Safety rules

- Make sure your work area is cleared of uninvited people and obstacles every time before you start operating the machine.

- Never cut carbon or any other material that may produce and disperse explosive dust. It is possible that sparks from motors and other machine parts will ignite and explode the airborne dust.

- Use a water-soluble cutting fluid on this machine. Oil-based cutting fluids may emit smoke or catch fire, depending on how they are used.

- Never leave the machine unattended when cutting flammable materials.

- Make sure any use of fire is prohibited in the shop and install a fire extinguisher or other fire control device near the machine when cutting titanium, magnesium, or any other material that produces flammable chips. Never leave the machine unattended when cutting flammable materials.

- Never touch the running saw blade with gloves or not. It is dangerous if your hands, clothing, or gloves are caught by the running blade.

- Never wear gloves or loose clothing when operating the machine. It may lead to serious injury if they are caught in the running machine. Wrap or cover long hair.

- Never step on or stand on the roller table. Your foot may slip or trip on the rollers and you will fall.

- Never leave the machine unattended when cutting flammable materials.

- Make sure any use of fire is prohibited in the shop and install a fire extinguisher or other fire control device near the machine when cutting titanium, magnesium, or any other material that produces flammable chips. Never leave the machine unattended when cutting flammable materials.
Safety rules

- Never adjust the wire brush or remove chips while the saw blade is still running. It is extremely dangerous if hands or clothing are caught by the running blade.

- Stop the saw blade before you clean the machine. It is dangerous if hands or clothing are caught by the running blade.

- Use roller tables at the front and rear sides of the machine when cutting long work. It is dangerous if the workpiece falls off the machine.

- Take preventive measures when cutting thin or short pieces from the work to keep them from falling. It is dangerous if the cut pieces fall.

- Turn off the shop circuit breaker switch before performing maintenance on the machine. Post a sign indicating the machine is under maintenance.

- Never start the saw blade unless the workpiece has been clamped firmly. If the workpiece is not securely clamped, it will be forced out of the vise during cutting.

- Never start the saw blade before you clean the machine. It is dangerous if hands or clothing are caught by the running blade.

- Never adjust the wire brush or remove chips while the saw blade is still running. It is extremely dangerous if hands or clothing are caught by the running blade.
Section 1 – Safety Information

1-1

Safety Instructions

1-2

Safety Devices

1-3

Emergency Stop

1-4

Illustration: Emergency Stop

1-5

Safety Labels

1-6

Illustration: Safety Labels

1-7

Hearing Protection

1-8

CE Compliance

1-9

Risk Assessment

1-10

Control Panel

1-11

Control Panel

1-12

Control Panel

1-13

Before Operating

1-14

Safety Precautions

Section 2 – General Information

2-1

Specification

2-2

Machine Parts Identification

2-3

Floor Plan

2-4

Unpacking & Inspecting

2-5

Illustration: Lifting Points

2-6

Lifting

2-7

Removing Shipping Bracket

2-8

Cleaning

2-9

Installing

2-10

Supplying Hydraulic Oil

2-11

Supplying Coolant

2-12

Connecting Electric Power

2-13

Leveling & Anchoring

2-14

Installing Roller Table (Optional)

2-15

Installing Fire Control Device

2-16

Relocating

Section 3 – Moving & Installation

3-1

Location & Environment

3-2

Unpacking & Inspecting

3-3

Leveling & Anchoring

3-4

Connecting Electric Power

3-5

Supplying Hydraulic Oil

3-6

Cleaning

3-7

Installing

3-8

Leveling & Anchoring

3-9

Installing Roller Table (Optional)

3-10

Installing Fire Control Device

3-11

Relocating

Section 4 – Operating Instructions

4-1

Safety Precautions

4-2

Before Operating

4-3

Control Panel

4-4

Control Panel

4-5

Control Panel

4-6

Control Panel

4-7

Before Operating

4-8

Control Panel

4-9

Control Panel

4-10

Control Panel

4-11

Control Panel

4-12

Control Panel

4-13

Control Panel

4-14

Control Panel

4-15

Control Panel

4-16

Control Panel

4-17

Control Panel

4-18

Control Panel

4-19

Control Panel

4-20

Control Panel

4-21

Control Panel

4-22

Control Panel

4-23

Control Panel

4-24

Control Panel

4-25

Control Panel

4-26

Control Panel

4-27

Control Panel

4-28

Control Panel

4-29

Control Panel

4-30

Control Panel

4-31

Control Panel

4-32

Control Panel

4-33

Control Panel

4-34

Control Panel

4-35

Control Panel

4-36

Control Panel

4-37

Control Panel

4-38

Control Panel

4-39

Control Panel

4-40

Control Panel

4-41

Control Panel

4-42

Control Panel

4-43

Control Panel

4-44

Control Panel

4-45

Control Panel

4-46

Control Panel

4-47

Control Panel

4-48

Control Panel

4-49

Control Panel

4-50

Control Panel

4-51

Control Panel

4-52

Control Panel

4-53

Control Panel

4-54

Control Panel

4-55

Control Panel

4-56

Control Panel

4-57

Control Panel

4-58

Control Panel

4-59

Control Panel

4-60

Control Panel

4-61

Control Panel

4-62

Control Panel

4-63

Control Panel

4-64

Control Panel

4-65

Control Panel

4-66

Control Panel

4-67

Control Panel

4-68

Control Panel

4-69

Control Panel

4-70

Control Panel

4-71

Control Panel

4-72

Control Panel

4-73

Control Panel

4-74

Control Panel

4-75

Control Panel

4-76

Control Panel

4-77

Control Panel

4-78

Control Panel

4-79

Control Panel

4-80

Control Panel

4-81

Control Panel

4-82

Control Panel

4-83

Control Panel

4-84

Control Panel

4-85

Control Panel
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Section 1 – Introduction</td>
</tr>
<tr>
<td>1.2</td>
<td>Section 2 – Setting up the Blade</td>
</tr>
<tr>
<td>1.3</td>
<td>Section 3 – Blade Descend Pressure &amp; Speed</td>
</tr>
<tr>
<td>1.4</td>
<td>Section 4 – HMI Touch Screen &amp; Functions</td>
</tr>
<tr>
<td>1.5</td>
<td>Section 5 – HMI Error Codes</td>
</tr>
<tr>
<td>1.6</td>
<td>Section 6 – Standard Accessories</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 7 – Optional Accessories</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 8 – Unrolling &amp; Installing the Blade</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 9 – Adjusting Wire Brush</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 10 – Adjusting Saw Arm</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 11 – Adjusting Blade Speed</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 12 – Breaking into the Blade</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 13 – Placing Workpiece onto Workbed</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 14 – Positioning Workpiece for Cutting</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 15 – Without Using Automatic First Cut Function</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 16 – Using Automatic First Cut Function</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 17 – Adjusting Coolant Flow</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 18 – Test Running the Machine</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 19 – Cutting Operation</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 20 – Using Top Clamp for Bundle Cutting</td>
</tr>
<tr>
<td>1.7</td>
<td>Section 21 – Terminating a Cutting Operation</td>
</tr>
</tbody>
</table>

## Section 2 – Setting up the Blade

- Blade Break-In
- Vise Loading
- Saw Blade Selection

## Section 3 – Blade Descend Pressure & Speed

- Blade Descend Pressure & Speed

## Section 4 – HMI Touch Screen & Functions

- HMI Touch Screen & Functions

## Section 5 – Electrical System

- Electrical Circuit Diagrams

## Section 6 – Hydraulic System

- Hydraulic Diagrams

## Section 7 – Bandsaw Cutting: A Practical Guide

- Introduction
  - Saw Blade Selection
- VISE LOADING
- Saw Blade Selection

## Section 8 – Maintenance & Service

- Introduction
- Basic Maintenance
- Maintenance Schedule
- Before Beginning a Day’s Work
- After Ending a Day’s Work
- Every Three Months
- Every Month
- Before Ending a Day’s Work
- After Starting a Day’s Work

---

!!
Table of Contents

Every Six Months

Storage Conditions

Terminating the Use of Machine

Oil Recommendation for Maintenance

Section 3 – Troubleshooting

Introduction

Precautions

Minor Troubles & Solutions

General Troubles & Solutions

Motor Troubles & Solutions

Blade Troubles & Solutions

Sawing Problems & Solutions

Re-adjusting the Roller Table

Section 10 – Parts

Part List

Spare Parts Recommendations

Section 11 – Warranty

Warranty

Section 10 – Parts

10-1

10-2
Safety is a combination of a well-designed machine, operator's knowledge about the machine, and alertness at all times.

Cosen's band machine has incorporated many safety measures during the design process and used protective devices to prevent personal injuries and potential risks. Warning labels and signs also serve as a reminder to the operator.

Throughout this manual, you will also see various safety-related symbols indicating important instructions that you should take note of prior to use of the machine or part of its functions. These important safety instructions do not cover all possible situations that might occur. It is your responsibility to take caution and follow procedures stated in this manual when installing, maintaining, and operating your machine.

Cosen will not be liable for damages resulting from improper use.

Section 1

SAFETY INSTRUCTIONS

What the icons and signs in this user manual mean:

- This icon marks WARNING; hazards or unsafe practices that may result in personal injury or damage to the machine.
- Supplementary information to the procedures described in this manual.
- Call your local agent or our service center for help.

SAFETY INFORMATION
This manual has important safety information. Read through it carefully before operating this machine to prevent personal injury or machine damage. Learn the operation, limitations, and specific potential hazards peculiar to this band saw. All users must read it before performing any activity on the machine, such as replacing the saw band or doing regular maintenance.

Do not operate this machine unless it is completely assembled. Keep all guards and shields in place before installing or starting up the machine. Keep blade protection cover and wheel covers in place and in working order. Make sure the power switch is off before plugging in power cord. Disconnect the power cord before making adjustment, maintenance or blade changes.

Always remember to switch off the machine when the work is completed. Keep unauthorized personnel away. Use recommended accessories. Improper accessories may be hazardous. Never hold the material by hand for cutting. Always use the vise and make sure the material is clamped securely before cutting. When a workpiece is too long or heavy, make sure it is supported with a roller table (recommended). Move saws is spotted with a roller, make sure the material is clamped securely.

Always wear proper apparel during operation. Some personal protective equipment is required for the safe use of the machine, e.g., protective goggles. Never operate while under the influence of drugs, alcohol or medication. Do not reach over or stand on any part of the machine. It is dangerous to operate the machine when the floor is slippery. Keep the floor clean and dry. Check for ice, moisture or other conditions that may affect its operation. Any damaged part will guarantee the greatest amount of heat. When the floor is slippery, keep the floor covered with absorbent material or dry ice. Do not do regular maintenance.

Keep your work area clean. Cluttered and slippery floors invite accidents. Keep your work area well illuminated at a minimum of 500 lumens. Keep your work area clean and clutter free.

Always remember to switch off the machine when the work is completed. Disconnect the power cord before plugging in power. Make sure the machine is covered;

Keep all guards and shields in place before starting up the machine. Do not operate this machine unless it is completely assembled. Do not perform any activity on the machine that is not related to the safe use of the machine.

Always wear proper apparel during operation. Personal protective equipment is required for the safe use of the machine. Wear proper apparel during operation.
SAFEGUARD DEVICES

The safeguard devices incorporated in this machine include the following two main parts:

1. Protection covers & guards
2. Safety-related switches

Protection Covers & Guards
1. Idle wheel housing cover
2. Drive and idle wheels
3. Gear reducer cover
4. Wire brush belt cover
5. Blade guard cover (left & right)
6. Chip conveyor cover (optional)
7. Chip conveyor cover (CE model only)
8. Chip conveyor cover (CE model only; as shown in illustration: Safety Fence)
9. Safety fence (left & right) (CE model only)
10. Blade guard cover (left & right)
11. Top clamps (optional)
12. Workpiece clamping vise
13. Chip conveyor (optional)
14. Wire brush
15. Quick approach device (optional)
16. Blade guide rollers

The protection devices should always be mounted on the machine whenever the machine is running.

Do not remove any of these safeguard devices under any circumstances except when servicing the machine. Even skilled service technicians should still take precautions when performing repairs or service on the machine with any of these protectors removed. It is the responsibility of the user to make sure all these elements are not lost and damaged.

Take note of the following main moving parts on the machine prior to and during machine operation:

- Saw bow assembly
- Drive and idle wheels
- Blade guide arm
- Saw blade guide rollers
- Quick approach device
- Wire brush
- Chip conveyor
- Workpiece clamping vise
- Shuttle vises and workbed rollers
- Shuttle vise assembly
- Workbed clamping vise
- Gear reducer (optional)
- Top clamps (optional)
- Workbed guide rollers
Safety Related Switches

To protect the operator, the following safety related switches on the machine are actuated when the machine is in operation.

Wheel motion detector
This is a proximity sensor used to detect the motion of the drive wheel. Once the saw blade is broken or the drive wheel is slipping, the sensor will detect the motion of the drive wheel. As soon as the detector senses anything unusual, the sensor will turn the machine off.

Power switch
Located on the cover of electrical cabinet, the power switch controls the main power of the machine. It can be locked with a padlock or a luggage lock. For CE models, supplementary emergency stop button may be available at other areas of the machine depending on machine type.

Emergency stop button
Located on the control panel, the button when pressed will stop the machine immediately come to a full stop to avoid injury or damage when an accident occurs. The button is made in red color and rubber material. Designed to be easily accessible, the emergency stop button is located on the left bottom corner on the control panel and is made in red color and rubber material. For CE models, supplementary emergency stop button may be available at other areas of the machine depending on machine type.

You should press it immediately without any hesitation when observing:

• An abnormal situation of problem such as fire, smoke, abnormal noise and etc.
• An emergency situation that would cause any injury or damage.

Among all these safety switches, some of them are used to protect the users and some of them are used to prevent damage to saw blades, the workpiece and the machine itself, etc. We have taken every precaution to prevent injury or damage and to provide safe and economical operation of the machine.

EMERGENCY STOP

When you press the button, the machine will immediately come to a full stop to avoid injury or damage when an accident occurs. The button is made in red color and rubber material. Designed to be easily accessible, the emergency stop button is located on the left bottom corner on the control panel and is made in red color and rubber material. For CE models, supplementary emergency stop button may be available at other areas of the machine depending on machine type.

Please refer to Illustration: Emergency Stop.

EMERGENCY STOP
<table>
<thead>
<tr>
<th>Meaning</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact Hazard</td>
<td><img src="image" alt="Impact Hazard" /></td>
</tr>
<tr>
<td>Loose Hand Hazard</td>
<td><img src="image" alt="Loose Hand Hazard" /></td>
</tr>
<tr>
<td>Crush Hazard By Wire</td>
<td><img src="image" alt="Crush Hazard By Wire" /></td>
</tr>
<tr>
<td>Burn Hazard / Hot Surface</td>
<td><img src="image" alt="Burn Hazard / Hot Surface" /></td>
</tr>
<tr>
<td>Hazardous Voltage</td>
<td><img src="image" alt="Hazardous Voltage" /></td>
</tr>
<tr>
<td>Cutting Hazard</td>
<td><img src="image" alt="Cutting Hazard" /></td>
</tr>
<tr>
<td>Do not stand on the machine or on the accessories!</td>
<td><img src="image" alt="Do not stand on the machine or on the accessories!" /></td>
</tr>
<tr>
<td>Personal Away</td>
<td><img src="image" alt="Personal Away" /></td>
</tr>
<tr>
<td>Keep Unauthorized</td>
<td><img src="image" alt="Keep Unauthorized" /></td>
</tr>
<tr>
<td>During Operation</td>
<td><img src="image" alt="During Operation" /></td>
</tr>
<tr>
<td>Wea Safety Shoes</td>
<td><img src="image" alt="Wea Safety Shoes" /></td>
</tr>
<tr>
<td>Read Operator’s Manual</td>
<td><img src="image" alt="Read Operator’s Manual" /></td>
</tr>
</tbody>
</table>

Please read through and understand them before operating the machine. Refer to Illustration: Safety.
HEARING PROTECTION

Always use ear protection!

When your machine is running, noise generated by the machine may come from the following:

- Drive wheel
- Coolant pump
- Blade motor
- Belt transmissions variable speed motors
- Hydraulic motor/pump
- Speed reducer
- Chip converter unit
- Wire brush unit
- Saw blade during cutting or material feed mechanism

- Drive wheel
- Coolant pump
- Blade motor
- Belt transmissions variable speed motors
- Hydraulic motor/pump
- Speed reducer
- Chip converter unit
- Wire brush unit
- Saw blade during cutting or material feed mechanism

Risk assessment generally takes account of intended use and foreseeable misuse, including process equipment damage during the machine design stage. However, the operator (or other people) still needs to take precautions when handling any part of the machine that is unfamiliar and anywhere on the laws of the Member States relating to machinery (2006/42/EC) – Annex I Essential health and safety requirements relating to the design and construction of machinery.

CE COMPLIANCE

Under Section 7: If maintenance does not seem to solve the problem, follow the troubleshooting procedures schedule (refer to Section 6).

I. Make sure all maintenance tasks have been performed following the prescribed maintenance procedures.

CE COMPLIANCE

Our products pass noise testing less than 78 dBA. Noise level vary according to working conditions and environment ear plugs or other hearing protection at all time. If your machine produces an undesired noise while it is running, you should:

- Drive wheel
- Coolant pump
- Blade motor
- Belt transmissions variable speed motors
- Hydraulic motor/pump
- Speed reducer
- Chip converter unit
- Wire brush unit
- Saw blade during cutting or material feed mechanism
This band saw machine is designed by Cosen’s R&D engineers to provide you the following features and advantages:

**Safety**
- This machine and each component has passed strict testing (Council Directive on the approximation of the laws of the Member States relating to Machinery).
- The machine is designed to fully protect the operator from it's moving parts during cutting operation.
- The machine will stop automatically when out of stock.
- The machine will shut off automatically when the saw blade is broken, protecting both the operator and the machine.
- The machine is designed in the way that the operation and adjustment can be easily performed.
- Dual valve system is designed to achieve optimal cutting performance with the simple setting of feed rate and perspective cutting pressure for different material.

**Durability**
- The intended life-span of the machine is counted based on regular daily operation. It is calculated with the life expectancy of 10 years under normal operating condition and exact attention to the maintenance schedule.
- 8 hours x 5 days x 52 weeks x 10 years = 20,800 hours

**Convenience & High-Performance**
- The machine will shut off automatically when the saw blade is broken, protecting both the operator and the machine.
- The machine is designed to achieve optimal cutting performance with the simple setting of feed rate and perspective cutting pressure for different material.
- The machine has been designed to fit fully protect the operator from it's moving parts during cutting operation.

This band saw machine is designed by Cosen’s R&D engineers to provide you the following features and advantages.
## Automatic Horizontal Bandsaw

**Model**

SW-100A

### Operating Environment

- **Temperature:** 5°C to 40°C (41°F to 104°F)
- **Humidity:** 30% to 85% (without condensation)

### Floor Space (L x W x H)

2100 x 2150 x 1800 mm (71.1" x 84.6" x 70.9")

### Weight

- **Net:** 1400 kg (3080 lbs)
- **Gross:** 1600 kg (3520 lbs)
- **Workbed Height:** 550 mm (21.7")

### Feeding Length

- **Single Stroke:** 381 mm (15")
- **Multi Stroke:** 403 mm (15.9")

### Tension

- **Hydraulic**: 27 x 350 x 0.9 mm (options)

### Guide

- **Interchangeable Tungsten Carbide**: 34 x 350 x 0.9 mm (options)

### Cleaning

- **Steel Wire Brush with Flexible Drive Shaft Driven by Main Motor**

### Motor Output

- **Saw Blade**: 2.2 kW (3 HP)
- **Hydraulic**: 0.75 kW (1 HP)
- **Coolant Pump**: 0.1 kW (1/8 HP)

### Tank Capacity

- **Hydraulic**: 20 L (5.0 gal.)
- **Coolant**: 38 L (9.5 gal.)

### Feeding Mode

- **Hydraulic with Full Stroke Cylinder**
- **Single Stroke**: 3,600 mm (141.7")
- **Multi Stroke**: 3,600 mm (141.7")

### Workbed Height

550 mm (21.7")

### Weight

- **Net:** 1400 kg (3080 lbs)
- **Gross:** 1600 kg (3520 lbs)

### Floor Space (L x W x H)

2100 x 2150 x 1800 mm (71.1" x 84.6" x 70.9")

### Capacity

- **280 x 250 mm (11" x 10") (H x W)**
- **250 x 250 mm (10" x 10") (H x W)**
- **250 mm (10") (W)**
MACHINE PARTS IDENTIFICATION

Machine side view

Coolant pump
Cleaning Hose

Roller Table (Optional)
Vertical Alignment Roller
Workbed Feed Roller
Gear Reducer

Machine front view

Blade Guide Arm
Front View Bed
Quick Approach Bar
Electrical Compartment
Front View Cylinder

Drive Wheel
Chip Conveyor
Electrical Panel with
Tube Control Valve
Controller
Machine top view

Chip Conveyor (optional)
Blade Motor
Rear Vise Feed Cylinder
Length Setting Stopper
Rear Vise Assembly
Rear Vise Cylinder
Control Panel
Table
Discharge
For your safety, please read all information regarding installation before proceeding.

Install your machine in a place satisfying all of the following conditions:

- Space:
  - Leave enough free space around the machine for loading work and unloading cut-off pieces as well as for maintenance and inspection. Refer to Section 2 General Specifications for machine dimensions and floor space.
  - Leave enough free space for loading work and unloading cut-off pieces as well as for maintenance and inspection. Refer to Section 2 General Specifications for machine dimensions and floor space.

- Environment:
  - Well lighted (500 lumens minimum).
  - Floor kept dry at all times in order to prevent operators from slipping.
  - Well lighted (500 lumens minimum).

- Limit the operation area of the machine to staff only.

- Both machine and material weight.

- Avoid uneven ground. Choose a solid level concrete floor which can sustain weight of installation and machine.

- Away from powders or dusts emitted from other machines.

- Away from vibration of other machines.

- Humidity level kept at 30%~95% (without condensation) to avoid dew on electric installation and machine.

- Room temperature between 5°C to 40°C.

- Away from direct exposure to the sunlight.

- Floor kept dry at all times in order to prevent operators from slipping.

- Away from direct exposure to the sunlight.

- Limit the operation area of the machine to staff only.

- Both machine and material weight.

- Avoid uneven ground. Choose a solid level concrete floor which can sustain weight of installation and machine.

- Away from powders or dusts emitted from other machines.

- Away from vibration of other machines.

- Humidity level kept at 30%~95% (without condensation) to avoid dew on electric installation and machine.

- Room temperature between 5°C to 40°C.

- Away from direct exposure to the sunlight.

- Floor kept dry at all times in order to prevent operators from slipping.

- Limit the operation area of the machine to staff only.

- Both machine and material weight.

- Avoid uneven ground. Choose a solid level concrete floor which can sustain weight of installation and machine.

- Away from powders or dusts emitted from other machines.

- Away from vibration of other machines.

- Humidity level kept at 30%~95% (without condensation) to avoid dew on electric installation and machine.

- Room temperature between 5°C to 40°C.
UNPACKING & INSPECTING

- Unpack your machine carefully to avoid damage to machine parts or surfaces.
- Upon arrival of your new band saw, please confirm that your machine is the correct model and it comes in the same specification you ordered.
- Pay special attention to machine surface, equipment furnished, and the electrical and hydraulic systems for damaged cords, hoses and leaks.
- It is also imperative that a thorough inspection be undertaken to check for any damage that could have occurred during shipping.
- Upon arrival of your new band saw, please confirm that your machine is the correct model and it comes in the same specification you ordered.
- Should you find any missing accessories, please contact your local agent immediately.

<table>
<thead>
<tr>
<th>Qty</th>
<th>Accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operation manual</td>
</tr>
<tr>
<td>1 pc</td>
<td>Chip blade (only for manual models)</td>
</tr>
<tr>
<td>1 set</td>
<td>Hexagon wrench</td>
</tr>
<tr>
<td>3 pcs</td>
<td>Open-ended spanner</td>
</tr>
<tr>
<td>2 pcs</td>
<td>Screwdriver (+,-)</td>
</tr>
<tr>
<td>1 pc</td>
<td>Grease gun</td>
</tr>
<tr>
<td>1 pc</td>
<td>Tool box</td>
</tr>
<tr>
<td>1 pc</td>
<td>Chip spade (only for manual models)</td>
</tr>
</tbody>
</table>
When moving the machine, we strongly suggest you choose any one of the methods described below.

1. Use a Crane

2. Lift the machine well balanced during lifting.

3. Keep the machine from impact or shock during this procedure. Also watch out your own fingers when moving your machine.

4. Apply the wire rope sling to the lifting hooks on the four ends of the machine. Refer to Illustration: Lifting Points for exact locations.

5. Slowly lift the machine; be sure to protect the machine is likely to damage the machine if not performed properly.

When you work together with more than two people, it is best to keep constant verbal communication with each other.

Interfere with the saw frame.

When moving your machine, you must use tools and equipment with the proper tensile strength and use proper method to perform the job.

If not performed properly, machine lifting is likely to damage the machine.
2. Use a forklift

Most users choose this method to move their machine because it is easy to set up. Make sure that the lifting rod can fully withstand the weight of the machine. (Refer to Section 2 – General Information for Specifications.)

It is not performed properly.

Machine lifting is likely to damage the machine.

You must keep the machine balanced at all times.

You must apply proper forklift technique to avoid damage to the machine.

You must have a qualified forklift operator to perform the job.

You must use rolling cylinders made in material of proper compressive strength.

You can use rolling cylinders to move your machine in a small machine shop environment.

3. Use rolling cylinders

Before use.

Make sure the forks are centered.

You must keep the machine balanced at all times.

Make sure the forks are able to reach in at least 2/3 of the machine depth.

Illustration only.

Machine lifting is likely to damage the machine.
Total number of wire ropes required: 4
Minimum weight capacity for each wire rope: 2 ton
After the machine has been properly positioned, remove the shipping bracket that is used to lock the saw frame and the saw bed. Retain this bracket so that it can be used again in the event that your machine must be relocated.

Cleaning

Do not remove the rust-preventive grease with a metal scraper and do not wipe the painted surfaces with solvents. Do not remove the rust-preventive grease with a metal scraper and do not wipe the painted surfaces with solvents. Apply machine oil to machine surfaces that are prone to rust.

Installing

Supply hydraulic oil

Supply cutting fluid

Connect electric power

Leveling & Anchoring

Install fire control device

Install roller table (optional)

After the machine has been placed at the designated position, remove the rust-preventive grease that has been applied to the machine.

Removing shipping bracket

After the machine has been properly placed, if it is a new machine, the oil tank should be full already. If not, fill the tank completely. Check the sight gauge to make sure the oil level in the tank is above 2/3 or full level. Open the filler cap and fill the hydraulic oil tank to supply hydraulic oil.
Suppling coolant

Supply coolant to the middle level of the sight gauge by pouring the coolant from above the chip conveyor. Use the sight gauge to check the coolant level remaining in the tank.

Always check the coolant supply before starting the machine. If the coolant pump is started without enough coolant supply in the tank, the pump and its drive motor may be damaged. Always check the coolant supply before starting the machine. Always check the coolant supply before starting the machine. If the coolant supply in the tank is started without enough coolant supply, the machine may be damaged.

Connecting electric power

Have a qualified electrician make the electrical connections. Refer to specification chart under Section 2 for the total electric power consumption of the motor and make sure your shop's circuit breaker is capable of this consumption amount. Also use a power supply cable of proper size to suit the power supply voltage. Refer to the specification chart under Section 2 for total electric power consumption of the motors and make sure your shop's circuit breaker is capable of this consumption amount. Also use a power supply cable of proper size to suit the power supply voltage. Power supply voltage: 99% - 110% of nominal supply voltage.

Ground the machine with an independent grounding conductor.

If the power supply voltage is different from the transformer and motor connection voltage shown on the label attached to the electrical compartment of the machine, contact COSEN or your agent immediately. Have a qualified electrician make the electrical connections.

Consult your coolant supplier for bandsaw use regarding coolant type and mixing ratio. Consult your coolant supplier for bandsaw use regarding coolant type and mixing ratio. Use the sight gauge to check the coolant level remaining in the tank.

Supply coolant to the middle level of the sight gauge by pouring the coolant from above the chip conveyor.

Source frequency: 99% - 101% of nominal frequency.

Supply voltage: 90% - 110% of nominal supply voltage.

Electric installation from working properly.

Consult your coolant supplier for bandsaw use regarding coolant type and mixing ratio.
1. Turn off the shop circuit breaker.

2. Make sure the machine circuit breaker switch on the electrical compartment door is turned to OFF.

3. Remove the screw securing the electrical compartment and then open the door.

4. Pull the power supply cable and grounding conductor through the power supply inlet into the electrical compartment (shown right).

5. Connect the power supply cable to the circuit breaker (N.F.B.) to the R, S and T terminals, and connect the ground cable to the E terminal.

6. Close the compartment door and fasten the screw.

7. Turn on the shop circuit breaker and then turn the emergency stop button back.

8. Indicator on the control panel will come on. Power supply inlet.

9. Make sure the sawing area is clear of any objects.

10. Repeat steps 6 to 9 to ensure the electrical connections are in the right order.

11. Power supply inlet.


13. Press the hydraulic ON button to start the hydraulic motor.

14. Turn clockwise to unlock the emergency stop button.

15. Indicator on the control panel will come on.

16. Disconnect the emergency stop switch from power circuit breaker switch to ON. The machine circuit breaker switch is recommended to OFF. Power Supply Inlet.

17. Turn on the hydraulic motor.

18. Place spirit level on the vise slide plates and the work table.

19. Level the machine in both directions i.e. along and across.

20. Make sure all leveling bolts evenly support the machine weight.
Anchoring

Normally there is no need to anchor the machine. If the machine is likely to vibrate, fix the machine to the floor with anchor bolts. Shock absorption steel plates are provided and can be placed under each leveling bolt to prevent their sinking into the concrete floor.

Installing roller table (optional)

The roller table is used to support long material at the rear and/or the front of the machine.

If you have ordered the optional roller table for cutting long material, position it before or behind the machine.

Level the roller table and the stand with the machine by adjusting the leveling bolts.

Installing Fire Control Device

Install a fire extinguisher or any other fire control device in the shop in case a fire breaks out.

We recommend you follow these procedures when relocating or shipping your machine to other place:

1. Descend the saw frame to its lowest position then turn off the power.
2. Fix the saw frame using the shipping bracket that originally came with the machine.
3. If you are shipping the machine, pack the machine carefully with industrial plastic wraps to protect it from dust.
4. Place the machine on a crane or fork lift to raise it. If a crane is used to lift the machine, ensure that the lifting cable is properly attached to the machine.
5. Do not forget to include the equipment originally furnished including the shock absorption steel plates and the instruction manual.

RELOCATING
OPERATING INSTRUCTIONS

SAFETY PRECAUTIONS

BEFORE OPERATING

CONTROL PANEL

STANDARD ACCESSORIES

OPTIONAL ACCESSORIES

UNROLLING & INSTALLING THE BLADE

BREAKING IN THE BLADE

ADJUSTING WIRE BRUSH

ADJUSTING COOLANT FLOW

ADJUSTING BLADE SPEED

ADJUSTING SAW ARM

STARTING AN AUTOMATIC OPERATION

USING TOP CLAMP FOR BUNDLE CUTTING

TEST-RUNNING THE MACHINE

POSITIONING WORKPIECE FOR CUTTING

PLACING WORKPIECE ONTO WORKBED

TERMINATING A CUTTING OPERATION

TERMINATING A CUTTING OPERATION

INSTUMENTS

OPERATING

Section 4
SAFETY PRECAUTIONS

For your safety, please read and understand the instruction manual before you operate the machine.

The operator should always follow these safety guidelines:

1. Do not remove jammed or cut-off pieces until the blade has come to a full stop.
2. Do not take your eyes off the machine while in operation.
3. Do not operate the machine while under the influence of drugs, alcohol or medication.
4. Wear protective gloves only when changing the blade.
5. Disconnect machine from the power source before making repairs or adjustments.
6. Remove these devices.
7. Protection devices should be in place at all times. For your own safety, never remove them.
8. Keep fingers away from the path of the blade.
9. Do not wear gloves, neckties, jewelry or loose clothing/hair while operating the machine.
10. The machine should only be used for its designated purpose.

The operator should always follow these safety guidelines:

1. Do not place warning signs to mark out machine work zone and restrict entry to be
2. Do not operate the machine while under the influence of drugs, alcohol or medication.
3. For eye protection, always wear protective safety glasses.
4. Check the blade tension and adjust blade guides before starting the machine.
5. Use auxiliary clamping or supporting devices to fix material in place before cutting.
6. Place warning signs to mark out machine work zone and restrict entry to be.
BEFORE OPERATING

Choosing an appropriate saw blade and using the right cutting method is essential to your cutting efficiency and safety.

Select a suitable saw blade and cutting method based on your work material, cutting accuracy, cutting speed, economic concern, and safety control.

Wet Cutting

If you choose dry cutting or low-speed cutting, the chips may accumulate in machine parts and may cause operation failure or insulation malfunction. We suggest you choose wet cutting to avoid machine damage.

Cutting unknown materials

Before cutting an unknown material, consult the material supplier, burn a small amount of chips from the material in a safe place, or follow any other procedure to check if the material is flammable.

Consult your coolant supplier for bandsaw use regarding coolant type and mix ratio.

Always add coolant into water for better mix result.

Never use water as your coolant.

The following table lists out its pros and cons for your reference.

<table>
<thead>
<tr>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td> Have a high cooling effect</td>
<td></td>
</tr>
<tr>
<td> Economical</td>
<td></td>
</tr>
<tr>
<td> Does not require cleaning of the cut</td>
<td></td>
</tr>
<tr>
<td> Not flammable</td>
<td></td>
</tr>
<tr>
<td> Remove machine paint</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td> Lose its rust protection effect if deteriorated</td>
<td></td>
</tr>
<tr>
<td> Tend to create foam</td>
<td></td>
</tr>
<tr>
<td> Subject to decay</td>
<td></td>
</tr>
<tr>
<td> Subject to decay, depending on the quality of the water used for dilution</td>
<td></td>
</tr>
</tbody>
</table>

Never take your eyes off the machine while in operation.

The fluid level in the sight gauge, please refer to machine specifications in this manual before starting a cutting job, make sure there is sufficient amount of coolant in the tank.

Consult your coolant supplier for bandsaw use regarding coolant type and mix ratio.

Always add coolant into water for better mix result.

Never use water as your coolant.

Cutting fluid

We recommend you use water-soluble cutting fluids.

The following table lists out its pros and cons for your reference.

<table>
<thead>
<tr>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td> Have a high cooling effect</td>
<td></td>
</tr>
<tr>
<td> Economical</td>
<td></td>
</tr>
<tr>
<td> Does not require cleaning of the cut</td>
<td></td>
</tr>
<tr>
<td> Not flammable</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td> Lose its rust protection effect if deteriorated</td>
<td></td>
</tr>
<tr>
<td> Tend to create foam</td>
<td></td>
</tr>
<tr>
<td> Subject to decay, depending on the quality of the water used for dilution</td>
<td></td>
</tr>
</tbody>
</table>

Never take your eyes off the machine while in operation.

The material in a safe place, or follow any other procedure to check if the material is flammable.
The control panel is located on the top of the electrical box. It includes the following functions:

- Power system
- Hydraulic system
- Cooling system
- Human-machine interface (HMI)

The operator must fully understand the function of each switch and button before operating the machine.
Control Buttons

When the lamp is on, it indicates the power to the machine is turned on.

1. POWER "ON" button indicator lamp
    Depressed this button the hydraulic motor and chip conveyor will start and the white light will come on.

When the hydraulic motor is ON, the chip conveyor will run at the same time, please keep your hands away from the chip conveyor.

2. POWER "OFF" button
    * Depressed this button the hydraulic pump motor and the built-in light will turn off.
    * Press to stop the hydraulic pump motor.

2. POWER "OFF" button
    * Depressed this button all of power will shut off and the whole machine operation stops immediately.

3. AUTO/Manual mode switch
    Use this switch to select between automatic and manual mode.

   • Manual mode switch
     Used to perform individual cutting jobs. When switched to the manual mode,

   • AUTO mode
     Used to automatically perform continuous cutting jobs. When switched to the AUTO mode, the machine will automatically operate according to the preset parameters.

4. BLADE DRIVE button
    When the VISE CLAMP SELECTOR \( [7] \) is turned to "I", the saw head will descend quickly before the limit switch of the quick approach device contacts with the workpiece. Therefore, the sawhead descends at the designated speed.

When the lamp is on, it indicates the power to the machine is turned on.
If the VISE CLAMP SELECTOR is turned to "", the blade motor will not operate at all even if this button is depressed.

5. RISE button
When this button is depressed, the blade motor will stop and the sawhead will rise. The sawhead will stop rising at the time when this button is released.

6. QUICK APPROACH button
This button is used to allow the sawhead to approach the workpiece quickly when the saw blade is at a distance from the workpiece. While this button is depressed, the sawblade descends quickly when the saw blade is at the workpiece. This button is used to allow the sawblade to approach the workpiece quickly when the saw blade is at the workpiece. The quick approach feeler may be damaged if the rear vise is moved with the work clamped and in contact with the quick approach feeler.

The quick approach feeler:
- Press to feed the stock forward.
- The rear vise can not be moved forward or backward when the blade motor is running.

8. REAR VISE FORWARD / BACKWARD selector
The forward and backward motion of the rear vise can be controlled by these two buttons after turning the AUTO / MANUAL SELECTOR to "". The motions of front vise and rear vise can be controlled as following.

FORWARD mode
- The rear vise moves forward.
- The front vise moves backward.
- The front vise closes and the rear vise opens.
- The front vise closes and the rear vise opens.
- The AUTO / MANUAL SELECTOR to ""

The button is engaged when " number 3 AUTO / MANUAL select switch is turned to "". The button is engaged when " number 3 AUTO / MANUAL select switch is turned to "".

FORWARD mode
- The front vise moves forward.
- The rear vise moves backward.
- The rear vise moves forward.
- The AUTO / MANUAL SELECTOR to "".
The rear vise cannot be moved either if the quick approach reeler is in contact with the work, or is raised and locked.
Press to feed the stock backward.

BACKWARD mode

The rear vise will not operate for safety measurement if button is pressed when the saw blade motor.

The rear vise cannot be moved backward if the front vise and rear vise are both closed. The rear
13. FEEDING TIMES selector

Depress the "-" type button at top or at under side for number changing. When this selector is pressed to "2", the rear vise performs a double (two-times) feeding of the workpiece. On this selector, the maximum cutting length is 3600 mm (141.7 in.) [400 mm x 9]. In addition, if cutting length is 1200 mm, then the feeding times should be set to "3". The maximum feeding times are "9".

The "CUTTING PIECES COUNTER" is turned "OFF" mode when the switch is turned to this mode, the "CUTTING PIECES COUNTER" is turned "ON". When the switch is turned to this mode, the "CUTTING PIECES COUNTER" is turned "OFF". When the switch is turned to this mode, the "CUTTING PIECES COUNTER" is turned "ON".

Fig 4-3. Feeding Times selector

Set value

Cut piece readout

Reset button (with lock)
The part of control panel is where cutting pressure and saw bow descend speed can be adjusted.

1. Cutting pressure control knob
   - This pressure control knob is used to adjust the cutting pressure of the blade.
   - Turning the knob clockwise increases the cutting pressure.
   - To obtain a good cutting result, choose the right cutting pressure by turning the knob until it points to your material on the color chart.

2. Blade descend speed control knob
   - This knob is used to adjust the descend speed of the saw blade.
   - Turning the knob clockwise increases the blade descend speed.
   - Blade descend speed is a determining factor to a good cutting time and quality cutoff surface.
   - Set the blade descend speed in accordance with the cutting pressure control knob.

STANDARD ACCESSORIES

Blade tension device
- This blade tension device equipped with hydraulic cylinder provides appropriate tension to the saw blade.
- To adjust the blade tension, turn the handle to release saw blade tension.
- The limit switch of the safety device can be reset by turning the blade tension selector to the sector to loosen the safety device to the saw blade.
- Upon saw blade breakage, the safety device will activate and immediately stop all machine operation.
- The limit switch of the safety device can be reset by turning the blade tension selector to the sector to loosen the safety device to the saw blade.

Never adjust blade tension while the blade is running.
Blade speed/motion detector
- Besides detecting the blade speed, the speed/motion detector also functions as a safety device. The specially designed gear reducer can work toward your preset blade speed and torque.

Quick approach device
- This device allows the blade to quickly descend to just right above the material to save you operation time.

Split front vises
- The split vises are a clever design to make sure your workpiece is tightly clamped by the two vises from both sides of the blade, maximizing stability and cutting precision.

Gear reducer
- Once blade breakage or slippage is detected, the drive wheel will stop in 10 seconds. The specially designed gear reducer can work toward your preset blade speed and torque.

Please refer to Section 6 for information on maintenance.
Coolant pump

When the hydraulic system is turned on, the coolant pump can be operated individually from the control panel. Coolant can be used to wash off chips as well as providing cooling during cutting.

OPTIONAL ACCESSORIES

Vise pressure regulator

- As a regular maintenance, remove the chip conveyor and clean all chip deposits inside.

Chip conveyor is a spiral device to bring chips out during cutting.

Vise pressure should never be lower than 8 kg/cm².

Pressure adjusting valve

Pressure gauge

Prevent external pressure from damaging the workpiece shape or exterior.

When cutting pipes or soft materials, reduce vise pressure to prevent vise pressure based on the material of your workpiece.

This adjustment valve is used to control vise pressure.

When the hydraulic system is turned on, the coolant pump can be operated individually from the control panel. Coolant can be used to wash off chips as well as providing cooling during cutting.
The optional 2M roller table supports the work material and ensures the material be fed in smoothly.

Refer to Section 6 for further information on adjusting the roller table.

Unrolling the blade

Please follow the procedures illustrated below.

Always wear leather gloves and protective glasses when handling a blade.

UNROLLING & INSTALLING THE BLADE
Step 5 - Turn the tension controller handle from "Release Position" to "Tension Position" to release tension. The idle wheel will then move slightly toward the direction of the drive wheel.

Step 6 - Remove the blade safety cover and open the idle and drive wheel covers.

Step 7 - Press the blade clip device to hold onto the blade. This device makes blade changing easy and feasible even with only one operator available.

Step 8 - Loosen the left and right carbide inserts by loosening the "lock nut" shown below. Easy Blade Replacement Device

Step 9 - Open the wire brush cover. Loosen the lock lever and lower the wire brush.

Step 10 - Remove the old blade. If necessary, clean the carbide inserts before installing a new saw blade.

Step 11 - Place the new blade around the idle wheel and the drive wheel. If necessary, clean the carbide inserts before installing a new saw blade.

Step 12 - Insert the blade into the left and right tungsten carbide inserts. The back and the sides of the blade need to be touching the inserts as well as the adjacent rollers.

Step 13 - Place the blade to the drive wheel and press the back of the blade against the flange of the drive wheel. Use the blade clip device to tightly hold the blade from falling out of the drive wheel.
When saw blade begins to rotate, the blade holder will automatically release the blade and fall back to its original position.

Step 14 - Make sure the back of the blade is also pressed against the flange of the idle wheel.

Step 15 - Turn the tension controller handle to the [ ] position to obtain blade tension.

Step 16 - Make sure the sides of the blade are in close contact with the carbide inserts and then tighten the left and right carbide inserts by tightening the “lock nut.”

Step 17 - Gently close the idle and drive wheel covers. When saw blade begins to rotate, the blade holder will automatically release the blade.

Step 18 - Press the saw blade start button to start the blade. Allow the blade to run for a few rotations, then press the saw bow up button to elevate the saw bow. Open the wheel covers.

Step 19 - Adjust wire brush to a proper position. Refer to Adjusting Wire Brush in this section.

Step 20 - After the break-in operation is completed, set all parameters back to normal settings.

Step 21 - The break-in operation can be considered sufficient if all the unusual noises or metallic sounds have been eliminated.

Step 22 - Lengthen the cutting time to 2-3 times of what is normally required.

BREKKING IN THE BLADE

When a new saw blade is used, be sure to first break it in before using it for actual, extended operation. Failure to break in the blade will result in less than optimum efficiency. To perform this operation, follow the instructions below:

Step 1 - Reduce the blade speed to one-half of its normal setting.

Step 2 - Lengthen the cutting time to 2-3 times of what is normally required.

Step 3 - The break-in operation can be considered sufficient if all the unusual noises or metallic sounds have been eliminated.

Step 4 - After the break-in operation is completed, set all parameters back to normal settings.

ADJUSTING WIRE BRUSH

Follow these steps to adjust wire brush to appropriate position:

Step 1 - Open the drive wheel cover.

Step 2 - Loosen the lock lever and the wire brush cover.

Step 3 - Move brush up/down until it makes proper contact with the saw blade (see below).

Step 4 - Reinstall the wire brush cover and tighten the lock lever.
Step 1 – Press the saw blade start button to start the saw blade drive motor.

Step 2 – Press the saw bow down button to lower the saw bow.

Step 3 – Use the flow control valve (shown below) to adjust the amount of fluid flowing to the cutting area.

Adjust the flow amount if you observe the following changes to the chips generated from cutting:

- If the chips are granulated, decrease the coolant flow amount.
- If the chips are sharp and curved, increase the coolant flow amount.

Adjusting Coolant Flow

Step 4 – Loosen the inserts by unlocking the lock nut.

Adjust the blade guide (guide arm) position based on the size of your workpiece:

Step 5 – Close the drive wheel cover.

Adjusting Saw Arm

Improper

Proper

Lock Lever
Step 1 – Press the saw bow up button and elevate the saw bow until it reaches to its highest point.

Step 2 – Manually lift up the paws and fully open the front and rear vises.

Step 3 – Loosen the vertical roller lock handles and fully open the vertical rollers.

Step 4 – Carefully place the workpiece onto the work feed table to where it extends approximately 30mm (1.2 inch) beyond the rear vise toward the front vise.

Step 2 – Loosen the blade guide locking lever. Then adjust the guide arm to a position suitable for your workpiece size.

Step 3 – After adjustment is made, tighten the blade guide locking lever.

Step 4 – Clamp the inserts back by tightening the lock nut.
Follow these steps to position your workpiece:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear vises clamp material. Turn the vise clamp switch to the left to open the rear vise. Push up the quick approach bar so it is just above the height of the workpiece. Under no circumstances should the quick approach bar be lowered below the height of the workpiece. Turn the feed forward button until the rear vise touches the front limit switch. Press the feed backward button to lower the saw bow until the rear vises retract to clamp material again.</td>
</tr>
<tr>
<td>2</td>
<td>Align vertical rollers. Press the feed forward button (and the feed backward button if necessary) until the cutoff point on the workpiece aligns with the blade line.</td>
</tr>
<tr>
<td>3</td>
<td>Feed material forward. Press the feed forward button until the rear vise touches the rollers by lifting the lock handles. Move the vertical alignment rollers toward the workpiece until it is flush against the rear vise. Lift up the pawl and manually position the rear vise. Turn the vise clamp switch to the left to open the rear vise.</td>
</tr>
<tr>
<td>4</td>
<td>Lift up the pawl and manually position the front vise so it is just above the height of the workpiece. Under no circumstances should the quick approach bar be lowered below the height of the workpiece. Press the feed forward button (and the feed backward button if necessary) until the workpiece is correctly positioned. Turn the vise clamp switch to the right to secure the vise clamp.</td>
</tr>
<tr>
<td>5</td>
<td>Turn the vise clamp switch to the left to open the rear vise.</td>
</tr>
<tr>
<td>6</td>
<td>Precision position. Press the feed forward button (and the feed backward button if necessary) until the workpiece is securely clamped by the rear vise.</td>
</tr>
<tr>
<td>7</td>
<td>Turn the vise clamp switch to the right until the workpiece is securely clamped by the front vise.</td>
</tr>
<tr>
<td>8</td>
<td>Confirm cutoff point. Press the saw bow down button to lower the saw bow until the quick approach bar descends to just about 10mm (0.4 inch) above the workpiece.</td>
</tr>
<tr>
<td>9</td>
<td>Precision position. Press the feed forward button (and the feed backward button if necessary) until the cutoff point on the workpiece aligns with the blade line.</td>
</tr>
<tr>
<td>10</td>
<td>Front vises clamp material. Turn the vise clamp switch to the left so the workpiece is securely clamped by the front vise.</td>
</tr>
</tbody>
</table>

Positioning Workpiece for Cutting
Test-running the machine

Testing machine performance:

1. Turn on the power and run a basic performance test after you finish installing the machine. Follow the following tests on the machine before first use:

- Feed forward and backward
- Saw bow ascending/descending
- Vice clamping/unclamping

2. Start the coolant pump.

3. Turn on the relay switch in the control box.

4. Elevate the saw bow. (If your coolant pump is in reverse and the machine cannot run, please change the electrical phase.)

5. After the saw bow ascends, extend the quick approach device.

6. Remove the rust-prevention grease with cleaning oil or kerosene.

Step 7 – Turn the coolant pump.

Step 8 – Test these functions under manual mode:

- Vise clamping/unclamping
- Saw bow ascending/descending
- Feed forward and backward

We suggest you run this machine can ensure good machine performance in the future.
CUTTING OPERATION

Step 1 – Check before you cut

- Power: Check the voltage and frequency of your power source.
- Coolant: Check if you have sufficient coolant in the tank.
- Hydraulic: Check if you have sufficient hydraulic oil.
- Pressure: Check the blade pressure and frequency of your power source.
- Cutter: Check the cutting conditions for different materials.
- Workpiece: Check all the rollers on the front and rear workbeds to roll smoothly.
- Laser: Check the work lamp or laser (optional) and make sure there is no worn out teeth along the blade.
- Light: Check if there is any object on the feeding bed that may cause interference.
- Roller: Check the saw bow to be elevated and lowered smoothly.
- Saw bow: Check the saw bow to see if it can be elevated and lowered smoothly.

Step 2 – Place your workpiece onto the workbed manually or by using a lifting tool or a crane.

Before loading, make sure the vises are opened to at least wider than the width of the workpiece.

Step 3 – Position your workpiece.

Step 4 – Clamp the workpiece.

Step 5 – Turn the cutting pressure control knob to adjust cutting pressure according to the material.

Step 6 – Adjust blade descend speed control knob to obtain a suitable blade descend speed for your material.

Step 7 – Start running the blade.

Before you start cutting, check again that there is no other object in the cutting area.

Step 8 – While the blade descends, adjust the blade speed if necessary. You can do so by turning the blade speed control knob, clockwise to speed up and counterclockwise to slow down. The blade speed is displayed in the HMI touch screen.

Step 9 – Select the proper cutting condition according to different materials.

Step 10 – After the entire cutting job is completed, elevate the saw bow to the top and open the vises to remove the workpiece.

Step 11 – Clean the workbed by removing chips and cutting fluids.

Step 12 – Lower the saw bow to a proper position then turn off the power.

Step 13 – Check before you cut.
STARTING AN AUTOMATIC OPERATION

Step 1:– Use manual mode and cut the edge of the workpiece by using the same procedures as those described under manual operation.

Step 2:– After the trim cut is completed and the saw blade has stopped at the lower limit position, press the saw blade start button and press the saw bow down button to start automatic cutting.

Step 3:– Turn the Auto/manual switch to Auto.

For example, when the required cutting length is 600mm, \( C = (600 - 1.6 \times 2) / 2 = 299.2 \) mm

\[
\frac{u}{1 - u} = \frac{C}{1 - \frac{t}{l}}
\]

where \( C = \) Value set on counter (mm),
\( u = \) Feeding times
\( l = \) Set with \( l \) mm
\( t = \) set value (mm)
\( l = \) Required cutting length (mm)

To determine the value to be set on the cutting length preset counter, be sure to use the following equation:

Step 4:– Turn the Auto/manual switch to manual.

Step 5:– Feed the workpiece forward to the required cutting position.

Step 6:– Clamp the workpiece.

Step 7:– Set the required cutting length on the cutting length preset counter using the following procedures:

1) Loosen the lock screw.
2) Turn the handwheel to set the required cutting length which was determined in step 4 above on the counter. When setting the required cutting length, be sure to turn the handwheel clockwise to prevent setting error due to backlash.
3) Tighten the lock screw.

Step 8:– If the required cutting length is more than 400mm (15.7”) Feed the workpiece twice by turning the feeding times button.

Procedures:

Step 3:– Turn the Auto/manual switch to manual.

Step 4:– Open the front vise.

Step 5:– Feed the workpiece toward to the required cutting position.

Step 6:– Clamp the front vise.

Step 7:– Approximately 1/4turn (0.4inch) above the workpiece press the saw blade down button to raise the saw bow until the quick approach bar is depressed under manual operation.

Step 2:– After the trim cut is completed and the saw blade has stopped at the lower limit position, use manual mode and cut the edge of the workpiece by using the same procedures as those described under manual operation.
Step 6 - Install the bundle-cutting fence to the work tray. The fence is designed to prevent cut pieces from flying out.

Step 5 - Turn the top clamp handles so that the clearance between the top clamp jaw and the top of the bundled workpiece is within 5 to 10 mm (0.2 ~ 0.4 in).

Step 4 - Align the top clamp cylinders with the center of the workpiece and tighten the lock nuts.

Step 3 - Position the workpiece for bundle cutting.

Step 2 - Connect the top clamp hoses to the pressure joints on the vise hydraulic cylinders.

Step 1 - Install stud bolts on the front and rear vises and position the top clamp.

To perform bundle cutting, use the top clamps and take the following installation procedure:

Proper and improper stacking of workpieces.

Proper:

Improper:

Specifications:

Note the allowable clamping width and height (Refer to Section 2 - General Information).
Step 7 – Press Single/Bundle Cutting Mode button and switch to bundle cutting mode.

Step 8 – For subsequent cutting procedures, refer to the instructions under manual operation and automatic operation.

Uninstalling Top Clamp for Cutting Single Material:

Step 1 – Disconnect the top clamp hoses.

Step 2 – Loosen the lock nuts and remove the top clamp.

Step 3 – Remove the stud bolts.

To terminate a cutting operation, press either the saw bow up button or the emergency stop button.

The saw blade will stop running when the saw bow up button is pressed.

Both the saw blade and hydraulic pump motors will stop running when the emergency stop button is pressed.

The machine will stop automatically when an error occurs.

TERMINATING A CUTTING OPERATION

STOP

- To terminate a cutting operation, press either the saw bow up button or the emergency stop button.

- The saw blade will stop running when the saw bow up button is pressed.

- Both the saw blade and hydraulic pump motors will stop running when the emergency stop button is pressed.

- The machine will stop automatically when an error occurs.

FROM SCATTERING ACROSS THE WORK TRAY, ADJUST THE WIDTH OF THE FENCE TO BE SLIGHTLY LARGER.
Section 5

5-2 Control Panel Layout
5-3 Circuit Board Layout
5-4 Power Supply Layout
5-5 PLC Input/Output Layout

Electrical Circuit Diagrams
Section 6

HYDRAULIC SYSTEM

HYDRAULIC CIRCUIT DIAGRAM
Section 7

BANDSAW CUTTING: A PRACTICAL GUIDE

SOLUTIONS TO SAWING PROBLEMS
Blade Break-In
Vise Loading
Saw Blade Selection
Introduction
INTRODUCTION

1. TPI: The number of teeth per inch as measured from gullet to gullet.

2. Band width: The wider the band saw blade, the more stability it will have.

3. Cutting edge material:

4. Set: The bending of a tooth to right or left to allow clearance of the back of the blade through the cut.

5. Width: The nominal dimension of a saw blade as measured from the lip of the tooth to the back of the band.

6. Thickness: The dimension from side to side on the blade.

7. Gullet: The curved area at the base of the tooth, the tooth tip to the bottom of the gullet is the gullet depth.

SAW BLADE SELECTION

1. Band length: The dimensions of the band will depend on the band saw machine that has been installed.

2. Band width: Please refer to Section 2 – General Information.

3. Cutting edge material:

4. Set: The bending of teeth to right or left to allow clearance of the back of the blade through the cut.

5. Width: The nominal dimension of a saw blade as measured from the lip of the tooth to the back of the band.

6. Thickness: The dimension from side to side on the blade.

7. Gullet: The curved area at the base of the tooth, the tooth tip to the bottom of the gullet is the gullet depth.

SAW BLADE SELECTION

1. Band length: The dimensions of the band will depend on the band saw machine that has been installed.

2. Band width: Please refer to Section 2 – General Information.

3. Cutting edge material:

4. Set: The bending of teeth to right or left to allow clearance of the back of the blade through the cut.

5. Width: The nominal dimension of a saw blade as measured from the lip of the tooth to the back of the band.

6. Thickness: The dimension from side to side on the blade.

7. Gullet: The curved area at the base of the tooth, the tooth tip to the bottom of the gullet is the gullet depth.

SAW BLADE SELECTION

1. Band length: The dimensions of the band will depend on the band saw machine that has been installed.

2. Band width: Please refer to Section 2 – General Information.

3. Cutting edge material:

4. Set: The bending of teeth to right or left to allow clearance of the back of the blade through the cut.

5. Width: The nominal dimension of a saw blade as measured from the lip of the tooth to the back of the band.

6. Thickness: The dimension from side to side on the blade.

7. Gullet: The curved area at the base of the tooth, the tooth tip to the bottom of the gullet is the gullet depth.

SAW BLADE SELECTION

1. Band length: The dimensions of the band will depend on the band saw machine that has been installed.

2. Band width: Please refer to Section 2 – General Information.

3. Cutting edge material:

4. Set: The bending of teeth to right or left to allow clearance of the back of the blade through the cut.

5. Width: The nominal dimension of a saw blade as measured from the lip of the tooth to the back of the band.

6. Thickness: The dimension from side to side on the blade.

7. Gullet: The curved area at the base of the tooth, the tooth tip to the bottom of the gullet is the gullet depth.
The main factor here is the contact length of the blade in the workpiece. If it is 4P, \( \frac{25.4}{4} \approx 6.35 \text{ mm} \), that is, one tooth is 6.35 mm. If it is 3P, \( \frac{25.4}{3} \approx 8.46 \text{ mm} \). If the number is small, it means that the tooth is large.

What is written as 3/4 is that it is a variable pitch of large (3) / small (4).

The saw blade must contact the cutting material at least two pitches. In the case of a thickness of 15 mm,

The position in which material is placed in the vise can have a significant impact on the cost per cut.

The surface conditions will also affect the cutting rate. If there are places on the surface of the material which are hard, a slower blade speed will be required or blade damage may result. If the material which are hard, a slower blade speed will be required or blade damage may result.

Tooth spacing is determined by the hardness of the material and its thickness in cross-section.

The material which are hard, a slower blade speed will be required or blade damage may result. The saw blade must contact the cutting material at least two pitches. In the case of a thickness of 15 mm,

The surface conditions will also affect the cutting rate. If there are places on the surface of the material which are hard, a slower blade speed will be required or blade damage may result. The saw blade must contact the cutting material at least two pitches. In the case of a thickness of 15 mm,
The following diagrams suggest some cost-effective ways of loading and fixturing. Be sure, regardless of the arrangement selected, that the work can be firmly secured to avoid damage to the machine or injury to the operator.

BladeBreak-In

1. Select the proper band speed for the material to be cut.

2. Reduce the feed force/rate to achieve a cutting rate 20% to 50% of normal (soft materials require a larger feed rate reduction than harder materials).

3. Begin the first cut at the reduced rate. Make sure the teeth are forming a chip. Small adjustments to the band speed may be made in the event of excessive noise/vibration. During the first cut, increase feed rate/force slightly once the blade fully enters the workpiece. With each following cut, gradually increase feed rate/force until a cutting rate is reached. Completing a proper break-in on a new band saw blade will dramatically increase its life.

The following diagrams suggest some cost-effective ways of loading and fixturing. Be sure, regardless of the arrangement selected, that the work can be firmly secured to avoid damage to the machine or injury to the operator.
BASIC MAINTENANCE

Basic maintenance requires the operator to perform it regularly. It is always easy and takes just a little effort to do the basic maintenance. But it always turns out to be a very essential process to assure the long life and efficient operation of the machine. Most of the necessary, some of the daily maintenance usually takes just a little time but will give remarkable results for the best performance and longer life of the band saw machine. A maintenance schedule is

INTRODUCTION

MAINTENANCE & SERVICE

Section 8
We suggest you do the maintenance on schedule.

**MAINTENANCE SCHEDULE**

**Before beginning a day's work**

1. Please check the hydraulic oil level. If oil level volume is below 1/2, please add oil as necessary. (Filling up to 2/3 level is better for system operation.)
2. Please check the cutting fluid level, adding fluid as necessary. If the fluid appears contaminated or deteriorated, drain and replace it.
3. Please check the saw blade to ensure that it is properly positioned on both the drive and idle wheels.
4. Please make sure that the saw blade is properly clamped by the left and right inserts.
5. Please check the wire brush for proper contact with the saw blade. Replace the wire brush if it is worn out.

**After ending a day's work**

1. Please remove saw chips and clean the machine with discharging the cutting fluid when work has been completed.

**Do not discharge cutting fluid while the saw blade is operating because it will cause severe injury on operator's hand.**

**Recommended Grease:**

- **Shell Alvana EP Grease 2**
- **Mobil Mobilplex 48**
- **Mobil Mobilplex 48 (600W Cylinder oil)**

**Every month**

- Please check the wire brush for proper contact with the saw blade. Replace the wire brush if it is worn out.

**Every three months**

- Replace the transmission oil after operating for three months (or 600 hours).

**Every three months**

- Replace the transmission oil after operating for three months (or 600 hours).

- **Recommended Grease:**
  - **Shell Alvana EP Grease 2**
  - **Mobil Mobilplex 48**

**Before beginning a day's work**

- Please apply grease to the following points:
  - I. Idle wheel
  - II. Drive wheel
  - III. Blade tension device

- Please apply grease to the following points:
  - I. Idle wheel
  - II. Drive wheel
  - III. Blade tension device
Every six months

1. Clean the filter of the cutting fluid.
2. Replace the transmission oil for every half of a year (or 1200 hours).
   - Recommended TRANSMISSION OIL
     - Omala oil HD220
     - Mobil comp 632 600W Cylinder oil
3. Replace the hydraulic oil.
   - Recommended HYDRAULIC OIL
     - Shell Tellus 27
     - Mobil DTE Oil Hydraulic 28

TERMINATING THE USE OF THE MACHINE

- Must be connected to earth.
- Avoid excessive deformation and vibration.
- Temperature:
  - Avoid exposing to direct sunlight or heat rays which can change the environmental corrosion gases and salt.
- Atmosphere: use a plastic canvas to cover machine to avoid excessive dust, acid fume.
  - Relative humidity: 30% ~ 95% (without condensation)
  - Ambient temperature: 5 °C ~ 40 °C
  - Turn off the power.

Generally, this machine will be stored on the following conditions in future:

STORAGE CONDITIONS

- Mobil comp 632 600W Cylinder oil
- Omala oil HD220
- Recommended TRANSMISSION OIL
  - Check the sight gauge to ascertain the transmission level
  - Every half of a year (or 1200 hours)
  - Replace the transmission oil
- I Clean the filter of the cutting fluid.
3. Drain all of the cutting fluid and oil off and carefully treat them to avoid pollution.

2. Turn off the stop circuit breaker switch before servicing the machine.

1. Turn off the stop circuit breaker switch before servicing the machine.

### Oil Recommendation for Maintenance

<table>
<thead>
<tr>
<th>Item</th>
<th>Method</th>
<th>Revolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dovetail guide</td>
<td>Keep grease covered. Antirust.</td>
<td>Daily</td>
</tr>
<tr>
<td>Roller bearing</td>
<td>Sweep clean and oil with lubricant.</td>
<td>Daily</td>
</tr>
<tr>
<td>Bed roller / surface</td>
<td>Sweep clean and oil with lubricant.</td>
<td>Monthly</td>
</tr>
<tr>
<td>Band wheel</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Blade tension device</td>
<td>Use grease gun, but not excess.</td>
<td>Monthly</td>
</tr>
<tr>
<td>Blade of bearing</td>
<td>Use grease gun, but not excess.</td>
<td>Monthly</td>
</tr>
<tr>
<td>Bed # A20</td>
<td>Oil with lubricant, but not excess.</td>
<td>Monthly</td>
</tr>
<tr>
<td>Dovetail guide</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Shell R2</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Light Hydraulic # 24</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Shell Tellus # 22</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Shell Mobil Gear # 630</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Shell Alvania EP Grease 2</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Shell Alvania EP Grease 2</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Shell Mobilux 32</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Mobil Mobilplex 48</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Mobil DTE oil Light Hydraulics</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Omala oil HD 220</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Mobil Gear 630</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Mobil Gear 630</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Omala oil HD 220</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Mobil Gear 630</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Omala oil HD 220</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Mobil Gear 630</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Omala oil HD 220</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Mobil Gear 630</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Mobil Gear 630</td>
<td>Oil with lubricant, but not excess.</td>
<td>Weekly</td>
</tr>
</tbody>
</table>
TROUBLESHOOTING

INTRODUCTION

All the machines manufactured by us pass a 48 hours continuously running test before shipping out and we are responsible for the after sales service problems during the warranty period if the machines are used normally. However, there still exist the some unpredictable problems which may disable the machine from operating.

We have accumulated enough experiences and technical data to handle all of the regular system troubles, the system troubles in this machine model can be classified into three types, namely GENERAL TROUBLES, MOTOR TROUBLES and BLADE TROUBLES. Although you may have other troubles which can not be recognized in advance, such as malfunctions due to the limited life-span of mechanical, electric or hydraulic parts of the machine, we have enough experiences and technical data to handle all of the regular system troubles. Moreover, our engineer department has been continuously improving the machines to prevent all possible troubles. We hope that you will give us your maintenance experience and ideas so that both sides can achieve the best performance.

Section 9

TRoubleshooting

RE-ADJUSTING THE ROLLER TABLE
SAWING PROBLEMS & SOLUTIONS
BLADE TROUBLES & SOLUTIONS
MOTOR TROUBLES & SOLUTIONS
MINOR TROUBLES & SOLUTIONS
GENERAL TROUBLES & SOLUTIONS
PRECAUTIONS
**PRECAUTIONS**

When an abnormality occurs in the machine during operation, you can do it yourself safely. If you have to stop machine motion immediately for parts exchanging, you should do so according to the following procedures:

- Press **HYDRAULIC MOTOR OFF** button or **EMERGENCY STOP** button.
- Open the electrical enclosure door.
- Turn off breaker.

*BEBEFORE ANY ADJUSTMENT OR MAINTENANCE OF THE MACHINE, PLEASE MAKE SURE TO TURN OFF THE MACHINE AND DISCONNECT THE POWER SUPPLY.*

---

### GENERAL TROUBLES AND SOLUTIONS

**DISCONNECT POWER CORD TO MOTOR BEFORE ATTEMPTING ANY REPAIR OR INSPECTION.**

### TROUBLE

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Probable Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor stalls</td>
<td>Reduced blade speed</td>
</tr>
<tr>
<td>Increased cutting time</td>
<td>Excessive head pressure</td>
</tr>
<tr>
<td>Cannot make square cut</td>
<td>Excessive blade speed</td>
</tr>
<tr>
<td>Dull blade</td>
<td>Dull blade</td>
</tr>
<tr>
<td>Guide rollers not adjusted properly</td>
<td>Guide rollers not adjusted properly</td>
</tr>
<tr>
<td>Rear vise jaw not adjusted properly</td>
<td>Rear vise jaw not adjusted properly</td>
</tr>
<tr>
<td>Improper blade selection</td>
<td>Improper blade selection</td>
</tr>
<tr>
<td>Abrading feed.</td>
<td>Abrading feed.</td>
</tr>
</tbody>
</table>

**SUGGESTED REMEDY**

- Refer to Operating Instructions “Belt Selection”.
- Refer to Operating Instructions “Blade Selection”.
- Refer to Operating Instructions “Power Supply”.
- Refer to Operating Instructions “Speed Selection”.
- Refer to Operating Instructions “Speed Selection”. Use special alloy blades. Consult your industrial distributor for recommendation on type of hardened material. (Consult your)
- Refer to Operating Instructions “Power Supply”.

---

**GENERAL TROUBLES AND SOLUTIONS**

**TURN OFF THE MACHINE AND DISCONNECT THE POWER SUPPLY. BEFORE ANY ADJUSTMENT OR MAINTENANCE OF THE MACHINE, PLEASE MAKE SURE TO**
## Minor Troubles & Solutions

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Probable Cause</th>
<th>Suggested Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saw blade motor does not run even though blade drive button is pressed.</td>
<td>Overload relay activated.</td>
<td>Reset.</td>
</tr>
<tr>
<td>Saw blade is not at forward limit position.</td>
<td>Motor overloaded.</td>
<td>Reduce motor load.</td>
</tr>
<tr>
<td>Motor will not start.</td>
<td>Magnetic switch open, or protector switch open.</td>
<td>Reset protector by pushing red button (inside electric box).</td>
</tr>
<tr>
<td>Low voltage.</td>
<td>Inspect all lead terminations on motor for loose or shorted connections.</td>
<td>Increase wire sizes, or reduce length of wiring.</td>
</tr>
<tr>
<td>Motor overloaded.</td>
<td>Incorrect fuses or circuit breakers.</td>
<td>Install correct fuses or circuit breakers.</td>
</tr>
<tr>
<td>Motor fails to develop full power. (Power output of motor decreases rapidly with decrease in voltage at motor terminals.)</td>
<td>Power line overloaded with lights, appliances and other motors.</td>
<td>Reduce the load on the power line.</td>
</tr>
<tr>
<td>Motor stalls (Resulting in blown fuses or tripped circuit breakers).</td>
<td>Short circuit in motor or loose connections.</td>
<td>Inspect all lead terminations on motor for loose or shorted connections.</td>
</tr>
<tr>
<td>Low voltage.</td>
<td>Inspect all lead terminations on motor for loose or shorted connections.</td>
<td>Increase wire sizes, or reduce length of wiring.</td>
</tr>
<tr>
<td>Motor overloaded.</td>
<td>Incorrect fuses or circuit breakers.</td>
<td>Install correct fuses or circuit breakers.</td>
</tr>
</tbody>
</table>

### Motor Troubles & Solutions

**Trouble**

**FORWARD button pressed SW FRAME reset.**

- Saw blade is not at forward limit position.
- Even though blade drive button is pressed, even though blade drive drive button does not run.
- Overload relay activated.
- Saw blade motor does not run.

**Trouble**

**MINOR TROUBLES & SOLUTIONS**
## Blade Troubles and Solutions

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Probable Cause</th>
<th>Suggested Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teeth strippage</td>
<td>Too few teeth per inch</td>
<td>Use finer tooth blade</td>
</tr>
<tr>
<td>Loading of gullets</td>
<td>Use coarse tooth blade or cutting lubricant.</td>
<td></td>
</tr>
<tr>
<td>Excessive feed</td>
<td>Decrease feed pressure.</td>
<td>Adjust saw guides.</td>
</tr>
<tr>
<td>Work not secured in vise</td>
<td>Clamp material securely.</td>
<td></td>
</tr>
<tr>
<td>Blade breakage</td>
<td>Teeth too coarse</td>
<td>Use a finer tooth blade.</td>
</tr>
<tr>
<td>Premature tooth wear</td>
<td>Not enough feed</td>
<td>Use finer tooth blade.</td>
</tr>
<tr>
<td>Dry cutting</td>
<td>Blade too coarse</td>
<td>Use cutting lubricant.</td>
</tr>
<tr>
<td>Too few teeth per inch</td>
<td>Use finer tooth blade.</td>
<td></td>
</tr>
</tbody>
</table>

Disconnect power cord to motor before attempting any repair or inspection.
<table>
<thead>
<tr>
<th>Sawing Problems and Solutions</th>
<th>Suggested Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sawing Problems</strong></td>
<td></td>
</tr>
<tr>
<td>1. <strong>Vibration during cutting</strong></td>
<td>Use blade with correct pitch suited to workpiece width</td>
</tr>
<tr>
<td>2. <strong>Short life of saw blade</strong></td>
<td>Replace worn saw blade</td>
</tr>
<tr>
<td>3. <strong>Failure to cut</strong></td>
<td>Perform break-in operation to workpiece width</td>
</tr>
<tr>
<td>4. <strong>Broken blade</strong></td>
<td>Use blade with correct pitch suited to workpiece width</td>
</tr>
<tr>
<td>5. <strong>Use of blade with incorrect pitch</strong></td>
<td>Replace blade</td>
</tr>
<tr>
<td>6. <strong>Excessive cutting rate</strong></td>
<td>Reduce cutting rate</td>
</tr>
<tr>
<td>7. <strong>Excessive material surface</strong></td>
<td>Soften material surface</td>
</tr>
<tr>
<td>8. <strong>Excessive wear material surface</strong></td>
<td>Replace with suitable workpiece</td>
</tr>
<tr>
<td>9. <strong>Improperly clamped workpiece</strong></td>
<td>Check and correct</td>
</tr>
<tr>
<td>10. <strong>Broken back-up roller</strong></td>
<td>Replace</td>
</tr>
<tr>
<td>11. <strong>Air in cylinder</strong></td>
<td>Bleed air</td>
</tr>
<tr>
<td>12. <strong>Non-water soluble cutting fluid used</strong></td>
<td>Replace</td>
</tr>
<tr>
<td>13. <strong>Insufficient or lean cutting fluid</strong></td>
<td>Add fluid or replace</td>
</tr>
<tr>
<td>14. <strong>Fluctuation of line voltage</strong></td>
<td>Stabilize</td>
</tr>
<tr>
<td>15. <strong>Adjustable blade guide too far from workpiece</strong></td>
<td>Bring blade guide close to workpiece</td>
</tr>
<tr>
<td>16. <strong>Loose blade guide</strong></td>
<td>Tighten</td>
</tr>
<tr>
<td>17. <strong>Blue or purple saw chips</strong></td>
<td>Reduce cutting rate</td>
</tr>
<tr>
<td>18. <strong>Accumulation of chips at inserts</strong></td>
<td>Clean</td>
</tr>
<tr>
<td>19. <strong>Broken back-up roller</strong></td>
<td>Replace</td>
</tr>
<tr>
<td>20. <strong>Use of non-specified saw blade</strong></td>
<td>Replace</td>
</tr>
<tr>
<td>21. <strong>Fluctuation of line voltage</strong></td>
<td>Stabilize</td>
</tr>
<tr>
<td>22. <strong>Improperly clamped by insert</strong></td>
<td>Adjust improperly clamped workpiece</td>
</tr>
<tr>
<td>23. <strong>Wear brush improperly positioned</strong></td>
<td>Increase clearance of saw blade to workpiece</td>
</tr>
<tr>
<td>24. <strong>Insufficient saw blade tension</strong></td>
<td>Increase speed of saw blade</td>
</tr>
<tr>
<td>25. <strong>Excessive saw head descending speed</strong></td>
<td>Reduce speed</td>
</tr>
<tr>
<td>26. <strong>Excessive saw head descending speed</strong></td>
<td>Reduce speed</td>
</tr>
<tr>
<td>27. <strong>Failure to break-in operation</strong></td>
<td>Perform break-in operation to workpiece width</td>
</tr>
<tr>
<td>28. <strong>Use of blade with incorrect pitch</strong></td>
<td>Use blade with correct pitch suited to workpiece width</td>
</tr>
<tr>
<td>29. <strong>Workpiece are not mounted properly</strong></td>
<td>Re-mount workpiece</td>
</tr>
<tr>
<td>30. <strong>Accumulation of chips on machine table</strong></td>
<td>Clean and adjust workpiece</td>
</tr>
<tr>
<td>31. <strong>Workpiece are not bundled properly</strong></td>
<td>Re-bundle workpiece</td>
</tr>
<tr>
<td>32. <strong>Back edge of blade touching wheel</strong></td>
<td>Move back edge of blade to obtain clearance</td>
</tr>
<tr>
<td>33. <strong>Flange are not mounted properly</strong></td>
<td>Change flange</td>
</tr>
<tr>
<td>34. <strong>Use of non-specified workpiece</strong></td>
<td>Replace with suitable workpiece</td>
</tr>
<tr>
<td>35. <strong>Workpiece of insufficient diameter</strong></td>
<td>Use other machine, suited for diameter of workpiece</td>
</tr>
<tr>
<td>36. <strong>Broken blade</strong></td>
<td>Replace</td>
</tr>
<tr>
<td>37. <strong>Use blade with correct pitch suited to workpiece width</strong></td>
<td>Use blade with correct pitch suited to workpiece width</td>
</tr>
<tr>
<td>38. <strong>Non-water soluble cutting fluid used</strong></td>
<td>Replace</td>
</tr>
<tr>
<td>39. <strong>Excessive cutting rate</strong></td>
<td>Reduce cutting rate</td>
</tr>
<tr>
<td>40. <strong>Excessive wear material surface</strong></td>
<td>Replace with suitable workpiece</td>
</tr>
<tr>
<td>41. <strong>Improperly clamped workpiece</strong></td>
<td>Check and correct</td>
</tr>
<tr>
<td>42. <strong>Wear brush improperly positioned</strong></td>
<td>Increase clearance of saw blade to workpiece</td>
</tr>
<tr>
<td>43. <strong>Insufficient saw blade tension</strong></td>
<td>Increase speed of saw blade</td>
</tr>
<tr>
<td>44. <strong>Excessive saw head descending speed</strong></td>
<td>Reduce speed</td>
</tr>
<tr>
<td>45. <strong>Excessive saw head descending speed</strong></td>
<td>Reduce speed</td>
</tr>
<tr>
<td>46. <strong>Failure to break-in operation</strong></td>
<td>Perform break-in operation to workpiece width</td>
</tr>
<tr>
<td>47. <strong>Use of blade with incorrect pitch</strong></td>
<td>Use blade with correct pitch suited to workpiece width</td>
</tr>
</tbody>
</table>

Follows: Other than this manual, the manufacturer also provides some related technical documents listed as **SAWING PROBLEMS AND SOLUTIONS**.
<table>
<thead>
<tr>
<th>#1. Heavy Even Wear On Tips and Corners of Teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Probable Cause:</strong></td>
</tr>
<tr>
<td>A. Improper break-in procedure.</td>
</tr>
<tr>
<td>B. Excessive band speed for the type of material being cut.</td>
</tr>
<tr>
<td>C. Low feed rate causes teeth to rub instead of cutting.</td>
</tr>
<tr>
<td>D. Hard materials being cut such as stainless and tool steels.</td>
</tr>
<tr>
<td>E. Insufficient sawing fluid due to inadequate supply.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Probable Cause: Improper Ratio and/or Improper Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Insufficient sawing fluid due to inadequate supply.</td>
</tr>
<tr>
<td>B. Hard materials being cut such as “Flame Cut Edge”.</td>
</tr>
<tr>
<td>C. Low feed rate causes teeth to rub instead of cutting.</td>
</tr>
<tr>
<td>D. Hard materials such as stainless and tool steels.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#20. Broken Band Shows A Twist In Band Length.</th>
</tr>
</thead>
<tbody>
<tr>
<td>#10. Heavy Wear On Both Sides Of Band</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>#15. Body Breaking – Fracture Traveling In An Angular</td>
</tr>
<tr>
<td>#14. Chipped Or Broken Teeth</td>
</tr>
<tr>
<td>#13. Butti Weld Breakage</td>
</tr>
<tr>
<td>#12. Heavy Wear On Both Sides Of Teeth</td>
</tr>
<tr>
<td>#11. Uneven Wear On Scoring On The Sides Of Band</td>
</tr>
<tr>
<td>#11. Uneven Wear On Tips and Corners Of Teeth</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#2. Wear On Both Sides Of Teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>#3. Wear On One Side Of Teeth</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#7. Chips Welded To Tooth Tips</th>
</tr>
</thead>
<tbody>
<tr>
<td>#6. Tooth Stripage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#9. Discolored Tips Of Teeth Due To Excessive Frictional Heat</th>
</tr>
</thead>
<tbody>
<tr>
<td>#8. Grooves Loading Up With Material</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#19. Used Band Is “Short” On The Tooth Edge</th>
</tr>
</thead>
<tbody>
<tr>
<td>#18. Broken Band Shows A Twist In Band Length.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#2. Wear On Both Sides Of Teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1. Heavy Even Wear On Tips and Corners Of Teeth</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#17. Band Is Twisted Into A “Figure 8” Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>#16. Body Breakage Or Cracks From Gullets</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#11. Uneven Wear On Scoring On The Sides Of Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>#10. Heavy Wear On Both Sides Of Band</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#12. Heavy Wear And/Or Swaginging On Back Edge</th>
</tr>
</thead>
<tbody>
<tr>
<td>#11. Uneven Wear On Scoring On The Sides Of Band</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#4. Chipped Or Broken Teeth</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>#5. Body Breakage Or Cracks From Back Edge</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>#15. Body Breaking – Fracture Traveling In An Angular</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>#11. Uneven Wear On Scoring On The Sides Of Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>#10. Heavy Wear On Both Sides Of Band</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#12. Heavy Wear And/Or Swaginging On Back Edge</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>#5. Body Breakage Or Cracks From Back Edge</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>#15. Body Breaking – Fracture Traveling In An Angular</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>#11. Uneven Wear On Scoring On The Sides Of Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>#10. Heavy Wear On Both Sides Of Band</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#12. Heavy Wear And/Or Swaginging On Back Edge</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>#5. Body Breakage Or Cracks From Back Edge</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>#15. Body Breaking – Fracture Traveling In An Angular</th>
</tr>
</thead>
</table>
9-7

9. Wear on both sides of teeth

Probable Cause:
A. Broken, worn or missing back-up guides allowing teeth to contact side guides.
B. Improper blade selection for application.
C. Improper break-in procedure.

#3. Wear on one side of teeth

Probable Cause:
A. Worn wheel flange, allowing side of teeth to contact wheel surface or improper tracking on machine head.
B. Loose or improperly positioned side guides.
C. Blade not perpendicular to cut.
D. Blade rubbing against cut surface on return stroke of machine head.
E. Improper break-in procedure.
F. Improper blade selection for application.

#4. Chipped or broken teeth

Probable Cause:
A. Improper break-in procedure.
B. Improper blade selection for application.
C. Handling damage due to improper opening of material.
D. Improper positioning or clamping of material.
E. Excessive feeding rate or feed pressure.
F. Hitting hard spots or hard scale in material.

E. Chip brush assembly, guards, etc.

#2. Wear on both sides of teeth

Probable Cause:
A. Broken, worn or missing back-up guides allowing teeth to contact side guides.
B. Improper side guides for band width.
C. Improper break-in procedure.
#5. Body Breakage Or Cracks From Back Edge
Probable Cause:
A. Insufficient sawing fluid due to inadequate supply.
B. Worn, missing or improperly positioned chip brush.
C. Improper band tension.
D. Improper band speed.
E. Notches in back edge from handling damage.
F. Insufficient back-up guide "preload" will cause back edge to work harden which results in cracking.

#6. Chips Welded To Tooth Tips
Probable Cause:
A. Improper feeding rate.
B. Excessive feed rate or feed pressure.
C. Improper pitch for cross sectional size of material being cut.
D. Improper positioning of material being cut.
E. Improper tooth pitch for cross sectional size of material being cut.
F. Insufficient sawing fluid due to inadequate supply.
G. Insufficient sawing fluid due to inadequate material being cut.
H. Hard spots in material being cut.
I. Band speed too slow for grade of material being cut.

#7. Tooth Strippage
Probable Cause:
A. Improper break-in procedure.
B. Worn, missing or improperly positioned chip brush.
C. Excessive feed rate or feed pressure.
D. Movement or vibration of material being cut.
E. Improper tooth pitch for cross sectional size of material being cut.
F. Insufficient sawing fluid due to inadequate supply, improper ratio and/or improper application.
G. Improper band speed.
H. Improper band tension.
I. Insufficient band feed-up guide "preload" will cause back edge of back-up guide to work harden which results in cracking.
J. Improper band tracking – back edge rubbing heavy.
K. Not enough band feed-up guide "preload" for correct band side to side track.
L. Improper band feed-up guide "preload" for correct band side to side track.
M. Excessive feed rate.
N. Improper band tracking – back edge rubbing heavy.
O. Improper band tension.
8. Gullets Loading Up With Material

Probable Cause:
A. Loose side guides.
B. Chipped, worn or defective side guides.
C. Band is rubbing on part of the machine.
D. Gullet arms spread to maximum capacity.
E. Accumulation of chips in side guides.

9. Discolored Tips Of Teeth Due To Excessive Frictional Heat

Probable Cause:
A. Insufficient sawing fluid due to inadequate supply.
B. Excessive band speed.
C. Improper ratio and/or improper application.
D. Insufficient sawing fluid due to inadequate supply.

10. Heavy Wear On Both Sides Of Band

Probable Cause:
A. Insufficient sawing fluid due to inadequate supply.
B. Excessive feeding rate.
C. Improper feeding rate.
D. Band installed backwards.

11. Uneven Wear Or Scratching On The Sides Of Band

Probable Cause:
A. Too fine of a tooth pitch – insufficient gullet capacity.
B. Excessive feeding rate producing too large of a chip.
C. Worn, missing or improperly positioned chip brush.
D. Insufficient sawing fluid due to inadequate supply.
#12. Heavy Wear And/Or Swagging On Back Edge
Probable Cause:
A. Excessive feed rate.
B. Excessive twist type of stress existed.
C. Guide arms spread too wide while cutting.
D. Excessive back-up guide „preload“. 

#13. Butt Weld Breakage – Fracture Traveling In An Angular Direction

Probable Cause:
C. Using too fine of a tooth pitch for the size of material.
B. Too slow of band speed.
A. Excessive feeding rate.

#14. Heavy Wear In Only The Smallest Gullets

Probable Cause:
C. Using too fine of a tooth pitch for the size of material.
B. Too slow of band speed.
A. Excessive feeding rate.

(see Observations #5, #15 and #16)

Probable Cause:
A. Any of the factors that cause body breaks can also cause butt weld breaks.

#15. Body Breaking – Fracture Traveling In An Angular Direction
Probable Cause:
A. Excessive twist type of stress existed.
B. Excessive back-up guide „preload“.
C. Improper band tracking – back edge rubbing.
D. Worn or defective back-up guides.

#12. Heavy Wear And/Or Swagging On Back Edge
#16. Body Breakage Or Cracks From Gullets
Probable Cause:
A. Side gullets are too tight – rubbing near back edge.
B. Worn band wheels causing uneven tension.
C. Guide arms are spread too far apart.
D. Excessive feeding rate.
E. Excessively worn teeth.
F. Excessively worn gullets.

#17. Band is Twisted Into A Figure „8“ Configuration
Probable Cause:
A. Excessive band tension.
B. Excessive „preload“ – band riding heavily against back-up guides.
C. Worn band wheels causing uneven tension.
D. Excessive feeding rate.
E. Guide arms are spread to maximum capacity.
F. Improper band tracking – back edge rubbing heavily.

#18. Used Band Is „Long“ On The Tooth Edge
Probable Cause:
A. Excessive „preload“ – band riding heavily against back-up guides.
B. Worn band wheels causing uneven tension.
C. Guide arms are spread to maximum capacity.
D. Excessive feeding rate.
E. Side gullets are too tight – rubbing near gullets.
F. Excessively worn teeth.

#19. Used Band Is „Short“ On The Tooth Edge
Probable Cause:
A. Excessive feeding rate.
B. Excessively worn gullets.
C. Guide arms are spread too far apart.
D. Excessive band tension.
E. Side gullets are too tight – rubbing near gullets.
F. Excessively worn teeth.

#19. Used Band Is „Short“ On The Tooth Edge
Probable Cause:
A. Excessive „preload“ – band riding heavily against back-up guides.
B. Worn band wheels causing uneven tension.
C. Guide arms are spread to maximum capacity.
D. Excessive feeding rate.
E. Side gullets are too tight – rubbing near gullets.
F. Excessively worn teeth.
Probable Cause:

A. Excessive band tension
B. Any of the band conditions which cause the band to be long (#18) or short (#19) on tooth edge.
C. Cutting a tight radius.

Adjusting the Roller Table

If the feeding table and the machine frame are not positioned under the horizontal balance, the loaded material may be going up gradually and affect the cutting effect.

Procedure:

1. Screw or loosen the adjusting bolt to attain the horizontal balance (leveling) between the roller table and the machine frame.
2. Ensure that the machine frame is not struck by the loaded material on the feeding table.
3. Check the leveling by the measuring tool.
4. After finished the adjusting, fix the roller table.

Measurement, Horizontal balance

Tool, measuring

To adjust:

If the feeding table suffers the huge stroke and the alignment is affected, follow the below procedure:

RE-ADJUSTING THE ROLLER TABLE

#20. Broken Band Shows A Twist In Band Length
Section 1

Warranty

New machines are warranted to be free from defects in workmanship and material for a period of one (1) year from the date of shipment by Seller. The warranty period is based on normal usage of two thousand eighty (2080) hours per year and is reduced proportionately for any excess usage.

Products, which under normal operating conditions in Buyer’s plant are defective in workmanship or materials or parts damaged by misuse, negligence or failure of Buyer to provide appropriate maintenance and service as stated in the operator’s manual or industry standard and normally acceptable practices, will be repaired or replaced at the option of Seller.

This warranty does not apply if the machine has been altered or modified without our prior written consent. Accessory equipment supplied with manufacturer’s parts to its products, even though defective, will not be covered by this warranty. The warranty available for all electrical components to the machine is voided if the voltage supplied to the machine is found to be outside the stated voltage of the machine by +/- 10% and/or grounded at machine.

Accessories Supplied with Manufacturer’s Equipment: The warranties available to the Buyer are those extended by the accessory manufacturer, if any. The warranty period is based on normal usage of the accessory equipment, if any, to the extent they are in force and effect. The warranties available to the Buyer are those extended by the accessory manufacturer, if any. The warranty period is based on normal usage of the accessory equipment, if any, to the extent they are in force and effect.

Electrical Equipment: The warranty available to the Buyer is for all electrical components to the Buyer’s equipment will be voided if the voltage supplied to the machine is found to be outside the stated voltage of the machine by +/- 10% and/or grounded at machine.

Accessories Supplied with Manufacturer’s Equipment: The warranties available to the Buyer are those extended by the accessory manufacturer, if any. The ACCESSORY MANUFACTURER’S WARRANTY, if any, is exclusive and is in lieu of all other warranties whether written, oral or implied.

The operator’s manual or industry standard and normally acceptable practices. The Seller will have no obligation to repair or replace perishable parts, or materials or parts damaged by misuse, negligence or failure of Buyer to provide appropriate maintenance and service as stated in the operator’s manual or industry standard and normally acceptable practices.

This warranty does not cover shipping freight charges for either the return of the defective part or for the shipping of the replacement or repaired part. This warranty does not apply if the machine has been altered or modified without our prior written consent.

The shipping of the replacement or repaired part will be repaired or replaced at the option of Seller. New machines are warranted to be free from defects in workmanship and material for a period of one (1) year from the date of shipment by Seller. The warranty period is based on normal usage of two thousand eighty (2080) hours per year and is reduced proportionately for any excess usage.

Warranty
The following table lists the common spare parts we suggest you purchase in advance:

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saw blade</td>
<td>Coolant tank leak-proof gasket</td>
</tr>
<tr>
<td>Wire brush</td>
<td>Duster seal</td>
</tr>
<tr>
<td>Belt</td>
<td>Bearings</td>
</tr>
<tr>
<td>Holders</td>
<td>Carbide inserts</td>
</tr>
<tr>
<td>Steel plates</td>
<td>Wire brush</td>
</tr>
<tr>
<td>Coolant tank filter</td>
<td>Saw blade</td>
</tr>
<tr>
<td>Oil seal</td>
<td>Steel plates</td>
</tr>
<tr>
<td>O-ring</td>
<td>Rubber washer</td>
</tr>
</tbody>
</table>

### Spare Parts Recommendations

#### PART LIST

**Spare Parts Recommendations**

**PARTS**

Section 10