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To the Reader

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IMPORTANT INFORMATION: PLEASE READ FIRST.....	7
SAFETY.....	9
1.1 Safety Overview.....	10
1.1.1 Safety Messages.....	10
<i>Personal Injury.....</i>	<i>10</i>
<i>Property Damage.....</i>	<i>10</i>
1.2 Machine Safety.....	11
1.2.1 General Shop Safety.....	11
1.2.2 Operational Safety.....	11
<i>General.....</i>	<i>11</i>
<i>Blades.....</i>	<i>12</i>
<i>Workholding.....</i>	<i>12</i>
1.2.3 Electrical Safety.....	12
ABOUT YOUR MACHINE.....	13
2.1 Machine Specifications.....	14
SITE REQUIREMENTS.....	15
3.1 General Site and Space Requirements.....	16
3.1.1 Site Requirements.....	16
3.1.2 Space Requirements.....	16
3.2 Electrical and Power Requirements.....	17
3.2.1 Electrical Requirements.....	17
3.2.2 Power Requirements.....	17
3.3 Air Requirements.....	18
INSTALLATION.....	19
4.1 Before You Begin.....	20
4.2 Move the Pallet.....	21
4.3 Unpack the Machine Crate.....	22
4.4 Set Up the Machine.....	24
4.4.1 Level the Machine.....	24
4.4.2 Install the Coolant Screen.....	24
4.4.3 Install the Blade Tensioner Handles.....	24
4.4.4 Install the Outfeed Guide.....	25
4.4.5 Remove the Shipping Bolts on the Rear Cage.....	25
4.4.6 Verify Motor Belt Tension.....	25
4.4.7 Make Air Connections.....	26
<i>Air Requirements.....</i>	<i>26</i>

TABLE OF CONTENTS

4.5 Verify the Installation

4.5.1 Verify the Proximity Sensor Installation

4.5.2 Power On the Machine

4.5.3 Power Off the Machine

SYSTEM BASICS

5.1 Controls Overview

5.1.1 Machine Controls

5.1.2 Program Controls

BASIC OPERATIONS

6.1 Choose a Blade

6.2 Change a Blade

6.2.1 Install a New Blade

6.2.2 Verify the Blade Installation

6.2.3 Break in the Blade

6.3 Change the Speed

6.4 Change the Feed Rate

6.5 Change the Clamping Pressure

6.6 Set the Number of Cuts

6.7 Set the Number of Cycles

AUTOMATIC OPERATION

7.1 Use Automatic Mode

MANUAL OPERATION

8.1 Use Manual Mode

MACHINE MAINTENANCE

9.1 Maintenance Safety

9.1.1 All Maintenance Procedures

9.1.2 Swarf Maintenance Procedures

9.1.3 Coolant Maintenance Procedures

9.2 Maintenance Schedules

9.2.1 Daily

9.2.2 Weekly

9.2.3 Monthly

9.2.4 Semi-Annually

9.2.5 Annually

9.3 Replace the Gearbox Oil

TROUBLESHOOTING

10.1 Operations Troubleshooting

10.1.1 Blades Break Too Frequently

10.1.2 Blades Dull Too Quickly

10.1.3 Blades Lose Teeth	60
10.1.4 Cuts Are Crooked	61
10.1.5 Material Doesn't Advance	62
10.1.6 Material Slips in Vise Clamps	63
10.1.7 Noise or Problems Moving Through the Cut	64
10.2 Motor and Electrical Troubleshooting	65
10.2.1 Coolant Pump Doesn't Work	66
10.2.2 Error on the Control Panel	68
<i>Control Panel Displays CS</i>	68
<i>Control Panel Displays E**</i>	68
<i>Bandsaw Error Codes Reference</i>	68
10.2.3 Machine Doesn't Start or a Panel Breaker Trips	70
10.2.4 Machine Stalls or It's Underpowered	71
10.2.5 Noise or Machine Vibration	73
10.3 Mechanical Adjustments	74
10.3.1 Adjust the Blade Guides	74
10.3.2 Adjust the Blade Tracking	74
10.3.3 Adjust the Blade Brush	77
10.3.4 Adjust the Height of the Infeed Table	77
10.3.5 Adjust the Jaws	78
<i>Align the Fixed Jaw</i>	78
<i>Adjust the Fixed Clamp Jaw</i>	78
DIAGRAMS AND PARTS LISTS	81
11.1 Base Casting Exploded View	82
11.2 Base Casting Parts List	83
11.3 Head Casting Exploded View	85
11.4 Head Casting Parts List	86
11.5 Infeed Table Exploded View	88
11.6 Infeed Table Parts List	89
11.7 Stand Exploded View	91
11.8 Stand Parts List	92
11.9 Blade Wheel	93
11.10 Motor Assembly	95
11.11 Gear Box Assembly	97
11.12 Sliding Blade Guide (Parent)	99
11.13 Sliding Blade Guard (Child)	101
11.14 Blade Tensioning Kit	103
11.15 Lift Cylinder Assembly	105
11.16 Coolant System	107
PNEUMATIC SCHEMATICS	109
12.1 Pneumatic System	110
12.2 Pneumatic System Parts List	111

TABLE OF CONTENTS

ELECTRICAL SCHEMATICS.....	113
13.1 Electrical Schematic	114

IMPORTANT INFORMATION: PLEASE READ FIRST

INSPECT THE ITEMS DELIVERED

Before installing your machine, carefully inspect all delivered items. Complete the following steps upon receiving your shipment to ensure that everything is in proper condition and that any issues are promptly addressed.

1. Inspect the item(s):
 - Photograph any damage that may have occurred during shipping.
 - Note any damage on the delivery receipt before signing for the shipment. If there is extensive visible damage to the machine, refuse to accept the shipment.
 - Verify the received goods against the packing list. If there is any damage or shortages, you must contact Tormach within 30 days of receipt. Create a support ticket with Tormach Technical Support at tormach.com/how-to-submit-a-support-ticket for guidance on how to proceed.
2. If there are any items that have not yet been delivered, we recommend waiting until you've received all shipments to begin installing the machine. Depending on the product and options ordered, the system may arrive in one or more shipments of:
 - Accessories (if applicable)
 - Machine



Note: The machine system and large accessories are sent by freight carrier. Smaller accessories may be sent by parcel service.

SAVE THESE INSTRUCTIONS!

This document contains important safety warnings and operating instructions for your machine. Before operating this machine in any way, you and all other operators must read and understand all instructions. If you don't, there's a risk of voided warranty, property damage, serious injury, or death. Keep these instructions with your machine so that they're readily accessible.

PURPOSE AND SCOPE OF THIS DOCUMENT

This document is intended to provide sufficient information to allow you to install, configure, and use your machine. It assumes that you have appropriate experience and/or access to training.

GETTING HELP

We provide no-cost technical support through multiple channels. The quickest way to get the answers you need is normally in this order:

1. Read this document.
2. Read related documents and watch related videos at tormach.com/support.
3. If you still need answers, gather the following information so that we may help you as quickly as possible:
 - Your phone number, address, and company name (if applicable).
 - Machine model and serial number, which are located next to the Main Disconnect switch.
 - Any accessories that you have for your machine.
 - A clear and concise description of the issue.
 - Any supporting media and information that you can share with us. For example, you could:
 - Analyze what might have changed since the machine last worked correctly.
 - Record a short video.
 - Take a picture of a part.
 - Use a digital multimeter for voltage readings.
4. Once you've gathered the information in Step 3, contact us in the following ways:
 - a. Create a support ticket: Go to tormach.com/how-to-submit-a-support-ticket
 - b. Phone: (608) 849-8381 (Monday through Friday, 8 a.m. to 5 p.m. U.S. Central Standard Time)

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or entity for any reason for any loss or damage arising from the information contained in this document.

This document provides guidance on safety precautions and techniques, but because the specifics of any one workshop or other local conditions can vary greatly, we accept no responsibility for machine performance or any damage or injury caused by its use. It's your responsibility to verify that you fully understand the implications of what you're doing and comply with any legislation and codes of practice applicable to your city, state, or nation.

SAFETY

IN THIS SECTION, YOU'LL LEARN:

- About the standards and safety precautions associated with this machine.



Before operating the machine in any way, you must read and understand this section.

Safe operation of the machine depends on its proper use and the precautions you take. Only trained personnel — with a clear and thorough understanding of its operation and safety requirements — shall operate this machine.

CONTENTS

1.1 Safety Overview.....	10
1.2 Machine Safety.....	11

1: SAFETY

1.1 Safety Overview

1.1 SAFETY OVERVIEW

Before operating the machine in any way, you must read and understand this section.

- Read and understand all safety messages used in this document.
- Locate and understand all safety decals on the machine.
- Locate and become familiar with all information decals on the machine.

1.1.1 Safety Messages

The following examples show the standard safety message types used to draw your attention to important information. The standards distinguish between personal injury safety messages and property damage warning messages.

Personal Injury

Personal injury safety messages have safety alert symbols and the following hazard level labels:



DANGER! Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



WARNING! Indicates a hazard with a medium level of risk which, if not avoided, can result in death or serious injury.



CAUTION! Indicates a hazard with a low level of risk which, if not avoided, can result in minor or moderate injury.

Property Damage

NOTICE! Indicates a hazard which, if not avoided, can cause property damage.

1.2 MACHINE SAFETY



Before operating the machine in any way, you must read and understand this section.

Safe operation of the machine depends on its proper use and the precautions you take. Only trained personnel — with a clear and thorough understanding of its operation and safety requirements — shall operate this machine.

1.2.1 General Shop Safety	11
1.2.2 Operational Safety	11
1.2.3 Electrical Safety	12

1.2.1 General Shop Safety

- ✓ Verify that only qualified machinery maintenance professionals install, set up, or perform maintenance on this machine.
- ✓ Keep the work area well-lit. Use additional lighting if needed. The work area should be illuminated to a minimum of 500 lx.
- ✓ Keep the work area temperature- and humidity-controlled.
- ✓ Remove loose-fitting clothing, neckties, gloves, and jewelry.
- ✓ Tie up long hair and secure it under a hat.
- ✓ Wear safety eye protection rated for ANSI Z87+.
- ✓ Wear closed-toed safety shoes.
- ✓ Wear ear protection when you expect the machine or the machining processes to exceed safe exposure limits.
- ✓ Keep the work area clean and free of clutter. Machine motion can occur if controls are accidentally activated.
- ✓ Immediately clean up spills after they occur.
- ✗ Never operate the machine after consuming alcohol or taking medication that could prevent you from safely operating the machine.
- ✗ Never operate the machine while tired or otherwise impaired.
- ✗ Never operate the machine in an explosive (ATEX) atmosphere. Such explosive atmospheres include explosive gases, vapors, mists, powders, and dusts.

1.2.2 Operational Safety

General

- ✓ Understand that the machine is automatically controlled and can start at any time.
- ✓ Become familiar with all physical controls.
- ✓ Always use a chip scraper or brush when clearing away chips, oil, or coolant.
- ✓ Examine all blades, fixtures, workpieces, and guarding for signs of damage. Replace any damaged components as soon as you find them.
Guards may not stop all types of projectiles, like broken blades or loose workpieces.
- ✓ Stop the machine and verify that all machine motion has completely stopped before doing any of the following:
 - ✓ Adjusting a part, fixture, or coolant nozzle.
 - ✓ Changing blades or parts.
 - ✓ Clearing away chips, oil, or coolant.
 - ✓ Reaching into any part of the machine's motion envelope.
 - ✓ Removing protective shields or safeguards.
 - ✓ Taking measurements.
 - ✓ Doing any other action inside the guard.
- ✓ Use flood or MQL (mist) coolant as required by the machining operation.
- ✓ Only use coolants designed for metal working applications such as soluble oils, semi-synthetic, or synthetic coolants.
- ✓ Read the Safety Data Sheet (SDS) for all workpiece materials, coatings, coolants (flood or MQL), lubricants, and other consumables. Chips, dust, and vapors from certain materials can be toxic or otherwise harmful.
- ✓ Understand that this product can expose you to chemicals which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.
- ✓ Dispose of scrap and swarf according to local regulations and guidelines.
- ✓ Thoroughly read all safety precautions and instructions.
- ✗ Never reach around a guard.
- ✗ Never allow the machine to run unattended.

1: SAFETY

1.2 Machine Safety

- ✗ Never obstruct the Emergency Stop button or any other controls.
- ✗ Never allow untrained operators to install, operate, or maintain the machine.
- ✗ Never modify, defeat, or bypass safety devices or interlocks.
- ✗ Never machine abrasive, carcinogenic, explosive, flammable, radioactive, or toxic materials. Such materials include, but are not limited to:
 - ✗ Beryllium and its alloys
 - ✗ Ceramic
 - ✗ Fiberglass
 - ✗ G10 fiberglass laminate
 - ✗ Graphite
 - ✗ Lead and its alloys
 - ✗ Magnesium and its alloys
- ✗ Never allow swarf to accumulate on or within the machine.
- ✗ Never use flammable liquids (like alcohol, diesel fuel, or kerosene) in the machine's coolant system.
- ✗ Never use water, coolants without rust inhibitors, or straight cutting oil in the machine's coolant system.

Blades

- ✓ Examine blades for signs of damage or missing teeth. Replace any damaged blades, or blades with missing teeth, as soon as you find them.
- ✓ Wear gloves and safety eye protection when replacing blades.
- ✓ Verify that the teeth on the blade point toward the workpiece.
- ✗ Never use worn or damaged blades, or blades with missing teeth. Blades can break and become dangerous projectiles.

Workholding

- ✓ Secure workpieces with appropriate workholding devices.
- ✓ Verify that the workpiece is adequately secured.
- ✓ Remove cutoff workpieces and other large chips before starting the machine.
- ✗ Never leave tools, stock, or other loose items inside the machine.

- ✗ Never use your hands to hold the workpiece during machining operations.

1.2.3 Electrical Safety



WARNING! Electrical Shock Hazard: You must power off the machine before making any electrical connections. If you don't, there's a risk of electrocution or shock.

- ✓ Power off the machine before servicing.
- ✓ Understand that certain electrical components can retain dangerous electrical voltages, even after the machine is powered off and all power is removed from the system.
- ✓ Understand that certain installation, maintenance, and troubleshooting procedures — for the machine and certain accessories — require access to or modification of wiring inside of the electrical cabinet. Only qualified electrical machinery technicians shall perform these procedures.
- ✓ Confirm that the mains voltage conforms to requirements before connecting the machine.
For more information, see "Electrical and Power Requirements" (page 17).
- ✓ Confirm that the machine installation meets all codes and regulations of your locality.
- ✓ Confirm that electrical connections are performed by a certified electrician.
- ✓ Lock the electrical cabinet door and remove the keys when the machine is not being serviced to prevent unqualified or unauthorized personnel from accessing the electrical cabinet.
- ✗ Never operate the machine with the electrical cabinet door open.
- ✗ Never reach into the electrical cabinet with the machine powered on.
- ✗ Never modify the machine's electronics.
- ✗ Never drill into the electrical cabinet.

ABOUT YOUR MACHINE

IN THIS SECTION, YOU'LL LEARN:

- About this machine's specifications.

CONTENTS

2.1 Machine Specifications.....	14
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2: ABOUT YOUR MACHINE

2.1 Machine Specifications

2.1 MACHINE SPECIFICATIONS

Programmable Automatic Workpiece Positioning	
Cut Lengths	0.157 in. to 50 in. (4 mm to 1270 mm)
Maximum Length Per Stroke	Up to 10 in. (254 mm)
Maximum Strokes per Part	5
Maximum Parts per Program	999
Maximum Capacity	
Rectangular Stock	6 in. tall × 8 in. wide (152 mm tall × 203 mm wide)
Round Stock	7 in. (178 mm) diameter
Material Weight	250 lbs (113 kg), subject to air supply pressure
Blade	
Motor Power	1 hp (0.75 kW)
Blade Speeds	60 Hz: 90, 134, 195, 255 ft/min (27, 41, 59, 78 m/min) 50 Hz: 70, 110, 160, 210 ft/min (22, 34, 49, 64 m/min)
Blade Length	93 in. (2362 mm)
Blade Width	0.75 in. (19 mm)
Blade Thickness	0.035 in. (0.9 mm)
Coolant	
Capacity	2.65 gal (10 L)
Dimensions	
Floor-To-Table Height	22 in. (559 mm)
Typical System Weight	450 lb (205 kg)
Power and Air Requirements	
Primary Power	Single-Phase 115 Vac, 50/60 Hz
Required Circuit Amperage	Dedicated 15 A breaker
Compressed Air Source	90 psi to 120 psi (620 kPa to 827 kPa)
Space Requirements	
Minimum Depth	36 in. (0.91 m) plus the length of stock
Minimum Height	67 in. (1.71 m)
Minimum Width	60 in. (1.53 m)

SITE REQUIREMENTS

IN THIS SECTION, YOU'LL LEARN:

- About the site requirements of this machine (including electrical and power requirements).



Before operating the machine in any way, you must read and understand this section.

CONTENTS

3.1 General Site and Space Requirements	16
3.2 Electrical and Power Requirements	17
3.3 Air Requirements	18



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3: SITE REQUIREMENTS

3.1 General Site and Space Requirements

3.1 GENERAL SITE AND SPACE REQUIREMENTS

When choosing a location for your machine, you must verify that it meets all requirements outlined in this section.

3.1.1 Site Requirements

You must verify that the area:

- Allows for unrestricted access to machine controls.
- Conforms to the following:
 - **Primary Power Required** Single-Phase 115 Vac, 50/60 Hz
 - **Recommended Circuit Amperage** Dedicated 15 A breaker



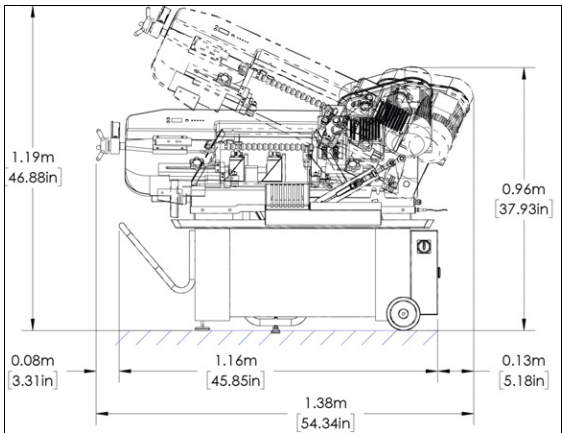
Note: For more information, see "Electrical and Power Requirements" (on the next page).

- Has clean, dry, compressed air.
- Is a dry, properly ventilated, and well-lit internal space.
- Provides for unobstructed machine motion and operation.

3.1.2 Space Requirements

The area must meet the following space requirements. Allow more space to access the rear of the machine for maintenance and repairs.

- **Machine Size** 54" × 37" (1.4 m × 0.9 m)
- **Machine Height** 47" (1.2 m)



3.2 ELECTRICAL AND POWER REQUIREMENTS

You must verify that the site conforms to the following electrical and power requirements.

3.2.1 Electrical Requirements

A certified electrician must make all electrical connections, and it's your responsibility to verify that the electrical installation of the machine meets all local regulations and electrical codes.

- **Primary Power Required** Single-Phase 115 Vac, 50/60 Hz
- **Recommended Circuit Amperage** Dedicated 15 A breaker

3.2.2 Power Requirements

If the site conforms to the electrical requirements, verify that it meets the following power requirements:

- **Proper Grounding** You must properly ground the power input to the machine. Examine the continuity between bare metal on the machine frame and true earth ground (a water pipe or similar) to verify that it's properly grounded.
- **Correct Plug Pattern** The machine is shipped with a NEMA 5-15P plug, designed for use with a NEMA 5-15R receptacle.

3: SITE REQUIREMENTS

3.3 Air Requirements

3.3 AIR REQUIREMENTS

- **Air Pressure** 90-120 psi (620-825 kPa)
If the air supply is more than 120 psi (825 kPa), you must use a regulator.
- **Dry Air** We recommend using a compressed air dryer, desiccator, or filter between the air compressor and the machine.
- **Lubricated Air** You must lubricate the air with air tool oil.

INSTALLATION

IN THIS SECTION, YOU'LL LEARN:

- About the installation process required for this machine.



Before operating the machine in any way, you must read and understand this section.

CONTENTS

4.1 Before You Begin	20
4.2 Move the Pallet	21
4.3 Unpack the Machine Crate	22
4.4 Set Up the Machine	24
4.5 Verify the Installation	27



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4: INSTALLATION

4.1 Before You Begin

4.1 BEFORE YOU BEGIN

1. Inspect the item(s):

- Photograph any damage that may have occurred during shipping.
- Note any damage on the delivery receipt before signing for the shipment. If there is extensive visible damage to the machine, refuse to accept the shipment.
- Verify the received goods against the packing list.

If there is any damage or shortages, you must contact Tormach within 30 days of receipt. Create a support ticket with Tormach Technical Support at tormach.com/how-to-submit-a-support-ticket for guidance on how to proceed.

2. Before uncrating your machine, collect the following tools and items:

- 14 mm wrench
- Adjustable wrench
- Flat-blade screwdriver
- Hammer
- Metric hex wrench set
- Pallet jack
- Phillips screwdriver
- Pry bar
- Razor blade
- Safety eyewear that meets ANSI Z87+
- Snips
- Work gloves

4.2 MOVE THE PALLET

Shipments arrive in crates loaded on pallets, which the freight carrier unloads onto the curb or loading dock.



WARNING! Transportation and Lift Hazard: Before moving the machine, you must confirm that all persons are clear of the area below the machine. Qualified professionals must transport, lift, and move the machine. Moving parts can entangle, pinch, or cut you, causing death or serious injury.

- Verify that the ground surface is smooth and clean of debris, and then use a pallet jack to move the pallet(s) to the desired installation location.



Note: If the ground is not smooth, you may need to use a forklift (or similar lifting equipment rated for uneven surfaces) to move the pallet(s).

4: INSTALLATION

4.3 Unpack the Machine Crate

4.3 UNPACK THE MACHINE CRATE

CAUTION! Sharp Objects Hazard: Before opening the shipping crate, you must put on work gloves and safety eyewear that meets ANSI Z87+. If you don't, the shipping crate and steel straps could cut you, causing serious injury.

1. Put on work gloves and eye protection.
2. Cut the shipping straps on the outside of the machine's shipping box with snips. Discard the shipping straps.
3. Cut open the machine's shipping box with a razor blade, and then remove the shipping box from the shipping crate. Discard the cardboard.
4. Open and disassemble the machine's shipping crate with a hammer. Start with the top and follow by the four sides. Set aside the wood from the machine's shipping crate; we recommend using it later in this procedure to remove the bandsaw from the pallet.
5. Remove the plastic machine wrap and discard. When finished, the contents will look similar to the following image.



Figure 4-1: Bandsaw after opening the shipping crate.

6. Inspect the item(s):
 - Photograph any damage that may have occurred during shipping.
 - Verify the received goods against the packing list.If there is any damage or shortages, you must contact Tormach within 30 days of receipt. Create a support ticket with Tormach Technical Support at tormach.com/how-to-submit-a-support-ticket for guidance on how to proceed.
7. Cut all shipping straps securing the machine, the

accessory box, and the coolant tank to the pallet with snips. Remove the accessory box from the pallet and set it aside for later use.

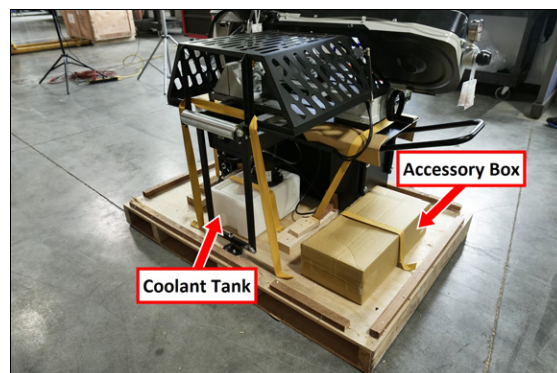


Figure 4-2: Accessory box and coolant tank on the pallet.

8. Slide the coolant tank into the stand. You may have to turn the coolant tank so that the fin in the stand aligns with the slot in the coolant tank.



Figure 4-3: Coolant tank installed in the stand.



Note: Take care to keep the lines behind the coolant tank neat and tidy to prevent kinks.

9. Find the coolant hose that's pre-installed on the bandsaw, and put its loose end into the coolant tank.

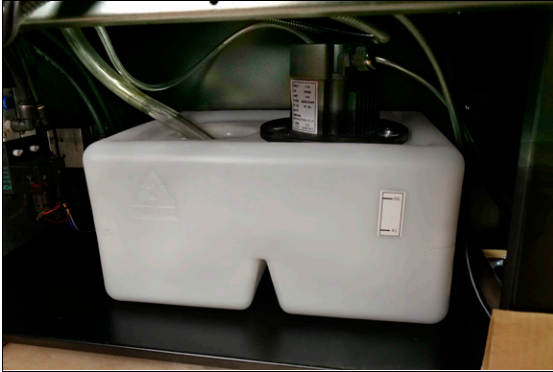


Figure 4-4: Coolant hose installed into the coolant tank.

⚠ CAUTION! Team Lift Required: You must have the aid of more than one person to lift and move the object. The object is heavy, and lifting it by yourself can cause serious injury.

10. To move the bandsaw off of the pallet, we recommend reusing parts of the machine crate that you previously disassembled to make a staircase at the right-hand side of the pallet. Before you lift the machine, verify that you have assistance to help you move it off of the pallet. We recommend two people.

NOTICE! While lifting the machine, don't use the infeed table as a lifting point. If you do, there's a risk of machine damage.

- a. Remove the wooden blocks used to keep the bandsaw's wheels and feet in place during shipping with a pry bar or a hammer. Then, remove the wooden slat along the right-hand side of the pallet.
 - b. Assemble three 2x4s from the machine's crate on the right-hand side of the pallet to create a step.
 - c. Suspend the bandsaw's power cord so that it's out of way for moving the machine.
 - d. Lift and guide the bandsaw off of the pallet and down the steps.
11. Move the machine to the desired installation location with its handle and wheels.
 12. Remove the shipping bracket securing the base casting

to the head casting. Use a 5 mm hex wrench to remove the socket head cap screw from the top of the bracket, and a 14 mm wrench to remove the nut from the bottom of the bracket.



Figure 4-5: Shipping bracket securing the base casting to the head casting.

13. We recommend replacing the bolt on the head casting, and keeping the shipping bracket in the event of a future move.

4: INSTALLATION

4.4 Set Up the Machine

4.4 SET UP THE MACHINE

Before you begin machining operations, you must setup and align the machine. Complete the following steps in the order listed:

4.4.1 Level the Machine.....	24
4.4.2 Install the Coolant Screen.....	24
4.4.3 Install the Blade Tensioner Handles.....	24
4.4.4 Install the Outfeed Guide.....	25
4.4.5 Remove the Shipping Bolts on the Rear Cage.....	25
4.4.6 Verify Motor Belt Tension.....	25
4.4.7 Make Air Connections.....	26

4.4.1 Level the Machine

Before operating the machine, you must verify that it's approximately level. While this helps with things like coolant flow, it doesn't impact machine performance.

To level the machine:

- Make note of any high or low spots, and, if required, adjust the leveling feet.



Figure 4-6: Leveling feet on the machine.

4.4.2 Install the Coolant Screen

1. Find the accessory box that you set aside earlier. Remove the coolant screen from the box, and set the rest aside.

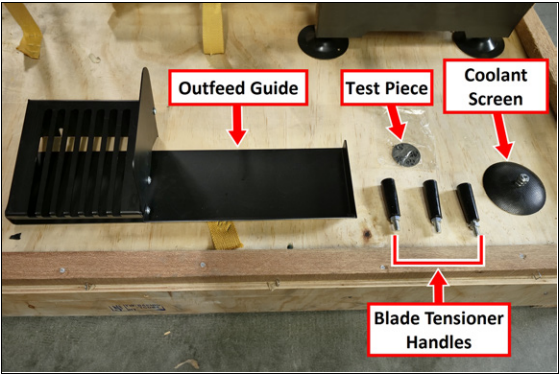


Figure 4-7: Coolant screen inside the accessory box.

2. Put the coolant screen on the machine's base below the saw, as shown in the following image. Make sure that the nut on the coolant screen is facing up.

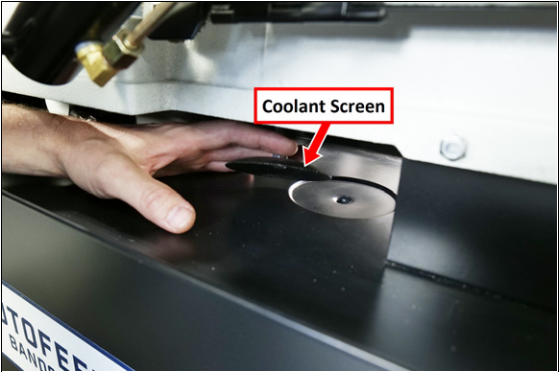


Figure 4-8: Coolant screen put on the machine's base.

Note: The bolt on the coolant screen is intended to use as a handle.

4.4.3 Install the Blade Tensioner Handles

1. Find the accessory box that you set aside earlier. Remove the three blade tensioner handles from the box, and set the outfeed guide aside.

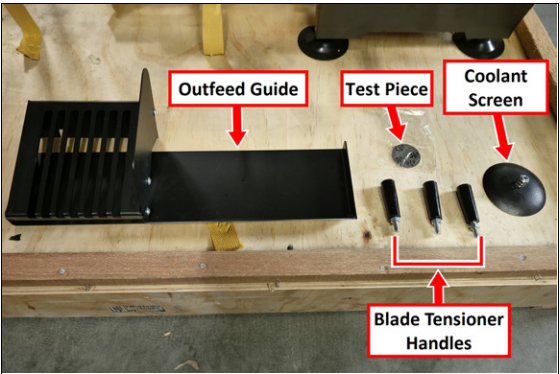


Figure 4-9: Contents of the accessory box.

2. Install the three blade tensioner handles with a flat-blade screwdriver.



Figure 4-10: Installing the blade tensioner handles.

4.4.4 Install the Outfeed Guide

1. Find the outfeed guide (from the accessory box) that you set aside earlier.

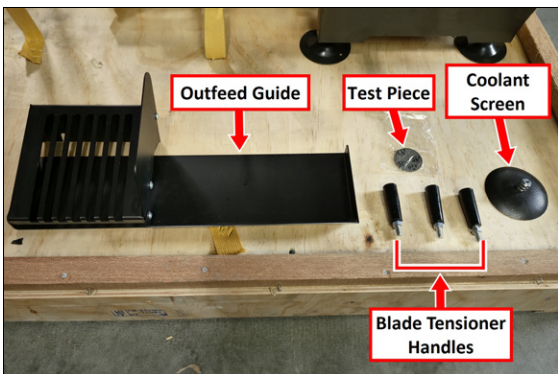


Figure 4-11: Contents of the accessory box.

2. Identify the two Phillips head screws that are pre-installed on the machine. Loosen the screws with a Phillips head screwdriver.

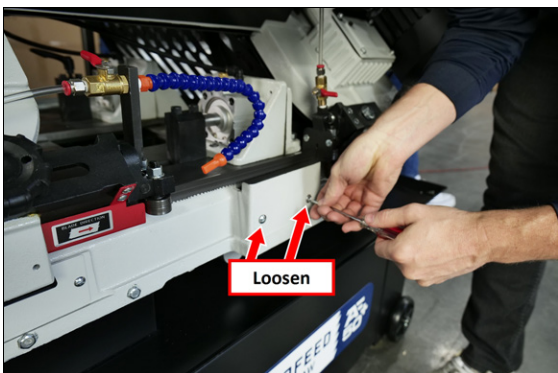


Figure 4-12: Loosening the two screws for the outfeed guide.

3. Slide the outfeed guide over the two screws. Adjust the return tray so that it's in the pan, as shown in the following image.



Figure 4-13: Outfeed guide correctly aligned.

4. Tighten the two Phillips head screws with a Phillips head screwdriver.

4.4.5 Remove the Shipping Bolts on the Rear Cage

- The rear cage is secured to the frame for shipment. Remove the two bolts with a 5 mm hex wrench.

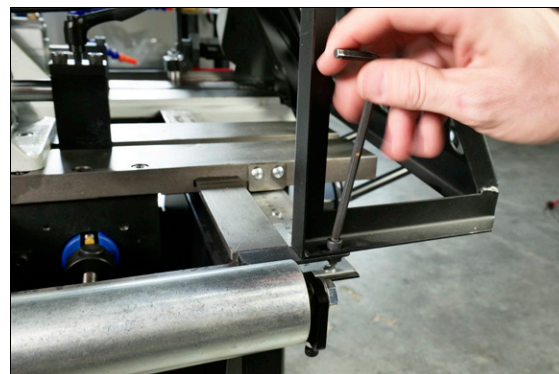


Figure 4-14: Removing the shipping bolts from the rear cage and the frame.

4.4.6 Verify Motor Belt Tension

To properly validate the installation of your machine, you must verify that the motor belt is properly tensioned.

To verify the motor belt tension:

1. Verify that the air supply and the machine's main power cable aren't yet connected to the machine.

4: INSTALLATION

4.4 Set Up the Machine

2. Open the pulley cover.



Figure 4-15: Pulley cover opened.

3. Firmly push the belt between the pulleys. If it's properly tensioned, the belt should move approximately 1/2 in. If it's not properly tensioned, complete the steps in "Change the Speed" (page 37).



Figure 4-16: Testing the tension of the motor belt.

4. Close the pulley cover.

4.4.7 Make Air Connections

1. Remove the fitting from the input port on the FRL Filter-Regulator-Lubricator (on the back of the machine) with an adjustable wrench.



Figure 4-17: Original air fitting installed on the FRL.

2. Install the provided fitting to the input port on the FRL with an adjustable wrench.



Figure 4-18: Provided air fitting installed on the FRL.

3. Connect the air line from your site to the input port on the FRL Filter-Regulator-Lubricator.

Air Requirements

- **Air Pressure** 90-120 psi (620-825 kPa)
If the air supply is more than 120 psi (825 kPa), you must use a regulator.
- **Dry Air** We recommend using a compressed air dryer, desiccator, or filter between the air compressor and the machine.
- **Lubricated Air** You must lubricate the air with air tool oil.

4.5 VERIFY THE INSTALLATION

After setting up the machine you must verify the installation. Complete the following steps in the order listed:

4.5.1 Verify the Proximity Sensor Installation	27
4.5.2 Power On the Machine	27
4.5.3 Power Off the Machine	27

4.5.1 Verify the Proximity Sensor Installation

To properly validate the installation of your machine, you must verify that the proximity sensors are correctly installed.

To verify the proximity sensor installation:

1. Find the four proximity sensors on the machine as shown in the following image.

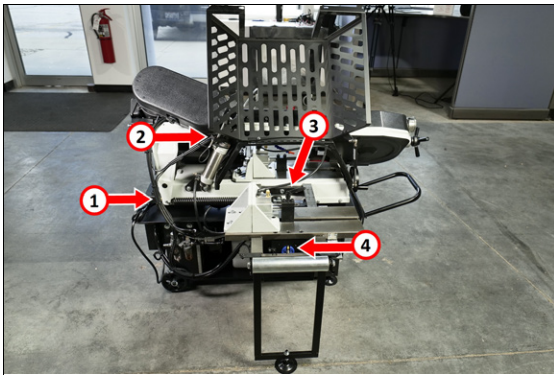


Figure 4-19: Proximity sensors on the bandsaw.

2. Inspect each proximity sensor to verify that there's a 0.55 mm to 0.75 mm gap.



Figure 4-20: Proximity sensor.

3. You've successfully verified the proximity sensor installation. Now, you must verify the machine's electronics. Go to "Power On the Machine" (below).

4.5.2 Power On the Machine

To properly validate the installation of your machine, you must understand how to power on and off the machine and use the controls.

To power on the machine:

1. Connect the machine's mains power cable to the verified electrical service.
2. Find the Main Disconnect switch, and then turn it to **ON**. Mains power is now connected to the machine.
3. Rotate the Emergency Stop button on the operator panel one-quarter turn clockwise to release it.
4. Verify that the lights on the control panel come on.
5. You've successfully verified that you can power on your machine. Now, you must verify that you can power off the machine. Go to "Power Off the Machine" (below).

4.5.3 Power Off the Machine

1. Push the Emergency Stop button on the operator panel to lock it into the disabled position.
2. Turn the Main Disconnect switch to **OFF**. Mains power is disconnected from the machine. You're done verifying that you can power off the machine.

You've successfully verified the installation of your machine.



SYSTEM BASICS

IN THIS SECTION, YOU'LL LEARN:

- About the main components of the machine and how it moves.



Before operating the machine in any way, you must read and understand this section.

CONTENTS

5.1 Controls Overview.....	30
----------------------------	----

5: SYSTEM BASICS

5.1 Controls Overview

5.1 CONTROLS OVERVIEW

To safely and effectively operate your machine, you must become familiar with its basic controls.

5.1.1 Machine Controls

The following controls energize the machine's control electronics:

- **Main Disconnect Switch** On the front of the electrical cabinet.
- **Cycle Start Button** On the control panel.



Figure 5-1: Machine controls.

- **Coolant Switch** On the control panel.
- **Pause Button** On the control panel.
- **Emergency Stop Button** On the control panel.

5.1.2 Program Controls

The control panel has the following controls, used to switch between automatic and manual mode, and to set the parameters for machine operations:

- **Up and Down Arrow Buttons** On the control panel.
For information, see "Set the Number of Cuts" (page 40).
- **Stroke Button** On the control panel.
For information, see "Set the Number of Cycles" (page 41).



Figure 5-2: Program controls.

BASIC OPERATIONS

IN THIS SECTION, YOU'LL LEARN:

- About the basic operations required for most projects, organized as a suggested project workflow.

CONTENTS

6.1 Choose a Blade.....	32
6.2 Change a Blade.....	33
6.3 Change the Speed.....	37
6.4 Change the Feed Rate.....	38
6.5 Change the Clamping Pressure.....	39
6.6 Set the Number of Cuts.....	40
6.7 Set the Number of Cycles.....	41

6: BASIC OPERATIONS

6.1 Choose a Blade

6.1 CHOOSE A BLADE

Using the correct blade for the material is important to reduce cost and to operate the bandsaw efficiently. Because there's a wide variety of bandsaw blade types, you must first know the specifications of the material you want to cut.

Choosing a blade depends on a number of different factors.

Use this section as a reference; for more information, see your blade manufacturer's reference materials.



Note: AF50+ Autofeed Bandsaw blades are 93 in. × 3/4 in. × 0.35 in.

To choose a blade, determine the following:

1. **Teeth Per Inch (TPI)** Based on the size and shape of the material, select the TPI. A high TPI cuts slower and smoother, while a low TPI cuts faster and rougher. While cutting, you must always have three teeth engaged with the part.

Material Thickness Range	TPI Range
1/8 in. (6 mm) to 1/4 in.	10 to 14
1/4 in. to 1/2 in. (12 mm)	8 to 12
1/2 in. (12 mm) to 1 in.	6 to 10
1 in. to 2 in.	5 to 8
2 in. to 4 in.	3 to 4
4 in. to 7 in.	2 to 3
7 in. to 12 in.	1-2/5 to 2-1/2

2. **Tooth Form** Select the tooth form (the shape of the cutting edge). The tooth form affects how the blade cuts through the material.
3. **Tooth Set** Based on the required chip clearance, select the tooth set (the angle at which the tooth is offset from the blade). The particular tooth set is what carries the chip away from the cut, and is important for surface finish.

6.2 CHANGE A BLADE

The bandsaw arrives with a blade installed. To change the blade, complete the following steps in the order listed:

6.2.1 Install a New Blade	33
6.2.2 Verify the Blade Installation	36
6.2.3 Break in the Blade	36



Note: For simplicity, you must verify the blade installation before you set the saw head down.

6.2.1 Install a New Blade



WARNING! Crush Hazard: Moving parts can entangle, pinch, or cut you, causing death or serious injury. While operating the machine in vertical position, you must keep your hands away from the blade.

1. Put on work gloves, eye protection, and any other appropriate personal protective equipment. We recommend a long-sleeved shirt and long pants.
2. Power off the bandsaw and disconnect it from the main air supply.
 - a. Push the Emergency Stop button on the operator panel to lock it into the disabled position.
 - b. Turn the Main Disconnect switch to **OFF**. Mains power is disconnected from the machine.
 - c. Disconnect the air line from your site from the input port on the FRL Filter-Regulator-Lubricator.
3. On the back of the machine, identify the air cylinder, as shown in the following image.

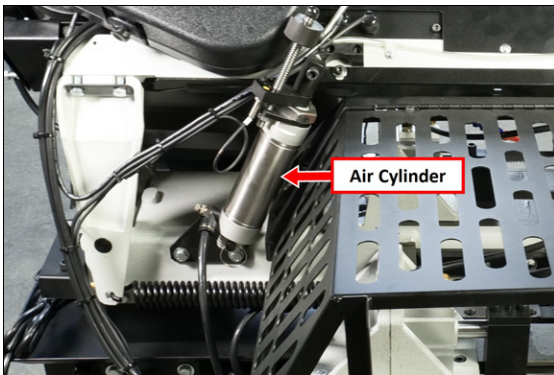


Figure 6-1: Air cylinder on the back of the machine.

4. Remove the cotter clip (on the end of the quick-release

pin).

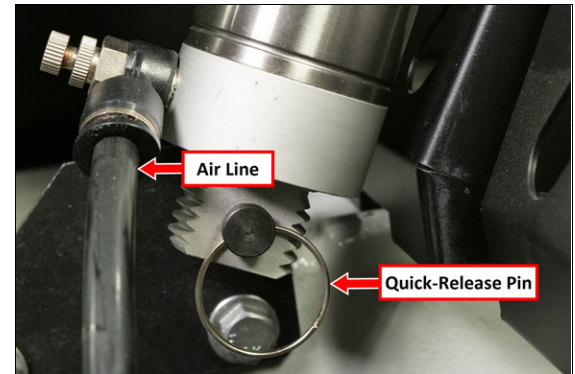


Figure 6-2: Quick-release pin on the air cylinder.

5. Pull the quick-release pin out of the air cylinder, and set it aside.
The air cylinder hangs from the saw head.
6. Lift the saw head to the upright position, as shown in the following image.



Figure 6-3: Bandsaw head lifted upright.

6: BASIC OPERATIONS

6.2 Change a Blade

7. Loosen the bolt securing the air cylinder to the bandsaw with an 8 mm hex wrench until the door can open. Make sure the bolt is still secure enough to hold the air cylinder in place — letting the air cylinder hang adds extra strain to the wires.



Figure 6-4: Bolt on the air cylinder.

8. Slide up the bottom of the blade cover, and then slide the blade cover up until it clears the base casting.



Figure 6-5: Blade cover.

9. Remove the two screws from the side of the blade cover with a 5 mm hex wrench, and then set aside the screws.

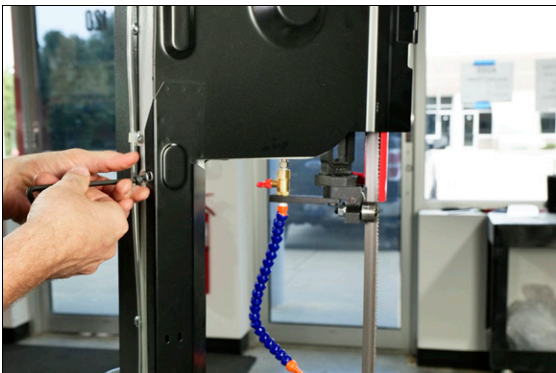


Figure 6-6: Removing the screws securing the blade cover to the bandsaw.



Figure 6-7: Blade cover opened.

11. Remove the two screws securing the blade guard with a Phillips screwdriver. Set the screws and the guard aside.

10. Open the blade cover, as shown in the following image.



Figure 6-8: Removing the blade guard.

12. Identify the tensioner on the top of the saw head.

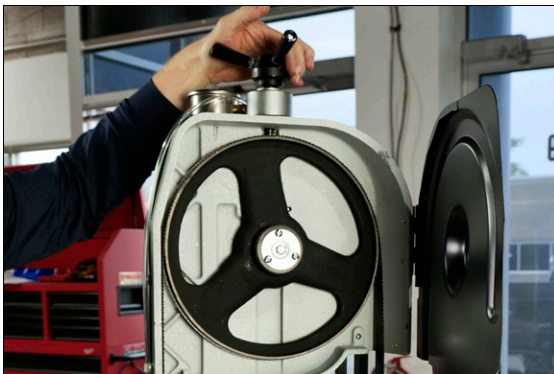


Figure 6-9: Tensioner on top of the saw head.



Note: Only use the inner circle on the tensioner for 3/4" blades.

13. Loosen the tensioner to remove the tension on the blade.



CAUTION! Cut Hazard: Bandsaw blades can cut you, causing serious injury. Before handling any bandsaw blades, you must put on work gloves, eye protection, and any other appropriate personal protective equipment (like a long-sleeved shirt and long pants).

14. Carefully remove the blade from the wheels.
15. Put the new blade into the blade guides so that its teeth are pointing away from the blade guide's rollers, and so that its tooth direction is pointing toward the motor (from the blade guides).
16. Use one hand to hold the blade in between the blade guides, and use the other hand to put the blade around the wheels.
17. Keep one hand on the blade to hold it in between the blade guides, and use the other hand to tighten the tensioner. Continue tightening until the needle on the blade tensioning gauge is aligned with the tip of the arrow.



Figure 6-10: Tensioner dial aligned with the tip of the arrow.

18. Re-install the blade guard with its two screws that you set aside earlier.
19. Close the blade cover, and then secure it using the two screws you set aside earlier.
20. Move the bottom of the blade cover down. Before you put the saw head down, you must verify that the blade is seated.
21. Re-install the air cylinder and the air line.
22. Carefully set the saw head down.

6: BASIC OPERATIONS

6.2 Change a Blade

6.2.2 Verify the Blade Installation

1. Power on the bandsaw.
 - a. Rotate the Emergency Stop button on the operator panel one-quarter turn clockwise to release it.
 - b. Turn the Main Disconnect switch to **ON**.
Mains power is connected to the machine.
2. Set the bandsaw to manual mode: from the control panel, push the Down Arrow and Up Arrow buttons at the same time. The control board displays - - - .



WARNING! Crush Hazard: Moving parts can entangle, pinch, or cut you, causing death or serious injury. While operating the machine in vertical position, you must keep your hands away from the blade.

3. From the operator panel, push the Cycle Start button. The blade moves through the blade guides and around the blade wheels.
4. Let the blade move for three seconds. Then, on the operator panel, press the Emergency Stop button.
5. Examine the position of the blade on the wheels, and do one of the following:
 - **Blade Correctly Positioned on the Wheels**
You've verified that the blade is correctly installed. Go to the next section.
 - **Blade Moved off the Wheels** Power off the machine and disconnect it from the power supply. Then, adjust the blade until it's correctly positioned on the wheels, and repeat Steps 1 through 5.

6.2.3 Break in the Blade

All new bandsaw blades are manufactured with extremely sharp teeth, which need to be worn down slightly so that they don't fracture under the high cutting pressure used in bandsawing. Your blade will cut more consistently and last much longer if you hone the teeth to create a small radius on the tip.

To break in a new blade:

- **For Easy-To-Cut Materials (like carbon steel and aluminum)** Reduce the feed rate to half the normal rate for 50-100 square inches.
 - **For Hard-To-Cut Materials (like nickel-based alloys, hardened steels, tool steels and stainless steels)** Reduce the feed rate to 3/4 the normal rate for 25-75 square inches.
 - Gradually increase to the normal cutting rate over the next few cuts, adjusting speed slightly if necessary to avoid vibration.
- Use the band speed recommended for the material you are cutting.

6.3 CHANGE THE SPEED



Note: For information on selecting a blade cutting speed, see a machinist's handbook.

To change the blade cutting speed:

1. Power off the bandsaw and disconnect it from the main air supply.
 - a. Push the Emergency Stop button on the operator panel to lock it into the disabled position.
 - b. Turn the Main Disconnect switch to **OFF**.
Mains power is disconnected from the machine.
 - c. Disconnect the air line from your site from the input port on the FRL Filter-Regulator-Lubricator.
2. Open the pulley cover.
3. Loosen the clamping bolt under the motor.
4. Turn the belt tensioning bolt counterclockwise to loosen the tension on the belt. Continue to turn the bolt until you can remove the belt from the pulleys.
5. Move the belt from one position on the pulleys to another. Refer to the speed selection chart inside the pulley cover for more information.

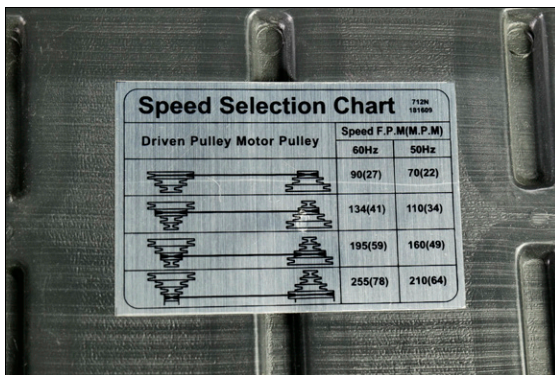


Figure 6-11: Speed selection chart inside the pulley cover.

6. Turn the belt tensioning bolt clockwise to increase the tension on the belt.
7. Firmly push the belt between the pulleys. If it's properly tensioned, the belt should move approximately 1/2 in. If it's not properly tensioned, repeat Steps 6 through 7.
8. Tighten the clamping bolt.
9. Close the pulley cover.

6: BASIC OPERATIONS

6.4 Change the Feed Rate

6.4 CHANGE THE FEED RATE

Determine the feed rate by observing how the bandsaw is operating and the chip formations that it's cuts are producing.

NOTICE! If the feed rate is too high, it could cause stalling or the blade to break. If the feed rate is too low, it could dull the blade too quickly.

To change the feed rate:

1. Open the hydraulic flow on the blade feed lever: turn the lever so that it's inline with the cylinder.

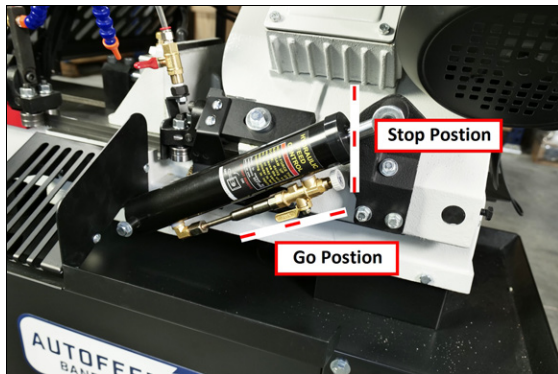


Figure 6-12: Blade feed lever.

2. Adjust the feed rate:
 - **To Increase the Feed Rate** Turn the dial on the blade feed lever counterclockwise.
 - **To Decrease the Feed Rate** Turn the dial on the blade feed lever clockwise.
3. Close the hydraulic flow on the blade feed lever: turn the lever so that it's perpendicular with the cylinder.

6.5 CHANGE THE CLAMPING PRESSURE



Note: Choosing the clamping pressure — or the amount of force that the jaws exert onto the part — depends on the type of material you're cutting. For more information, see a machinist's handbook.

To change the clamping pressure:

- Adjust the pneumatic regulator on the gearbox to increase or decrease the clamping pressure.



Figure 6-13: Pneumatic regulator.

6: BASIC OPERATIONS

6.6 Set the Number of Cuts

6.6 SET THE NUMBER OF CUTS

Use the Up Arrow and Down Arrow buttons on the control panel to indicate the number of cuts.

To set the number of cuts:

- **Automatic Mode** Select a number from 1 to 999.
- **Manual Mode** Do one of the following:
 - Push the Down Arrow and Up Arrow buttons at the same time. The control panel displays - - - .
 - Push the Down Arrow button until the control panel displays - - - .



Note: A display of - - - on the control panel indicates that the machine is in manual mode.

6.7 SET THE NUMBER OF CYCLES



Note: You'll only set the number of cycles in automatic mode. The Stroke button isn't used in manual mode.

If the required length is longer than a full stroke can move, use the stroke multiplier.

To set the number of cycles:

- Use the Stroke button to indicate the number of cycles:
select a number from 1 to 5.



AUTOMATIC OPERATION

IN THIS SECTION, YOU'LL LEARN:

- How to operate the machine in automatic mode.

CONTENTS

7.1 Use Automatic Mode.....	44
-----------------------------	----

7: AUTOMATIC OPERATION

7.1 Use Automatic Mode

7.1 USE AUTOMATIC MODE

To use the bandsaw in automatic mode:

1. Confirm that the blade is appropriate for the material.
For more information, check with your blade manufacturer for application usage.
If the blade is not appropriate for the material, you must first change it. Go to "Change a Blade" (page 33).
2. Open the clamps on both vises with the handwheel and the clamp handle. Then, load the material between the vises.

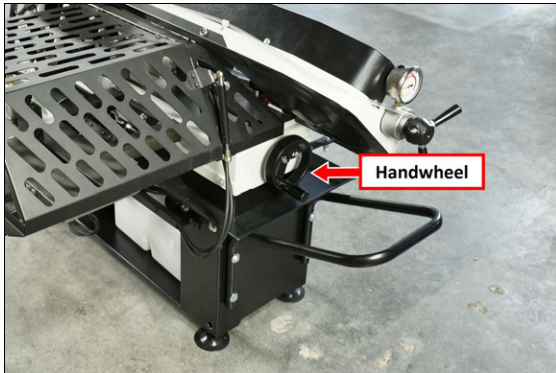


Figure 7-1: Handwheel.

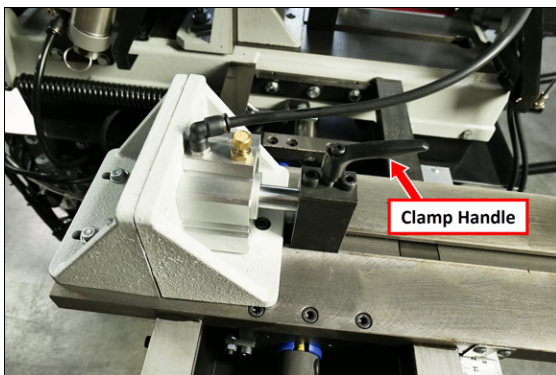


Figure 7-2: Clamp handle.

3. Push the material up to the back of the blade.
4. On the infeed table, identify the horizontal quick-adjustment nut. Press the button on the quick-adjustment nut to loosen it. Then, move it away from the blade and past the desired length of cut.

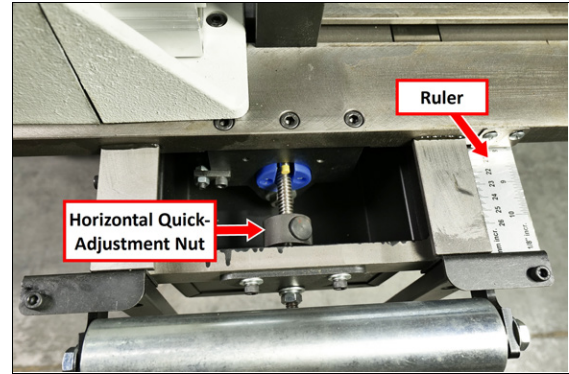


Figure 7-3: Horizontal quick-adjustment nut.

The horizontal quick-adjustment nut controls the length to which the infeed table moves.

Note: Use the ruler to determine how far to move the components to achieve the desired cut.

5. Adjust the infeed table until the back edge of the table is just past the desired length of cut on the ruler.
6. Rotate the horizontal quick-adjustment nut to make fine adjustments to the infeed table until the back edge of the table is aligned with the desired length of cut on the ruler.
If the length needed is longer than a full stroke can move, use the stroke multiplier on the control panel to achieve the required length. For more information, go to "Set the Number of Cycles" (page 41).
7. Use the handwheel to close the fixed vise clamp until it is approximately 1/8 in. from the material.
8. Loosen the clamp handle to close the feeding vise clamp until it is approximately 1/8 in. from the material.
9. Tighten the clamp handle to lock it in place.
10. Remove any backlash: pull the feeding vise by hand toward the clamp handle. Then, verify that there's still approximately 1/8 in. gap between the vise and the material.
11. Adjust the clamping pressure to the desired amount using the regulator (mounted by the gearbox).

12. On the front of the machine, locate the blade support guide. Move the blade support guide until it is 1/4 in. from the material.

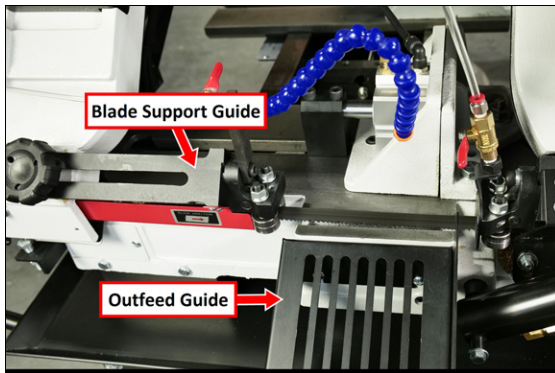


Figure 7-4: Blade support guide on the front of the machine.

13. Position the coolant nozzle so that it points at the blade ahead of the material.
14. On the front of the machine, identify the blade feed lever, and then move it up.

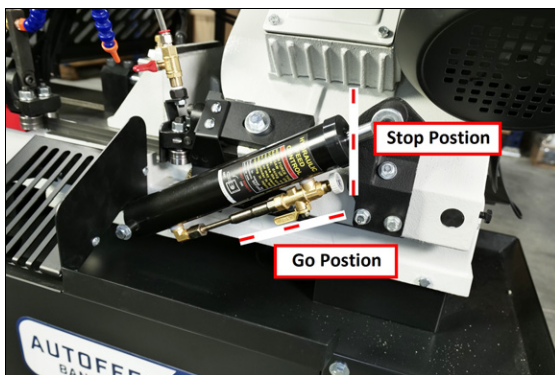


Figure 7-5: Blade feed lever.

The blade feed lever is now in the **Stop** position. While in the **Stop** position, the saw head doesn't move down.

15. On the back of the machine, identify the vertical quick-adjustment nut. Press the button on the quick-adjustment nut to loosen it. Then, move it to the top of the threaded rod.
16. Lift the saw until the blade is about two inches above the material.
17. Press the button on the quick-adjustment nut to loosen it. Then, lower it until it meets the lift height sensor as shown in the following image.

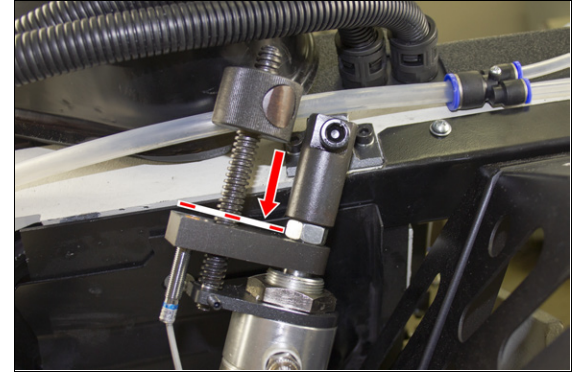


Figure 7-6: Vertical quick-adjustment nut.

The vertical quick-adjustment nut controls the level to which the saw head lifts after completing one cut and before beginning another cut.

18. On the operator panel, twist out the Emergency Stop button, which powers on the control board.
19. On the control panel, do the following:
 - Use the Down Arrow and Up Arrow buttons to indicate the number of cuts desired.
 - Use the Stroke button to indicate the number of strokes desired.
20. On the operator panel, push the green Cycle Start (CS) button twice, which activates the blade.
21. Verify that the blade feed lever is down (in the **Go** position).
22. On the front of the machine, above the blade feed lever, locate the feed adjustment knob. Use the feed adjustment knob to set the cutting rate.



MANUAL OPERATION

IN THIS SECTION, YOU'LL LEARN:

- How to operate the machine in manual mode.

CONTENTS

8.1 Use Manual Mode.....	48
--------------------------	----

8: MANUAL OPERATION

8.1 Use Manual Mode

8.1 USE MANUAL MODE

To use the bandsaw in manual mode:

1. Confirm that the blade is appropriate for the material.
For more information, check with your blade manufacturer for application usage.
If the blade is not appropriate for the material, you must first change it. Go to "Change a Blade" (page 33).
2. Open the clamps on both vises with the handwheel and the clamp handle. Then, load the material between the vises.

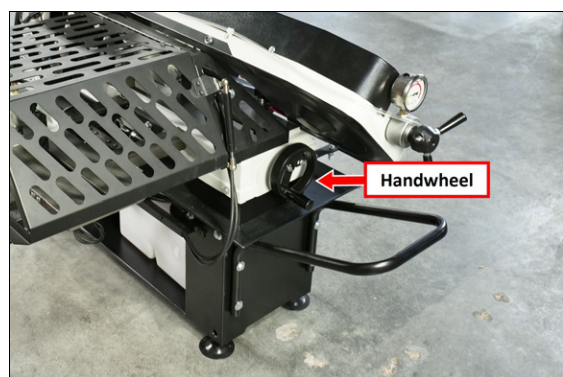


Figure 8-1: Handwheel.

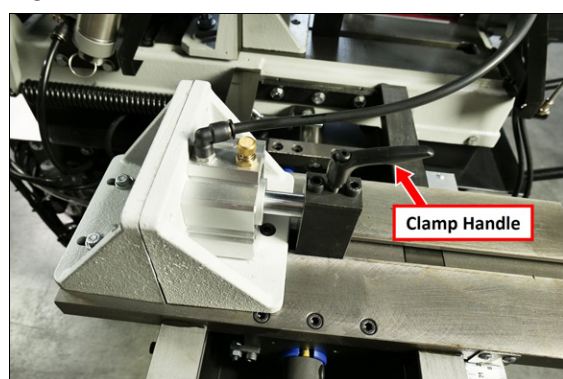


Figure 8-2: Clamp handle.

3. On the front of the machine, identify the blade feed lever, and then move it up.

Figure 8-3: Blade feed lever.

The blade feed lever is now in the **Stop** position. While in the **Stop** position, the saw head doesn't move down.

4. On the back of the machine, identify the vertical-quick adjustment nut. Press the button on the quick adjustment nut to loosen it. Then, move it to the top of the threaded rod.

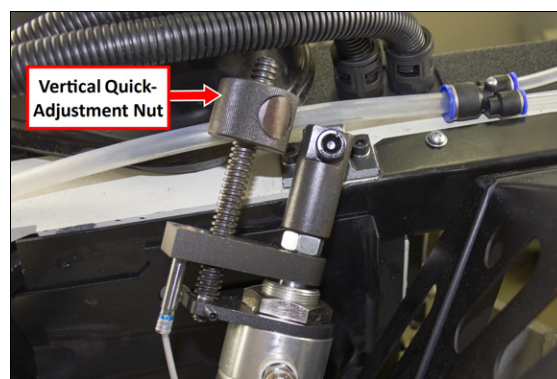


Figure 8-4: Vertical quick-adjustment nut.

5. Lift the saw head up to its maximum allowed height.
6. Move the material forward until it is at the desired length for the cut.
7. Use the handwheel to close the vise until the material is secure.



Note: Only the front clamp is used in manual mode.

8. On the front of the machine, locate the blade support guide. Move the blade support guide until it is 1/4 in. from the material.

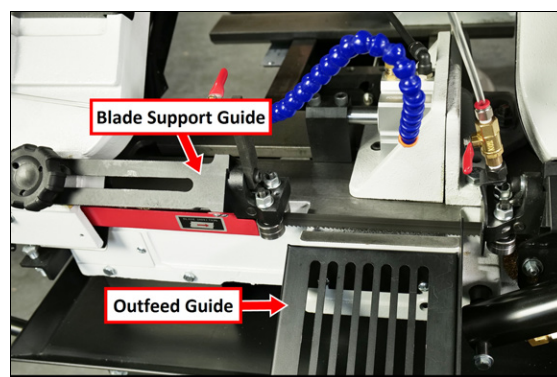


Figure 8-5: Blade support guide on the front of the machine.

9. Position the coolant nozzle so that it points at the blade ahead of the material.
10. On the operator panel, twist out the Emergency Stop button, which powers on the control board.
11. On the control panel, push the Down Arrow and the Up Arrow buttons at the same time.
The control board displays ---.
A display of - - - on the control panel indicates that the machine is in manual mode.

12. On the operator panel, push the green Cycle Start (CS) button twice, which activates the blade.
13. Move the blade feed lever down (in the **Go** position), and adjust the feed as necessary.
14. On the front of the machine, above the blade feed lever, locate the feed adjustment knob. Use the feed adjustment knob to set the cutting rate.



MACHINE MAINTENANCE

IN THIS SECTION, YOU'LL LEARN:

- About the required maintenance procedures that you must do so that this machine operates as designed.



Before operating the machine in any way, you must read and understand this section.

CONTENTS

9.1 Maintenance Safety	52
9.2 Maintenance Schedules	53
9.3 Replace the Gearbox Oil	54

9: MACHINE MAINTENANCE

9.1 Maintenance Safety

9.1 MAINTENANCE SAFETY

Read and understand the following safety messages before beginning any maintenance procedures.

9.1.1 All Maintenance Procedures

- ✓ Understand that the machine is automatically controlled and can start at any time.
- ✓ Power off the machine and disconnect the pneumatic supply before doing any maintenance procedures.
- ✓ When appropriate, lockout/tagout the plug and the pneumatic supply line before doing any maintenance procedures.
- ✓ Wear safety eye protection rated for ANSI Z87+.

9.1.2 Swarf Maintenance Procedures

- ✓ Wear work gloves.

9.1.3 Coolant Maintenance Procedures

- ✓ Wear rubber gloves.

9.2 MAINTENANCE SCHEDULES

To keep your machine running as smoothly as possible, you must regularly do the following maintenance procedures.



Note: Before you begin any maintenance procedures, read and understand "Maintenance Safety" (on the previous page).

If you disassemble any components, refer to the machine's reference drawings when you've completed the maintenance procedure. For information, see "Diagrams and Parts Lists" (page 81). For any additional support, we can help. Create a support ticket with Tormach Technical Support at tormach.com/how-to-submit-a-support-ticket for guidance on how to proceed.

9.2.1 Daily

- ☐ Clean the blade brush of swarf.
- ☐ Clean the drip pan of swarf.
- ☐ Examine the drip pan grate for clogs.
- ☐ Examine the coolant level and condition.
- ☐ Use a rust inhibitor on all exposed, non-lubricated, non-painted metal surfaces.



Note: Don't use rust inhibitor on the guide rails or vice lead screw.

- ☐ Verify that the FRL Filter-Regulator-Lubricator has at least 90 psi compressed air, and that the lubricator has air tool oil above the bottom of the plastic tube.
- ☐ Apply oil (like E-900 ball screw lubricant, or similar) to the linear rails.

9.2.2 Weekly

- ☐ Clean all exterior surfaces with a clean rag.
- ☐ Examine the blade brush and adjust it if it's not in contact with the blade.

9.2.3 Monthly

- ☐ Clean the electrical cabinet of dust with a clean cloth or compressed air.
- ☐ Put #2 tube grease on each guide rail within the travel

path of the infeed table.

- ☐ Clean fine swarf from the coolant tank.

9.2.4 Semi-Annually



Note: After the first 90 days of operation, complete the items on this list. After that, complete the items every six months.

- ☐ Examine the motor belt for wear.
- ☐ Lightly lubricate the vise lead screw with #2 tube grease.

9.2.5 Annually

- ☐ Inspect the gearbox for leaks.

9: MACHINE MAINTENANCE

9.3 Replace the Gearbox Oil

9.3 REPLACE THE GEARBOX OIL

1. Power off the bandsaw and disconnect it from the main air supply.
 - a. Push the Emergency Stop button on the operator panel to lock it into the disabled position.
 - b. Turn the Main Disconnect switch to **OFF**.
Mains power is disconnected from the machine.
 - c. Disconnect the air line from your site from the input port on the FRL Filter-Regulator-Lubricator.
2. Put a catch pan for the gear oil below the gearbox drain plug.
3. Remove the four bolts from the gear box, and set aside the cover plate and gasket.
4. Remove the drain plug and allow the oil to drain out.
5. Remove the remaining oil with a rag.
6. Install the drain plug and fill the gearbox with approximately 10 oz (0.3 liters) of SAE 90 Gear Oil (ISO 220).
7. Replace the cover plate and gasket, and secure them in place with the bolts that you set aside in Step 3.

TROUBLESHOOTING

IN THIS SECTION, YOU'LL LEARN:

- About common causes of failure in this machine, and our recommendations for diagnosing and correcting them.



WARNING! Electrocution Hazard - Electrical Cabinet: Do not make or disconnect connections under power.



Before operating the machine in any way, you must read and understand this section.

CONTENTS

10.1 Operations Troubleshooting	56
10.2 Motor and Electrical Troubleshooting	65
10.3 Mechanical Adjustments	74



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10: TROUBLESHOOTING

10.1 Operations Troubleshooting

10.1 OPERATIONS TROUBLESHOOTING

If your machine isn't operating as expected, there are many tips and procedures that you can follow to solve the problem.

- 10.1.1 Blades Break Too Frequently.....57
- 10.1.2 Blades Dull Too Quickly.....59
- 10.1.3 Blades Lose Teeth..... 60
- 10.1.4 Cuts Are Crooked..... 61
- 10.1.5 Material Doesn't Advance..... 62
- 10.1.6 Material Slips in Vise Clamps..... 63
- 10.1.7 Noise or Problems Moving Through the Cut..... 64

10.1.1 Blades Break Too Frequently

- **Problem** Blades break more often than expected when cutting materials.
- **Cause** The feed rate may be too high, you may be using the wrong blade, or you may need to make adjustments to the blade or workpiece.

You May Need To...	Probability	How-To Steps	Need More?
Clean the bandsaw.	High	Examine the bandsaw for chip build-up between the blade and it's wheels. If necessary, clean it of chips.	For information, see "Machine Maintenance" (page 51).
Adjust the feed rate.	High	Verify that the feed rate isn't too high: lower the feed rate, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Change the Feed Rate" (page 38).
Raise the vertical quick-adjustment nut.	High	During automatic operation, verify that the blade can't collide with the material while it initially lowers: raise the vertical quick-adjustment nut. The blade can break or stall when it drops from the raised position and then collides with the part before the feed rate is controlled.	For information, see "Use Automatic Mode" (page 44).
Examine the blade, material, and size of cut.	High	Verify that the blade's TPI isn't too fine or too course for the size and type of material being cut. If not, you may need to choose a new blade. Verify that the blade isn't dulling too quickly.	For information, see "Choose a Blade" (page 32) and "Blades Dull Too Quickly" (page 59).
Adjust the blade's tension.	Medium	Verify that the blade isn't too tight or too loose between the wheels. If necessary, use the tensioner on the top of the saw head to adjust the blade's tension.	For information, see "Change a Blade" (page 33).
Move the blade above the workpiece.	Medium	During manual operation, verify that the blade isn't on the workpiece when the operation begins: you must move the blade above the workpiece before you begin cutting.	For information, see "Use Manual Mode" (page 48).
Examine the workpiece setup.	Low	• Manual Operation Verify that the workpiece isn't too loose: use the handwheel to tighten the clamp on the front vise. If necessary, use a jig to hold the workpiece. • Automatic Operation Examine the vise clamps: verify that there is 1/8 in. or less of a gap between the clamps and the material. Then, verify that the vise jaw clamping pressure isn't set too low for the material.	For information, see "Use Automatic Mode" (page 44) or "Use Manual Mode" (page 48).
Verify that the blade doesn't rub on the wheel flange.	Low	Verify that the blade isn't incorrectly tracking so that it runs directly against the wheel flange during operations. Follow the procedure to adjust the blade tracking.	For information, see Mechanical Adjustments.

10: TROUBLESHOOTING

10.1 Operations Troubleshooting

You May Need To...	Probability	How-To Steps	Need More?
Align the guide bearings.	Low	Verify that the guide bearings are correctly aligned. If they're not, adjust them.	For information, see "Mechanical Adjustments" (page 74).
Use a high-quality blade.	Low	Verify that you're using a high-quality blade. If you're not, you may need to choose a new blade.	For information, see "Choose a Blade" (page 32).
Follow the blade break-in procedure.	Low	To maximize blade life, you must follow the procedure to break in the blade.	For information, see "Break in the Blade" (page 36).
Adjust the clamping pressure.	Low	During automatic operation, verify that the clamp pressure regulator isn't set too low: increase the pressure, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Change the Clamping Pressure" (page 39).

10.1.2 Blades Dull Too Quickly

- **Problem** Blades dull earlier than expected when cutting materials.
- **Cause** The cutting speed or feed rate may be incorrect, you may be using the wrong blade, or you may need to make adjustments to the blade.

You May Need To...	Probability	How-To Steps	Need More?
Clean the bandsaw.	High	Examine the bandsaw for chip build-up between the blade and it's wheels. If necessary, clean it of chips.	For information, see "Machine Maintenance" (page 51).
Adjust the feed rate.	High	Verify that the feed rate isn't too high: lower the feed rate, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Change the Feed Rate" (page 38).
Adjust the cutting speed.	High	Verify that the cutting speed isn't too high: lower the cutting speed, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Change the Speed" (page 37).
Examine the blade, material, and size of cut.	High	Verify that the blade's TPI isn't too fine or too course for the size and type of material being cut. If not, you may need to choose a new blade. Verify that the blade isn't breaking too frequently.	For information, see "Choose a Blade" (page 32) and "Blades Break Too Frequently" (page 57).
Follow the blade break-in procedure.	High	To maximize blade life, you must follow the procedure to break in the blade.	For information, see "Break in the Blade" (page 36).
Replace the blade.	Low	Examine the blade for twists or kinks. If there are any, replace the blade.	For information, see "Change a Blade" (page 33).
Adjust the position of the blade on the wheels.	Low	Verify that the blade is correctly positioned on the wheels: open the blade cover and examine the blade. If necessary, adjust the tracking.	For information, see "Mechanical Adjustments" (page 74).

10: TROUBLESHOOTING

10.1 Operations Troubleshooting

10.1.3 Blades Lose Teeth

- **Problem** Blades lose teeth when cutting materials.
- **Cause** The feed rate may be too high, you may need to make adjustments to the workpiece, or you may be using the wrong blade.

You May Need To...	Probability	How-To Steps	Need More?
Clean the bandsaw.	High	Examine the bandsaw for chip build-up between the blade and it's wheels. If necessary, clean it of chips.	For information, see "Machine Maintenance" (page 51).
Adjust the feed rate.	High	Verify that the feed rate isn't too high: lower the feed rate, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Change the Feed Rate" (page 38).
Examine the workpiece setup.	High	• Manual Operation Verify that the workpiece isn't too loose: use the handwheel to tighten the clamp on the front vise. If necessary, use a jig to hold the workpiece. • Automatic Operation Examine the vise clamps: verify that there is 1/8 in. or less of a gap between the clamps and the material. Then, verify that the vise jaw clamping pressure isn't set too low for the material.	For information, see "Use Automatic Mode" (page 44) or "Use Manual Mode" (page 48).
Examine the blade for excessive chip build-up.	High	If the blade has excessive chip build-up in the gullets, use a coarser-tooth blade.	For information, see "Choose a Blade" (page 32).
Adjust the clamping pressure.	Medium	During automatic operation, verify that the clamp pressure regulator isn't set too low: increase the pressure, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Change the Clamping Pressure" (page 39).

10.1.4 Cuts Are Crooked

- **Problem** The machine makes crooked cuts through materials.
- **Cause** The feed rate or cutting speed may be incorrect, you may be using the wrong blade, or you may need to make adjustments to the blade.

You May Need To...	Probability	How-To Steps	Need More?
Clean the bandsaw.	High	Examine the bandsaw for chip build-up between the blade and it's wheels. If necessary, clean it of chips.	For information, see "Machine Maintenance" (page 51).
Adjust the feed rate.	High	Verify that the feed rate isn't too high: lower the feed rate, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Change the Feed Rate" (page 38).
Replace the blade.	High	Examine the blade for dullness. If it's too dull, replace it.	For information, see "Change a Blade" (page 33).
Replace or adjust the guide bearings.	Medium	Examine the guide bearings: they may be out of adjustment, or too far away from the workpiece. If they are, adjust them.	For information, see "Use Automatic Mode" (page 44), "Use Manual Mode" (page 48), or Mechanical Adjustments.
Adjust the blade's tension.	Medium	Verify that the blade isn't too tight or too loose between the wheels. If necessary, use the tensioner on the top of the saw head to adjust the blade's tension.	For information, see "Change a Blade" (page 33).

10: TROUBLESHOOTING

10.1 Operations Troubleshooting

10.1.5 Material Doesn't Advance

- **Problem** The material isn't moving forward during operations to continue the cut.
- **Cause** You may need to make adjustments to the machine, or adjust the clamping pressure.

You May Need To...	Probability	How-To Steps	Need More?
Clean the bandsaw.	High	Examine the bandsaw for chip build-up. If necessary, clean it of chips.	For information, see "Machine Maintenance" (page 51).
Remove any obstructions from the air line.	High	Verify that the air line isn't pinched. If it is, remove the obstruction.	For information, see "Air Requirements" (page 18).
Adjust the clamping pressure.	High	During automatic operation, verify that the clamp pressure regulator isn't set too low: increase the pressure, and then test.	For information, see "Change the Clamping Pressure" (page 39).
Align the jaws.	Medium	Examine the vise clamps for correct alignment. If they're not correctly aligned, adjust them.	For information, see "Mechanical Adjustments" (page 74).
Adjust the air pressure.	Low	Verify that the air pressure is set to at least 90 psi. If it's not, adjust your regulator. Otherwise, examine your air supply.	For information, see "Air Requirements" (page 18).
Adjust the infeed table.	Low	Examine the infeed table for correct alignment. If it's not correctly aligned, adjust it.	For information, see "Mechanical Adjustments" (page 74).

10.1.6 Material Slips in Vise Clamps

- **Problem** The material slips in the vise clamps during operations.
- **Cause** The air pressure to the vise jaws may be too low.

You May Need To...	Probability	How-To Steps	Need More?
Clean the bandsaw.	High	Examine the bandsaw for chip build-up. If necessary, clean it of chips.	For information, see "Machine Maintenance" (page 51).
Adjust the air pressure to the vise jaws.	High	Verify that the air pressure is set to at least 90 psi. If it's not, adjust your regulator. Otherwise, examine your air supply.	For information, see "Air Requirements" (page 18).
Tighten the handwheel.	High	During manual operation, verify that the handwheel is completely tightened. If it's not, tighten it.	For information, see "Manual Operation" (page 47).

10: TROUBLESHOOTING

10.1 Operations Troubleshooting

10.1.7 Noise or Problems Moving Through the Cut

- **Problem** The machine is loud while cutting, or it doesn't move freely while cutting.
- **Cause** The feed rate may be too high, or you may be using the wrong blade.

You May Need To...	Probability	How-To Steps	Need More?
Clean the bandsaw.	High	Examine the bandsaw for chip build-up between the blade and it's wheels. If necessary, clean it of chips.	For information, see "Machine Maintenance" (page 51).
Adjust the feed rate.	High	Verify that the feed rate isn't too high: lower the feed rate, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Change the Feed Rate" (page 38).
Examine the blade and the material.	High	Verify that the blade's TPI isn't too high, or that the material isn't too course: you must use the correct blade for the material. If you're not, you may need to choose a new blade.	For information, see "Choose a Blade" (page 32).
Adjust the clamping pressure.	Medium	During automatic operation, verify that the clamp pressure regulator isn't set too low: increase the pressure, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Change the Clamping Pressure" (page 39).
Tighten the handwheel.	Medium	During manual operation, verify that the handwheel is completely tightened. If it's not, tighten it.	For information, see "Manual Operation" (page 47).
Adjust the cutting speed.	Medium	Verify that the cutting speed isn't too high: lower the cutting speed, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Change the Speed" (page 37).

10.2 MOTOR AND ELECTRICAL TROUBLESHOOTING

If you're having problems with your machine's electronics or motor, there are many tips and procedures that you can follow to solve the problem.

10.2.1 Coolant Pump Doesn't Work

66

10.2.2 Error on the Control Panel

68

10.2.3 Machine Doesn't Start or a Panel Breaker Trips

70

10.2.4 Machine Stalls or It's Underpowered

71

10.2.5 Noise or Machine Vibration

73

10: TROUBLESHOOTING

10.2 Motor and Electrical Troubleshooting

10.2.1 Coolant Pump Doesn't Work

- **Problem** The coolant pump doesn't work.
- **Cause** The coolant pump may not be receiving power, or there may be faulty components.

You May Need To...	Probability	How-To Steps	Need More?
Turn on the coolant pump.	High	Examine the coolant pump's switch. If necessary, turn it to the ON position.	For information, see "Controls Overview" (page 30).
Fill the coolant tank.	High	Examine the coolant level in the coolant tank. If necessary, fill it to an appropriate level.	For information, see "Machine Maintenance" (page 51).
Examine the coolant pump.	Medium	Examine the coolant pump for blockages or mechanical damage. If necessary, remove blockages or replace the coolant pump.	Create a support ticket with Tormach Technical Support at tormach.com/how-to-submit-a-support-ticket for guidance on how to proceed.
Examine the main motor.	Low	Verify that the motor that drives the blade (main motor) is powered on and operating. If it's not on, turn it on.	Create a support ticket with Tormach Technical Support at tormach.com/how-to-submit-a-support-ticket for guidance on how to proceed.
Replace the main fuse.	Low	Examine the main fuse. If necessary, replace it.	For information, see "Electrical Schematics" (page 113).

You May Need To...	Probability	How-To Steps	Need More?
Replace the coolant pump.	Low	Verify that the: • Main motor is running • The blade is running  WARNING! Crush Hazard: Moving parts can entangle, pinch, or cut you, causing death or serious injury. While operating the machine, you must keep your hands away from the blade. • Coolant switch is in the ON position Then, use a digital multimeter to measure AC voltage at wires 208 and 102/N at the operator panel.  WARNING! Electrocution Hazard: When servicing the machine from inside the operator panel, always use caution. Even after you've powered off the machine, electronic devices in the operator panel may retain dangerous electrical voltages. Only qualified electrical machinery technicians should perform maintenance or troubleshooting procedures inside the operator panel while power is still on. If there's no voltage, replace the coolant pump.	For information, see "Electrical Schematics" (page 113).
Examine the wiring.	Low	Examine the coolant pump's wiring for breaks, disconnection, or corrosion. If necessary, replace or repair the wires.	For information, see "Electrical Schematics" (page 113).

10: TROUBLESHOOTING

10.2 Motor and Electrical Troubleshooting

10.2.2 Error on the Control Panel

For information on bandsaw error codes, see "Bandsaw Error Codes Reference" (below).

Control Panel Displays CS

- **Problem** The control panel displays CS.



Note: This message display isn't an error. It indicates that the machine is ready for the cycle start command.

- **Cause** The machine is ready to operate: push the green Cycle Start (CS) button.

You May Need To...	Probability	How-To Steps	Need More?
Push the green Cycle Start (CS) button.	High	CS on the control panel display indicates that the machine is ready for the cycle start command. Push the Cycle Start (CS) button, and the machine begins automated function.	For information, see "Use Automatic Mode" (page 44) or "Use Manual Mode" (page 48).

Control Panel Displays E**

- **Problem** The control panel displays E**.
- **Cause** You may need to make adjustments to the machine, or adjust the air pressure.

You May Need To...	Probability	How-To Steps	Need More?
Adjust the proximity switch.	High	Verify that the proximity switch is properly adjusted: it must be about 1 mm from the activating position.	For information, see "Verify the Proximity Sensor Installation" (page 27).
Adjust the air pressure.	High	Verify that the machine's automated movement can move to the endpoint in the allowed time window. Examine the machine's air pressure. If it's below 90 psi, adjust it.	For information, see "Air Requirements" (page 18).
Adjust the vise jaws.	Low	Verify that the machine advances the material in the allowed time window. Examine the vise jaws to confirm that they're properly adjusted, and that they don't allow the material to drag. If the vise jaws constrict the material, adjust them.	For information, see "Mechanical Adjustments" (page 74).

Bandsaw Error Codes Reference

Error	Description
CS	Waiting for user input. Press the Cycle Start button.
E1	Memory failure.
E2	Overvoltage: The transformer detected the input voltage is too high (above 28 V).
E3	Undervoltage: The transformer detected the input voltage is too low (below 19 V).

10: TROUBLESHOOTING

10.2 Motor and Electrical Troubleshooting

Error	Description
E4	Panel communication error.
E5	The pulley safety switch isn't latched.
E6	Cut sensor error.
E10	The saw lift timed out. It never reached it's required height.
E11	Incorrect user input; cut canceled. To start the operation, press the Cycle Start button twice.
E12	The saw lift proximity sensors (up and down) are both active.
E13	The infeed and outfeed proximity sensors (forward and rear) are both active.
E15	The infeed table retract stroke timed out (on the initial stroke).
E16	The infeed table advance stroke timed out.
E17	The infeed table retract stroke timed out (on a subsequent stroke).

While troubleshooting error codes, examine the Stroke LEDs on the control panel, which correspond to the proximity sensors on the bandsaw. If the LED light is illuminated, the proximity sensor is active.

- **×1** LED: Infeed (advance) proximity sensor
- **×2** LED: Outfeed (retract) proximity sensor
- **×4** LED: Saw down proximity sensor
- **×5** LED: Saw up proximity sensor



10: TROUBLESHOOTING

10.2 Motor and Electrical Troubleshooting

10.2.3 Machine Doesn't Start or a Panel Breaker Trips

- **Problem** The machine doesn't start or a panel breaker trips.
- **Cause** There may be incorrect wiring or faulty components.

You May Need To...	Probability	How-To Steps	Need More?
Power on the main power supply, or examine the main power supply voltage.	High	• Test all hot lines to confirm that they have the correct voltage on all legs. • Verify that the main power supply is switched to the ON position.	For information, see "Electrical Schematics" (page 113).
Replace the main fuse.	High	Examine the main fuse. If necessary, replace it.	For information, see "Electrical Schematics" (page 113).
Examine the pulley cover safety switch.	Medium	Examine the pulley cover safety switch wiring. If necessary, make the correct connections.	For information, see "Electrical Schematics" (page 113).
Rewire the plug/receptacle.	Low	Test the contacts. If necessary, make the correct connections.	For information, see "Electrical Schematics" (page 113).
Rewire the motor.	Low	Inspect the motor wiring. If necessary, make the correct connections.	For information, see "Electrical Schematics" (page 113).
Replace the start capacitor.	Low	Test the start capacitor. If necessary, make the correct connections.	For information, see "Electrical Schematics" (page 113).
Replace the panel breaker.	Low	Verify that the panel breaker is the correct size for the machine load. If it's not, replace it.	Create a support ticket with Tormach Technical Support at tormach.com/how-to-submit-a-support-ticket for guidance on how to proceed.
Examine all wiring.	Low	Examine all wiring for breaks, disconnections, or corrosion. If necessary, repair or replace the wires.	For information, see "Electrical Schematics" (page 113).
Replace the motor.	Low	Test the motor. If necessary, repair or replace it.	Create a support ticket with Tormach Technical Support at tormach.com/how-to-submit-a-support-ticket for guidance on how to proceed.

10.2.4 Machine Stalls or It's Underpowered

- **Problem** The machine stalls, or you find that it's underpowered during operations.
- **Cause** The feed rate may be too high, or you may be using the wrong blade.

You May Need To...	Probability	How-To Steps	Need More?
Raise the vertical quick-adjustment nut.	High	During automatic operation, verify that the blade can't collide with the material while it initially lowers: raise the vertical quick-adjustment nut. The blade can break or stall when it drops from the raised position and then collides with the part before the feed rate is controlled.	For more information, see "Use Automatic Mode" (page 44).
Use a different blade.	High	Verify that the blade's TPI isn't too high, or that the material isn't too course: you must use the correct blade for the material. If you're not, you may need to choose a new blade.	For information, see "Choose a Blade" (page 32).
Adjust the feed rate or cutting speed.	High	• Verify that the feed rate isn't too high: lower the feed rate, and then do a test cut. Examine the behavior of the machine as it cuts. • Verify that the cutting speed isn't too high: lower the cutting speed, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Change the Feed Rate" (page 38) or "Change the Speed" (page 37).
Examine the workpiece setup.	Medium	• Manual Operation Verify that the workpiece isn't too loose: use the handwheel to tighten the clamp on the front vise. If necessary, use a jig to hold the workpiece. • Automatic Operation Examine the vise clamps: verify that there is 1/8 in. or less of a gap between the clamps and the material. Then, verify that the vise jaw clamping pressure isn't set too low for the material.	For information, see "Use Automatic Mode" (page 44) or "Use Manual Mode" (page 48).
Adjust the blade's tension.	Low	Verify that the blade isn't too tight or too loose between the wheels. If necessary, use the tensioner on the top of the saw head to adjust the blade's tension.	For information, see "Change a Blade" (page 33).
Examine the main power supply voltage.	Low	Test the hot lines to confirm that they have the correct voltage on both legs.	For information, see "Electrical Schematics" (page 113).
Replace the motor bearings.	Low	Rotate the shaft: if there's rotational grinding or if the shaft is loose, this indicates that you must replace the motor bearings.	Create a support ticket with Tormach Technical Support at tormach.com/how-to-submit-a-support-ticket for guidance on how to proceed.
Rewire the plug/receptacle.	Low	Test the contacts. If necessary, make the correct connections.	For information, see "Electrical Schematics" (page 113).

10: TROUBLESHOOTING

10.2 Motor and Electrical Troubleshooting

You May Need To...	Probability	How-To Steps	Need More?
Rewire the motor.	Low	Inspect the motor wiring. If necessary, make the correct connections.	For information, see "Electrical Schematics" (page 113).
Replace the motor.	Low	Test the motor. If necessary, repair or replace it.	Create a support ticket with Tormach Technical Support at tormach.com/how-to-submit-a-support-ticket for guidance on how to proceed.

10.2.5 Noise or Machine Vibration

- **Problem** The machine vibrates or operates loudly.
- **Cause** There may be damaged components, or you may need to use a different blade or cutting speed.

You May Need To...	Probability	How-To Steps	Need More?
Change the blade or the cutting speed.	High	• Verify that the blade's TPI isn't too high: you must use the correct blade for the material. • Verify that the cutting speed isn't too high: lower the cutting speed, and then do a test cut. Examine the behavior of the machine as it cuts.	For information, see "Choose a Blade" (page 32) or "Change the Speed" (page 37).
Examine the workpiece setup.	High	• Manual Operation Verify that the workpiece isn't too loose: use the handwheel to tighten the clamp on the front vise. If necessary, use a jig to hold the workpiece. • Automatic Operation Examine the vise clamps: verify that there is 1/8 in. or less of a gap between the clamps and the material. Then, verify that the vise jaw clamping pressure isn't set too low for the material.	For information, see "Use Automatic Mode" (page 44) or "Use Manual Mode" (page 48).
Replace or sharpen the blade.	Medium	Examine the blade for dullness. If it's too dull, sharpen or replace it.	For information, see "Change a Blade" (page 33).
Fill the oil in the gearbox.	Medium	Examine the oil level in the gearbox. If necessary, fill it to an appropriate level.	For information, see "Replace the Gearbox Oil" (page 54).
Replace the motor fan cover or the fan.	Low	Examine the motor fan cover and the fan: • Motor Fan Cover If it's dented, replace it. • Fan If it's damaged or loose, replace it.	Create a support ticket with Tormach Technical Support at tormach.com/how-to-submit-a-support-ticket for guidance on how to proceed.

10: TROUBLESHOOTING

10.3 Mechanical Adjustments

10.3 MECHANICAL ADJUSTMENTS

If your machine isn't operating as expected, there are many tips and mechanical adjustments that you can follow to solve the problem.

10.3.1 Adjust the Blade Guides.....	74
10.3.2 Adjust the Blade Tracking.....	74
10.3.3 Adjust the Blade Brush.....	77
10.3.4 Adjust the Height of the Infeed Table.....	77
10.3.5 Adjust the Jaws.....	78

10.3.1 Adjust the Blade Guides

1. Power off the bandsaw and disconnect it from the main air supply.
 - a. Push the Emergency Stop button on the operator panel to lock it into the disabled position.
 - b. Turn the Main Disconnect switch to **OFF**. Mains power is disconnected from the machine.
 - c. Disconnect the air line from your site from the input port on the FRL Filter-Regulator-Lubricator.
2. Identify the knob on the blade support guide. Then, loosen it.

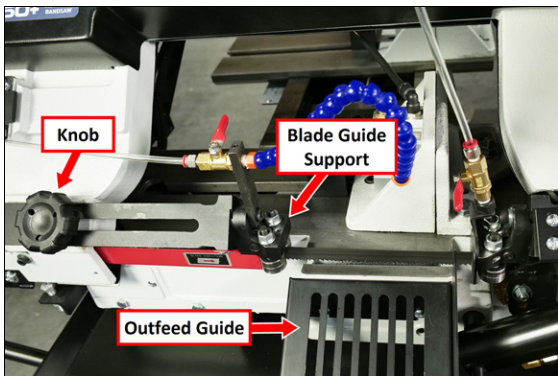


Figure 10-1: Blade support guide and its knob.

3. Move the blade support guide toward the material. Stop when it's 1/4 in. from the material.
4. Tighten the knob on the blade support guide.

10.3.2 Adjust the Blade Tracking

⚠ WARNING! Crush Hazard: Moving parts can entangle, pinch, or cut you, causing death or serious injury. While operating the machine in vertical position, you must keep your hands away from the blade.

1. Put on work gloves, eye protection, and any other appropriate personal protective equipment. We recommend a long-sleeved shirt and long pants.
2. Power off the bandsaw and disconnect it from the main air supply.
 - a. Push the Emergency Stop button on the operator panel to lock it into the disabled position.
 - b. Turn the Main Disconnect switch to **OFF**. Mains power is disconnected from the machine.
 - c. Disconnect the air line from your site from the input port on the FRL Filter-Regulator-Lubricator.
3. On the back of the machine, identify the air cylinder, as shown in the following image.

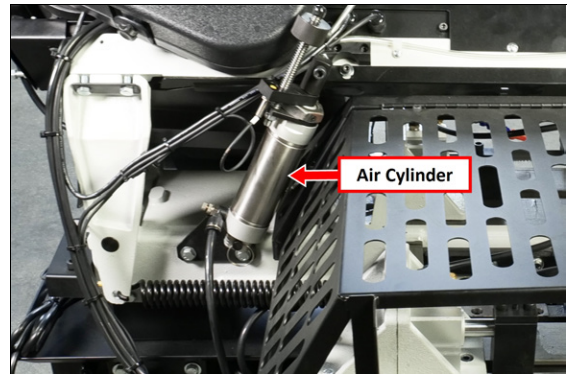


Figure 10-2: Air cylinder on the back of the machine.

4. Remove the cotter clip (on the end of the quick-release pin).

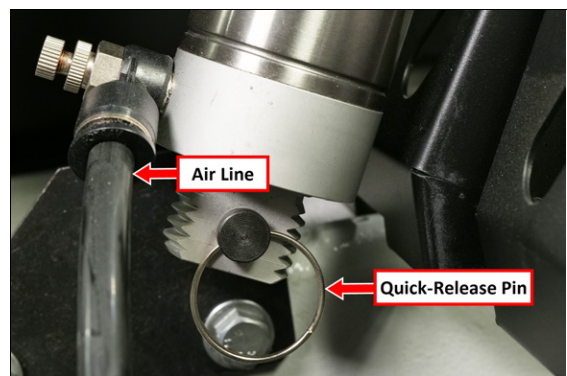


Figure 10-3: Quick-release pin on the air cylinder.

5. Pull the quick-release pin out of the air cylinder, and set it aside.
The air cylinder hangs from the saw head.

6. Lift the saw head to the upright position, as shown in the following image.



Figure 10-4: Bandsaw head lifted upright.

7. Loosen the bolt securing the air cylinder to the bandsaw with an 8 mm hex wrench until the door can open. Make sure the bolt is still secure enough to hold the air cylinder in place — letting the air cylinder hang adds extra strain to the wires.



Figure 10-5: Bolt on the air cylinder.

8. Slide up the bottom of the blade cover, and then slide the blade cover up until it clears the base casting.



Figure 10-6: Blade cover.

9. Remove the two screws from the side of the blade cover with a 5 mm hex wrench, and then set aside the screws.

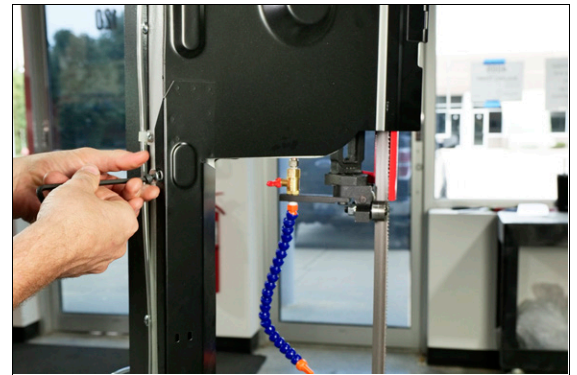


Figure 10-7: Removing the screws securing the blade cover to the bandsaw.

10: TROUBLESHOOTING

10.3 Mechanical Adjustments

10. Open the blade cover, as shown in the following image.



Figure 10-8: Blade cover opened.

11. Identify the tensioner on the top of the saw head.

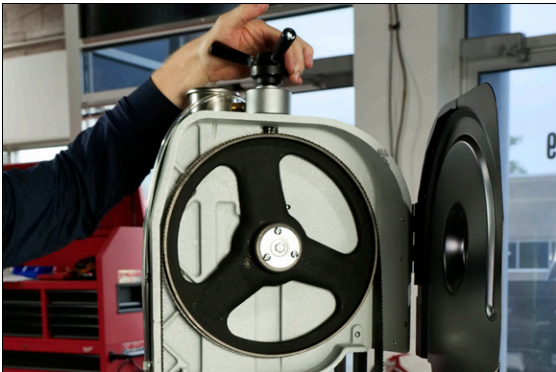


Figure 10-9: Tensioner on top of the saw head.

12. Verify that the blade tension is set correctly.
13. Power on the bandsaw.
- Rotate the Emergency Stop button on the operator panel one-quarter turn clockwise to release it.
 - Turn the Main Disconnect switch to **ON**.
Mains power is connected to the machine.
14. Set the bandsaw to manual mode: from the control

panel, push the Down Arrow and Up Arrow buttons at the same time. The control board displays - - - .

WARNING! Crush Hazard: Moving parts can entangle, pinch, or cut you, causing death or serious injury. While operating the machine in vertical position, you must keep your hands away from the blade.

15. From the operator panel, push the Cycle Start button. The blade moves through the blade guides and around the blade wheels.
16. Observe the blade as it moves:
- Correct Tracking** The blade runs next to, but not directly against, the wheel shoulder.
 - Incorrect Tracking** Go to Step 16.

NOTICE! You must not let the blade run directly against the wheel shoulder. If you do, it could cause damage to the bandsaw or the blade.

17. Identify the two socket head cap screws with washers on the front of the bandsaw. Then, loosen them with a 6 mm hex key wrench.



Figure 10-10: Socket head cap screws used to adjust the blade tracking.

18. Identify the socket head cap screw without a washer.
19. Use the socket head cap screw without a washer to adjust the blade tracking. While observing the blade as it moves, do one of the following:
- Track Closer to Wheel Shoulder** Turn the socket head cap screw without a washer clockwise.
 - Track Away from Wheel Shoulder** Turn the socket head cap screw without a washer counterclockwise.

20. Put a piece of paper between the blade and the wheel to test the blade tracking.
21. With the paper held in place, slowly turn the socket head cap screw without a washer to track the wheel closer to the shoulder. Continue turning until the paper is cut into two pieces.
22. Slowly back off the socket head cap screw without a washer to move it slightly away from the wheel shoulder.
23. Tighten the two socket head cap screws with washers on the front of the bandsaw.

10.3.3 Adjust the Blade Brush

NOTICE! You must verify that the blade brush is adjusted correctly and regularly maintained. If you don't, it could cause damage to the blade. For information, see "Machine Maintenance" (page 51).

To adjust the blade brush:

1. Identify the blade brush.

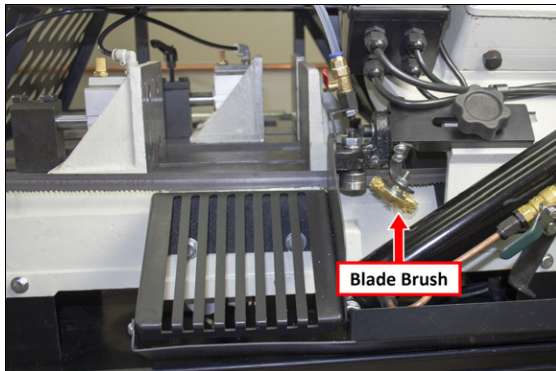


Figure 10-11: Blade brush.

2. Adjust the blade brush until its bristles overlap the blade.
- If the Blade Brush (PN 38033) is worn or damaged, you must replace it.

10.3.4 Adjust the Height of the Infeed Table

1. Find a piece of 24 in. stock. We recommend using one of the following:
 - Cold-rolled steel (that's at least 1 in. square)
 - Extruded aluminum (that's at least 1-1/2 in. square)
 - Structural tubing (that's at least 1-1/2 in. square)
2. Move the infeed table so that it's approximately in the center of travel.

3. Loosen three M10 socket head cap screws on the base casting. This allows you to adjust the height of the infeed table.

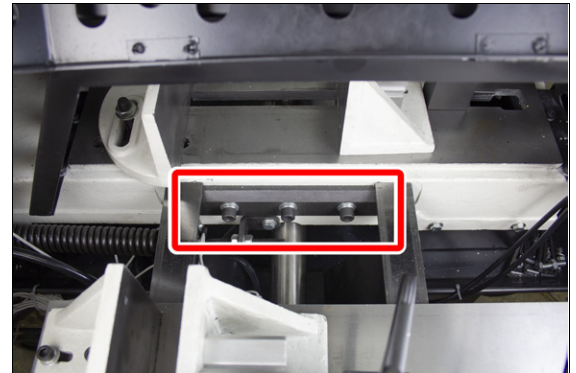


Figure 10-12: M10 socket head cap screws on the base casting.

4. Open the clamps on both vises with the handwheel and the clamp handle. Then, load the stock between the vises as shown in the following image.

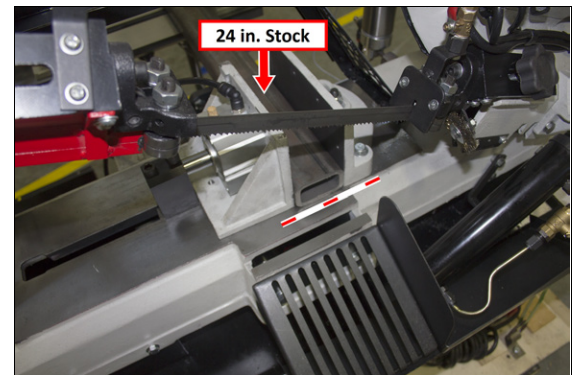


Figure 10-13: Stock loaded between the vises.

5. Close the vise with the handwheel until the material is secure. Verify that the stock is flat against the entire length of the base casting.

10: TROUBLESHOOTING

10.3 Mechanical Adjustments

6. Lift and secure the guide rail and the infeed table to the stock with clamps, as shown in the following image.



Figure 10-14: Clamp secured to the 24-in. stock.

7. Tighten the three M10 socket head cap screws that you loosened in Step 3.
8. If required, adjust the leveling foot.



Figure 10-15: Leveling foot.

9. Remove the clamps from the machine.
10. Remove the stock from the machine.

10.3.5 Adjust the Jaws

Complete the following steps in the order listed:

Align the Fixed Jaw

1. Open the jaws so that there's enough space to put a square in between them.
2. Put a square on the base casting between the jaws.
3. Push the square until it's flush with the side of the blade.



Note: The square must be flush with the side of the blade, not the blade's teeth.

4. Loosen the two screws securing the fixed jaw to the base casting with a box end wrench.

5. Tap the fixed jaw until it's flush with the side of the square. Verify that the square is still flush with the side of the blade.

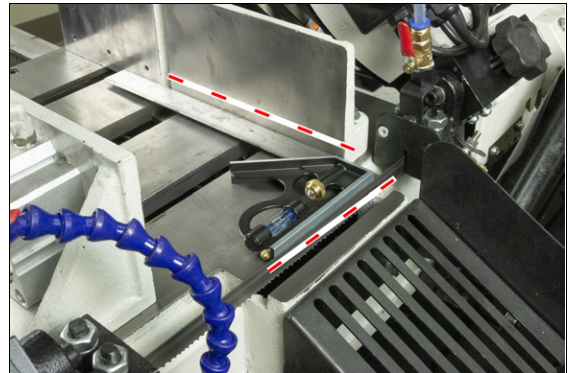


Figure 10-16: Fixed jaw aligned with the blade.

6. Tighten the two screws securing the fixed jaw to the base casting. Confirm that it remains flush with the square.
7. Remove the square from the base casting.

Adjust the Fixed Clamp Jaw

1. Find a piece of 24 in. stock. We recommend using one of the following:
 - Cold-rolled steel (that's at least 1 in. square)
 - Extruded aluminum (that's at least 1-1/2 in. square)
 - Structural tubing (that's at least 1-1/2 in. square)
2. Open the clamps on both vises with the handwheel and the clamp handle. Then, load the stock between the vises as shown in the following image.

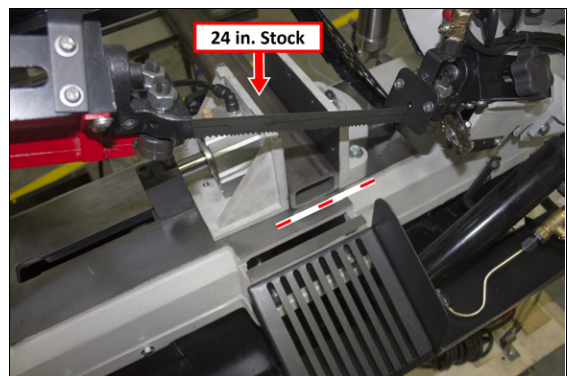


Figure 10-17: Stock loaded between the vises.

3. Close the vise with the handwheel until the material is secure. Verify that the stock is flat against the entire length of the base casting.

4. Loosen the four M8 socket head cap screws securing the fixed clamp jaw to the infeed table.

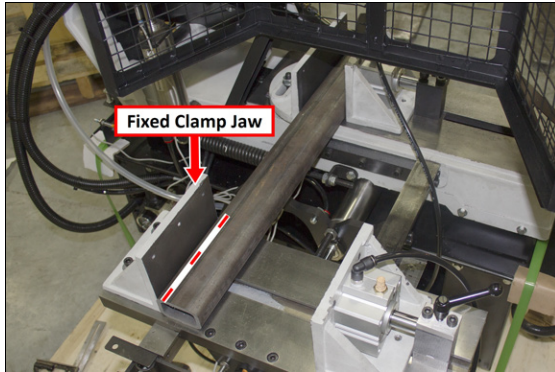


Figure 10-18: M8 socket head cap screws on the fixed clamp jaw.

5. Secure the stock to the fixed jaw with a clamp.
6. Tap the fixed clamp jaw until it is flush with the side of the stock.
7. Tighten the four M8 socket head cap screws that you loosened in Step 4. Verify that the fixed clamp jaw remains flush with the stock.
8. Remove the clamp from the machine.
9. Remove the stock from the machine.



DIAGRAMS AND PARTS LISTS

IN THIS SECTION, YOU'LL LEARN:

- About this machine's components.

NOTICE! Only use Tormach-approved parts when making replacements. If you don't replace parts with those listed in this section, you may void your warranty.

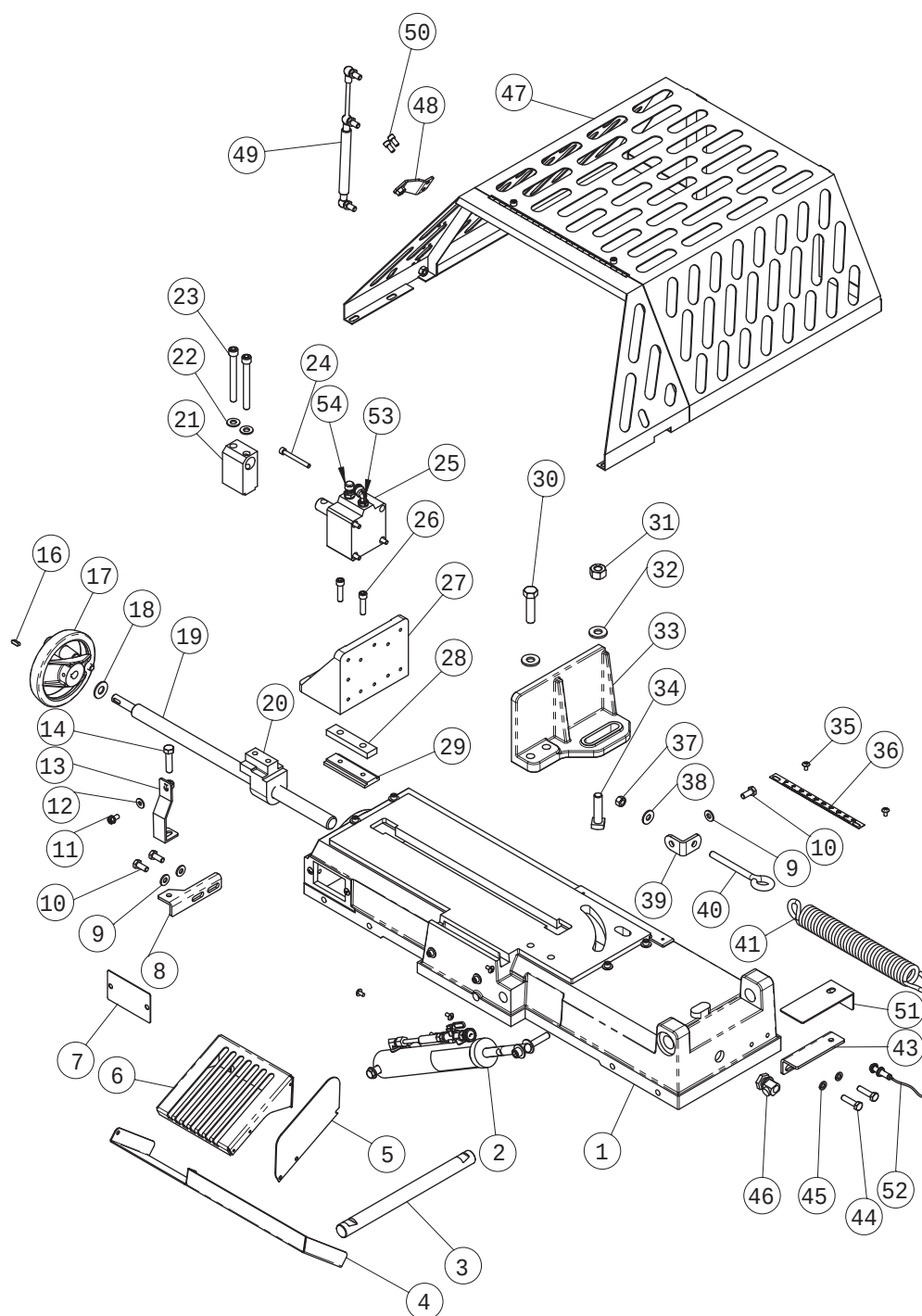
CONTENTS

11.1 Base Casting Exploded View	82
11.2 Base Casting Parts List	83
11.3 Head Casting Exploded View	85
11.4 Head Casting Parts List	86
11.5 Infeed Table Exploded View	88
11.6 Infeed Table Parts List	89
11.7 Stand Exploded View	91
11.8 Stand Parts List	92
11.9 Blade Wheel	93
11.10 Motor Assembly	95
11.11 Gear Box Assembly	97
11.12 Sliding Blade Guide (Parent)	99
11.13 Sliding Blade Guard (Child)	101
11.14 Blade Tensioning Kit	103
11.15 Lift Cylinder Assembly	105
11.16 Coolant System	107

11: DIAGRAMS AND PARTS LISTS

11.1 Base Casting Exploded View

11.1 BASE CASTING EXPLODED VIEW



11.2 BASE CASTING PARTS LIST

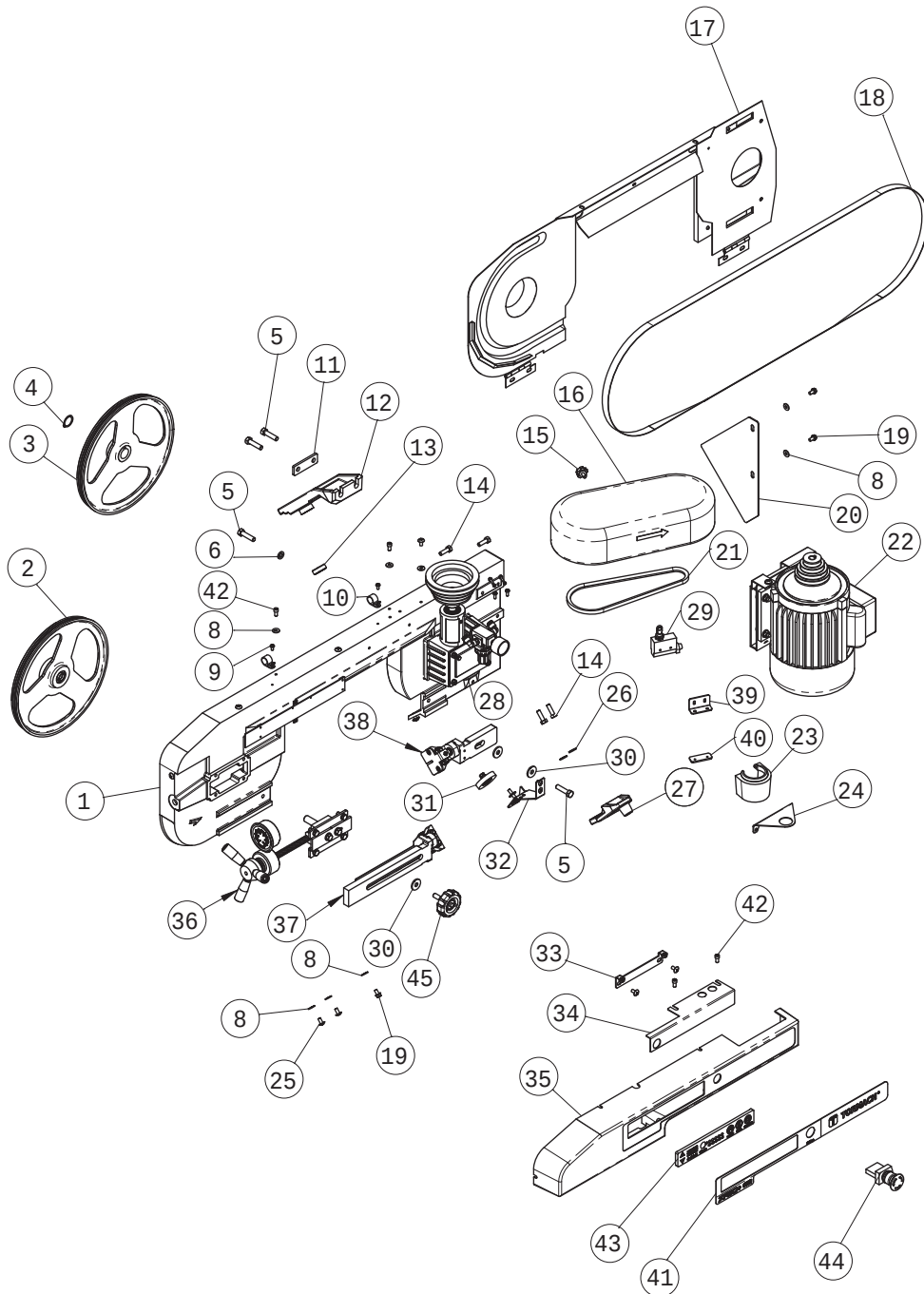
ID	Description	Quantity
1	Base Casting (PN 52667)	1
2	Hydraulic Cylinder (PN 52674)	1
3	Shaft (PN 52675)	1
4	Outfeed Guide Return Tray	1
5	Outfeed Guide Side Panel	1
6	Outfeed Guide	1
7	Cover	1
8	Limit Stopper (Front)	1
9	Washer, 5/16" 18 × 2T	3
10	Screw, Hex Head, 5/16" × 18 - 3/4"	3
11	Screw, Hex Head, 1/4" × 20 - 1/2" (with spring washer)	1
12	Washer, 1/4" 16 × 5T	1
13	Shipping Bracket	1
14	Screw, Hex Head, 3/8" × 16 - 1-1/2"	1
16	Flat Key, 5 × 5 - 15	1
17	Hand Wheel	1
18	Washer, 1/2" 28 × 2T	1
19	Vise Lead Screw (PN 52676)	1
20	Vise Lead Screw Nut (PN 52677)	1
21	Clamp Block – Saw Table	1
22	Washer, 3/8" 20 × 2T	2
23	Screw, Round Head, 3/8" × 16 - 3-1/2"	2
24	Screw, Round Head, M6 - 55	4
25	Clamp Air Cylinder	1
26	Round Head Screw, 5/16" × 18 - 1-1/4"	2
27	Infeed Moveable Jaw (PN 52678)	1
28	Clamp Vise Washer	1
29	Clamp Vise T-Nut	1
30	Screw, Hex Head, 1/2" × 12 - 2"	1
31	Nut, 1/2" 12	1

11: DIAGRAMS AND PARTS LISTS

11.2 Base Casting Parts List

ID	Description	Quantity
32	Washer, 1/2" 28 × 3T	2
33	Rear Fixed Jaw	1
34	Screw, Square Head, 1/2" × 12 - 2"	1
35	Screw, Round Head, 3/16" × 24 - 3/8"	8
36	Angle Scale	1
37	Nut, 3/8" 16	3
38	Washer, 3/8" 23 × 2T	1
39	Spring Bracket	1
40	Adjustable Spring Rod (PN 52679)	1
41	Balancing Spring (PN 52680)	1
42	Screw, Hex Head, 3/8" × 16 - 1-3/4"	1
43	Limit Stopper (PN 52681)	1
44	Screw, Hex Head, 5/16" × 18 - 1/4"	2
45	Washer, Spring, 5/16"	2
46	Connector, 1/2"	1
47	Motion Guard Lid	1
48	Bracket – Nitrogen Shock	1
49	Gas Spring	1
50	Screw, Round Head, 1/4" × 20 - 1/2"	8
51	Proximity Switch Cover	1
52	Proximity Sensor Switch (PN 52682)	1
53	Fitting	1
54	Silencer	1

11.3 HEAD CASTING EXPLODED VIEW



11: DIAGRAMS AND PARTS LISTS

11.4 Head Casting Parts List

11.4 HEAD CASTING PARTS LIST

ID	Description	Quantity
1	Saw Head Casting	1
2	Idler Wheel (PN 52644)	1
3	Drive Wheel (PN 52645)	1
4	Retaining Ring S25	1
5	Screw, Hex Head, 3/8" × 16 - 1-1/2"	7
6	Washer, Spring, 3/8"	4
8	Washer, 1/4" 16 × 1.5T	10
9	Screw, Binding Head, 3/16" - 3/8"	2
10	Wire Clamp, 5/8"	2
11	Washer	1
12	Support Arm (PN 52646)	1
13	Pacer Ring, 32 × 23 × 10.5	1
14	Screw, Hex Head, 5/16" × 18 - 1"	4
15	Plum Handle, 1/4" - 20	1
16	Belt Cover	1
17	Blade Cover	1
18	Saw Blade	1
19	Screw, Hex Head, 1/4" × 20 - 1/2" (with spring washer)	3
20	Chip Shelter	1
21	Motor Belt (PN 52647)	1
22	AF50+ Motor	1
23	Protective Cover (PN 52648)	1
24	Bracket – Clamp Pressure Regulator	1
25	Screw, Round Head, 1/4" × 20 - 1/2"	10
26	Washer, 5/16" 18 × 2T	2
27	Hydraulic Pivot Arm (PN 52649)	1
28	Gear Box Assembly (PN 52650)	1
29	Limit Switch (PN 52651)	1
30	Washer, 3/8" 16 × 3T	3
31	Brush (PN 52652)	1

11: DIAGRAMS AND PARTS LISTS

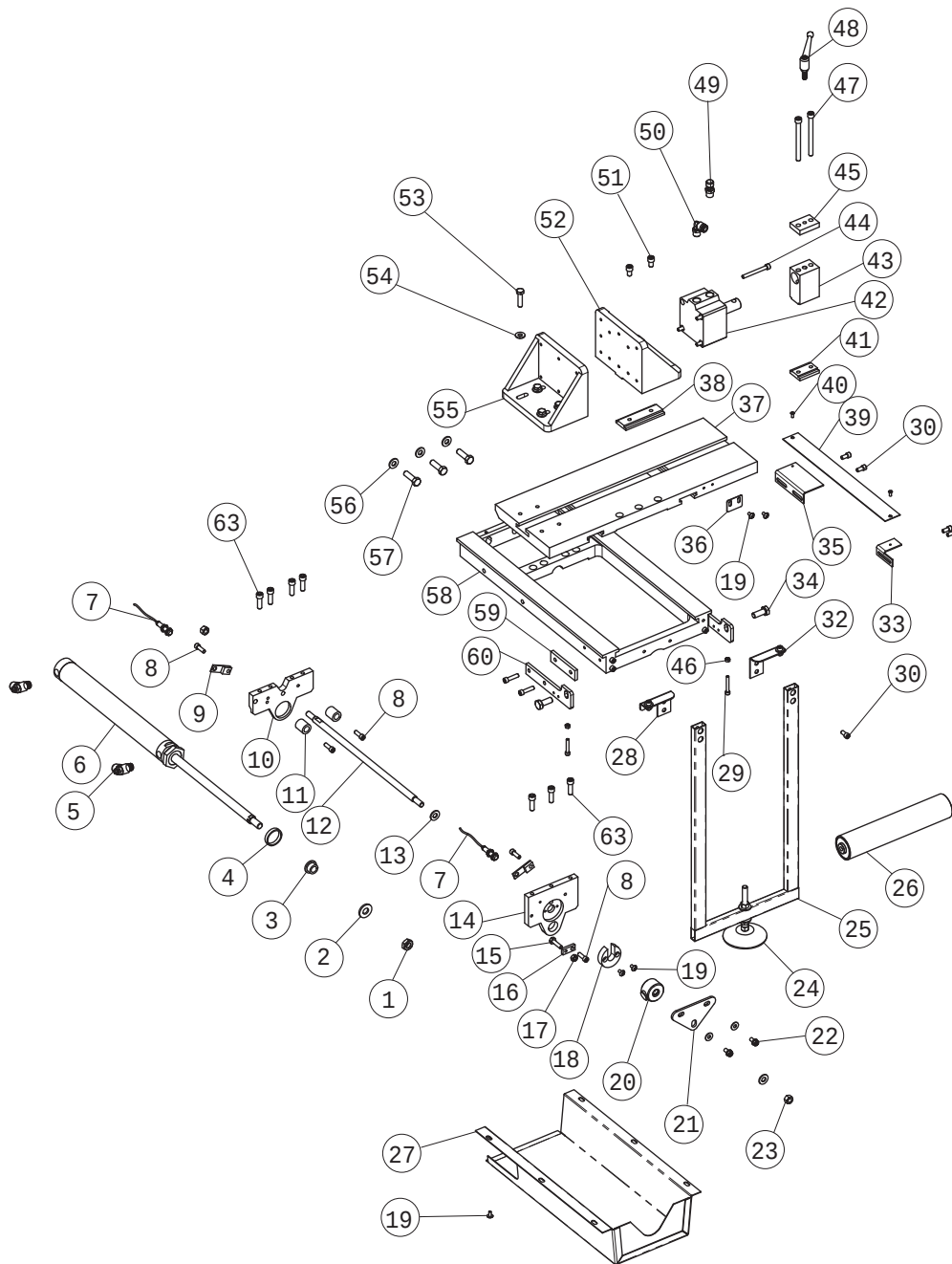
11.4 Head Casting Parts List

ID	Description	Quantity
32	Brush Holder (PN 52653)	1
33	Conduit Fixed Bracket	1
34	Conduit Fixed Bracket	1
35	Molded Saw Cover (PN 52654)	1
36	Blade Tensioner	1
37	Rear Blade Guide (PN 52655)	1
38	Front Blade Guide (PN 52656)	1
39	Proximity Switch Bracket	1
40	Proximity Switch Bracket	1
41	Control Panel Label	1
42	Screw, Round Head, 1/4" x 20 - 1/2"	4
43	Control Panel (PN 52657)	1
44	Emergency Stop Switch (PN 30462)	1
45	Blade Guide Knob	1

11: DIAGRAMS AND PARTS LISTS

11.5 Infeed Table Exploded View

11.5 INFEED TABLE EXPLODED VIEW



11.6 INFEED TABLE PARTS LIST

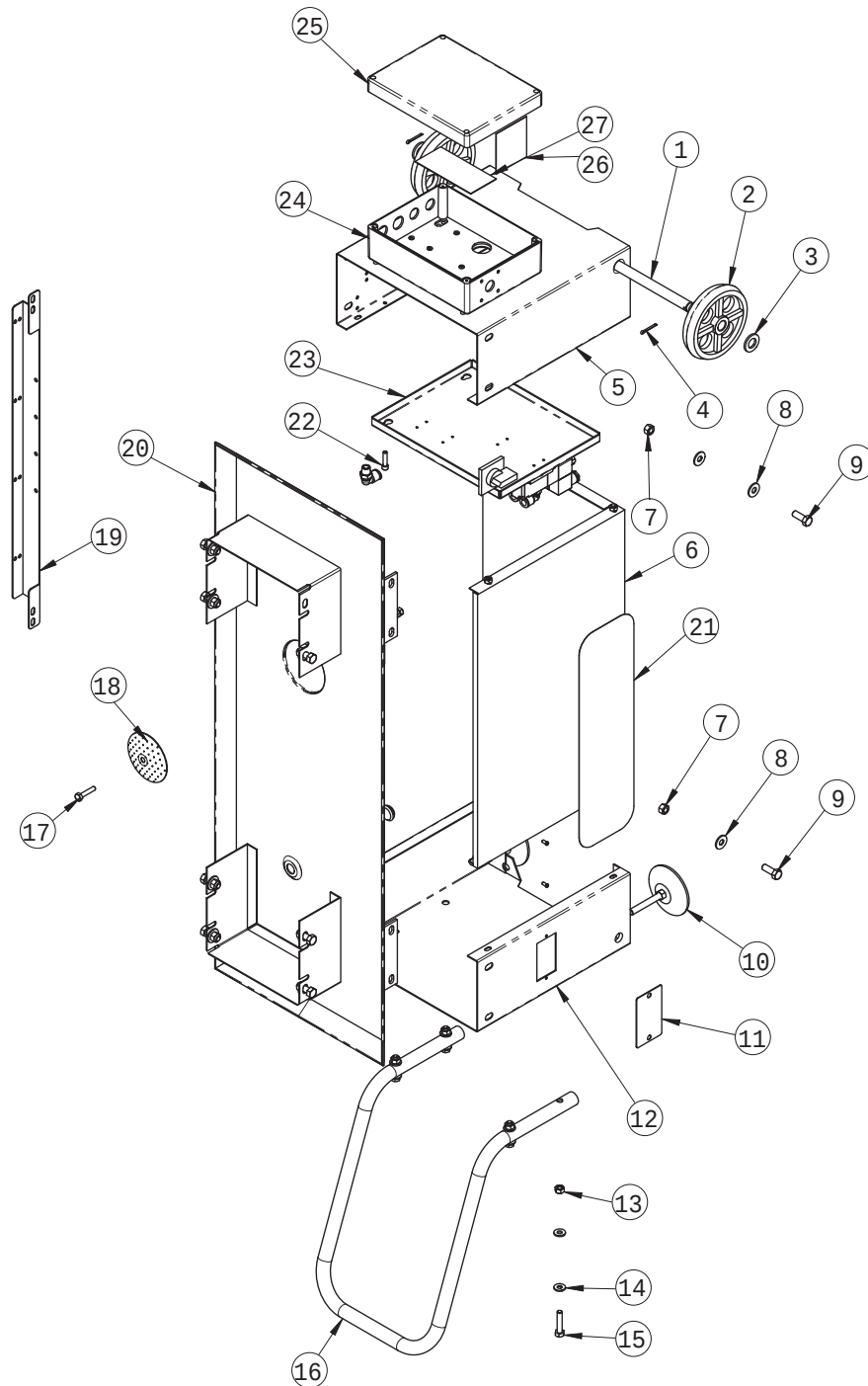
ID	Description	Quantity
1	Nut, M12	1
2	Washer, 1/2" 28 × 3T	1
3	Bushing, D25x12L	1
4	Bushing, D34.5*d30.3*6.5T	1
5	Flow-Control Elbow	2
6	Infeed Air Cylinder – Body	1
7	Proximity Sensor	2
8	Screw, Socket Head Hex, 1/4" - 20 × 3/4"	5
9	Bracket	2
10	Infeed Air Cylinder Mount	1
11	Bumper	2
12	Acme Length Adjustment Screw, M12 × 3 - 369 mm	1
13	Washer, 3/8" 20 × 2T	1
14	Infeed Table Bracket	1
15	Bolt, Hex Head, 1/4" × 20 - 1"	1
16	Bracket	1
17	Nut, Hex, 1/4" 20	1
18	Bumper	1
19	Screw, Round Head, 3/16" × 24 - 3/8"	10
20	Acme Nut Body	1
21	Acme Screw Bracket	1
22	Screw, Hex Head, 1/4" × 20 - 1/2" (with spring washer)	2
23	Nut, 3/8" 16	4
24	Infeed Leveling Foot	1
25	Infeed Support Leg	1
26	Roller – Infeed Table	1
27	Infeed Table Bottom Cover	1
28	Guard Support – Left	1
29	Screw, Socket Head Hex, M5 × 35	1
30	Screw, Round Head, 1/4" × 20 - 1/2"	10
31	Washer, 1/4" 16 × 1.5T	2

11: DIAGRAMS AND PARTS LISTS

11.6 Infeed Table Parts List

ID	Description	Quantity
32	Guard Support - Right	1
33	Scale Mounting Bracket – Outboard	1
34	Bolt, Hex Head, M10 × 25	2
35	Scale Mounting Bracket – Inboard	1
36	Indicator 35x26x1.0T	1
37	Infeed Table	1
38	Clamp Jaw T-Nut	1
39	Scale	1
40	Screw, Flat Head, 5/32" × 32 - 3/8"	2
41	Clamp Block T-Nut	1
42	60 mm Air Cylinder	1
43	Clamp Block – Infeed Table (PN 52685)	1
44	Screw, Socket Head Hex, M6 × 55	4
45	Top Plate - Clamp Block	1
46	Nut, M5	2
47	Screw, Socket Head Hex, 5/16" × 18 - 3-1/2"	2
48	Clamp Handle, M8 × 1.25 (PN 52686)	1
49	Silencer	1
50	Elbow Fitting	1
51	Screw, Socket Head Hex, 5/16" × 18 - 1/2"	2
52	Infeed Movable Jaw	1
53	Bolt, Hex Head, 5/16" × 18 - 1/4"	4
54	Washer, 5/16" 18 × 2T	4
55	Infeed Fixed Vise Jaw	1
56	Washer, 3/8" 20 × 2T	3
57	Bolt, Hex Head, 3/8" × 16 - 1-1/4"	3
58	Infeed Guide Rail	1
59	Infeed Roller Spacer Plate	2
60	Roller Bracket	2
62	Washer, 1/4" 16 × 1.5T	2
63	Screw, Hex Head Socket, 5/16" × 18 - 1"	7

11.7 STAND EXPLODED VIEW



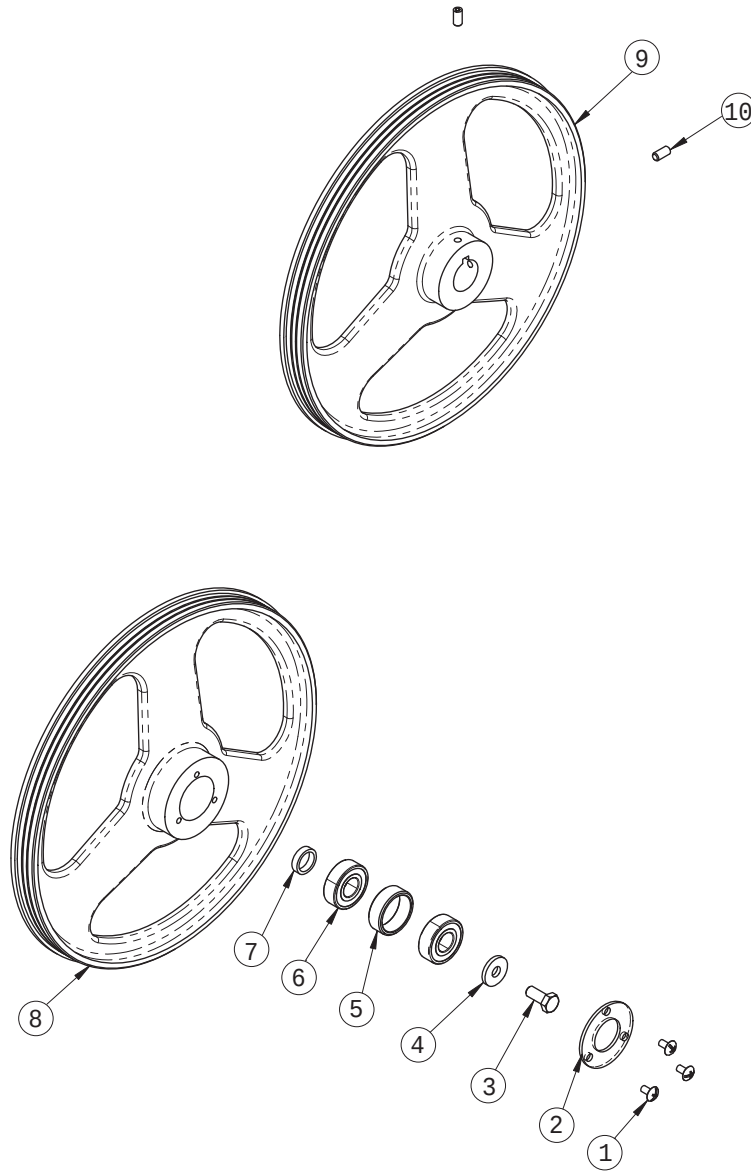
11: DIAGRAMS AND PARTS LISTS

11.8 Stand Parts List

11.8 STAND PARTS LIST

ID	Description	Quantity
1	Shaft (PN 52687)	1
2	Wheel (PN 52688)	2
3	Washer, 5/8" 30 × 3T	4
4	Split Pin, 3 × 25	2
5	Right Stand Panel	1
6	Middle Stand Panel	1
7	Nut, 3/8" - 16	9
8	Washer, 3/8" 23 × 2T	10
9	Screw, Hex Head, 3/8" 16 × 1"	9
10	Leveling Foot (PN 52683)	2
11	Cover Panel	1
12	Left Stand Panel	1
13	Nut, 5/16" - 18	6
14	Washer, 5/16" 18 × 2T	8
15	Screw, Hex Head, 5/16" × 18 - 1-1/2"	4
16	Handle	1
17	Screw, Hex Head, 5/16" × 18 - 3/4"	1
18	Filter (PN 52689)	1
19	Pipeline	1
20	Water Pan	1
21	AF50+ Logo Decal	1
22	Screw, Round Head, 1/4" × 20 - 1"	2
23	Air Fixed Board	1
24	Electrical Cabinet	1
25	Electrical Cabinet Cover	1

11.9 BLADE WHEEL

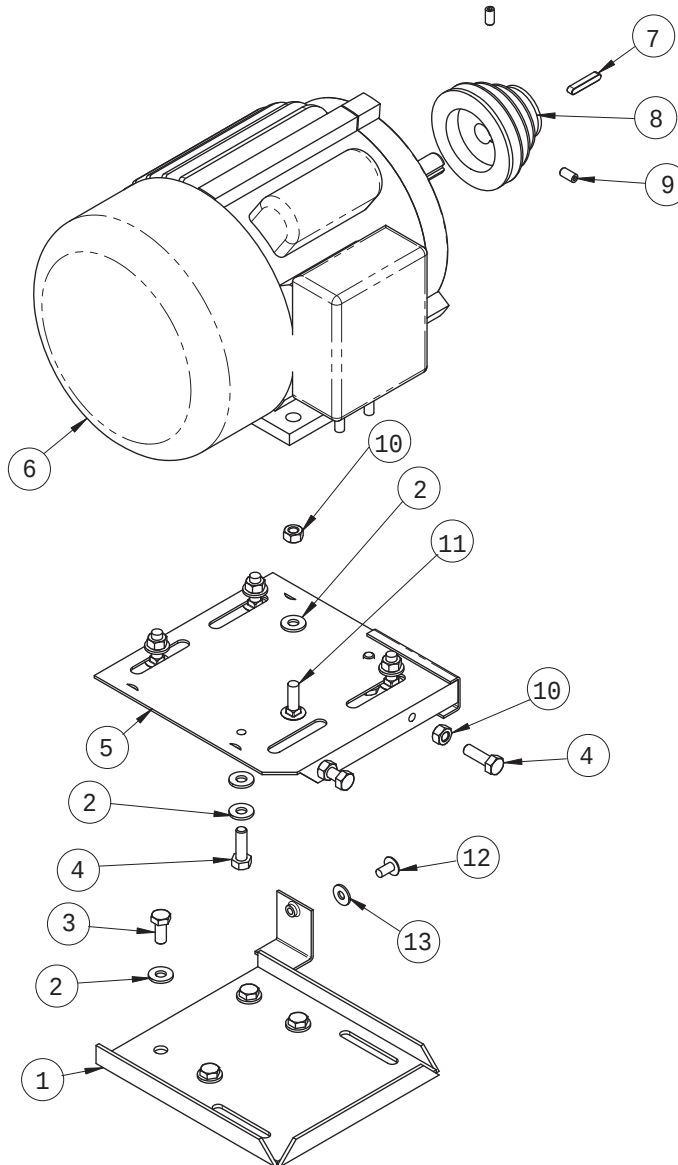


11: DIAGRAMS AND PARTS LISTS

11.9 Blade Wheel

ID	Description	Quantity
1	Screw, Round Head, 3/16" × 24 - 3/8"	3
2	Bearing Cover (PN 52658)	1
3	Screw, Hex Head, 5/16" × 18 - 3/4"	1
4	Washer, 5/16" 23 × 3T	1
5	Spacer Ring	1
6	Bearing (PN 52659)	2
7	Spacer Ring	1
8	Idler Wheel	1
9	Drive Wheel	1
10	Screw, Set, 1/4" × 20 - 1/2"	2

11.10 MOTOR ASSEMBLY

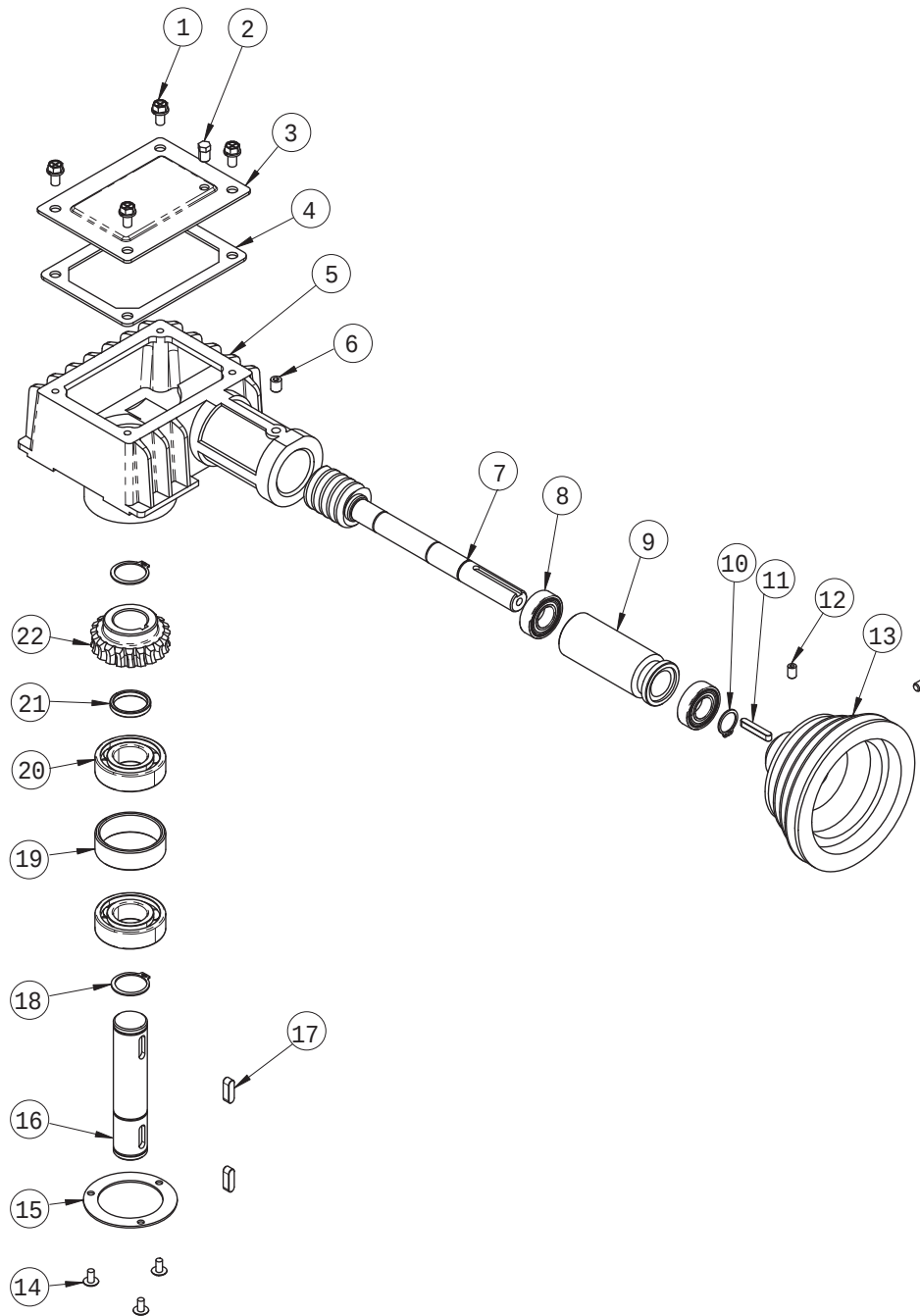


11: DIAGRAMS AND PARTS LISTS

11.10 Motor Assembly

ID	Description	Quantity
1	Motor Bracket – Lower	1
2	Washer, 5/16" 18 × 2T	12
3	Screw, Hex Head, 5/16" × 18 - 3/4"	4
4	Screw, Hex Head, 5/16" × 18 - 1"	4
5	Motor Bracket – Upper	1
6	Motor (PN 52660)	1
7	Key, Flat, 5 × 5 - 30	
8	Motor Pulley	1
9	Screw, Set, 1/4" × 20 - 1/2"	2
10	Nut, 5/16" -18	6
11	Screw, Truss Head, 5/16" × 18 - 1"	4
12	Screw, Round Head, 1/4" × 20 - 1/2"	1
13	Washer, 1/4" 16 × 1.5T	1

11.11 GEAR BOX ASSEMBLY

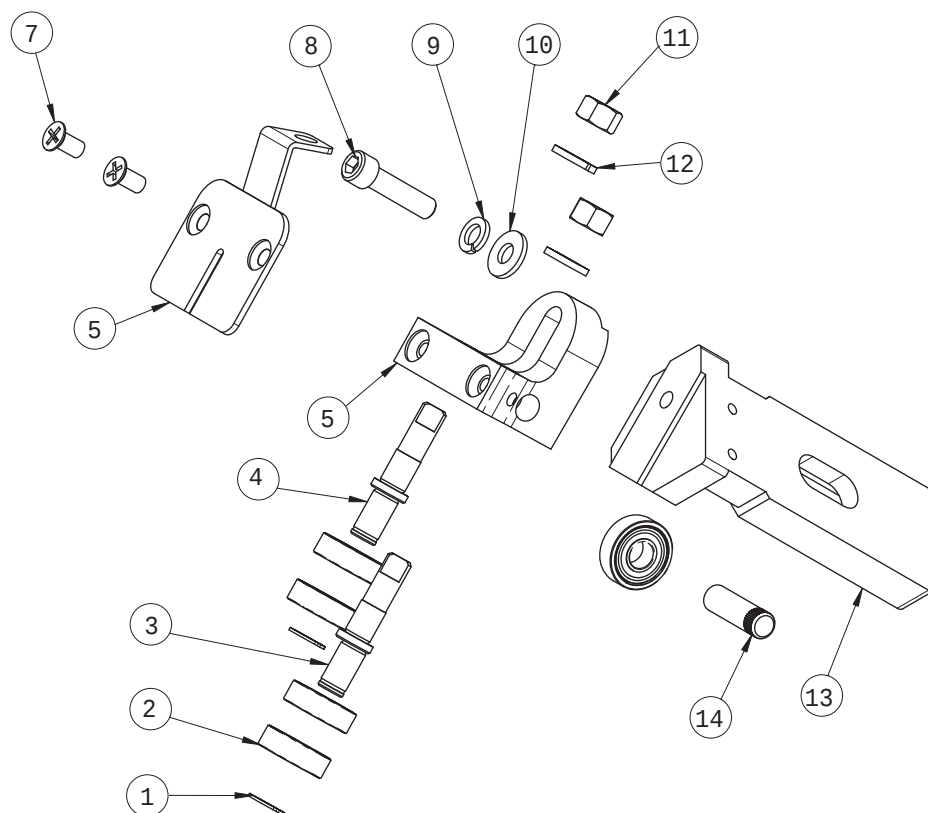


11: DIAGRAMS AND PARTS LISTS

11.11 Gear Box Assembly

ID	Description	Quantity
1	Screw, Hex Head, 1/4" × 20 - 1/2" (with spring washer)	4
2	Screw, Hex Head, M8 × 1	1
3	Cover	1
4	Gasket	1
5	Gear Box Housing	1
6	Screw, Set, 5/16" × 18 - 3/8"	1
7	Worm Shaft	1
8	Bearing	2
9	Bushing	1
10	Retaining Ring	1
11	Key, Flat, 5 × 5 - 30	1
12	Screw, Set, 1/4" × 20 - 3/8"	2
13	Pulley	1
14	Screw, Round Head, 3/16" × 24 - 3/8"	3
15	Bearing Cover	1
16	Shaft	1
17	Key, Flat, 6 × 6 - 20	2
18	Retaining Ring	2
19	Spacer Ring	1
20	Bearing	2
21	Spacer Ring	1
22	Worm Gear	1

11.12 SLIDING BLADE GUIDE (PARENT)

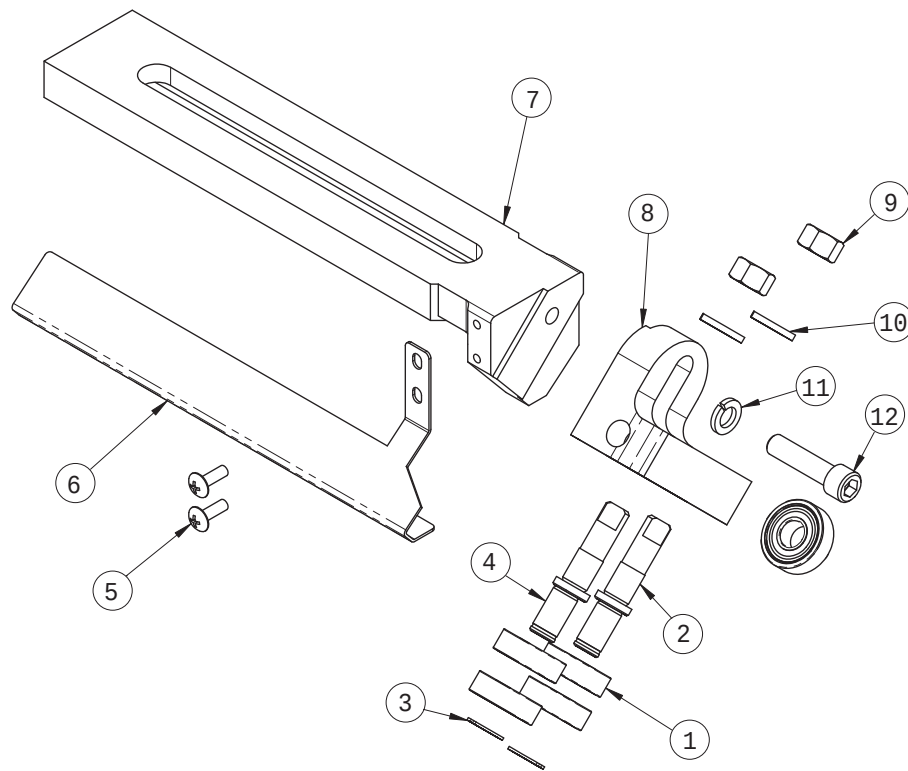


11: DIAGRAMS AND PARTS LISTS

11.12 Sliding Blade Guide (Parent)

ID	Description	Quantity
1	Retaining Ring (PN 52669)	2
2	Bearing (PN 52667)	5
3	Eccentric Shaft (PN 52662)	1
4	Center Shaft (PN 52663)	1
5	Adjustable Blade Guide (PN 52664)	1
7	Screw, Flat Head, 1/4" × 20 - 1/2"	2
8	Screw, Round Head, 5/16" × 18 - 1-1/4"	1
9	Washer, Spring, 5/16"	1
10	Washer, 5/16" 18 × 2T	1
11	Nut, 3/8" - 24	2
12	Washer, Spring, 3/8"	2
13	Sliding Blade Guide (PN 52665)	1
14	Shaft (PN 52666)	1
15	Blade Cover	1

11.13 SLIDING BLADE GUARD (CHILD)

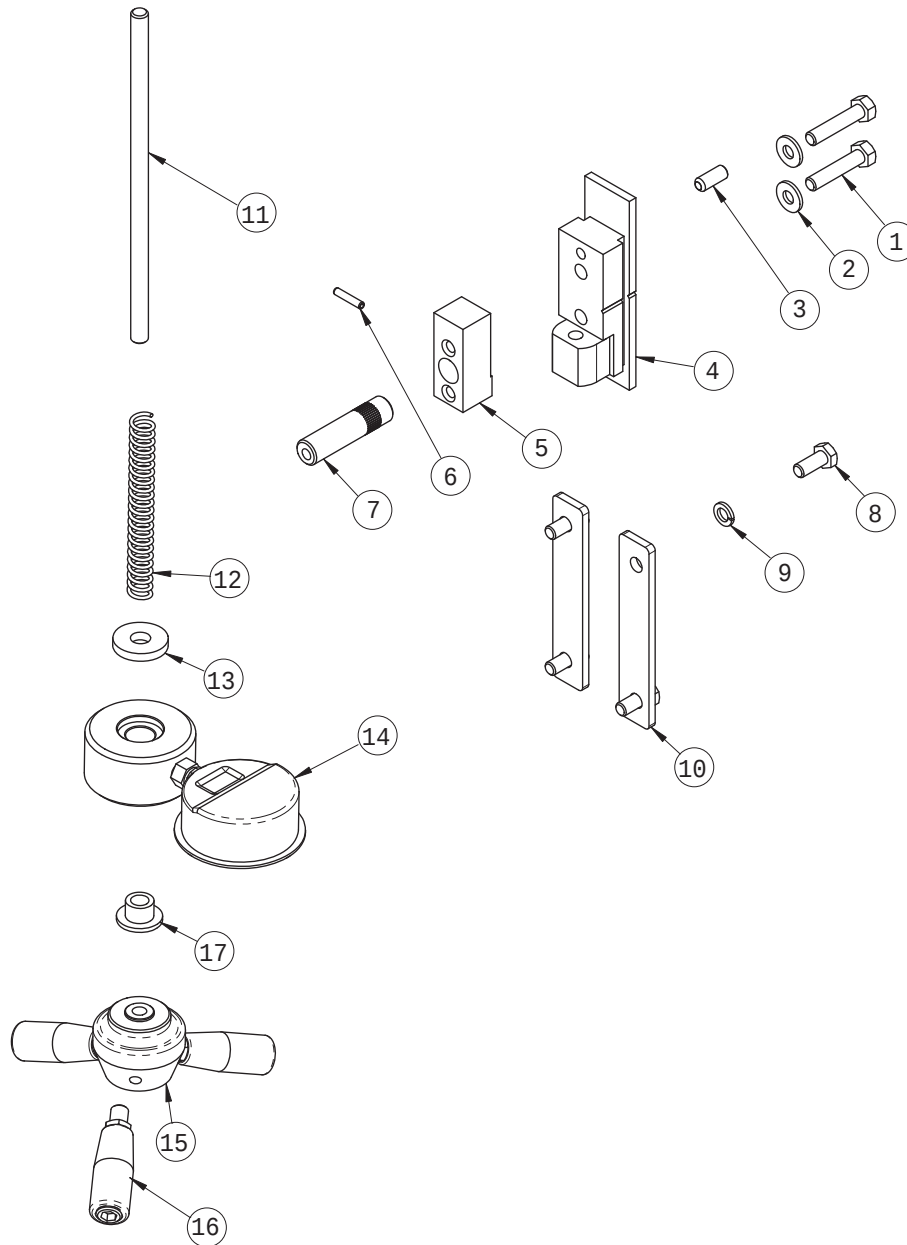


11: DIAGRAMS AND PARTS LISTS

11.13 Sliding Blade Guard (Child)

ID	Description	Quantity
1	Bearing	5
2	Center Shaft	1
3	Retaining Ring	2
4	Egocentric Shaft	1
5	Screw, Truss Head, 5/32" × 32 - 1/2"	2
6	Blade Guard (PN 52670)	1
7	Sliding Blade Guide (PN 52671)	1
8	Adjustable Blade Guide (PN 52672)	1
9	Nut, 3/8" - 24	2
10	Washer, Spring, 3/8"	2
11	Washer, Spring, 5/16"	1
12	Screw, Round Head, 5/16" × 18 - 1-1/4"	1
13	Shaft	1

11.14 BLADE TENSIONING KIT

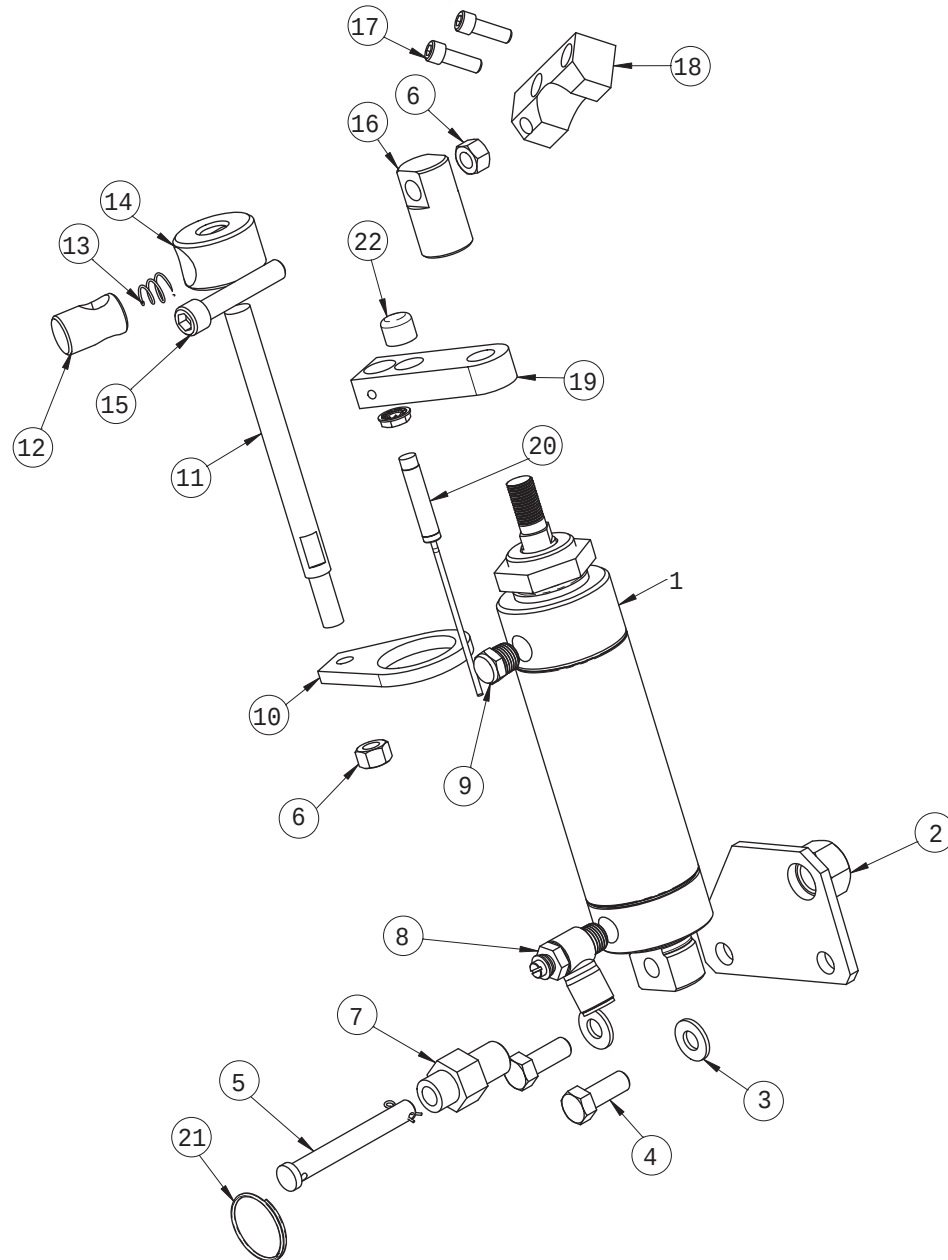


11: DIAGRAMS AND PARTS LISTS

11.14 Blade Tensioning Kit

ID	Description	Quantity
1	Screw, Hex Head, 5/16" × 18 - 1-1/2"	2
2	Washer, 5/16" 18 × 2T	2
3	Screw, Set, 5/16" × 18 - 3/4"	1
4	Sliding Base	1
5	Blade-Wheel's Base	1
6	Pin, Spring, Slotted 4 × 20	1
7	Pin	1
8	Screw, Hex Head, 5/16" × 18 - 3/4"	4
9	Washer, Spring, 5/16"	4
10	Sliding Guide	2
11	Screw, Tension, 3/8 × 16 - 225	1
12	Spring, Compressed	1
13	Spacer Ring, 30 × 15L	1
14	Tension Gage (PN 52673)	1
15	Tension Handle Hub	1
16	Handle	3
17	Spacer	1

11.15 LIFT CYLINDER ASSEMBLY

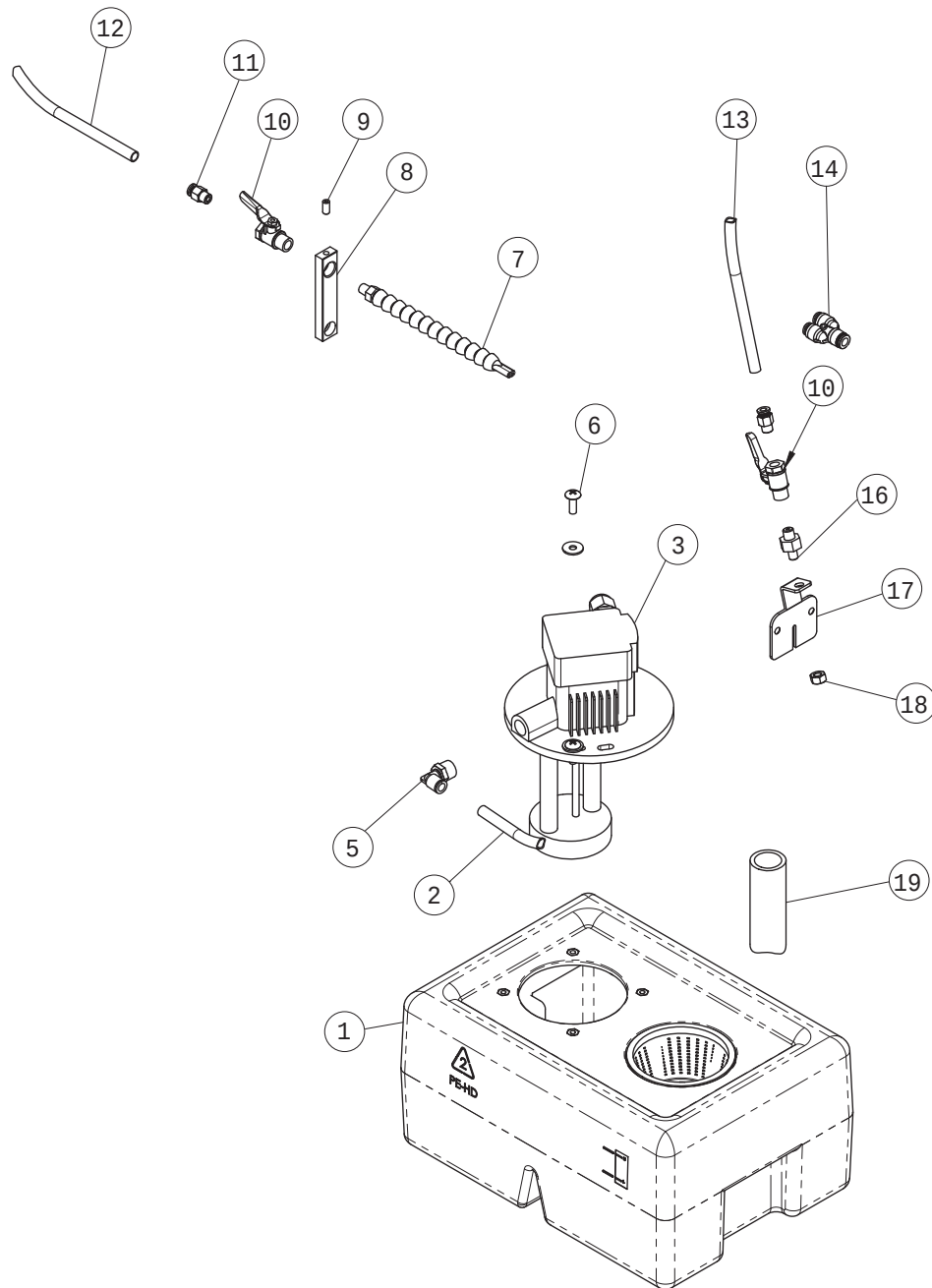


11: DIAGRAMS AND PARTS LISTS

11.15 Lift Cylinder Assembly

ID	Description	Quantity
1	Lift Cylinder	1
2	Lift Cylinder Bracket	1
3	Washer, 3/8" 20 × 2T	2
4	Screw, Hex Head, 3/8" × 16 - 1"L	2
5	Lift Cylinder Axle	1
6	Nut, 3/8" - 16	2
7	Bottom Pivot	1
8	Flow-Control Elbow	1
9	Muffler	1
10	Lift Cylinder Stop Base	1
11	Length Adjustment Screw	1
12	Acme Nut Spring and Button Assembly (PN 54356) Acme Nut Insert Spring 15 × 12	1
13		
14	Acme Nut Body	1
15	Screw, Socket Head Hex, 3/8" × 16 - 2-1/2"	1
16	Clevis Lift Cylinder	1
17	Screw, Socket Head Hex, 1/4" × 20 - 3/4"	2
18	Top Pivot Mount	1
19	Lift Cylinder Stop	1
20	Proximity Sensor	1
21	Pull Ring	1
22	Protective Cover	1

11.16 COOLANT SYSTEM



11: DIAGRAMS AND PARTS LISTS

11.16 Coolant System

ID	Description	Quantity
1	Coolant Tank, 13 Liter	1
2	PVC Hose, 6 × 1200	1
3	Coolant Pump (PN 52693)	1
5	Quick-Fitting (L-Shaped), 3/8" × 8 (PN 52690)	1
6	Screw, Truss Head, 1/4" × 20 - 1/2"	2
7	Nozzle	12
8	Nozzle Support (PN 52692)	1
9	Screw, Set, 1/4" × 20 - 1/2"	1
10	Valve, 1/8" × 1/8" (Female) (PN 52691)	2
11	Fitting, 6 × 1/8 (Male)	2
12	PVC Hose, 4 × 1600	1
13	PVC Hose, 4 × 730 (PN 52697)	1
14	Pneumatic Fitting	1
16	Nozzle	1
17	Blade Cover	1
18	Nut, 5/16" - 18	1
19	PVC Hose, 5/8" × 260 (PN 52694)	1

PNEUMATIC SCHEMATICS

IN THIS SECTION, YOU'LL LEARN:

- About the pneumatic schematics for this machine's pneumatic systems.

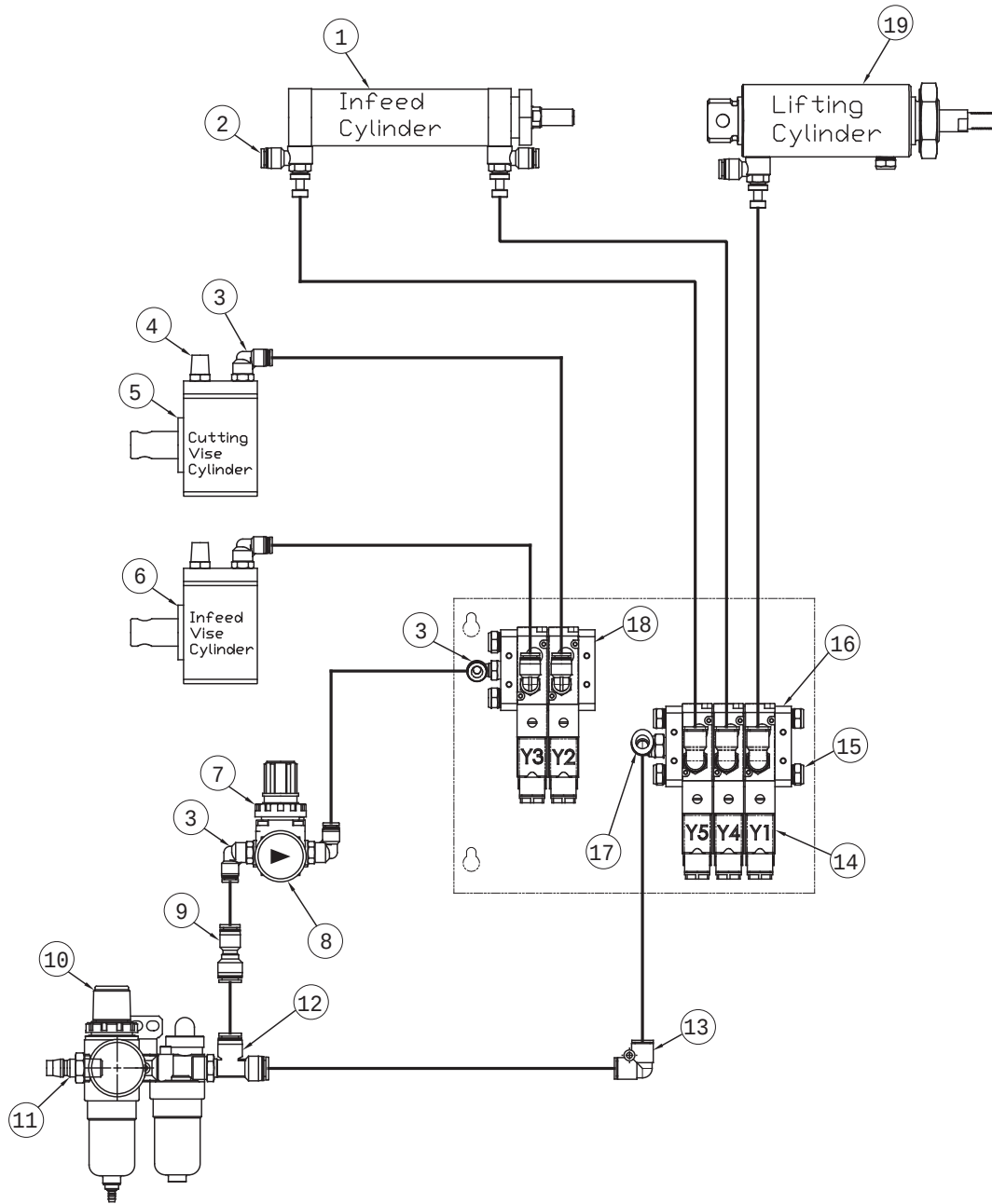
CONTENTS

12.1 Pneumatic System	110
12.2 Pneumatic System Parts List	111

12: PNEUMATIC SCHEMATICS

12.1 Pneumatic System

12.1 PNEUMATIC SYSTEM



12.2 PNEUMATIC SYSTEM PARTS LIST

ID	Description	Quantity
1	Infeed Cylinder	1
2	Speed Controller	3
3	Male Elbow	6
4	Silencer	2
5	Compact Cylinder	1
6	Compact Cylinder	1
7	Pressure Regulator	1
8	Pressure Gauge	2
9	Fitting	1
10	Regulator	1
11	Fitting	1
12	Fitting	1
13	Fitting	1
14	Solenoid Valve	5
15	Silencer	7
16	Manifold	1
17	Fitting	4
18	Manifold	1
19	Lifting Cylinder	1



ELECTRICAL SCHEMATICS

IN THIS SECTION, YOU'LL LEARN:

- About the electrical schematics for this machine's electronics.

CONTENTS

13.1 Electrical Schematic	114
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13: ELECTRICAL SCHEMATICS

13.1 Electrical Schematic

13.1 ELECTRICAL SCHEMATIC

