Up" and "L2 Clamp Up" buttons on the Manual Control Screen.

Figure 91

Step 16 – Release the L1 & L2 Pushers using the "L1 Pusher Out" and "L2 Pusher Out" buttons on the Manual Control Screen.

Figure 92

Step 17 – Remove the board from the saw. If the cut measures exactly 15/32" and the shallower cut is on the left as shown below, it is correct and the calibration of the Center of Rotation is complete – skip to the next section. If not, continue to Step 18.

Shallower cut   15/32"

Direction of Feed
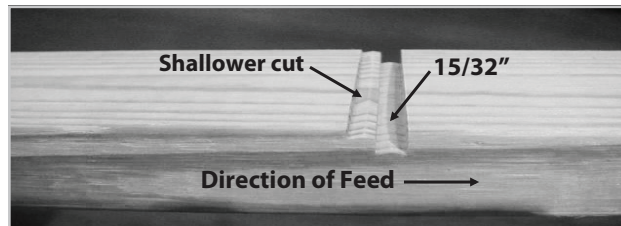
Figure 93

A1 should rotate about a vertical line down the center of the back side (motor side) of the blade. The rotation axis is built into the machine. Adjusting the Center of Rotation will align the blade with that axis.

⚠ **WARNING**

If the cut on the right of Figure 89 is the shallower cut on the left, Contact Alpine Equipment Customer Service for assistance.

Step 18 – Open the door to the saw cabinet, shut down the computer, and then disconnect electricity and air supply.

Step 19 – Lock and tag out the electrical and air supply in accordance with OSHA procedures (ie. OSHA 29 CFR 1910.147).

Step 20 – The Figure below shows the bolts that mount the motor to the angle plate.

If the saw is an "H" model, remove the B-axis cover plate to access the 4th motor mount bolt.

If the saw is an "HB" model, rotate B1 until the 4th motor mount bolt is accessible (approximately 35°). It is not necessary to remove the B-axis cover plate or the B-axis over-travel stop.
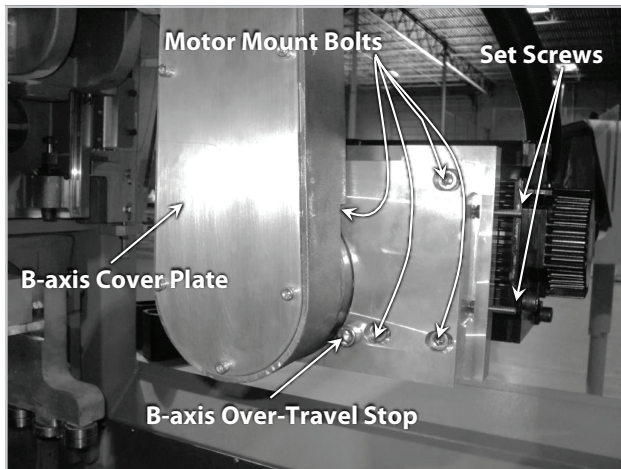
Figure 94

Step 21 – Loosen the bolts and use the set screws to move the motor one half the amount of the difference between the measurement taken and the required 15/32". Be careful to move the motor in the correct direction. With A1 at 90°, move the motor right if the Center of Rotation cut is too narrow and left if it is too wide.

Step 22 – Tighten the motor mount bolts.

Step 23 – Remove the lockout/tagout.

Step 24 – Power on the ALS 4.0 and follow normal startup (Section 3.1) and homing procedures and repeat Steps 1-17.

4.7 Calibrate Centerline (T1)

Step 1 – Place a 2x4 board (dimensional lumber) across L1 & L2.

Step 2 – Engage the L1 & L2 Pushers by pressing the "L1 Pusher In" and "L2 Pusher In" buttons on the Manual Control Screen.

Figure 95

Step 3 – Engage the L1 & L2 Clamps by pressing the "L1 Clamp Down" and "L2 Clamp Down" buttons on the Manual Control Screen.

Figure 96

Step 4 – Move T1 to "1.75" using the "Move T1" button on the Manual Control Screen.

Figure 97

Step 5 – Confirm Z1 is at "0.0".

Step 6 – If the saw was equipped with a bevel axis, confirm B1 is at "0.0".

Step 7 – Move A1 to 45° using the "Move A1" button on the Manual Control Screen.
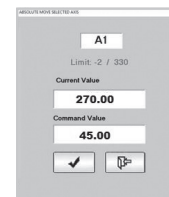
Figure 98

Step 8 – Start blade using "Saw Motor On" button on the Manual Control Screen.

Figure 99
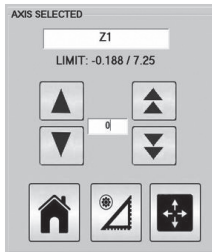
Figure 100

Step 9 – Jog Z1 down using the "Jog Z1 Down" button the Manual Control Screen until it cuts about 3/8" into the board.
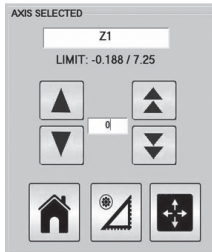

Figure 101

Step 10 – Move Z1 back to "0.0" using the "Move Z1" button on the Manual Control Screen.
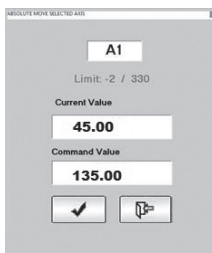
Figure 102

Step 11 – Move A1 to 135° using the "Move A1" button on the Manual Control Screen.
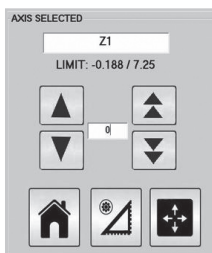
Figure 103

Step 12 – Jog Z1 down using the "Jog Z1 Down" button the Manual Control Screen until it cuts about 3/8" into the board.
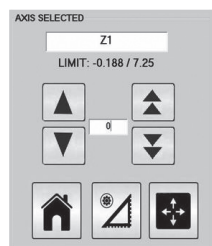
Figure 104

Step 13 – Move Z1 back to "0.0" using the "Move Z1" button on the Manual Control Screen.

Figure 105

Step 14 – Stop the blade using the "Saw Motor Off" button on the Manual Control Screen.

Step 15 – Release the L1 & L2 Clamps using the "L1 Clamp Up" and "L2 Clamp Up" buttons on the Manual Control Screen.

Figure 106

Step 16 – Release the L1 & L2 Pushers using the "L1 Pusher Out" and "L2 Pusher Out" buttons on the Manual Control Screen.

Figure 107

Step 17 – Remove the board from the saw and measure the distance from the back fence side of the lumber to the middle of the Centerline cut using a framing square. This dimension should be 1.75" (45mm). If so, it is calibrated – go to the next section.
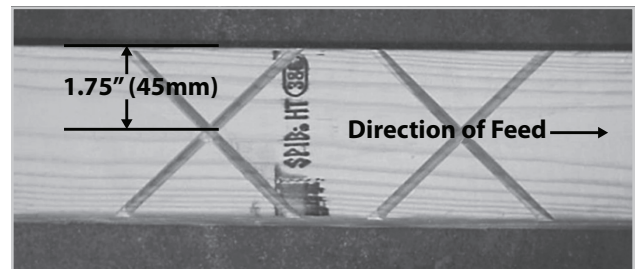
Figure 108

Step 18 – If the Centerline is off, the hard stop on the back of the T plate will need to be adjusted.

Step 19 – Turn off the blade motor and the conveyor. Once the saw stops, open the door to the saw cabinet, and then shut down the computer

Step 20 – Disconnect the electricity and air supply.

Step 21 – Lock and tag out the electrical and air supply in accordance with OSHA procedures (i.e. OSHA 29 CFR 1910.147).

Step 22 – The Figure below shows the hard stop for the T-axis. If the centerline of the cut is less than 1.75", extend the bolt. If the centerline of the cut is greater than 1.75", retract the hard stop bolt. Adjust the hard stop the distance the centerline is off.
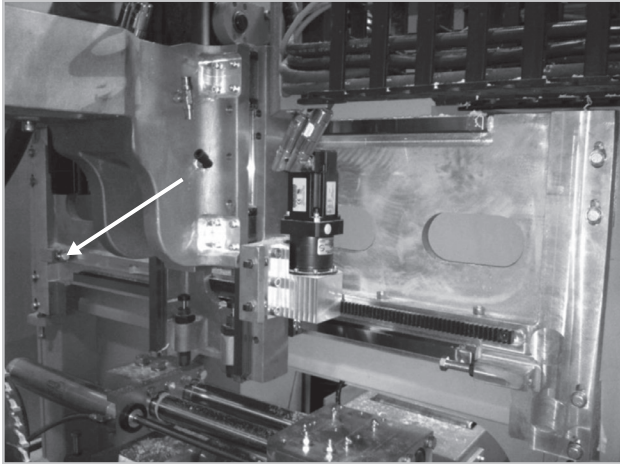
Figure 109

Step 23 – Remove the lockout/tagout.

Step 24 – Power the machine up and follow normal startup and homing procedures (Section 3.1). Repeat this section until calibration is complete.

4.8   L1/L2 Belt Tension Adjustment

In order to keep the ALS 4.0 running smoothly, it may be necessary to adjust the belt tension from time-to-time.

Step 1 – Loosen the idler sprocket bolts on both the front and back sides of the drive assembly, then loosen the locknuts.

Step 2 – Using a 9/16" wrench, adjust the belt tension assembly so that the belt can only be pulled away from the rollers by 1/4".

NOTE
Using an appropriate torque wrench, torque the adjustment nut to 40 in-lbs.

Step 3 – Once the belt has been properly tensioned, tighten the idler sprocket bolts on **both sides** of the drive assembly and the two lock nuts.

NOTE
The tension of the L1 & L2 belts should be checked prior to calibrating L1 & L2.
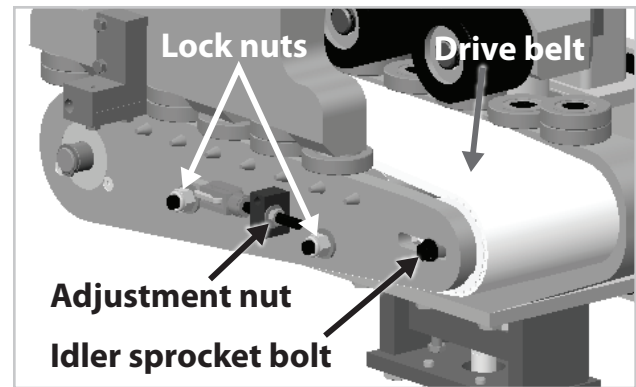
Figure 110

4.9   Calibrate Cut Length (L1/L2)

Step 1 – Check the L1/L2 belt tension (Section 4.8).

Step 2 – In SEMI AUTO mode, cut a board 15-11-0 and measure and record the overall length as "Cut 1".
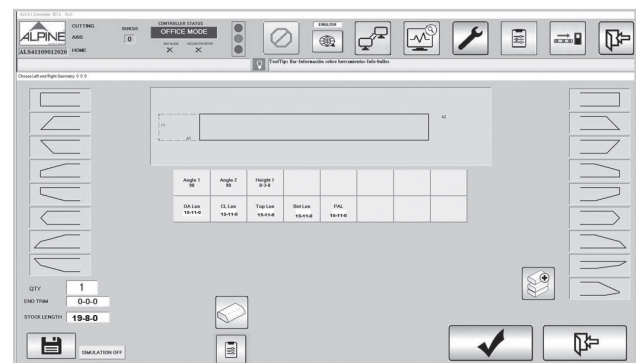
Figure 111

Step 3 – Reduce the cut length by 0-1-0. Cut, measure and record the overall length as "Cut 2".

- • If both cuts are accurate, the cut length is calibrated. Go to the next section.

- • If "Cut 1" and "Cut 2" are both long by the same amount, or both short by the same amount proceed to the next step.

- • If the two cuts are off by different amounts, contact **Alpine Equipment Customer Service** for additional guidance.

NOTE
In some cases it may be necessary to repeat the cut 5-6 times to determine the root cause of the inconsistent length.

Step 4 – To calibrate L1/L2, select "Controller" from the task bar at the bottom of the screen (Figure 112).
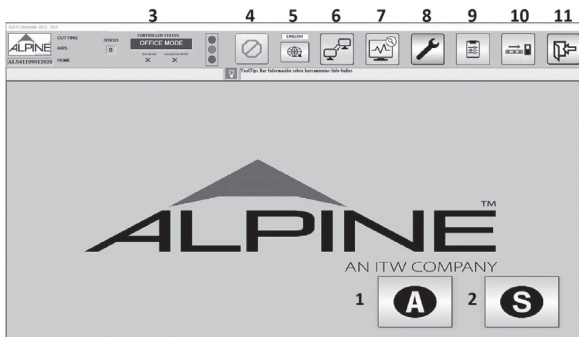
Figure 112

The screen in Figure 113 will appear:
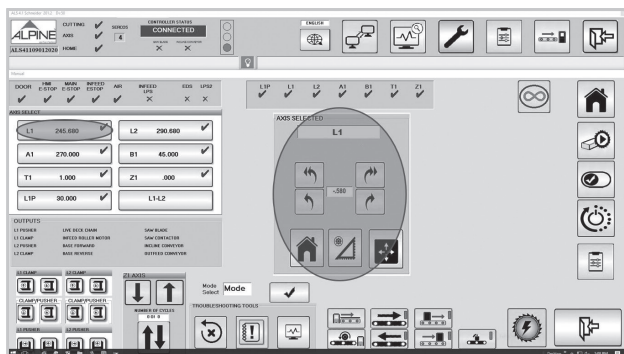
Figure 113

Step 5 – Select the "Calibrate L1 & L2 & L1P Lengths" button (circled on Figure 113 and shown in Figure 114).

Figure 114

Step 6 – Enter the commanded distance (the length input) and the actual measured distance using the box shown in Figure 115.
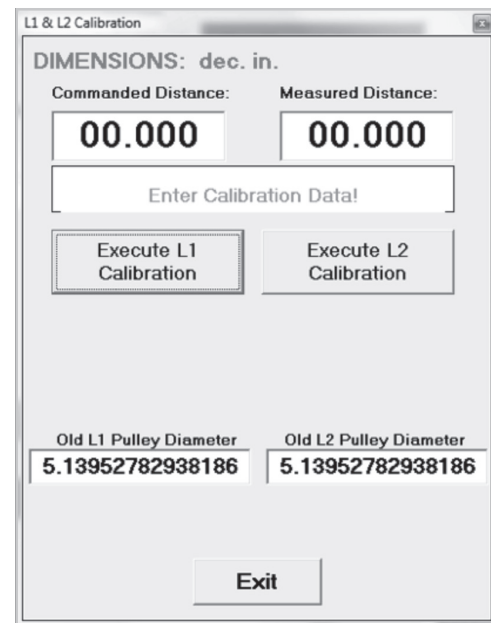
Figure 115

Step 7 – Select "Execute L1 Calibration". This button is shown in Figure 115 and Figure 116.
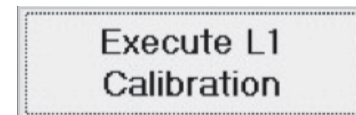
Figure 116

The following message (Figure 117) should appear.
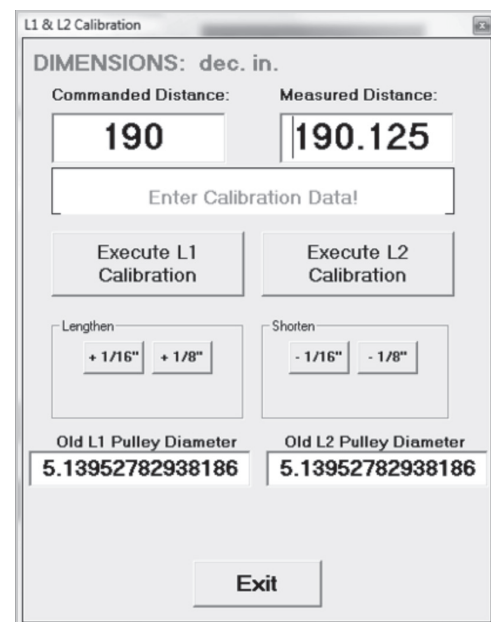
Figure 117

Step 8 – Repeat for axis L2.

Step 9 – Select "Exit".

4.10 Check Alignment of the T/Z Slide & Belt Feeders

Step 1 – Place a piece of machined lumber that is at least 7.25" wide across the L1 and L2 belts.

Step 2 – Engage the L1 & L2 Pushers by pressing the "L1 Pusher In" and "L2 Pusher In" buttons on the Manual Control Screen.

Figure 118

Step 3 – Engage the L1 & L2 Clamps by pressing the "L1 Clamp Down" and "L2 Clamp Down" buttons on the Manual Control Screen.

Figure 119

Step 4 – Move B1 to "0" using the "Move B1" button on the Manual Control Screen.
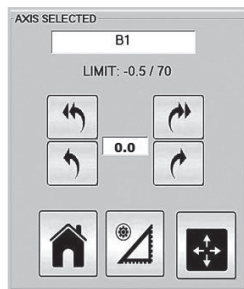
Figure 120

Step 5 – Move A1 to "90" using the "Move A1" button on the Manual Control Screen.

Figure 121

Step 6 – Move T1 to "-2" using the "Move T1" button on the Manual Control Screen
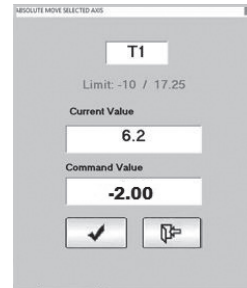
Figure 122

Step 7 – Move Z1 to "2" using the "Move Z1" button on the Manual Control Screen.
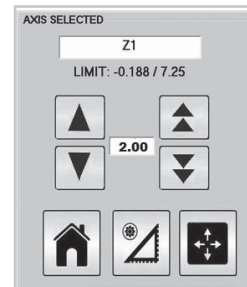
Figure 123

Step 8 – Start the blade using the "Saw Motor On" button on the Manual Control Screen.

Figure 124

Step 9 – Manually Jog T1 forward until a groove has been cut across the full width of the lumber using the "Jog T1 Fwd" button on the Manual Control Screen.
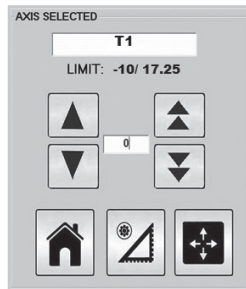
Figure 125
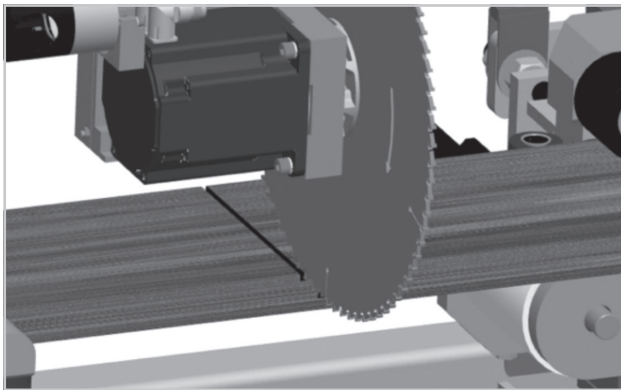
Figure 126

Step 10 – Move Z1 back to "0.0" using the "Z1 Move" button on the Manual Control Screen.
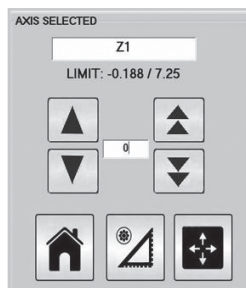
Figure 127

Step 11 – Move A1 to 90° using the "A1 Move" button on the Manual Control Screen.
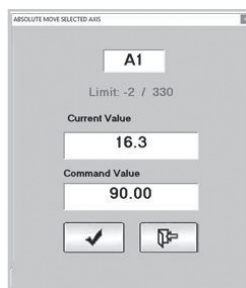
Figure 128

Step 12 – Stop the blade using the "Saw Motor Off" button on the Manual Control Screen.

Figure 129

Step 13 – Release the L1 & L2 Clamps using the "L1 Clamp Up" and "L2 Clamp Up" buttons on the Manual Control Screen.

Figure 130

Step 14 – Release the L1 & L2 Pushers using the "L1 Pusher Out" and "L2 Pusher Out" buttons on the Manual Control Screen.

Figure 131

Step 15 – Using a framing square on the surface of the board that was against the fence, check the groove as shown.

Figure 132

If the cut is square, the calibration procedure has been successfully completed.

⚠ WARNING

If the cut is not square, contact Alpine Equipment Customer Service for proper procedures, failure to follow proper procedures may result in damage to machine.

5. Maintenance

5.1 Parts Identification

5.1.1 Inkjet Printer
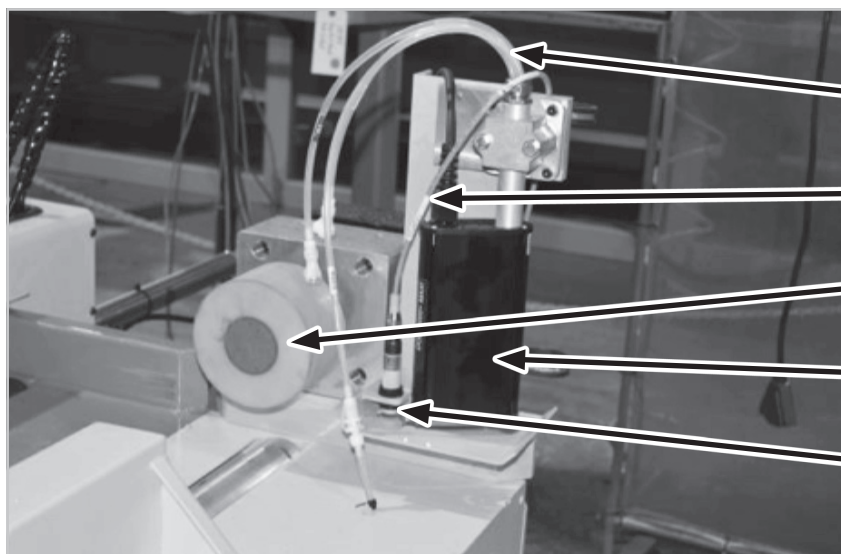
Figure 133

Printer Ink Cables – APN 26344

Printer Sensor Cable – APN 20662

Infeed Roller - APN 38081

Printer Head – APN 33795

Photo Sensor (Printer) – APN 20661

Printer Comm Cable (not pictured) – APN 26345

5.1.2 Inside the Cutting Cabinet
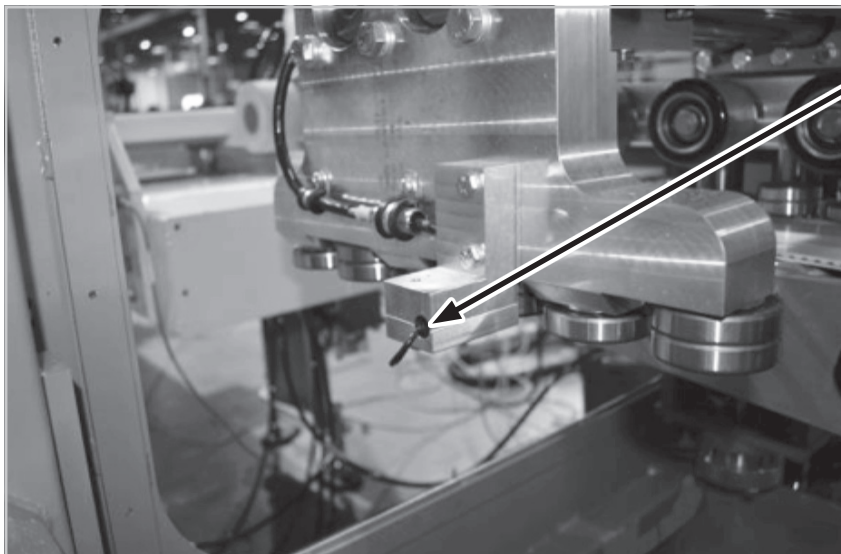
Figure 134

L1 Emitter – APN 24679
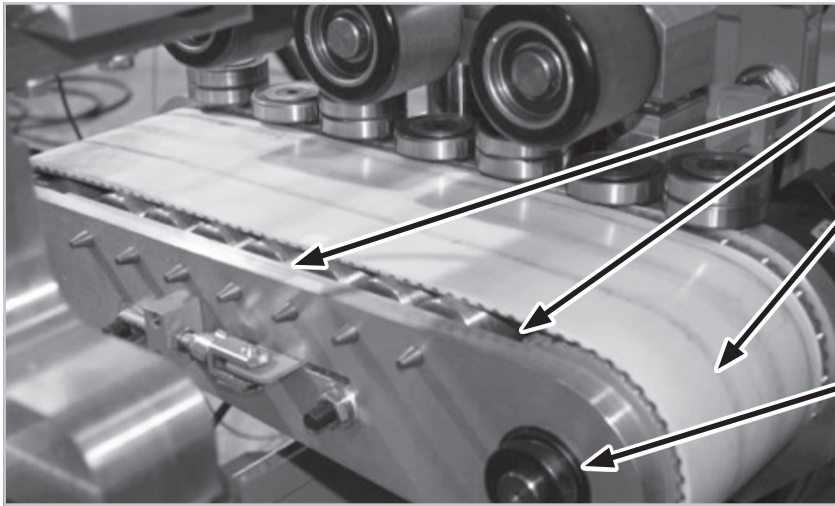
Figure 135

L1 Assembly – APN 34325

L1 Belt – APN 29107

Drive Shaft – APN 31026

Figure 136
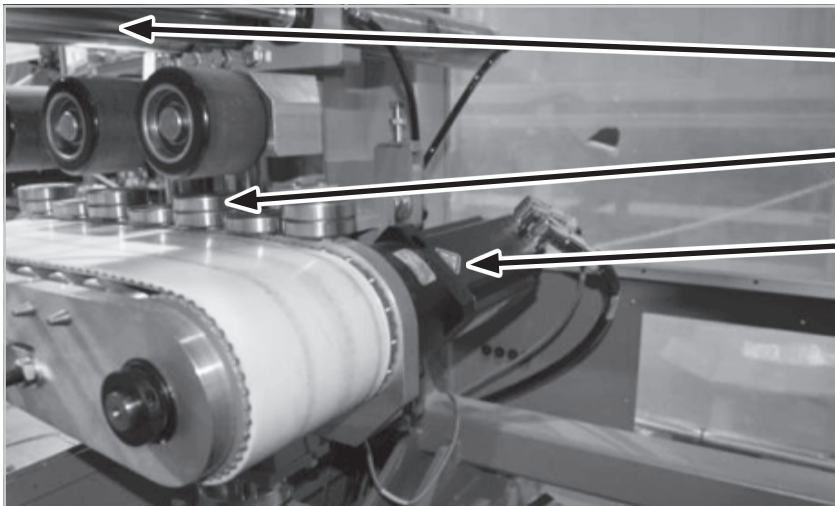
Shafts – APN 29988

Receiver – APN 23141

L1 motor – APN 41020

Bearing (not pictured) – APN 29987

Pusher Air Cylinder (not pictured) – APN 29761

Figure 137
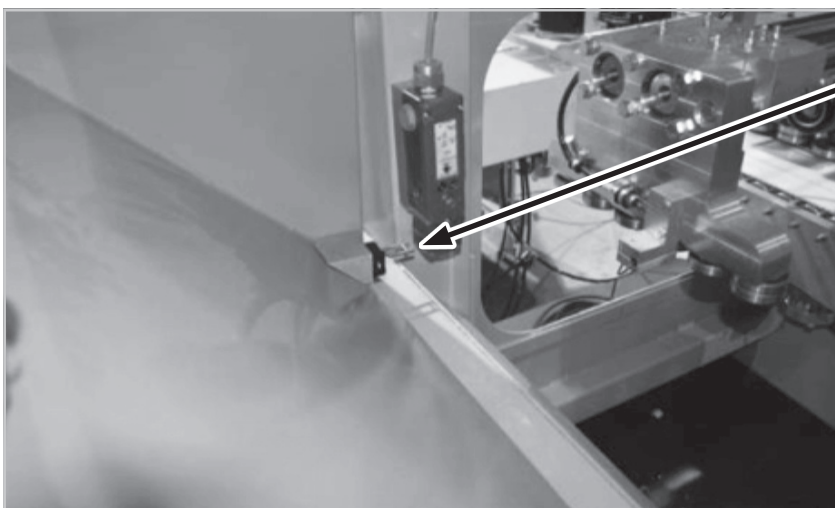
Door Interlock Mechanism:

Door Switch – APN 38208

Door Switch Key – APN 38207

Figure 138
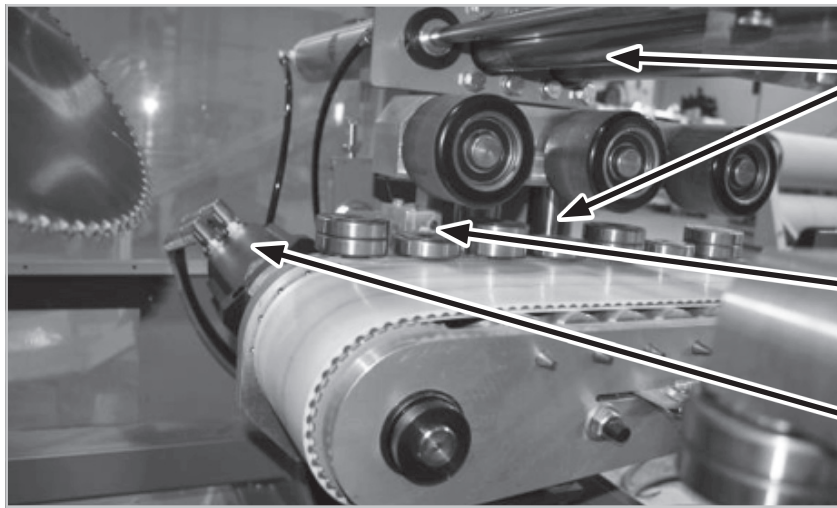
L2 Shafts – APN 29988

L2 Receiver – APN 23141

L2 Motor – APN 41020

Figure 139
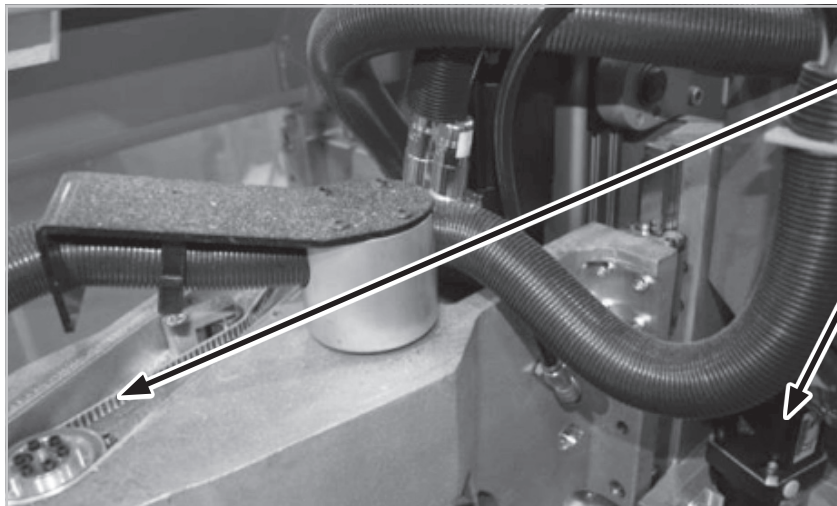
A1 Axis Belt – APN 28979

T1 Axis Motor – APN 41010

T1 Gearbox (not pictured) – APN 41011

Figure 140
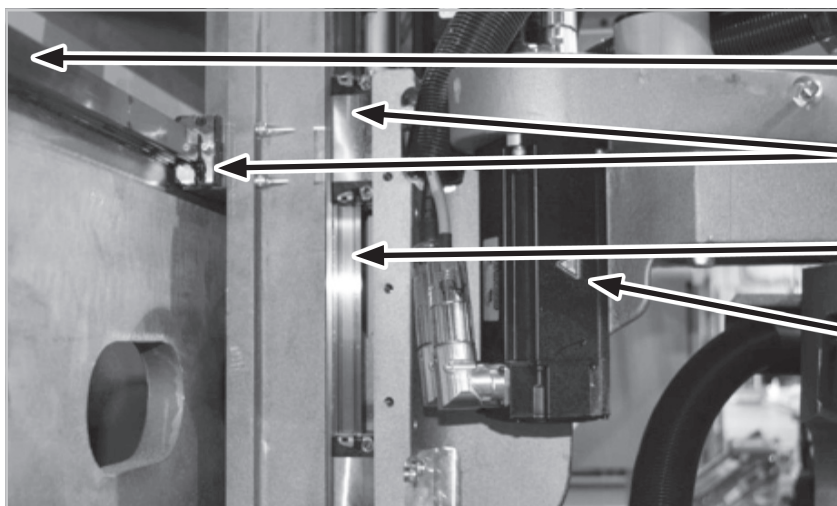
Linear Rail T-Axis – APN 28970

Linear Bearings – APN 29731

Linear Rail Z-Axis – APN 28969

A1 Axis Motor - APN 41009
(viewed from back of saw)

**B1 Axis Motor – APN 41009
(viewed from back of saw)**

Figure 141

5.1.3 Automated Infeed
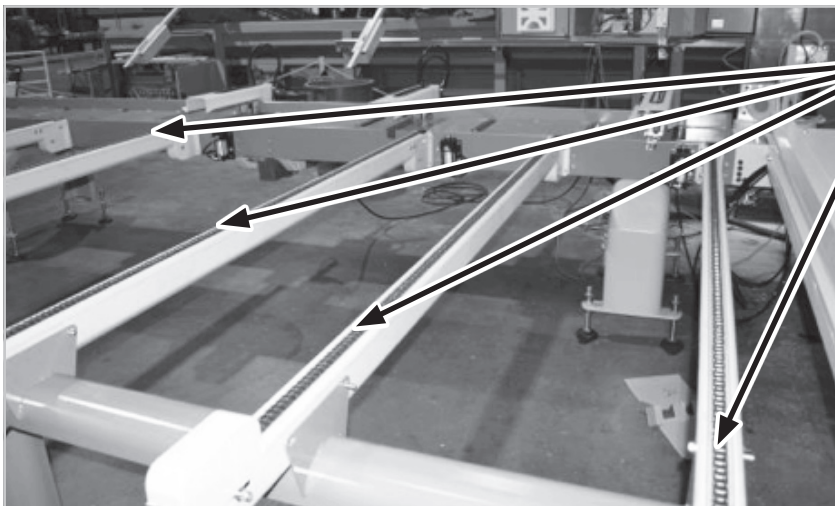
Chain – APN 70472

**Infeed Sensor (not pictured) –
APN 24664**

**Infeed Sensor Motor (not pictured) –
APN 29102**

Figure 142
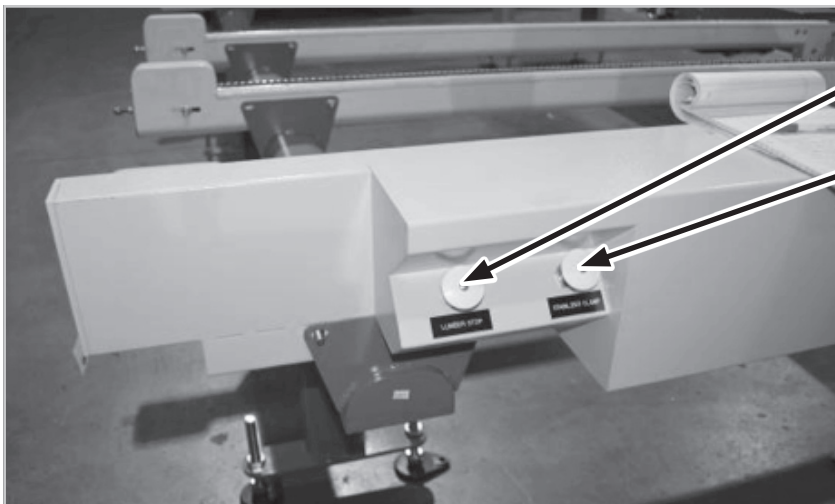
Lumber Stop Valve – APN 41081

Stabilizer Clamp Valve – APN 41081

Figure 143

5.1.4   Outfeed
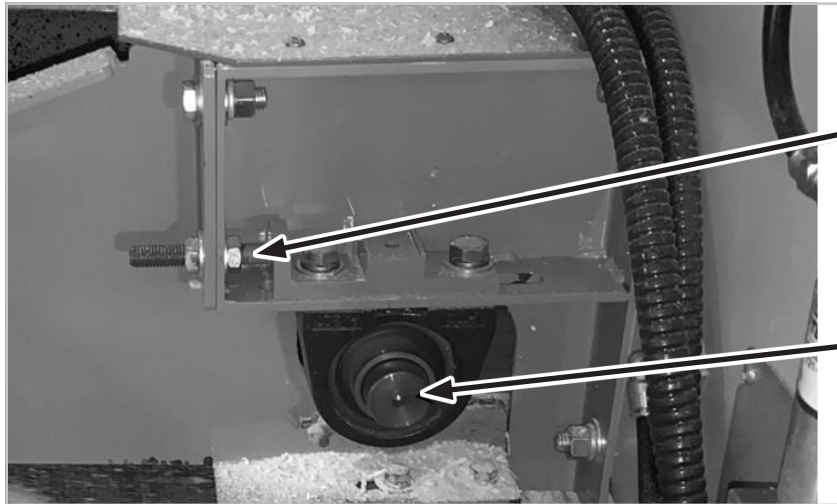
Belt Adjustment Screw – APN 27067

Parts Sorting Conveyor Tail Shaft –
APN 34009 (Bearing – APN 21993)

Figure 144
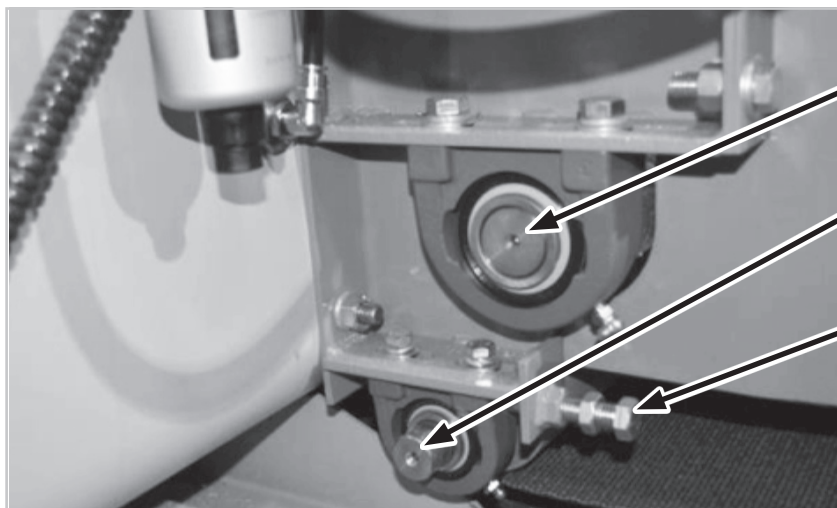
Parts Sorting Conveyor Tail Shaft –
APN 34009 (Bearing - APN 21993)

Waste Conveyor Tail shaft – APN 32758
(Bearing - APN 22437)

Belt Adjustment Screw – APN 20412

Figure 145
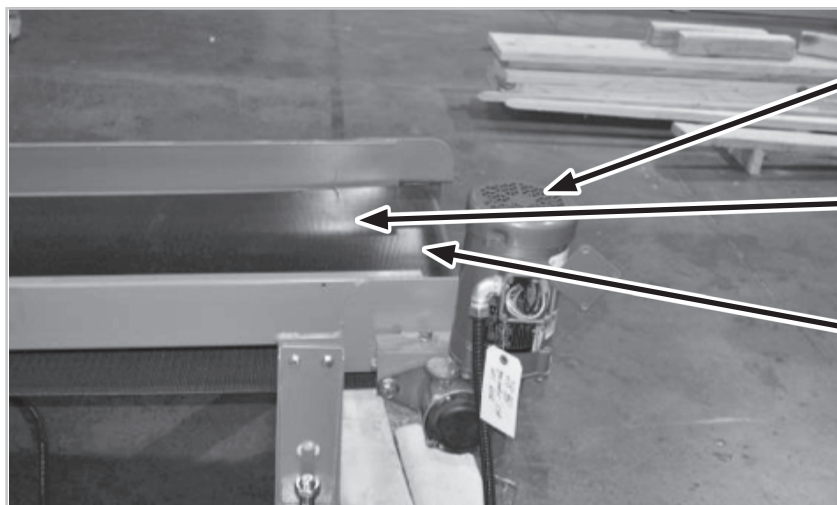
Waste Conveyor Gearmotor – APN 29861

Waste Belt – APN 30803

Tail Shaft (Roller) – APN 32759

Figure 146
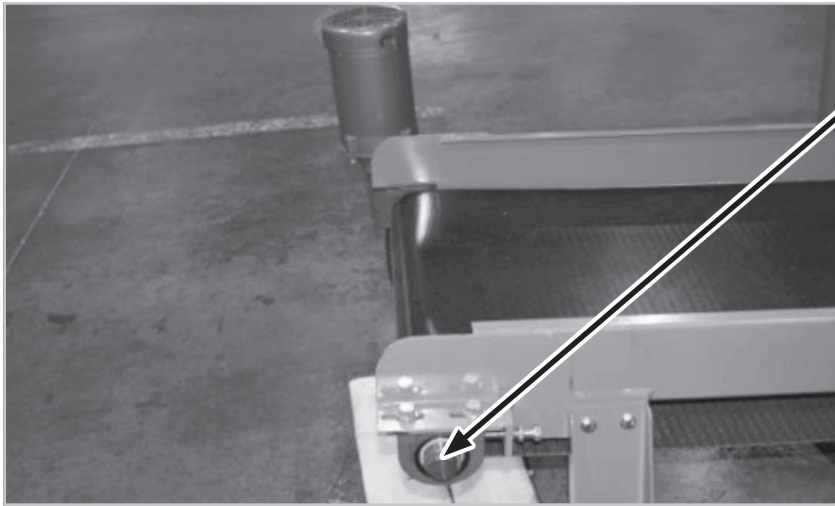
Tail Shaft (Roller) – APN 32759

Figure 147
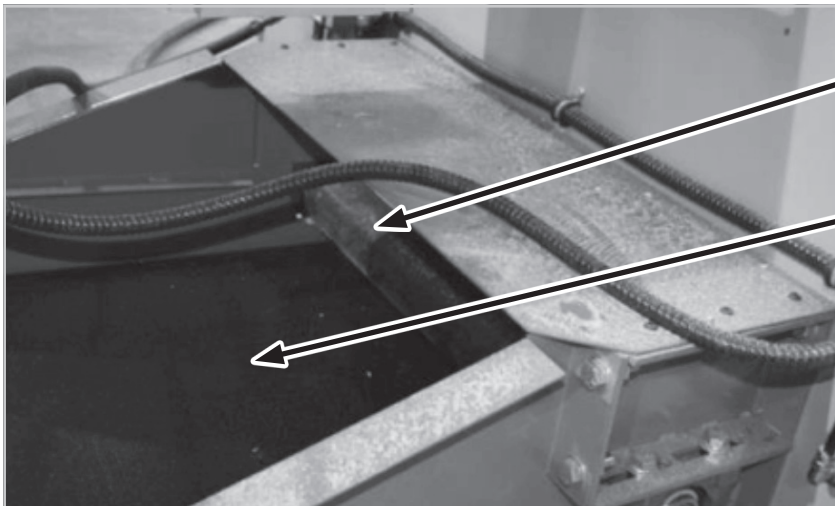
Sorting Belt – APN 27032

Waste Belt – APN 30803

Figure 148
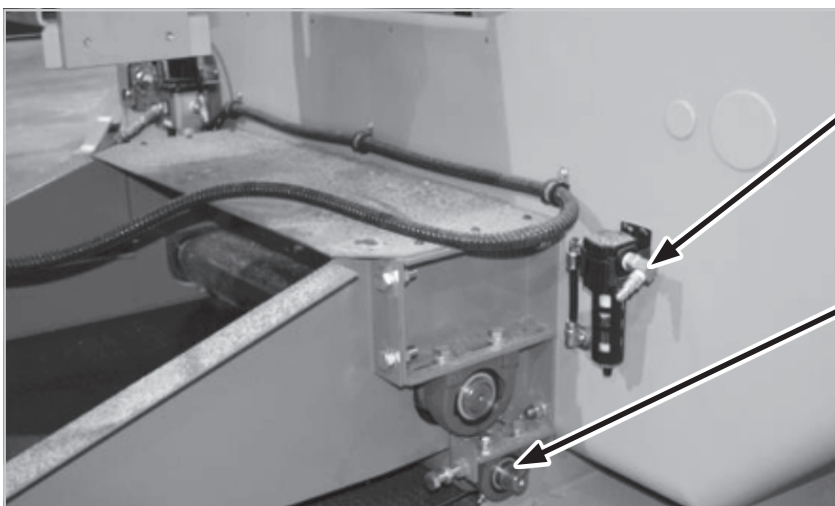
Vortec Cooler Filter Regulator – APN 37157

Adjustment Bearing – APN 22437

Figure 149

5.1.5 Main Saw Electrical Cabinet
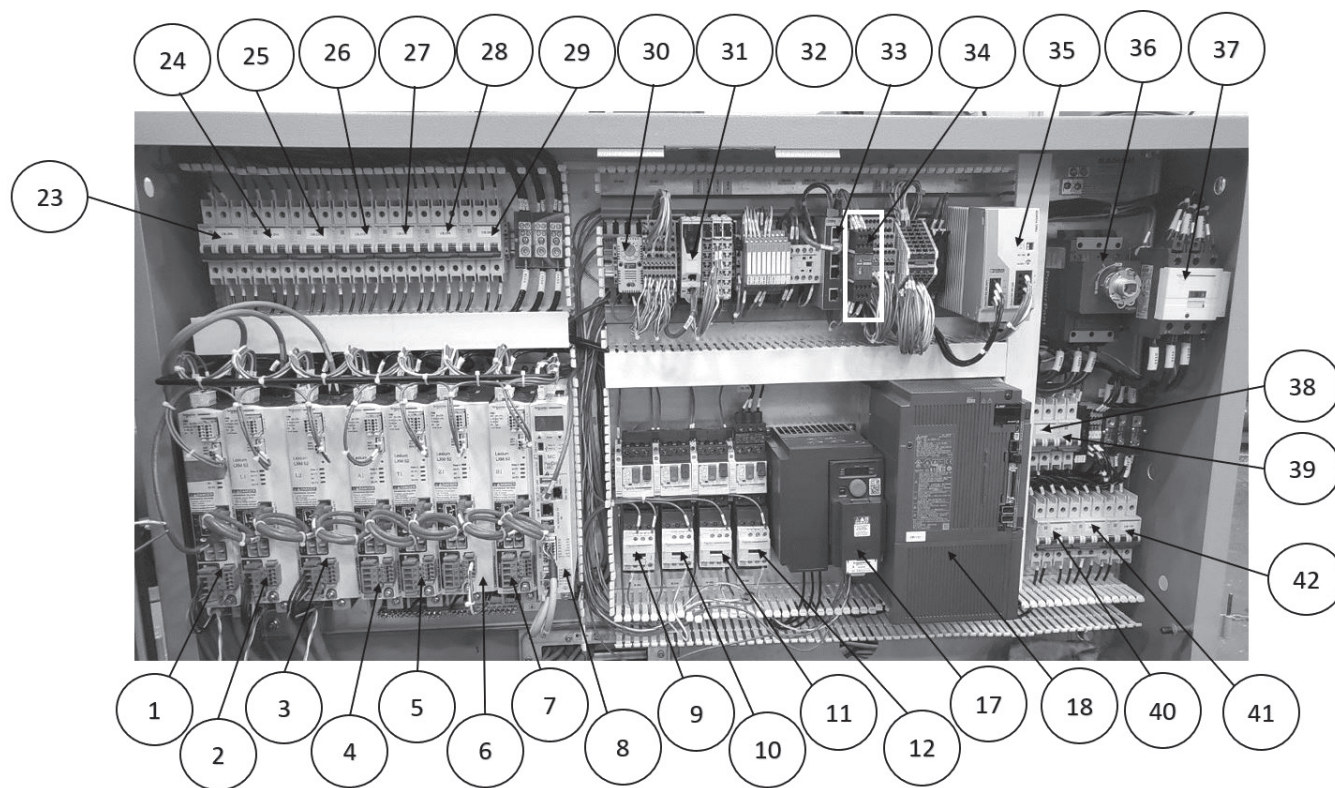
Figure 150

NO.	TAG NO.	DESCRIPTION	#APN
1	DR 208	Servo Drive 18 Amp Peak, L1P Axis	41075
2	DR 217	Servo Drive 30 Amp Peak, L1 Axis	41068
3	DR 224	Servo Drive 30 Amp Peak, L2 Axis	41068
4	DR 236	Servo Drive 18 Amp Peak, A1 Axis	41075
5	DR 242	Servo Drive 12 Amp Peak, T1 Axis	37288
6	DR 249	Servo Drive 30 Amp Peak, Z1 Axis	41068
7	DR 258	Servo Drive 18 Amp Peak, B1 Axis	41075
8	MC 300	Controller 8 Axes	42502
9	M 342	Contactor, 3 Pole, 80 Amp, 600 vac, 24 Vdc Coil	37220
10	M 344	Contactor, 3 Pole, 80 Amp, 600 vac, 24 Vdc Coil	37220
11	M 346	Contactor, 3 Pole, 80 Amp, 600 vac, 24 Vdc Coil	37220
12	M 348	Contactor, 3 Pole, 80 Amp, 600 vac, 24 Vdc Coil	37220
13	OL 140	Motor Overload Protector, 3 Pole, 1.0-1.6 Amps, 480 Vac	37220
14	OL 144	Motor Overload Protector, 3 Pole, 1.0-1.6 Amps, 480 Vac	42511
15	OL 148	Motor Overload Protector, 3 Pole, 1.0-1.6 Amps, 480 Vac	42511
16	OL 153	Motor Overload Protector, 3 Pole, 1.0-1.6 Amps, 480 Vac	42511
17	VFD 135	AC Drive, 380-500, 3HP, Compact	41069
18	DRV 123	Servo Drive, Saw Blade, 7KW, 400V	41032
19	CB 122	Miniature Circuit Breaker, 3 Pole, 240VAC 30 Amps	42576
20	CB 134	Miniature Circuit Breaker, 3 Pole, 240VAC 15 Amps	39062
21	CB 140	Miniature Circuit Breaker, 3 Pole, 240VAC 6 Amps	42575

NO.	TAG NO.	DESCRIPTION	#APN
22	CB 100	Miniature Circuit Breaker, 3 Pole, 240VAC 6 Amps	42501
23	CB 205	Miniature Circuit Breaker, 3 Pole, 240VAC 20 Amps	42501
24	CB 214	Miniature Circuit Breaker, 3 Pole, 240VAC 20 Amps	42501
25	CB 233	Miniature Circuit Breaker, 3 Pole, 240VAC 20 Amps	42501
26	CB 232	Miniature Circuit Breaker, 3 Pole, 240VAC 20 Amps	42501
27	CB 239	Miniature Circuit Breaker, 3 Pole, 240VAC 20 Amps	42501
28	CB 246	Miniature Circuit Breaker, 3 Pole, 240VAC 20 Amps	42501
29	CB 255	Miniature Circuit Breaker, 3 Pole, 240VAC 20 Amps	42501
30	DV-420	Thermostat	
31	PLC-BASE	Fieldbus Interface Bus Base	
32	CR-410	Contactor 600 VAC 6 Amp IEC	39874
33	ESW-902	Ethernet Switch, 5 Port, RJ45, 24Vdc, 10/100MB	
34	SM-405	E-Stop Safety Module, 24Vdc	25990
35	PS 102	Power Supply	39473
36	CB 102	Circuit Breaker 600Y/347V 80A	42572
37	M401	IEC Contactor, 3 Pole, 80 Amp, 600 vac, 24 Vdc Coil, DIN Rail Mount	41445
38	CB-100	Miniature Circuit Breaker, 3 Pole, 240VAC 6 Amps	42575
39	CB-106	Miniature Circuit Breaker, 2 Pole, 240VAC 5 Amps	
40	CB-122	Miniature Circuit Breaker, 3 Pole, 240VAC 30 Amps	42576
41	CB-134	Miniature Circuit Breaker, 3 Pole, 240VAC 15 Amps	39062
42	CB-140	Miniature Circuit Breaker, 3 Pole, 240VAC 6 Amps	42575

5.1.6 Printer Electrical Cabinet
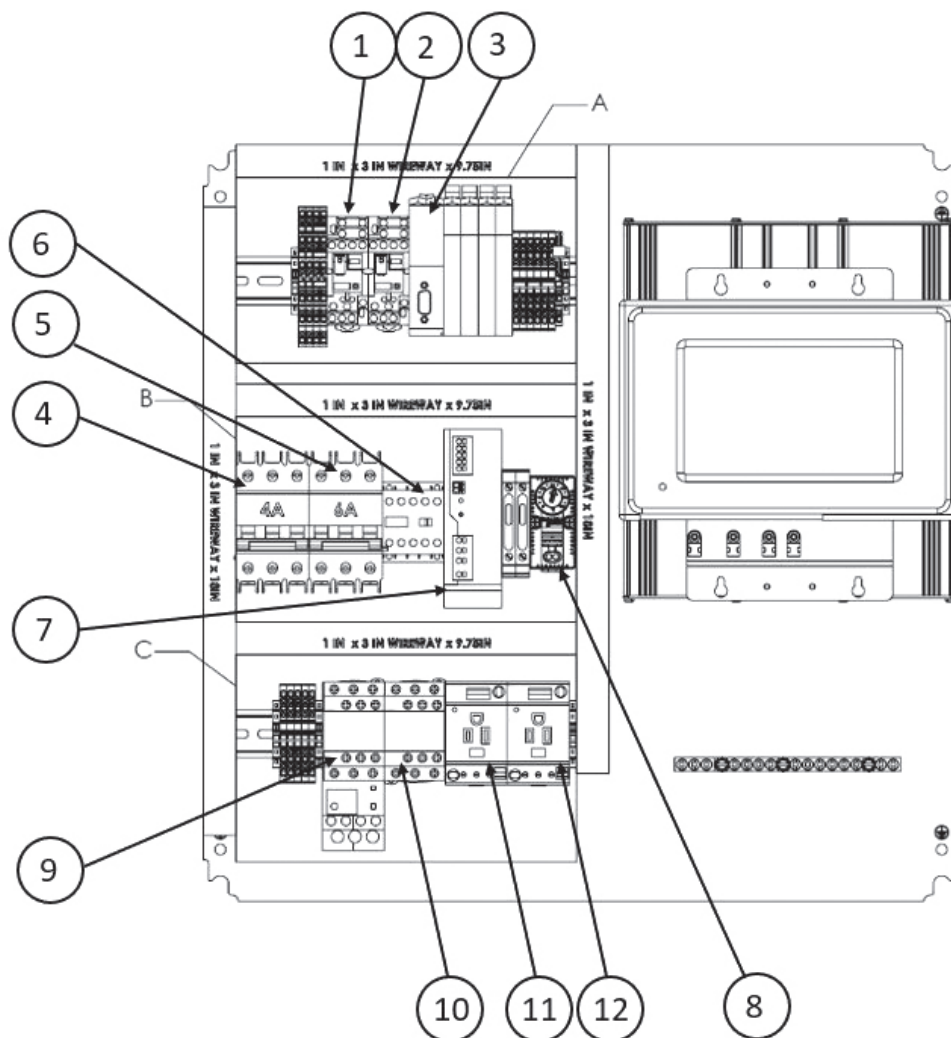
Figure 151

NO.	TAG NO.	DESCRIPTION
1	CR-735	Relay, 4PDT, 6 Amp, Rectangular, Plug-In, 14 Pin, 24 Vdc Non-Lighted Coil
2	CR-720	Relay, 4PDT, 6 Amp, Rectangular, Plug-In, 14 Pin, 24 Vdc Non-Lighted Coil
3	PLC-BASE	PLC, Fieldbus Bus Interface
4	CB-704	Circuit Breaker – 3P – 4 Amp – 480Y/277 V – 10 kA
5	CB-711	Circuit Breaker – 3P – 6 Amp – 480Y/277 V – 10 kA
6	M701	Contactor,magnetic, 24VDC, 6 Amp, IEC
7	PW-712	Power Supply, 2/3 Phase 400V-500VAC, 24VDC Output, 10 Amp
8	DV-717	THERMOSTAT NO FARENHAIT SCALE TS141F
9	M-741F	Contactor, 3 Pole, 9 Amp, 600 vac, 24 Vdc Coil
10	M-742R	Contactor, 3 Pole, 9 Amp, 600 vac, 24 Vdc Coil
11	RECPT-717	Power outlet; socket; AB 15A; USA; screw conn; DIN rail; 125 VAC; 15A
12	RECPT-717A	Power outlet; socket; AB 15A; USA; screw conn; DIN rail; 125 VAC; 15A
13	OL-704	Bimetallic Overload Relay 600V 2.5Amp

5.2   Cleaning

Clean sawdust out of the machine at the end of each shift of operation.

The L1 & L2 assemblies, emitters, receivers, and shafts (Section 5.1.2) should receive special attention during each saw cleaning. Following this instruction will insure the lumber feeding system operates smoothly. Each can be cleaned using a vacuum.

> ### ⚠ CAUTION
> **Use a vacuum to do this to avoid the intense dust hazard from using compressed air in the confined space of the machine.**

> ### ⚠ CAUTION
> **Pay particular attention to the belt drives (L1 and L2) and the T-axis linear bearings. Sawdust will accumulate on the T-axis bearings and will cause damage to the bearings if they are not kept clean.**

> ### ⚠ CAUTION
> **Pay special attention to the top of the Z-axis bearings, around the Z axis actuator (on top of the head assembly), the tops of the linear bearings on the L drives, the B1 homing slot (if the saw was equipped with a bevel axis) and the T1 spur and rack gear assembly.**

5.3   Machine Lubrication

See the included maintenance log for lubrication intervals (Appendix A). This section includes the locations where grease will be added per the maintenance intervals. Use NLGI 2 LITHIUM based grease.

> ### ⚠ CAUTION
> **DO NOT use greases that contain graphite or carbon particles or fibers of any type.**

Use only small amounts of grease (1 pump) at each location to avoid damage to the seals. There are **38** grease fittings on the saw, outfeed and trash conveyor system. If the saw is equipped with an Automated Infeed there are **16** additional fittings (for a total of 54). The following Figures will help in finding the location of all the grease fittings.

L1 & L2 Pushers: There are 4 grease fittings on top of the each bearing block on the L1 & L2 Pushers (8 total).
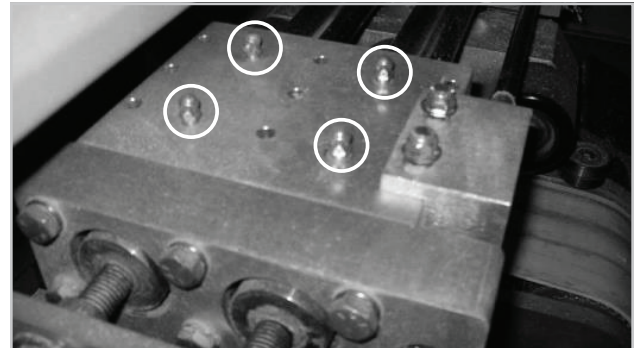
Figure 152

L1 & L2 Clamps: On the back of the saw cabinet, there are 2 sets of grease blocks, one for the L1 Clamp bearings, and one for the L2 Clamp bearings. Each set has 4 fittings (8 total).

Figure 153

T1 Bearings: There are 2 grease fittings at the back of the head (as shown in the picture on the right) and 2 more at the front (4 total).
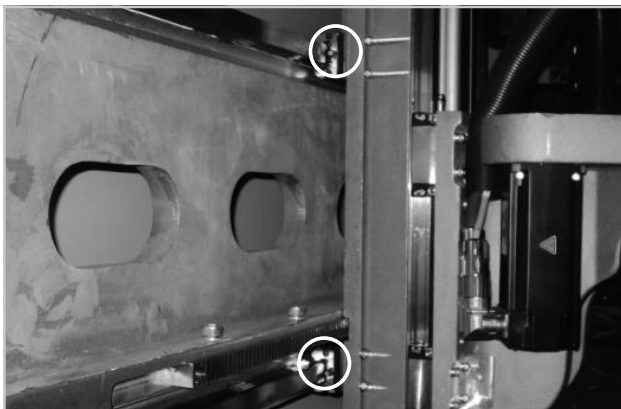
Figure 154

Z1 Bearings: There are 2 grease fittings on the bottom of the head (as shown in the picture on the right) and 2 more on the top (4 total).
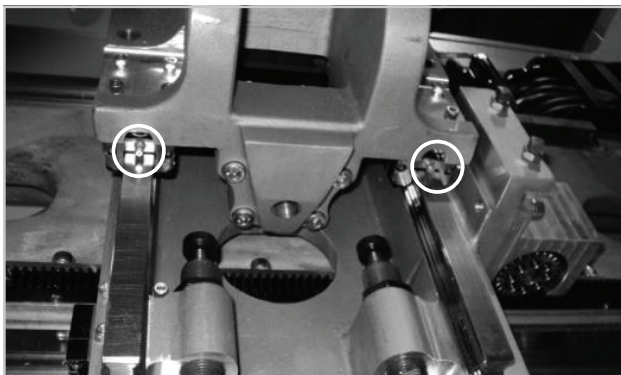
Figure 155

Outfeed Queue Conveyor: There are 3 shafts under the outfeed queue. Remove the guards around the two farthest from the saw cabinet and grease the bearings on each side of the shaft. Do not remove the guard plate the motor is mounted to. These fittings can be accessed without removing the motor (6 total).
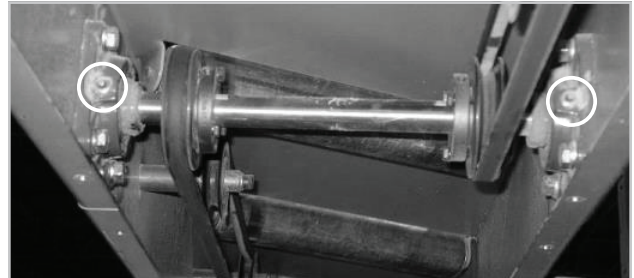
Figure 156

Trash Incline: There are four bearings on the trash incline—2 on the drive roller at the top of the incline (only one is shown in the picture on the right) and 2 more on the idler end at the bottom of the incline, just under the drive end of the trash/small parts conveyor (4 total).

Figure 157

Trash/Small Parts Conveyor: Similar to the trash incline, there are four bearings on the trash/small parts conveyor—2 on the drive roller on the infeed side of the saw cabinet, and 2 more on the idler end on the outfeed side, as shown in the picture on the right taken from behind the machine (4 total).
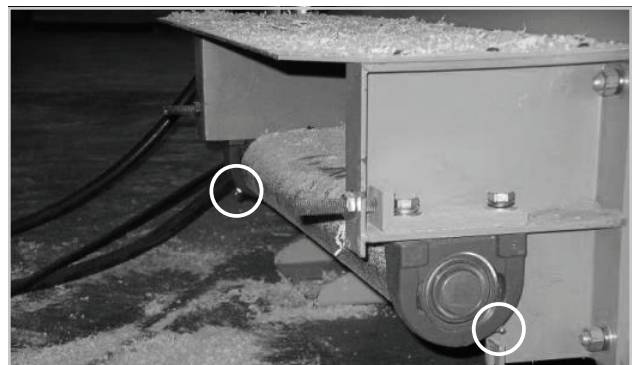
Figure 158

5.4 Automated Infeed

There are 4 grease fittings on the bearing block for the printer encoder wheel. The fittings can be accessed from the rear of the machine (4 total).
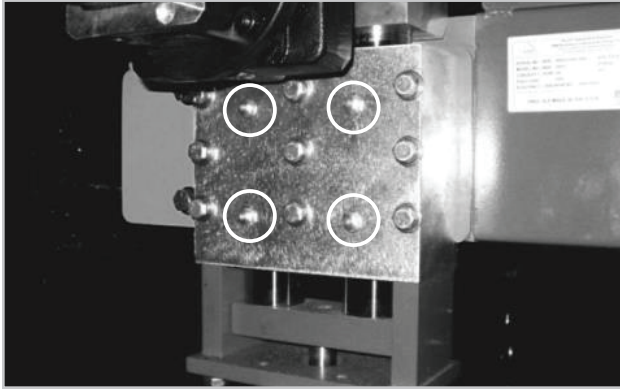
Figure 159

Below the rollcase for the Automated Infeed conveyor there is a driveshaft that powers each of the lumber strands on the Live Deck. On this driveshaft there are a total of 8 bearings that each contain one grease fitting (8 total).
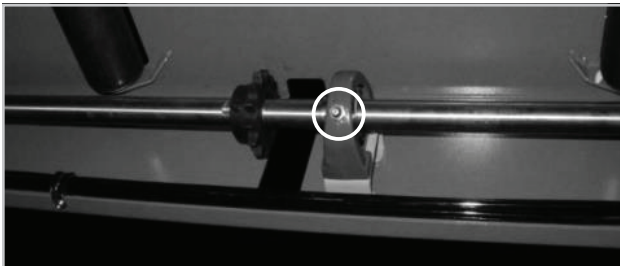
Figure 160

There is one grease fitting on each gripper assembly. To access them, make sure each gripper assembly is fully retracted. The fitting will be visible through the access hole at the rear of the machine (4 total).
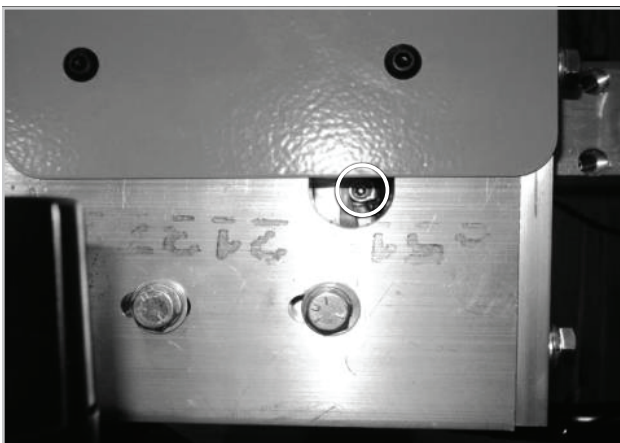
Figure 161

5.5 EXLAR® Actuator Maintenance

⚠ CAUTION

Alpine recommends wearing disposable Nitrile gloves when completing the actuator maintenance.

The EXLAR actuator will need to be lubricated according to the maintenance interval schedule (Appendix A).

To perform maintenance the actuator will need to be removed and moved to a clean location. To grease the components correctly the procedure from the EXLAR Manual Section 3.6 (I-Series Motor Mount Roller Screw Actuators Installation & Service Manual) will need to be followed. Then, the actuator can be re-installed.

5.5.1. EXLAR Actuator Belt Change

Step 1 – Click on the Manual icon on the ALS 4.0 main screen. It is the icon with the wrench symbol shown circled in Figure 162.

Figure 162

Step 2 – Select the icon (shown with the arrow) and Disable Software Limits as shown in Figure 163.

Figure 163

Step 3 – Enable the Axes by clicking or touching the button shown in Figure 164.

NOTE

When axes are enabled the button will read "Disable Axes," and when the axes are disabled the button will read "Enable Axes."
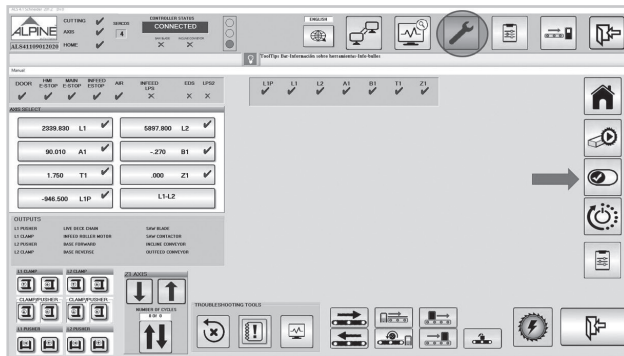
Figure 164

Step 4 – Jog Z1 down by selecting the Z-1-Axis first (Shown with the Arrow) and then pressing the button "Jog Z1 Down" to End Stop (Shown circled),The Saw will Beep and stop. Refer Figure 165.
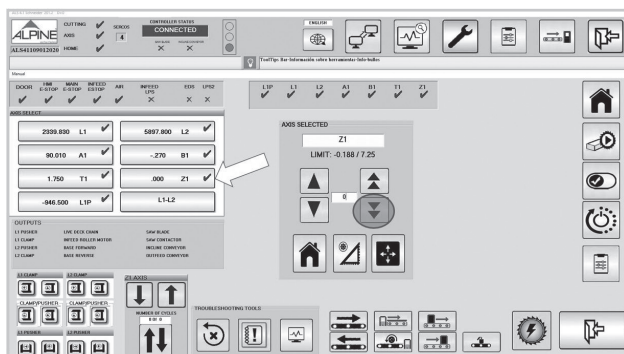
Figure 165

Step 5 – Disable Axes using the "Disable Axes" button shown in Figure 166. Look at the drive status if each Axis on the left is marked with a red "x" it means the Axes are disabled.

Figure 166

NOTE

The button that will then change to read "Enable Axes" as shown in Figure 167.

Figure 167

Figure 168 shows the Z-axis sitting on hard stops which prevent the axis from moving down any further.
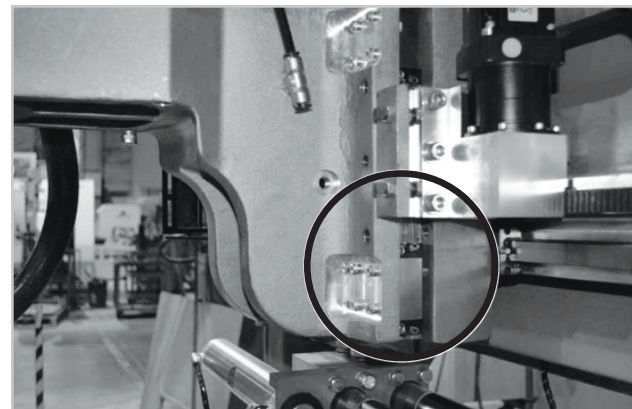
Figure 168

Step 6 – Lock out and tag out to ensure it is safe to begin working inside the machine.

⚠ CAUTION

Always use OSHA approved lock out tag out procedure.

Step 7 – Open door.

Step 8 – Remove cover by removing the 6 screws on top.

NOTE

This will be a tight fit with the top on the machine. Figure 169 shows the screw locations with the top of the machine removed.

Figure 169
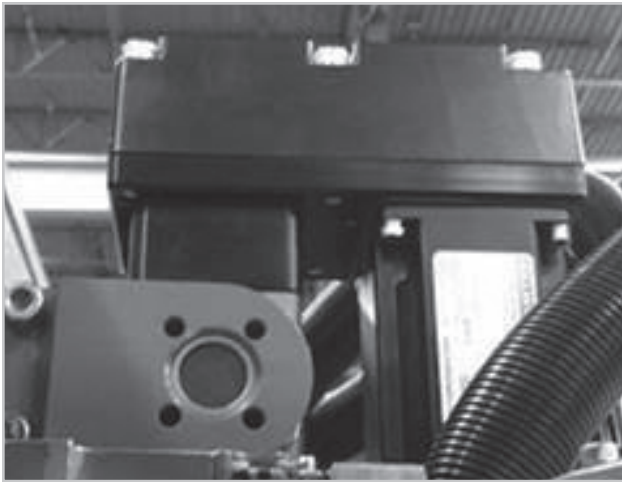
Figure 170

⚠ WARNING

**REMOVAL OF BELT WILL CAUSE ASSEMBLY TO DROP, MAKE SURE ASSEMBLY IS RESTING ON BOTTOM HARD STOP.
KEEP HANDS CLEAR AS HEAD MAY DROP A SMALL AMOUNT WHEN BELT IS LOOSENED!**

Step 9 – Loosen the idler pulley adjuster plate bolt and slide the idler pully assembly to the left to remove the belt. See Figure 171.
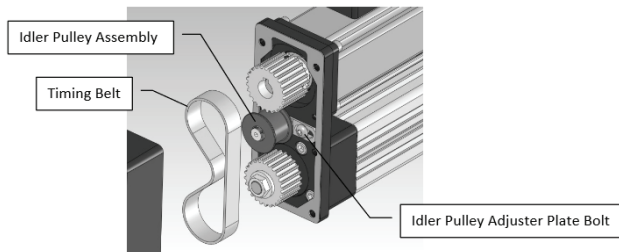
Figure 171

Step 10 – Install belt, tension using Force on Idler as shown in Figure 172.
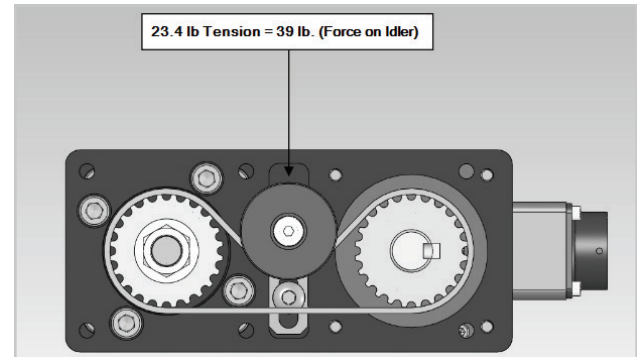
Figure 172

⚠ CAUTION

The idler pulley plate slot allows moving the idler pulley so the belt can be placed, followed by placing a force directly over the idler pulley to obtain the proper tension to tighten the belt to 23.4 lb. This requires 39 lb. of Force on the idler.

Tighten motor cover bolts.

NOTE

Do not over tighten cover bolts.

Figure 173

Step 11 – Remove all tools, close door, & remove lock out tag out devices.

Step 12 – Restart machine and home all axes.

Step 13 – After removing the actuator, follow the cleaning and greasing instructions in the EXLAR Manual (K-Series Motor Mount Roller Screw Actuators Installation & Service Manual).

NOTE

Specific instructions for this process can be found in the K Series Manual Doc, Section 3.0 titled Maintenance & Service.

5.5.2. Removing the Z1 Actuator

Step 1 – Before removing the Z1 actuator, make sure the head is all the way down against the bottom hard stops. Disconnect power from the ALS 4.0 and lockout/tag out the machine. Now unplug power and feedback cables from the top of the actuator.

> **⚠ CAUTION**
>
> **Failure to disconnect the power from the machine before removing the cables is not only dangerous, it WILL damage the actuator.**

Step 2 – Start removing the actuator by releasing the rod end that is attached to the Z-axis slide. Remove the four socket head cap screws from the bottom of the casting using an 8mm Allen wrench as shown in the Figure 174.
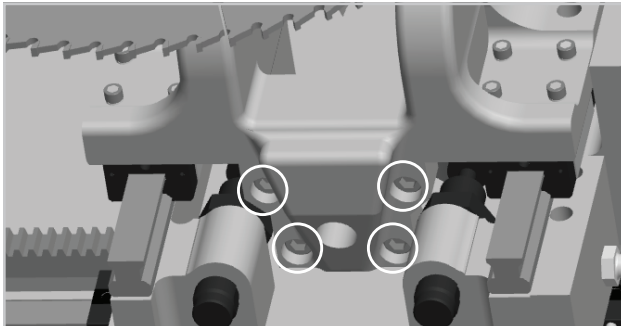
Figure 174

Step 3 – With the rod end of the actuator free remove the right-hand roof panel. Use a 5/32" Allen wrench to remove the 11 cap screws around the perimeter of the roof panel and a 7/16" flat wrench to remove the five hex head screws that attach the right-hand panel to the middle panel. Set the removed panel aside. This will provide the necessary clearance for the Z1 actuator to be removed through the top of the saw cabinet.

Step 4 – Use an 8mm Allen wrench to remove the cap screws from the trunnion mount at the top of the actuator. Carefully lift the actuator up and remove it through the top of the machine. The location of the cap screws and trunnion are shown in Figure 175.
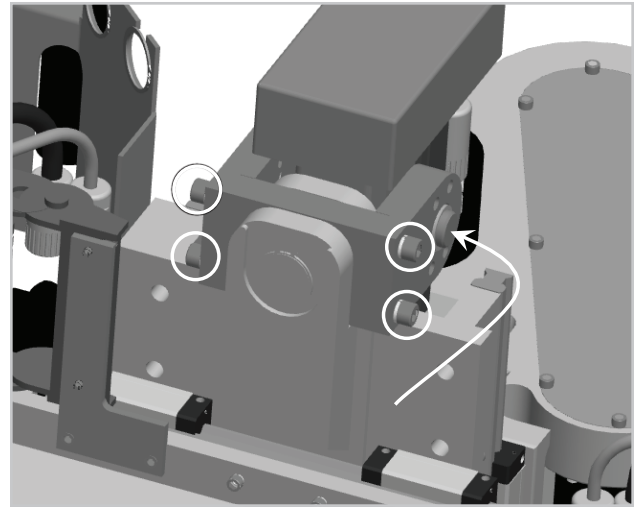
Figure 175

5.6 InkJet Printer

The inkjet printer heads should always be kept clean. Clean them daily with a soft brush that has been dipped in approved cleaner fluid. Also, be sure to flush the print nozzles with cleaner fluid if the printer is not used for an extended period of time (more than 24 hrs). See the Matthews Operator Manual 8000 Plus User Guide supplied with the saw for more information (I Mark V84i Technical/Protocol Manual).

5.7 Conveyor Belt Replacement & Tensioning

> **NOTE**
>
> **It is important that all conveyor belt rollers be cleaned and squared prior to starting adjustments.**

5.7.1. Conveyor Belt Removal & Installation

Step 1 – Loosen Tail Pulleys and put slack in the belt

Step 2 – Unbend Lacing Rod and Pull it out of the belt.

Step 3 – Remove the belt

Step 4 – Thread the belt the same as the previous belt was threaded

Step 5 – Pull the ends of the belt together, aligning the lacing

Step 6 – Install the rod that connects the lacing (Figure 167)
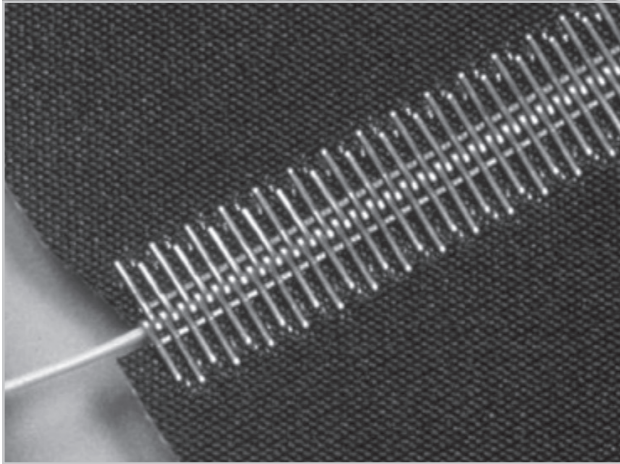
Figure 176

NOTE
Use clamps and/or vice grips to hold position while threading.

Step 7 – Bend the lacing rod end to keep it from sliding out

Step 8 – Tension and square tail pulleys to pull up slack on the bottom

Step 9 – Ensure belt does not slip with a light load of 10 – 15 lbs

NOTE
When the belt is tracking straight observe it for 15 minutes and then stop adjusting.

5.7.2   Waste Conveyor Belt Tensioning

Step 1 – Before adjusting check pulleys to ensure they are clear of debris

Vacuum sawdust off the inside of the belt.
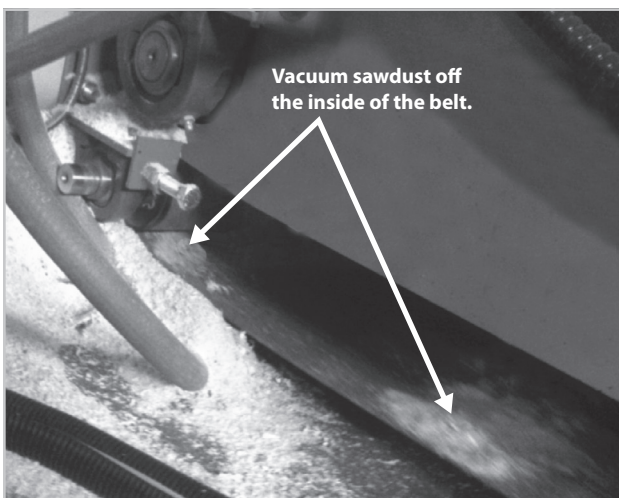
Figure 177

⚠ WARNING
NEVER PUT ANY PART OF YOUR BODY NEAR THE MOVING BELT.

Step 2 – Run conveyor to determine which way the belt is tracking.

Step 3 – Adjust bottom guide roller closest to machine.

Think of tracking a belt like riding a bicycle—the forward roller is the handlebar. The belt will adjust according to the direction in which you move the forward roller.

Travel direction

Moving roller this direction will track belt this direction.
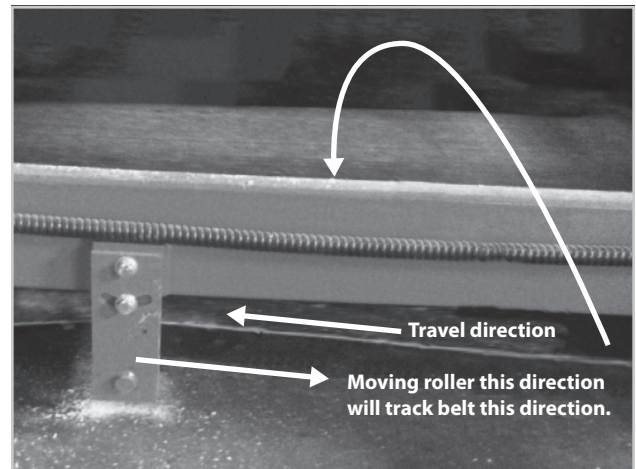
Figure 178

NOTE
Due to slippage and roller dynamics there is a limited amount of adjustment that can be made. It is important that all the rollers are spinning. If the roller stops spinning adjust it back to the point it spins. Then move to the next roller and continue the adjustment process.

Step 4 – Adjust middle guide roller the same as above if needed.
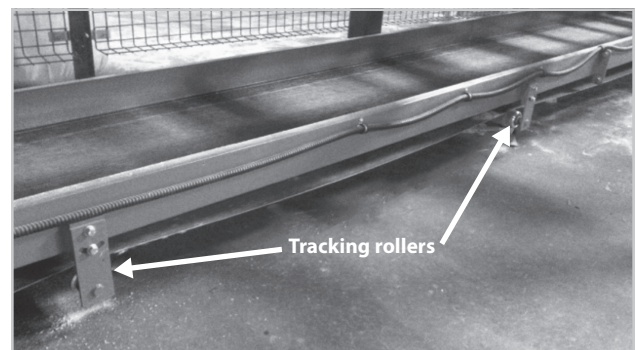
Tracking rollers

Figure 179

NOTE
The third roller is adjustable but should not need to be adjusted except for extreme cases.

5.7.3   Small Parts Conveyor

NOTE
The belt used on the small parts conveyor features a self-tracking belt and does not track off of guide rollers. This offers a simplified process for belt replacement and tracking as detailed in the following steps.

Step 1 – Ensure tail pulleys are free of debris.

Step 2 – Square tail pulleys by making slight adjustments to the tension blocks (Figure 180).
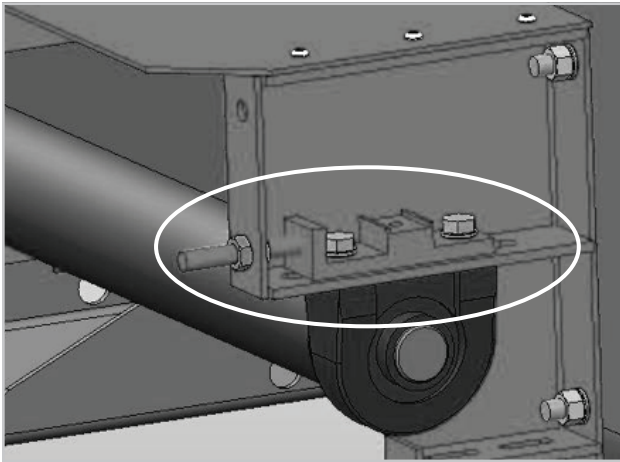
Figure 180

Step 3 – Run for 15 minutes to ensure belt is tracking correctly.

NOTE
Perform this process on both ends of the belt.

6. Troubleshooting

CONDITION	CAUSE	CHECK	CORRECTION
6.1 Incorrect Homing/ Cannot Home the Machine	No power	The green LED which indicates that the power is on should be illuminated	Press the button labeled "power reset" (Figure 1)
	Axis with fault	Call Alpine Equipment Customer Service.	Fault codes must be found using Alpine Equipment Customer Service troubleshooting tools in order to properly resolve this issue.
	Axis is blocked	Visually inspect A1, T1, Z1, B1 (if equipped) for blockage.	Remove blockage and restart homing process.
6.2 Centerline is Off	Warped lumber	Visually inspect lumber.	Re-cut with lumber that is straight.
	T1 axis homing	Measure the centerline using a framing square (Figure 128), the measurement should be 1 ¾ in. from the back fence.	Try to home T1. Then, re-calibrate the axis following the instructions in Section 4.7.
6.3 Length is not Correct **(The length tolerance of the ALS 4.0 is ± 1/16 in.)**	Length calibration	Check the cut length of the board using a tape measure.	Re-calibrate L1 & L2, following the instructions in Section 4.9.
	L1 & L2 clamps not operating properly	The clamp should come down within 1 ¼ in. of the L1 & L2 belts. Confirm that the rod end of the cylinder remains intact.	Tighten screws on the cylinder if they appear to have backed out of their holes. Replace cylinder if damaged or inoperable.
	Check belt tension	Section 4.8 covers the belt tensioning procedure.	Follow the tensioning procedure, cut a board, and check the length for correctness.
	Mechanical blockage	Visually inspect for mechanical blockage, especially near the LPS sensors.	Remove blockage and re-check length.
	Clean sensors	Locate emitters and receivers on L1 & L2 drives.	Wipe clean with a cloth, then use glass cleaner on the face of both the emitter and receiver.
	Wet or icy lumber	Visually inspect lumber for dampness or ice.	Remove wet or ice covered board from the infeed queue allowing it to dry completely before feeding it into the saw.
	Low Air pressure (Air pressure should read between 80-90 psi.)	Locate the regulator on outfeed of saw near the bottom of the outside of the saw cabinet and check the pressure. Listen for air leaks.	Adjust the regulator. If an air leak is found it should be repaired immediately, call Alpine Equipment Customer Service if assistance is required.
	Worn belts	Visually inspect belts for wear or cracking.	Rotate belts to even wear, or order new belts from Alpine Equipment Customer Service.

CONDITION	CAUSE	CHECK	CORRECTION
6.4 Conveyor will not Start	Machine is in E-Stop condition	Check all E-Stop locations to determine if one is pressed.	Reset the E-Stop switches by pulling them to the out position.
	Breaker trip	Using the included electrical schematic, locate the breaker.	Check the conveyor system for mechanical blockage, then reset the breaker.
	Breaker overload	Using the included electrical schematic, locate the breaker overload.	Press the reset button on the overload. If the overload continues to trip, call a qualified electrician to identify the source of the problem.
	No power to relay	Using the included electrical schematic, locate the relay. When on, a red LED will illuminate on the relay.	If the relay does not turn on, call a qualified electrician to identify the source of the problem.
	No power to contactor coil		Call a qualified electrician to identify the source of the problem.
6.5 Printer will not Print	Print controller program settings	Locate print controller panel on the computer task bar.	Reset print controller and print head settings. Match the settings to the default values noted in yellow on the screen.
	No ink in reservoir	The pump is located in the printer cabinet and has a toggle ON/OFF switch on it. Turn off the printer pump. Turn off the pump to depressurize the ink container and allow the level to be visually checked.	Replace the ink container and bleed the air out of the lines.
	Dirty print sensor	Check for an amber light on the print sensor when a board is present Verify that during other operational situations, the light illuminates green	If the light on the sensor is not changing properly, use Matthews cleaner on the sensor, cleaning any dried ink off of it. If the light does not illuminate green, it may be necessary to replace the sensor, call Alpine Equipment Customer Service for further assistance.
	Low or no air pressure to printer pump (gauge should read 11-14 psi.)	Check the air pressure at the pressure gauge. It can be found in the printer cabinet near the printer pump and check the pressure.	Adjust the regulator.
	Print controller program closed	Use the mouse to display the task bar. On the task bar check to see if the print controller program is open.	Use the desktop shortcut to open the print controller program.

CONDITION	CAUSE	CHECK	CORRECTION
6.6 **Prints Same Information**	Print controller program closed	Use the mouse to display the task bar. On the task bar check to see if the print controller program is open.	Use the desktop shortcut to open the print controller program.
	Print controller not connected	Open the print controller program to verity that the software recognizes the print controller. It should display V80i or V84i depending on the model of the controller.	Cycle power to the system, as well as closing and re-opening the print controller program.
		Verity that the print controller has power, checking that the power LED is illuminated.	If there is no power to the controller call Alpine Equipment Customer Service.
		Visually inspect the communication cable between the controller and the computer, looking for breaks or damage.	If the cable is damaged it needs to be replaced. Call Alpine Equipment Customer service for further assistance.
6.7 **Cannot Read the Print Information**	Clogged print head	Visually inspect the print head. Try purging ink onto a scrap piece of lumber.	Flush the system using Matthews cleaner through print head until the fluid comes out clear, this will insure the lines and print head are clear.
	Dried ink on print head	Visually inspect the print head. Try purging ink onto a scrap piece of lumber.	Use Matthews cleaner and a brush directly on the print head until it is clean of all ink residue.
	Low or no air pressure to printer pump (gauge should read 11-14 psi.)	The pump is located in the printer cabinet, as well as a pressure gauge and regulator and check the pressure.	Adjust the regulator.
	Air in ink line	Verify that ink reservoir is filled.	Bleed air out of lines and try printing again.
	Encoder wheel adjustment	Check the encoder wheel. Make sure it spins as the board travels into the saw cabinet.	Adjust the spring on the encoder wheel to raise or lower the encoder wheel to a height that allows it to spin as the board enters the saw.
		Check that the coupling on the wheel is intact and not damaged or broken.	Replace the encoder wheel if the coupling is damaged or broken.
6.8 **Inconsistent Print Placement**	Print sensor	Check for ink residue on the face of the sensor.	Use Matthews cleaner on the face to the print sensor to remove ink residue.
		Check the height of the print sensor.	Lower or raise the print sensor by adjusting the nuts on the top and bottom of its threaded section.
	Bad lumber load	Verify that lumber is against the back fence as it feeds past the printer and into the saw.	Check for and clear any mechanical blockage preventing the lumber from touching the back fence.
		Verify that the timing and sequence of the infeed process is operating properly.	Call Alpine Equipment Customer Service is timing and sequence is off.
	Encoder wheel adjustment	Check the encoder wheel. Make sure it spins as the board travels into the saw cabinet.	Adjust the spring on the encoder wheel to raise or lower the encoder wheel to a height that allows it to spin as the board enters the saw.

CONDITION	CAUSE	CHECK	CORRECTION
6.9 Automated Infeed Bad Lumber Load	Warped or crooked lumber	Visually inspect lumber before putting it on the live deck.	Pause or cancel the job, remove the warped or crooked lumber, then resume the job.
	Controller program error	Check the computer desktop for a bad load error.	Reset the controller program.
		Visually inspect lumber queue for a bad lumber load.	Pause or cancel job in process and straighten lumber.
	Incorrect L1P height	Remove the guard on L1P and check the dimension from the L1P roller down to the automated infeed. The height measurement should be 1 3/8 in.	With the guard off, adjust the roller to 1 3/8 in.
		Check the screws on the air cylinder to determine if they have begun to back out.	Tighten screws.
	Low air pressure (gauge should read 80-90 psi.)	Locate the regulator on outfeed of saw near the bottom of the outside of the saw cabinet and check the pressure.	Adjust the regulator.
6.10 Automated Infeed will not Start	Breaker trip	Check breaker CB 208 (inside printer cabinet) to determine if it has tripped.	Reset the breaker.
	Breaker overload	Using the included electrical schematic, locate the breaker overload location.	Press the reset button on the overload.
			If the overload continues to trip, call a qualified electrician to identify the source of the problem.
	Blocked/dirty sensor	Visually check sensor for blockage/debris.	Remove blockage/clean debris using a cloth and glass cleaner.
6.11 L1 Belt Runs in Reverse	Dirty EDS sensor	Open the manual control screen in the ALS software. Check the colors of the circles in the top left corner. They should both be red, if not see the correction to the right.	Clean the EDS sensors (emitter and receiver) with a cloth and glass cleaner.
	EDS sensors display green on ALS software manual screen	Open the manual control screen in the ALS software. If both lights remain green after they are cleaned then check sensors and cabling for visible damage.	Call Alpine Equipment Customer Service.

CONDITION	CAUSE	CHECK	CORRECTION
6.12 Pneumatic Cylinder does not Actuate or Actuates Slowly	Low Air pressure (Air pressure should read between 80-90 psi.)	Locate the regulator on outfeed of saw near the bottom of the outside of the saw cabinet and check the pressure.	Adjust the regulator.
	Defective air cylinder	Listen for air escaping from the cylinder.	Replace air cylinder.
		Check for free motion by disconnecting the air and manually move the system connected to that particular air cylinder.	Trouble moving the system indicated mechanical blockage. Remove the mechanical blockage and repeat the check.
	Air leak	Listen for air leaks inside and outside the saw cabinet.	Repair any air leaks immediately as they will cause the saw to drop below the required operating pressures.
	Defective solenoid valve	Listen for leaks as the solenoid valve actuates. A leaking valve could indicate damage to the seals.	Replace solenoid valve.
	Mechanical binding	Disconnect the air and manually move axis in question.	If difficult movement is experienced a bearing may be near the end of its life, call Alpine Equipment Customer Service for further assistance.
6.13 Blade Motor will not Start	Breaker tripped	Check CB 202 breaker in the main electrical cabinet.	Reset breaker if tripped.
	Servo drive error	Check codes on the blade motor servo drive in the electrical cabinet. It should display "bb" or "run."	Locate the blade reset button on the inside of the main electrical cabinet. Hold this reset button for 10-15 seconds. This will reset the blade motor servo drive and clear the fault code.
			After resetting, if the drive does not display "bb" or "run" call Alpine Equipment Customer Service.
	Damaged power or feedback cables	Visually inspect power and feedback cables.	Replace damaged cables.
			Call Alpine Equipment Customer Service if further assistance is required.
6.14 Machine Stops during Cutting Operation	Axis is blocked	Visually inspect A1, T1, Z1, B1 (if equipped) for blockage.	Remove blockage and restart homing process.
	Low Air pressure (Air pressure should read between 80-90 psi.)	Locate the regulator on outfeed of saw near the bottom of the outside of the saw cabinet and check the pressure.	Adjust the regulator.
	Cut out of range	Setup the piece in semi-auto mode and run the cut.	If the cut cannot be completed in semi-auto call Alpine Equipment Customer Service for assistance.
	Corrupted TRS file	Cut a job from a different TRS file to determine if this is the root cause.	Call Alpine Equipment Customer Service so they can analyze the TRS file being used.
	MPI state error	This error will cause the controller program to close. Check computer desktop for an error.	To resolve this error, call Alpine Equipment Customer Service.

CONDITION	CAUSE	CHECK	CORRECTION
6.15 Bevel Troubleshooting **(Refer to Section 3.4.5 for figures associated with this troubleshooting information)**	Encroaching adjacent pieces	Check the Bevel Spacing setting (1 in. = 0.08334).	Increase the value to add more space between bevels. The maximum value that can be entered is 0.166 which is equal to 2 in.
	Floor web length accuracy	Measure the floor web cut, if it is:	
		Too long	Enter a negative value in the "Check the Floor Web Length Adj." (1 in. = 0.08334).
		Too short	Enter a negative value in the "Check the Floor Web Length Adj." (1 in. = 0.08334).
	Bevel centerline	Perform a full machine calibration. Then, cut multiple test boards of the piece causing centerline inaccuracy. Change "Adjustments with LEADING and TRAILING Data." Values as follows:	Cutting multiple test boards will eliminate variability of lumber as a cause for this issue.
		Centerline too low	Enter a positive number. (1 in. = 0.08334).
		Centerline too high	Enter a negative number. (1 in. = 0.08334).
	Single bevel centerline	Perform a full machine calibration. Then, cut multiple test boards of the piece causing centerline inaccuracy. Change "Singl Bev Back Face Len Adj." Values as follows:	Cutting multiple test boards will eliminate variability of lumber as a cause for this issue.
		Centerline too low	Enter a positive number. (1 in. = 0.08334).
		Centerline too high	Enter a negative number. (1 in. = 0.08334).
	Rip valley cut length	Measure the length of the rip cut, if it is:	
		Too long	Enter a negative value in the "Rip Valley Length Adj." (1 in. = 0.08334).
		Too short	Enter a negative value in the "Rip Valley Length Adj." (1 in. = 0.08334).
	Rip valley offset	Visually check the rip valley cut, if it is:	
		Too shallow	Enter a positive number to remove more material (1 in. = 0.08334).
		Too deep	Enter a negative number to remove less material (1 in. = 0.08334).

CONDITION	CAUSE	CHECK	CORRECTION
6.16 E-Stop Troubleshooting	Cannot recover from E-Stop condition	Check all E-Stop buttons on the ALS (Figure 1) to determine if any are pressed. Check that three LED lights are illuminated on the safety relay module.	Return all E-Stop switches to operating condition, pulling then out and then press the blade reset button. If the relays are not illuminated contact Alpine Equipment Customer Service for further assistance.
	Thermistor overheating (see warnings below)	**Read WARNINGS and NOTE below.**	**Call Alpine Equipment Customer Service for further assistance with this issue. Additionally, see the warning notes below regarding this issue.**

7 Error Log Diagnostics

7.1 System Diagnostics and Troubleshooting

This section will show how to diagnose, and trouble shoot when there is a fault in the machine operation.

Touching icon 8 from the main screen will open the Manual Screen, from this screen the operator can view the status of all the machine components, Axes drives and output of the machine.

In the Manual Screen the areas marked #3 show the status of the axis drives, if any of the axis has a red cross the operator can touch icon #13 (Error Log) to see the machine errors that was generated specific to the axis at fault.

ERROR LOG (6) – Click or Touch on "ERROR LOG" to open the error log contents. The error log saves the following information:

(i) Date and time when error occurred.

(ii) Axis identification and error description.

(iii) Error code.

TROUBLESHOOTING GUIDE (14) – Click or touch on "Troubleshooting guide" to open Troubleshooting manual to get help with cause and corrective action based on "error code". The error code can be read directly from the Error code line can be read from the error log screen. To find the information on the specific error code search for the code in the PDF.

RESET (5) – After completing the corrective action click or touch "RESET"

Main Screen
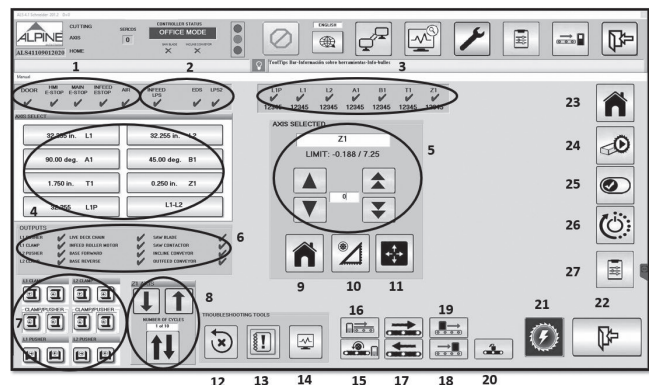
Manual Screen
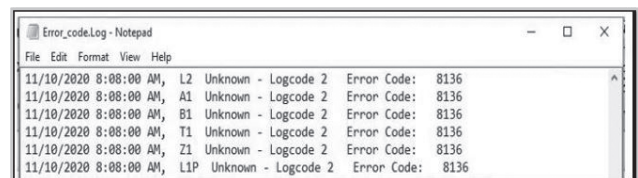
Error Log
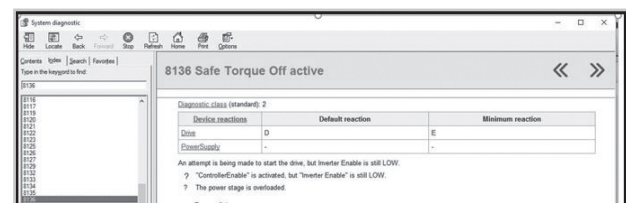
Troubleshooting Guide (PDF)

Appendix A – Maintenance Intervals

ALS 4.0 Machine Inspection Guide and Maintenance Log

Date _____/_____/_____

EVERY SHIFT / 8 HOURS	Mon	Tue	Wed	Thur	Fri	Sat	Sun
Clean saw dust off the machine with a vacuum cleaner (compressed air fills the environment with saw dust and debris and may cause a safety hazard).							
Clean and flush ink jet head.							
Check all light bulbs in operators control panel. Replace as required.							
Check that water has drained from coalescer.							
Check saw blades chipped or broken teeth.							

EVERY 10 SHIFTS / 80 HOURS	
Verify all calibration.	
Verify All belt feeder adjustments.	
Hand tighten all servo motor cables.	
Inspect all cables, connections, and routing components.	
Clean ink jet print sensor.	

EVERY 20 SHIFTS / 160 HOURS			
Inspect the refuse belts for cracks, wear, and tension.			
Apply one pump of grease (NLGI Grade No. 2) to fittings.			

LOCATION	Total	Where	
L1 & L2 Pushers	8	4 on top of each bearing block	
L1 & L2 Clamps	8	On the back side of the saw cabinet	
T1 Bearings	4	2 on the front and 2 on the back of the head	
Z1 Bearings	4	2 on the bottom and 2 on the top of the head	
Outfeed Queue	6	2 bearings on each shaft under the queue	
Waste Belt	4	2 on the drive roller and 2 on the idler roller	
Small Parts Conveyor	4	2 on the drive roller and 2 on the idler roller	
Automated Infeed (if applicable)			
Infeed Wheel	4	4 on the back of the bearing block	
Infeed Drive Shaft	8	Under the automated infeed rollcase	
Gripper Assembly	4	1 on the back side each gripper assembly	
Optional Accessories			
Incline Waste Belt	4	2 on the drive roller and 2 on the idler roller	
Small Parts Incline Belt	4	2 on the drive roller and 2 on the idler roller	

EVERY 100 SHIFTS / 800 HOURS	
Check L1/L2 belts for wear	

EVERY 260 SHIFTS / 2080 HOURS	
Lubricate Z1 EXLAR® actuator.	
Tighten electrical connections in the main panel (Lock out / Tag Out).	

Appendix B – Pneumatic System Schematic
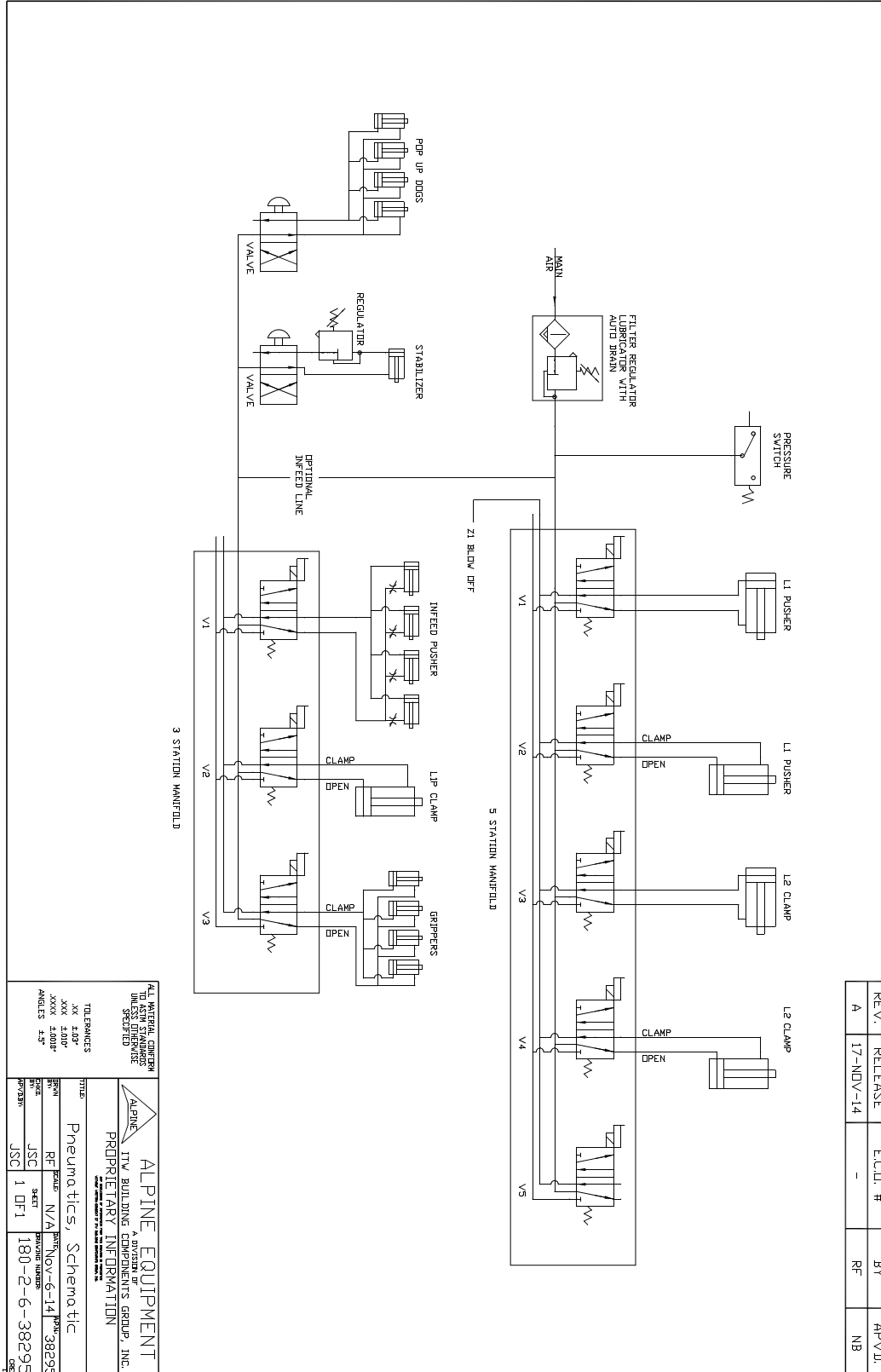
Appendix B – Pneumatic System Schematic – L1/L2 Blow-off
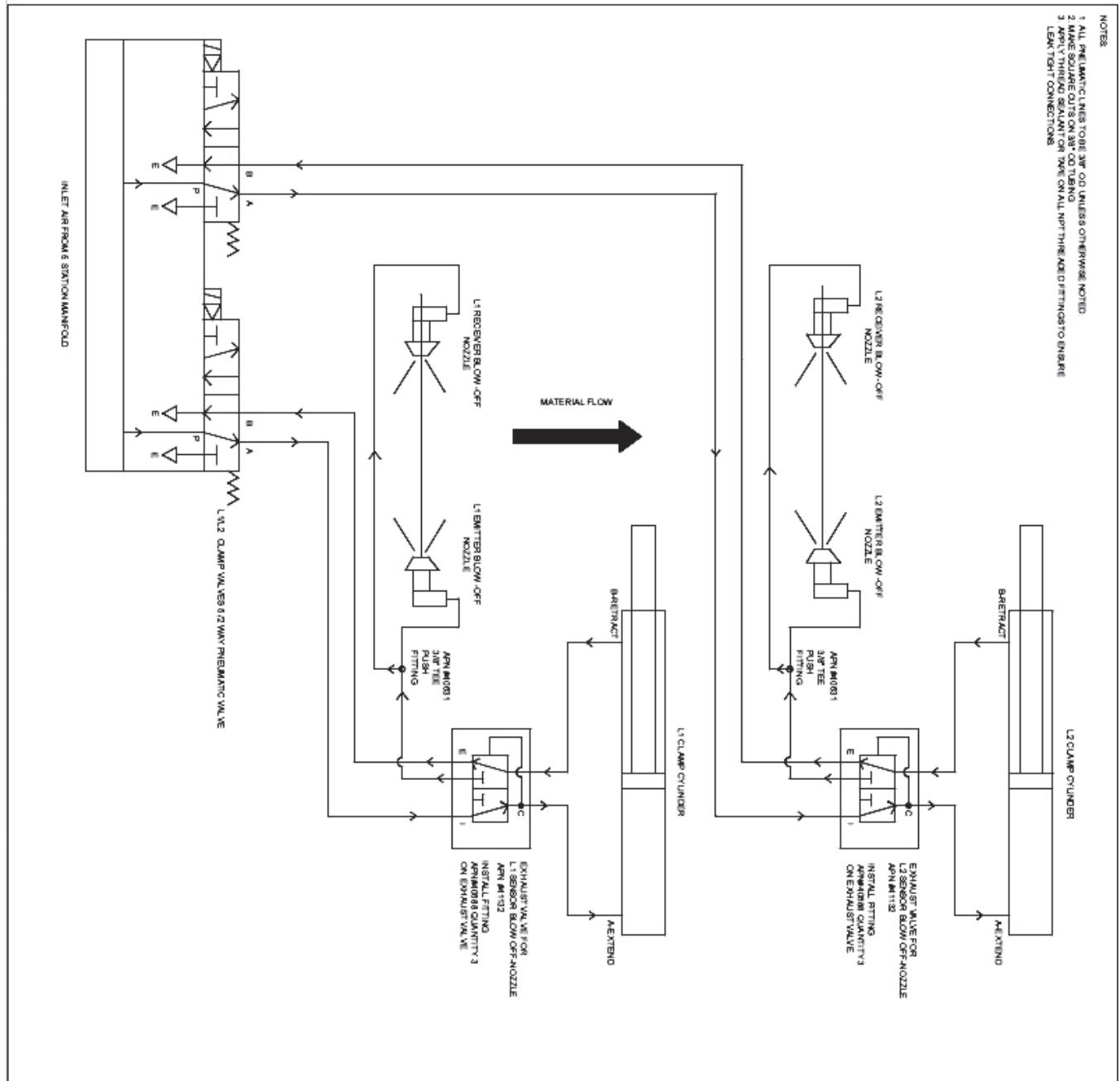
Appendix C – Unit Conversion Tables

fraction	decimal	fraction	decimal	fraction	decimal	fraction	decimal
1/64	0.0156	17/64	0.2656	33/64	0.5156	49/64	0.7656
1/32	0.0313	9/32	0.2813	17/32	0.5313	25/32	0.7813
3/64	0.0469	19/64	0.2969	35/64	0.5469	51/64	0.7969
1/16	**0.0625**	**5/16**	**0.3125**	**9/16**	**0.5625**	**13/16**	**0.8125**
5/64	0.0781	21/64	0.3281	37/64	0.5781	53/64	0.8281
3/32	0.0938	11/32	0.3438	19/32	0.5938	27/32	0.8438
7/64	0.1094	23/64	0.3594	39/64	0.6094	55/64	0.8594
1/8	**0.1250**	**3/8**	**0.3750**	**5/8**	**0.6250**	**7/8**	**0.8750**
9/64	0.1406	25/64	0.3906	41/64	0.6406	57/64	0.8906
5/32	0.1563	13/32	0.4063	21/32	0.6563	29/32	0.9063
11/64	0.1719	27/64	0.4219	43/64	0.6719	59/64	0.9219
3/16	**0.1875**	**7/16**	**0.4375**	**11/16**	**0.6875**	**15/16**	**0.9375**
13/64	0.2031	29/64	0.4531	45/64	0.7031	61/64	0.9531
7/32	0.2188	15/32	0.4688	23/32	0.7188	31/32	0.9688
15/64	0.2344	31/64	0.4844	47/64	0.7344	63/64	0.9844
1/4	**0.2500**	**1/2**	**0.5000**	**3/4**	**0.7500**	**1**	**1.0000**

feet	inches	feet	inches	feet	inches	feet	inches
1	12	7	84	13	156	19	228
2	24	**8**	**96**	14	168	**20**	**240**
3	36	9	108	15	180	21	252
4	**48**	10	120	**16**	**192**	22	264
5	60	11	132	17	204	23	276
6	72	**12**	**144**	18	216	**24**	**288**

mm	inches	mm	inches	mm	inches	mm	inches
.1	0.0039	23	0.9055	54	2.1260	85	3.3464
.2	0.0079	24	0.9449	55	2.1653	86	3.3858
.3	0.0118	25	0.9842	56	2.2047	87	3.4252
.4	0.0157	26	1.0236	57	2.2441	88	3.4646
.5	0.0197	27	1.0630	58	2.2835	89	3.5039
.6	0.0236	28	1.1024	59	2.3228	90	3.5433
.7	0.0276	29	1.1417	60	2.3622	91	3.5827
.8	0.0315	30	1.1811	61	2.4016	92	3.6220
.9	0.0354	31	1.2205	62	2.4409	93	3.6614
1	0.0394	32	1.2598	63	2.4803	94	3.7008
2	0.0787	33	1.2992	64	2.5197	95	3.7401
3	0.1181	34	1.3386	65	2.5590	96	3.7795
4	0.1575	35	1.3779	66	2.5984	97	3.8189
5	0.1968	36	1.4173	67	2.6378	98	3.8583
6	0.2362	37	1.4567	68	2.6772	99	3.8976
7	0.2756	38	1.4961	69	2.7165	100	3.9370
8	0.3150	39	1.5354	70	2.7559	200	7.8740
9	0.3543	40	1.5748	71	2.7953	300	11.8110
10	0.3937	41	1.6142	72	2.8346	400	15.7480
11	0.4331	42	1.6535	73	2.8740	500	19.6850
12	0.4724	43	1.6929	74	2.9134	600	23.6220
13	0.5118	44	1.7323	75	2.9527	700	27.5590
14	0.5512	45	1.7716	76	2.9921	800	31.4960
15	0.5905	46	1.8110	77	3.0315	900	35.4330
16	0.6299	47	1.8504	78	3.0709	1000	39.3700
17	0.6693	48	1.8898	79	3.1102	2000	78.7399
18	0.7087	49	1.9291	80	3.1496	3000	118.1099
19	0.7480	50	1.9685	81	3.1890	4000	157.4798
20	0.7874	51	2.0079	82	3.2283	5000	196.8498
21	0.8268	52	2.0472	83	3.2677	6000	236.2198
22	0.8661	53	2.0866	84	3.3071	7000	275.5897

Appendix D – Terms Glossary

Bevel – an edge of a structure that is not perpendicular to the face of the piece.

Board Foot – Measurement of lumber equal to one square foot an inch thick or 144 cubic inches. Multiply width in inches X length in inches X thickness in inches, divide by 144 for total board feet.

Bow – A warp along the length of a board.

Box Joint – Square shaped finger joints used to join pieces at right angles.

Butt Joint – A joint where the edges of two boards are against each other.

Carbide Tipped – Extremely hard steel pieces with sharp cutting edges fastened to cutting tools such as saw blades and router bits.

Chamfer – To bevel the corner of a board at a 45° angle.

Combination Square – A square that measures both 90 degree and 45 degree angles.

Common Grade Lumber – Lumber with obvious defects, used in construction framing.

Cross Cut – A cut which runs across the board perpendicular to the grain.

Cupping – This is when the edges of a board bend with the grain away from the center to form a concave shape.

Dovetail Joint – A joint where the fingers are shaped like a doves tail, used to join pieces at 90 degrees.

Face – When a board has one side that is wider than the other, the wider side is referred to as the face (as opposed to the edge). May also refer to the side that is to be visible in the finished item.

Fence – A straight guide on a tool such as a table saw or router table to keep the material a set parallel distance from the blade or cutter.

Finger Joint – Long tapered fingers used to join material lenghtwise, often used in manufacturing moulding to join short lengths.

Flush – When two adjoining surfaces are perfectly even with one another.

Grain – The appearance, size and direction of the alignment of the fibres of the wood.

Hold Down – A type of clamp which holds lumber in place during a cutting operation.

Infeed – The side of the saw where a board enters.

Jig – A device used to hold work or act as a guide in manufacturing or assembly.

Joint – The point at which two or more peices of wood are joined together.

Kerf – The width of a saw cut, determined by the thickness and set of the blade.

Knot – The portion of a branch or limb that is embedded in the wood.

Laminate – The product of bonding layers together as in beams or plywood.

Leading Edge – The edge of the board which enters the saw first.

Nominal Size – The rough sawn dimension a finished piece of material is referred to, for example what is referred to as a 2 X 4 is actually 1 1/2" X 3 1/2".

Outfeed – The side of the saw where the board exits.

Pitch – The number of teeth on a saw blade per inch. Can also be the sticky material in wood that builds up on the saw blade teeth.

Plumb – A term used to describe something that is perfectly perpendicular to the earth relative to gravity. A plumb bob on the end of a string will give you a line that is plumb or straight up and down.

Plunge – A vertical cut made using the Z-Axis on the ALS 4.0

Radial Arm Saw – Circular saw that runs on an overhead track, the track mechanism swings in relation to the table to make miter cuts.

Rake – The angle at which the leading edge of the teeth are cut on a saw blade.

Rip Cut – A cut which runs through the length of a board parallel to the grain.

Robertson Head – A screw head requiring a driver with a square tip, also referred to as a socket head.

Sweep – A horizontal cut made using the T-Axis on the ALS 4.0.

Table Saw – A circular saw mounted under a table with height and angle adjustments for the blade.

Taper Cut – A cut where the width decreases from one end to the other, these are usually done on a table saw with a jig.

Trailing Edge – The edge of the board which enters the saw last.

Warp – To bend or twist to the pull of the grain in the wood.

Appendix E – Warranty

Warranty

ALS 4.0

Alpine, a division of ITW Building Components Group Inc. (hereinafter referred to as "Alpine") warrants the ALS 4.0 to be free from defects in materials and workmanship for a period of one (1) year on parts, and 120 days on major labor (defined as labor required due to proprietary design or degree of difficulty, such that the customer would not be able to perform or hire a local source to perform using remote phone/Internet support from Alpine) from the date of delivery of the equipment. This warranty does not include out of pocket expenses (i.e. transportation, room & board) incurred to install replacement parts, and such expenses will be billed to the customer. Alpine shall only be liable under this warranty if the equipment is used as specified in the Alpine instruction manual and only provided that defects are not caused by damage to the equipment, alteration of the equipment, misuse, or use of the equipment for a purpose other than that for which it was designed. The warranty does not cover the failure of parts caused by lack of or improper maintenance and/or service of the equipment as recommended in the maintenance section of the manual. Components or parts not manufactured by Alpine (e.g. motors, drive boards, computers, etc.) are subject to the manufacturer's warranty and Alpine does not warranty these items. The warranty does not include normal wear and tear on the consumable items such as saw blades, belts, fuses, chains, etc.

The buyer must present warranty claims in writing within the warranty period, citing the unit's serial number and equipment manufacturing date. Alpine may either repair or replace defective parts at its option. All allegedly defective equipment and parts are subject to inspection by Alpine and no equipment or parts may be returned for warranty service without prior authorization from Alpine. All parts or equipment returned for warranty consideration must be shipped prepaid. Parts ordered under Alpine warranty will be shipped within 2 days via ground freight. Additional costs for express freight are the responsibility of the customer.

If warranty service is required and booked by the buyer with Alpine, the buyer must provide notice of cancellation of the service order within 24 hours of booking. If buyer cancels after 24 hours has expired, buyer is responsible for any costs incurred by Alpine by such cancellation, including non-refundable airfare or any other non-refundable out of pocket expenses. Such expenses will be invoiced to buyer.

This warranty is valid only if the customer has complied with all the purchase contract terms, including payment terms, and training requirements.

EXCEPT AS SET FORTH ABOVE, ALPINE MAKES NO WARRANTY OR REPRESENTATION OF ANY KIND, EXPRESS OR IMPLIED (INCLUDING NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE).

ALPINE WILL NOT BE LIABLE, AND BUYER WAIVES ALL CLAIMS AGAINST ALPINE, FOR INDIRECT, INCIDENTAL, SPECIAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, DOWN TIME, LOST PROFITS OR COMMERCIAL LOSSES, WHETHER OR NOT BASED UPON ALPINE'S NEGLIGENCE OR BREACH OF WARRANTY OR STRICT LIABILITY IN TORT OR ANY OTHER CAUSE OF ACTION. IN NO EVENT WILL ALPINE'S LIABILITY EXCEED THE PURCHASE PRICE OF THE SPECIFIC PRODUCTS OR SERVICES AS TO WHICH THE CLAIM IS MADE.

Buyer recognizes that equipment can be dangerous if used by untrained personnel. Buyer agrees to properly train all persons, including employees, subcontractors and transferees, who may use Alpine equipment. Buyer shall indemnify Alpine for all costs incurred with respect to claims for personal injuries and property damage in connection with use of equipment by any person without proper training. Alpine may provide buyer with training at time of equipment installation, provided, however, any training provided by Alpine will not affect Buyer's obligations set forth above.

Appendix F – Bibliography

JET.A.MARK 8000+ #41205998 Technical Manual Version 01,MPERIA - Mathews Marking Systems.PDF.

K-Series Universal Motor Mount Roller Screw Actuators Installation & Service Manual. Rev N.N.p.: EXLAR a Curtiss-Wright Company, 09 June. 2016 PN49269. PDF.

ALPINE
AN ITW COMPANY

155 Harlem Avenue
North Building – 4th Floor
Glenview, Illinois 60025
800-521-9790
alpineitw.com