



MULTI-FACE PLANER

PMA

OWNER'S MANUAL

MÁQUINAS PINHEIRO, LDA



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SYMBOLOLOGY

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SYMBOL EXPLANATION

Information



Paid attention



Cutter hand danger



hand danger



Hazard of impact



Electrical danger



Use eye protection



Use ear protection

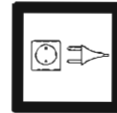




Use mask



Installation and adjustments



Maintenance's instruction



Repairer's instruction



Technical data



Telephone contact



Mail contact



Stipulate time period





GENERAL INFORMATION

III

7



PRODUCER:

Máquinas Pinheiro, LDA

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Portugal

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References

Designation: **Planer Matcher Moulder**

Model: **PMA5-510** (Outboard Bearing)

Machine n°: **1161**

Year of Manufacture: **2003**



GENERAL SPECIFICATIONS

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TECHNICAL DATA

TECHNICAL DATA	UNIT	PMA-2		PMA2-MS		PMA-4		PMA-2	
		510	860	510	860	510	860	510	860
Planing with	mm	0-510	0-860	0-510	0-860	45-490	45-840	45-490	45-840
Planing height	mm	0-260	0-260	12-260	12-260	12-205	12-205	12-205	12-205
Max. cutting width	mm			490	840			210	210
Max. cutting height	mm			120	120			55	55
Max. chip removal at.	Bottom arbor	mm	12	12	12	12	12	12	12
	Top arbor	mm	15	15	15	15	15	15	15
	Vertical right arbor	mm	12	12	12	12	12	12	12
	Vertical left arbor	mm	15	15	15	15	15	15	15
Max. profile depth at.	Bottom arbor	mm	13	13	13	13	13	13	13
	Top arbor	mm	40	40	40	40	40	40	40
	Vertical right arbor	mm	40	40	40	40	40	40	40
	Vertical left arbor	mm	40	40	40	40	40	40	40
Min. stock length	Intermittent feed	mm	415	415	415	415	415	415	415
	Continuous feed	mm	180	180	180	180	180	180	180
Variable feed speed	m/min	7-40	7-40	7-40	7-40	7-40	7-40	7-40	7-40
Speed	Horizontal arbors	r.p.m	5300	5300	5300	5300	5300	5300	5300
	Vertical arbors	r.p.m					5300	5300	5300
	Saw arbor	r.p.m			2300	2300			5300
Cutting circle	mm	140	140	140	140	140	140	140	140
Max. cutting circle at vert. tools	mm					220	220	220	220
Vertical arbor diameter	mm					40	40	40	40
Vertical arbor diameter	mm			60	60			60	60
Saw arbor diameter	mm			75	80			75	75
Saw sleeve diameter	mm			100	110			100	100
Saw spacers diameter	mm			200-400	200-400			150-200	150-250
Saw blades diameter	mm	140	140	140/160	140/160	140	140	140	140
Top feeding rolls - Quant.		4	4	7/8	7/8	4	4	4	4
Bottom feeding rolls diameter	mm	112	112	112	112	112	112	112	112
Bottom feeding rolls - Quant.		3	3	3	3	3	3	3	3
5th arbor travelling	Horizontal	mm						25	25
	Vertical	mm						80	80
Knives per cutterhead		4/6	4/6	4/6	4/6	4/6	4/6	4/6	4/6
Knives dimension	Horizontal - 510	mm	3x35x520		3x35x520		3x35x520		3x35x520
	Horizontal - 860	mm		3x35x870		3x35x870		3x35x870	3x35x870
	Vertical	mm					3x35x210	3x35x210	3x35x210
Motor	Bottom arbor	Kw/Cv	7,4/10	7,4/10	7,4/10	7,4/10	7,4/10	7,4/10	7,4/10
	Top arbor	Kw/Cv	10/15	10/15	10/15	10/15	10/15	10/15	10/15
	Vertical arbors	Kw/Cv					5,5/7,5	5,5/7,5	5,5/7,5
	Saw arbors	Kw/Cv			37/50	37/50			
	5th arbor	Kw/Cv							5,5/7,5
	Feeding	Kw/Cv	4/5,5	4/5,5	4/5,5	4/5,5	4/5,5	4/5,5	4/5,5
	Height adjustment	Kw/Cv	0,55/0,75	0,55/0,75	0,55/0,75	0,55/0,75	0,55/0,75	0,55/0,75	0,55/0,75
Net weight	Kg	3.250	3.550	5.250	5.850	3.750	4.150	4.150	4.650
Gross weight	Kg	3.500	3.800	5.500	6.100	4.000	4.400	4.400	4.900

Subject to technical alterations



INTRODUCTION TO THE MANUAL



This manual is designed to instruct you and your staff in the proper operation of your machine. It will help you company achieve maximum results in the areas of safety, production, and long term performance of the machine. It is important to remember that the best built machine will perform only as well as the who operate and service it.

In order to achieve quality machine performance it is crucial that machine operators and service technicians thoroughly understand all the individual machine systems and their interaction.

1. Be thoroughly trained by designated PINHEIRO technicians;
2. Keep the machine and the area around it very clean;
3. Lubricate the machine at designated intervals;
4. Maintain accurate lubrication and maintenance records,
5. Keep the machine in good repair using quality parts only;
6. Keep the knives and tooling sharp and in balance;
7. Keep the machine properly;

If these basic guidelines are followed regularly, the performance of this machine will be greatly enhanced.


It is the intent of the manufacturer, Pinheiro machinery and the distributor, that this machine serve your company to the fullest extent of its design. Please read this entire manual carefully and follow the practices set forth in it. Do not hesitate to call our service department at anytime if you have questions or if you need assistance.

We are here to serve each and every one of our valued customers!

	<p align="center">HOW TO USE THIS MANUAL</p>	<p align="center">VI</p>	<p align="center">10</p>
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HOW INTERPRETER THIS MANUAL



Logo	Description	Section	Page
↓	↓	↓	↓
	<p align="center">GENERAL INFORMATION</p>	<p align="center">III</p>	<p align="center">10</p>

Manual Ref.	Machine designation	Version Date
↓	↓	↓
<p align="center">PMA2/4(I)</p>	<p align="center">PMA</p>	<p align="center">01/00</p>

**HOW TO USE THIS MANUAL**

This Operator's Manual has been designed to cover all of the PINHEIRO series of Planer/Molders and Planer/Ripsaws. You will sometimes find information that may not pertain to your exact model, but you can quickly pass over it and go on to the next area that requires your attention.

If you will take the time to carefully and thoroughly review this entire manual, away from the machine, to familiarize yourself with all of the machines systems and proper set up, operating and maintenance procedures, you will most likely find that the initial start up of your new machine will happen more smoothly and more SAFETY. After your total review of this manual, go to the machine with the manual and again go through the entire manual. This time, compare all of the descriptions and illustrations to the actual machine parts and systems. This intelligent approach will minimize the chance to damage the machine or cause bodily injury during the initial set up, start up and operation.

This manual is broken down into several sections, as detailed on the table of contents page. It includes much information covering basic, and well proven, planing and molding and general woodworking procedures. Once you have covered the general areas, you will find that the actual machine sections are broken down into modules. Since all of these machines are modular in design, as well as expandable, this has proven to be the best approach.

Since every series of machines is built on a basic 2 head double surfacer, the machine section begins by covering the double surfacer model. From there, the side head module, profile spindle module, gang saw module, etc., are covered. Remember, investing the time to familiarize yourself with as much information as possible will make you a more knowledge able, more valuable and SAFER machine operator.

We have worked long and hard in an attempt to create an Owner's Manual that will serve each of our customers needs, from the one man shop to the 1000 employee manufacturing facility. This was a very difficult challenge, since we have such a wide variety of customers, who range in experience from ZERO well over 50 years in the wood industry.



We sincerely hope that this Owner's Manual will prove to be a very valuable and effective tool that will serve you for many years to come, and that our hard work will help YOU become a very skilled and accomplished machine operator. We always welcome feedback and suggestions on our products and hope you will feel free to help us develop even better future machines and manuals. We are always at your service and hope you will call us if you need assistance.

Good health, good luck and good planing to you and your company.



PINHEIRO WARRANTY

The Pinheiro machinery company through its distributors warrants that any part or product thereof that is manufactured by Pinheiro, which under normal operating conditions in the plant of the original purchaser thereof. Proves defective in material or workmanship within 12 months or 2000 hours of operating time, whichever comes first, from the date of shipment from Pinheiro's distributor, to the purchaser, will be replaced free or charge, f.o.b. Factory or distributor, provided that purchaser properly sends to Pinheiro's distributor, notice of the defect and establishes that the products have been properly installed, maintained and operated within the limits of rated and normal usage. All component parts and material not manufactures by Pinheiro shall be guaranteed by the manufacturers of all such purchased component parts and material.

Pinheiro is obligation (as determined by an inspection by Pinheiro through the distributor) under this warranty is limited to and shall be fully discharged by repairing any defective part, or supplying without charge, f.o.b. Its works, a similar part to replace any which within the above stated time from date of shipment is shown to have been defective as to material or workmanship. Pinheiro and the distributor shall have the option of requiring the return of these defective materials, transportation prepaid, to establish the warranty claim.

Pinheiro or distributor shall in no event be held liable for damages or delay caused by the defective material, and no allowance will be given by Pinheiro or the distributor for repairs or alterations unless made pursuant to its written consent and approval. Pinheiro or the distributor shall not be held responsible for work done, apparatus furnished or repairs made by unauthorized persons unless specifically agreed to and authorized in writing.

Except as stated above, there are no warranties, express or implied, including the warranties of merchantability and fitness for a particular purpose. Pinheiro acknowledges that purchaser's sole and exclusive remedy against company shall be for the repair or replacement of defective parts as provided for herein and the warranty as stated above is in lieu of any other warranty or remedy. In no event, be it due to a breach of performance of the goods sold hereunder, shall the seller be obligated or liable to purchaser in any manner for consequential or incidental damages, including, but not limited to, lost profits, plant downtime or suits by third parties.



RECEIVING MACHINE

The handling, moving and lifting of this machine is dangerous work that should only be performed by professionals.



BEFORE accepting this machine from the carrier, the person receiving the machine should carefully check for damage. If there is visible damage, no matter how minor, make a notation of the damage on the bill of lading, then contact the nearest representative of the delivering carrier to file a claim.

If damage has occurred, carefully look around, on the truck, for any items that may have broken off, come loose or fallen out of a package.

As soon as the machine is received do a complete inventory of all materials against the packing list. Contact the shipper immediately if there are any discrepancies.



UNLOADING

After arrival, carefully unload and transfer the unit to where it will be installed. Make sure that the machine is lifted properly. Careless handling can easily cause expensive damage and or serious injury.

Simple rules for the safe handling of the machine:

1. When lifting the machine, always use equipment rated at 50% higher than the shipping weight of the machine (i.e. fork lift, chains slings, etc.).
2. Leave the machine on the shipping skid until final placement.
3. When lifting the machine, always be sure to center the weight.
4. When using a fork lift, the forks must be 2200 mm (7 feet) or longer.
5. Work slowly and carefully to avoid damage to the machine or injury to the personnel.
6. Hire professional riggers to insure safe quality installation.
7. Do not attempt to lift on any part of the machine other than the main base. never attempt to pass cables or ropes through the machine frame, under motor brackets or tables.

**GENERAL SAFETY RULES**

STOP/CAUTION: Do not operate, adjust or service this machine until:

You have read this entire owner's manual, have been properly instructed and are very comfortable with both your task and your level or skill in that area.

When in Doubt shut the machine completely off, think the problem completely through, look in the owners manual for the solution and be sure that you are comfortable with the proper procedure before you start the machine.

A wrong decision by untrained operators and service people can cause a safety hazard, expensive repairs, down time, loss of profits and lots of aggravation.

When necessary the technical staff at the Pinheiro service center are always very willing and able to assist you in locating and solving your operation and maintenance problems.

NEVER

Never operate, service or go near the machine with loose clothing, or without required safety clothing, safety glasses, safety shoes, and additional items, as your company requires.

Never service or maintain the machine without the electrical power being completely shut off all switches, and locked off if possible, (unless power is required for the particular job).

Never change knives, grind knives, or work in area of heads without first switching or locking off all power controls, engaging the head locking devices, when available, and wearing all required safety items. (the power must be on and the heads unlocked only when jointing the knives).

Never clear broken and/or jammed material from the machine while feed rolls and cutters heads are turning.

Never reach inside or lean into machine when power is switched on or machine is operating.

Never operate machine while tools or other materials are on, in or around the machine or general work area. A clean machine and a clean work area allow for less safety hazards, unnecessary breakdowns and lost tools.

Never operate machine without all covers, hoods, safety devices, anti kickback fingers and proper electrical equipment in place and in good working order.



Remember this machine is only as good as the persons responsible for its upkeep and operation. This machine can either be a very valuable and profitable asset to your company, or it can be a source of aggravation. Its success or failure is up to all of us!



SAFETY PROCEDURES

Insist that safety equipment be used by all people working on or around the machine, even if they are not directly involved in the operation of the machine.

We recommend the following safety equipment:

- Industrial eye protection
- Industrial grade work gloves
- Breathing apparatus (Suited for the application)
- Industrial clothing
- Industrial ear protection

Highly visible warning signs on all machinery. Signs have been placed by the manufacturer and should be replaced immediately by the owner/operator when they become worn or fades. Replacement signs are available from the manufacturer.

Quality lighting for good visibility.

Fire protection equipment. Consult your local fire department fire equipment company or insurance company.

Implementing safety practices will enhance your operation, improve employee attitude and performance and help to avoid costly accidents.

Each operation section of this manual will also list proper safety procedures. Following the rules in each section will help to insure safe operation when working **in** or around the machine.



The primary safety components on the **planer** machines are the emergency locking stop buttons located at the front control panel and at the rear of the machine. These buttons enable either the operator or the take-away person to shut down the machine in an emergency situation. These devices are rugged and can be engaged quickly. Once Pressed in, all motors will immediately shut down.

Although the power is off once the emergency stop button is engaged, the heads will continue to coast, eventually coming to a complete stop.

Do not attempt to perform any operation on or around the machine until all heads come to a complete stop.

Do not attempt to operate this machine until you have read and understand all portions of this operators manual.

Always engaged both the front emergency stop button and the main disconnect switch before performing any work on or around the machine.



WASTE REMOVAL GUIDELINES PMA SERIES



The removal of shavings is the most important external system that will effect your planing quality and production. The size, proper construction, layout and installation are crucial to the performance of the planer

The blower system, like any machine, will not perform properly unless each line or pipe is laid out and installed in the correct manner. Much of the rated capacity of a blower can be lost if the lines are not correct it is always advisable to seek the assistance of a qualified industrial ventilation engineer.

To properly determine size and horsepower of the blower, it is critical that the person designing this entire system take into consideration the machine, the ductwork from the machine to the main trunk line, the distance from the machine to the blower, the distance from the blower to wear the waste material will be deposited, the velocity of the air moving through this system (4,000 to 4,500 r.p.m.), and the static pressure created with this system.

The following guidelines are to help you in sizing your system and components for each model in this series.



PLEASE! Each and every component in a waste removal system plays a critical role in the systems total performance. A simple mistake like using a "Tee" intersection instead of a "Y", can reduce suction to almost nothing. Reducing the outlet size of the blower can create enough resistance to drastically decrease the amount of suction at the machine, allowing the shavings to accumulate at the cutter heads causing the chips to mark the finished lumber.



The area of the main exhaust line to the blower should be equal to or slightly larger than the total area of all the connecting pipes combined. To or slightly larger than the total area of all the connecting pipes combined.

Elbows should never bend sharply, they should always have a bend radius equal to or greater than two and one half times its diameter.

Some type of flexible pipe is necessary to allow for the movement of the heads. This flexible pipe is usually very inefficient and expensive so use only enough to allow for the total movement of each head. Two to four feet is usually adequate. Straight steel pipe is the most efficient and cost effective and should be used as much as possible.

When connecting branch pipes to the main line the branch should enter at 30 to 45 degrees to the main. Never enter at 90 degrees and never place two branch lines directly opposite each other.

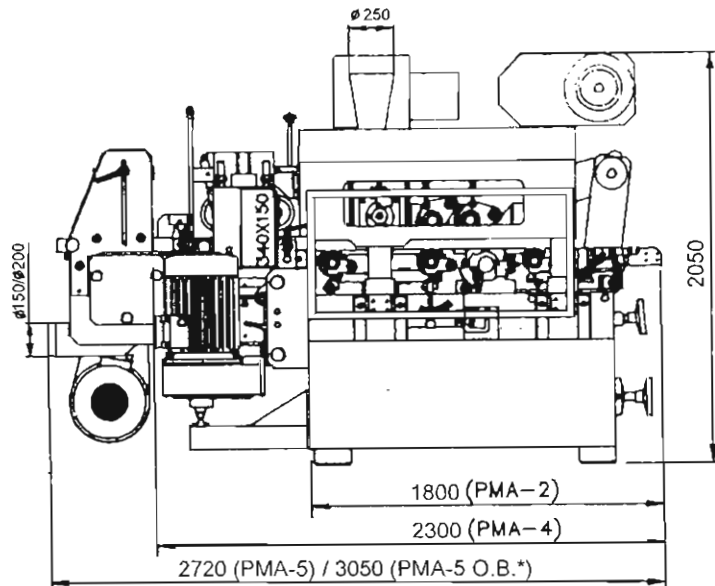
Straight steel pipe should be used throughout the system for greatest efficiency. It should be screwed, taped and properly supported.

It is recommended that guillotine type shut off be installed near the dust hoods so the exhaust air can be concentrated only on the heads in use. Always check to be sure the gates are open on the heads being used, and always make sure that at least one line is open to allow air flow when the blower is started or the entire system may collapse under tremendous vacuum load.

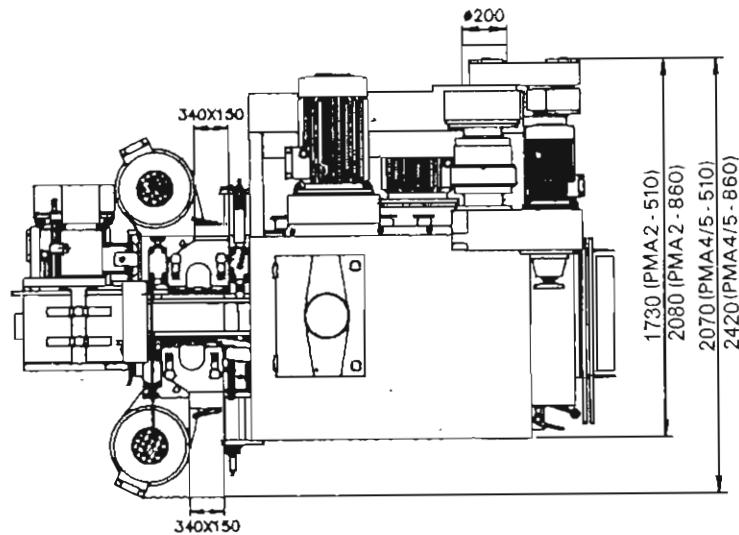
It is advisable to build extra capacity into your system to allow for future growth.



Heads Outlet Diameter and Air Flow Required



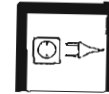
*Outboard Bearing



Heads	Outlet diameter	Air flow
Bottom head	200 mm (8")	3348 m ³ /h (1969 CFM)
Top head	250 mm (10")	5292 m ³ /h (3112 CFM)
Right head (h=310)	150 mm (5,9")	2250 m ³ /h (1300 CFM)
Left side head (h=310)	150 mm (5,9")	2250 m ³ /h (1300 CFM)
Right chamfering unit	80 mm (3")	380 m ³ /h (225 CFM)
Left chamfering unit	80 mm (3")	380 m ³ /h (225 CFM)



Machine installation



As long as there is a clean, sturdy, flat and level location to locate the machine, the machine can be set directly on the floor, on machine pads, or on wood or steel plates. PINHEIRO recommends the machine be set level on four machine pads (one on each corner). The space between the machine frame and the floor will allow you to clean the bottom cavity of the machine more efficiently. Bolting the machine to the floor is optional. Leave the machine on the shipping skid until it is positioned at its permanent location.

ASSEMBLY

Once the machine is located in its permanent setting, assemble or install any units that were shipped separate from the machine. Be careful to assemble, install, wire and adjust properly.

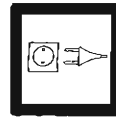
CLEANING

CAUTION: *Be sure to wear industrial grade work gloves and eye protection while cleaning this machine in order to prevent serious injury, cuts and scrapes from extremely sharp knives protruding from the planer heads.*

With the machine in position, wipe off rust preventative compound with a clean cloth or rag moistened in solvent.

Use every reasonable precaution against fire when using flammable liquids.

Go over all scraped or polished surfaces with 10w oil, then wipe off excess oil with a clean rag so that it is not transferred to the wood. Take extra precaution with cleaning solutions as they may remove paint.



ELECTRICAL SYSTEM

Introduction:

This planer utilizes high voltage. Any electrical work should be performed by licensed industrial electrician or serious electrical shock and/or death can result.

The electrical system for this machine has been engineered to provide the utmost efficiency. It includes quality magnetic starters, fuses, overloads and part-start motors. A wiring diagram is provided and includes a legend depicting all fuses, starters, lamps, push-buttons, etc.

Electrical Enclosures

The main electrical enclosure for this machine may be directly connected by conduit. There are several important items contained on the enclosure that deserve attention.

Locking Door:

A locking device is installed on the main electrical entrance so that whenever maintenance is being performed on the machine the system can be locked in the "Power Off" position.

Main On/Off Switch:

A locking main "On/Off" switch, when in the "On" position, will feed power directly to the fuse holders. This should also be locked in the "Off" position and the key removed during any maintenance.

Hour meter:

An optional hour meter may be located just above the main "On/Off" switch in order to monitor run-time and to schedule lubrication and maintenance.

Door safety Switch:

A safety switch is located on the bottom inside of the enclosure. When the door is not properly closed, it shuts "Off" low voltage 24 Vac power to the planers pushbutton control panel.

High voltage power is still present inside the enclosure regardless of the safety switch's position.

Fuses/Fuse Holders:

Every circuit is fused to protect the wiring and motor. The overloads are designed to protect the motors from being overworked. In the event of a short, fuses would react quickly to shut down the planer long before overloads could react. The fuses used in the Pinheiro planer are European and may not be readily available at your local supplier and so an extra set has been provided with the machine.



Always keep an extra set on hand to prevent needless and costly delays. A chart is located in your electrical information booklet and provides you with correct fuse size for your machine.

Magnetic Starters:

As mentioned previously, part-start motors are used most often on these machines in order to lower electrical demand during start-up on the larger motors. In order to accomplish this without having to manually switch the motors, a series of three magnetic starters are used in conjunction with a timer. The starters are clearly identified with numbers that correspond to those in your electrical information booklet, and with the wiring diagram provided, any licensed Industrial electrician can understand the system. All magnetic starters utilize 24 Vac low voltage coil for safety purposes and in order to facilitate voltage changeover.

Overloads:

In conjunction with the fuses, the planer also uses electrical overloads. These overloads are not only sensitive to motor overload but phase imbalance as well. For this reason it is important to tell your *Pinheiro* representative immediately if you plan to use a phase converter so that the correct overloads can be installed to accommodate the phase imbalances normally inherent with phase converters.

Neither Pinheiro or any of its representatives will warranty motors or any electrical components if a phase converter is used.

Transformer:

In the interest of personal safety and efficiency, a low voltage control circuit is used. This circuit is powered by a transformer and provides 24 Vac to the control circuit.

Primary Terminal Connector:

Three terminal connectors and a ground connector are provided to attach 380 V primary power lines to the main electrical enclosure.

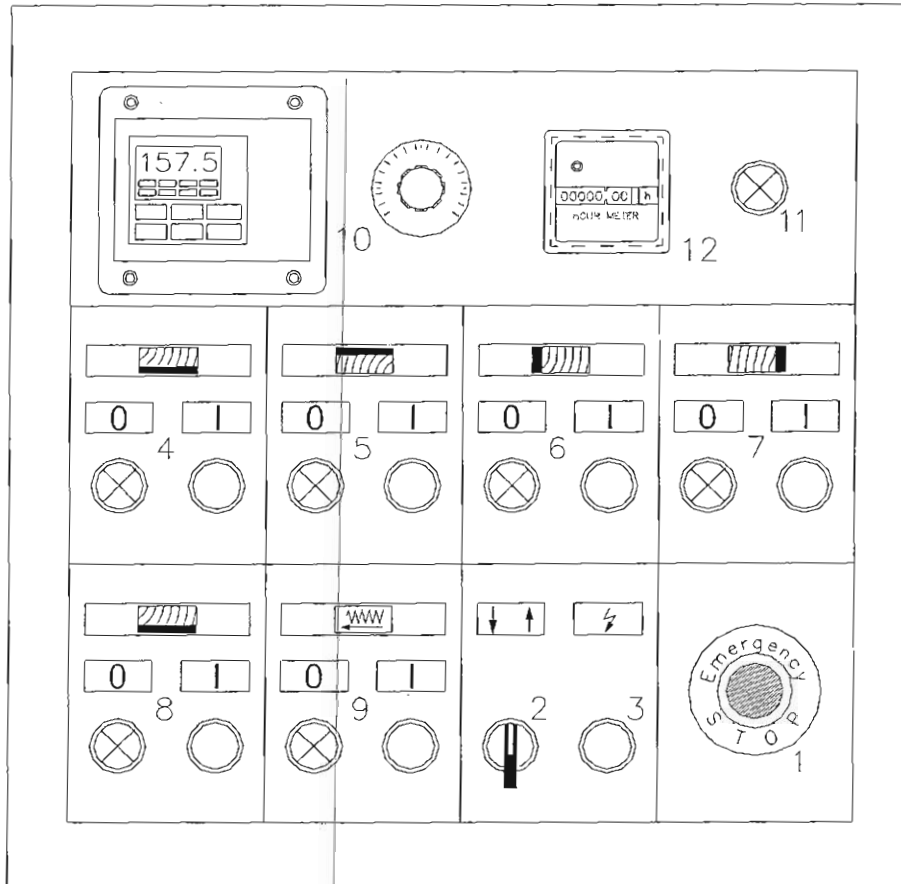
Terminal Connectors:

Individual terminal connectors are provided the main electrical enclosure to the machine mounted distribution box.

Distribution Enclosure:

Some models include a distribution box on the machine to connect all of the wires coming from the main electrical entrance to all of the electrical components on the planer. All of the terminals located in this box are clearly marked and match those mounted in the electrical entrance.

Control Panel



The motor control panel is conveniently located to provide easy and quick access for the operator.

White illuminated buttons are used to start each motor; these are momentary buttons and do not require continuous engagement in order to start the motor.

Red momentary buttons are used to stop each motor and, Like the start buttons, do not required continuous engagement.

The four main arbor motors and the feeding motor have an ampmmeters to indicate the electricity consumption.



When shutting down a machine always use the emergency stop button to ensure the power to the machine is shut off.

**1. Front Emergency Mushroom Stop Switch:**

When pushed in it will lock into the off position shutting off power to all the motors. It can only be released by turning the knob clockwise.

2. Thickness Setting Control:

The directions of this button are clearly marked with arrows indicating that the direction of travel for setting the desired thickness. Two limit switches are located at the left rear of the machine and have been pre-set at the factory to limit the minimum and maximum travel of the top section and to protect it from being damaged when powered up and down.

Thickness Speed Control (option): The thickness motor have two speeds the speed control button is marked with slow simbol (Turtle) for slow speed and fast simbol (Hare) for fast speed.

Thickness Display (option): The thickness value is indicated in the digital position indicator located at the left of this button.

3. Green light:

The electrical system is on.

4. Bottom Head Controls:

These buttons are used to start and stop the bottom head.

5. Top Head Controls:

These buttons are used to start and stop the top head.

6. Left Sidehead Controls:

These buttons are used to start and stop the left sidehead.

7. Right Sidehead Controls:

These buttons are used to start and stop the right sidehead.

8. 5th. spindle Controls:

These buttons are used to start and stop the 5th. spinde.

9. Feed System Controls:

These buttons are used to start and stop the feed motor, which cannot be started until the top head is running.

10. Feed Speed Control

This button is used to control the speed of the feed system. The speed (m/s) is indicated in the digital display located above of this button.

11. Thickness setting advise:

These buttons are used to advise the new thickness setting.



Motors: All motors on these machines are 50/60 Hz and of excellent quality. They are most often supplied as 380 Volt motors. Changes are the correct voltage has been wired to your specifications and you may never have to change voltage. Should it become necessary to change voltage, please contact the technical staff at Pinheiro Machinery, Ltd. or agent.

Limit/Safety Switches: Limit/Safety switches are designed to protect man and machine, please do not attempt to bypass or override them as serious injury and or damage may occur.

The thickness setting system has two limit switches that prevent the operator from raising or lowering the table or top frame beyond its safe limits while under power. This is done in the interest of the operator so that the table is not inadvertently run into the planer head causing either serious machine damage or personal injury.

A safety switch has been placed inside the door of the electrical enclosure preventing inadvertent starting of a motor while the door is open.

The machine are equipped with limit switches, located on the first top infeed roll, to shut the machine off if oversized material is fed into the machine.



If the machine shuts down because of over thick wood, before restating, always remove all wood from machine only after all heads have stopped rotating.

The powered raising and lowering system will not operate until the board has been removed from the machine. Reset the planer table to its original position, carefully restart the necessary motors, and continue planing.



MACHINE LUBRICATION

INTRODUCTION

The lubrication schedule supplied with manual illustrates the points of lubrication, types of grease or oil and recommended frequency of lubrication for each point.

This lubrication section has been written to facilitate de operations. Simply use only the details that refer to your specific model. If you should add any of the modular sections to your existing model in the future, this lubrication schedule has been designed to cover most situations.



Proper lubrication is a simple matter and will help eliminate premature wear of the components being lubricated.

Be careful not to over grease the bearings because too much grease can cause damage.

Suggestions

Motors:

Inspect your motors to see if they are equipped with any grease fittings. Most motors are supplied with permanently sealed bearings. If your motors have grease fittings, lubricate these fittings on a monthly basis, per the enclosed lubrication schedule, if the machine is run on a single shift basis. Lubricate accordingly, if the machine is run more than one shift per day.

Feed roll chains:

It is recommended that all of these feed system chains be lubricated every 8 to 16 hours of operation. A high quality chain and cable lubricant works very well and the aerosol can type is easy to apply.

Raising screws:

It is highly recommended that, if you raise and lower the top section frequently, that you oil the raising screws on the lubrication schedule on a daily basis. These particular parts are under great stress and this extra attention will benefit both the machine & operator.

**Raising system:**

If you frequently raise and lower the top head section, it is recommended that you lubricate the slides on a daily basis. Simply raise the top section to the maximum open position and lubricate both sides of the ways. Then lower the section all the way down and back up again, making certain that lubricant has covered the entire ways. Always wipe the entire slide clean before lubricating.

Side head slides:

If you frequently raise and lower the side head spindles and move them left and right, it is recommended that you lubricate them on a daily basis. As with the raising slides, make certain that you cover the ways with lubricant from end to end. Always wipe the entire slide clean before lubricating.

Cutter head bearings:

Be careful to only use 2 pumps of the proper grease in these bearings during your scheduled maintenance. Too much grease can cause rapid and severe damage to these bearings.

Feed rolls:

In order to simplify maintenance, most models include sealed feed roll bearing. because the feed rolls turn at a slower rpm and these are quality bearings, these bearings should give you years of dependable service. If the feed roll bearings have grease fittings, lubricate according to the chart.

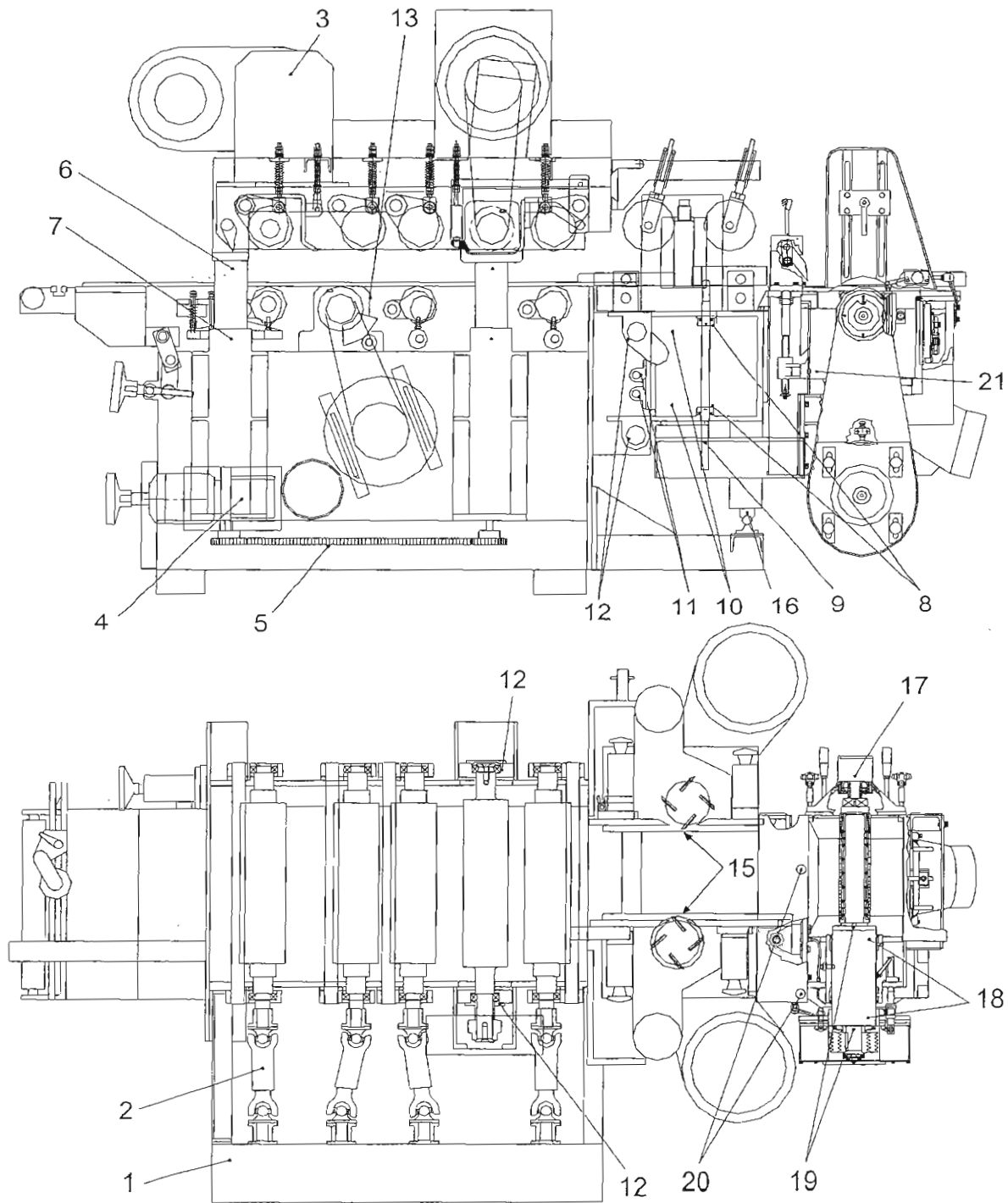
Feed roll drive shafts:

Lubricate the drive shafts of the cardan feed system according to the chart. Make certain to keep these parts clean and free from build up of wood chips and debris.

Gear boxes:

In order to maximize the life of your gearboxes, it is recommended that you check the oil level once a month and change the oil once a year. This is a very inexpensive way to minimize downtime and very costly repairs.

Lubrication Plan



See table next page.



Lubrication Table

Pos.	Points to be lubricated	Qt.	Period	Remarks	Lubricant (Shell)
1	Hosings / Transfer Hosings	2 / 2	Monthly Yearly	See the level Changing oil	Omala 220 / 680 Oil
2	Cordon systems	21	Weekly	4 pumps	Alvania R3 Grease
3	Speed variator gear box	1	Monthly Yearly	See the level Changing oil	Omala 220 Oil
4	Raising gear box	1	Monthly Yearly	See the level Changing oil	Omala 220 Oil
5	Chain	1	Daily	Put oil directly	Tona T 68 Oil
6	Lift screw	4	Weekly	2 pumps	Tona T 68 Oil
7	Lift guide	4	Weekly	2 pumps	Tona T 68 Oil
8	Lifting screw bearing	4	Daily	Put oil directly	Tona T 68 Oil
9	Lifting screw & nut	2	Daily	Put oil directly	Tona T 68 Oil
10	Side head sleeves	4	Weekly	Put oil directly	Tona T 68 Oil
11	Horizontal screw & nut	2	Daily	Put oil directly	Tona T 68 Oil
12	Horizontal guides	2	Daily	2 pumps R/L	Tona T 68 Oil
13	Bottom arbor bearing	2	Monthly	2 pumps R/L	Alvania R3 Grease
14	Top arbor bearing	2	Monthly	2 pumps R/L	Alvania R3 Grease
15	Vertical spindle bearings	4	Monthly	2 pumps R/L	Alvania R3 Grease
16	Horizontal bearing	2	Daily	2 pumps R/L	Tona T 68 Oil
17	Outboard bearing	1	Monthly	2 pumps	Alvania R3 Grease
18	5th. Spindle sleeve	2	Monthly	4 pumps	Tona T 68 Oil
19	5th. Spindle bearings	2	Monthly	2 pumps	Alvania R3 Grease
20	Vertical guides	2	Weekly	2 pumps	Tona T 68 Oil
21	Vertical screw & nut	1	Weekly	2 pumps	Tona T 68 Oil

**Introduction:**

In the manufacture of wood products, the planer and molder are often necessary to produce dimensional products with a consistently smooth finish.

Planers are sometimes called upon to remove large amounts of excess material quickly and efficiently to transform rough lumber into blanks for secondary operations or even finished products. These types of units are known as a roughing planers.

The fact that planers must often perform as work horses, (being fed continuously, removing large amounts of material, and required to produce a quality finish) it is most critical that the owner/operator completely understand proper set up, operating and maintenance procedures for all the systems within his particular machine.



Remember this rule of thumb: The attitude and skill of the operator critically determines the performance of any machine he operates. The investment into a quality machine must be followed by an investment into a quality operator and an investment into, their ongoing education.

The purpose of this manual is to give you, the operator, a better understanding of planers and planing in general, how to maintain, align, set up, operate, and trouble shoot them. categories have been outlined below in order to help you better understand planing concepts and how planers are adjusted for special jobs and for the differences in material.



Types of Planing

Rough Planing:

(roughing, sizing) Rough planing generally means sizing lumber, with sometimes serious thickness variations, to a uniform thickness that is greater than the finished thickness of the end product to be produced from this material.

Hit or Miss:

(skimming, skip planing) The same as rough planing, except that light cuts are made to keep the lumber close to original thickness as possible, leaving areas on some boards unplanned.

Finish Planing:

(finishing) Finish planing generally means a final more precise pass through a planer. Usually this results in a higher quality surface appearance and a standard finished thickness.

Molding:

(profiling) Molding or profiling generally means to apply a special shape or pattern to the faces (top or bottom or both) and or edges of the lumber.

Matcher:

Matching generally means shaping or profiling the edges of a piece of lumber where two edges will interlock, like a tongue and groove pattern.

S1S:

(surface one side) Single surfacing.

S2S:

(surface two sides) Double surfacing.

S3S:

(surface three sides) Double surfacing and planing one edge or double surfacing and ripping one edge.

S4S:

(surface four sides) Four siding.

Jointing:

Generally refers to removing all high spots on the bottom face of a board leaving a flat uniform unstressed surface. This is accomplished by passing a board over a bottom planing head with a minimum amount of down pressure.

**Facing:**

(flattening) Generally refers to a special endless bed or carpet fed jointing planer that helps to flatten the bottom surface of a board by using a minimum amount of down pressure while feeding the stock through the machine. Some jointers are equipped with a special feeding device consisting of an endless track with many individual spring loaded fingers that feed the wood into the machine and over the bottom cutterhead while applying a light down pressure. This system offers the benefits of hand jolting while providing more safety to the operator and significantly increasing production.

There are also facing planers built that use a combination of spring loaded fingers and standard feed rolls. These machines both flatten the bottom face of a board with a bottom head and then plane a uniform thickness with a rear top head in one pass.

Pre-Straightening:

A process where a rabbet is cut into the lower right edge of a board, on the infeed table before the board enters the planer. The inside edge of the rabbet is then guided along a straight edge through the machine and to the right side head. It should be noted that these systems are limited to eliminating small crooks, usually ranging from zero to one half inch over the length of a board.



The most efficient machines used to straighten lumber are either a straight-line rip saw or dip chain gang saw.



Now that we have looked at the different type's of planing lets look at the type's of defects encountered in lumber so that we can best determine the proper planing operation.

Lumber Defects:

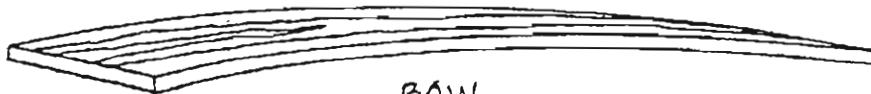
Sawing, drying and natural conditions:



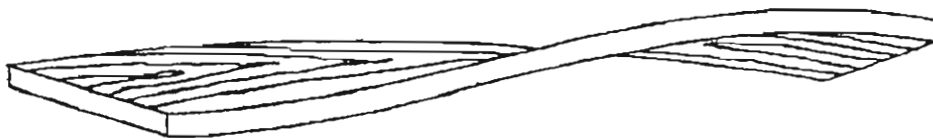
SWEEP



CUP



BOW



TWIST

**Bow:**

A bow is a long gradual curve along the face of the board with the greatest difference in the middle of the piece gradually decreasing toward the ends. (Fig. 1)

Twist:

A distortion of a board into a shape suggestive of an airplane propeller. (Fig. 2)

Crook: (sweep)

A sweep is a curve along the edge's of the board causing the piece not to be straight. sweep's can be long and gradual or short and hard like a kink. (Fig. 3)

Cup:

A bend running from one edge of the board across to the other edge. (Fig. 4)

Thick and Thin:

This is a condition most commonly caused by poor sawing practices. in some cases a one inch thick rough sawn board can range from 22mm to 38mm thick over the length of a single board.

These conditions that exist in lumber, especially hardwoods, only make the planer's job more difficult and often create a need for secondary machinery to produce quality finished products. It would be nice to be able to feed any piece of rough lumber into a planer/molder and have a perfect finished product, free from defects, coming out the other end, but this seldom happens.

There are some products produced in this manner, mostly in softwoods, such as siding, decking, and dimension lumber. These products, although accurate in dimension, are by no means consistently straight, flat and true. But, for these type's of products, a good planer/molder will produce and acceptable finish. When more accuracy is required, such as moldings, flooring, furniture parts and architectural millwork, many more machining steps are needed to ensure a consistent quality product. Thus, we have some of the reason for the many different types of planing and secondary machining operations.





The many process needed to work lumber free of defects and prepared for final machining into high quality products are well known to the furniture, molding, flooring, and architectural millwork industries. For this reason many larger company's split their manufacturing space into a rough mill and a finish mill. What about small plants that can not afford all the extra capital equipment, space and people needed? The answer is flexible manufacturing and the key is a planer/molder that can both rough out lumber quickly and efficiently and finish it properly.

This type of flexible manufacturing is made even more attractive by a new concept in planers. The planer/molder, which offers wider and thicker capacities then the conventional molder, can efficiently rough and finish plane, as well as profile, mold and match a very wide range of products. These machines are set up with the bottom head first to help joint the bottom surface flat before it enters onto the main table. Because the wood is flat against the main table as it passes under the top head, dimensional accuracy and flatness of the lumber is improved.

Advantages of Rough Planing:

Although some woodworker will insist that the extra process of rough planing is not cost effective, let us look at the potential advantages that can be gained:

Knife wear:

Rough planing cleans lumber surfaces of dirt and grit thereby eliminating nicking and premature wearing of your finishing machine knives during important set ups and production runs.

Defecting:

Rough planing cleans lumber surfaces, helps detect defects, and improves the grading and selecting process.

Uniform size:

Rough planing will produce a product that is more uniform in size and help the performance of secondary machines such as gang rips, molders and sanders, as well as significantly reducing the wear and tear factor. The uniform size of the lumber will allow for better feeding and will increase production dramatically on all machines by reducing jam-ups, eliminating knife and saw burn marks that cause defects in the finished product and prematurely wear the cutting edges of these tools.

Improved Flatness:

If rough planed properly, a board has a fiat bottom and requires lighter cut during finishing and molding operations.



Sorting Widths:

When working with random width lumber, rough planing allows the tail person to sort out the most common widths that best fit your products for more efficient break down of the lumber into blanks or parts.

Waste Reduction:

Rough planing allows you to sort lumber widths to fit your product thereby eliminating waste at the rip saw. Another advantage is that inventorying a stack of single widths is made easier by just counting the pieces and multiplying that number by their average length.

The ability to grade and select lumber before final processing will eliminate running stock that was no good to begin with. Clean stock being fed to finishing planers or molders will reduce expensive downtime, extend tool life and minimize grinding cost.

Many small manufacturers argue that the extra handling and processing cannot be cost effective for their operations, but in reality, it can actually improve overall production, quality and reduce waste and maintenance expenses. Remember that quality is number one and a quality product will sell itself, build customer loyalty and separate yourself from your competition. In manufacturing you always want to eliminate ineffective process but never skip necessary one's, because every process has an effect on your finished product. Test all process' thoroughly before making your decisions and listen to your customers.

Although there are numerous types of planers, the most standard type is the roll feed machine. These machines can be built specifically for roughing, finishing or both, however, they require different setup adjustments.

**DIFFERENCES BETWEEN ROUGH AND FINISH PLANERS:**

Roughing planers are usually massively built and equipped with large motors, rugged and very flexible sectional feed roll and chipbreaker systems that allow for the removal of large amounts of material at high speeds. These machines are engineered to handle excessive thick and thin variations in rough lumber. The concept is to produce a board with a uniform thickness and a reasonable finish.

Rough stock has many hills and valleys, so raising the bottom feed rolls (when installed) will improve the feeding. Sometimes lowering the top feed rolls provides for better feeding if the rough lumber is thinner than normal.

Rule of Thumb:

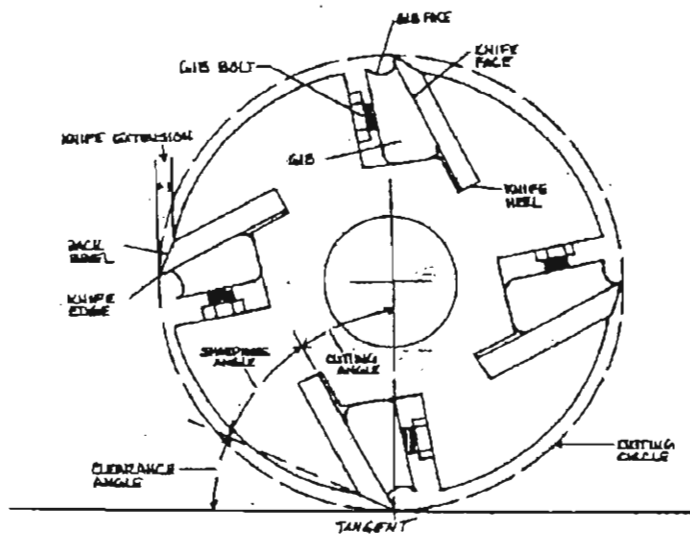
Setting the bottom rolls higher improves feeding, but this advancement in height reduces the finished surface quality.

Finish planers tend to be more compact efficient and usually designed to remove less material at lower feed speeds. Most planers, large or small, have the same basic components but are designed and laid out differently. The setting or adjusting of these components determines the finish that the machine will produce. Since the bottom feed rollers (when installed) are set much closer to the table surface, the biggest difference in machine adjustments between rough and finish planing is the position of the feed system components. The settings given in this manual for the proper position of the feed system components. The settings given in this manual for the proper positioning of the feed and guide system components can be used on many other conventional planers and molders, but you should check with the machines manufacturer before making adjustments.

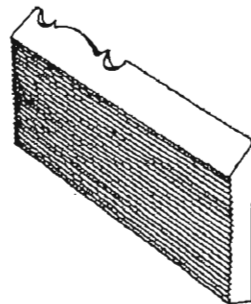
Terminology:



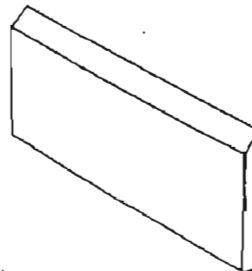
For more detailed technical information we recommend that you consult the *Máquinas Pinheiro, Lda* technical service.



CUTTER HEAD TERMINOLOGY



PROFILED
CORRUGATED
KNIFE



STRAIGHT
SMOOTH
KNIFE

Gibb:

The Gibb is a holding bar used to distribute uniform pressure against the knife to hold it firmly in place against the cutterhead.

**Gibb Bolt:**

Gibb bolts are closely spaced and used to wedge the Gibb against the knife for a firm hold.

Gibb Face:

The Gibb face is the top edge that is exposed and is usually machined out specially to help deflect the chips.

Knife Face:

The knife face is the surface that contacts the Gibb and extends out past the Gibb to the cutting edge of the knife.

Cutting Angle:

The cutting angle is the angle formed by the face of the knife and a line extending from it is cutting edge through the center of the head.

Clearance Angle:

The clearance angle is the angle between the grinding bevel of the knife and a line drawn tangent to the cutting circle at the knives cutting edge.

Sharpness Angle:

The sharpness angle is the angle between the knife face and the knife grinding bevel.

Knife Extension:

The knife extension is the amount that the knife edge extends out beyond the body of cutterhead.

Cutting circle:

The cutting circle is the diameter of the cutterhead plus the total of two knife extensions.

EXAMPLE- Diameter of head = 125 mm (5")

Knife extension = 1,5 mm (1/16")

Cutting Circle = $125 + 1,5 + 1,5 = 128$ mm (5" + 1/16" + 1/16" = 5 1/8")

Knife marks per inch:

Determined by the number of knives in a cutterhead, the RPM of the cutterhead, and the feed speed of the machine. To find knife marks per inch take the number of knives in the cutterhead and multiply by the cutterhead RPM, then divided by the feed speed (FPM), then divide by 12, which is the number of inches in each foot.

EXAMPLE: 4 KNIVES x 5500 RPM X 50 FPM = 22000 KNIFE MARKS/MINUTE

$22000 \text{ KMPM} / 50 \text{ FPM} / 12" \text{ PER FOOT} = 36 \text{ KMPI}$



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Pitch knife marks: (pkm)

is the distance between knife marks.

EXAMPLE: N° KNIVES = 4

CUTTERHEAD RPM. = 5500

FEED SPEED = 10 METERS/Min.

$$\text{PKM (mm)} = \frac{\text{FEED SPEED X 1000}}{\text{CUTTERHEAD RPM. X N° KNIVES}} = \frac{10 \text{ X } 1000}{5500 \text{ X } 4} = 0,45 \text{ mm}$$



Remember that in order to get the best planing finish possible and the maximum number of knife marks per mm for any given planer or molder, the cutting edge of each and every knife must be precisely positioned to each other in the Cutterhead. If the Cutting edge of any one knife protrudes further out than any other knife, the highest knife in the Cutterhead will make the deepest cut and leave the only finish mark, giving you a one knife finish no matter how many knives are used. The only way to achieve the maximum number of knife marks per mm and the best possible planing finish is to carefully set each knife within 0,1 mm of each other, and then to carefully joint the Cutterhead.

Minimum Cutting Circle:

Determined by both the spindle diameter, (Since a certain amount of metal is required between the bore and the cutting edge to give the cutter body adequate strength) and the closest possible position of the fence to the spindle, (Since the cutting edge of the tool must go beyond the face of the fence and penetrate into the wood a designed depth of cut).



When changing from minimum diameter tooling to larger diameter sets be sure to re-adjust fences, and hand rotate the spindle, so that the cutters clear the fence systems by a safe distance. If the machine is started and the larger diameter cutters crash into the steel fence system, serious bodily injury and machine damage can occur instantly.

Maximum Cutting Circle:

Determined by the distance between the spindle, the fence system, the dust hood and other machine parts. Any cutter with a larger diameter than the maximum cutting circle of any machine will end up crashing into machine parts.

**High Speed Steel Tooling:**

Although the set up and alignment of planing and molding machines is very critical to their performance one of the most important factors in successful planing is sharp knives. The maintenance and upkeep of you knives and Cutterheads is a never ending task. Once new knives are installed and working you must be preparing the next set. If you are sending them out you need a minimum of three sets, one in the machine, another in transit to or from the grinder, and one on the shelf ready for installation.

Whether you are grinding your own knives or sending them out, a few strict rules must be maintained for success.

Quality Stock:

When new knives arrive from the supplier you should check them carefully, on the infeed bed of the planer, for flatness, straightness, height and length in complete sets.

Keep in Sets:

In order to maintain the balance of each Cutterhead, knives should be kept and ground in sets of two, three or four, depending on the number of knives used in the head.

Proper Knife Grinding:

Knives should be ground slowly and an abundant amount of flood coolant applied in order to avoid burning that will warp and shorten the life of the knife.

Clean Knife edge:

Always clean the knife edge after grinding and jointing. While wearing industrial safety gloves, press a block of hardwood directly into the knife edge and rub it back and forth along the full length of the knife until it is free of all contamination and grinding burrs.

Knife Storage:

Keep knives in a safe clean area to prevent unnecessary loss or damage.

**Carbide Tooling:**

Today, the cost of quality tooling is very high and requires proper selection, proper use and proper maintenance to extract the maximum amount of profit and service from each set of cutters. Before purchasing any carbide tooling it is very important that you consult with a very experienced and dependable supplier that can guaranty the best design, quality and price for the tooling required. There are several critical factors to consider before issuing your purchase order.

Remember, there are many vendors trying to sell carbide tooling that range in design, quality, price, delivery, dependability and service after the sale, and believe us, you will require service after the sale. The next time you are ready to purchase carbide cutters, consider the following:

Determine how you intend to use this set:

Is this a one-time job or are you going to use this set on a more ongoing basis. Carbide cutters come in several grades. A C-2 grade carbide is most commonly used in lower priced cutters, and a harder C-3 grade is used in cutters that require a longer life. C-4 grade is available, but usually is used for machining high density materials and not soft or hard woods.

Determine Feed Rate:


You need decide if a two, four or six wing cutter will be necessary.

Estimate How Downtime will be Handled:

If this set will be a standard tool, a backup set may be required to reduce downtime in the event the first set gets damaged, or simply requires scheduled maintenance, right in the middle of an important production run.

Another Decision that can Reduce Downtime:

For reduce downtime to a minimum is to have your tooling designed to a constant cutting circle. This strategy allows the set-up man to quickly change the cutters sets without having to re-adjust the fence systems, a very time consuming task, or even to stack multiple sets on the spindle for very rapid changeover.

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Inspect Cutters:

Always inspect cutters as soon as they arrive from the supplier to make certain that they meet your "Exact" design specifications and have not been damaged in shipping. Waiting until the last minute to inspect tooling can often lead to some very ugly and unnecessary telephone and fax communication.

Storage:

After you have received your tooling, your purchase can be better protected by making certain that your cutters are stored and maintained properly. A small investment of time and caring can extend the life of your tooling significantly.

Carbide is very hard and brittle and extra care is advised when handling. Cutters should never be placed on any metal surfaces. Always place them on cardboard or wood.

Avoid stacking cutters with different cutting diameters, since they could easily crash into machine parts when adjusting spindles.

(See Tooling Section/Terminology/Maximum Cutting Circle).

Avoid excessive dulling of your cutters. This kind of abuse will require more grinding than normal, will possibly damage the carbide by the intense impacting, not cutting, or the wood, and will significantly shorten the life of the cutter set.

Unused carbide cutters should be stored in a safe environment until needed. It is advisable to coat them with a light oil during short or long term storage.

Keep your cutters clean, as gum and pitch accumulations on wings can contribute to a reduced service life. To help increase cutter life, place cutter sets in a common household powered detergent with warm water for at least one hour and then clean with a soft bristle brush (Not a wire brush) to loosen pitch and gum. Wipe dry, coat with light oil and store properly.

In order to achieve constant profile specifications, always return the cutter set to the original supplier to rebuild.

Always clean the cutting edge after grinding or honing, while wearing industrial safety gloves, by rubbing a honing stone or block of hardwood over it, until it is free of all contamination and grinding burrs.



Dispensable Knife Cutterheads:

There is a variety of these types of heads available that can be operated in most machines. The great benefit to these Cutterheads is that they eliminate the need to grind knives and they minimize the time required to change knives. Most often, changing a knife can be accomplished in less than one minute with only a mallet and block of wood as tools. Since the knives rest on a profiled seat and centrifugal force is used to lock them into place, no gages, wrenches or knife setting jigs are needed during knife installation. The operator should be able to learn the proper knife changing procedure in only a few minutes.

Most dispensable style straight planer knives are double edge with two usable cutting edges. These knives are available in different grades of HSS and carbide. If quality knife stock is used and installed and operated properly, one dispensable knife edge will often plane about as much lumber as a standard knife, before either would need to be changed. If the dispensable system is high quality, then the quality of the finish is about that of a jointed head.

There are several advantages in using this type of system. The time needed to service these heads is minimal and required a minimum level of technical skill. The cost of these knives, per usable inch of cutting edge, often cost about the same as the cost of grinding standard planer knives. No jointing is required. In most cases in order to obtain a high quality finish, marks created in the finished material by nicked knives can often be quickly eliminated by simply moving opposite knives in the cutterhead, placing the nick in one knife behind the good edge of the next knife. HSS and carbide knives can be quickly changed to use the proper knife stock for any given job. Alternating both HSS and carbide knives can be quickly set up and gotten lengthen the life of the HSS knives while improving the finish quality of the carbide knives. If a reasonable length of cutting edge towards the end of the knives have not be used, the knives can be alternated and staggered in the cutterhead to allow for the total use of each knife, reducing the overall knife costs.

There are several factors that should be considered before investing in this type of Cutterhead. These heads cost more money than standard style Cutterheads. In most dispensable style heads, only straight planing can be accomplished, eliminating the use of this head for profile work. Some heads allow for profile knives to be used that have a short profile depth. A reasonable stock of new knives should be kept on hand since these style knives are not as readily available as standard planer knives. This style



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head is usually not designed for high production or very heavy chip load applications. The normally function very efficiently in small to medium production applications, under normal chip load conditions.

If the knives are run too long, after they have dulled, the excess pounding on the system, caused when any head is run with dull knives, can damage the knife seats and gibbs in the head. Once the seat and jibs are damaged, knives may begin to wear faster or break. When this situation occurs, the head sometimes can be repaired, but sometimes must be replaced. To gain the full advantage of these heads, the operator must pay closer attention to the condition of the knives.

It is always a good practice to clean out each slot with a brush between knife changes to make certain that the seat and gibb are very clean and smooth. Once the knives have been installed, the head stated and a few boards, it is advisable to stop the head for a minute and check to make certain that the knives have seated properly.



KNIFE SETTINGS

INTRODUCTION:

Setting knives in a planer is the most frequent task performed on this machine. Maintaining a sharp and balanced cutter head is the most important factor when it comes to achieving a quality finish and minimizing long term wear and tear on the equipment. Dull knives or out of balanced heads create stress on the cutter head and bearings, and cause vibration that will over time, effect many parts on the machine. So, it is very important that the person, or persons, responsible for the set-up and maintenance of your planer use the proper techniques and follow simple guidelines to ensure it's top performance and long life.

To attain maximum efficiency and speed at this task, follow these rules of thumb religiously.

1) **QUALITY KNIFE STOCK**; Insist on an M2, or better, grade of high speed steel knives, unless your particular job requires something different.

2) **FLAT & STRAIGHT KNIFE STOCK**; When receiving knife stock, either new or re-ground, set it on your planer infeed table and make sure that each knife, when standing on it's heel, (the side opposite the cutting edge), is flat against the table. If not, it should be returned to either your supplier for replacement or to the grinding shop for repair.

Using straight quality stock will greatly improve your speed and accuracy in setting knives.

3) **BALANCE SET**; Knives should be kept and ground in balanced sets. To check, set 2 knives on their heels and back to back on the infeed table. They should be EXACTLY the same height and length. If available, a weight scale is more accurate and will give better results.

4) **ACCURATE KNIFE SETTING**: With the new gages available today, it is possible to quickly set a **QUALITY** set of knives within a few thousandths of an inch. Therefore, this set can be run in without an initial jointing on the head, giving you a longer knife life and less set-up time.

Note: The following procedures it is only to be used with standard Pinheiro cutter heads.

**KNIFE SETTING PROCEDURE****TOP HEAD:**

Assemble the following tools before starting knife maintenance.

- a. A portable rolling work table.
- b. 17mm Gibb bolt wrench (supplied with machine).
- c. Knife setting device (supplied with machine).
- d. Screw driver or 5mm alien wrench (supplied with machine).
- e. Safety glasses.
- f. Industrial Work gloves.
- g. One set of quality, balanced knives.
- h. A small 2,5 x 2,5 x 7,5 cm (1" x 1" x 3") block of hardwood.

The following techniques can be useful in setting knives in other machines, but always consult the particular machine manufactures' recommendations to ensure the proper setting of their machines.

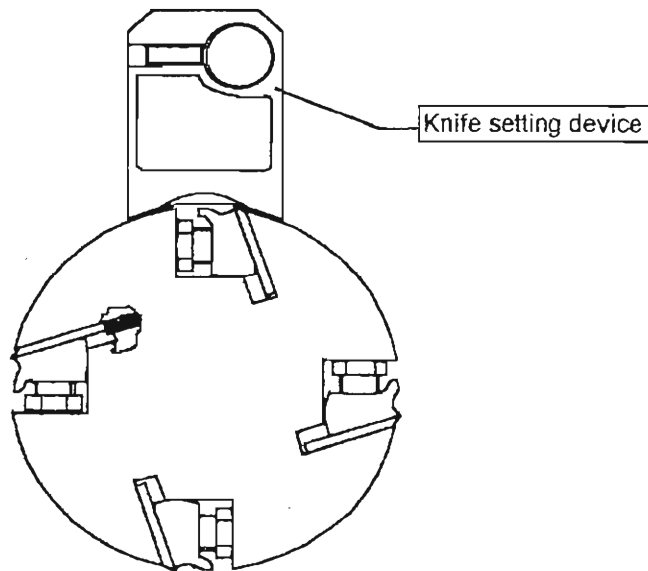
- 1) Carefully place the portable work table in a comfortable working location near the machine. Make sure that all tools are laid out in an organized fashion and that the set of knives to be installed have been properly inspected and are ready for installation.
- 2) Press both front and rear emergency stop buttons to the off position and switch the main disconnect switch off.
- 3) Raise the main cover.
- 4) Put on safety glasses and industrial work gloves before beginning this procedure.
- 5) Remove the deflector from the top of the chip breaker bar.
- 6) Loosen each Gibb bolt in the top slot, and as soon as the wrench starts to move, stop and go on to the next one before completely loosening the others.



Tightening and loosening the gibbs evenly will increase the speed of the operation and eliminate unnecessary wear and tear on the entire head assembly.



- 7) After all of the Gibb bolts are properly loosened, the knife setting springs will push the knife out about one half inch.
- 8) Remove the knife, Gibb, and knife springs from the slot and CAREFULLY place them onto the work table.
- 9) Clean out the slot with either compressed air or a stiff brush to ensure complete safe and efficient seating of all the components of the system. PROPER EYE PROTECTION IS ESSENTIAL FOR THIS OPERATION.
- 10) Make certain that the knives, gibbs and springs are thoroughly clean and then CAREFULLY begin the installation procedure.
- 11) Insert new or re-sharpened knives into the slot.
- 12) CAREFULLY place knife setting device on the cutterhead as illustrated in the following Fig. and hold it firmly with one of the hands.



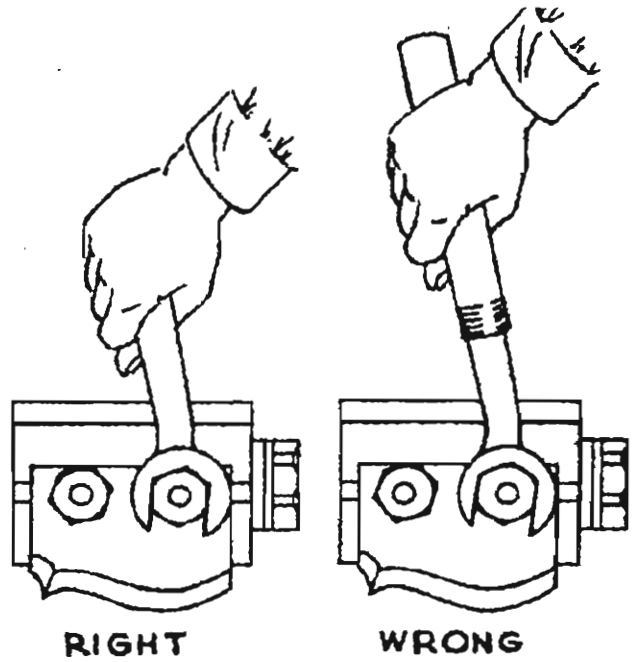
- 13) Starting with the second bolt in from each end, snug up all the bolts evenly and then back them off just enough so that the knife moves freely, the spring will then push the knife toward the knife setting device stop.
- 14) The knife should be in the correct position, so Tighten each Gibb bolt from the center outwards, and do not tighten one Gibb completely but tighten each one slightly and go around the head several times until proper tension (400 inch pounds) is obtained on each Gibb.



Do not ever use a wrench larger than that supplied with the machine for tightening the knives.

Many knives have been broken and heads ruined by excessive and uneven gibb bolt pressure.

Caution your operator against using such a wrench, as too much pressure may be applied.





KNIFE SETTING PROCEDURE

**BOTTOM HEAD:**

Assemble the following tools before starting knife maintenance.

- a. A portable rolling work table.
- b. 17mm Gibb bolt wrench (supplied with machine).
- c. Knife setting device (supplied with machine).
- d. 17mm torque wrench (machine accessory).
- e. Safety glasses.
- f. Industrial Work gloves.
- g. One set of quality, balanced knives.
- h. A small 2,5 x 2,5 x 7,5 cm (1" x 1" x 3") block of hardwood.

The following techniques can be useful in setting knives in other machines, but always consult the particular machine manufactures' recommendations to ensure the proper setting of their machines.

Introduction: The bottom cutterhead parts are the same as the top, the major difference is in the way we gauge the knife height. On the bottom head we set the knives to the main table instead of the head, although we do check that the head is level to the main table first. The same general practices for the top head apply to the bottom head and the same tools are used.

Procedure:

- 1) Carefully place the portable work table in a comfortable working location near the machine. Make sure that all tools are laid out in an organized fashion and that the set of knives to be installed have been properly inspected and are ready for installation.
- 2) Raise the top section of the machine to the maximum open position.
- 3) PUSH IN BOTH EMERGENCY STOP BUTTONS.
- 4) PUT ON SAFETY GLASSES AND INDUSTRIAL WORK GLOVES BEFORE BEGINNING THIS PROCEDURE.



- 5) If the side heads fences are mounted on the machine, remove them from the machine and place them in secure area where they will not get walked on or otherwise damaged.
- 6) Lower the infeed table, as if to set a maximum depth of cut for the bottom head.
- 7) If the knives are still in the head, loosen, remove and clean them following the same procedure as outlined in steps 6 through 14 in the "Knife Setting-Top Head" section (page 50).
- 8) Set a precision straight edge on the main table and extended it over the head and CAREFULLY rotated the head by hand, the highest knife should lightly scrape the bottom surface of the straight edge. This means that the highest knife should be from zero to 2 to 3 thousandths above the main table. If the knife is not set in this range, across the main table, you may have to re-set the right and left bottom head adjusting bolts,(see step 20 **ON THE CUTTERHEAD, FEEDING & HOLDDOWN COMPONENTS ILLUSTRATION**), until the proper setting is obtained.
This means the knife is level with the main table or a few thousandths of an inch higher.



KNIFE SETTING PROCEDURE FOR

SIDE HEADS:

To set the side head knives you must remove the heads from the machine and place them onto a wooden work bench or equivalent to protect the knives from damage.

Assemble the following tools:

- a) Heavy duty Industrial Work gloves.
- b) 55 mm tee handle wrench (supplied with machine).
- c) 17mm head wrench (supplied with machine).
- f) Large screw driver (supplied with machine).
- g) Block of hardwood.
- h) 1 set of sharp balanced replacement knives.
- i) 1 Knife setting device (supplied with machine).

1. WHILE WEARING YOUR INDUSTRIAL SAFETY GLOVES, locate the spindle lock on the outside of the side head assembly, pull out the black tee handle and rotate it 90 degrees. CAREFULLY rotate the head until the spindle lock engages.
2. Remove the hex nut that locks the head to the spindle by using the tee handle wrench supplied. The nut on each head loosens in the direction the head turns while cutting. The right head is a right hand thread, the left head is a left hand thread. Keep nuts separate to avoid damaging threads.
3. If installed on the top of each side head, remove the tapered split ring by carefully pressing a screwdriver into the slot to release the pressure on the shaft.
4. CAREFULLY remove the head and place it onto a wooden work bench or other non damaging surface. USE HEAVY DUTY INDUSTRIAL WORK GLOVES TO PREVENT INJURY.
5. Set the head vertically on the bench and loosen all the Gibb bolts evenly, as described in KNIFE SETTING PROCEDURE FOR TOP HEAD. Do not loosen completely. Repeat on all knives.
6. Lay the head horizontally onto the bench and finish loosening a Gibb until the knife springs up.



7. Remove the knife, springs, and Gibb. Thoroughly clean all of these items and the cutterhead slot. Repeat for all four knives.

8. WHILE WEARING INDUSTRIAL SAFETY GLOVES, CAREFULLY clean all new or re-ground knife edges thoroughly by sliding a wooden block back and forth across the length of the knife until free of contamination. Repeat process until all knives are clean.

9. CAREFULLY install springs, Gibb and knife into one cutterhead slot.

10. Place the knife setting device as illustrated in the Fig. 12 (**knife setting procedure for top head**) and hold it firmly with one of the hands.

11) Starting with the second bolt in from each end, snug up all the bolts evenly and then back them off just enough so that the knife moves freely, The spring will then push the knife toward the knife setting device stop.

12) The knife should be in the correct position, so Tighten each Gibb bolt from the center outwards, and do not tighten one Gibb completely but tighten each one slightly and go around the head several times until proper tension (400 inch pounds) is obtained on each Gibb

13. CAREFULLY replace head on shaft. Heads can be used on either side by turning them end over end 180 degrees. If required, be sure that the top and bottom split rings are in place before installing the lock nut.

14. Install and firmly tension the nut onto the shaft. Do not use a pipe or any leverage device on the tee handle wrench.

15. Place the spindle lock securely in the free position so that the head turns freely. The spindle lock has machined notches to hold it in place. Always be sure it is in the proper notch to avoid serious damage to the machine.

16. Once both sideheads have been properly re-installed, reset the fences and guides to the cutting circle of each head.

KNIFE WEAR TIP:

Set each side head scale to zero and run in this position until the knives wear, then lower each head until the unused portion of knife is positioned at the required working height.

When the heads can no longer be lowered (approx. 10 cm / 4" of trivia) rotate the heads to the opposite side, start at zero and repeat the process.

**CORRUGATED KNIVES:**

There are two significant advantages to using corrugated knives. First, since they are held into the head by inter-locking the grooves on the knife face into the grooves in the head, as well as the pressure between the gibbs, gibe bolts and head, they are held more securely than smooth planer knives and are safer to use, when installed properly. Second, since the grooves on the knife and in the head are parallel, when manufactured and maintained properly, they are quicker to set into the head.

Though they are safer to use and require less installation time, they cost more money to purchase and they require more sophisticated and expensive grinding procedures to maintain them properly. All of these factors must be considered when deciding to use either smooth or corrugated knives for any given production run.

Since they are held more securely in the cutterhead, they are the best tool to use for profile work that requires the knife to protrude further beyond the head body than for normal planing. For any profile work that requires the knife to extend more than 3 mm, corrugated knives are recommended.

Recommendations:

Always invest in at least M-2 quality knife steel from a reputable supplier.

Once a set of knives has been properly ground, always parallel to the corrugations, and balanced, make certain that the knife and head pocket are thoroughly clean before installing the knives into the cutterhead.

Always keep corrugated knives in sets of two balanced knives.

If four knives are to be used, install each set of two matched knives in opposite pockets in the cutterhead.

Always install the knives so that the minimum cutting circle of the profile knife, the deepest part of the profile ground into the knife, is not extending more than one corrugation above the cutterhead body. Since each corrugation is about 1,5 mm or 1,5 mm, the minimum cutting circle should never be more than about 2,3 mm or 2,4 mm beyond the cutterhead.

When ordering new knife stock, make certain that the new knife will not extend much more than one corrugation beyond the cutterhead body before the heel of the new knife contacts the seat of the pocket. If the knife stock is too wide and protrude too far out of the cutterhead, this will cause a potentially dangerous situation.



The gibe used for each corrugated knife should be about the same length as the knife, and not shorter than 15% less than the knife.

Gibbs should also be kept in sets of two balanced pieces and installed opposite each other in the cutterhead.

If each knife is ground precisely parallel to the corrugations and identical to each other, and the head is corrugated precisely, than each knife should be almost perfectly within the same cutting circle, when installed into the cutterhead. When this is the case, the knives only need to be adjusted side to side within the cutterhead for proper setting, and not up and down.

Use quality and precision setting gages to properly set each profile knife into the cutting circle.

Avoid using corrugated knives for straight planing, since, if they are not ground precisely parallel and identical, per the height of each corrugation, they will not be set close to the same cutting circle. Since they must be raised or lowered at least one corrugation at a time, and cannot be tilted, as with smooth planer knives, it can be sometimes impossible to get all of the properly set, without severe jointing.

Always store the knives in a dry, flat and safe storage rack, or container and keep a light coat of machine oil on them to minimize corrosion.

Proper care, grinding, balancing and setting will help to maximize the performance, knife life, and minimize the operating costs, downtime, of your tooling.

**KNIFE JOINTING:**

Knife jointing is a process where a stationary stone is put into contact with a cutterhead that is rotating at full RPM. This process when performed properly, is used to even out the high and low areas of the knife tips to create a uniform cutting circle. The more uniform the cutting circle is, the better finish that will be experienced on the lumber being planed or molded. Both straight knife and profile knife jointers are available. As in most situations, there are advantages and disadvantages to be considered;

ADVANTAGES:

The chip load on each knife is more evenly distributed between all the knives when the knives are properly set and jointed, allowing the cutterhead and knives to operate more smoothly.

A properly jointed head usually gives a higher quality finish at a given feed rate or can maintain the same finish at a higher feed rate.

Jointing can sometimes be a quick way to freshen up a set of dulling knives, without having to remove them for grinding. If the set of knives were properly installed and not run until they were too dull, the first jointing can allow between 113 to 112 more production to be run before more knife maintenance must be performed. If, after the first jointing, the knives are not run too dull again, less than one third more production can be gained by one more jointing procedure. By this time, the machine will be very noisy and the knives must be removed and ground.

Disadvantages:

The jointing process can be very dangerous if not performed properly and safely.

A jointed edge is not as sharp as a properly ground edge.

Jointing leaves a heel or flat spot behind the cutting edge, sometimes causing it to rub on the lumber as it leaves the cut.

A jointed edge makes smaller chips that are harder for the blower system to extract.

A jointed head requires more horsepower.

A jointed knife can cause chip tear out and fuzzy grain, depending on moisture content and species of the wood.

As the flatness of the joint is increased, the operating noise level increases accordingly.

A jointed head increases vibration and operating stress on the head and bearings.



A jointed knife edge will dull faster than a ground edge.

An over jointed knife might have to be ground the equivalent of two or three normal grindings, before a proper cutting edge is established. When this occurs, the life of the knife is significantly reduced.

Although the disadvantages seem to outweigh the advantages, you should perform your own experiments to determine if knife jointing is overall advantageous for your own operation.



Jointing is a very dangerous procedure that should only be attempted by qualified operators who have thoroughly read and understand this manual, and have spent enough time operating the machine to become totally familiar with its proper and safe operation.



Make certain that no knife contacts the stone as the head is rotated. When the head is started under power, there should be absolutely no contact of the stone and any knife until the stone holder is intentionally lowered.



Never start the cutterhead motor if the stone is low enough to contact any knife along th entire length of the cutterhead.



GUIDE SYSTEM

1. Top infeed rolls:

Solid or sectional round cylinders, usually sharp edged or serrated, used to advance lumber up to the cutterheads. These rolls are spring loaded to allow for movement up and down, accommodating thick and thin lumber variations. Sectional feed rolls are available and allow for several boards to be fed, side by side, at one time, even though there may be slight thickness variations between the individual boards. Urethane feed rolls are available to feed materials without marking the surfaces, especially when re-manufacturing already surfaced lumber.

2. Bottom Infeed Rolls: (When installed)

These solid rolls are set slightly above the table surface to reduce friction. The round cylinders are usually smooth but can be sharp edged on some machine designs. These rolls usually have a small degree of adjustment, are not spring loaded, and rotate in a fixed height position.

These rolls can either be idlers or power driven.

3. Pressure Bar/Bottom Head: (When installed)

A series of loaded holddown shoes to help hold the lumber down as it passes over the bottom head. The individual shoes form over the top surface of the lumber to minimize the down pressure to prevent cracking wide cupped boards.

4. Outfeed Rolls:

Smooth round cylinders so they do not mark or damage the planed surface of the lumber. They are used to pull the wood through the machine after it has lost contact with infeed rolls.

5. Infeed Table:

An extension table used to guide the lumber level into the machine. Some infeed tables are adjustable up and down from zero to one-half inch in order to set a fixed depth of cut over the bottom cutter head.

6. Main Table: (Platen)

The surface that runs directly under the top cutterhead, feed rolls, chip breaker and pressure bar, where the finish thickness is set, and is usually the surface that all major feed system components are set parallel to.

**7. Cutter Head:**

A round cylinder with replaceable or permanent knives that protrude beyond the body of the cylinder. These heads usually rotate opposite, or against, the feeding system at high r.p.m.'s.

8. Chip Breaker / Top Head:

A spring loaded solid or sectional pressure bar located in front of the top cutter. It is designed to break the chips off without splintering and tearing the lumber and to hold the lumber firmly down onto the main table for a quality finish. Sectional chipbreakers are available, In conjunction with top sectional feed rolls, to allow for several boards to be fed, side by side, at one time, even though there may be slight thickness variations between the Individual boards.

A solid chip breaker system uses one sold bar across the with of the machine to hold the lumber down onto the main table. A sectional system uses individual shoes form over the top surface of the lumber and to hold it securely down onto the table.

9. Pressure bar / Top Head:

A solid bar located behind the top cutter head. It is designed to hold lumber firmly down onto the main table until completely clear of the top head.

10. Right Infeed Fence:

A fixed or adjustable straight edge that guides lumber starlight through the machine and into the right sidehead. This fence is preset to allow for a fixed depth of cut from the right sidehead.

11. Left Infeed fence:

An adjustable spring loaded straight edge that is used to guide varying width lumber against the right infeed fence and to limit the maximum width of lumber entering the machine.

12. Left Infeed Guide Roll:

An adjustable spring-loaded roll positioned In front of the machine to guide the lumber over against the right infeed fence and to limit the maximum width of lumber entering the machine.

13. Left Sidehead Infeed Guide:

An adjustable and spring loaded plate, located in front of the left sidehead, used to guide varying width lumber against the right sidehead and to limit the maximum width of material entering between the two sideheads.

**14. Sidehead Holddown:**

Adjustable and spring loaded rolls to hold lumber firmly down onto the table, or table rails, when the sideheads are machining the edges of the lumber.

15. Right Outfeed Fence:

An adjustable guide after right sidehead used to keep lumber straight and secure as it is being machined.

16. Left Outfeed Fence:

An adjustable guide after the left sidehead used to keep lumber straight and secure, as it is being machined.

SYSTEM SET-UP**General introduction:**

The feeding and holddown systems, including the top and bottom feed rolls, the bottom head pressure bar and the top head chip breaker and pressure bar, play a critical role in the performance of the machine and the success and or failure of the planing operation. There are many variables that can effect the feeding process such as lumber that is green, dry, thick, thin, cupped, warped, swept, cracked, tapered, etc,. The adjustments given in this section are designed to work under different conditions and will give positive results in most cases. But, when a feeding problem arises, you might have to modify some these adjustments slightly to correct the feeding problem.

Only attempt to change any of these settings after you have double checked to make absolutely certain that all of the feeding and holddown system components are set correctly, according to the specifications given in this manual. If you are having difficulty in getting your machine to feed properly, be sure to thoroughly review this entire section, then check the trouble shooting section of this manual and then, if you are still not able to solve your feeding problem call your Pinheiro service technician.



Every machine has its own character and only practice, experience, common sense and dedication to becoming a high quality technician will teach you the subtle adjustments required, of your particular machine, to quickly and easily correct unexpected feeding problems.

Aggressive hammering against lumber that has stopped feeding can often lead to serious damage to the machine and or possible bodily injury.

It is always a very good practice to keep a set up log near the machine to keep notes about the different settings that you have found that work best for the many different situations that will occur. Dedication to learning the art of becoming a first class technician and keeping accurate notes will speed up your learning process and will improve your performance, and value to your company, more rapidly.

Before continuing on this section, make certain that the top and bottom heads are still parallel with the main table and that the knives in the top and bottom heads are set properly and in good operating condition. (See Knife Setting Section)

It is very important that you always do your best to consistently adjust your machine as close as possible to the tolerances listed in this section. Because there are so many variables in the real work place, some allowance must be given to compensate for them. At any given time, once you have done your best to set your machine up to the exact recommended specifications, you can allow a plus or minus 0.05 mm tolerance.

PREPARATION

1. Assemble the following items:
 - a. One set of metric open/box end wrenches.
 - b. One extra 19 mm open/box end wrench.
 - c. One set metric alien wrenches.
 - d. One PG-1 universal planer gage.
 - e. One large screw driver.
 - f. One pair of long cuff safety work gloves.
 - g. One straight edge as long as the pressure bar.



- h. One pry bar and block of wood to place under bar.
2. Open the machine to about the 125 mm mark on the thickness scale to allow adequate space to use the PG-1 set up gage.
3. Press in and lock both front & rear emergency stop buttons to the OFF position and switch the main disconnect to the OFF position and lock into this position.
4. Put on the long cuff safety work glove and be certain to always wear these.
These safety gloves to eliminate the possibility of cutting your hands and arms when working around the very sharp knives in the cutterheads.
5. Remove the following items from the machine:
 - a. Left and right infeed fences. (When installed)
 - b. Outfeed holddowns. (When installed)
6. Spread the sideheads apart to their maximum open position- (When installed)
7. Carefully raise the main cover/sound enclosure and carefully secure it in the maximum open position.

SETTING THE TOP HEAD CHIPBREAKER AND PRESSURE BAR

Introduction:

Before starting this procedure, be certain that you thoroughly understand the concept of a Chipbreaker and a pressure bar, as described and illustrated in the *Feeding, Holddown and Guide System Component* section of this manual. Before beginning the vertical adjustments on the top head Chipbreaker and pressure bar, be certain that both the Chipbreaker and pressure bar are in the proper horizontal position. There are two types of adjustments in these systems, vertical and horizontal. Both adjustments must be properly made in order for the feed system to function properly and for you to attain the best possible finish.

Horizontal Adjustment Procedure:

The closer these bars are to the cutting circle, the better finish you will attain on the top surface of the board.



You must always keep a minimum of 6 mm between the maximum cutting circle of the top head and the inside face of both the Chipbreaker and pressure bar. With any less clearance this 6 mm, you risk the possibility that when the pressure and chip breaker are raised upward by over thick rough material, that these two metal objects may come into contact with the top head knives, causing possible expensive damage to the machine and or bodily injury.

To adjust the horizontal position of the chipbreaker and or pressure bar, loosen the jam nuts and or bolts that lock the system into position and turn the nuts or bolts that move the system until the chipbreaker and pressure bar are at the desired setting. Once the 6 mm clearance has been set, and double checked by rotating the cutterhead by hand, securely tighten the jam nuts or bolts to lock the system in place.

Vertical Adjustment Procedure:

In order to keep a uniform down pressure on each board as it enters and exits the top cutterhead, the chipbreaker and pressure bar system must be parallel to the main table and positioned at the proper height in relation to the top head cutting circle. If the system is set too high, the board can chatter as it passes under the top cutterhead and give you a washboard finish. If the system is set too low, the board may get jammed while passing through the machine. Generally, the bottom most surface of the chipbreaker and pressure bars are set at about 0,25 mm below the top head cutting circle.

If the chipbreaker system is a solid system, the bottom surface of the chipbreaker, that comes into contact with the lumber, will be a solid bar.

If it is a sectional chipbreaker system, the bottom surface will be a series of sectional shoes. Either way, the height setting is made from the bottom most surface that comes into contact with the lumber.

Preparing the Set UP Gage:

Place the PG-1 Universal set up gage on the left side of the main table, directly under the top head, with the contact point of the dial indicator in the up position. Loosen the thumb screw on the indicator holder and raise the indicator until the contact point touches the body of the top cutterhead and the needle move about 0,50 mm.

Move the indicator assembly in and out under the cutterhead body until you locate top dead center (TDC the highest reading on the dial). While holding the gage firmly in this position.



Carefully rotate the cutterhead backwards, (so the back of the knife comes in contact with the contact point of the indicator, and not the cutting edge of the knife) to find the highest reading on the dial. As you carefully rotate the head backwards, the highest reading on the indicator will represent the top dead center of the top head cutting circle. Once you have established this reading, rotate the indicator face until you have positioned the zero, on the indicator face, to this exact position.



Now that you have zeroed in on your top head cutting circle, you will use this exact zero, point to set all of the components of the feeding and holddown systems.

1. Move the gage forward and under the left end of the Chipbreaker bar.

Move the gage in and out until you get the highest reading on the gage, this is TDC. Since you are looking to position the lowest point on the bottom of the Chipbreaker bar 0,25 mm below the cutting circle, you must read, from your established zero point on the dial, +0,25 mm. Since the needle on the dial may rotate past zero more than one time while you are moving from the cutterhead to the chipbreaker bar, be very careful that you take your 0,25 mm reading from your established zero point on the dial.

2. Now, move the gage under the right end of the Chipbreaker bar and get your TDC reading. If your left and right readings are within 0,05 mm from the desired 0,25 mm setting, you can leave the chipbreaker bar at this setting, making certain that it is securely locked into this position. If the left and right readings are more than 0,05 mm apart, and or the bottom face of the chipbreaker is very close to the 0,25 mm setting, you must now adjust the Chipbreaker bar to the proper setting.

3. To change the vertical position of the Chipbreaker bar, loosen the jam nuts or bolts and rotate the nuts or bolts used to move the system until the desired setting is reached on the dial indicator. Once the left side has been properly set, repeat this procedure on the right side of the chipbreaker. Take the time to double check both the left and right settings carefully. Once both settings are correct securely



tighten the jam nuts or bolts and check to make sure that the Chipbreaker bar has not moved during the tightening of the nuts or that you still have a +0,25 mm reading on the dial indicator.



Allways rotate the top Cutterhead by hand once your Chipbreaker has been set to make sure that you have a 6 mm minimum clearance before starting the Cutterhead motor.

Setting the Top Head Pressure Bar

To set the pressure bar assembly to be 0,25 mm below the top head cutting circle and parallel to the main table, simply follow each and every step as described to set the Chipbreaker bar.



Allways rotate the top Cutterhead by hand once your pressure bar has been set to make sure that you have a 6 mm minimum clearance before starting the Cutterhead motor.



It is always recommended that, after the Chipbreaker has been set, the Chipbreaker assembly is raised up to its maximum allowable working height and the top head rotated by hand, before the machine is started. This is done by placing a pry bar under the center of the Chipbreaker bar and on a block of wood that has been positioned on the main table, and prying the Chipbreaker bar up to its maximum height, while fully rotating the cutter head by hand. If there is less than 6 mm of knife clearance at the highest position of the Chipbreaker, the Chipbreaker must be positioned to the proper setting. When a sectional Chipbreaker system is used, simply use a short block of wood across the bottom of two shoes and follow the same lifting and hand rotating procedure. This short safety check insures that, if a thick board enters the machine, the Chipbreaker bar will not crash into the knives when it is lifted up by a thick board, possibly causing, serious damage to the machine and or bodily injury.

**Setting the Bottom Head Pressure Bar**

The bottom head pressure bar is a sectional, not a solid, pressure bar.

Each of the individual shoes is spring loaded and works independently to form over the top of cupped lumber. This design assists in feeding cupped lumber over the bottom head without forcing the lumber down too hard, possibly causing it to crack.

Before this system can be set to the proper height, 0,25 mm below the top head cutting circle, all of the individual pressure shoes must be positioned at the same height to each other.

4. Place a straight edge across the bottom face of all the shoes and check to make certain that each shoe is evenly contacting the straight edge. If any of the individual shoes are too high or too low, loosen up the jam nut and adjusting nut for that shoe and make the proper adjustment to set the shoe in line with all the other shoes.
5. Before leaving this procedure, make certain that all of the jam nuts and adjusting nuts are securely tightened on each shoe.
6. Once all of the shoes are set properly in line with each other, simply follow the same procedure, as with the other pressure bar, to set this system 0,25 mm below the top head cutting circle.



SETTING THE TOP INFEED ROLLS

Introduction

There may be two to four top infeed rolls in the machine. The first infeed roll is designed to feed the wood over the bottom jointing head and can be adjusted to apply a minimum amount of down pressure to help remove any cupping, without flattening, and possibly cracking, the lumber. The second and third feed rolls are usually set with more spring pressure to drive the wood from the first roll up to the top Cutterhead. These rolls can be made of urethane and have a smooth surface or can be made of steel and have every aggressive teeth. both designs have been engineered to handle most all type of both hardwood and softwood.

These rolls should be set at approximately 1 mm below the top head cutting circle.

1. Raise the infeed table up to the zero position on the infeed table thickness scale and even with the main table.
2. Place the gage under the left end of the first top infeed roll. Make sure that you are keeping track of your established zero point on the dial (see Preparing the Set Up Gage).
3. Slide the gage in and out under the feed roll until you get the highest reading on the dial.
4. On aggressive feed rolls with deep grooves and teeth, make certain that the feed roll is positioned so that one of the teeth is faced starlight down towards the table in order to establish the proper TDC from the lowest point on the feed roll.
5. Move the gage over to the right end of this feedroll and slide it in and out until you get the highest reading on the dial. If the left and right reading on your dial is within 0,05 mm of each other, and the TDC is at 1 mm below the top head cutting circle, double check that the left and right side jam nuts and adjusting nuts for this feed roll are securely tightened and continue on to the next feed roll. If the left and right readings are more than 0,05 mm apart, you must adjust this feed roll to the proper position.
6. To adjust the feed roll to the proper height and or parallel to the main table, simply follow the same steps used to set the pressure bars.
7. Once you have the first top infeed roll set to the proper height and parallel to the table, and all the nuts are properly tightened, go on to the next feed roll and follow this same exact procedure.



SETTING TOP OUTFEED ROLLS

Introduction

The top outfeed roll is used to pull the work away from the top Cutterhead. This roll must have a very smooth finish in order not to mark the top surface of the lumber that has been finish planed by the top Cutterhead. Since the smooth finish offers much less traction, It is important to understand that this top outfeed roll requires much more spring pressure and is set lower than the infeed rolls, 1,25 mm below the top head cutting circle.

Also, it is critical that this roll is kept very clean and free from foreign matter, or else, whatever has collected on this roll will be imprinted into the top finished surface of your planed lumber.

1. To adjust the feed roll to the proper height and or parallel to the main table, simply follow the same steps used to set the pressure bars.



Outfeed Device: If you own a 4 or S head Planer/Molder model with a powered outfeed device beyond the last Cutterhead, set all of the top feed rolls to 1,25 mm below the top head cutting circle.



Saw Arbor Module: If you own a Combination Planer / Rip Saw model, you can set all of the to feed rolls at 1,25 mm below the to head cutting circle.

**SETTING THE SPRING PRESSURE**

Each of the adjusting rods for the top feed roll, Chipbreaker and pressure bars has a coil spring attached. Without the proper spring pressure on the pressure bars, Chipbreaker and top feed rolls, It will be very difficult, if not impossible, to attain consistent feeding and a quality planing finish.

1. Loosen the spring jam nut and adjusting nut on each of the adjusting rods. Once there is no longer any tension on each spring, simply turn the adjusting nut hand tight against the spring.
2. Use the table below to set the proper spring pressure on each of the adjusting rods.
3. Make certain that you keep track of the number of times you have fully rotated the adjusting nut in order to keep even and proper tension on all of the feed rolls, pressure bars and Chipbreaker,
4. Once the proper number of rotations on each nut has been reached, tighten the jam nut against the adjusting nut to securely lock the system into the set position.

SPRING AND PNEUMATIC PRESSURE SETTINGS

Each of the settings listed below represents a good average setting for general planing, molding and ripping. With time, practice and dedication, you will determine the best settings to handle different machining operations under various working conditions.

1. st and 2. nd Top Infeed Rolls	Pneumatic	5 rot.
3. rd and 4. th Top Infeed Rolls	Spring	5 rot.
Top Outfeed Roll (5. th roll)	Spring	10 rot.
Bottom Head Pressure Bar	Spring	5 rot.
Top Head Pressure Bar	Spring	8 rot.
Top Head Chipbreaker	Spring	5 rot.
Side Head Module Holddown Rolls	Spring	3 rot.
Outfeed Device Module Top Feed Rolls	Spring	8 rot.

**SETTING THE BOTTOM FEED ROLLS**

The bottom feed rolls are used to break the friction between the table and the material being fed through the machine. You will find that it might often be necessary to re-adjust these feed rolls to help the feeding process.

Various species of lumber, thickness, dryness, surface roughness, defects, feed speed, etc, will create different conditions may force you to be ready to make ongoing adjustment during production runs. Since these small adjustments are easy to make with the bottom feed roll adjusting handles, take the time to get used to what settings work best for different product runs.

Keep in mind that if the rolls are too low, this will often cause the wood to stop feeding. If the rolls are too high, you will most likely experience sniping on the bottom face of your lumber.

PREPARING THE SET UP GAGE

Place the PG-1 Universal set up gage on the main table. Rotate the gage so the contact point is facing down.

Loosen the thumb screw on the indicator holder and raise or lower the indicator until the contact point touches the table and the needle moves about 0,5 mm. Move the indicator assembly back and forth over the table until you locate top dead center (TDC the highest reading on the dial).

While holding the gage firmly in this position, rotate the indicator face until you have positioned the zero, on the indicator face, to this exact position.

1. Position the gage onto the table and over the center of the first bottom feed roll. Move the gage back and forth until you have located the TDC of this roll. If the reading is according to the setting you require for the material you will run (See Setting Table Bellow), then go onto the second bottom feed roll, and so on.
2. If the roll must be adjusted, simply loosen the locking device and use the adjusting handle to make the proper setting. After the setting is correct tighten the locking device and double check the setting, before going onto the nest roll.
3. It is a good practice to often check to make certain that the bottom feed rolls are parallel to the table. Simple use the gage to check both ends of the roil to make certain that both ends are equal on the gage. If not, simple adjust either the left or right side of the roll support mechanism to bring the roil back into a parallel position. Always securely tighten all of the components that have been loosened and moved.



RECOMMENDED BOTTOM FEED ROLL SETTINGS

Soft Wood	0,075 mm Above the Table
Hardwood	0,125 mm Above the Table
Timbers	0,25 mm Above the Table

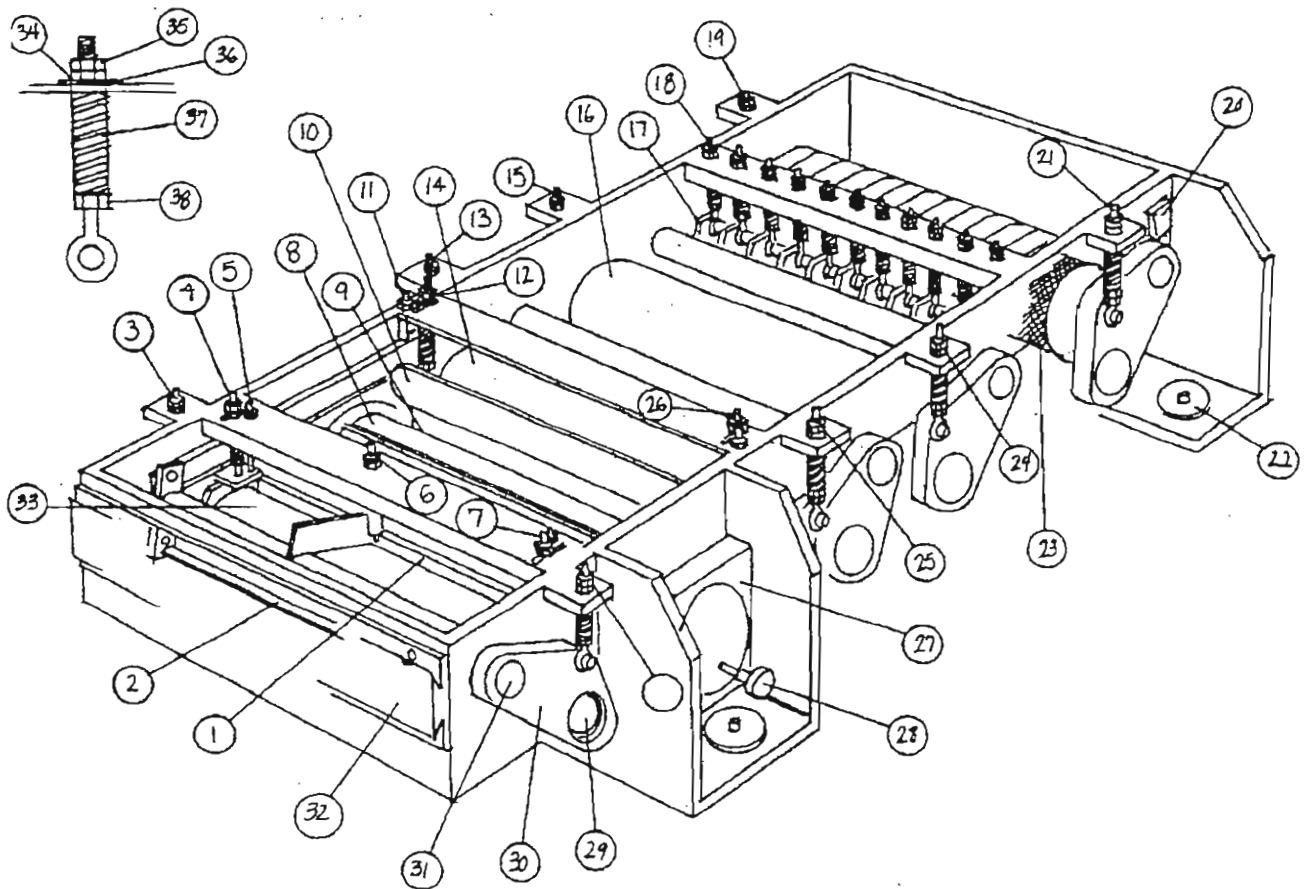


If you have thoroughly and carefully followed this entire procedure to set up the feeding and holddowns system, the machine should be ready to run. If you find problems with consistent feeding and or planing finish, simply review the manual to help determine the cause of the problem and the solution.



Avoid using hammers and other tools to soon when a problem occurs. Often, this action will only cause more problems and will complicate the situation, turning what might have been only a simple adjustment change into a major project.

Top feeding system components



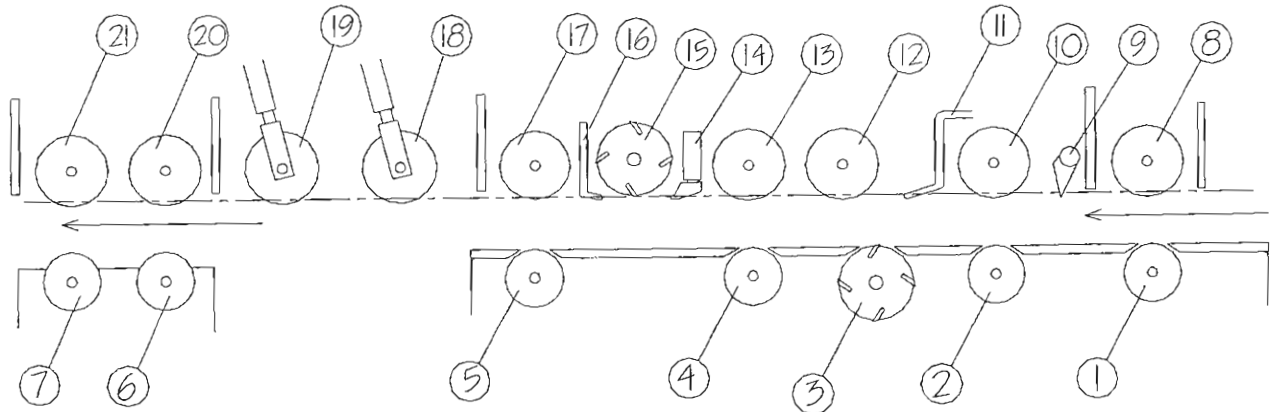
**Components list**

- 1) TOP HEAD PRESSURE BAR
- 2) TOP OUTFFED ROLL SCRAPER
- 3) TOP OUTFFED ROLL ADJUSTER RIGHT SIDE
- 4) TOP HEAD PRESSURE BAR ADJUSTER, RIGHT SIDE
- 5) TOP HEAD PRESSURE BAR STOP, RIGHT SIDE
- 6) HORIZONTAL ADJUSTING DEVICE FOR TOP HEAD
- 7) TOP HEAD PRESSURE BAR ADJUSTER, LEFT SIDE
- 8) TOP HEAD
- 9) TOP HEAD CHIP BREAKER BAR
- 10) SHAVINGS DEFLECTOR PLATE
- 11) TOP HEAD BREAKER STOP
- 12) TOP HEAD CHIP BREAKER ADJUSTER, RIGHT SIDE
- 13) 3RD TOP INFEED ROLL ADJUSTER, RIGHT SIDE
- 14) 3RD TOP INFEED ROLL
- 15) 2ND TOP INFEED ROLL ADJUSTER, RIGHT SIDE
- 16) 2ND TOP INFEED ROLL
- 17) BOTTOM HEAD PRESSURE SHOE
- 18) BOTTOM HEAD PRESSURE SHOE ADJUSTING DEVICE
- 19) 1ST TOP INFEED ROLL ADJUSTER, RIGHT SIDE
- 20) 1ST TOP INFEED ROLL LIMIT SWITCH
- 21) 1ST TOP INFEED ROLL ADJUSTER, LEFT SIDE
- 22) BREATHER FOR FRAME LIFTING SYSTEM, LEFT FRONT
- 23) 1ST TOP INFEED ROLL
- 24) 2ND TOP INFEED ROLL ADJUSTER, LEFT SIDE
- 25) 3RD TOP INFEED ROLL ADJUSTER, LEFT SIDE
- 26) TOP HEAD CHIP BREAKER ADJUSTER, LEFT SIDE
- 27) TOP HEAD BEARING BLOCK
- 28) TOP HEAD LOCKING DEVICE
- 29) TOP OUTFEED ROLL SHAFT
- 30) TOP FEED ROLL HANGER PLATE
- 31) HANGER PLATE PIVOT SHAFT
- 32) DOVETAIL FOR OUTFEED ROLLS

ADJUSTING DEVICE

- 34) HEIGHT ADJUSTING NUT
- 35) JAM NUT
- 36) MACHINE FRAME
- 37) SPRING WASHER
- 38) SPRING PRESSURE ADJUSTING NUT

Feeding & holddown system components

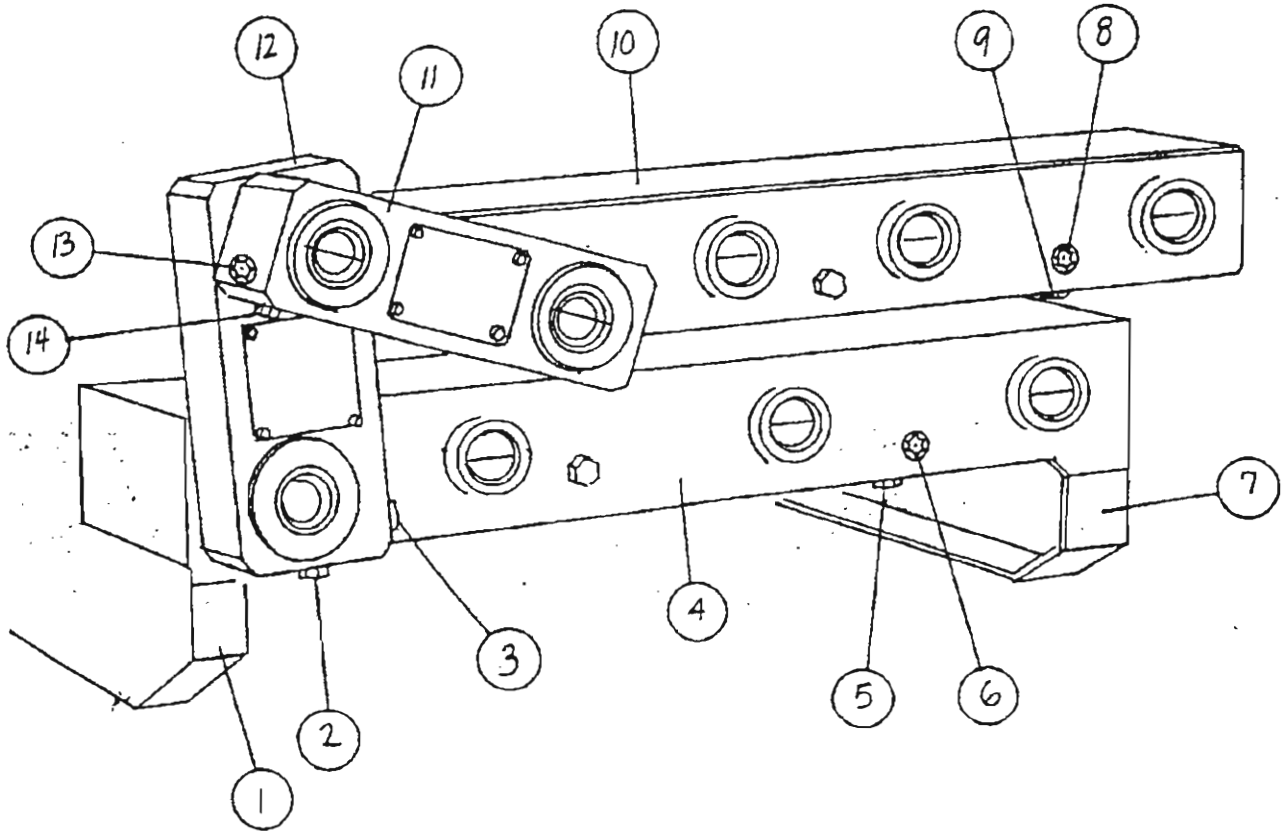


- | | |
|--|---|
| 1) FIRST BOTTOM INFEED ROLL (OPTION) | 12) 3RD TOP INFEED ROLL |
| 2) 2ND BOTTOM INFEED ROLL | 13) 4TH TOP INFEED ROLL |
| 3) BOTTOM CUTTERHEAD | 14) TOP HEAD CHIPBREKER |
| 4) 3RD BOTTOM INFEED ROLL | 15) TOP CUTTERHEAD |
| 5) BOTTOM OUTFEED ROLL | 16) TOP HEAD PRESSURE BAR |
| 6) FIRST BOTTOM ROLL/OUTFEED DEVICE (OPTION) | 17) TOP OUTFEED ROLL |
| 7) 2ND BOTTOM ROLL / OUTFEED DEVICE (OPTION) | 18) FIRST TOP OUTFEED ROLL / SIDE HEAD MODULE |
| 8) FIRST TOP INFEED ROLL (OPTION) | 19) 2ND TOP OUTFEED ROLL / SIDE HEAD MODULE |
| 9) ANTI KICKBACK FINGERS | 20) FIRST TOP ROLL / OUTFEED DEVICE (OPTION) |
| 10) 2ND TOP INFEED ROLL | 21) 2ND TOP ROLL / OUTFEED DEVICE (OPTION) |
| 11) BOTTOM HEAD PRESSURE BAR | |

	POSITIONS	HEIGHT SETTING HEAD CUTTING CIRCLE	PRESSURE SETTINGS
TOP INFEED ROLLS	8), 10)	..... 2 mm BELOW	..... 5 ROTATIONS
TOP INFEED ROLLS	12), 13)	..... 2 mm BELOW	..... 5 ROTATIONS
TOP OUTFEED ROLL.....	17)	..... 1,5 mm BELOW	..... 10 ROTATIONS
BOTTOM HEAD PRESSURE BAR.....	11)	..... 1,5 mm BELOW	..... 5 ROTATIONS
TOP HEAD PRESSURE BAR.....	16)	..... 0,5 mm BELOW	..... 8 ROTATIONS
TOP HEAD CHIPBREAKER	14)	..... 1,5 mm BELOW	..... 5 ROTATIONS
SIDE HEAD MOD. HOLDDOWN ROLLS....	18), 19)	.... 2 mm BELOW	..... 3 ROTATIONS
OUTFEED DEVICE TOP FEED ROLLS.....	20), 21)	..... 2 mm BELOW	..... 8 ROTATIONS

	POSITIONS	HEIGHT SETTING ABOVE TABLE	
BOTTOM FEED ROLLS.....	1), 2), 4), 5),	..... 0,2 mm BELOW	(see page 73)
OUTFEED DEVICE BOTTOM FEED ROLLS.....	6), 7)	..... 0,2 mm BELOW	(see page 73)

Feed system housing



- 1) FRONT SUPPORT
- 2) BOTTOM TRANSFER HOUSING DRAIN
- 3) BOTTOM TRANSFER HOUSING SIGHT GLASS
- 4) BOTTOM HOUSING
- 5) BOTTOM HOUSING DRAIN
- 6) BOTTOM HOUSING SIGHT GLASS
- 7) BACK SUPPORT
- 8) TOP HOUSING SIGHT GLASS
- 9) TOP HOUSING DRAIN
- 10) TOP HOUSING
- 11) TOP TRANSFER HOUSING
- 12) BOTTOM TRANSFER HOUSING
- 13) TOP TRANSFER HOUSING SIGHT GLASS
- 14) TOP TRANSFER HOUSING DRAIN



Introduction

When planing on three or four sides, it is necessary to use fences to properly guide the material being planed up to, and away from, the side cutter heads. The infeed fences guide the lumber up to the side heads and the outfeed fences guide the lumber away from the side heads. If these fences are not set parallel to each other and the outfeed fences are not properly set to the cutting circle of the side heads, it will be difficult to keep the machine feeding properly and to produce a straight and quality finished product.

The Standard 4 or 5 Head Machine will Include the Following Components in the Fence and Guide System

Right Infeed Fence

The right infeed fence is the foundation to the entire fence system. It serves as the basic straight edge to guide the lumber straight through the machine and established the depth of cut (The amount of material to be removed) by the right side Cutterhead. Once the right infeed fence is properly set, all the other components in the fence system will be set in relation to this fence.

There are two adjustments that must be made to this system during normal operation.

1. Depth of Cut:

To set the fence for the desired depth of cut, use the adjusting device located in front of the right sidehead dust hood. Release the locking device and screw the fence in or out until the proper depth of cut has been established. This will be discussed later in this section.

2. Location:

Since the right side head can be set at any position across the entire width of the table, the right fence also offers this feature. When the right side head is moved horizontally, the right infeed fence moves with the sidehead assembly. The depth of cut setting will remain in its set position, even though the fence has been moved.



Make certain to keep all the components of the rack and pinion system clean and coated with a light oil at all times. The fence system should be run through its entire adjustment range, cleaned and lubricated every week.

Right Outfeed Fence

The right outfeed fence keeps the lumber feeding straight, after it passes the right side Cutterhead, and helps to minimize sniping on the front and back ends of the lumber's edges.

This fence must be kept absolutely parallel with the right infeed fence and properly set to the cutting circle of the right side Cutterhead. Otherwise, the lumber may will stop feeding, the right and or left edges may have finish problems and the finished lumber may not be planed straight.

When the outfeed fences are properly set, the lumber will smoothly exit the Cutterheads, landing evenly onto and between both fences, to be straight and firmly guided out of the machine. When a fence is set beyond the cutting circle, the lumber will be pushed away from the Cutterhead, causing snipe on the end of the board, wedging it between the fences and causing it to stop feeding. When a fence is set behind the cutting circle, the lumber has no firm guide to keep it straight, causing a rough and or not straight finish



Again, it is critical that both outfeed fences be properly set to the cutting circles in order to produce a quality finish, straight lumber and consistent feeding.

Left Infeed Roller Guide

The machine may either be equipped with a roller guide or a full length fence, on the left side. In either case, this device is used to guide the lumber, entering the machine, up against the right infeed fence. Both devices can be set at any position across the width of the main table and are spring loaded to allow for variations in the width of the rough lumber.



When the roller guide is used, usually when longer materials are to be planed on four sides or molded, the adjustable roller guides the in-coming lumber over against the right infeed fence. The lumber is then guided through the machine by the feed roofs, until it leaves the outfeed roofs behind the top Cutterhead. At that point, the left sidehead infeed guide, which is adjustable and spring loaded, helps to keep the lumber against the right infeed fence as it enters the right side Cutterhead. Without this guide, the lumber could travel away from the right side Cutterhead during the planing process.

Left Infeed Fence

When short pieces of lumber are to be machined on four sides, sometimes a full length left infeed fence (available as an option) is used. The front end of the fence will be attached to the infeed area of the machine just like the infeed roll, and the back end of the fence will be connected to the left sidehead infeed guide. If and when shorter material is causing feeding problems, this left fence system can help to keep short lengths of lumber guided straighter through the machine.

Left Sidehead Infeed Guide

This guide block is used to help keep the lumber against the right infeed fence and firmly against the right Cutterhead. It is spring loaded and can be adjusted for both spring tension and maximum open position.

It is also used to limit the maximum width of the lumber entering the left Cutterhead.

Usually, this guide block will allow up to 20 mm of material to be planed by the left Cutterhead. If more material needs to be removed, the depth of cut setting, on the right Cutterhead, should be increased to even out the cutting load.

Left Outfeed Fence

The left outfeed fence keeps the lumber feeding straight, after it passes the left side Cutterhead, and helps to minimize sniping on the front and back ends of the lumber's edges. This fence must be kept absolutely parallel with the right outfeed fence and properly set to the cutting circle of the left side cutterhead. Otherwise, the lumber will may stop feeding, the right and or left edges may have finish problems and the finished lumber may not be planed straight.



Fence Alignment Procedure

Since the PMA series has the right fence permanently installed and aligned at the factory, we will use this fence to align all the other fences and guides in the fence system.

1. Assemble the following items.
 - 1.1. One set of metric alien wrenches.
 - 1.2. One High Quality straight edge, between 2 mm to 2,5 mm long. (This precision tool must be handle carefully and stored in a dry, flat, safe and secured area).
 - 1.3. One gage block. (wood or aluminum, about 125 mm x 500 mm, with both edges machined exactly square and parallel)
 - 1.4. Flashlight.
 - 1.5. One pair of long cuff safety work gloves.
 - 1.6. Clean wiping cloth.
 - 1.7. Small container of light machine oil-
2. Turn off the front and rear emergency stop buttons. Be sure that the main power switch is shut off on the electrical entrance.
3. Put on the long cuff safety work gloves
4. Install the standard sideheads on the right and left side spindles.
5. Set the left face of the right infeed fence about 3 mm beyond the cutting circle of the right side Cutterhead.
 - 5.1. Use the depth of cut adjusting handle, located in front of the right side head dust hood, to move the fence in and out.
 - 5.2. Wipe the working edge of the fence clean and apply a light coating of oil.
 - 5.3. Place the long straight edge firmly against the fence and allow it to go beyond the right side Cutterhead.
 - 5.4. Open the top of the right side dust hood and carefully rotate the head clockwise. If any of the knives contact the straight edge, use the depth of cut adjusting device to move the fence further away from the Cutterhead. If no knives contact the straight edge, and it is about 3 mm away from the cutting circle, then go on to the next step in this procedure.



6. Once the right infeed is in position, slide the straight edge firmly against the fence, past the cutterhead and to the back end of the right outfeed fence. It is critical that the outfeed fence is exactly parallel to the infeed fence in order to produce straight and quality products.
7. Once the straight edge is properly in place and held firmly against at least 1/2 the length of the infeed fence, loosen the locking device on the right outfeed fence assembly, and use the adjusting device to move the outfeed fence until it make contact with the straight edge.
8. If the outfeed fence is touching the straight edge evenly, front to back, the setting is correct and does not need adjustment. Tighten locking device on outfeed fence assembly. Using the flashlight, double check to make certain that the straight edge and outfeed fence are exactly parallel to each other.
9. If the outfeed fence is touching only the front or back of the straight edge, loosen the alien cap screws that secure the outfeed fence assembly to the table



Carefully set the face of the outfeed fence evenly against the straight edge. Lightly tighten the cap screws and double check the alignment. When the alignment is properly set, tighten the cap screws securely. Tighten the locking device on outfeed fence assembly and double check the alignment, carefully with flashlight. Carefully remove the straight edge and store it properly.

10. It is critical that both outfeed fences are exactly parallel to each other.
 - 10.1. Make certain that there are no objects in or on the outfeed rails, between the outfeed fences.
 - 10.2. Carefully use the left sidehead horizontal adjusting device to move the left sidehead section over so that both outfeed fences are about 125 mm apart.
 - 10.3. Place this gage block firmly against the right outfeed fence and hold it in that position.



- 10.4. Loosen the locking device on the left outfeed fence assembly and carefully adjust the left outfeed fence to make contact with the gage block. If the left outfeed fence is touching the block evenly, front to back, no other adjustment is needed,
- 10.5. If the left outfeed fence is touching only the front or back of the gage block, loosen the alien cap screws that secure the left outfeed fence assembly to the table. Then, carefully set the face of the outfeed fence evenly against the gage block. Lightly tighten the cap screw and double check the alignment. When the alignment is properly set, securely tighten all the cap screws.
- 10.6. Tighten the locking device on outfeed fence assembly and double check the alignment carefully with flashlight. If the left outfeed fence is not set exactly parallel to the right outfeed fence, repeat the adjustment procedure.
- 10.7. Once the two outfeed fences are set exactly parallel to each other, carefully remove the gage block and store it properly.
11. The left sidehead infeed guide will be aligned only after the left outfeed fence is set to the cutting circle of the left sidehead.

SIDEHEADS AND FENCE SET UP PROCEDURE

Introduction

Once the fences are properly aligned, setting the heads and fences for most production runs should be a quick and simple procedure. We will cover the set up procedure for four sided planing (S4S), using straight planer knives, because this is a simple procedure.

To set the outfeed fences up to use profile knives in the sideheads, simply follow the exact same procedure, but set the straight edge to the minimum cutting circle of the heads. (Refer to the tooling section of this manual for the definition of the minimum cutting circle) This set up allows the outfeed fences to contact only the widest area of the finished product, firmly guiding it out of the machine.



Set Up Procedure

1. Assemble the following items.
 - 1.1 One set of metric alien wrenches.
 - 1.2 One High quality straight edge, between 500 mm to 600 mm long. This precision tool must be handled carefully and stored in a dry, flat, safe and secured area.
 - 1.3 Flashlight.
 - 1.4 One pair of long cuff safety work gloves.
 - 1.5 Clean wiping cloth.
 - 1.6 Small container of light machine oil.
2. Turn off the front and rear emergency stop buttons. Be sure that the main power switch is shut off on the electrical entrance.
3. Put on the long cuff safety work gloves right outfeed fence.
 - 3.1 Loosen the locking device on the right outfeed fence.
 - 3.2 Set the straight edge firmly against the right out feed fence and slide it over the right cutterhead.
 - 3.3 Rotate the head slowly and adjust the fence in and out until the highest knife in the head contacts the straight edge, then lock the fence into this position. Rotate the head 360 degrees to make certain that only one knife is very lightly contacting the straight edge.

The goal is to hear the knife contact the straight edge, but, as the knife rotates past the straight edge, the straight edge stays firmly against the fence, with absolutely no movement.

The right outfeed fence is now set about even with the right sidehead cutting circle and can be locked into this position.
 - 3.4 Check the clearance between the front end of the right outfeed fence and the cutting circle. It should be approximately 6 mm. If not, loosen the bolts that secure the fence plate to the adjusting block and slide the fence plate, forward or backward, into proper position. Then securely tighten the bolts. Rotate the head 360 degrees to make certain that there is about 6 mm clearance between all the knives and the front end of the fence.

**Right Infeed Fence:**

- 1 - Slide the straight edge along the right outfeed fence, past the cutterhead and up to the back end of the infeed fence. Hold the straight edge firmly against the outfeed fence and in this position. The outside edge of the straight edge indicates the cutting circle of the right cutterhead.
- 2 - Unlock the depth of cut setting device and adjust the right infeed fence until it lightly contacts the straight edge. The right infeed fence is now even with the cutting circle of the right cutterhead.
- 3 - Unlock the adjustable scale on the depth of cut adjusting device and position the zero mark even with the end of the depth of cut adjusting device, and lock into this position. When turning the adjusting device on this system, the marks on the scale will indicate the amount of material that will be machined off by the right cutterhead.
- 4 - Set the infeed fence to about 3 mm depth of cut, about 3 marks on the scale, if the scale is metric, and lock into that position.

This setting will allow about 3 mm of material to be removed by the right cutterhead if the lumber is riding evenly against the right infeed fence. If more or less material needs to be removed, simply re-adjust the position of the infeed fence, in relation to the cutting circle of the right Cutterhead.

Left Outfeed Fence:

- 1- Loosen the left outfeed fence locking device.
- 2- Set the straight edge against the left outfeed fence and slide it over the left head.
- 3- Rotate the head slowly and adjust the fence in and out until the highest knife in the head contacts the straight edge, then lock the fence into this position. Rotate the head 360 degrees to make certain that only one knife is very lightly contacting the straight edge.
The goal is to hear the knife contact the straight edge, but, as the knife rotates past the straight edge, the straight edge stays firmly against the fence, with absolutely no movement.
- 4- Check the clearance between the front end of the right outfeed fence and the cutting circle. It should be approximately 6 mm. if not, loosen the bolts that secure the fence plate to the adjusting block and slide the fence plate, forward or backward, into proper position. Then securely tighten the bolts. Rotate the head 360 degrees to make certain that there is about 6 mm clearance between all the knives and the front end of the fence.



The outfeed fence settings should be checked at the start of every production run.

Left Sidehead Infeed Guide:

- 1- Slide the straight edge against the left outfeed fence, past the Cutterhead and over the guide block.
- 2- Loosen the locking device and adjust the guide block even with the straight edge. 3 - Lock the guide block in this position.
- 3- Pull the guide block plate back to its maximum open position, about parallel with the straight edge, and make certain that there is at least 6 mm of space between the face of the guide block and the straight edge.
- 4- If there is not at least 6 mm of travel, reset the position of the travel stop, behind the guide block, to allow a minimum of 6 mm of travel.

Left Infeed Guide:

The left infeed guide roll, or fence, should be set so that the distance between this device and the right fence is smaller than the width of the material to be run. This causes the guide to be forced open as the lumber enters the machine and causes the lumber to be pressed against the right fence.

It is a good policy to set this guide up so that the maximum open position is about equal to that of the left Cutterhead infeed guide. This set up helps to keep material, too wide to pass between the two sideheads, from entering the machine, minimizing feeding problems and downtime.

Setting Outfeed Fence Opening:

Once the side heads are properly installed and set and all the fences have been properly adjusted, the distance between the outfeed fences must be set to the finished width of the lumber to be run. Since the right sidehead remains in a fixed position, the left sidehead must be moved in and out to set the finished width dimension for any production run.

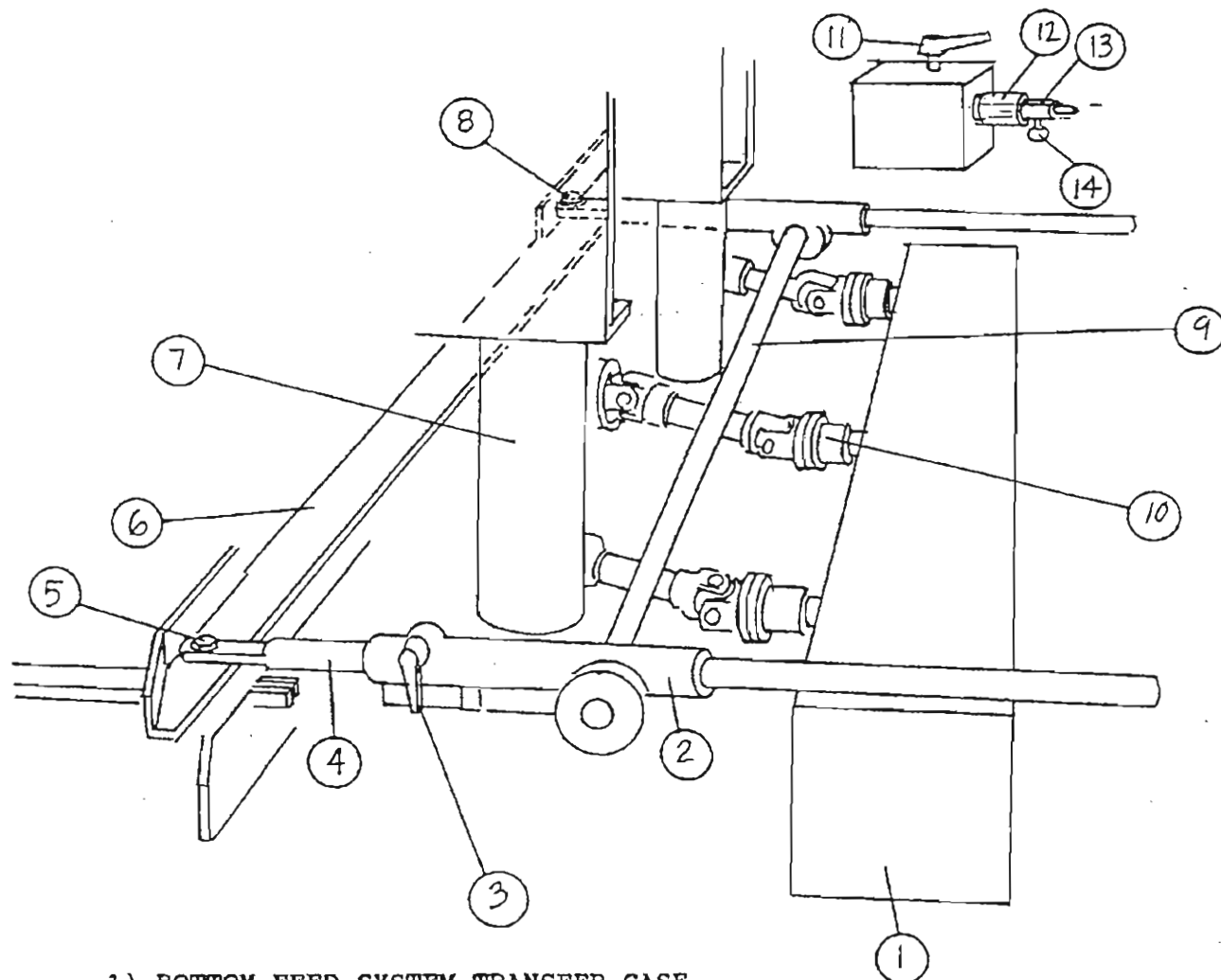


The outfeed fence scale is used to set the fences. This scale should be checked for accuracy during the scheduled monthly maintenance procedure.

Accurately measure between the inside faces of the two outfeed fences and set the indicator on the scale to the proper position.

- 1- Unlock the horizontal locking device for the left sidehead.
- 2- Use the left head horizontal adjusting device to move the left head to the desired setting.
- 3- Use the outfeed fence scale to determine the position of the left outfeed fence. If a 100 mm finished width is required, move the left sidehead until the indicator reads 100 mm on the scale.
- 4- Once the fences are set, double check the opening between the outfeed fences with a precision rule for final adjustment
- 5- Lock the left sidehead into this position.

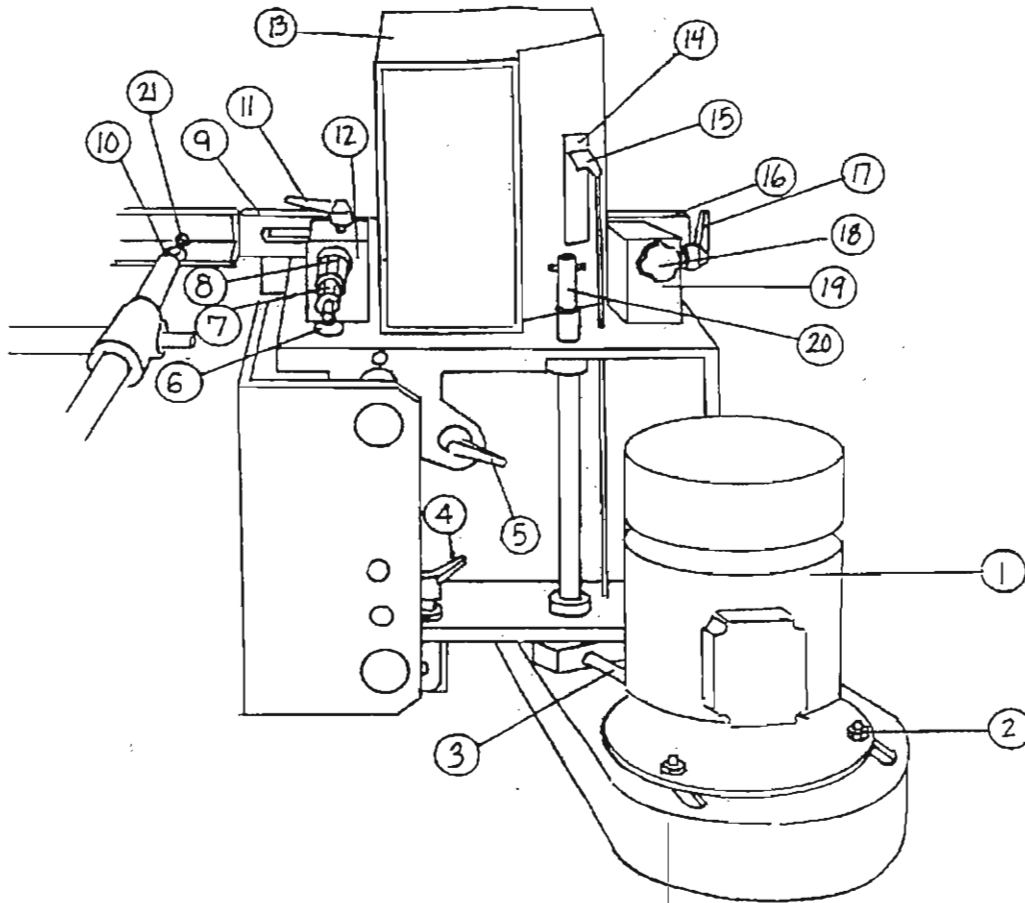
Fence System Components



1) BOTTOM FEED SYSTEM TRANSFER CASE

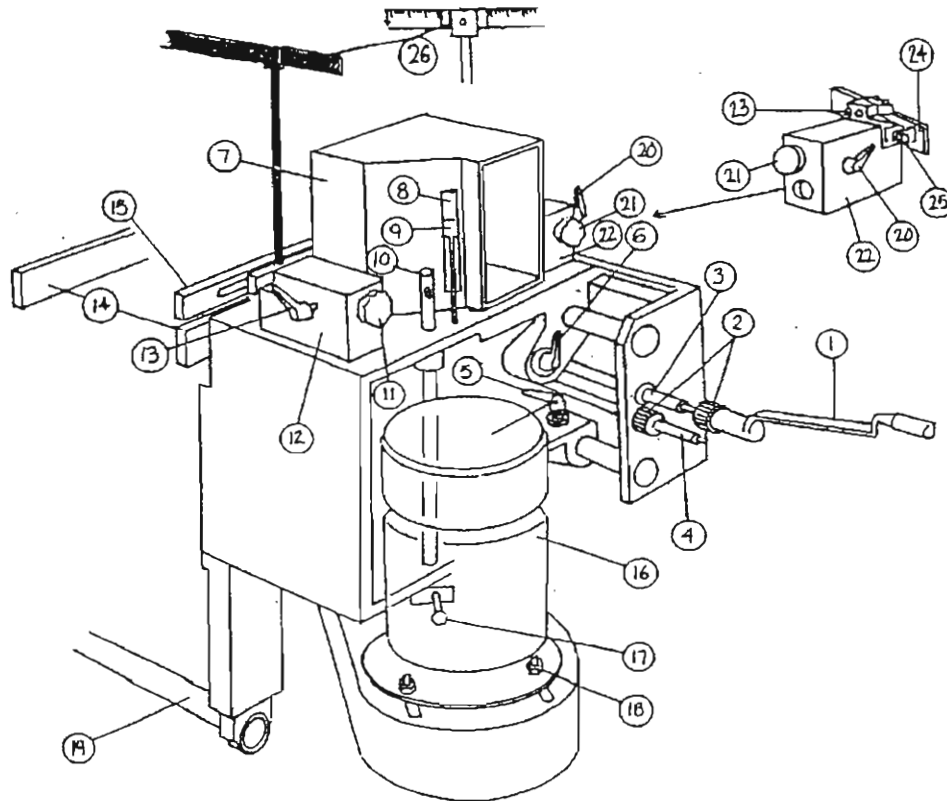
- 1) BOTTOM FEED SYSTEM TRANSFER CASE
- 2) FRONT FENCE HOUSING
- 3) LOCKING DEVICE
- 4) FRONT FENCE ROD
- 5) FRONT CONNECTING BOLT
- 6) RIGHT FENCE
- 7) FRONT MACHINE COLUMN
- 8) BACK CONNECTING BOLT
- 9) TRANSFER ROD
- 10) FEED SYSTEM DRIVE SHAFT
- 11) LOCKING DEVICE
- 12) DEPTH OF CUT ADJUSTING HANDLE
- 13) DEPTH OF CUT SCALE
- 14) LOCKING DEVICE

Right Side Spindle Components



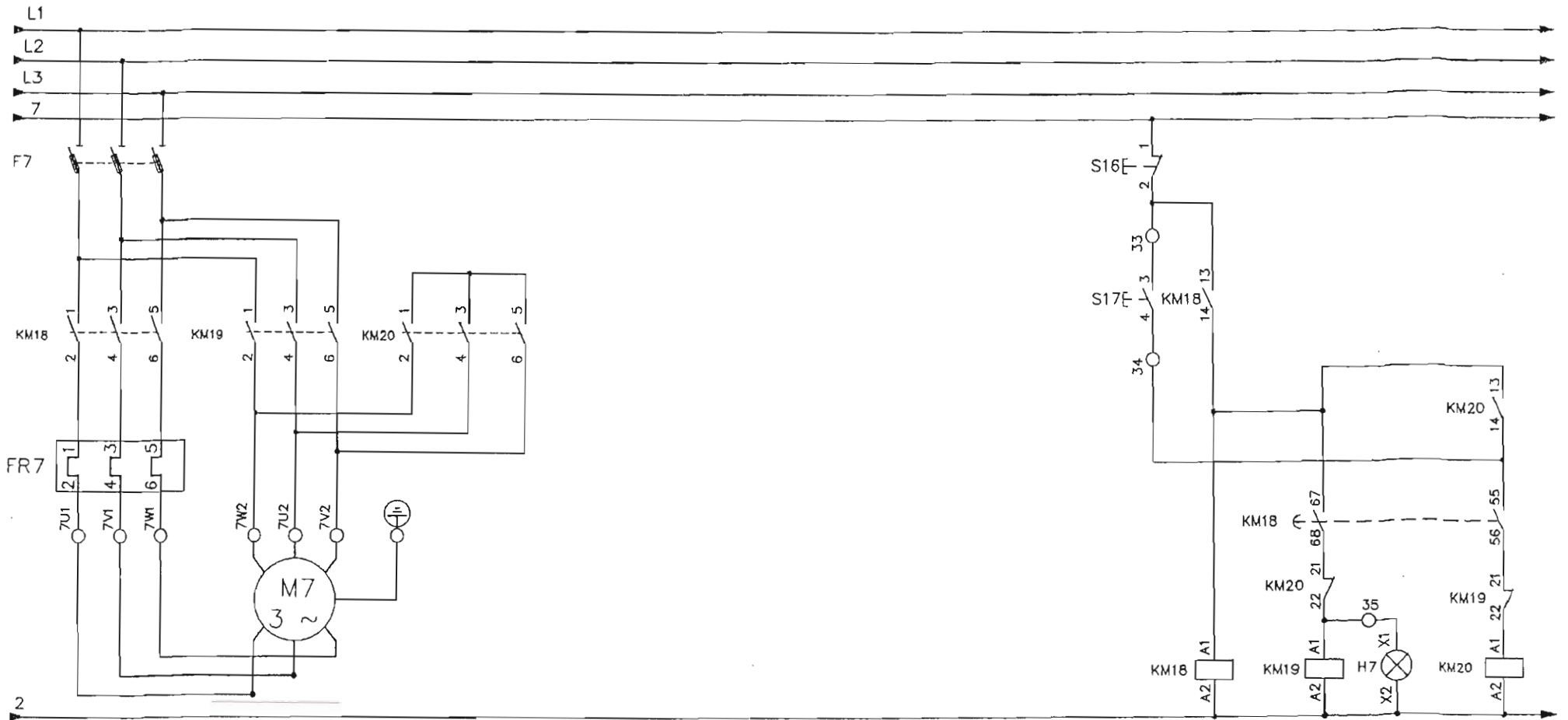
- 1) MOTOR
- 2) MOTOR POSITIONING BOLTS
- 3) BELT TENSIONING DEVICE
- 4) LOCKING DEVICE FOR HORIZONTAL MOVEMENT OF SPINDLE
- 5) LOCKING DEVICE FOR VERTICAL MOVEMENT OF SPINDLE
- 6) LOCKING DEVICE FOR ADJUSTING SCALE
- 7) DEPTH OF CUT ADJUSTING SCALP
- 8) DEPTH OF CUT ADJUSTING HANDLE
- 9) RIGHT SIDE INFEEED FENCE
- 10) FENCE ROD
- 11) LOCKING DEVICE FOR ADJUSTMENT BLOCK
- 12) DEPTH OF CUT ADJUSTMENT BLOCK
- 13) DUST HOOD FOR RIGHT SIDEHEAD
- 14) VERTICAL ADJUSTMENT SCALE
- 15) SCALE INDICATOR
- 16) OUTFEED FENCE
- 17) LOCKING DEVICE FOR OUTFEED FENCE
- 18) ADJUSTING DEVICE FOR OUTFEED FENCE
- 19) ADJUSTING BLOCK FOR OUTFEED FENCE
- 20) ADJUSTING DEVICE FOR VERTICAL MOVEMENT OF SPINDLE

Left Side Spindle Components




- 1) ADJUSTING HANDLE FOR HORIZONTAL MOVEMENT OF SPINDLE
- 2) GEARS TO LOCK BOTH SPINDLES TOGETHER
- 3) HORIZONTAL ADJUSTING DEVICE FOR RIGHT SIDEHEAD
- 4) HORIZONTAL ADJUSTING DEVICE FOR LEFT SIDHEAD
- 5) LOCKING DEVICE FOR HORIZONTAL MOVEMENT OF LEFT SIDHEAD
- 6) LOKING DEVICE FOR VERTICAL MOVEMENT OF LEFT SIDHEAD
- 7) LEFT SIDEHEAD DUST HOOD
- 8) VERTICAL ADJUSTMENT SCALE
- 9) SCALE INDICATOR
- 10) ADJUSTING DEVICE FOR VERTICAL MOVEMENT OF SPINDLE
- 11) ADJUSTING DEVICE FOR OUTFEED FENCE
- 12) ADJUSTMENT BLOCK FOR OUTFEED FENCE
- 13) LOCKING DEVICE FOR OUTFEED FENCE
- 14) OUTFEED TABLE RAILS
- 15) OUTFEED FENCE
- 16) MOTOR
- 17) BELT TENSIONING DEVICE
- 18) MOTOR POSITIONING BOLTS
- 19) SUPORT RAIL
- 20) LOCKING DEVICE FOR SIDEHEAD INFEEED GUIDE
- 21) ADJUSTING DEVICE FOR SIDEHEAD INFEEED GUIDE
- 22) ADJUSTMENT BLOCK FOR SIDEHEAD INFEEED GUIDE
- 23) DEVICE TO LIMIT CLOSED POSITION OF GUIDE
- 24) SIDEHEAD INFEEED GUIDE
- 25) ADJUSTING DEVICE TO LIMIT OPEN POSITION OF GUIDE
- 26) FINISHED WIDTH SCALE

5° ARVORE / 5° SPINDLE

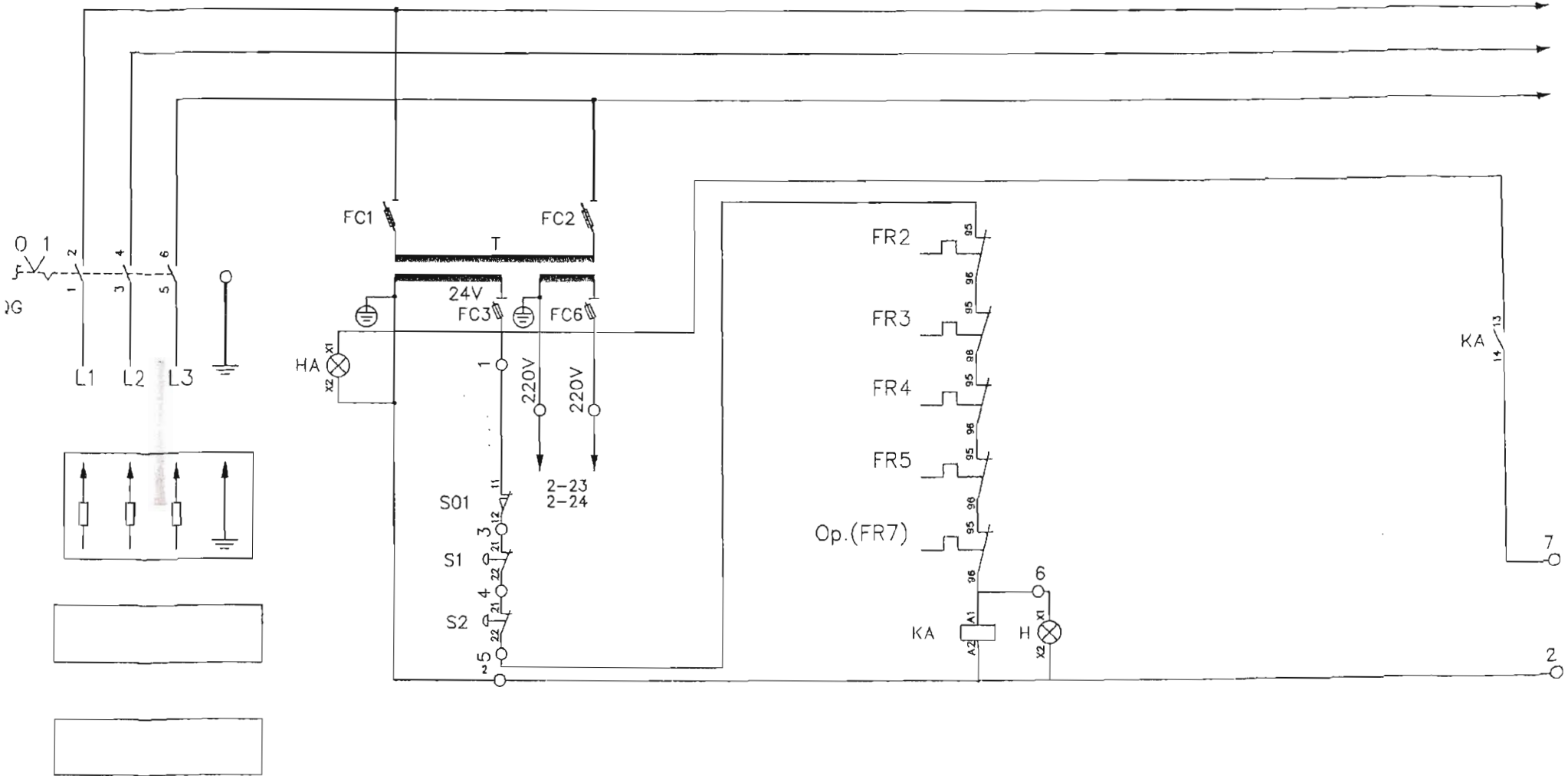


1-2	8-1	1-2	8-4	1-2	8-7
3-4	8-2	3-4	8-5	3-4	8-8
5-6	8-3	5-6	8-6	5-6	8-9
13-14	8-21	13-14	8-26	13-14	8-25
55-56	8-28	21-22	8-28	21-22	8-23
67-68	8-23				

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
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Desenhado	Data	Nome		Aplic.	P.M.A.	Substitui:	Ref.
Verificou	02/03/28	PEDRO		5° ARVORE / 5° SPINDLE	Subst. por:		PM-8
Obs.					N.:	0235	Pág. de

CIRCUITO PRINCIPAL / MAIN CIRCUIT

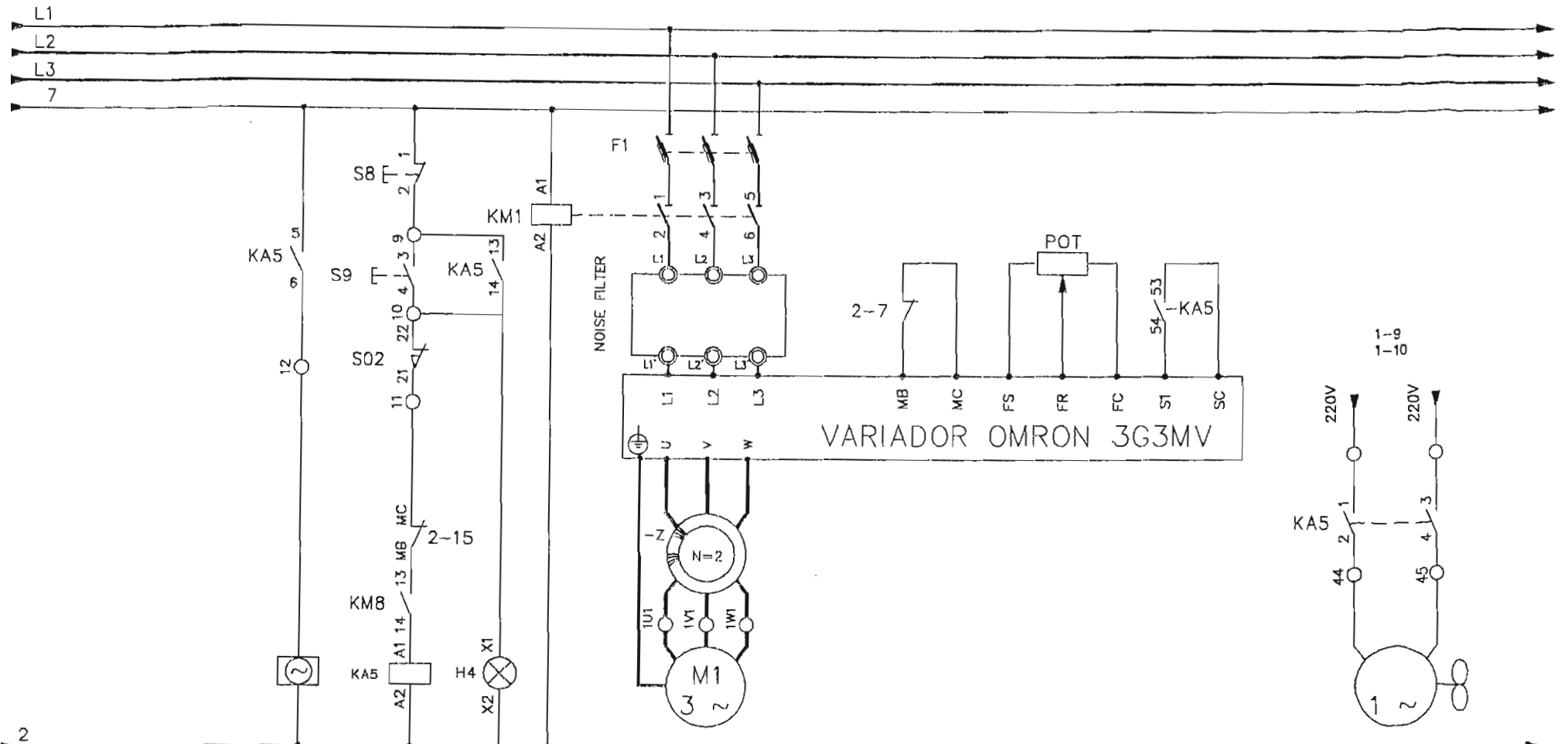


13-14 1-26

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
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Desenhado	Data	Nome		Aplic.	PMA	Substituído	Ref. PM-1
Verificou	02/03/28	PEDRO			CIRCUITO PRINCIPAL / MAIN CIRCUIT	Subst. por:	
Obs.						N.: 0238	Pág. de

Arrasto / Feeding



1-2	2-23	1-2	2-11
3-4	2-24	3-4	2-12
5-6	2-5	5-6	2-13
13-14	2-8		
53-54	2-20		

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
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Data	Nome
030206	RICARDO
Desenhou	
Verificou	
Obs.	

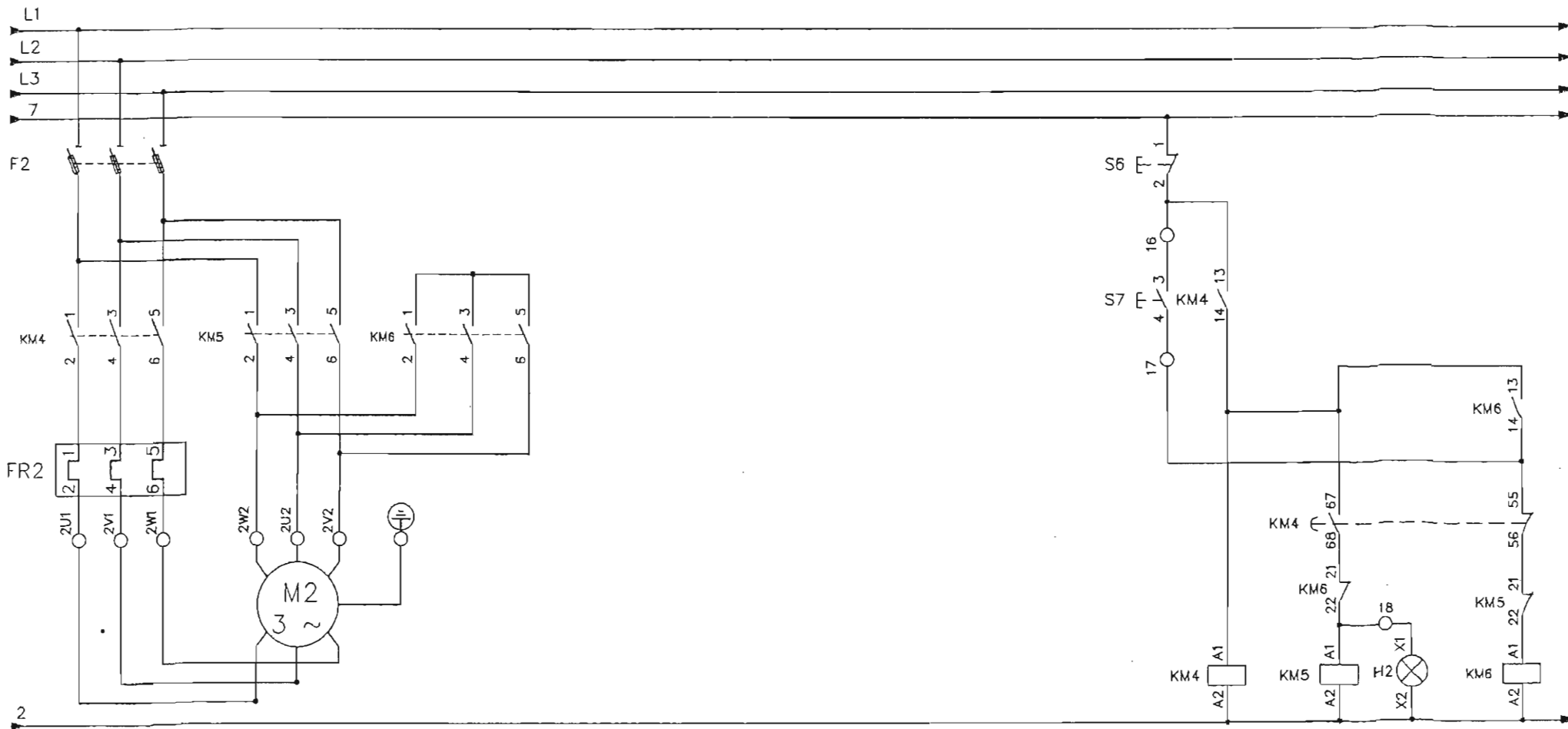


Aplic.	PMA
	Arrasto / Feeding

Substitui:	
Subst. por:	
N.:	0340

Ref.	PM-2
Pág.	de

ARVORE HORIZONTAL INFERIOR / BOTTON ARBOR

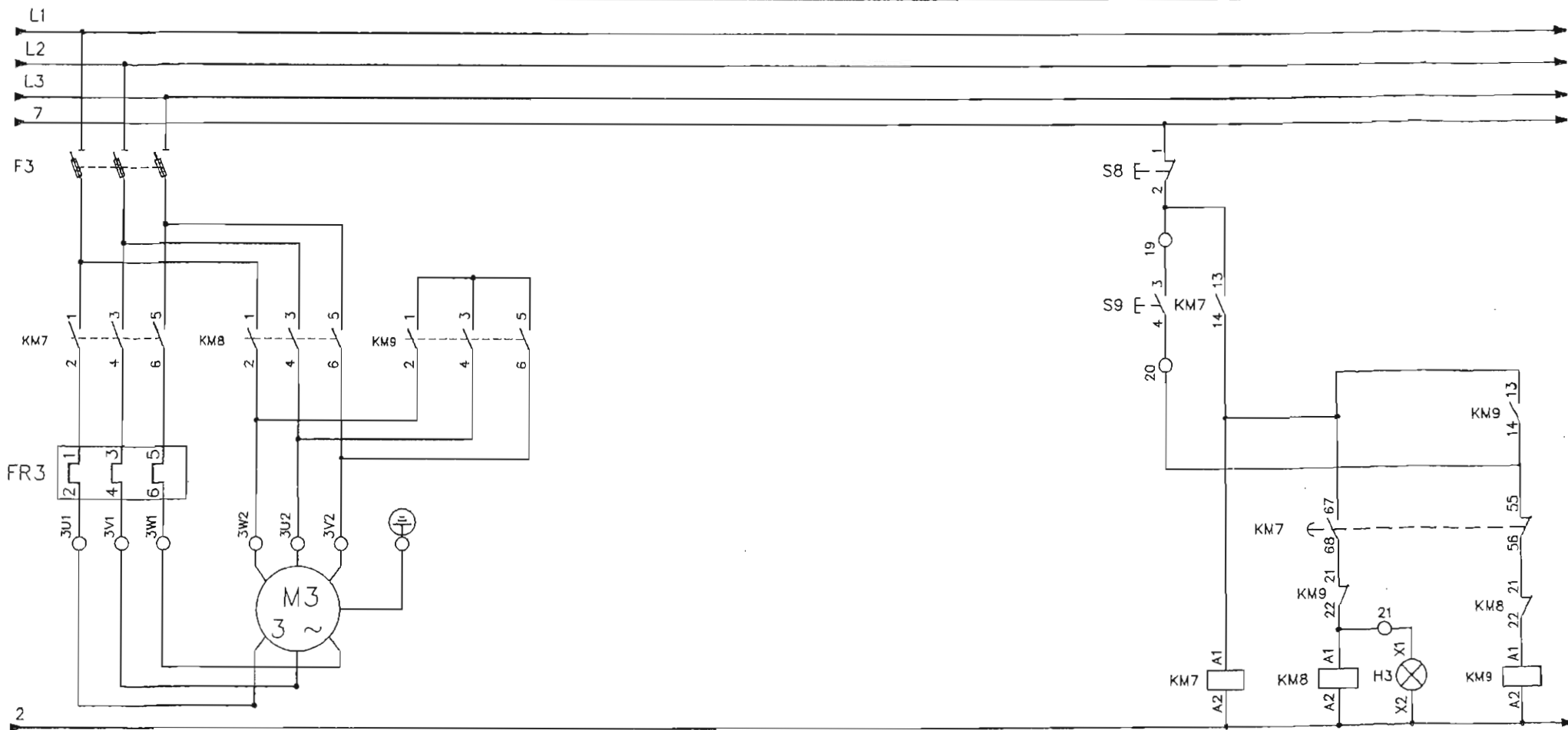


1-2	3-1			
3-4	3-2			
5-6	3-3			
13-14	3-21	1-2	3-4	1-2
55-56	3-26	3-4	3-5	3-4
67-68	3-23	5-6	3-6	5-8
		21-22	3-25	3-9
				13-14
				3-26
				21-22
				3-23

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
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	Data	Nome		Aplic.	P.M.A.	Substitui:	Ref.	
Desenhou	02/03/28	PEDRO			ARVORE HORIZONTAL INFERIOR / BOTTON ARBOR	Subst. por:	PM-3	
Verificou						N.º		0230
Obs.								Pág. de

ARVORE HORIZONTAL SUPERIOR / TOP ARBOR

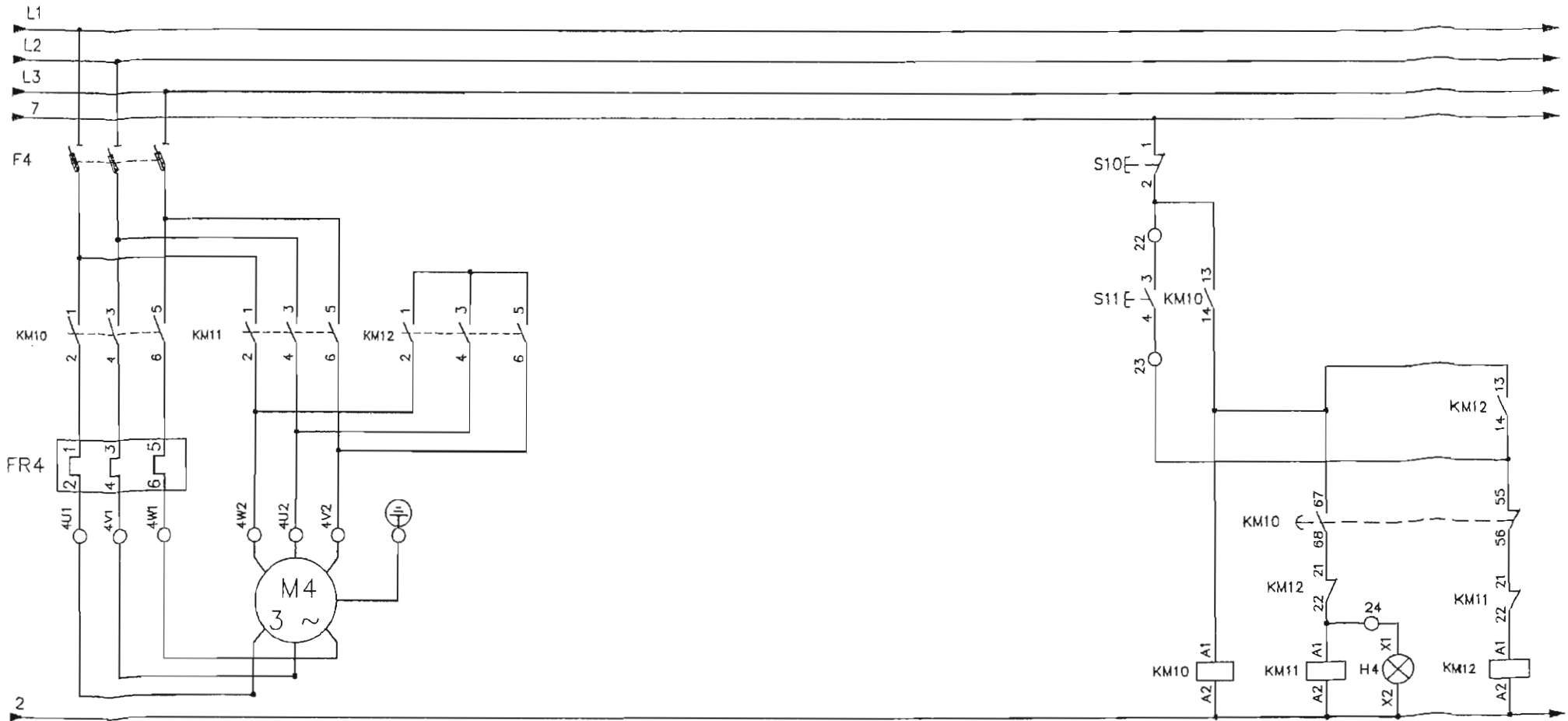


1-2	4-1		
3-4	4-2	1-2	4-4
5-6	4-3	3-4	4-5
13-14	4-21	5-6	4-6
55-56	4-26	21-22	4-25
67-68	4-23		
		1-2	4-7
		3-4	4-8
		5-6	4-9
		13-14	4-26
		21-22	4-23

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
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	Data	Nome		Aplic.	P.M.A.	Substitui:	Ref.
Desenhado	02/03/28	PEDRO		ARVORE HORIZONTAL SUPERIOR / TOP ARBOR	Subst. por:		PM-4
Verificou					N.º:	0231	
Obs.						Pág. de	

ARVORE VERTICAL ESQ. / LEFT SIDE HEAD



1-2	5-1				
3-4	5-2	1-2	5-4	1-2	5-7
5-6	5-3	3-4	5-5	3-4	5-8
13-14	5-21	5-6	5-6	5-6	5-9
55-56	5-26	21-22	5-26	13-14	5-26
67-68	5-23			21-22	5-23

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
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Data	Nome
02/03/28	PEDRO
Desenhou	
Verificou	
Obs.	

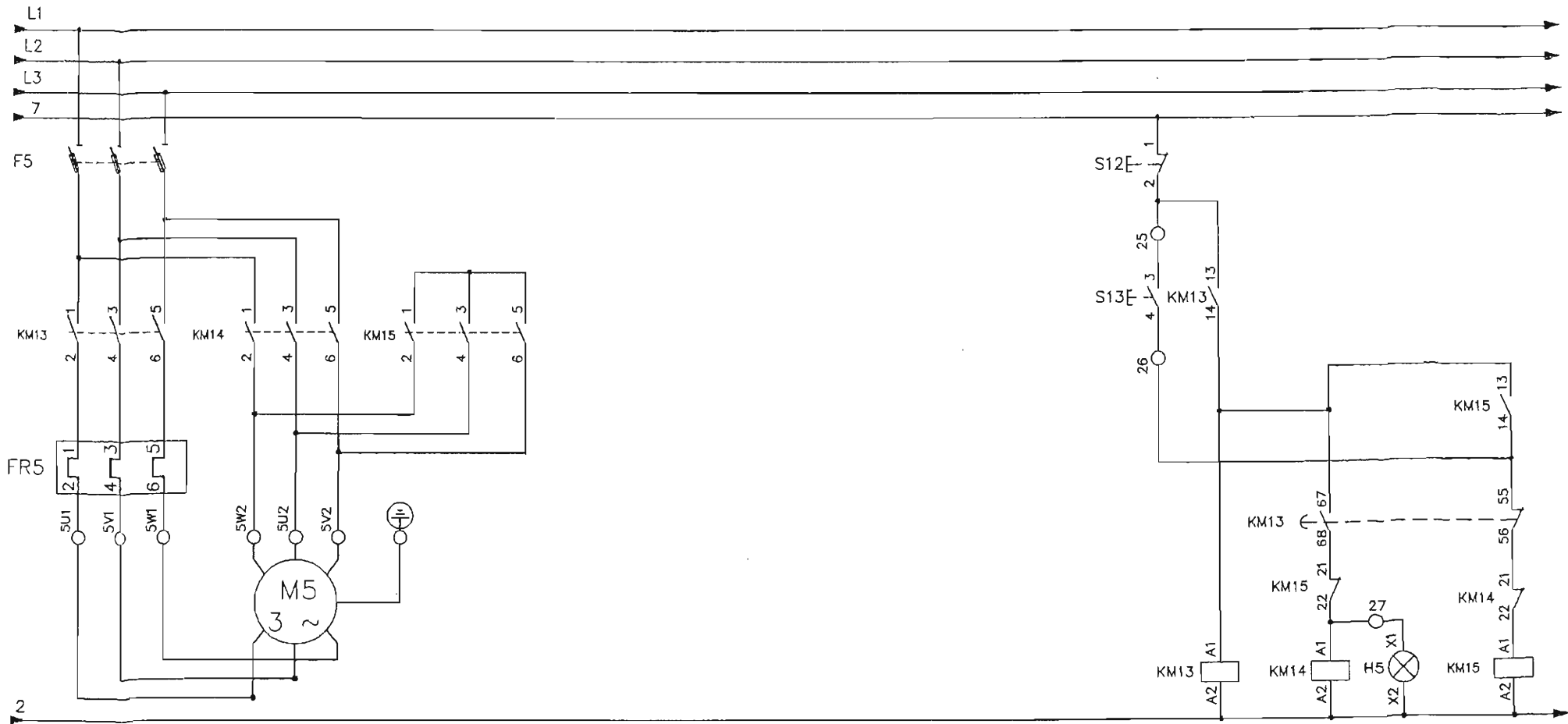


Aplic.	P.M.A.
ARVORE VERTIACAL ESQ. / LEFT SIDE HEAD	

Substitui:	
Subst. por:	
N.:	0232

Ref.	PM-5
Pág.	de

ARVORE VERTICAL DIR. / RIGHT SIDE HEAD

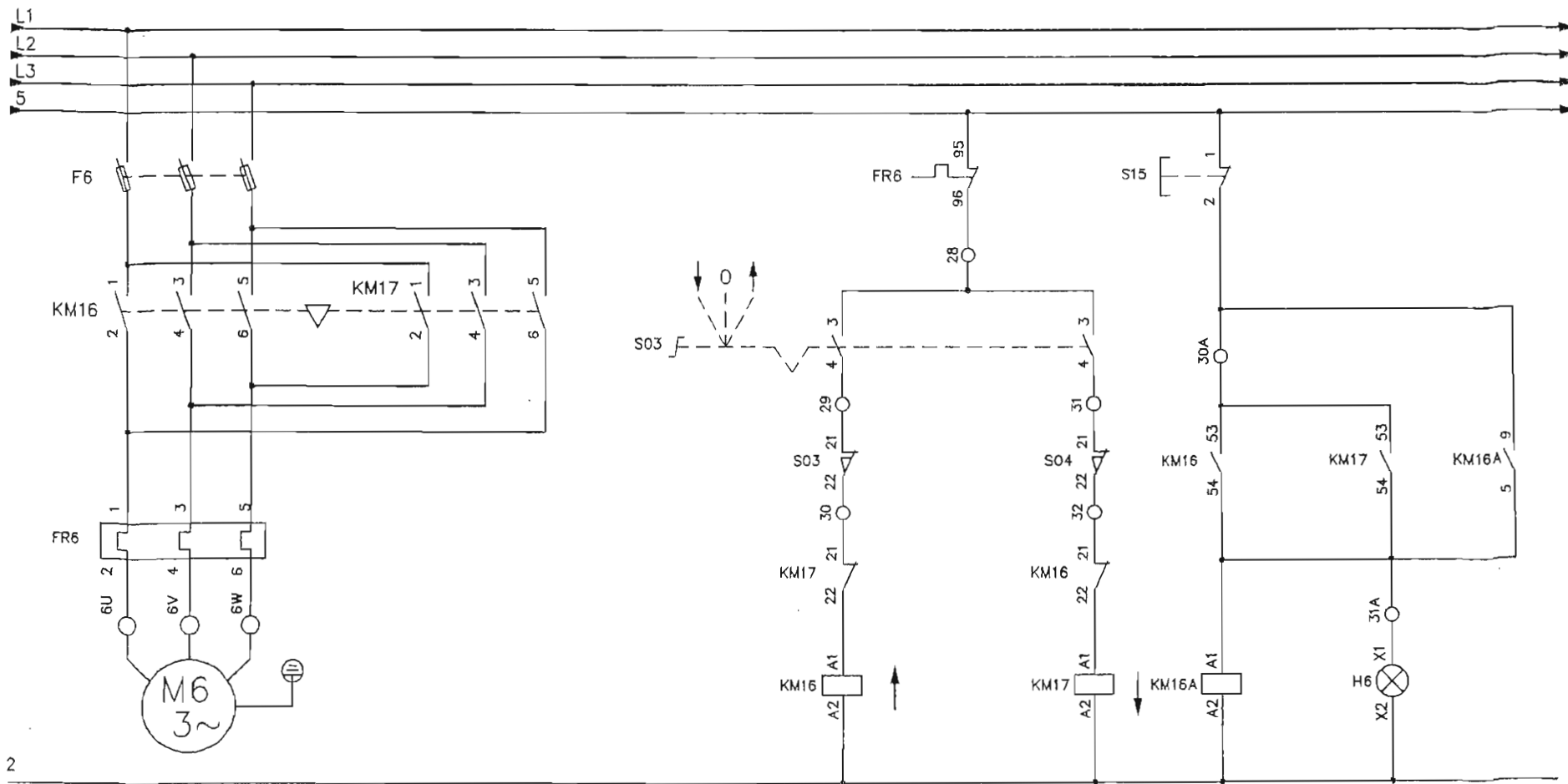


1-2	6-1	1-2	6-4	1-2	6-7
3-4	6-2	3-4	6-5	3-4	6-8
5-6	6-3	5-6	6-6	5-6	6-9
13-14	6-21	13-14	6-26	13-14	6-26
55-56	6-26	21-22	6-26	21-22	6-23
67-68	6-23				

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
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Desenhou	02/03/28	Nome	PEDRO		Aplic.	P.M.A.	Substitui:	Ref.	PM-6
Verificou					ARVORE VERTICAL DIR. / RIGHT SIDE HEAD	Subst. por:			
Obs.						N.:	0233	Pág.	de

ELEVAÇÃO / Thickness setting



1-2	7-2	1-2	7-7		
3-4	7-3	3-4	7-8		
5-6	7-4	5-6	7-9	5-9	7-25
21-22	7-18	21-22	7-14		
53-54	7-20	53-54	8-23		

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
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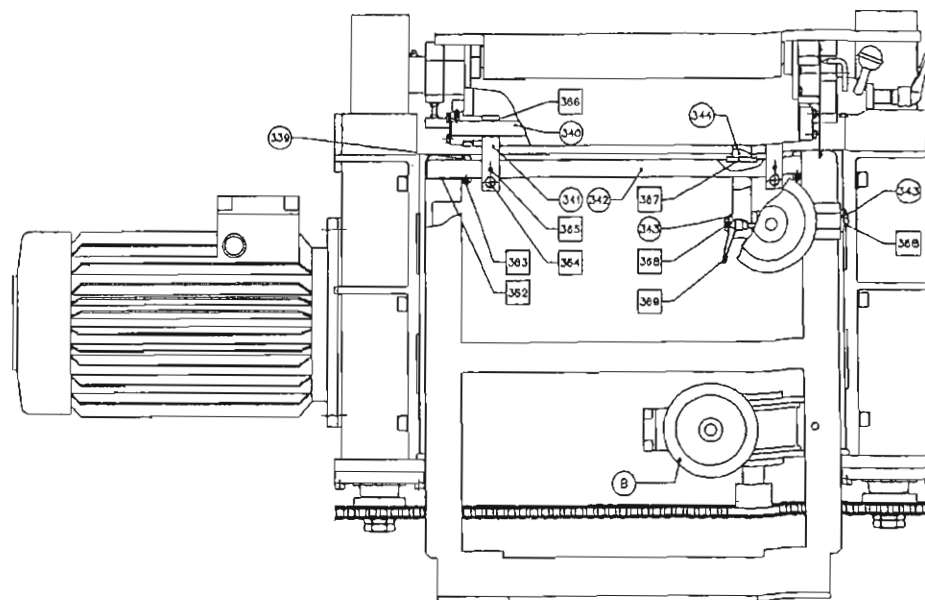
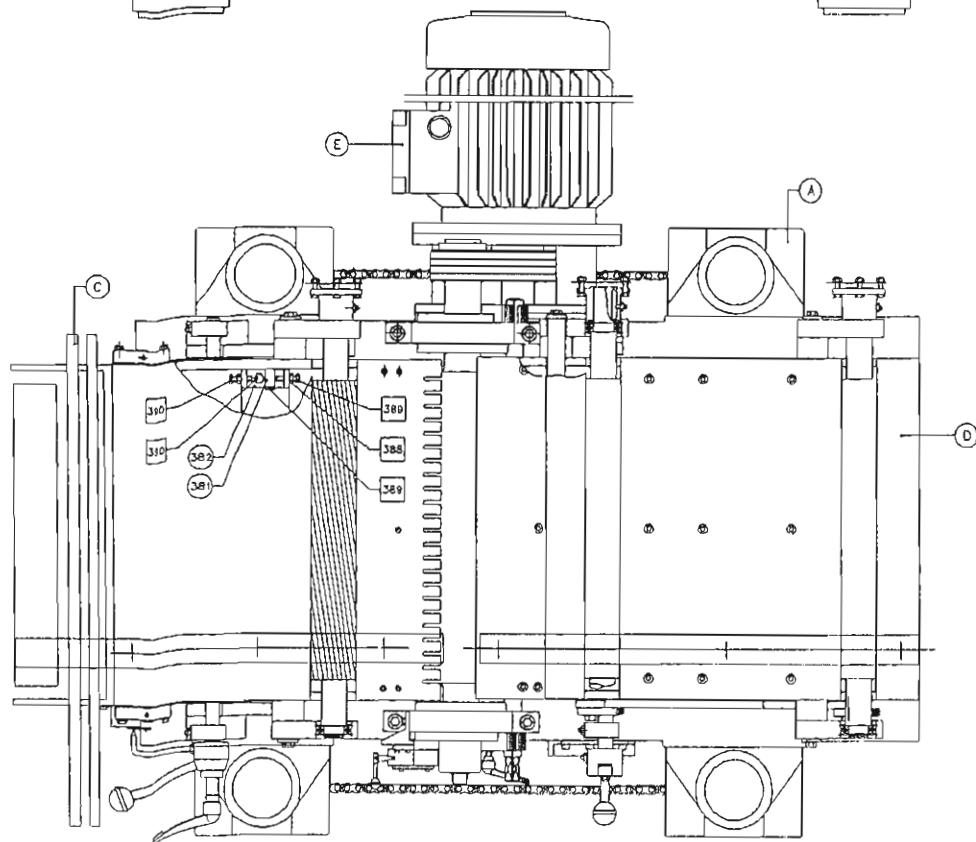
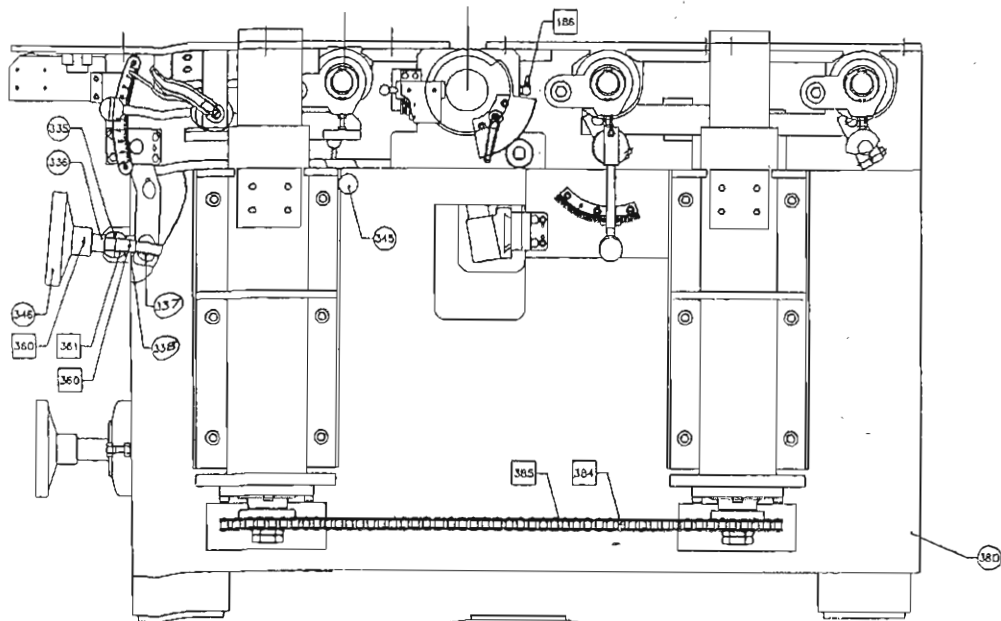
	Data	Nome
Desenhou	02/03/28	Pedro
Verificou		
Obs.		



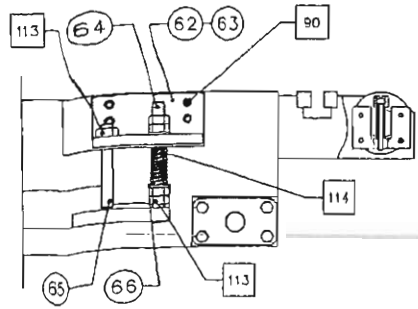
Aplic.	PMA
Elevação / Thickness setting	

Substitui:	Ref. PM-7
Subst. por:	
N.:	0234

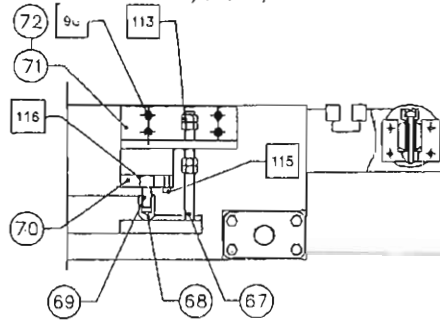
Pág.	de
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c/tensoo por mola



Rolo c/tensoo pneumatica



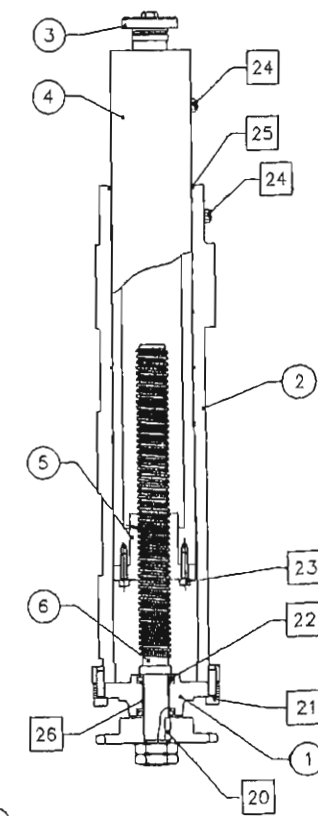
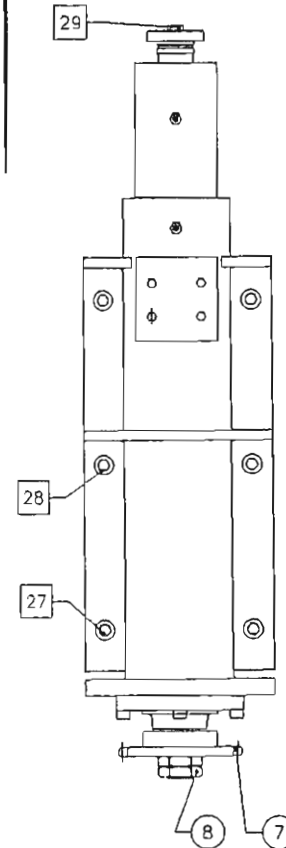
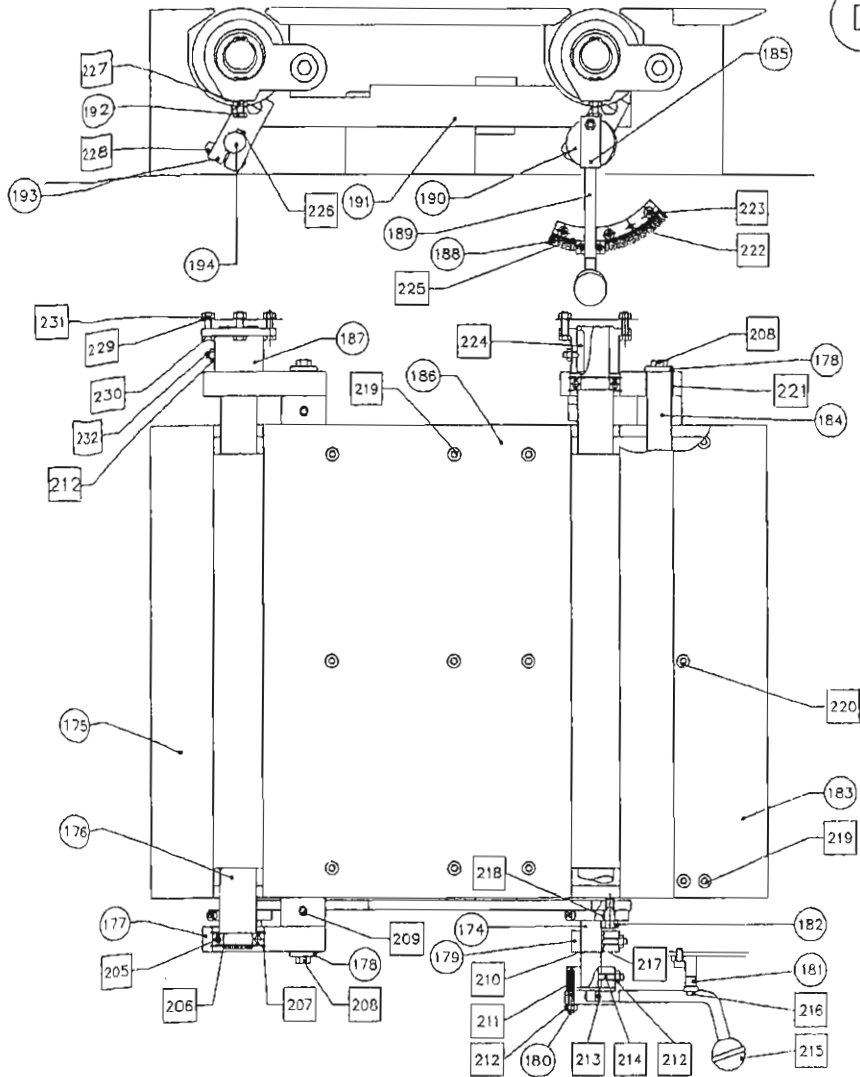
Sub conj.material mecanico
(fixe e elevacao)

IX

97

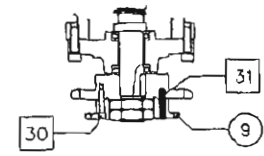
MESA DE ROLOS LISOS INFERIORES

D

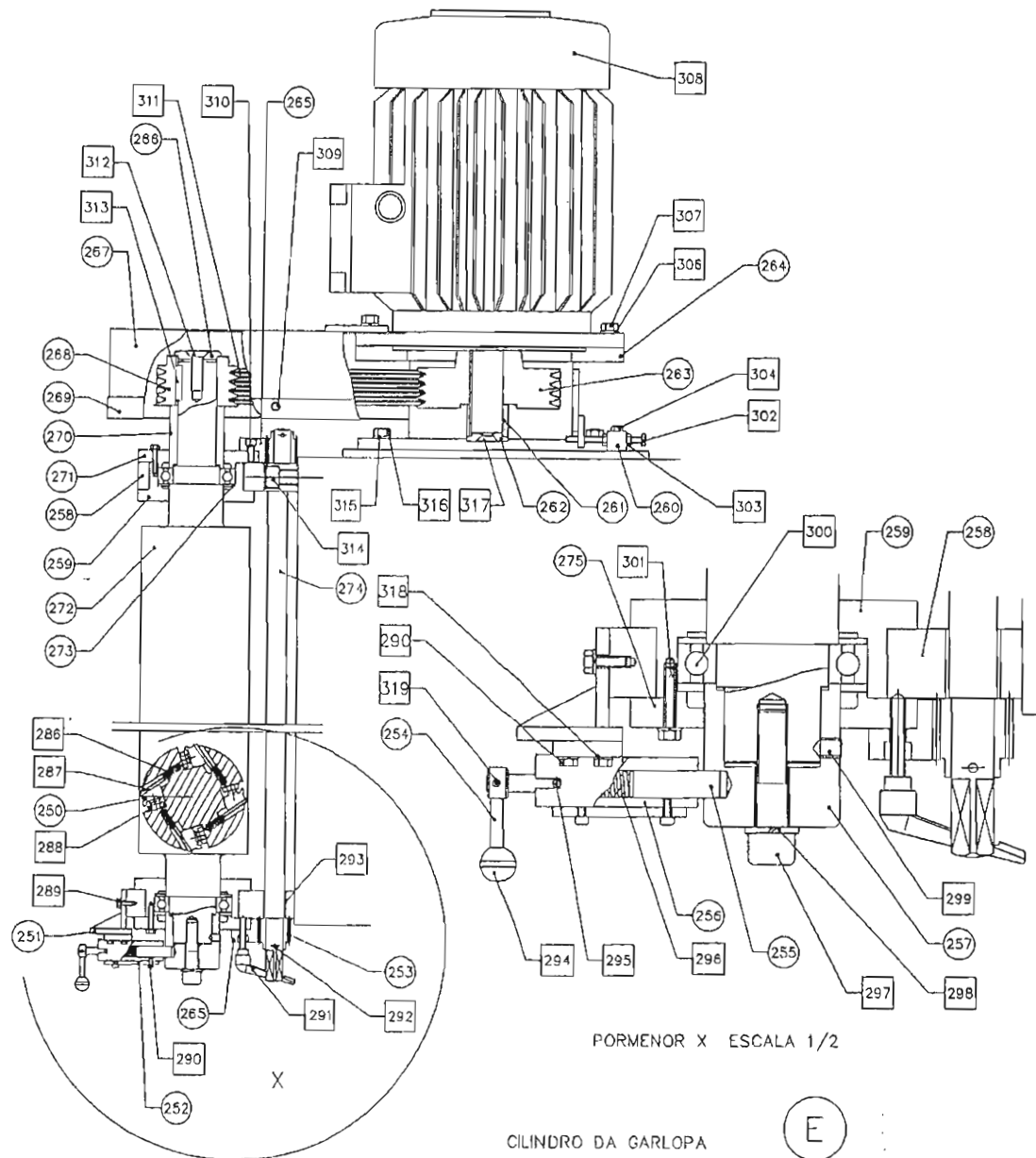


GUIA DE ELEVACAO

A

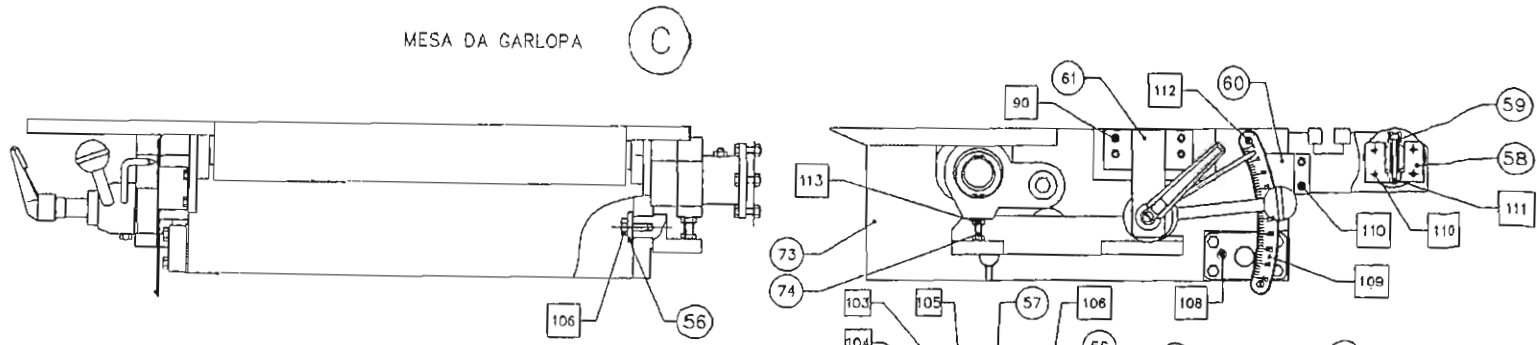


So q/ c/ extracao
Guia esquerda de saida

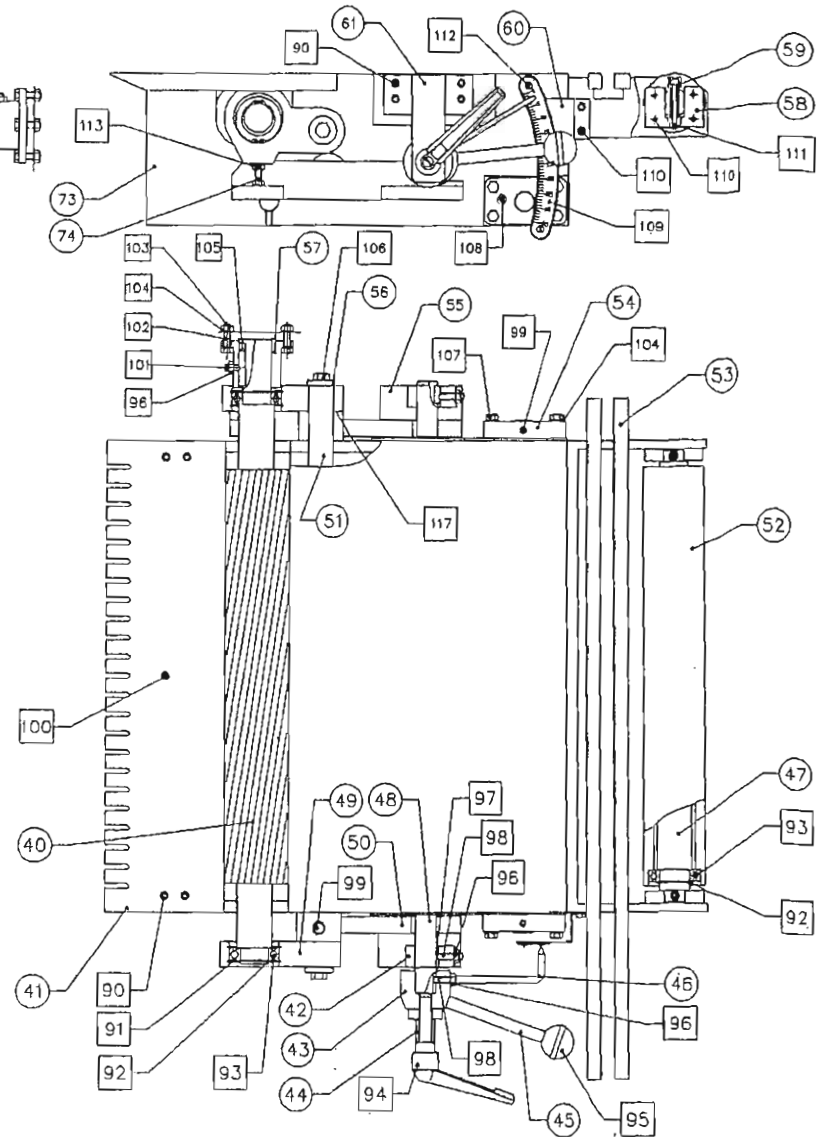
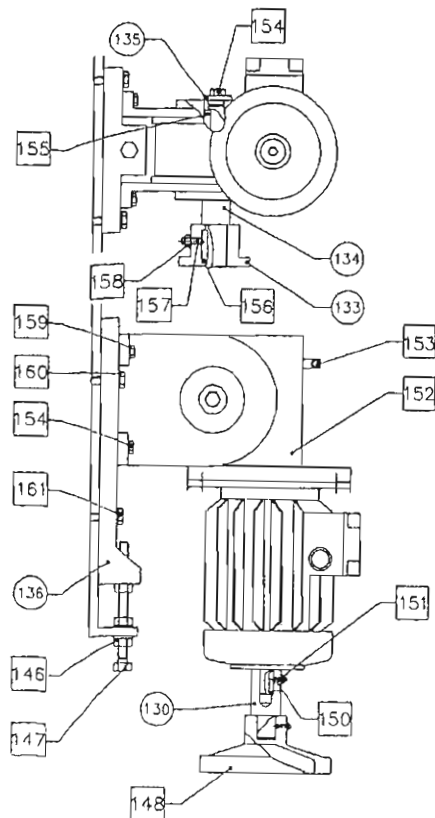




MESA DA GARLOPA (C)



MOTOREDUTOR DE ELEVACAO (B)

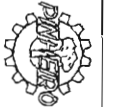


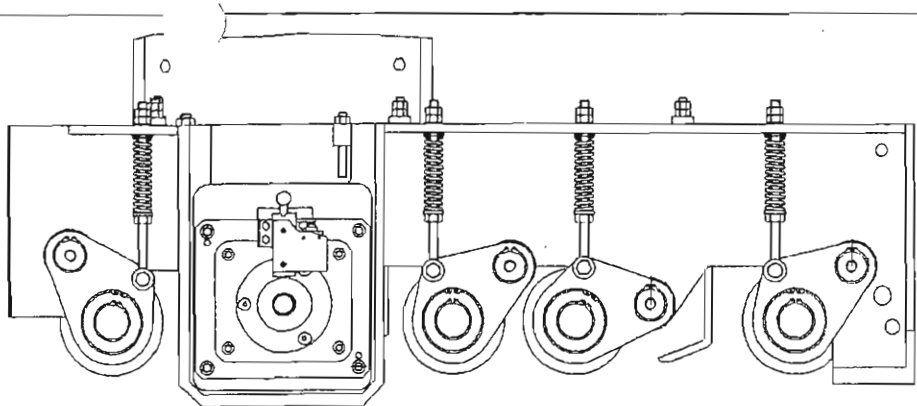
Descrição		Quantidade		Especificação		Código		Material		Observações		Observações	
1	Polia de ao	4	35814	04	30 cv 80 ciclos	PMF	2	2	Pilha pneumática	Fasto	120	A-53-10	Almofada para retorno por rolão
1	Polia de ao	4	31997	04	30 cv 50 ciclos	PMF	4	3	Anilha de pressão	DIN-127	118	B12	
1	Polia de ao	4	35813	04	15/20/25 cv 60 ciclos	PMF	4	3	Parafuso cob. sext.	DIN-558	116	M12x30	
1	Polia de ao	4	32089	04	15/20/25 cv 50 ciclos	PMF	2	4	Coaxialho autolubrificante		114	23x30x3x20	
1	Polia de ao	4	35912	04	7,5/10 cv 80 ciclos	PMF	2	2	Coaxialho autolubrificante		118	18x10x16x15	
1	Anilha c/ batente	4	35970	04	e48 30 cv	NMP-713	2	2	Anilha helic. comar. cil.	10-220073	55	97	M6x50
1	Anilha c/ batente	4	32558	04	642 15/20/25 cv	NMP-713	2	2	Paraf. cob. sext.	DIN-558	116	M12x30	
1	Anilha c/ batente	4	32566	04	e38 7,5/10 cv	NMP-713	2	2	Paraf. cob. cil.	DIN-912	112	M4x8	
1	Coaxialho escalotado	4	32012	04	30 cv	PMF	2	2	Paraf. cob. cil.	DIN-912	112	M4x8	
1	Coaxialho escalotado	4	32092	04	15/20/25 cv	PMF	2	2	Paraf. cob. cil.	DIN-912	112	M6x25	
1	Coaxialho escalotado	4	38770	04	7,5/10 cv	PMF	1	1	Paraf. cob. cil.	DIN-912	112	M6x20	
1	Supporte	4	34701	01	260	PMQ	1	1	Chaveta	4C-100048	103		
2	Chumaceira	3	38374	04	250	PMQ	5	5	Cavilha elastica	DIN-1481	108	8x30	
2	Chumaceira	3	35997	04	258	PMQ	4	4	Paraf. cob. sext.	DIN-558	107	M4x35	
1	Coaxialho	4	38287	01	257	PMQ	1	1	Chaveta	DIN-6885	105	A10x8x20	
1	Mancal	4	49354	04	258	HTAF	2	2	Anilha de pressão	DIN-127	104	B8	
1	Fixador	4	8984	01	259	HTAF	4	4	Paraf. cob. sext.	DIN-558	109	M8x25	
1	Manipulo	4	8965	01	254	HTAF	1	1	Paraf. cob. sext.	DIN-558	109	M8x25	
2	Corrão	4	32047	02	253	PMF	1	1	Parafuso cob. emb.	DIN-7991	100	M8x30	
1	Apelo	4	38295	01	252	PMF	4	4	Paraf. roscado	DIN-913	99	M8x10	
1	Supporte	4	38296	08	251	PMF	2	2	Paraf. roscado	DIN-914	98	M8x30	
4	Calca de lamina	4	37079	02	250	PMF	2	2	Chaveta	DIN-6885	97	A8x7x20	
4	Calca de lamina	4	35989	02	250	PMF	4	4	Paraf. sextavado	DIN-934	96	M8	
2	Paraf. c/ sext. int.	DIN-914	212	M8x20			4	4	Cartela exterior	DIN-471	32	e35	
8	Paraf. autolubrificante	DIN-980	23	M8 U-10			8	8	Cartela exterior	DIN-472	31	e62	
8	Paraf. cob. cil.	DIN-358	10,9	M8x25			8	8	Paraf. cob. cil.	DIN-912	90	M8x30	
8	Anilha de pressão	DIN-127	229	B8			8	8	Paraf. cob. cil.	DIN-912	89	M12x30	
2	Paraf. cob. cil.	DIN-172	228	M8x40			2	2	Coaxialho de separação	4-35289	75	NMP-718	#12x18x18
4	Paraf. sextavado	DIN-934	227	M12			2	2	Paraf. cob. sextavado	4-350135	74	M12x35	
2	Chaveta	DIN-6885	226	A8x7x20			2	2	Meça	2-39061	04		
1	Esqalo	4C-100288	225	M12			1	1	Supporte esquadro	4-37043	01	72	direita
2	Chaveta	DIN-6885	224	A10x8x50			1	1	Supporte esquadro	4-37042	01	71	esquerda
1	Paraf. cob. cil.	DIN-912	223	M8x20			2	2	Placa	4-37038	01	70	so q/tenao por mofo
2	Cavilha elastica	DIN-1481	222	36x20			2	2	Eixo	3-37039	01	69	so q/tenao por mofo
4	Coaxialho autolubrific.	DIN-980	221	230x34x30			2	2	Paraf. roscado	4-37037	01	68	so q/tenao por mofo
1	Paraf. cob. emb.	DIN-7991	220	M8x30			4	4	Anilha lisa	4-41887	01	67	M12x140 NMP-500
1	Paraf. cob. cil.	DIN-912	219	M8x30			2	2	Paraf. roscado	4-41886	01	66	so q/tenao por mofo
2	Coaxialho autolubrificante	DIN-980	218	112x814x12			2	2	Paraf. roscado	4-41885	01	65	M12x110 NMP-500
8	Chaveta	DIN-6885	217	A8x7x20			2	2	Paraf. roscado	4-41884	01	64	so q/tenao por mofo
2	Paraf. cob. cil.	DIN-912	216	M8x20			2	2	Paraf. roscado	4-41883	01	63	M12x140 NMP-500
1	Safere axial	DIN-913	215	M8x20			1	1	Supporte esquadro	4-35611	01	62	Direita
5	Paraf. roscado	DIN-913	214	M8x30			1	1	Supporte esquadro	4-35610	01	61	Esquerda
8	Paraf. sextavado	DIN-934	213	M8			1	1	Paraf. roscado	3-37579	01	60	so q/rolo rígido
1	Meça helic. comar. cil.	4C-220097	212	e8x5x1,5x3,5x38			2	2	Parafusa	4-31858	02	59	so q/rolo rígido
4	Cartela exterior	DIN-471	211	e25			2	2	Supporte	4-32108	01	58	PMF
4	Paraf. roscado	DIN-913	209	M8x10			1	1	Flange	4-31922	02	57	PMF
4	Paraf. cob. sext.	DIN-558	208	M10x25			4	4	Anilha lisa	4-30761	01	56	PMF
8	Cartela exterior	DIN-472	207	e62			1	1	Apelo	3-35609	01	55	e35 NMP-601
4	Cartela exterior	DIN-471	206	e35			2	2	Supporte flange	4-31993	04	54	PMF
4	Relamento na. de esfera	DIN-625	205	6007 2RS(15x82x14)			1	1	Supporte auto	3-37261	01	53	PMF
1	Eixo esquadro	4-37677	198				1	1	Supporte auto	3-35671	01	52	
2	Coaxialho de fixação	4-30127	197	A-25 (NMP-70S)			1	1	Roço	4-37678	01	51	
4	Apelo	4-39274	196				1	1	Roço	4-37675	01	50	
1	Meça	3-39024	195	(Cromoduro)			1	1	Eixo liso	4-37676	02	49	
1	Eixo escalotado	4-37581	194				1	1	Apelo	3-35608	01	50	
1	Eixo escalotado	4-35678	193				2	2	Chumaceira	4-31823	04	48	PMF
2	Roço	4-35679	192				1	1	Eixo escalotado	4-37578	02	47	so q/rolo rígido
4	Parafusa cob. sext.	4-350135	8,8	M12x35			1	1	Eixo escalotado	4-35680	02	46	so q/rolo rígido
1	Boca fixadora	4-37834	01	181			1	1	Eixo lacaçado	4-37679	01	47	
1	Fixador	4-37050	02	190			1	1	Eixo lacaçado	4-35672	01	46	
1	Manipulo haste	4-32204	98	189			1	1	Indicador	4-37597	01	45	so q/rolo rígido
1	Separator dentado	3-32206	03	188			1	1	Manipulo haste	4-53154	01	44	M12x144 NMP-717
2	Flange	4-31922	02	187			1	1	Coaxialho de separação	4-53304	01	43	e17x22x28 NMP-718
1	Meça	3-39024	04	186			1	1	Maniquio base	4-37573	02	42	so q/rolo rígido
1	Meça	3-37646	04	186			2	2	Excentrica	4-31921	02	41	PMF
1	Supporte eixos cruzados	4-31954	01	185			1	1	Boca	3-39059	01	40	5202039059
2	Eixo liso	4-37578	02	184			1	1	Boca	2-39089	01	39	5202039089
1	Eixo liso	4-35679	02	183			1	1	Roço estrizado	3-37102	02	38	
1	Boca	3-39075	01	183			1	1	Roço estrizado	3-35620	02	37	
1	Boca	3-39074	01	183									
2	Parafusa eixo	4-8801	02	182			HTAF						
1	Fixador	4-32205	03	181			PMF						
1	Paraf. c/ sext. int.	4-350139	01	180	M8x25		PMF						
4	Excentrica	4-31951	02	179			PMF			DIN-1481	31	8x40	
4	Anilha lisa	4-50761	01	178	e35		NMP-601			DIN-912	30	M6x30	
4	Chumaceira	4-31923	04	177			3	3	Indicador	DIN-127	28	B16	1030100159
2	Roço liso	3-37101	02	176			242	242	Anilha de pressão	DIN-127	28	B16	1030100148
2	Roço liso	3-35621	02	176			242	242	Paraf. cob. cilindrico	DIN-912	27	M15x40	1030100798
1	Meça	2-38091	04	175			4	4	Coaxialho autolubrific.	DIN-912	26	30x30x34x30	1030400098
1	Meça	2-37533	04	175			4	4	Raspador		25	ABR 100x108x3,5/5	1031400536
1	Eixo escalotado	4-38293	02	174			8	8	Lubrificador	1-485	24	1/8 GAS	1032500912
1	Eixo escalotado	4-38296	02	174			8	8	Paraf. cob. cilindrica	DIN-912	23	M6x30	1030100888
1	Boca	3-39077	01	173			8	8	Relamento axial	DIN-711	22	51106 (10x32x47x11)	1031600399
1	Boca	3-39076	01	173			8	8	Paraf. cob. cilindrica	DIN-912	21	M10x40 (248 c/ 2 MS)	1030100717
1							4	4	Chaveta	DIN-6885	20	A8x7x25	1032780023
4	Paraf. cob. sext.	DIN-558	167	M12x30			1	1	Cartela de corrente	4-33556	9		5202033556
4	Anilha de chapa	DIN-125	166	e10,5			8	8	Paraf sextavado	4-32411	8		5202032411
4	Anilha de pressão	DIN-127	159	B10			1	1	Cartela de corrente	4-33535	7		5202033535
1	Paraf. sextavado	DIN-934	158	M8			4	4	Eixo c/ rosca trapoz.	4-31877	6		5202031877
1	Paraf. roscado	DIN-913	157	M8x20			4	4	Paraf. c/ rosca trapoz.	4-31879	6		5202031879
1	Chaveta	DIN-6885	156	A10x8x40			4	4	Paraf. c/ rosca trapoz.	4-31883	5		5202031883
1	Chaveta	DIN-6885	155	A8x7x80			4	4	Carniça	4-37632	4		3298037632
5	Paraf. cob. sext.	DIN-358	154	M10x20			4	4	Parafusa	4-31962	3		3202631962
1	Jealho autolubrificado	153	3/8 C Mocho-fermo				4	4	Mancal	3-35938	3		5204635938
1	Mota-reductor	STM	152	100-53 1/40-0,75x1000rpm-2 partes de veio			4	4	Tamboa	4-37272	1		5204037272
2	Paraf. sextavado	DIN-934	151	M8			8	8					
2	Paraf. roscado	DIN-913	150	M5x15			8	8					
1			149										
1	Volante de manobra		148	e125x16H7	1051300134								
1	Parafusa cob. sext.	DIN-558	147	M12x180									
4	Paraf. sextavado	DIN-934	146	M12									
1													
1	Placa do moto-reductor	3-35642	01	136									
1	Anilha lisa	4-50761	01	135	e35								
1	Veio	4-36424	02	134									
1	Cartela de corrente	4-31893	02	133			PMF						
1	Aumento	4-35843	01	132									

Ref: PMA-1-0001

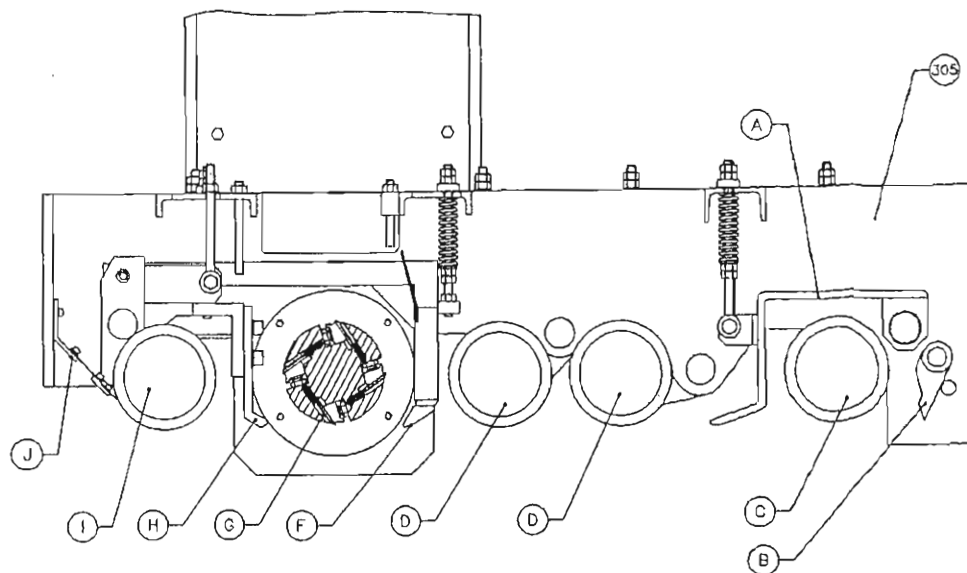
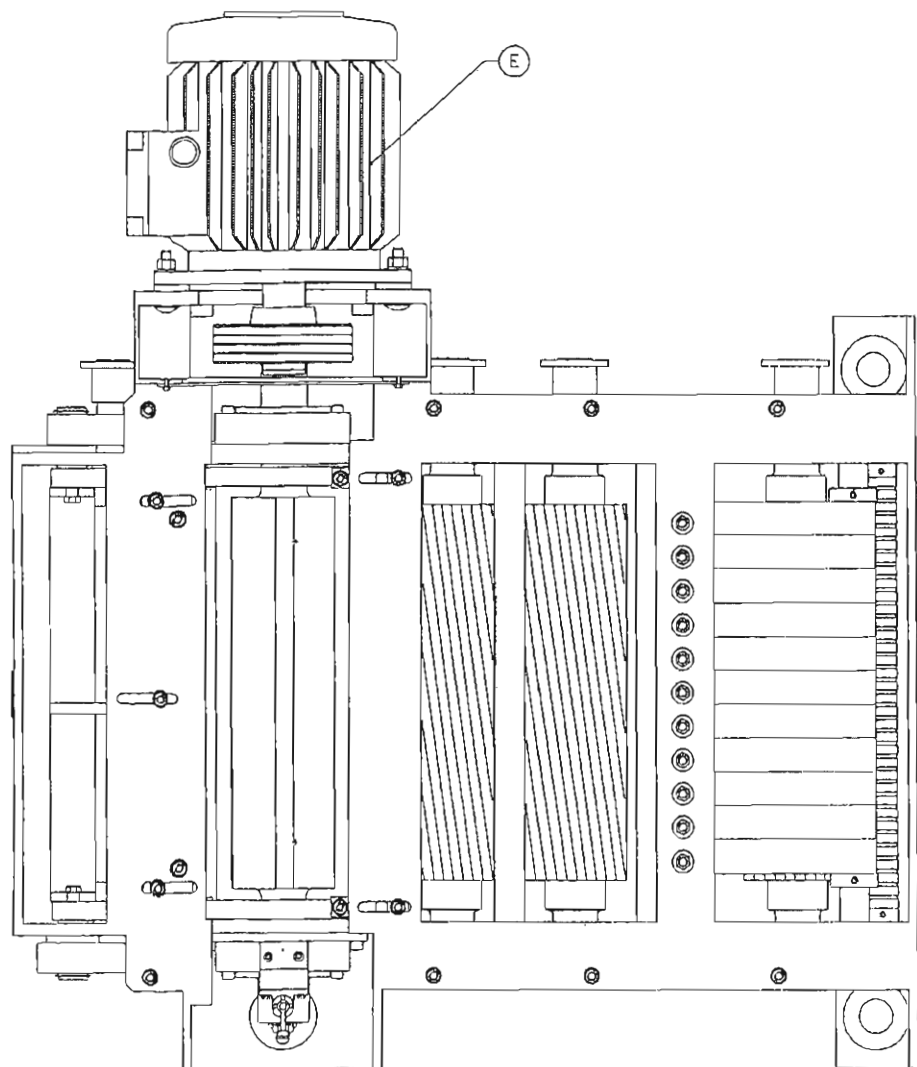
PMA

Versão: 2,00
09.09.05



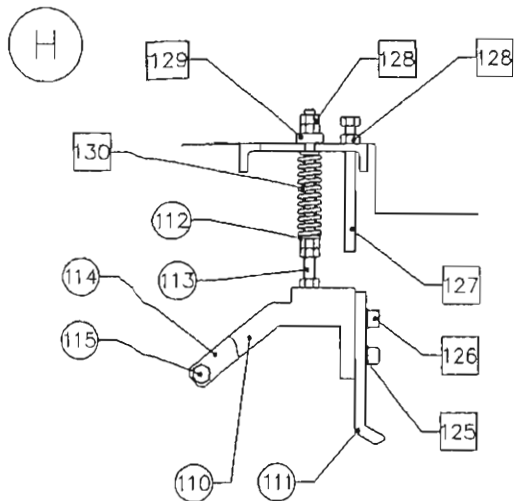


Conjunto da estrutura superior

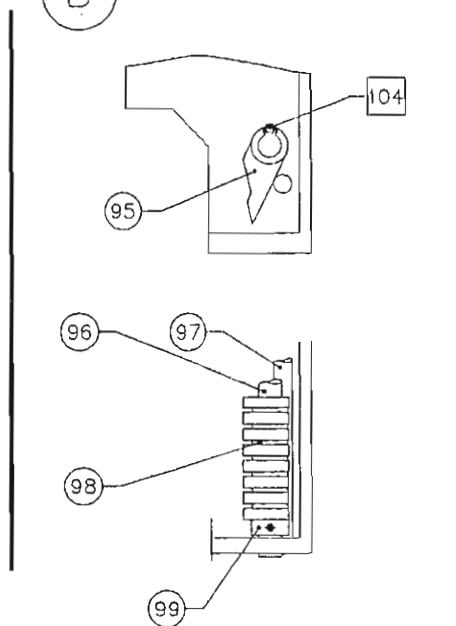




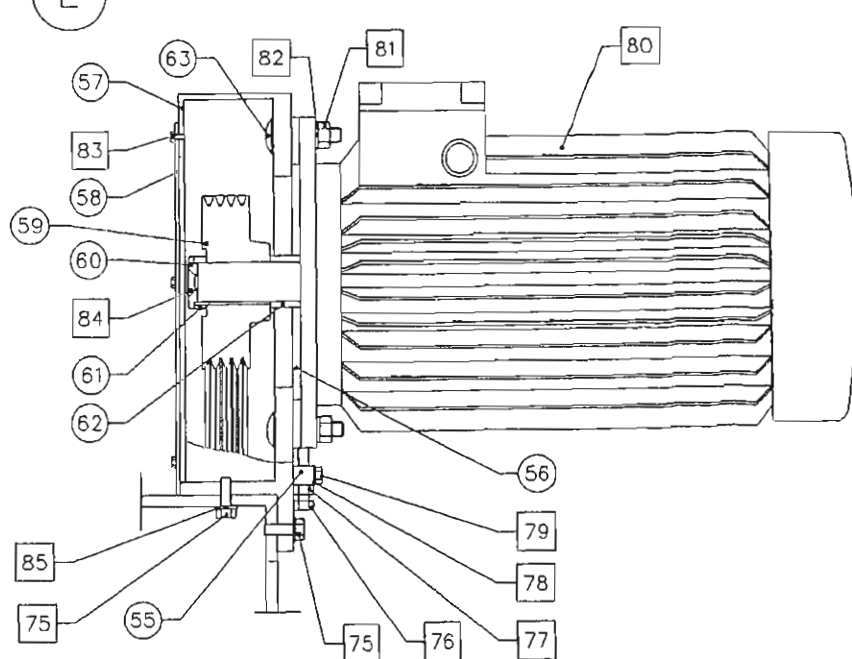
Calçador de saída do desengrosso



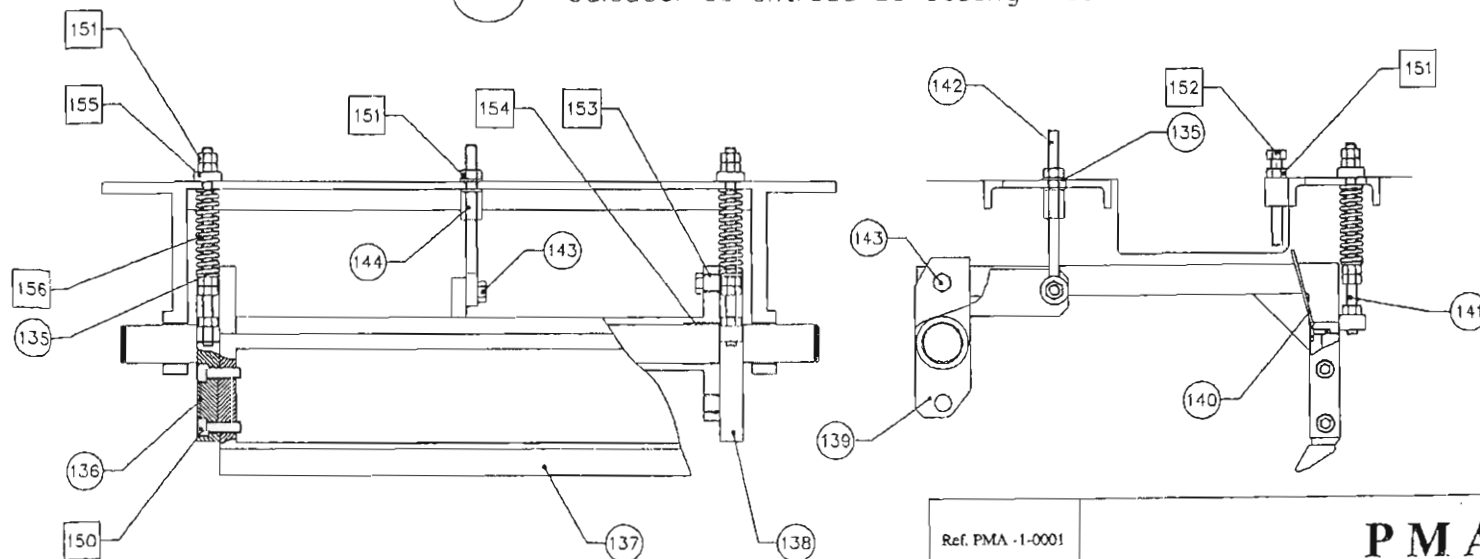
B Linguetes anti-recuo



E Motor do desengrosso

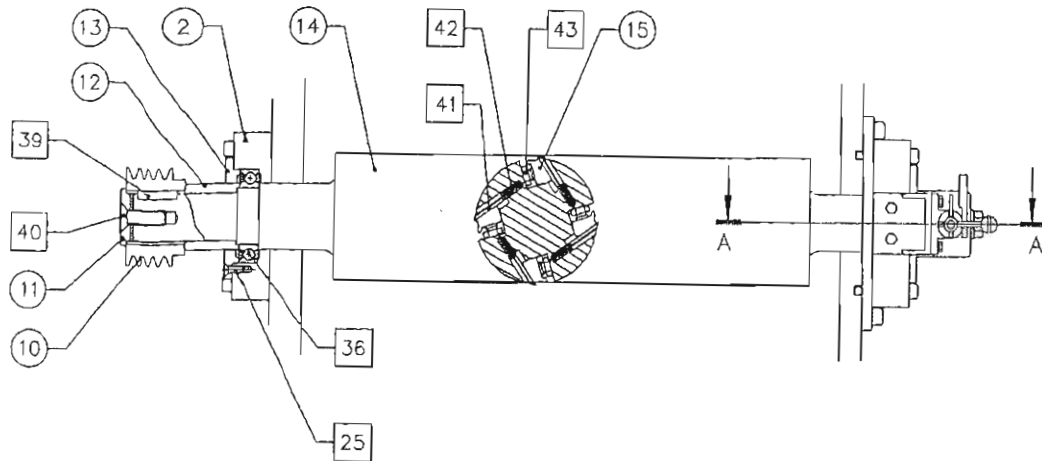


F Calçador de entrada do desengrosso

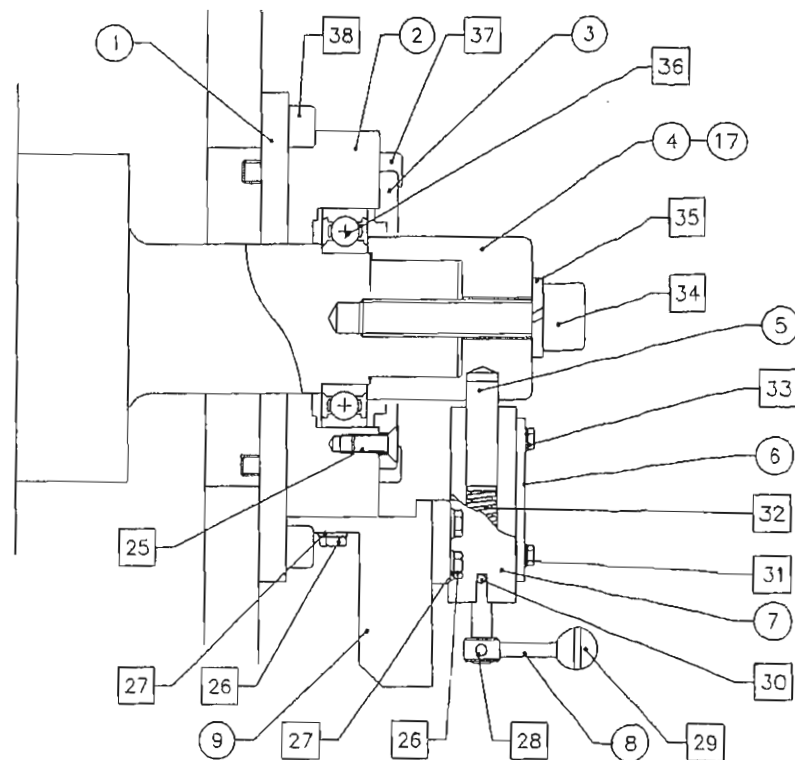
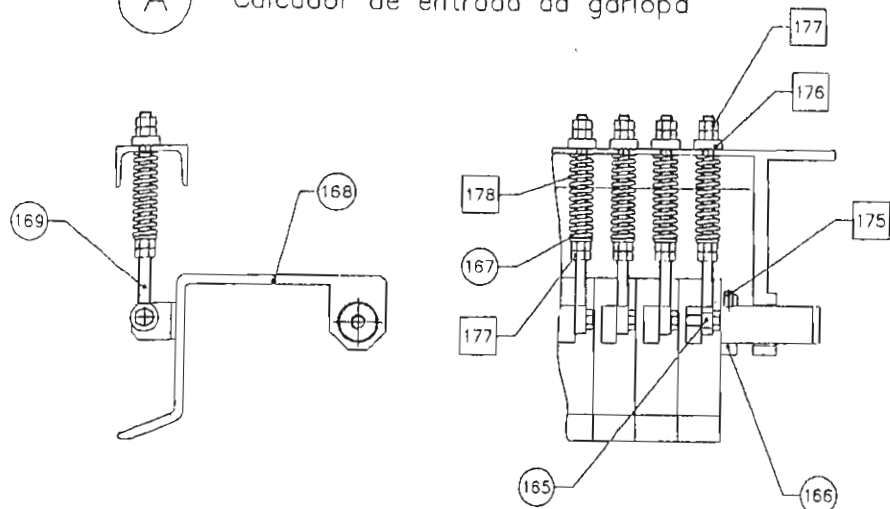




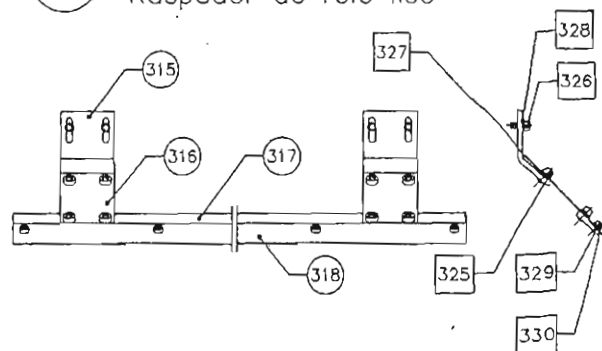
G Cilindro do desengrosso



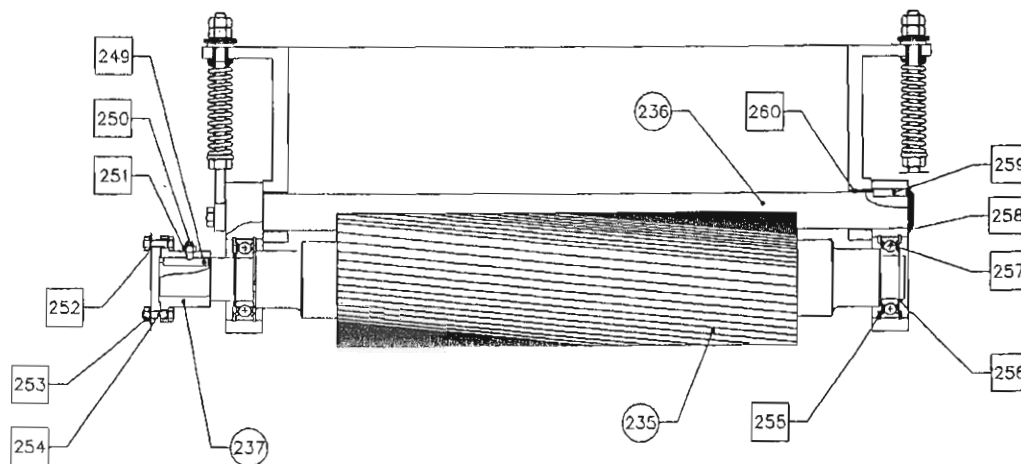
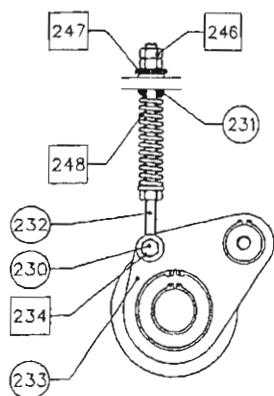
A Calcador de entrada da garlopa



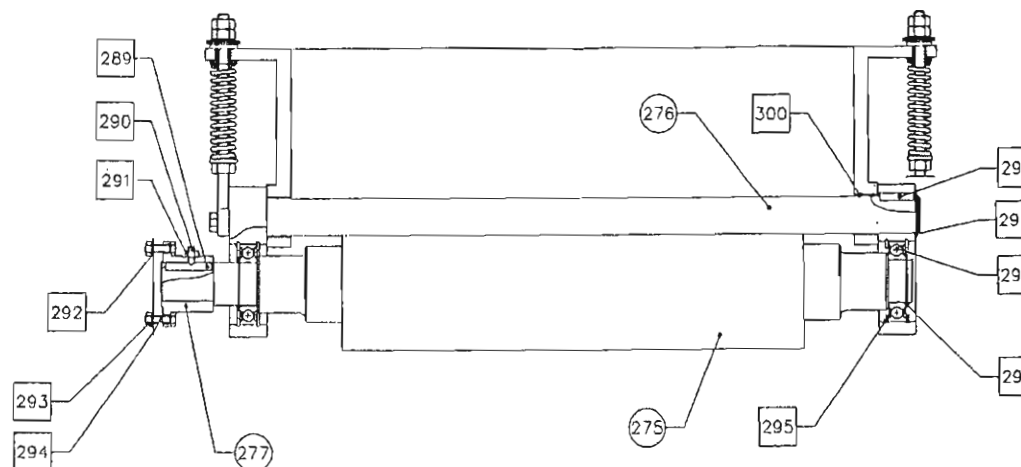
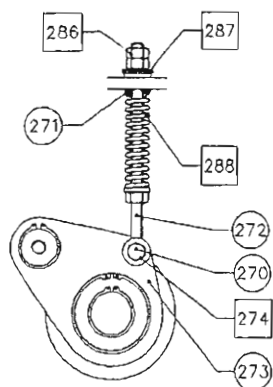
J Raspador do rolo liso



D 2- e 3- rolo de arrato estriado dente helicoidal

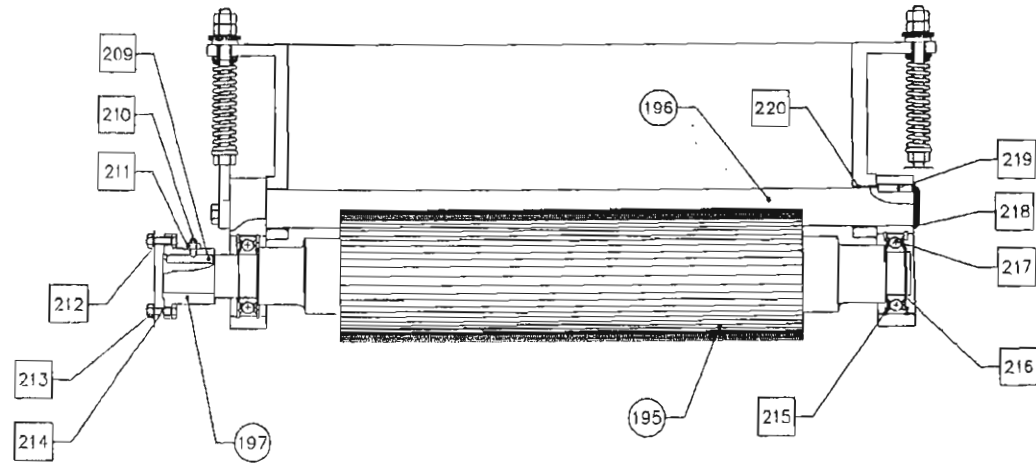
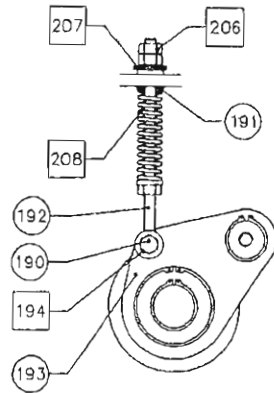


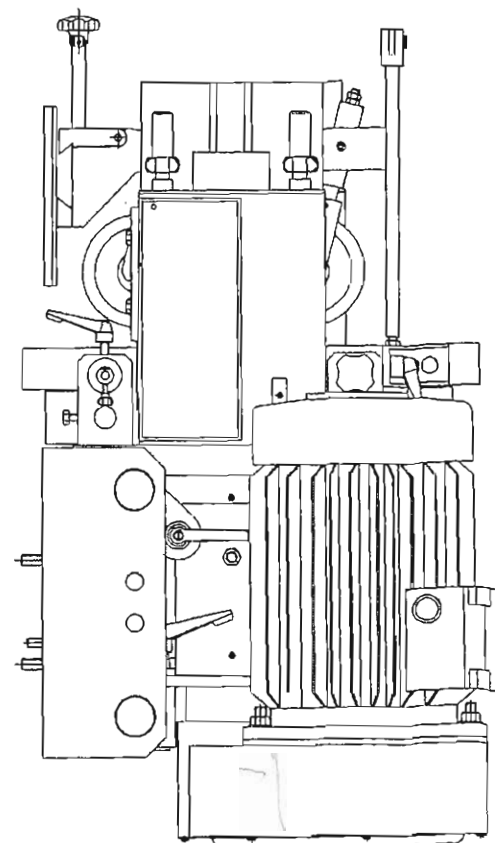
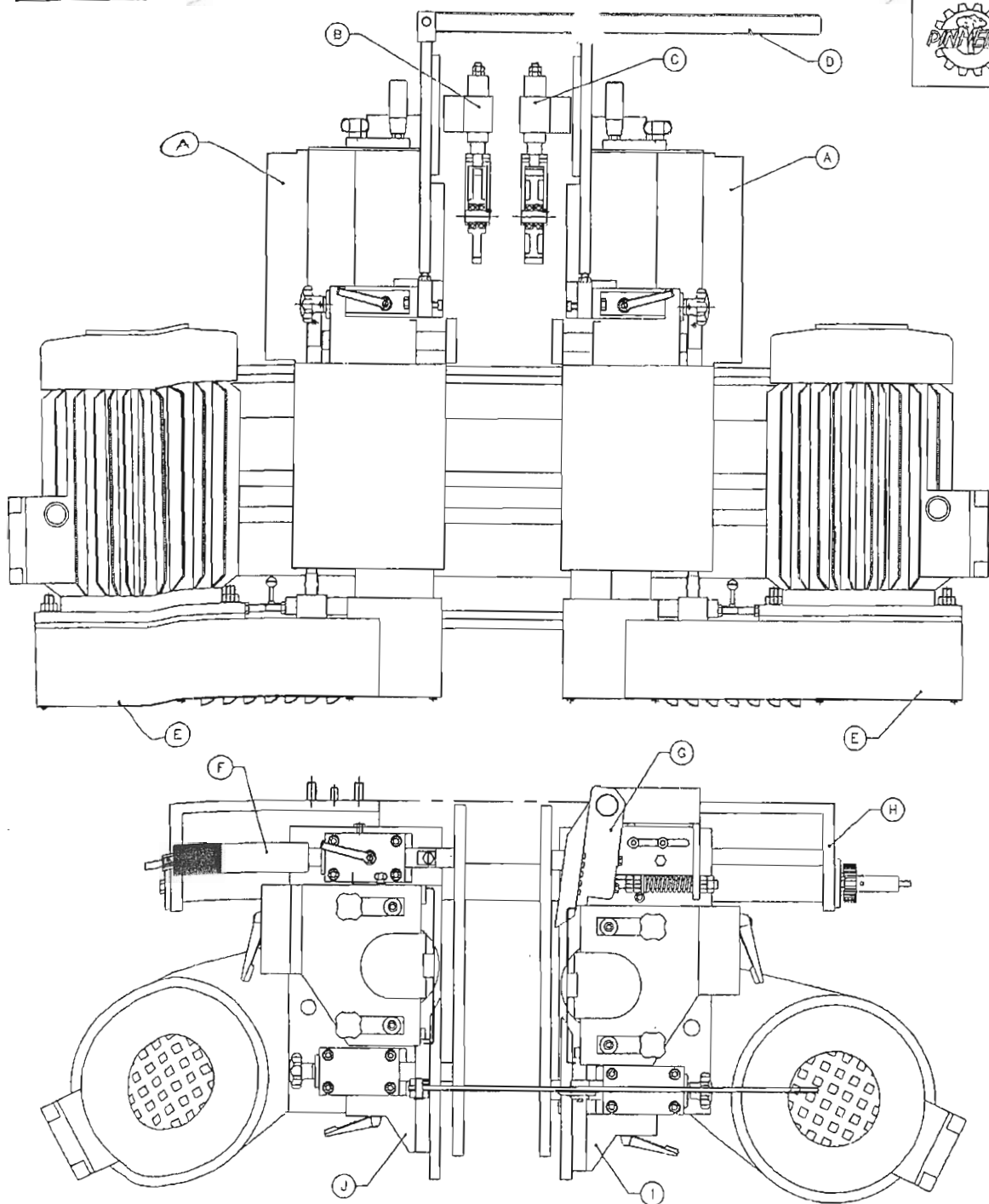
I Rolo liso de saida





C 1- rolo de arrato estriado dente direito

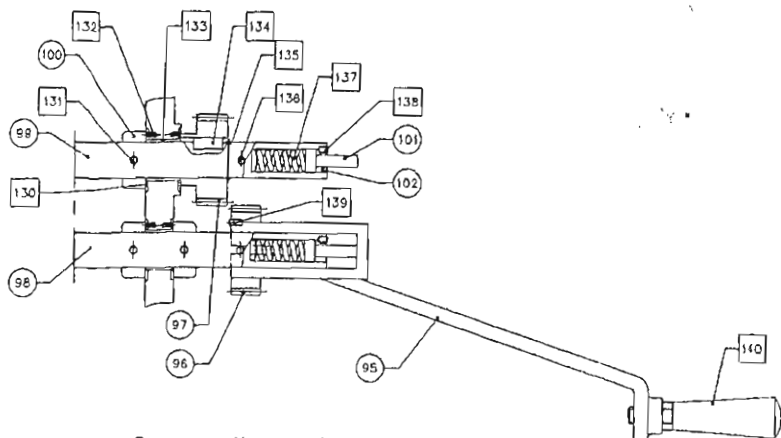
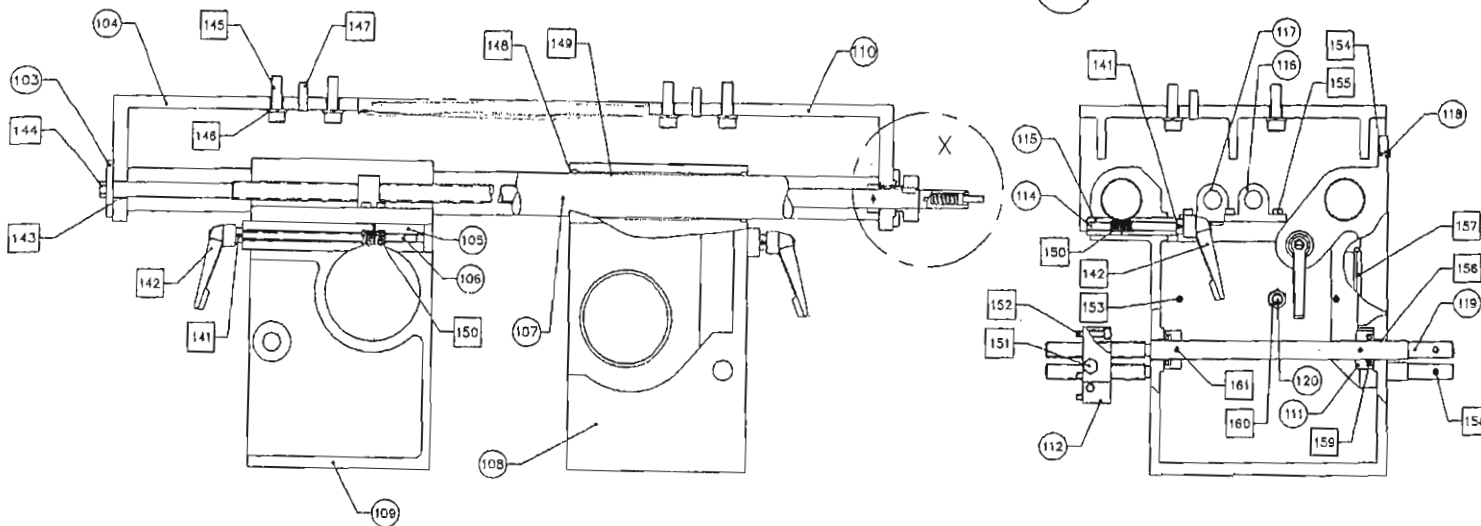






Movimento transversal dos pios (normal)

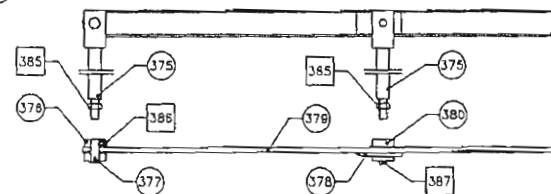
(H)



Pormenor X - montagem dos fusos
Escala 1/2

(D)

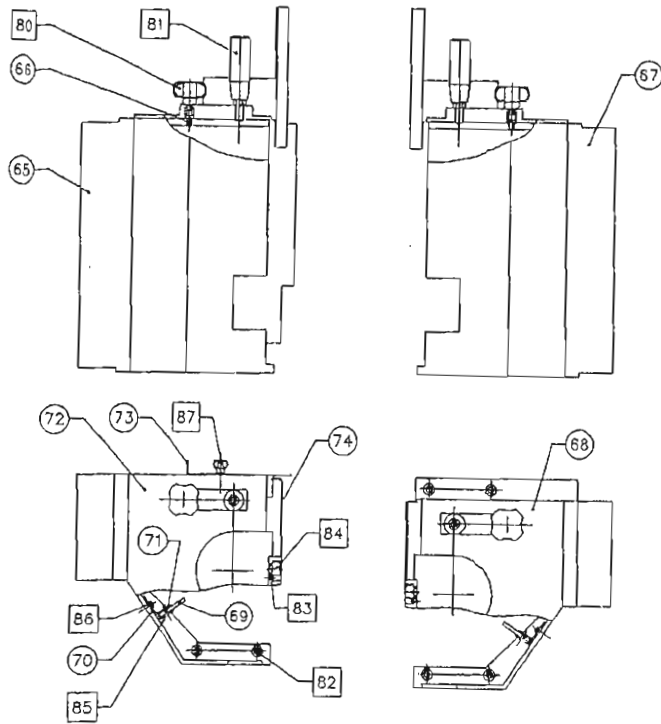
Escala da largura de aplainamento





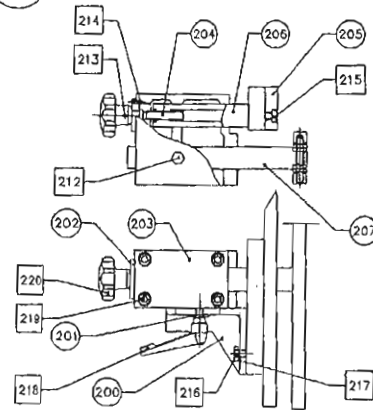
Campanulas de aspiracao

A



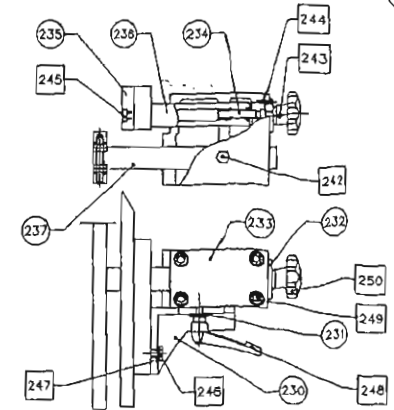
J

Paralela solda direita



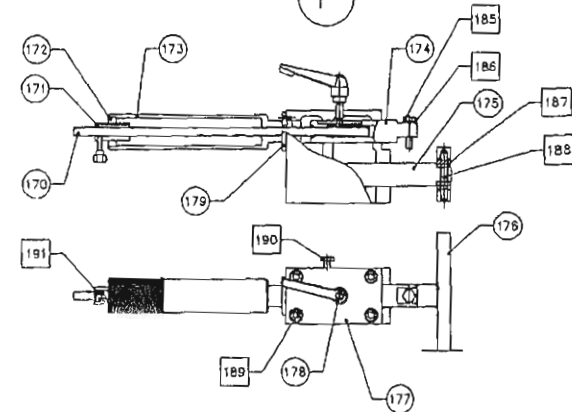
Paralela esquerda de solda

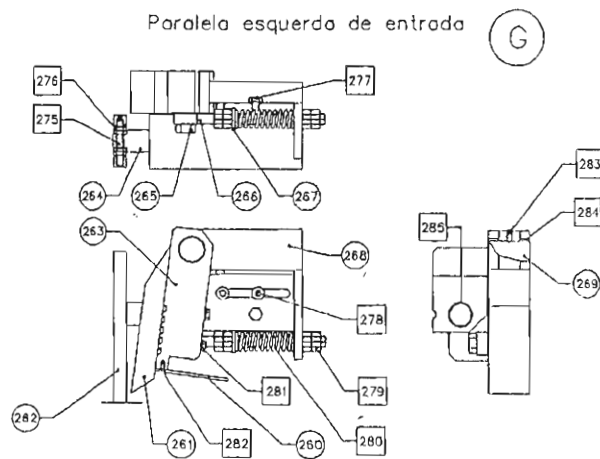
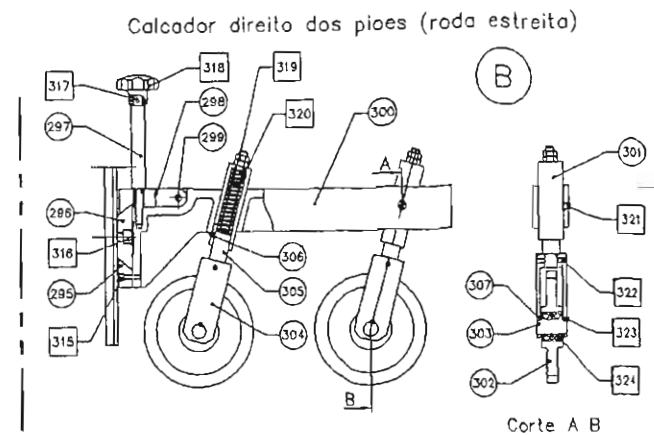
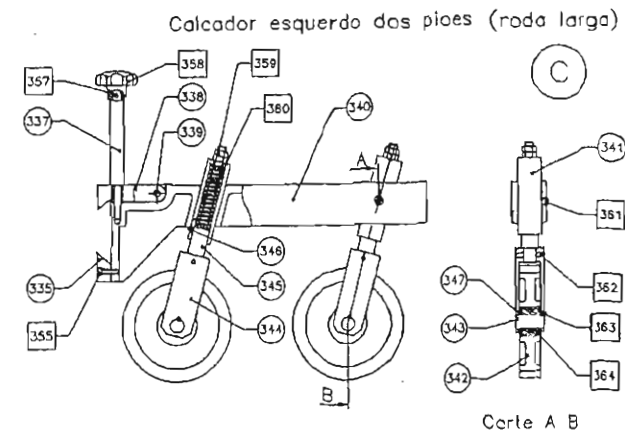
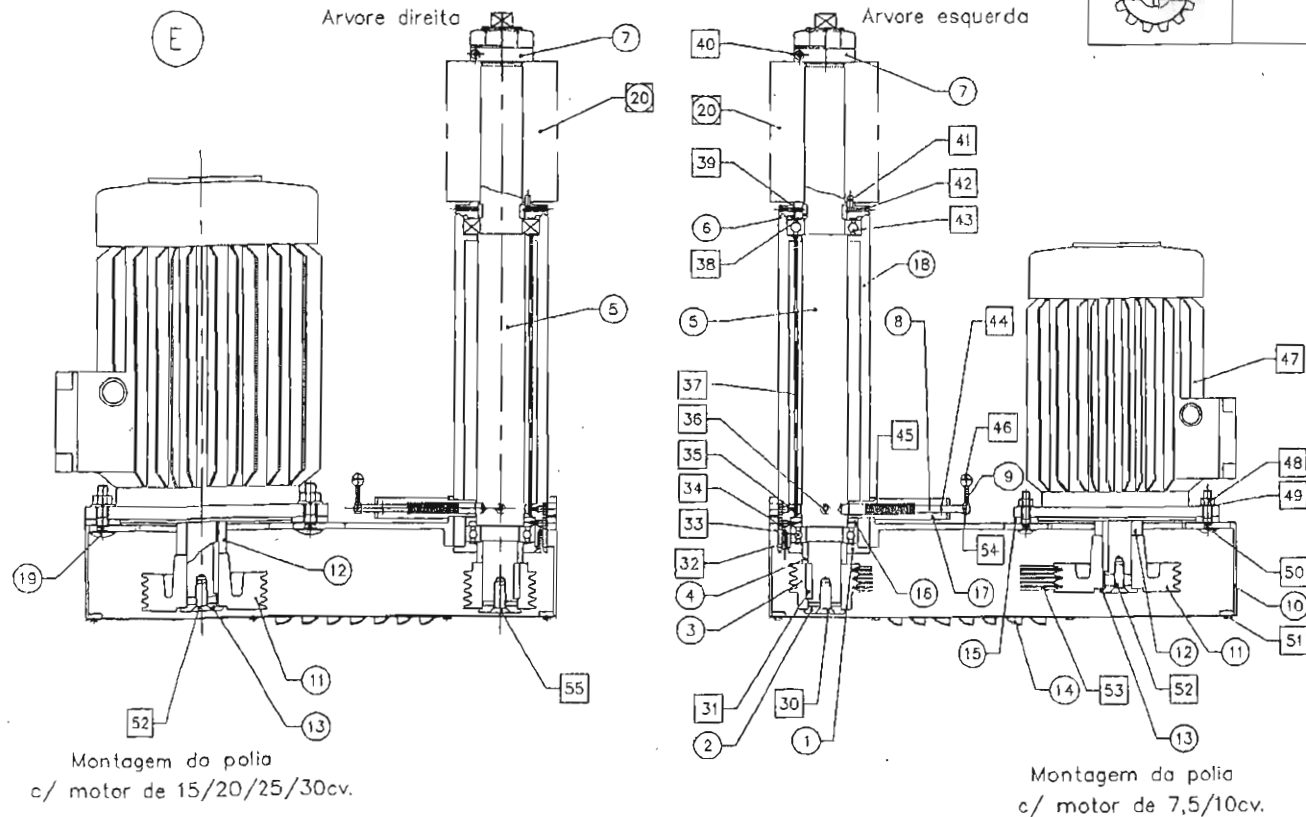
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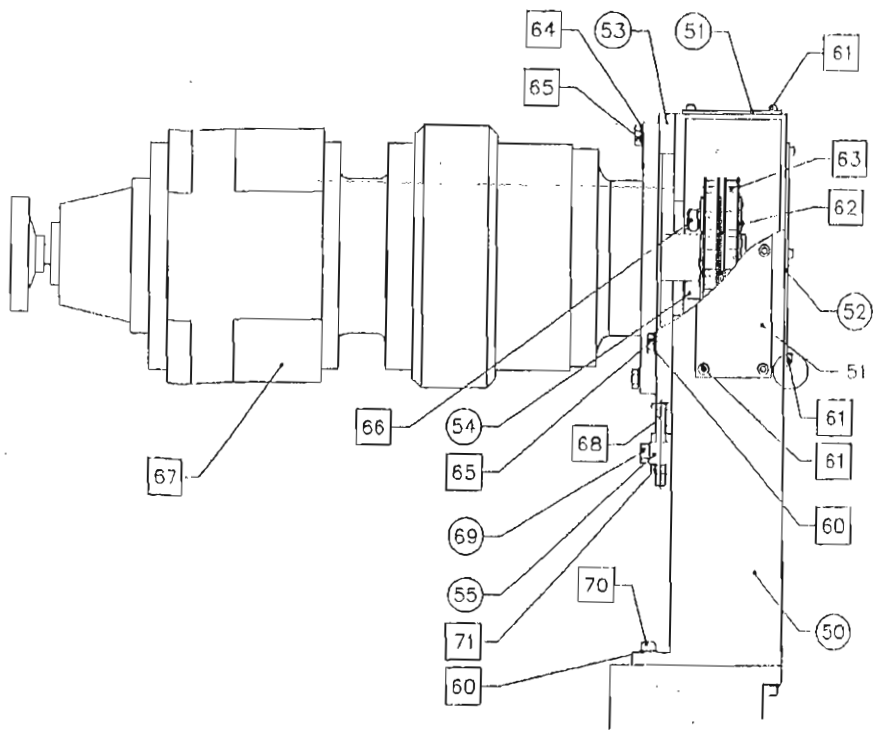


Paralela entrada direita

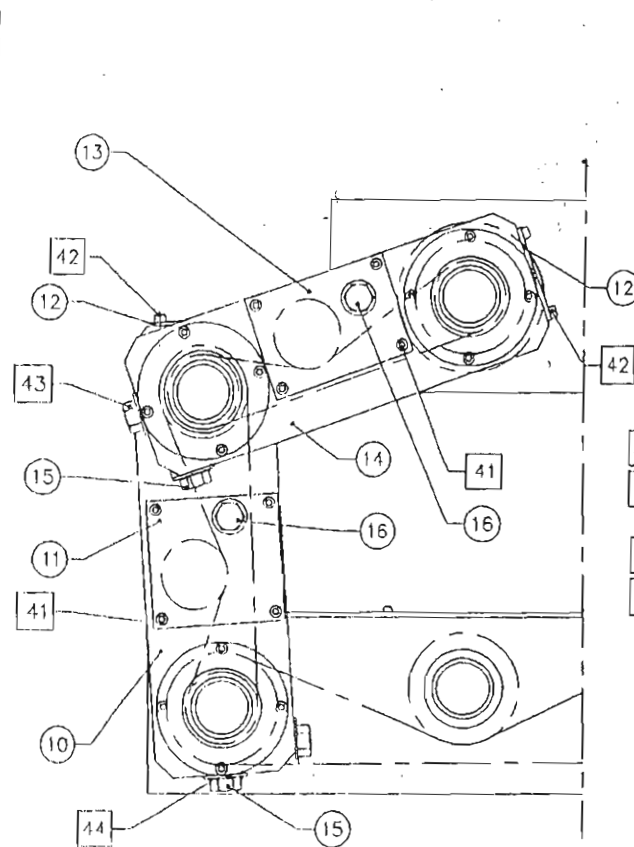
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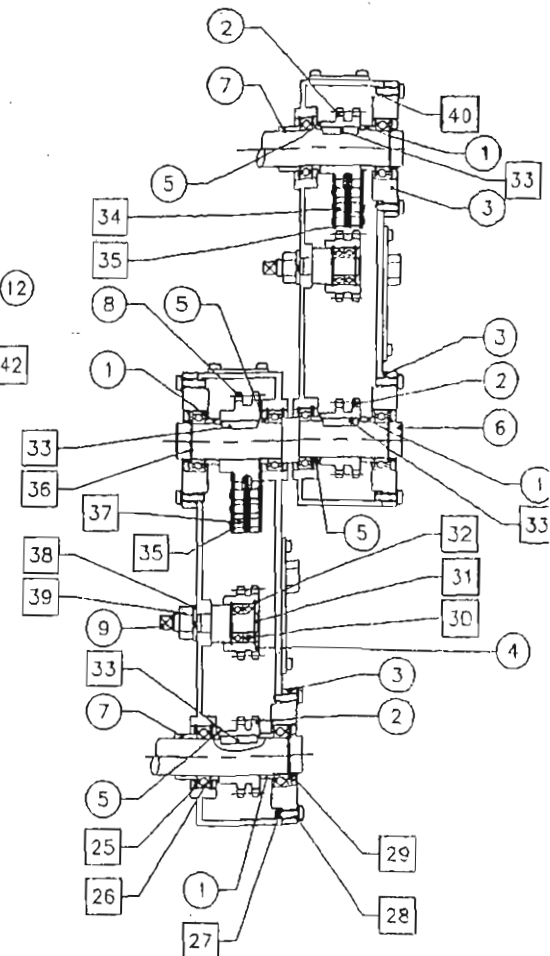


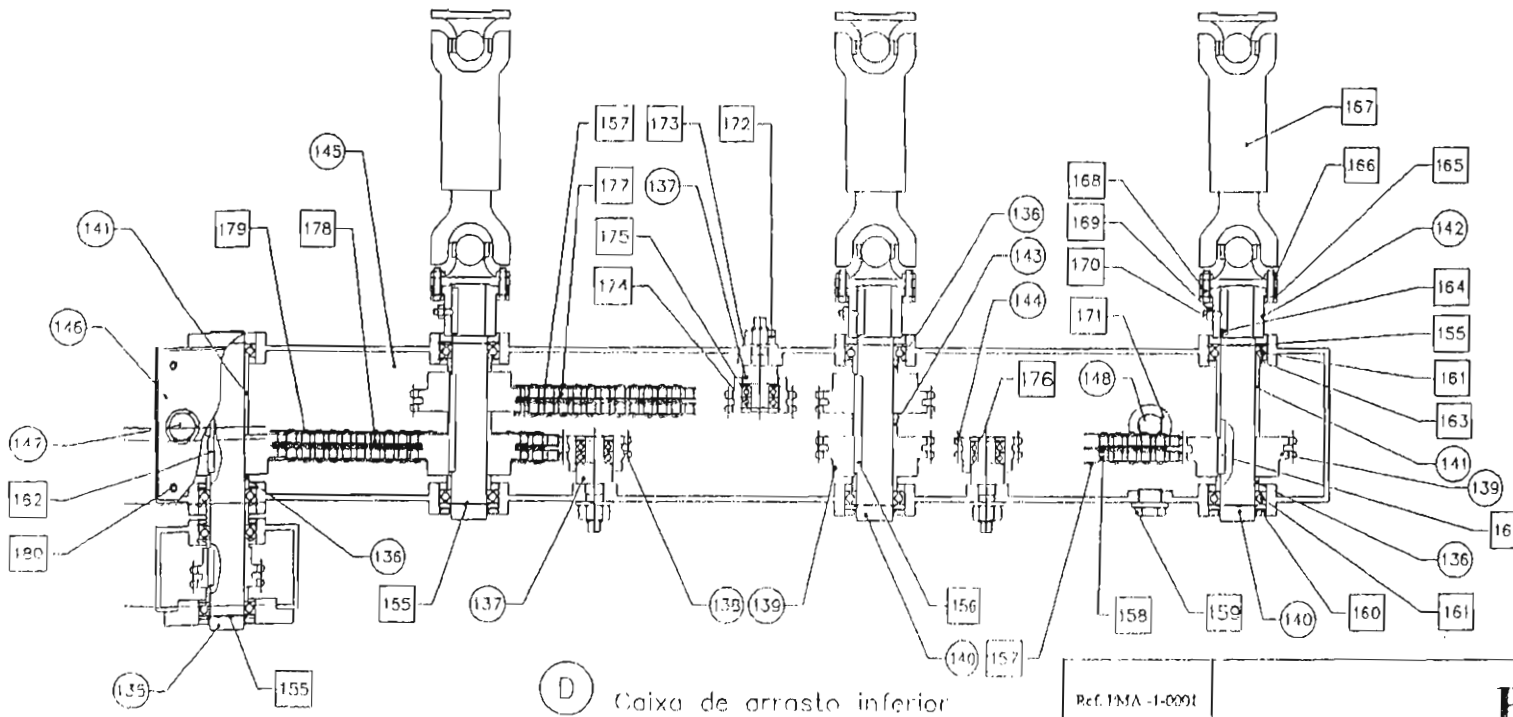
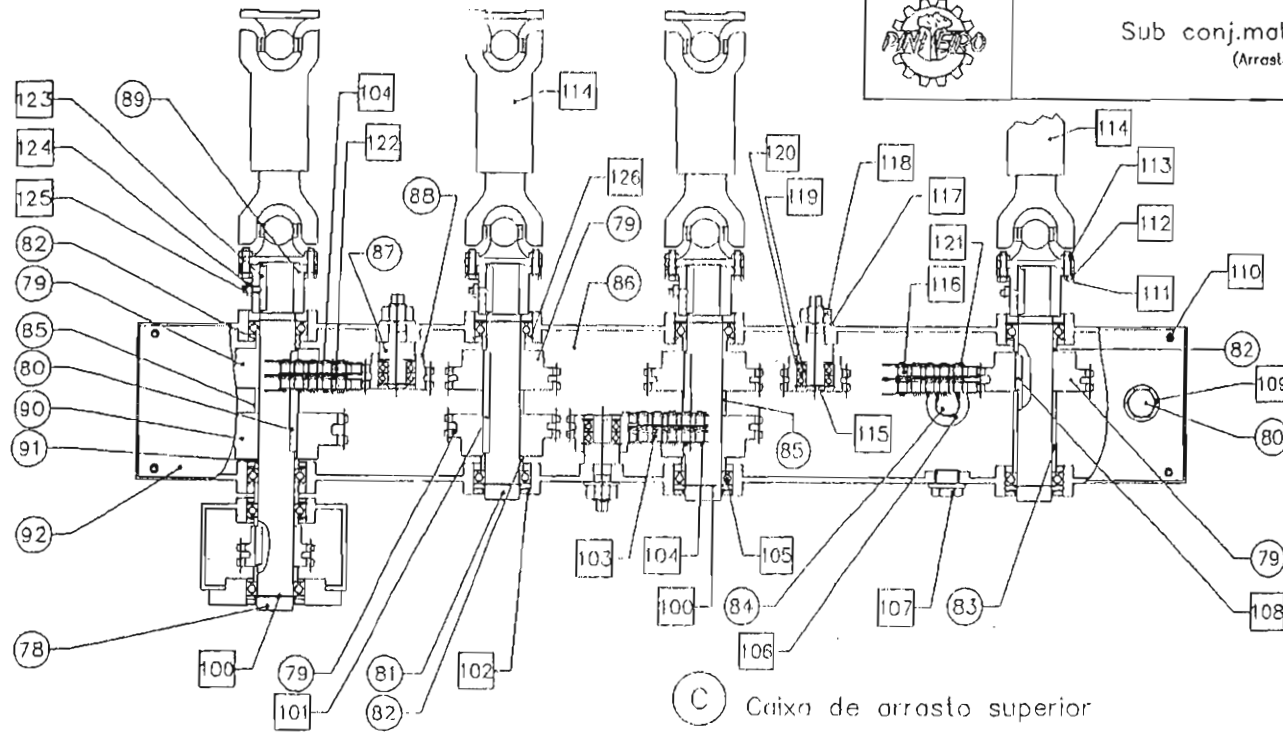


(B) Moto-variador de arrasto



(A) Caixa de arrasto em tesoura







Qtd	Descrição	Dim	Mat	Obs	Qtd	Descrição	Dim	Mat	Obs
1	Paraf. cob. cil.	DIN-912	M16x50		1	Paraf. cob. cil.	DIN-912	M16x50	
1	Anilha de pressão	DIN-127	M8		1	Anilha de pressão	DIN-127	M8	
1	Paraf. cob. cil.	DIN-912	M12x35		1	Paraf. cob. cil.	DIN-912	M12x35	
1	Paraf. cob. cil.	DIN-912	M10x10		1	Paraf. cob. cil.	DIN-912	M10x10	
1	Elo de engate	DIN-8187	5/8 x 3/8 x 10,18		1	Elo de engate	DIN-8187	5/8 x 3/8 x 10,18	
1	Corrente dupla	DIN-8187	5/8 x 3/8 x 10,18 x 150mm		1	Corrente dupla	DIN-8187	5/8 x 3/8 x 10,18 x 150mm	
1	Corrente dupla	DIN-8187	5/8 x 3/8 x 10,18 x 140mm		1	Corrente dupla	DIN-8187	5/8 x 3/8 x 10,18 x 140mm	
1	Circelis exterior	DIN-472	M8		1	Circelis exterior	DIN-472	M8	
1	Circelis interior	DIN-472	M8		1	Circelis interior	DIN-472	M8	
1	Rolamento rígido de esfera	DIN-625	6004 2RS #20x47x12		1	Rolamento rígido de esfera	DIN-625	6004 2RS #20x47x12	
1	Anilha de pressão	DIN-127	M8		1	Anilha de pressão	DIN-127	M8	
1	Paraf. sextavado	DIN-934	M8x20		1	Paraf. sextavado	DIN-934	M8x20	
1	Anilha de cobre	DIN-934	M8x10		1	Anilha de cobre	DIN-934	M8x10	
1	Paraf. cob. sext.	DIN-931	M8x30		1	Paraf. cob. sext.	DIN-931	M8x30	
1	Cardan (BONDOLI & PAVES)		020 Ref. 8919 020x001		1	Cardan (BONDOLI & PAVES)		020 Ref. 8919 020x001	
1	Paraf. autoblocante	DIN-985	M8-U-10		1	Paraf. autoblocante	DIN-985	M8-U-10	
1	Anilha de pressão	DIN-127	M8		1	Anilha de pressão	DIN-127	M8	
1	Chavele	DIN-6885	A12x40		1	Chavele	DIN-6885	A12x40	
1	Circelis interior	DIN-472	M8		1	Circelis interior	DIN-472	M8	
1	Chavele	DIN-6885	A12x40		1	Chavele	DIN-6885	A12x40	
1	Rolamento rígido de esfera	DIN-625	6008 2RS #40x68x15		1	Rolamento rígido de esfera	DIN-625	6008 2RS #40x68x15	
1	Retentor	SIMRIT	B1 #40x68x7		1	Retentor	SIMRIT	B1 #40x68x7	
1	Vimbr de aço c/ anilha	DIN-8187	5/8 x 3/8 x 10,18 x 150mm		1	Vimbr de aço c/ anilha	DIN-8187	5/8 x 3/8 x 10,18 x 150mm	
1	Corrente dupla	DIN-8187	5/8 x 3/8 x 10,18		1	Corrente dupla	DIN-8187	5/8 x 3/8 x 10,18	
1	Moto de	DIN-8187	A12x40		1	Moto de	DIN-8187	A12x40	
1	Chavele	DIN-6885	A12x40		1	Chavele	DIN-6885	A12x40	
1	Circelis exterior	DIN-472	M8		1	Circelis exterior	DIN-472	M8	
1	Bujão	4-35503	1/2" G	NMP-720	1	Bujão	4-35503	1/2" G	NMP-720
1	Bujão	4-35502	3/8" G	NMP-720	1	Bujão	4-35502	3/8" G	NMP-720
1	lampa	4-35707			1	lampa	4-35707		
1	Caixa longitudinal	1-35632			1	Caixa longitudinal	1-35632		
1	Carrolo de corrente dupla	4-31919		PUF	1	Carrolo de corrente dupla	4-31919		PUF
1	Cosquilho escalado	4-31822		PUF	1	Cosquilho escalado	4-31822		PUF
1	lampa	4-35707		PUF	1	lampa	4-35707		PUF
1	Cosquilho de separacao	4-31916	#10x50x27	PUF	1	Cosquilho de separacao	4-31916	#10x50x27	PUF
1	Eixo esnigado	4-31909	#40x50x8	PUF	1	Eixo esnigado	4-31909	#40x50x8	PUF
1	Carrolo de corrente	4-31974		PUF	1	Carrolo de corrente	4-31974		PUF
1	Carrolo de corrente	4-35886		PUF	1	Carrolo de corrente	4-35886		PUF
1	Eixo excentrico	4-32223		PUF	1	Eixo excentrico	4-32223		PUF
1	Cosquilho de separacao	4-32855	#40x50x16	NMP-718	1	Cosquilho de separacao	4-32855	#40x50x16	NMP-718
1	lampa	4-35551			1	lampa	4-35551		
1	Circelis interior	DIN-472	M8		1	Circelis interior	DIN-472	M8	
1	Paraf. sextavado	DIN-914	M8x20		1	Paraf. sextavado	DIN-914	M8x20	
1	Paraf. cob. cil.	DIN-912	M8x10		1	Paraf. cob. cil.	DIN-912	M8x10	
1	Anilha de cobre	DIN-934	M8x10		1	Anilha de cobre	DIN-934	M8x10	
1	Chavele	DIN-6885	A12x40		1	Chavele	DIN-6885	A12x40	
1	Vimbr de aço c/ anilha	DIN-8187	5/8 x 3/8 x 10,18		1	Vimbr de aço c/ anilha	DIN-8187	5/8 x 3/8 x 10,18	
1	Anilha de pressão	DIN-127	M8		1	Anilha de pressão	DIN-127	M8	
1	Rolamento rígido de esfera	DIN-625	6004 2RS #20x47x12		1	Rolamento rígido de esfera	DIN-625	6004 2RS #20x47x12	
1	Retentor	SIMRIT	B1 #40x68x7		1	Retentor	SIMRIT	B1 #40x68x7	
1	Anilha de pressão	DIN-127	M8		1	Anilha de pressão	DIN-127	M8	
1	Paraf. cob. cil.	DIN-912	M8x10		1	Paraf. cob. cil.	DIN-912	M8x10	
1	Rolamento rígido de esfera	DIN-625	6008 2RS #40x68x15		1	Rolamento rígido de esfera	DIN-625	6008 2RS #40x68x15	
1	Circelis interior	DIN-472	M8		1	Circelis interior	DIN-472	M8	
1	Bujão	4-35502	3/8" G	NMP-720	1	Bujão	4-35502	3/8" G	NMP-720
1	Bujão	4-35503	1/2" G	NMP-720	1	Bujão	4-35503	1/2" G	NMP-720
1	lampa	2-35848			1	lampa	2-35848		
1	lampa	4-35707			1	lampa	4-35707		
1	lampa	4-35708			1	lampa	4-35708		
1	lampa	4-35709			1	lampa	4-35709		
1	Calço	2-35847			1	Calço	2-35847		
1	Eixo excentrico	4-32223		PUF	1	Eixo excentrico	4-32223		PUF
1	Carrolo de corrente dupla	4-35849		PUF	1	Carrolo de corrente dupla	4-35849		PUF
1	Cosquilho de separacao	4-32858	#10x50x25	NMP-718	1	Cosquilho de separacao	4-32858	#10x50x25	NMP-718
1	Eixo	4-35650			1	Eixo	4-35650		
1	Cosquilho de separacao	4-32400	#40x50x10	NMP-718	1	Cosquilho de separacao	4-32400	#40x50x10	NMP-718
1	Carrolo de corrente dupla	4-31919		PUF	1	Carrolo de corrente dupla	4-31919		PUF
1	lampa	4-35849			1	lampa	4-35849		
1	Carrolo de corrente dupla	4-35878		PUF	1	Carrolo de corrente dupla	4-35878		PUF
1	Cosquilho de separacao	4-32866	#40x50x16	NMP-718	1	Cosquilho de separacao	4-32866	#40x50x16	NMP-718
1	Designação				1	Designação			

