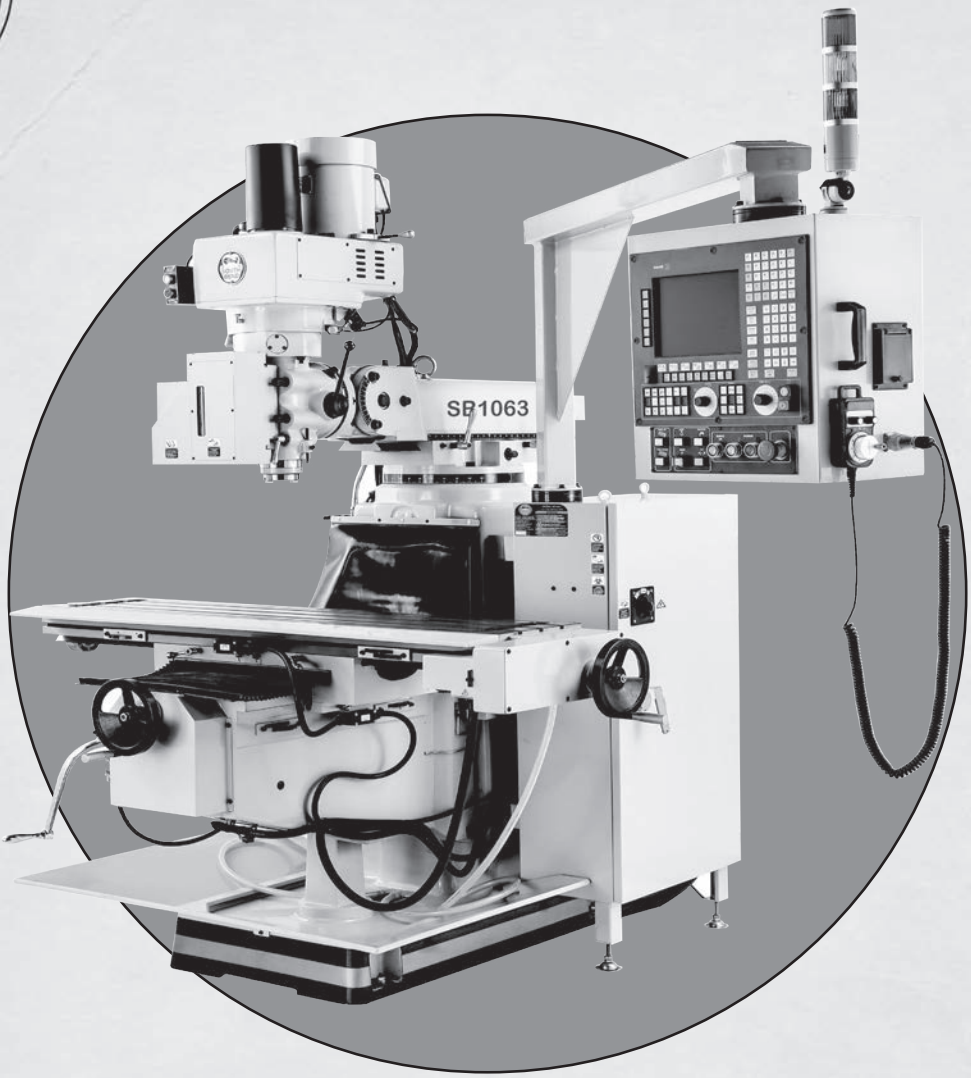
12" X 58" CNC KNEE MILL

MODEL SB1063



OWNER'S MANUAL

South Bend Lathe Co.®

Hundreds of Thousands of Lathes Sold With a Tradition of Quality Since 1906!

For Machines Mfd. Since 5/19

Scope of Manual

This manual helps the reader understand the machine, how to prepare it for operation, how to control it during operation, and how to keep it in good working condition. We assume the reader has a basic understanding of how to operate this type of machine, and that the reader is experienced with using CNC controls and commands. As with all machinery of this nature, learning the nuances of operation is a process that happens through training and experience. If you are not an experienced operator of this type of machinery, read through this entire manual, then learn more from an experienced operator, schooling, or research before attempting operations. Following this advice will help you avoid serious machine damage, personal injury, and get the best results from your work.

Manual Feedback

We've made every effort to be accurate when documenting this machine. However, errors sometimes happen or the machine design changes after the documentation process—so the manual may not exactly match your machine. If a difference between the manual and machine leaves you in doubt, contact our customer service for clarification.

We highly value customer feedback on our manuals. If you have a moment, please share your experience using this manual. What did you like about it? Is there anything you would change to make it better? Did it meet your expectations for clarity, professionalism, and ease-of-use?

South Bend Lathe, Inc.
c/o Technical Documentation Manager
P.O. Box 2027
Bellingham, WA 98227
Email: manuals@southbendlathe.com

Updates

For your convenience, any updates to this manual will be available to download free of charge through our website at:

www.southbendlathe.com

Customer Service

We stand behind our machines. If you have any service questions, parts requests or general questions about the machine, feel free to contact us.

South Bend Lathe Co.
P.O. Box 2027
Bellingham, WA 98227
Phone: (360) 734-1540
Parts Department: (417) 886-2954
Fax: (360) 676-1075 (International)
Fax: (360) 734-1639 (USA Only)
Email: cs@southbendlathe.com

Table of Contents

About This Machine

Foreword

"*Most boys should learn a trade in order that they may become skilled workmen. The trained workman is always in demand...When a boy has learned a trade, becomes a skilled mechanic, he has excellent equipment with which to begin life's battle, but he need not stop there. George Westinghouse, the Wright Brothers, Henry Ford, and the Studebaker Brothers were mechanics, and it was their mechanical training that made their success possible.*" —**Machine Shop Equipment**, 2nd Ed., 1920, by the O'Brien Brothers, founders of South Bend Lathe.

The first South Bend milling machine debuted in the 1950's. During that time, the milling machine and the already well-established South Bend lathes created the foundation of many tool rooms and school shops across America and beyond her borders. Many young people in those days came of age on South Bend equipment, becoming world-class machinists, mechanical engineers, inventors, and manufacturing visionaries.

A lot has changed in the world since then. Those same school shops have mostly been replaced by computer labs. The technology in the rotary dial phone, television set, mechanical calculator, computer, and camera of that decade could barely fit into one large room together—now they fit into a tiny box that is no bigger than a box of breath mints. And the average production machinist spends more time at a computer than at a machine. Technology has been much refined and the world operates on a much faster pace.

But some things haven't changed. The same human ingenuity and passion that created the best mechanical technology of today still exists within us. The core machines of the modern shop, like this South Bend milling machine, are still fundamentally important.

When you think about it, the greatest mechanical technology of the future will be what we create today. As the owner of a South Bend milling machine, you are now part of a great legacy. What will you create with yours?

Capabilities

This Milling Machine is built for any industrial setting, tool room, or school shop and is built for many years of service. Large workpieces can be supported and is perfect for face milling, end milling, planing, slot or keyway cutting, dovetailing, routing, drilling, reaming, and boring to name a few. With the movable ram and tilting head, all these tasks can be performed on horizontal, vertical, and angled surfaces.

Features

This CNC milling machine features 3-axis table movement with built-in X-, Y-, and Z-axis servo motors. It is constructed with high-grade Meehanite castings, and the saddle and knee ways are Turcite coated and built with wide square ways for maximum support and accuracy throughout the full range of movement.

To ensure quality work results, we have equipped this mill with premium spindle bearings that are rated to extreme tolerances. The spindle taper is NT40 and has servo motor downfeed with a variable feed rate between 0-0.98 FPM and spindle travel of 3.5".

The machine uses a Delta VFD-B inverter with a 5HP induction motor to provide true variable spindle speed from 50-5000 RPM.

The headstock is mounted on a wide dovetail movable ram with 20" of travel on the column and 320° rotating capability. The headstock itself can swivel 90° left/right or 45° forward/back so it can be positioned for nearly any setup needed.

To reduce the time spent doing daily lubrication, this milling machine is outfitted with an electronic lubrication system that automatically lubricates the most critical areas.

A quality Fagor 8055i control panel with excellent electrical components and attention to detail give dependable CNC milling operations.

Last but not least, this milling machine includes a circulating coolant system with the pump and reservoir in the column base.

Full View Identification (Left)

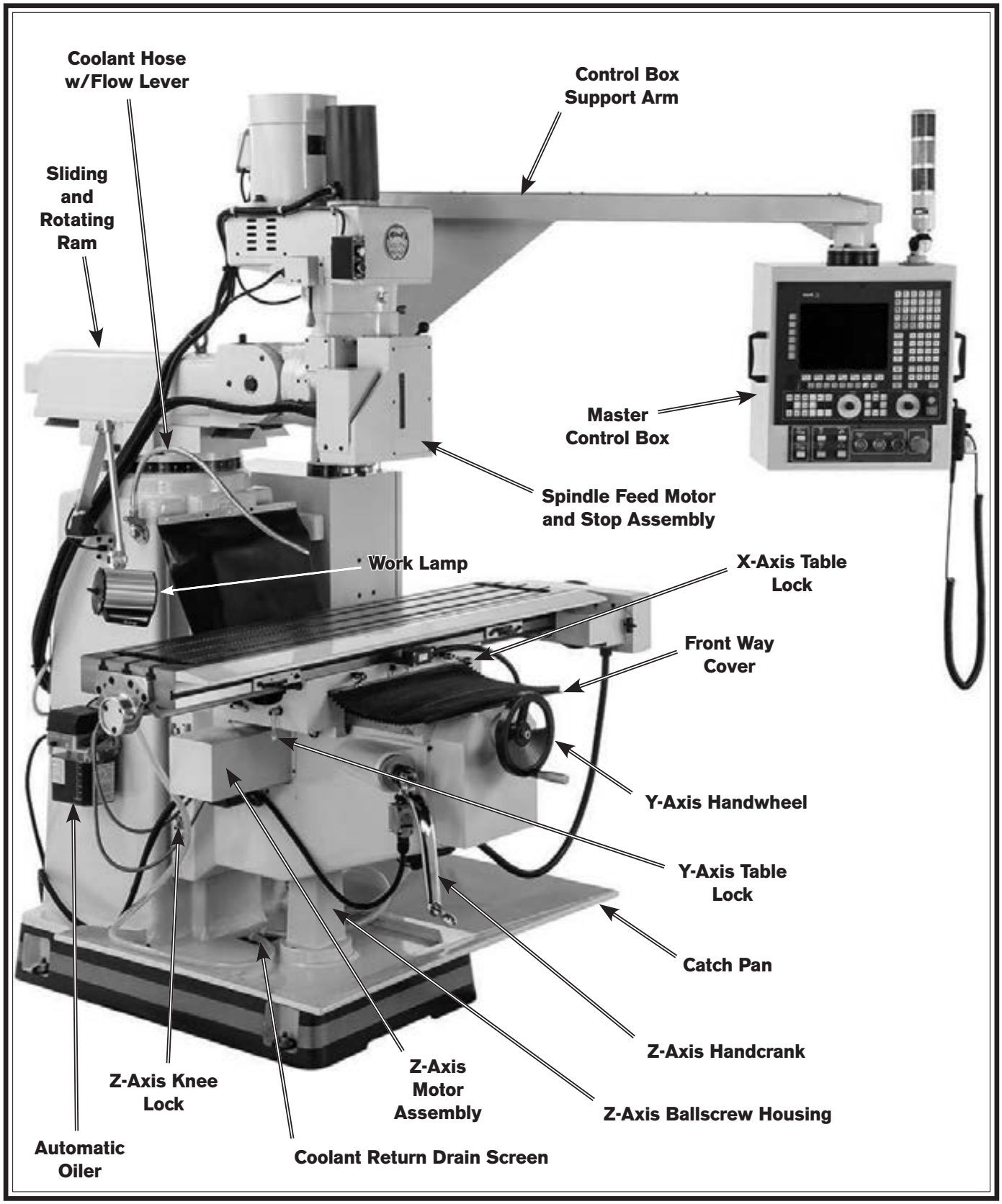


Figure 1. Left side machine view.

Full View Identification (Right)

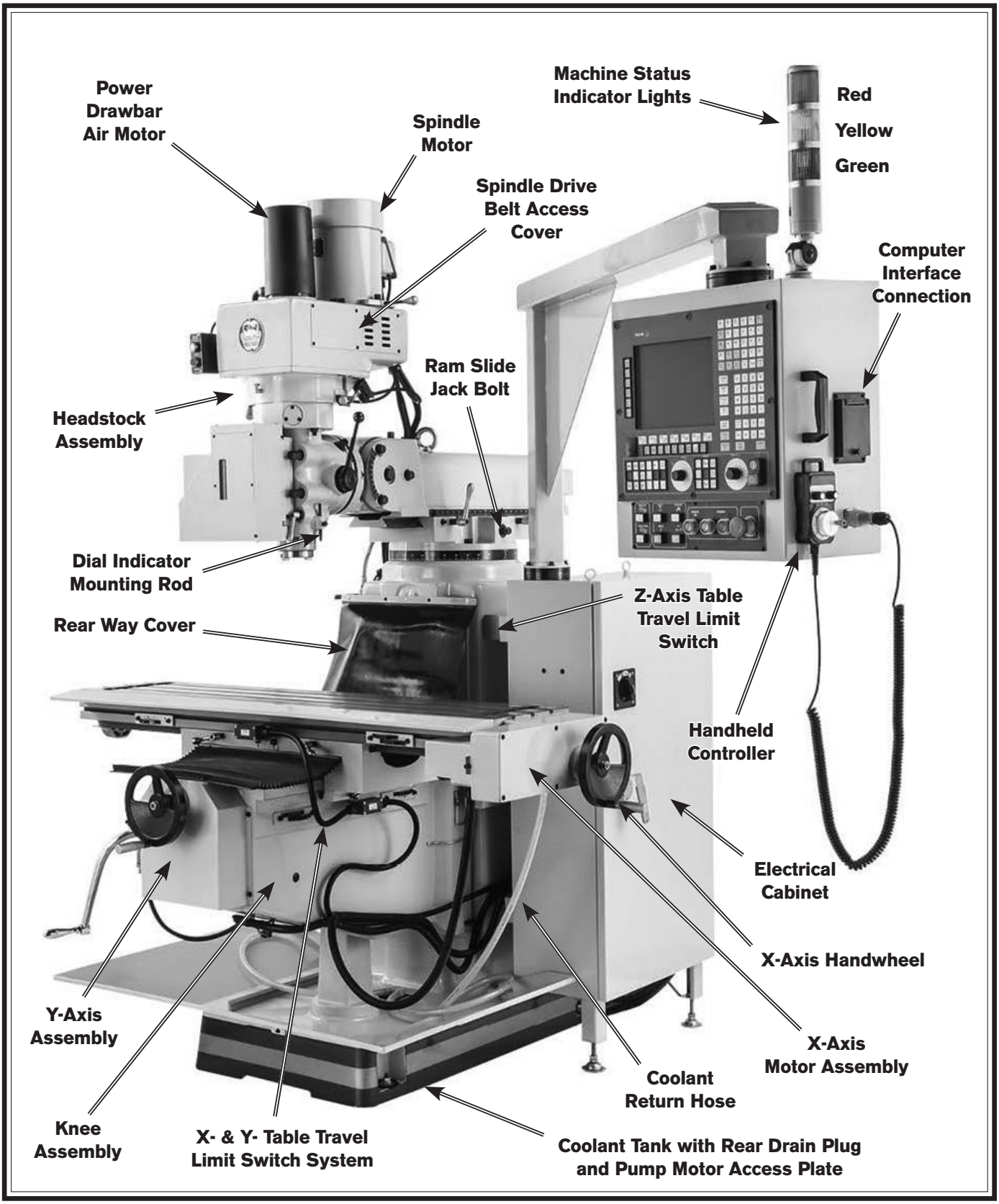


Figure 2. Right side machine view.

Controls Identification (Left)

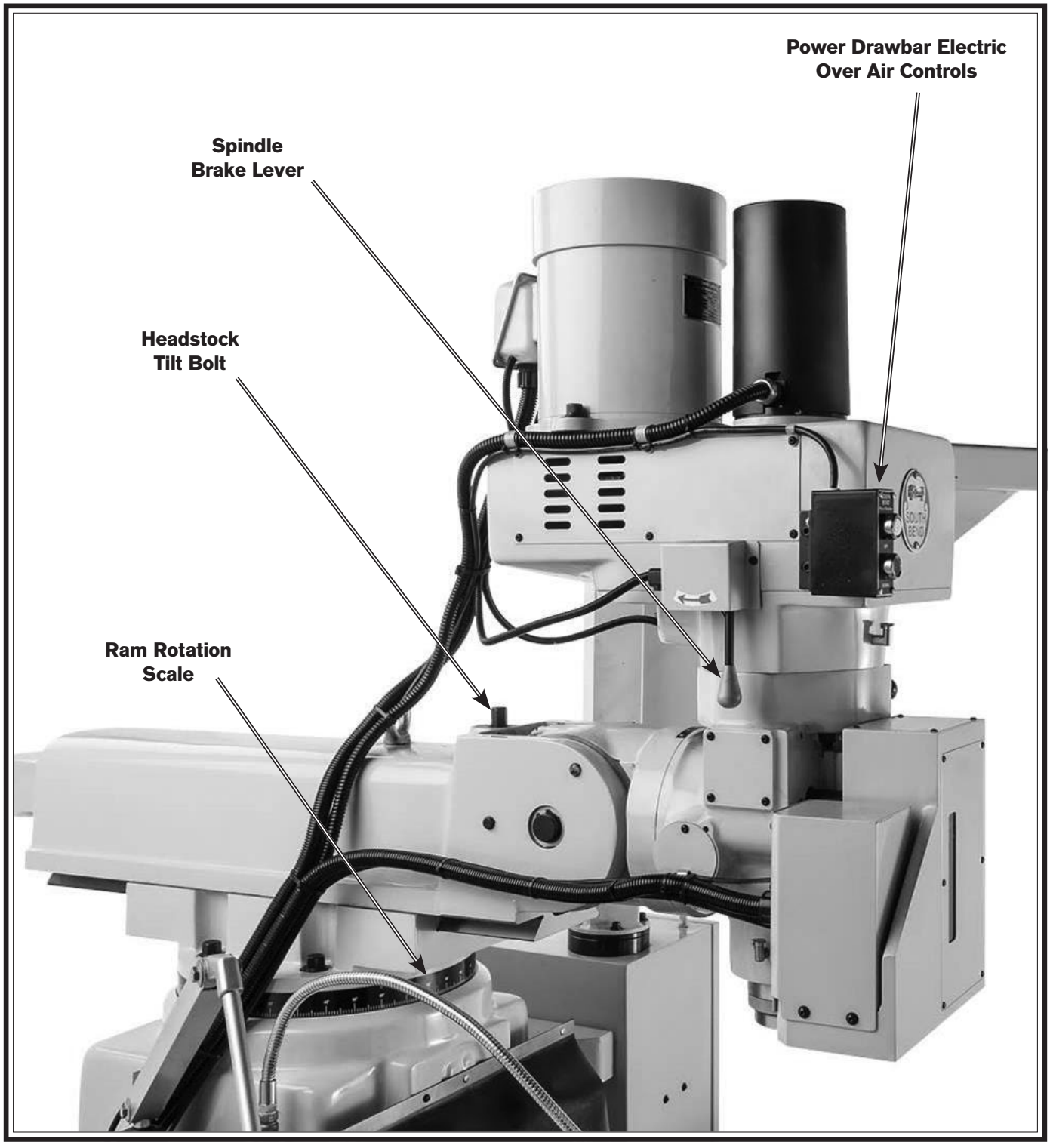


Figure 3. Left side controls.

Controls Identification (Right)

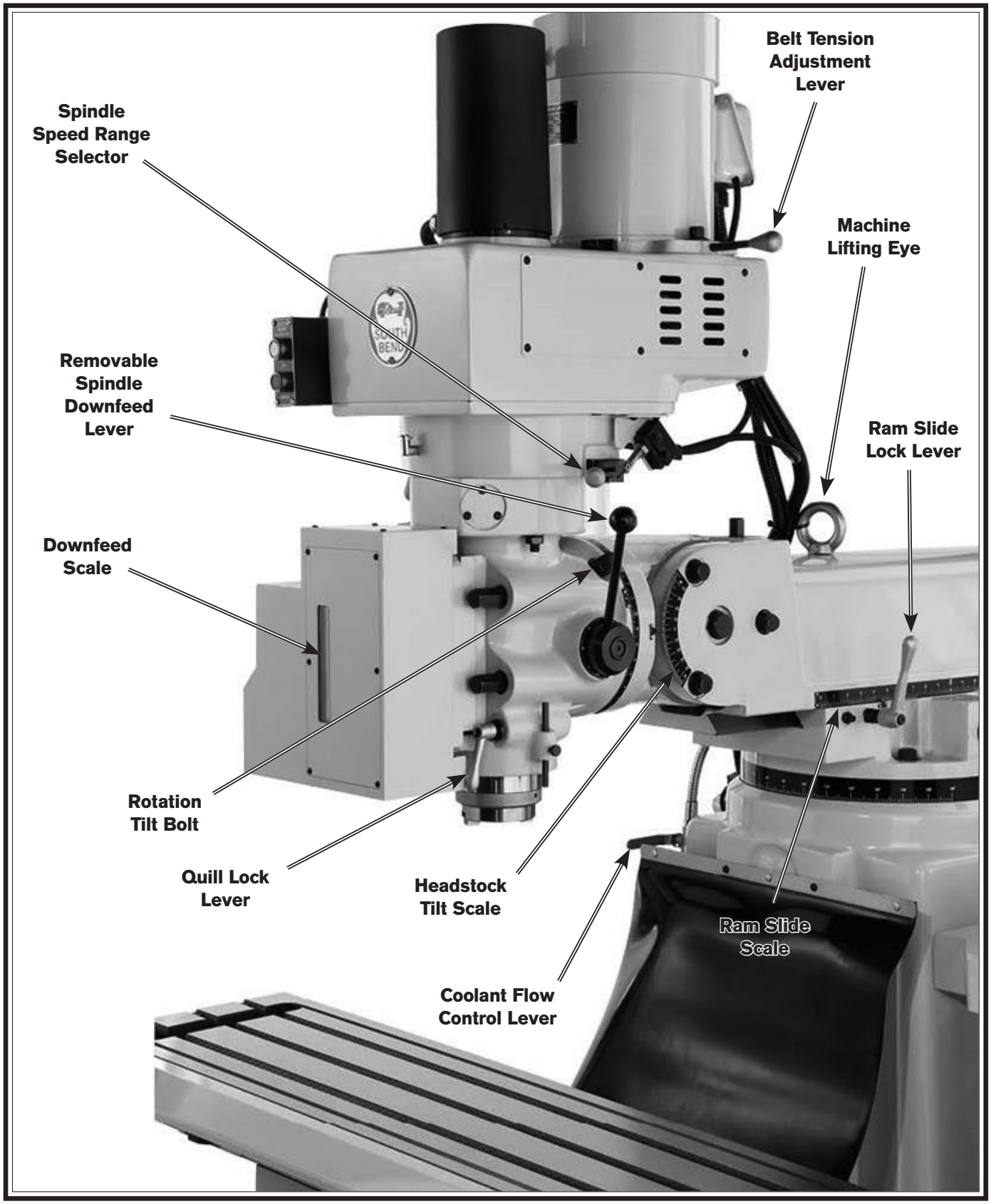


Figure 4. Right side controls.

Control Panel Close-Up Identification

Figure 5. Control panel close-up details.

⚠WARNING

Serious personal injury could occur if you connect the machine to power before completing the setup process. DO NOT connect power until instructed to do so later in this manual.

⚠WARNING

Untrained users have an increased risk of seriously injuring themselves with this machine. Do not operate this machine until you have understood this entire manual and received proper training.

Controls & Components

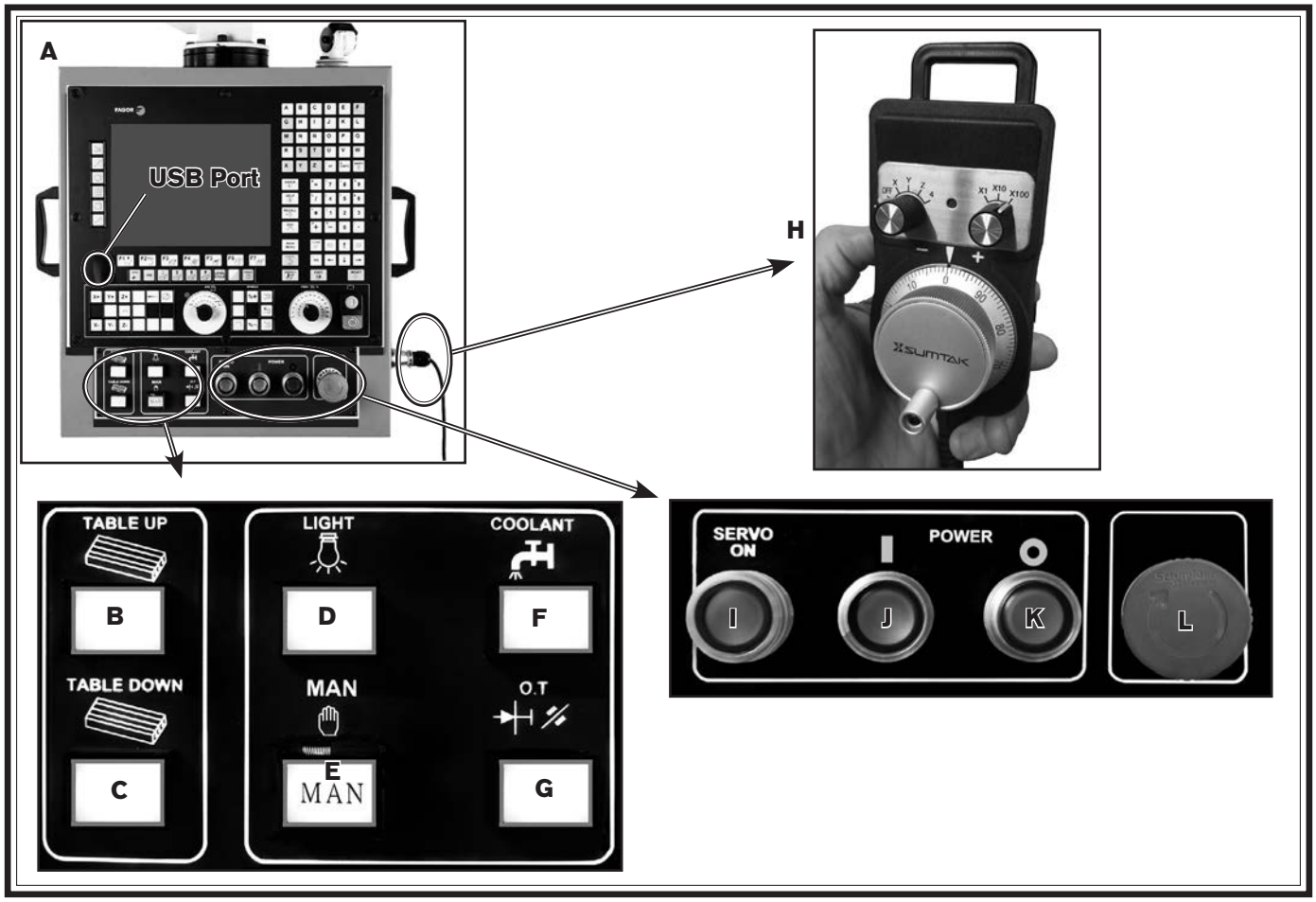


Figure 6. Control panel close-up details.

Controls & Components

These controls are largely independent of the CNC interface and most will be used in **Machine Start-Up** testing without using CNC programs. Refer to Fagor CD Manuals for CNC testing.

A. Control Panel: This is the master location for entering CNC commands and serves as user interface with machine during milling operation.

B. TABLE UP Button: Moves work table up until upper limit switch is tripped.

C. TABLE DOWN Button: Moves work table down until lower limit switch is tripped.

D. LIGHT Button: Toggles work light ***ON/OFF***.

E. MAN (DRO) Button: Shuts down all servo-driver power and releases the spindle and quill lock so you can use the spindle downfeed lever.

F. COOLANT Button: Toggles coolant pump ***ON/OFF***.

G. O.T REL Button: If axis over travel trips limit switch, alarm message displays and all axis motors stop. The **O.T REL** button resets motors to resume operations.

Note: *Pressing ESC clears alarm, and pressing Servo On initalizes jog mode for table to be moved back into the safe area.*

H. Handheld Controller: Attached to the control box, it controls manual feed of X-, Y-, and Z-axes and has speed multiplying dial functions.

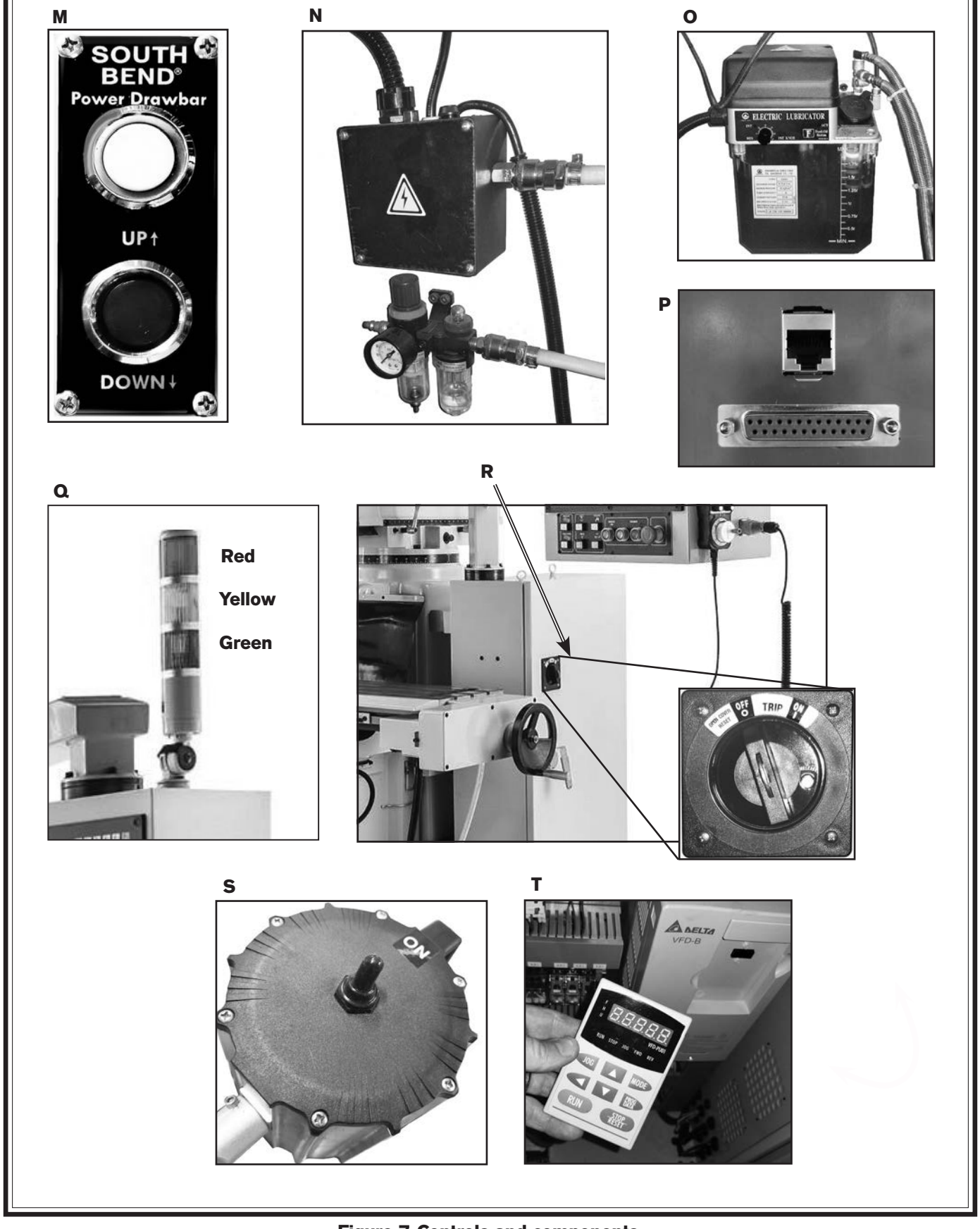


Figure 7. Controls and components.

I. Servo ON Button: Takes machine table axis out of Manual Mode and puts machine back into CNC Mode for electronic control of servo motors.

J. Power OFF (O) Button: Powers ***OFF*** all items.

K. Power ON (I) Button: Powers ***ON*** all items.

L. EMERGENCY STOP Button: Stops all motors on machine immediately.

M. Power Drawbar Controls:
The UP button threads drawbar into the tooling and seats the tooling with spindle. The DOWN button unthreads drawbar from tooling and unseats tooling from spindle for removal.

N. Drawbar Motor Air and Lubrication System:
This is a two-part electric over air control system. Up/Down buttons open and close air valve to supply regulated filtered air to drawbar motor. The oiler also adds a drop of oil to the air every time the button is pressed.

Note: *The oil is for the drawbar motor only and does not reach the tooling arbors. Arbor and spindle mating surfaces must still be maintained by you.*

O. Automatic Electronic Lubricator:
Automatically lubricates machine on timed basis. Manual Override button will lubricate on command.

Note: *Lubrication volume and frequency can be set manually by referring to the list of locations in the Maintenance Section of this manual and the oiler instructions.*

P. Control Box Interface: When the waterproof cover is opened, revealed is the:
- CAT-5 Port
- IEEE 1284 DB25 25-Pin Parallel Port

Q. Machine Status Indicator Light: When illuminated, a red, yellow, or green light indicates the operation mode of the machine. Refer to the Fagor Manual for all the various modes of operation indicated.

R. Master Electrical Safety Switch:
This switch toggles power to all machine systems and most electronic components in electrical box. However, when switched to OFF, the input side is still live, so for all electrical work, this machine must still be disconnected from power first.

S. Work Lamp ON/OFF Switch: When switch is in ON position; work light can be turned ***ON*** and ***OFF*** at control panel.

T. VFD Controller: This control is only used for initial VFD setup at the factory and troubleshooting by authorized and trained technicians. The machine operator will never need to use this control and, tampering with VFD settings can void warranty.

P.O. Box 2027, Bellingham, WA 98227 U.S.A.
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Product Specifications

Model SB1063
12" x 58" CNC Knee Mill

Product Dimensions

Weight	3814 lbs.
Width (side-to-side) x Depth (front-to-back) x Height	124 x 105-1/2 x 93-1/2 in.
Footprint (Length x Width)	47 x 38 in.

Shipping Dimensions

Type	Wood Crate
Content	Machine
Weight	4015 lbs.
Length x Width x Height	106 x 79 x 100 in.
Must Ship Upright	Yes

Electrical

Power Requirement	220V, 3-Phase, 60 Hz
Full-Load Current Rating	25A
Minimum Circuit Size	30A
Connection Type	Permanent (Hardwire to Shutoff Switch)
Switch Type	Control Panel w/Magnetic Switch Protection
Inverter (VFD) Type	Delta VFD-B
Inverter (VFD) Size	5 HP

Motors

Spindle

Horsepower	5 HP
Phase	3-Phase
Amps	14A
Speed	1730 RPM
Type	Induction
Power Transfer	Belt Drive
Bearings	Shielded & Permanently Sealed

Coolant Pump

Horsepower	1/8 HP
Phase	3-Phase
Amps	0.38A
Speed	3450 RPM
Type	Induction
Power Transfer	Direct Drive
Bearings	Shielded & Permanently Sealed

X-Axis Feed

Horsepower..... 1 HP
Phase..... 3-Phase
Amps..... 5.1A
Speed..... 3000 RPM
Type..... Servo
Power Transfer ..... Belt Drive
Bearings..... Shielded & Permanently Sealed

Y-Axis Feed

Horsepower..... 1 HP
Phase..... 3-Phase
Amps..... 5.1A
Speed..... 3000 RPM
Type..... Servo
Power Transfer ..... Belt Drive
Bearings..... Shielded & Permanently Sealed

Z-Axis Feed

Horsepower..... 1/2 HP
Phase..... 3-Phase
Amps..... 2.6A
Speed..... 3000 RPM
Type..... Servo
Power Transfer ..... Belt Drive
Bearings..... Shielded & Permanently Sealed

Main Specifications

Operation Info

Spindle Travel..... 3.5 in.
Max Distance Spindle to Column..... 27 in.
Max Distance Spindle to Table..... 19 in.
Longitudinal Table Travel (X-Axis)..... 32 in.
Cross Table Travel (Y-Axis)..... 15.7 in.
Vertical Table Travel (Z-Axis)..... 16.5 in.
Ram Travel..... 20 in.
Turret or Column Swivel (Left /Right)..... 320 deg.
Head Tilt (Left/Right)..... 90 deg.
Head Tilt (Front/Back)..... 45 deg.
Drilling Capacity for Cast Iron..... 1 in.
Drilling Capacity for Steel..... 15/16 in.
Tapping Capacity..... 3/4 in.
End Milling Capacity..... 3/4 in.
Face Milling Capacity..... 3-15/16 in.

Table Info

Table Length..... 58 in.
Table Width..... 12-1/2 in.
Table Thickness..... 3-3/8 in.
Table Weight Capacity..... 660 lbs.
Number of T-Slots..... 3
T-Slot Size..... 5/8 in.
T-Slots Centers..... 3-1/4 in.
Number of Longitudinal Feeds..... Variable Speed
X-Axis Table Power Feed Rate..... 16 FPM
Y-Axis Table Power Feed Rate..... 16 FPM

Spindle Info

Spindle Taper..... NT40
Number of Vertical Spindle Speeds..... Variable Speed
Range of Vertical Spindle Speeds..... 50 - 5000 RPM
Quill Diameter..... 4-1/8 in.
Quill Feed Rates..... Variable: 0 - 0.98 FPM
Drawbar Thread Size..... 5/8-11
Drawbar Length..... 25-9/16 in.
Spindle Bearings..... Angular Contact - 7210A

Construction

Spindle Housing/Quill..... Cast Iron
Table..... Precision-Ground Cast Iron
Head..... Cast Iron
Column/Base..... Cast Iron
Base..... Cast Iron
Stand..... Cast Iron
Paint Type/Finish..... Enamel

Other

Country of Origin ..... Taiwan
Warranty ..... 1 Year
Approximate Assembly & Setup Time ..... 1 Hour
Serial Number Location ..... Machine ID Label
ISO 9001 Factory ..... No

Features

3-Axis Servo Driven
Fagor Control Panel with Hand-Held Controller
Manual/Servo Mode
Power Drawbar
Powered Lubrication System
Coolant Recycling System
Auxiliary Worklight

Included Accessories

Tool Box Including the Following Items:
Flat-Head, Philip Head Screwdrivers
Closed-End Wrench 19/21mm
Open-End Wrench 12/14mm
10-Pc. Hex Wrench Set: 1.5, 2, 2.5, 3, 4, 5, 5.5, 6, 8 & 10mm
Bottle for Oil

Understanding Risks of Machinery

Operating all machinery and machining equipment can be dangerous or relatively safe depending on how it is installed and maintained, and the operator's experience, common sense, risk awareness, working conditions, and use of personal protective equipment (safety glasses, respirators, etc.).

The owner of this machinery or equipment is ultimately responsible for its safe use. This responsibility includes proper installation in a safe environment, personnel training and usage authorization, regular inspection and maintenance, manual availability and comprehension, application of safety devices, integrity of cutting tools or accessories, and the usage of approved personal protective equipment by all operators and bystanders.

The manufacturer of this machinery or equipment will not be held liable for injury or property damage from negligence, improper training, machine modifications, or misuse. Failure to read, understand, and follow the manual and safety labels may result in serious personal injury, including amputation, broken bones, electrocution, or death.

The signals used in this manual to identify hazard levels are as follows:

DANGER	***Death or catastrophic harm WILL occur.***	**CAUTION**	***Moderate injury or fire MAY occur.***
WARNING	***Death or catastrophic harm COULD occur.***	***NOTICE***	***Machine or property damage may occur.***

Basic Machine Safety

Owner's Manual: All machinery and machining equipment presents serious injury hazards to untrained users. To reduce the risk of injury, anyone who uses THIS item MUST read and understand this entire manual before starting.

Personal Protective Equipment: Operating or servicing this item may expose the user to flying debris, dust, smoke, dangerous chemicals, or loud noises. These hazards can result in eye injury, blindness, long-term respiratory damage, poisoning, cancer, reproductive harm or hearing loss. Reduce your risks from these hazards by wearing approved eye protection, respirator, gloves, or hearing protection.

Trained/Supervised Operators Only: Untrained users can seriously injure themselves or bystanders. Only allow trained and properly supervised personnel to operate this item. Make sure safe operation instructions are clearly understood. If electrically powered, use padlocks and master switches, and remove start switch keys to prevent unauthorized use or accidental starting.

Guards/Covers: Accidental contact with moving parts during operation may cause severe entanglement, impact, cutting, or crushing injuries. Reduce this risk by keeping any included guards/covers/doors installed, fully functional, and positioned for maximum protection.

Entanglement: Loose clothing, gloves, neckties, jewelry or long hair may get caught in moving parts, causing entanglement, amputation, crushing, or strangulation. Reduce this risk by removing/securing these items so they cannot contact moving parts.

Mental Alertness: Operating this item with reduced mental alertness increases the risk of accidental injury. Do not let a temporary influence or distraction lead to a permanent disability! Never operate when under the influence of drugs/alcohol, when tired, or otherwise distracted.

Safe Environment: Operating electrically powered equipment in a wet environment may result in electrocution; operating near highly flammable materials may result in a fire or explosion. Only operate this item in a dry location that is free from flammable materials.

Electrical Connection: With electically powered equipment, improper connections to the power source may result in electrocution or fire. Always adhere to all electrical requirements and applicable codes when connecting to the power source. Have all work inspected by a qualified electrician to minimize risk.

Disconnect Power: Adjusting or servicing electrically powered equipment while it is connected to the power source greatly increases the risk of injury from accidental startup. Always disconnect power BEFORE any service or adjustments, including changing blades or other tooling.

Secure Workpiece/Tooling: Loose workpieces, cutting tools, or rotating spindles can become dangerous projectiles if not secured or if they hit another object during operation. Reduce the risk of this hazard by verifying that all fastening devices are properly secured and items attached to spindles have enough clearance to safely rotate.

Chuck Keys or Adjusting Tools: Tools used to adjust spindles, chucks, or any moving/rotating parts will become dangerous projectiles if left in place when the machine is started. Reduce this risk by developing the habit of always removing these tools immediately after using them.

Work Area: Clutter and dark shadows increase the risks of accidental injury. Only operate this item in a clean, non-glaring, and well-lighted work area.

Properly Functioning Equipment: Poorly maintained, damaged, or malfunctioning equipment has higher risks of causing serious personal injury compared to those that are properly maintained. To reduce this risk, always maintain this item to the highest standards and promptly repair/service a damaged or malfunctioning component. Always follow the maintenance instructions included in this documentation.

Unattended Operation: Electrically powered equipment that is left unattended while running cannot be controlled and is dangerous to bystanders. Always turn the power ***OFF*** before walking away.

Health Hazards: Certain cutting fluids and lubricants, or dust/smoke created when cutting, may contain chemicals known to the State of California to cause cancer, respiratory problems, birth defects, or other reproductive harm. Minimize exposure to these chemicals by wearing approved personal protective equipment and operating in a well ventilated area.

Difficult Operations: Attempting difficult operations with which you are unfamiliar increases the risk of injury. If you experience difficulties performing the intended operation, STOP! Seek an alternative method to accomplish the same task, ask a qualified expert how the operation should be performed, or contact our Technical Support for assistance.

Additional Milling Machine Safety

You can be seriously injured or killed by getting clothing, jewelry, or long hair entangled with rotating cutter/spindle. You can be severely cut or have fingers amputated from contact with rotating cutters. You can be blinded or struck by broken cutting tools, metal chips, workpieces, or adjustment tools thrown from the rotating spindle with great force. To reduce your risk of serious injury when operating this machine, completely heed and understand the following:

Understanding Controls: Make sure you understand the function and proper use of all controls before starting. This will help you avoid making mistakes that result in serious injury.

Avoiding Entanglement. DO NOT wear loose clothing, gloves, or jewelry, and tie back long hair. Keep all guards in place and secure. Always allow spindle to stop on its own. DO NOT stop spindle using your hand or any other object.

Wear Face Shield. Always wear a face shield in addition to safety glasses. This provides more complete protection for your face than safety glasses alone.

Use Correct Spindle Speed. Follow recommended speeds and feeds for each size and type of cutting tool. This helps avoid tool breakage during operation and ensures best cutting results.

Inspect Cutting Tool. Inspect cutting tools for sharpness, chips, or cracks before each use. Replace dull, chipped, or cracked cutting tools immediately.

Properly Secure Cutter. Firmly secure cutting tool or drill bit so it does not fly out of spindle during operation.

Power Disruption. In the event of a local power outage during operation, turn spindle switch OFF to avoid a possible sudden startup once power is restored.

Clean Machine Safely. Metal chips or shavings can be razor sharp. DO NOT clear chips by hand or compressed air that can force chips farther into machine—use a brush or vacuum instead. Never clear chips while spindle is turning.

Secure Workpiece To Table. Clamp workpiece to table or secure in a vise mounted to table, so workpiece cannot unexpectedly shift or spin during operation. NEVER hold workpiece by hand during operation.

Properly Maintain Machine. Keep machine in proper working condition to help ensure that it functions safely and all guards and other components work as intended. Perform routine inspections and all necessary maintenance. Never operate machine with damaged or worn parts that can break or result in unexpected movement during operation.

Disconnect Power First. To reduce risk of electrocution or injury from unexpected start- up, make sure mill/drill is turned OFF, dis- connected from power, and all moving parts have come to a complete stop before changing cutting tools or starting any inspection, adjustment, or maintenance procedure.

Remove Chuck Key & Spindle Tools. Always remove chuck key, drawbar wrench, and other tools used on the spindle immediately after use. This will prevent them from being thrown by the spindle upon startup.

Preparation Overview

The purpose of the preparation overview is to help you gather your resources and the machine for installation and operation. Steps for these items are covered further later in this section.

The typical preparation process is as follows:

1. Unpack machine inventory the shipment.

2. Inspect the machine for shipping damage.

3. Clean the machine and its components.

4. Review **Precautions Against Product Damage** in the **Fagor Operators Manual**, and if location is acceptable;

5. Electrician verifies the power source voltage, phase, and ground is within specification listed in this manual and the **Fagor Operators Manual**. Refer to Power Requirements on **Page 23** of that manual.

- If required, surge protection is installed.

6. Move the machine to its operating location.

7. Fasten and shim machine to the floor, or use optional feet and bolts and adjust until level.

8. Install loose components as required.

9. Fill coolant and lubrication oil reservoirs as applicable according to **Lubrication** section starting on **Page 36**.

10. Make remaining adjustments and inspections to ensure machine is ready for operation.

11. Connect machine to power.

12. Read and understand **Fagor Operating Manual,** and its **Monitor Information Layout** on **Page 28**.

13. Complete machine **Test Run** in this manual.

14. Clean and make sure all tools are accounted for and put away.

Required for Setup

The items listed below are required to successfully set up and prepare this machine for operation.

For Lifting

- A forklift or other power lifting device rated for at least 5000 lbs.
- Lifting chain and safety hook rated for at least 5000 lbs.
- One or more assistants.

For Power Connection

- A power source that meets the minimum circuit requirements for this machine. Refer to **Page 23** for details.
- A qualified electrician to ensure a safe and code-compliant connection to the power source.

For Assembly

- Cotton rags
- Applicable PPE for assembly and solvents
- Mineral spirits
- Safety glasses
- Oil can with applicable machine oil
- Grease gun with applicable grease
- Stiff grease brush
- Floor mounting hardware as needed
- Basic shop hand tools

Unpacking

This item was carefully packaged to prevent damage during transport. If you discover any damage, please immediately call Customer Service at (360) 734-1540 for advice. You may need to file a freight claim, so save the containers and all packing materials for possible inspection by the carrier or its agent.

Inventory

Inspect the machine for damage and inventory your shipment for the following items.

Included Documentation List
(Packed Inside of Electrical Box Door)

Fagor Binder Printed Manual:
Fagor CNC 8055 M Programming Manual Ref. 1010, Soft: V01.0X

Fagor CD:
Fagor Manual Man_8055.pdf 8055 M
- Installation Manual
- Operating Manual
- Programming Manual
- Error Solution
- Examples Manual

Delta Printed Manual:
Delta VFD-B Printed

Delta Packet:
- Delta VFD-B Instruction Sheet
- Delta VFD-B Parameter Manual

Delta CD:
Delta AC Motor Drives VFD Series User Manual VFD-B

Power Drawbar Printed Manual:
Air Power Drawbar Operation Manual, PD-150-PD-200

Description (see Figure 8)	Qty
A. Tool Box	1
B. Feed Lever (see For Manual Mode)	1
C. Closed-End Wrench 19/21mm	1
D. Open-End Wrench 12/14mm	1
E. Hex Wrench 10-Pc. Set 1.5–10mm	1
F. Screwdriver Standard #2	1
G. Screwdriver Phillips #2	1
H. Oil Bottle	1
I. Table Drain Elbow Fittings	2
J. Coolant Hoses with Hose Clamps	2
K. Machine Feet	4
L. Machine Feet Bolt and Nut Kit	1

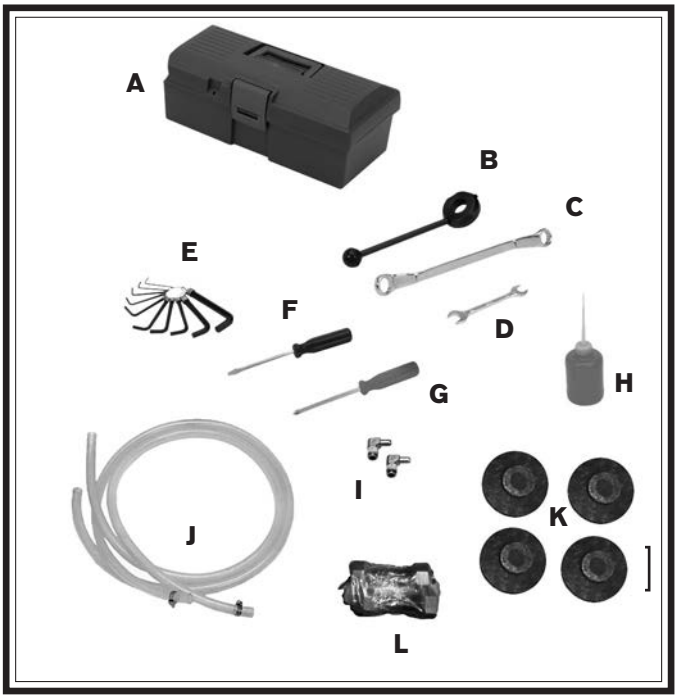


Figure 8. Shipping inventory.

Cleaning & Protecting

Unpainted surfaces are coated at the factory with a heavy-duty rust preventative for protection during shipment and storage. This long-term coating works very well, but can be time-consuming to thoroughly remove.

Be patient and do a careful job when cleaning and removing the coating. The time you spend doing this will reward you with smooth-sliding parts and a better appreciation for the proper care of the unpainted surfaces.

Although there are many ways to successfully remove the rust preventative, we have cleaned thousands of machines and found the following process to be the best balance between efficiency and minimized exposure to toxic fumes or chemicals.

Before cleaning, gather the following:

- Disposable rags
- Cleaner/degreaser (certain citrus-based degreasers work extremely well and they have non-toxic fumes)
- Safety glasses and disposable gloves

Note: *Automotive degreasers, mineral spirits, or WD•40 can be used to remove rust preventative. But before using these products, test a small amount on an inconspicuous area to make sure they will not stain the metal or cause paint to become discolored or peal. Do not use on plastics.*

⚠WARNING

Gasoline and petroleum products have low flash points and can explode or cause fire if used for cleaning. Avoid using these products to remove rust preventative.

⚠CAUTION

Many cleaning solvents are toxic if inhaled. Minimize your risk by only using these products in a well ventilated area.

NOTICE

Avoid chlorine-based solvents, such as acetone or brake parts cleaner that may damage painted surfaces. Always follow the manufacturer's instructions when using any type of cleaning product.

Basic steps for removing rust preventative:

1. Put on safety glasses and disposable gloves.

2. Coat all surfaces that have rust preventative with a liberal amount of your cleaner or degreaser and let them soak for a few minutes.

   Tip: *Placing rags that are saturated with your cleaner over areas with heavy concentrations of the rust preventative coating for a period of time is an excellent way to soften the thick deposits for easy removal.*

3. Wipe off the surfaces. If your cleaner or degreaser is effective, the rust preventative will wipe off easily.

   Tip: *To clean off thick coats of rust preventative on flat surfaces, such as beds or tables, use a plastic paint scraper to scrape off the majority of the coating before wiping it off with your rag. (Do not use a metal scraper or it may scratch the surface.)*

4. Repeat **Steps 2–3** as necessary until clean, then coat all unpainted surfaces with a quality metal protectant or light oil to prevent rust.

Location

Physical Environment

Location is important for safe operation and longevity of machine and parts. For best results, operate this machine in an environment that is free from vibration, excessive moisture, hazardous or flammable chemicals, airborne abrasives, and extreme conditions. The ambient working temperature requirement is: 41°F to 104°F (+5°C to +40°C) and the storage temperature is -13°F to 158°F (-25°C to +70°C). The relative humidity for both is below 90% (non-condensing). Make sure that all environmental conditions listed in the **Fagor Operating Manual** are met. For the list; refer to **Precautions Against Product Damage**.

Electrical Installation

Place this machine near an existing power source. Make sure all power cords are protected from traffic, material handling, moisture, chemicals, or other hazards. Make sure to leave access to a means of disconnecting the power source or engaging a lockout/tagout device.

Lighting

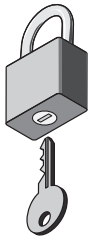
Machine lighting is adequate for safe operation.

Weight Load

Refer to the **Machine Specifications** for the weight of your machine. Make sure that the surface upon which the machine is placed will bear the weight of the machine, additional equipment that may be installed on the machine, and the heaviest workpiece that will be used. Additionally, consider the weight of the operator and any dynamic loading that may occur when operating the machine.

Space Allocation

Consider the largest size of workpiece that will be processed through this machine and provide enough space around the machine for adequate operator material handling or the installation of auxiliary equipment. With permanent installations, leave enough space around the machine to open or remove doors/covers as required by the maintenance and service described in this manual.



⚠CAUTION

Children or untrained people may be seriously injured by this machine. Only install in an access restricted location.

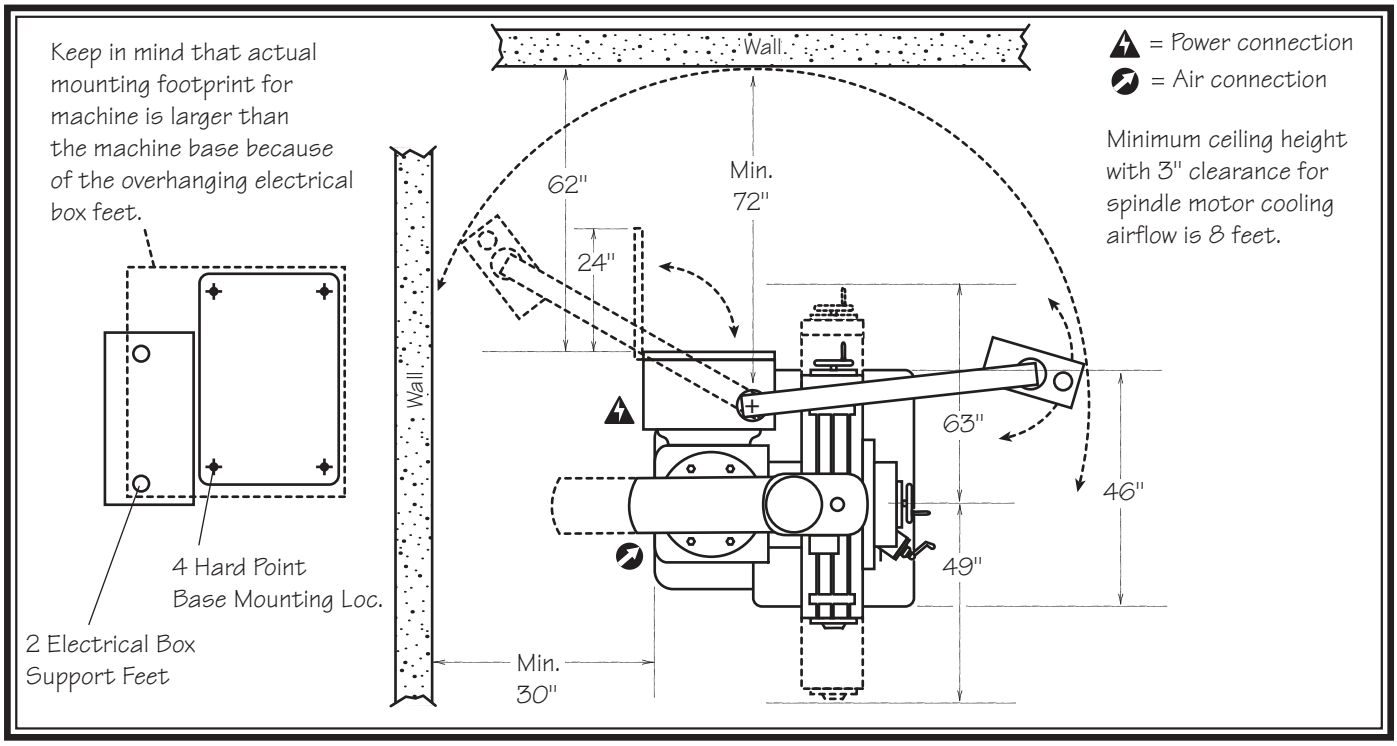


Figure 9. Clearances.

Lifting & Moving

⚠WARNING

This machine and its parts are heavy! Serious personal injury may occur if safe moving methods are not used. To reduce the risk of a lifting or dropping injury, ask others for help and use power equipment.

The method of lifting and moving the mill described below requires at least two other people for assistance and a hoist or forklift with a lifting strap or chain rated for at least 5000 lbs.

To lift and move mill:

1. Position ram and headstock so lifting eye is centered with the column as illustrated in **Figure 10** (refer to **Ram Movement** on **Page 31** and **Headstock Movement** on **Page 29** for detailed instructions).

2. To prevent unexpected movement during lifting and moving; after re-positioning ram and headstock, make sure they are locked in place.

IMPORTANT: Before lifting mill, make sure four turret lock bolts (two on each side of ram, **Figure 11**) are torqued to 47 ft/lbs.

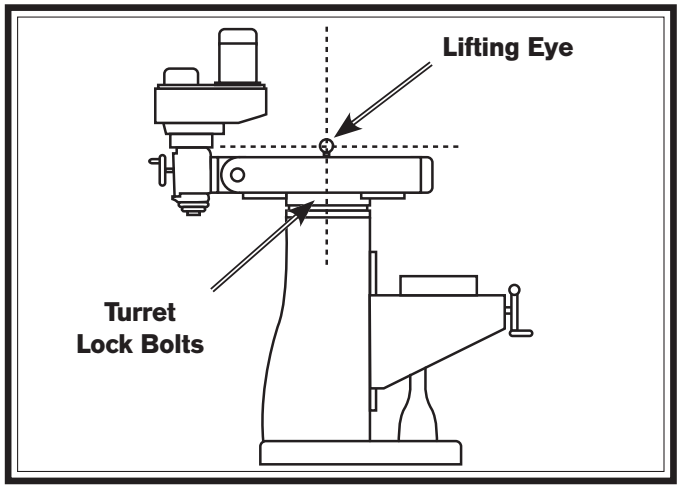


Figure 10. Ram and head position before moving.

3. Verify that lifting eye is threaded completely into ram where all threads are engaged with casting.

4. Attach lifting strap or chain to lifting eye located on top of the ram; or attach lifting straps under ram, as shown in **Figure 11**.

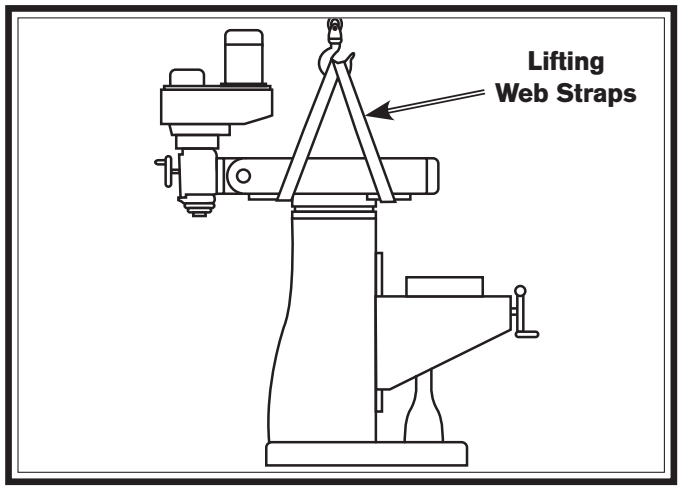


Figure 11. Optional lifting using web straps.

5. Unbolt mill from shipping pallet.

6. With your assistants steadying mill to keep it from swaying and rotating, slowly lift mill a couple of inches.

   — If mill tips forward or backward, lower it to ground and adjust ram or table to balance load. Make sure to re-tighten lock levers and bolts before lifting mill again.

   — If mill lifts evenly, continue to move it to its permanent location.

Leveling & Mounting

Although not required, we recommend that you level your machine and mount it to the floor. Because this is an optional step and floor materials may vary, mounting hardware is not included.

NOTICE

We strongly recommend securing your machine to the floor if it is hardwired to the power source. Consult with your electrician to ensure compliance with local codes.

Leveling

Leveling machinery helps precision components, such as bed ways, remain straight and flat during the lifespan of the machine. Components on an unleveled machine may slowly twist due to the dynamic loads placed on the machine during operation.

For best results, use a precision level that is at least 12" long and sensitive enough to show a distinct movement when a 0.003" shim (approximately the thickness of one sheet of standard newspaper) is placed under one end of the level.

See the figure below for an example of a high precision level.

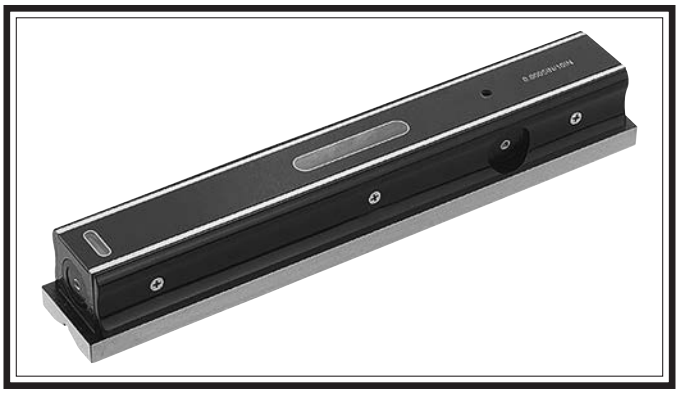


Figure 12. Typical precision level.

Bolting to Concrete Floors

To prevent the Model SB1063 from tipping and causing a crushing hazard when heavy workpieces are mounted off-center, we strongly recommend that you bolt the mill to a concrete floor or pad.

There are many different methods of securing the mill to the floor. Lag shield anchors and lag bolts are available in the sizes required for this mill. Also, cutting the floor and pouring footings with embedded J-bolts is another method.

Research options and select the best choice that fits your specific conditions.

Note: *This machine has an oversized electrical box with a control arm mounted to the top. Below the electrical box are two additional support legs (see Figure 13). These adjustable legs are only to be used as supports and should not be fastened to the floor or be used as jack bolts to help level the mill.*

Figure 13. Electrical box support feet.

Assembly

This machine has been fully assembled and tested at the factory for break-in and conversion to CNC operation. No assembly is required; however, retain the tool box, its tools, and the manual downfeed handle from the initial non-CNC configuration. Spindle feed is CNC operated only.

Power Requirements

⚠WARNING

Electrocution or fire may occur if machine is ungrounded, incorrectly connected to power, or connected to an undersized circuit. Use a qualified electrician to ensure a safe power connection.

Grounding Instructions

In the event of certain types of malfunctions or breakdowns; correct machine grounding provides a safe path for electricity to go instead of through YOU as electric shock or electrocution.

This machine must be correctly grounded in accordance with all local codes and ordinances before any machine test run or operation.

Once the machine is set up and assembled as previously described in this manual, it is ready to be connected to the power source.

Required Power Source..... 220V/ Three-Phase
With Conversion Kit ..... 440V/ Three-Phase
Phase Converter Allowed ..... No
Full Load Amp Draw ..... 25 Amps
Nominal Voltage Range..... 208V/220V/240V
Frequency ..... 60 Hz
Minimum Circuit Size ..... 30 Amps
Power Cord ..... Hardwire with Conduit
Plug/Receptacle ..... N/A
Minimum Extension Cord Size ..... *N/R*
Maximum Extension Cord Length..... *N/R*

N/R = Not Recommended

NOTICE

There are a series of steps that must be followed to when turning the machine ON. Before connecting the machine to power as instructed on the next page, make sure the main power switch located on the electrical box remains OFF. This will disable power to the control panel until it is required in the Test Run on Page 24.

Power Connection

1. Make sure the incoming power source meets the requirements stated in **Power Requirements**.

2. Make sure that all installation conditions are met as outlined in the Fagor Operating Manual, **Precautions Against Product Damage** of the Fagor Manual.

3. To ensure the Delta VFD Drive will operate correctly, only an electrician or qualified personnel can hardwire this machine to the power source.

4. Using an extension cord and plug is not recommended.

Air Connection

1. Make sure the incoming shop air source is between 60-120 PSI.

2. Connect the shop air source to the regulator inlet assembly shown in **Figure 31**, Item C.

   Note: *The air connection can use a quick disconnect, or a direct piping connection. However, if a direct connection is used, an ON/OFF valve should be installed at that location so the incoming air can be shut off at the machine for service.*

4. Set the regulator air pressure according to the requirement indicated in the Power Drawbar Manual.

   IMPORTANT: If shop air has excessive moisture, you must add an additional water separator assembly.

Test Run

After all preparation steps have been completed, the machine and its safety features must be tested by a person who has existing experience and training using CNC machinery to ensure correct operation.

If you discover a problem with the machine or its safety features, do not operate it further until you have resolved the problem. Refer to the **Troubleshooting** section on **Page 48** for solutions to common problems that may occur. If you need additional help, contact our Tech Support at (360) 734-1540.

During the test run, you will verify the proper operation of the following controls and machine systems:

PART 1:
- Main power switch
- Power ON button
- EMERGENCY STOP button
- Table Up/Down button operation
- Control panel operation
- X-axis table movement
- Y-axis table movement
- Z-axis table movement
- Manual spindle travel
- Power drawbar lubrication
- Power drawbar operation
- Coolant pump system
- Electronic oiler operation
- Work lamp operation
- Power OFF button

PART 2:
- Fagor CNC Testing. Refer to desired Fagor test sequence and/or operation listed below

Fagor Binder Printed Manual:
Fagor CNC 8055 M Programming Manual Ref. 1010, Soft: V01.0X

Fagor CD:
Fagor Manual Man_8055.pdf 8055 M
- Installation Manual
- Operating Manual
- Programming Manual
- Error Solution
- Examples Manual

Test Run the Mill

1. Read and follow safety instructions at the beginning of this manual, take required safety precautions, and make sure machine is set up and adjusted properly.

2. Next review and understand Self Teaching Manual located on the supplied Fagor CD. With CD inserted, click on **Man_8055.pdf** and following list of documentation will be available:

   8055 M
   - Installation Manual
   - Operating Manual
   - Programming Manual
   - Error Solution
   - Examples Manual

3. Connect compressed shop air to air regulator shown in **Figure 31** on **Page 37**.

4. Verify that air regulator is set to required PSI listed in the Drawbar Manual.

5. Turn master power switch on electrical box to ON position.

   - Red power light (see Figure 14) illuminates on front of the control panel, indicating that master power switch is operational and machine is fully powered up.

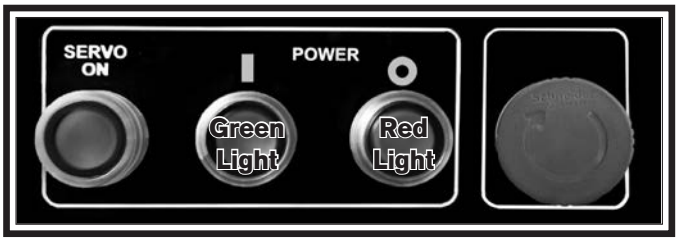


Figure 14. Initial controls.

6. Press POWER (**I**) button (see **Figure 14)** on control panel.

   - Red power light will go out, and green ON button light will illuminate, indicating machine is ready for commands.

- Control panel screen will boot up then display main screen.
- When boot-up is finished, the screen will display main screen.

7. Loosen Z-axis locks.

8. Press EMERGENCY STOP button (see **Figure 14)**.

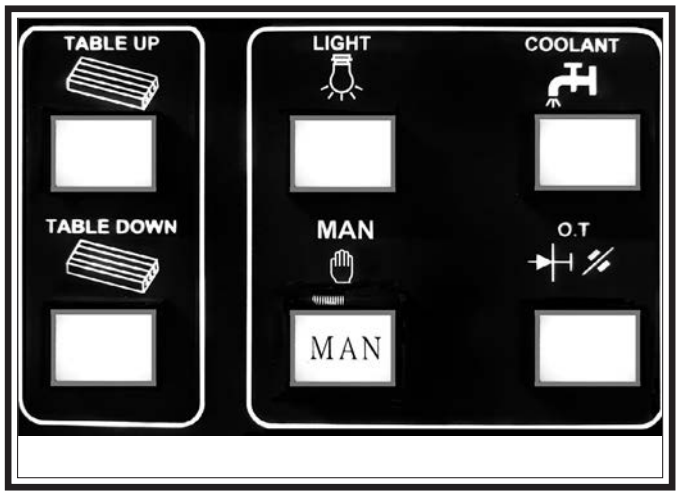


Figure 15. Basic push button controls.

9. Press TABLE UP and TABLE DOWN buttons (see **Figure 15**). The buttons should be inoperative indicating that EMERGENCY STOP button successfully shuts ***OFF*** all motor functions.

Note: *The control panel and rest of machine stays live.*

10. Rotate EMERGENCY STOP button clockwise until it pops out. Wait and allow control panel to boot up again.

11. Press TABLE UP button. Table should raise.

12. Press TABLE DOWN button. Table should lower.

Note: *If table moves opposite to controls used, phase polarity must be corrected.*

- To do this; turn machine ***OFF***, disconnect it from power, and swap position of any two L1, L2, or L3 power wires on offending motor.

13. Verify that machine goes into Manual DRO Mode; flip plastic switch cover open and press MAN button (see **Figure 15**).
- MAN button will illuminate white indicating machine is in manual mode.

14. Press JOG or F4 button (see **Figure 5**) and machine will change to Manual DRO mode. All servo motors will turn ***OFF*** allowing for manual ballscrew rotation.

While in this manual mode; loosen corresponding lock levers and manually operate following controls:

- X-axis handwheel
- Y-axis handwheel
- Z-axis table up/down handcrank

Note: *Trying to move handwheels before machine is put into manual mode will generate an error message on screen. Once mill is put in manual mode error message will go away.*

15. Refer to **Air Regulator, Filter, Lubricator** instructions on **Page 37** and verify correct volume of oil is injected in drawbar motor supply air.

16. Verify power drawbar system operates by quickly pushing Drawbar DOWN and Drawbar UP buttons (see **Figure 7**, **View L**).

17. To prevent a dry-run of pump and damage, verify coolant tank is full (refer to Coolant Reservoir on **Page 41**).

18. Point coolant nozzle toward chip pan, and test pump operation by pushing COOLANT button (see **Figure 15**). During operation, adjust coolant flow by moving flow lever (**see Figure 1**) to various positions.

19. Refer to **CESH Electronic Oiler** on **Page 37** and verify that oiler is set to distribute an adequate amount of oil for the number of mechanical repettions.

20. Press Manual Oil button (see **Figure 30**, **Item B**). The light should illuminate, oil pump heard, and oil distribution indicated at ways. Do not hold button for longer than four minutes or oil pump can overheat.

21. Turn work lamp ***ON*** at back of lamp shroud (see **Figure 7**, View R), and then press LIGHT button shown in (see **Figure 15**).

- Light should illuminate.

22. Press POWER (O) button to shut machine ***OFF*** shown in **Figure 14** on control panel.

- Red power light will illuminate.
- Control panel screen will turn off.
- Green POWER (I) button light (see **Figure 14**) will go out indicating that POWER OFF (O) button is functional and machine is powered but not ready for commands.

23. "Congratulations! The Test Run is complete. Proceed to your desired machine operations outlined in the Fagor CNC Manual(s).

Inspections & Adjustments

The following list of adjustments were performed at the factory before the machine was shipped:

Gib Adjustment .....**Page 44**

Be aware that machine components can shift during the shipping process. Pay careful attention to the adjustments above during operation of the machine. If you find that the adjustments are not set according to the procedures in this manual or your personal preferences, re-adjust them.

Spindle Break-In

The high-quality bearings and gears used in the mill are manufactured to very close tolerances. The spindle bearings and associated drive system have been broken-in at the factory and no pre-load break-in is required.

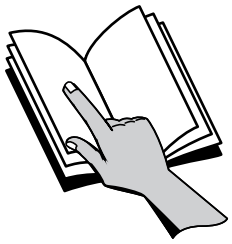
NOTICE

Since the mill head was rotated parallel to the table for shipping purposes, you will need to tram the spindle with the table if your first operation requires 90° alignment.

Operation Overview

The purpose of this overview is to first provide the machine operator with a minds-eye picture of the basic physical milling machine functions. The second purpose is to introduce and link typical CNC control panel concepts and modes with those operations, so the user can find applicable CNC procedures in the Fagor Operating Manual.

Note: Due to the generic nature of this overview, it is not intended to be an instructional guide for performing actual machine operations.
To learn more about specific operations and machining techniques, seek training from people experienced with this type of machine, and do additional research outside of this manual.



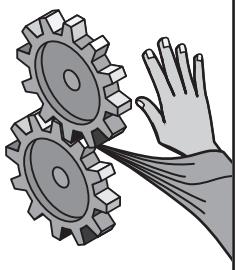
⚠WARNING

To reduce the risk of serious injury when using this machine, read and understand this entire manual before beginning any operations.

In a typical milling operation, the operator does the following:

1. Examines the workpiece to make sure it is suitable for milling.
2. Firmly clamps workpiece to table.
3. Installs correct cutting tool for operation.
4. Loosens the applicable X-, Y-, or Z-axis table and knee locks.
5. Uses CNC control panel or manual controls to confirm correct positioning of cutting tool and workpiece for operation.

   If X-, Y-, or Z-axis will be used during operation, operator confirms tool paths, specifications, and associated machine settings.
6. Verifies working envelope does not exceed axis position and travel.



⚠WARNING

Loose hair, clothing, or jewelry could get caught in machinery and cause serious personal injury. Keep these items away from moving parts at all times to reduce this risk.

⚠WARNING

During operation, small metal chips may become airborne, leading to serious eye injury. Wear safety glasses to reduce this risk.

Note: *Controller will reject program if told to go further than the global coordinate system.*

7. Puts on personal protective gear and makes sure workpiece and table are clear of all tools, cords, and other items.
8. Starts the machine, coolant pump, and completes milling operations.
9. Turns machine ***OFF***.
10. Removes workpiece and cleans machine.

Table Movement

The table is driven in the X-, Y-, and Z-axes by servo motors that are connected where the handwheels are fastened. These servo motors are the physical interface between CNC digital commands and actual mechanical table movement.

The milling machine is equipped with a Fagor control panel that has an additional handheld controller connected. The CNC system can be switched between Servo Mode and Manual Mode for different types of table movement. Refer to the Fagor manual for complete details.

NOTICE

Always keep the table locked in place unless table movement is required for your operation. Unexpected movement of the table during operations could damage the cutter or workpiece.

While the X- and Y-axis handwheels are spring-loaded outward to the disengaged position, make it a habit to also use the folding handcrank lever feature (see **Figure 16**) to help eliminate entanglement when the table is being power fed.

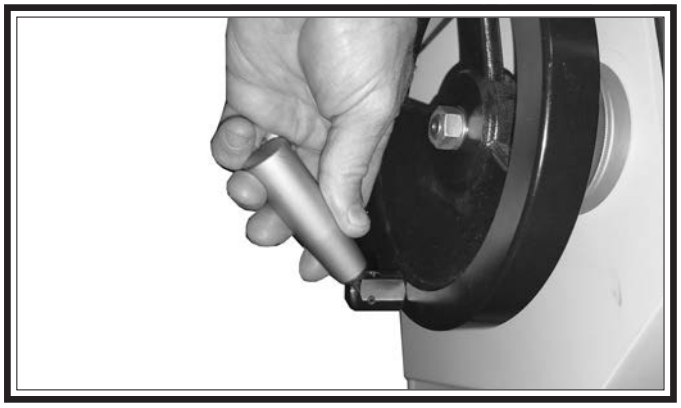


Figure 16. Handwheel with folding handcrank lever for power-fed safety.

Table & Knee Locks

Refer to **Figures 17–18** for the locations of the locks used to secure the table in place.

Figure 17. X- and Y-axes table lock locations.

Figure 18. Z-axis knee lock locations.

Headstock Movement

The mill head tilts 45° forward and back, and rotates 90° left and right, as shown in **Figures 19–21**.

Tool Needed	Qty
Wrench 19mm	1

NOTICE

Always lock headstock firmly in place after tilting or rotating it. Unexpected movement of headstock during operations could cause damage to cutter or workpiece.

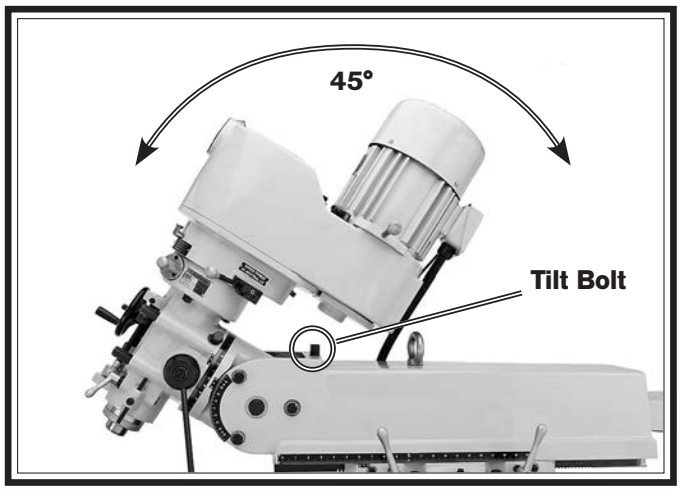


Figure 19. Head tilts 45° forward and back.

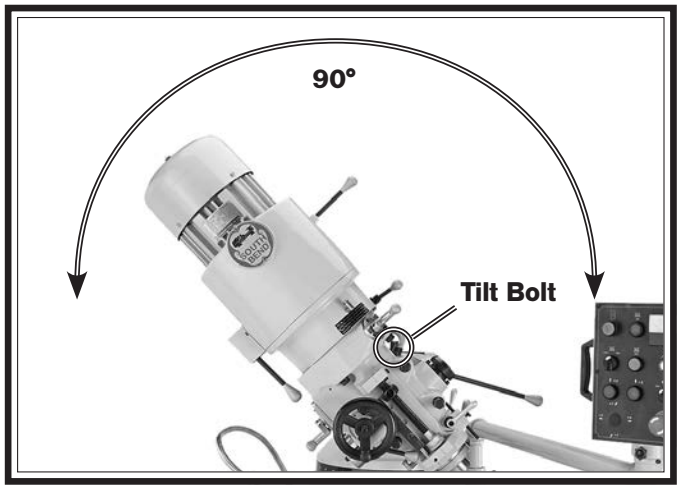


Figure 20. Head tilts 90° left-and-right.

Tilting Head

1. DISCONNECT MILL FROM POWER!

2. Loosen the three tilt lock bolts on the right side of the ram adapter shown in **Figure 21**.

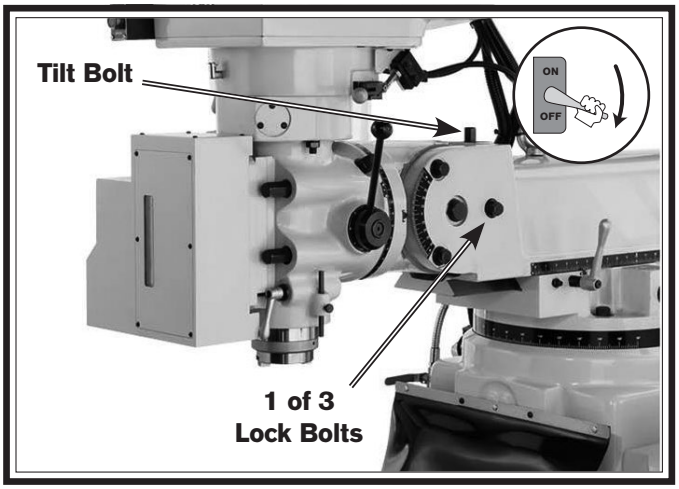


Figure 21. Head tilting controls.

3. Use one hand to apply pressure to the head in the direction of tilt, then slowly rotate the tilt bolt. Rotating this bolt clockwise will tilt the head back.

4. When the head is in the correct position for your operation, re-tighten all three lock bolts.

Rotating Head

1. DISCONNECT MILL FROM POWER!

2. Loosen four rotation lock bolts on face of head shown in **Figure 22**.

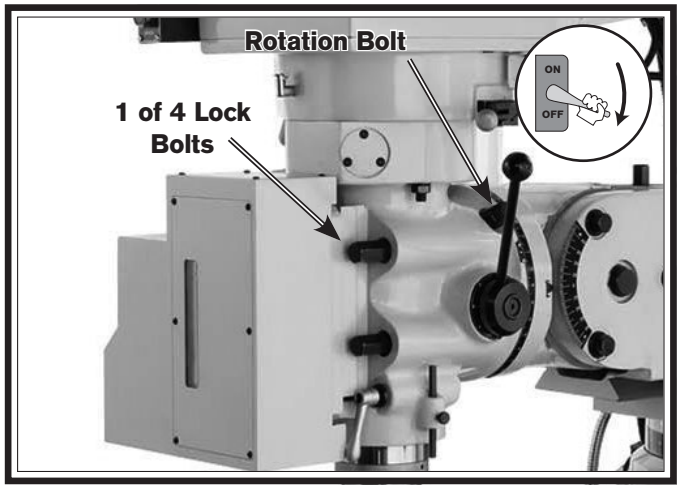


Figure 22. Head rotating controls.

3. Use one hand to apply pressure in direction of rotation, then slowly turn rotation bolt.

4. Re-tighten lock bolts when head is in desired position.

Tramming Spindle

When your operation requires that the spindle axis be precisely perpendicular to the table, you must tram or square the spindle with the table to ensure the spindle is exactly 90° to the table.

This procedure involves mounting a dial test indicator to the quill or spindle, rotating it around the table, and adjusting the head position so that the spindle axis is 90° to the table X- and Y- axes, as illustrated in **Figure 23**.

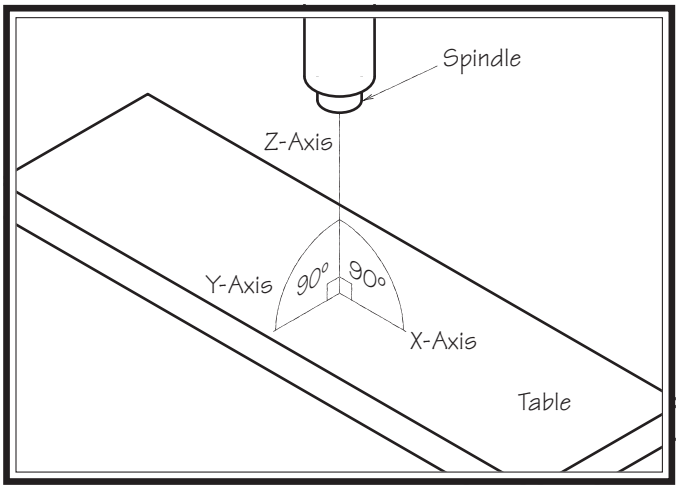


Figure 23. Spindle axis perpendicular to table X- and Y-axes.

We encourage you to research the many variations of spindle tramming to find the one that works best for you.

Ram Movement

The ram travels forward and backward 20" and rotates horizontally 320° on its turret.

Tool Needed	Qty
Wrench 19mm	1

Moving Ram Back and Forth

1. DISCONNECT MILL FROM POWER!

2. Loosen two lock levers shown in **Figure 24** on right side of ram.

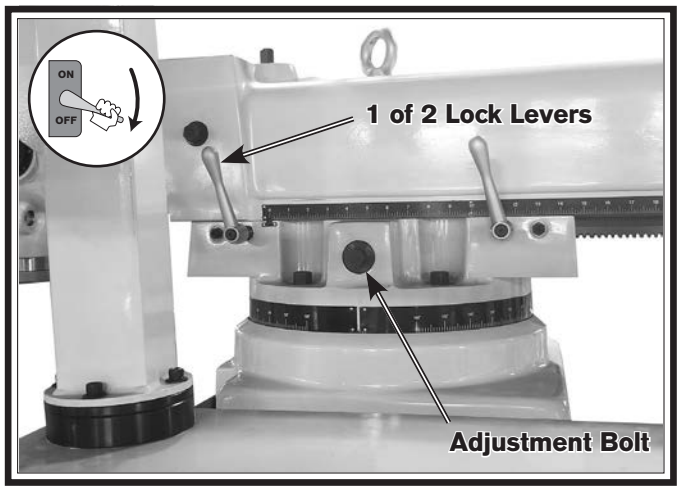


Figure 24. Ram forward and backward movement controls.

3. Make sure there are no obstructions to ram travel, especially with spindle tool around workpiece, then slowly rotate adjustment bolt (see **Figure 24**) to move ram. Rotating bolt clockwise will move ram backward.

4. Re-tighten lock levers.

NOTICE

Always lock ram firmly in place after moving it. Unexpected movement of ram and head during operations could cause damage to cutter or workpiece.

Rotating Ram

1. DISCONNECT MILL FROM POWER!

2. Loosen four lock bolts on top of turret (see **Figure 25**).

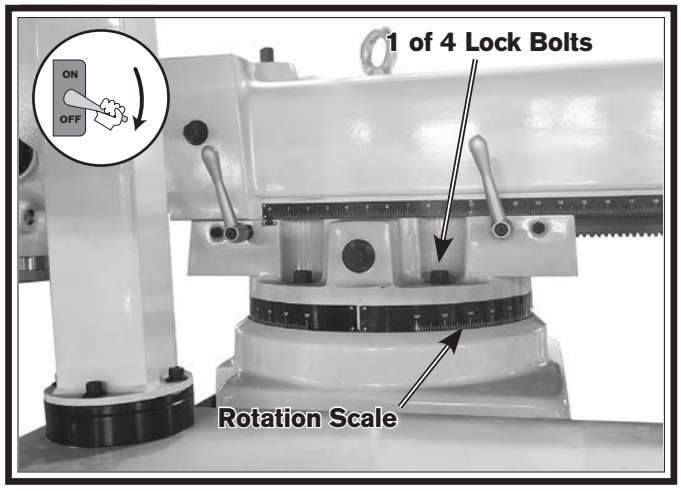


Figure 25. Ram rotation lock bolts.

NOTICE

In the next step, take care not to entangle or stretch electrical cabling as you move ram around turret.

3. Push on head to manually rotate it. Use rotation scale (see **Figure 25**) to determine correct position for your operation

4. Re-tighten four lock bolts.

Downfeed Control

When the machine is set to the CNC mode, the quill and spindle become locked with the servo-driven ballscrew. As a result, the manual downfeed lever is disabled and should be removed.

When the machine is placed in Manual mode; the quill and spindle are unlocked and can be controlled manually. For this operation, the downfeed lever can be easily reinstalled as shown below.

To install downfeed lever:

1. DISCONNECT MILL FROM POWER!
2. Position downfeed lever at top of spindle stroke.
3. Align index pin with closest index hole (see **Figure 26**).
4. Slide hub onto shaft until detent pin engages with its associated detent on shaft.

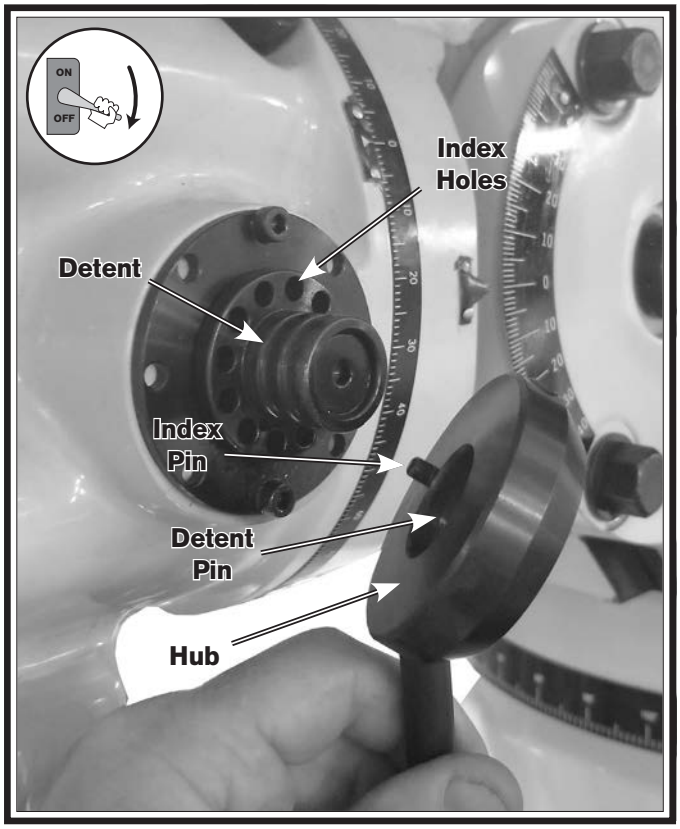


Figure 26. Downfeed handle hub, detents, and pin.

Auto-Downfeed System

Spindle downfeed movement is controlled by toggling from CNC mode to Manual mode. When in CNC mode, the quill is locked with the ballscrew and the feed lever cannot pull the quill down. The opposite is true when in Manual mode.

Spindle Brake

When pushed, the spindle brake lever (see **Figure 27**) activates a switch that turns the spindle motor ***OFF*** and engages drum-type brake pads to stop spindle rotation.

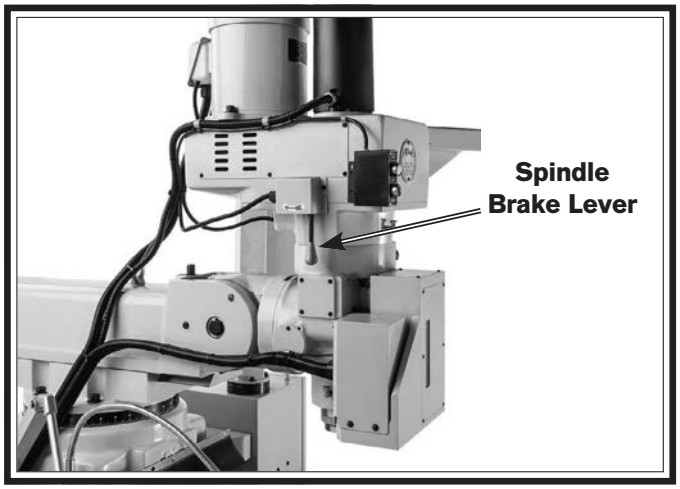


Figure 27. Location of spindle brake lever.

NOTICE

Spindle brake is typically used in an emergency situation where you need to stop spindle in a hurry. Overuse of spindle brake will lead to excessive wear of brake pads and drum.

Changing Tooling

The mill is equipped with an NT40 spindle taper and a ⅝"-11 x 25⁹⁄₁₆" internal spindle drawbar.

⚠CAUTION

The sharp edges of tools can easily cut your hands and fingers. Always use protection when handling cutting tools.

Loading Tooling

Items Needed **Qty**
Rag 1

To load tooling:

1. DISCONNECT MILL FROM POWER!

2. Clean any debris or surface substances from inside spindle taper and mating surface of tooling.

   Note: *Debris or oily substances can prevent tooling and spindle from properly mating. This condition can cause excessive vibration, poor cutting results, or tool/workpiece damage.*

3. Using a thick rag, hold tooling or arbor so they are seated in the spindle bore and lugs are splined with spindle slots.

4. With a sequence of several short presses, push drawbar UP button (see **Figure 28**) to tighten and lock arbor and tooling in place.

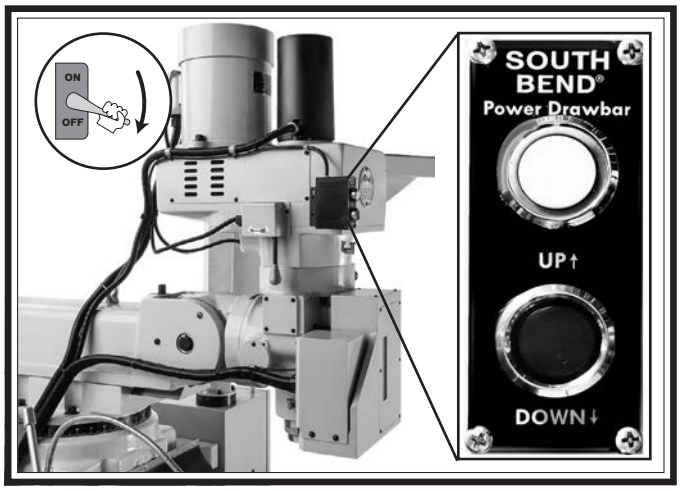


Figure 28. Drawbar controls.

Unloading Tooling

Items Needed **Qty**
Rag 1

To unload tooling:

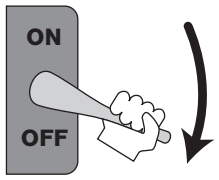
1. DISCONNECT MILL FROM POWER!

2. Using a thick rag, hold tooling or arbor carefully to prevent it from falling when drawbar releases it.

3. With a sequence of several short presses, push drawbar DOWN button (see **Figure 28**) to loosen and unseat arbor and tooling.

4. Remove arbor and tooling.

Maintenance Schedule



⚠WARNING

Always disconnect machine from power before performing maintenance or serious personal injury may result.

Regular maintenance will ensure proper care of the equipment. We strongly recommend that all operators make a habit of following the daily maintenance procedures.

For optimum performance from this machine, this maintenance schedule must be strictly followed. Use the **Monthly Maintenance Chart** on **Page 35** to ensure this is done.

Ongoing

To maintain a low risk of injury and maximize efficient machine operation, periodically evaluate the listed items below. If a problem is found, immediately shut the machine down, disconnect it from power, and fix the problem before continuing operations.

- Loose mounting bolts or fasteners.
- Worn, frayed, cracked, or damaged wires.
- EMERGENCY STOP button not working correctly.
- Missing belt or chip guards.
- Reduction in braking speed or efficiency.
- Coolant not flowing correctly.
- Worn or damaged tooling.
- Any other unsafe condition.

Before Beginning Operations

- Make sure the electric box door is closed and properly latched.
- Check the coolant reservoir in the base. Fill it or clean it out if necessary.
- Verify that oiler lubrication reservoirs are full enough for the operation.
- Loosen or tighten applicable table and spindle lock levers for the upcoming operation.

Daily, After Operations

- Push the EMERGENCY STOP button.
- Turn the main power switch to the OFF position.
- Vacuum/clean all chips and swarf from table, slides, and base.
- Wipe down all unpainted or machined surfaces with a high-quality rust preventative compound.
- Wipe away excess flood oil from areas that are auto lubricated.

Item \ Day	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	27	28	29	30	31
Inspection																															
Coolant Level																															
Air Lubricator Oil Level																															
Ele. Lubricator Oil Level																															
Gib Adj.																															
Air Filters																															
End of Day																															
Disconnected From Power																															
Cleaned & Protected																															
Wipe Down Cast Iron																															
Lubrication																															
Quill																															
Speed Range Bearing Sleeve																															
Headstock Gearing																															
Ram Ways																															
Head & Ram Rack & Pinion Gears																															

Use this chart to keep track of the maintenance performed on the mill. Cross out or initial the "Day" box for each item on the list. If the box is blacked out, maintenance is not required for that item on that day.

Make copies of this page to use each month. Keep each charts as a maintenance record for the mill.

Month/Year:

South Bend Lathe Co.®

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Cleaning

Regular cleaning is one of the most important steps in taking good care of this machine. In most shops, each operator is responsible for cleaning the machine immediately after using it or at the end of the day. We recommend that the cleaning routine be planned into the workflow schedule, so that adequate time is set aside to do the job right.

Typically, the easiest way to clean swarf from the ways and table is to use a wet/dry shop vacuum that is dedicated for this purpose only. The small chips left over after vacuuming can be wiped up with a slightly oiled rag. Avoid using compressed air to blow off chips, as it may drive them deeper into moving surfaces and could cause sharp chips to fly into your face or hands.

All visible swarf should be removed daily from the mill during cleaning.

Unpainted & Machined Surfaces

Besides the ways, all other unpainted and machined surfaces should be wiped down daily to keep them rust-free and in top condition. This includes any surface that is vulnerable to rust if left unprotected (especially any parts that are exposed to water-soluble cutting fluids). Typically, a thin film of oil is all that is necessary for protection.

Lubrication

The mill has numerous moving metal-to-metal contacts that require regular and proper lubrication to ensure efficient and long-lasting operation, and to protect your investment.

Other than the lubrication points covered in this section, all other bearings are internally lubricated and sealed at the factory. Simply leave them alone unless they need to be replaced.

Before performing any lubrication task other than using the electronic oiler, DISCONNECT THE MILL FROM POWER! Always clean away grime before lubricating.

IMPORTANT: For all lubrication tasks, first clean the debris and grime from the oil cup or grease fitting and the immediate area to prevent contamination of the oil cups, grease fittings, or new lubricant.

Use the schedule and information in **Figure 29** as a daily guide for lubrication tasks.

NOTICE

The following recommended lubrication schedule is based on light-to-medium usage. Keeping in mind that lubrication helps to protect the value and operation of the mill, these lubrication tasks may need to be performed more frequently depending on usage.

Lubrication Task	Frequency (Hours of Operation)	Page Ref.
Quill	3–4 hrs.	39
Table Ways and Ballscrews	Auto Oiler	37
Speed Range Bearing Sleeve	Before Every Use	38
Headstock Gearing	40 hrs.	38
Ram Ways	40 hrs.	39
Head Rack and Pinion	6 Months	39

Figure 29. Recommended lubrication tasks, schedules, and instruction page references.

CESH Electric Lubricator

Required Oil Viscosity ..... 32-68cSt at 40 Deg. C
Lubricant Type ..... Syncon® R&O Oil (ISO VG 32-68)
Manual Auto Frequency ..... 10 Sec every 60 Min
CNC Auto Frequency ..... 10 Sec every 5 Min
Reservoir Capacity ..... 2 Liters

The electronic oiler (see **Figure 30**) is connected to metal tubes that direct oil to critical wear points at ways and ballnuts for the spindle, table, saddle, and knee.

A. Lubrication Adjustment: Using Interval Time Knob, 10 second pump cycle can be adjusted to intervals shown on the dial.

B. Manual Oiling: When pressing Feed Oil Button for manual lubrication, do not push and hold button for longer than four minutes or you will overload lubricator pump. If temperature reaches 100 Deg. F, sensor will stop motor for about 5 minutes to allow for cooling.

C. Maintenance: Clean oil filter and discharge outlets every 6 months to maintain correct flow.

D. Oil Level: Do not overfill. When oil level falls below safe level, built-in float switch will automatically sound warning buzzer.

Note: *Refer to Electronic Oiler for Wiring diagram located under its cover and label for further instructions if required.*

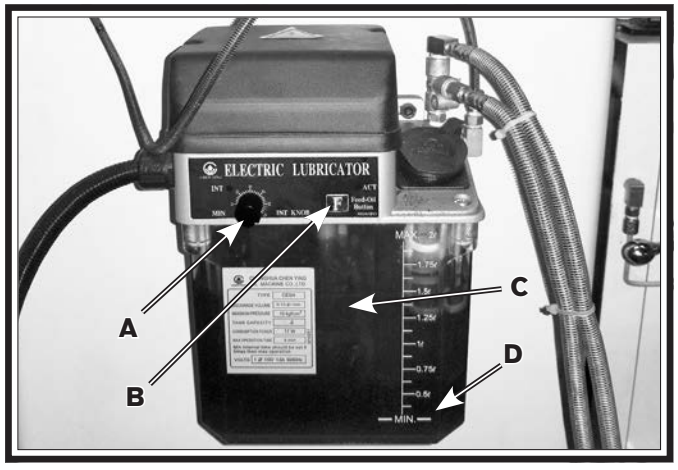


Figure 30. Oiler controls.

Air Regulator, Filter, Lubricator

Required Oil Viscosity ..... 32-68cSt at 40 Deg. C
Lubricant Type ..... Syncon® R&O Oil (ISO VG 32-68)
Drop Frequency ..... 3 Drops Per Drawbar Change
Reservoir Capacity ..... 1 fl/oz

Air Regulator, Filter, Lubricator (see **Figures 31–33**) provide the following functions that support Air Power Drawbar Motor:

Description (see Figure 31)

A. Locking Air Pressure Knob (20-130 PSI)
B. Regulated Air Pressure Gauge
C. Shop Air Inlet (145 PSI Max)
D. Air Filter Element (Brass Stone)
E. Water Reservoir
F. Spring-Loaded Water Drain
G. Oiler-Jet Sight Glass
H. Oil Flow Adjustment Ring
I. Regulated Air Outlet to Control Box
J. Oil Reservoir

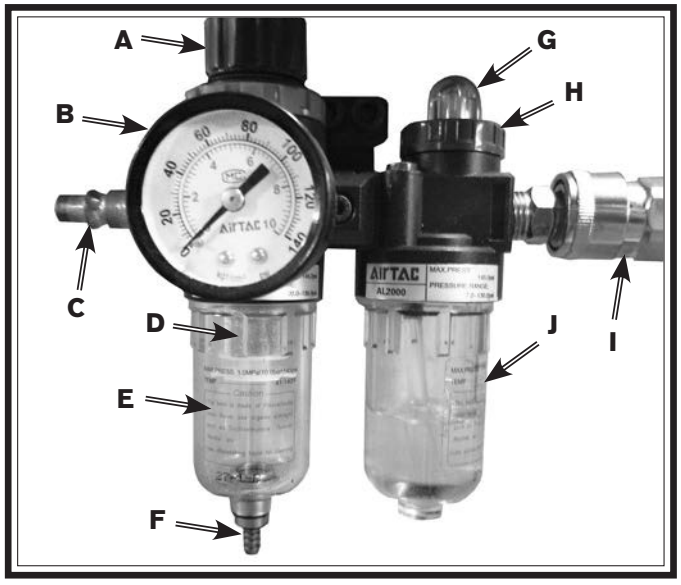


Figure 31. Air regulator, oiler, filter, and water separator.

K. Control Box Assembly
L. Air Regulator, Filter, Lubricator Assembly
M. Drawbar Motor Control Box Assembly Fuse

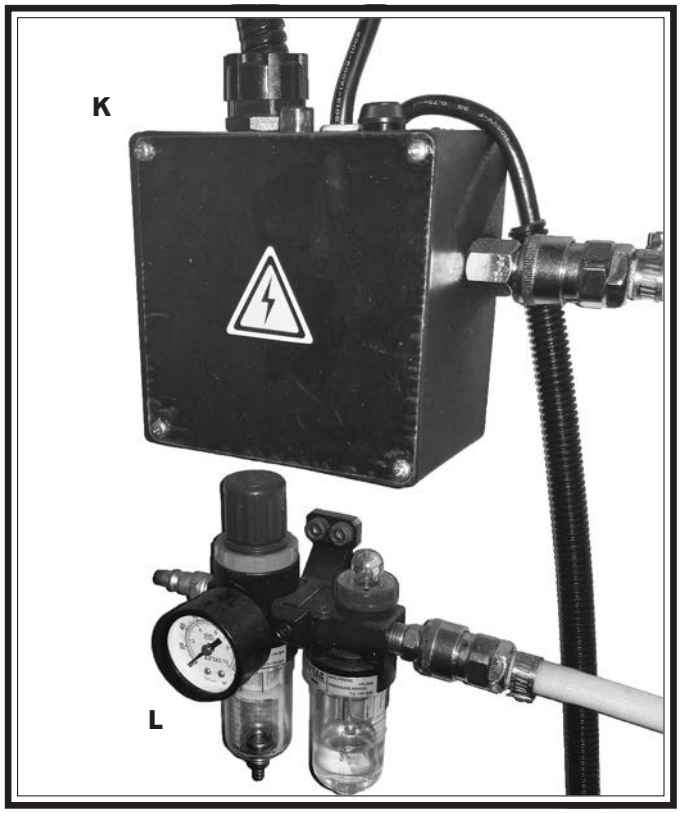


Figure 32. Power drawbar air and oiling system.

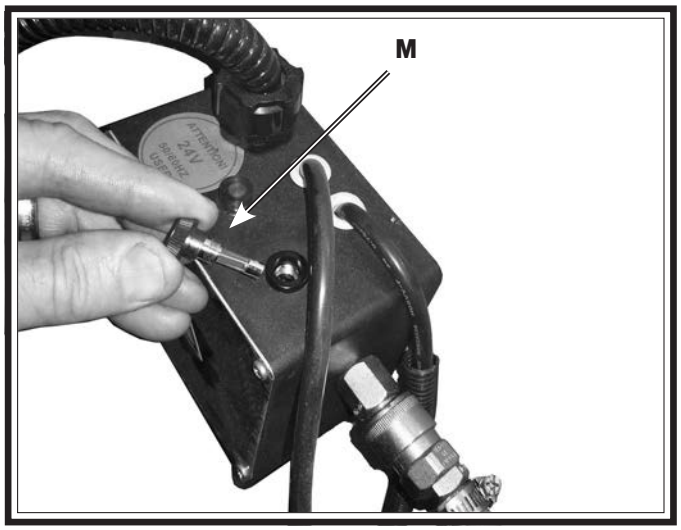


Figure 33. Drawbar motor control box assembly.

Speed Range Bearing Sleeve

Lubricant Type..... South Bend SB1365 Way Oil or ISO 68 Equivlent
Amount ..... Fill Oil Cup
Check/Add Frequency ..... Before Every Use

Lift the oil cup cap shown in **Figure 34** to fill it with lubricant.

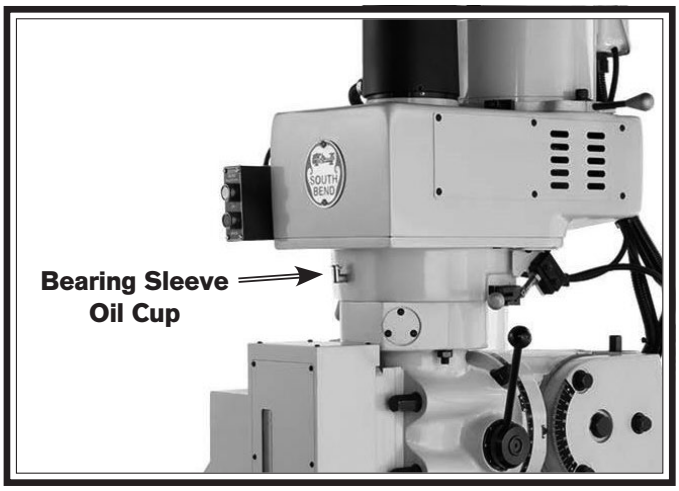


Figure 34. Bearing sleeve oil cup.

Headstock Gearing

Lubricant Type..... Grease NLGI #2 or Equivalent
Amount .....Two Pumps of Grease Gun
Check/Add Frequency .....40 hrs. of Operation

Wipe-off grease fitting and add two pumps of grease from a grease gun (see **Figure 35)**.

Figure 35. Headstock gearing grease fitting location.

Quill

Lubricant Type..... South Bend SB1365 Way Oil or ISO 68 Equivlent
Amount ..... Fill Oil Cup
Check/Add Frequency .....4 hrs. of Operation

Lift the oil cup cap shown in **Figure 36** to fill it with lubricant.

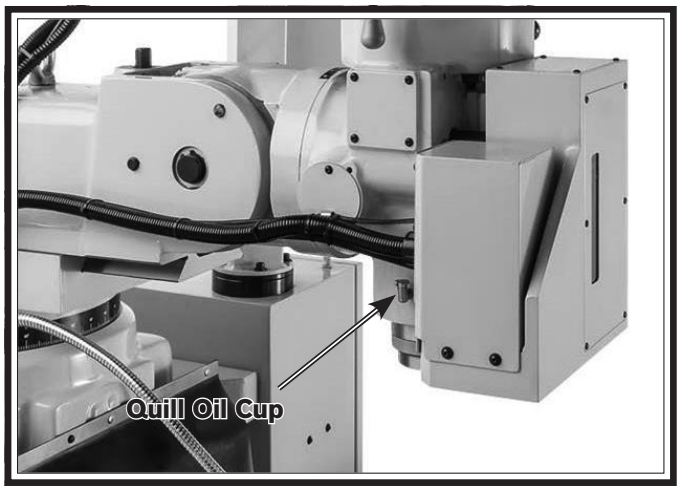


Figure 36. Quill oil cup location.

Ram Ways

Lubricant Type..... South Bend SB1365 Way Oil or ISO 68 Equivlent
Amount ..... Thin Coat
Check/Add Frequency .....40 hrs. of Operation

Move the ram back and forth as necessary to access the full length of the ways (see **Figure 37**), then use a clean shop rag to apply a thin coat of lubricant.

Note: *Do not get any oil on the ram rack (refer to the next subsection).*

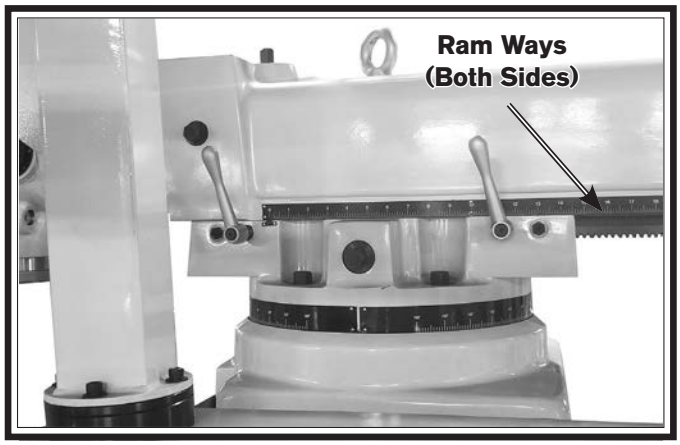


Figure 37. Ram ways exposed for lubrication.

Headstock Rack & Pinion Gear

The interaction between the cast iron surfaces of these devices (see **Figures 38**-**39**) produces a dry powder that provides an adequate lubrication. However, if the machine is operated in an area prone to rust, a light coat of grease will help keep surface rust at bay.

Do not pack with grease or apply any other lubricant that could attract abrasives and cause caking that would interfere with smooth movement.

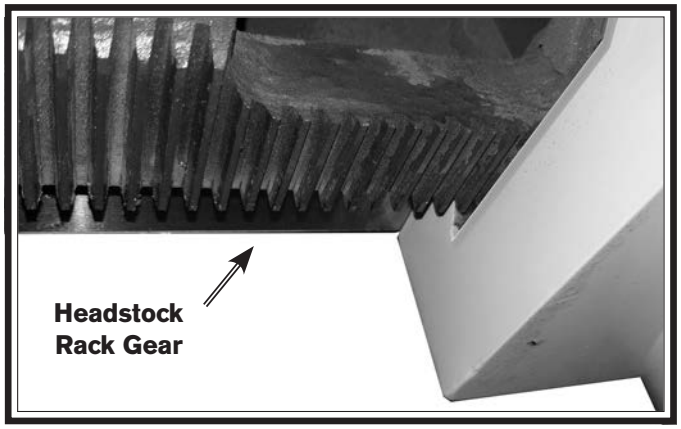


Figure 38. Headstock slide rack and pinion assembly (pinion hidden).

Figure 39. Headstock tilt rack and worm assembly.

Air Filters

The mill has numerous electrical components enclosed inside of the electrical box that generate substantial heat. To ensure efficient and long-lasting operation this heat must be removed.

The electrical box is fitted with two exhaust cooling fans and two inlet vents that have filters to keep the inside of the electrical box clean. These filters require periodic inspection and cleaning.

Before performing any task on the electrical box or its fans, DISCONNECT THE MILL FROM POWER!

Check/Clean Frequency.....40 hrs. of Operation

Tools Needed	**Qty**
Hex Wrench 2.5mm	1
Screwdriver Standard #2	1
Solution of Mild Dish Soap and Water	As Required

To clean air filters:

1. Use a thin bladed tool to carefully pry-off snap-on filter cover (see **Figure 40)**.

Figure 40. Air filter element.

2. Wash filter pad in warm soapy water, pat dry with towel.

3. Reinstall exhaust filter and filter cover.

4. Working from outside of the electrical cabinet (see **Figure 41**), use a vacuum nozzle to remove collected dust from inlet vent filters.

   If the filters are extremely clogged, remove the four screws and the external covers also shown in **Figure 41** and clean like exhaust fan filters.

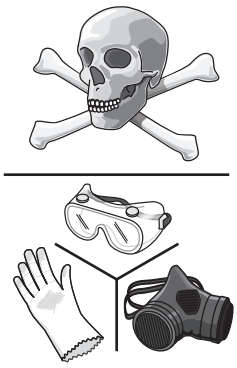
Figure 41. Air filter external covers.

Coolant Reservoir

Hazards

As cutting fluid ages, heavy metals and dangerous microbes can accumulate and create a poison hazard. The risk of exposure to this hazard can be greatly reduced by replacing old cutting fluid on a monthly basis, as indicated in the maintenance schedule or according to manufacturer's recommendations.

The important thing to keep in mind when working with the cutting fluid is to minimize exposure to your skin, eyes, and respiratory system by wearing the proper PPE (personal protective equipment), such as splash-resistant safety glasses, long-sleeve gloves, protective clothing, and a NIOSH approved respirator.



⚠WARNING

BIOLOGICAL & POISON HAZARD!

Use the correct personal protection equipment when handling cutting fluid. Follow federal, state, and fluid manufacturer requirements for proper disposal.

A small amount of coolant is lost during normal operation. Keep the coolant reservoir filled to the point where the strainer screen is slightly submerged under the surface of the coolant. By doing so a quick visual check can be made before every use. Under all circumstances (as checked with a dip wire), the coolant should never fall below a 2" level in the base reservoir. Change or service coolant according to manufacturer's instructions.

The coolant reservoir holds approximately five gallons (19 liters) of fluid.

Checking Coolant Level

1. Clean away debris and grime from coolant drain screen on base of mill (see **Figure 42**), and verify that screen is slightly submerged.

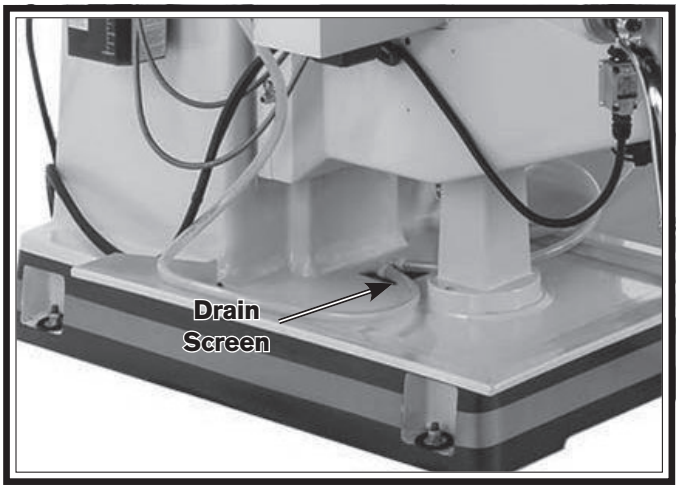


Figure 42. Location of the coolant drain screen.

NOTICE

Running coolant pump without adequate coolant in reservoir may permanently damage coolant pump and is not covered under warranty.

2. If coolant level in reservoir is less than 2", pour more coolant through screen and into reservoir until drain screen is seen to be slightly submerged.

Changing Coolant

Tools Needed	Qty
Cleaning Solution	As Reqd.
Hex Wrench 3, 5mm	1 Ea
Ratchet ½" Drive	1
Shallow Catch Pan	1
Bucket 5 Gal.	1
Rubber Hose (optional)	1

To change coolant:

1. Put on appropriate personal protective equipment.

2. Clean away chips and shavings from coolant drain screen on base of mill.

3. Place bucket on milling table.

4. Use coolant pump and nozzle to pump coolant from reservoir into bucket. If required, use rubber hose as nozzle extension.

   Note: *In event that reservoir was full and coolant flow was foamy or had limited flow with valve fully open pump intake may be restricted and require cleaning. Otherwise go to* **Step 8**.

5. DISCONNECT MILL FROM POWER!

6. Remove coolant reservoir access panel from rear of column.

7. Remove pump mounting screws and move pump out of way (see **Figure 43**).

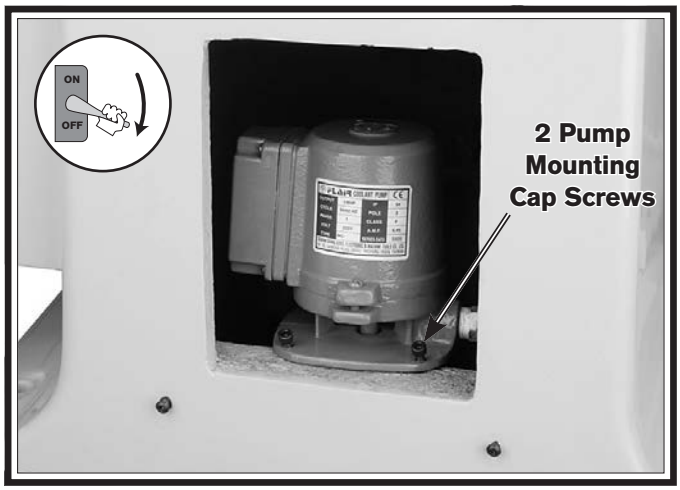


Figure 43. Rear access of coolant pump.

8. Place shallow catch pan under rear drain plug (see **Figure 44**) and remove plug.

Figure 44. Reservoir drain plug location (rear side of machine base).

9. Allow remaining coolant to drain, and wash out reservoir tank with a cleaner that is soluble with coolant used.

10. Thoroughly flush and clean around base of pump intake.

Tip: Placing a series of magnets at bottom of coolant reservoir can help naturally remove fine metal chips and flakes from being recirculated through cooling system when cutting.

11. When reservoir and pump are clean and dry, reinstall pump (if removed), access panel, and drain plug.

12. Refill reservoir through catch pan with coolant until drain screen stays slightly submerged.

Machine Storage

To avoid control box damage, and rust or corrosion damage to metal surfaces, you must properly prepare the mill for storage if it will not be operated for any length of time.

You also must make certain that the storage environment temperature will maintain between -13°F to 158°F (-25°C to +70°C), and the relative humidity will not exceed 90% (non-condensing).

To prepare mill for storage:

1. DISCONNECT MILL FROM POWER!

2. Lubricate as directed in **Maintenance** section beginning on **Page 36**.

3. Remove all coolant as directed in **Changing Coolant** section on **Page 42**.

4. Blow out coolant lines with compressed air.

5. Thoroughly clean all unpainted, bare metal surfaces, then coat them with quality rust preventative. Take care to ensure these surfaces are completely covered but that rust preventative is kept off painted surfaces.

Tip: *If mill will be out of service for less than a year, use way oil or good grade of medium-weight machine oil (not motor oil or WD-40) in place of rust preventative.*

6. Painted surfaces may be cleaned and waxed with any quality automotive car wax.

- If machine will be out of service for year or longer, drain oiler and blow out oil lines with compressed air.

- If machine will be out of service for year or longer, loosen the belts to prevent them from stretching during storage. Post a reminder on mill that belts need to be re-installed or tensioned before resuming operations.

- If machine will be out of service for year or longer, place a few moisture-absorbing desiccant packs inside electrical and control panel boxes.

7. Cover and place the machine in dry area that is out of direct sunlight and away from hazardous fumes, paint, solvents, or gas. Fumes and sunlight can bleach or discolor paint and plastic parts.

Adjusting Gibs

Gibs are tapered lengths of metal between two sliding surfaces. Gibs control the gap between these surfaces and how accurately they slide. Correctly adjusting the gibs is critical to producing good milling results.

Tight gibs make table movement more accurate but stiff. Loose gibs make moving the table less accurate but easier. The goal of gib adjustment is to remove unnecessary play without causing the ways to bind and the ballscrews to wear prematurely.

Gibs are adjusted with a screw at each end. The screws are adjusted in unison to move the gib back and forth to increase or decrease the gap between the ways. The process of properly adjusting the gibs is a trial-and-error process based on how much preload they apply to the ways.

Refer to **Figures 45–47** to identify the locations of the table, saddle, and knee gibs, and the adjustment screws for each.

The saddle and knee have three gibs each—two on each side, and one that is left of center. Adjust the gibs on the sides first, then adjust the left-center gib.

To adjust gibs:

1. DISCONNECT MILL FROM POWER!
2. Remove small parts, such as way wipers and covers, to access gib adjustment screws.
3. Loosen all table and knee locks, and clean and lightly oil ways.
4. Center table on saddle.
5. Loosen one gib adjustment screw and tighten opposing screw same amount to move gib.
6. Use handwheel crank to move the table and knee until you feel a slight drag.
7. Reinstall small parts, such as way wipers and covers that were removed to access gib adjustment screws.

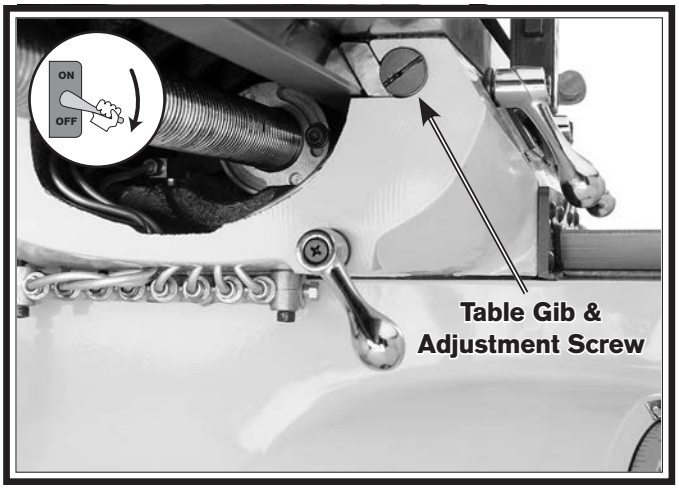


Figure 45. Typical table gib and adjustment screw underneath the left side of the table.

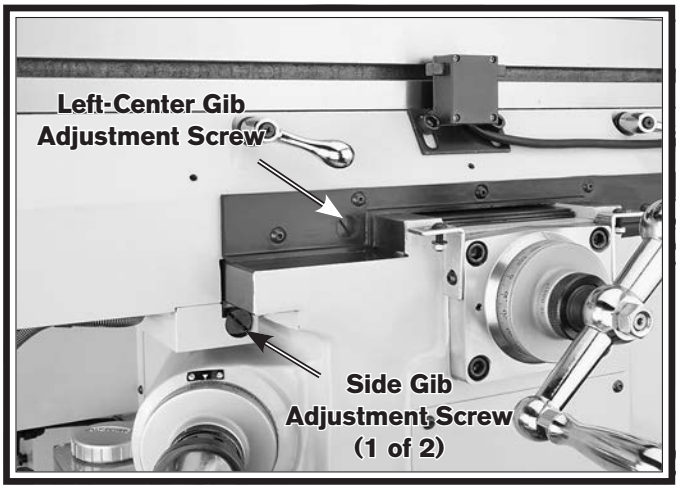


Figure 46. Typical saddle gib adjustment screws.

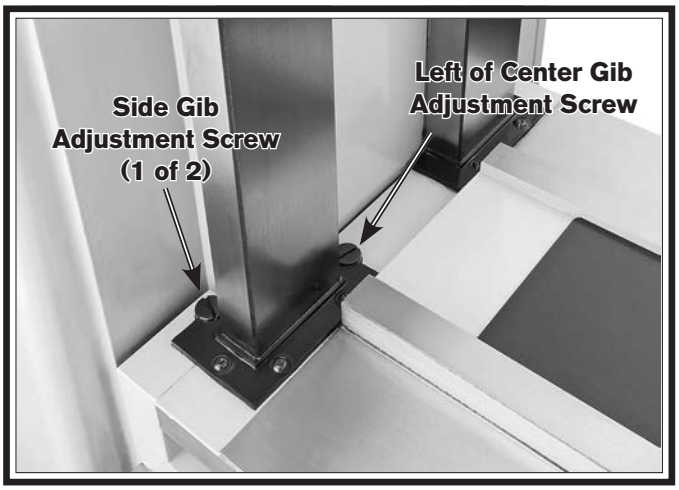


Figure 47. Typical knee gib adjustment screws.

Adjusting X-, Y-, and Z- Ballscrew Backlash

This milling machine uses ballscrew technology for X-, Y-, and Z-axes movement. Unlike a standard half-nut and lead screw design, the ballscrew design requires no periodic adjustment and should last the life of the machine.

Main Belt Tensioning

Power is transferred from the motor to the spindle with a heavy-duty cogged or synchronous belt. With normal use, the belt will gradually stretch over time. When it does, perform the following procedure to re-tension it.

Tools Needed	Qty
Hex Wrench 2.5mm	1
Hex Wrench 10mm	1

To re-tension belt:

1. DISCONNECT MILL FROM POWER!

2. Loosen two motor mount cap screws, one on each side of motor (see **Figure 48**).

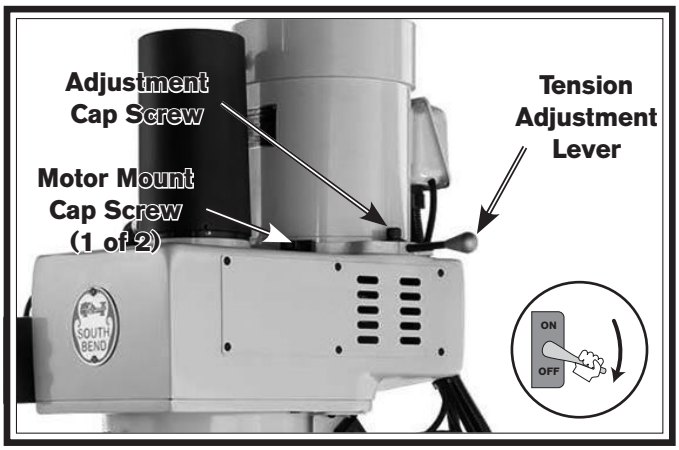


Figure 48. Belt tensioning controls.

3. Push belt tension adjustment lever back with moderate force until no slop exists. Correct adjustment is zero deflection with only slight pulley preload.

4. While holding tension, tighten adjustment cap screw against motor mounting plate to secure setting.

5. Re-tighten motor mount cap screws.

   If it has been a long period of time and belt has not been inspected, or it is suspected that there is a belt problem, vent cover can be removed (see **Figure 49**) for belt inspection and belt changes.

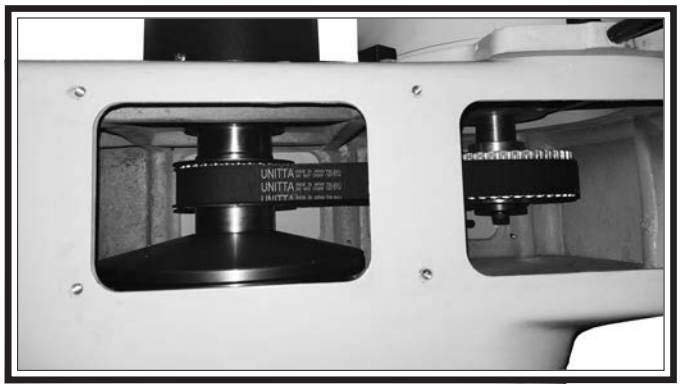


Figure 49. Cogged belt inspection, cover removed.

Servo Motor Belt Replacement

Power is transferred from servo motor to X- and Y-axis ballscrews with cogged or synchronous belts. With normal use, belts will gradually require adjustment or replacement. When they do, follow these procedures.

X-Axis Belt

Tools Needed	Qty
Hex Wrench 2.5mm	1
Hex Wrench 3mm	1
Hex Wrench 5mm	1
Wrench 10mm	1
Wrench 19mm	1

To re-tension or replace belt:

1. DISCONNECT MILL FROM POWER!

2. Flip down folding handwheel lever and push on handwheel so it locks with shaft.

3. While holding handwheel locked with shaft, remove shaft nut shown in **Figure 50**.

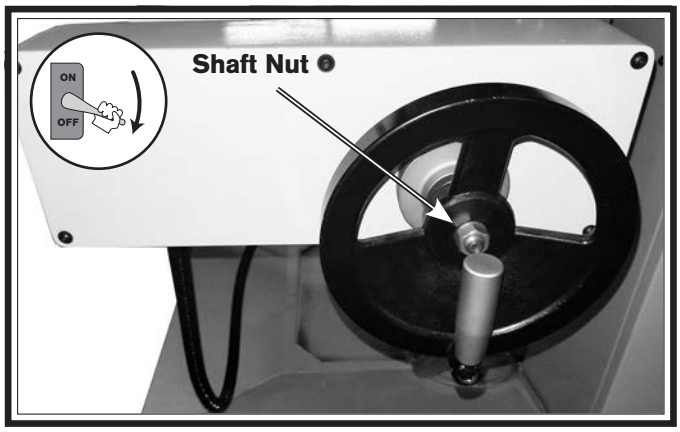


Figure 50. X-axis handwheel.

4. Slide handwheel off of shaft.

5. Without losing shaft key (see **Figure 51**), slide hub off shaft.

Note: *If hub is tight, tap with block of wood and it should release and then slide off.*

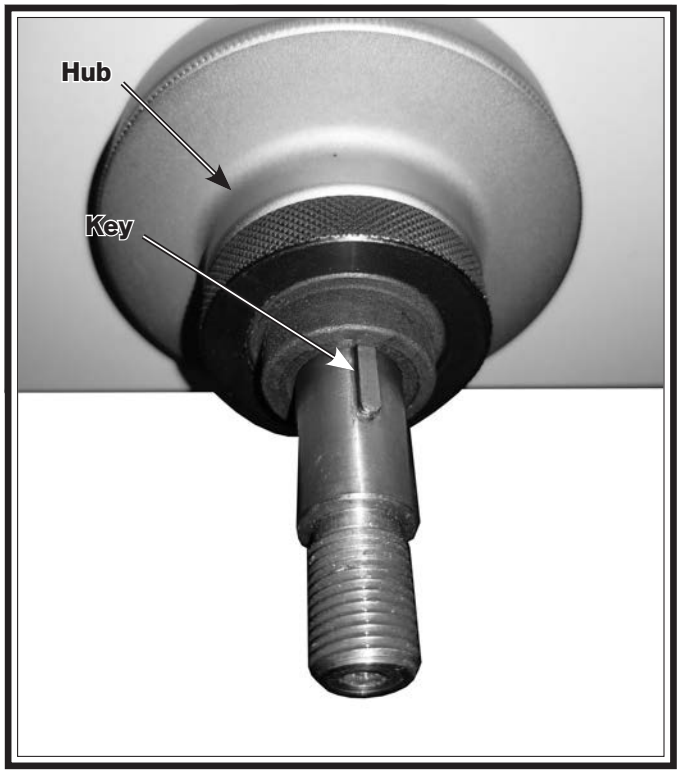


Figure 51. X-axis hub.

6. Remove six cover screws and cover.

7. Loosen three motor mount cap screws (see **Figure 52**).

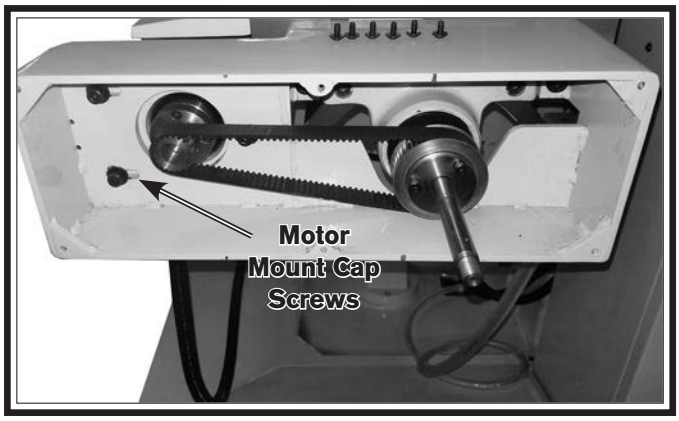


Figure 52. X-axis synchronous drive belt.

8. Loosen belt tensioner jam nut.

9. Adjust belt tensioner (see **Figure 53**) loosen belt.

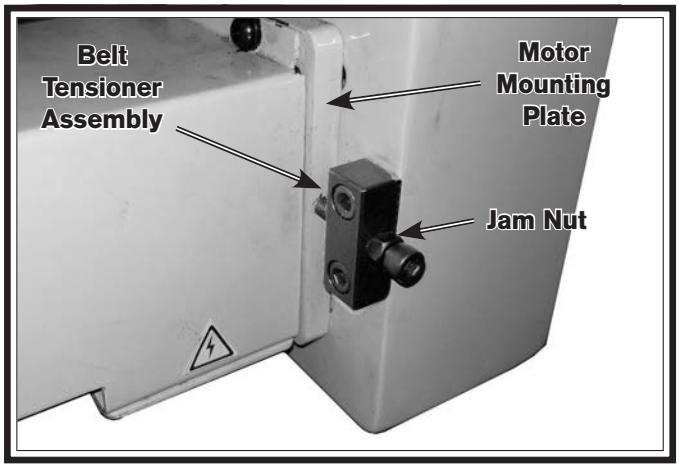


Figure 53. X-axis drive belt tensioner.

10. Replace belt.

11. Tension belt so it is tight without slop. Correct adjustment is zero deflection with only slight pulley preload.

12. Retighten tensioner jam nut, motor mount bolts, and reinstall cover using its six screws.

13. Reinstall shaft key, hub, and handwheel.

Y-Axis Belt

Tools Needed	Qty
Hex Wrench 2.5mm	1
Hex Wrench 3mm	1
Hex Wrench 5mm	1
Wrench 19mm	1

To tension or replace belt:

1. DISCONNECT MILL FROM POWER!

2. Flip down folding handwheel lever and push on handwheel so it locks with shaft.

3. While holding handwheel locked with shaft, remove shaft nut shown in **Figure 54**.

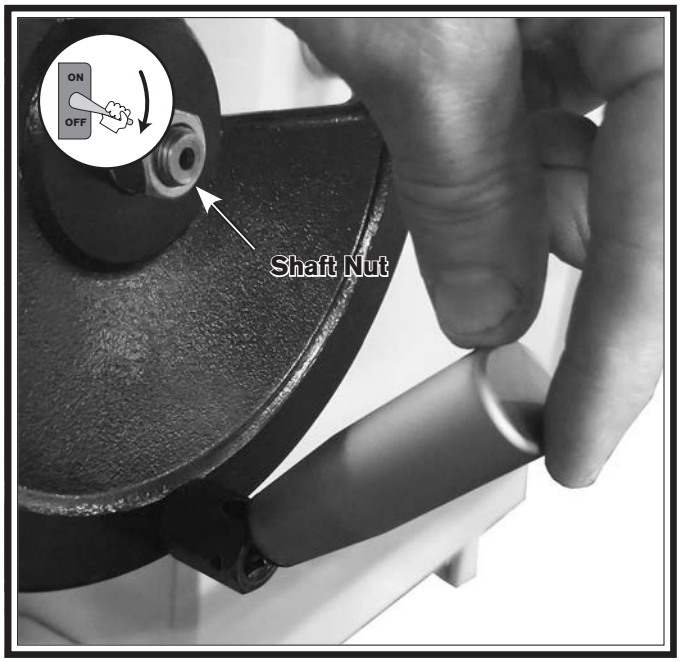


Figure 54. Y-axis handwheel assembly.

4. Slide handwheel off of shaft.

5. Without losing shaft key (see **Figure 55**), slide hub off shaft.

   Note: *If hub is tight, tap with block of wood and it should release and then slide off.*

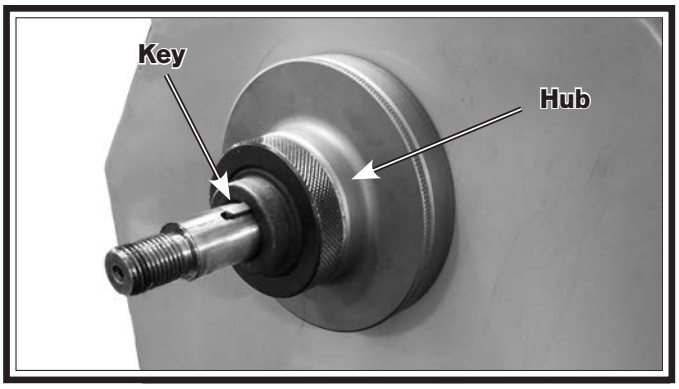


Figure 55. Y-axis hub assembly.

6. Remove six cover screws and cover.

7. Loosen four motor mount bolts (see **Figure 56**).

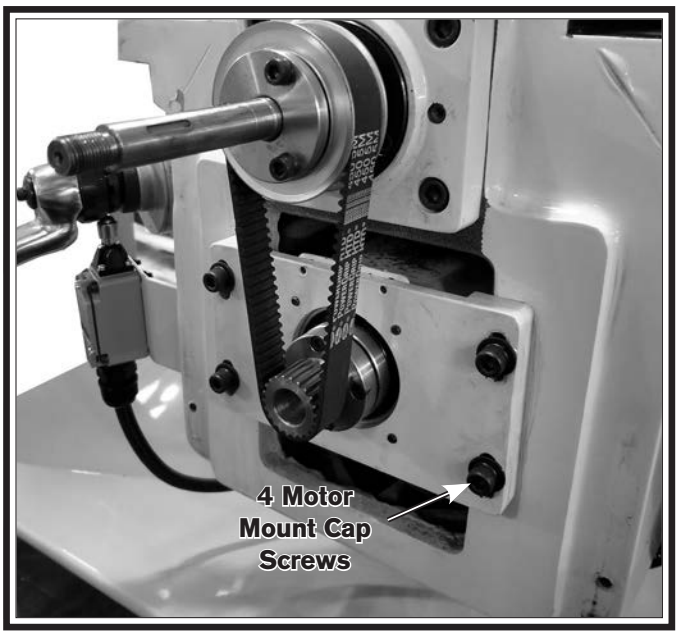


Figure 56. Y-axis synchronous drive belt.

8. Grasp motor from underside and lift slightly to de-tension belt.

9. Replace belt.

10. Lower motor to tension belt so it is tight without any slop. Correct adjustment is zero deflection with only slight pulley preload.

11. Retighten motor mount bolts, and reinstall cover using six screws.

12. Reinstall the shaft key, hub, and handwheel.

If you need replacement parts, or if you are unsure how to do any of the solutions given here, feel free to call us at (360) 734-1540.

Symptom	Possible Cause	Possible Solution
Machine does not start or a breaker trips on start-up.	1. EMERGENCY STOP button pushed in or at fault.	1. Rotate the button clockwise until it pops out; replace if necessary.
	2. Main power switch not turned ***ON***.	2. Make sure the electrical box door is closed and securely latched, then turn main power switch ***ON***.
	3. Main power switch at fault.	3. Replace main power switch.
	4. Plug/receptacle at fault or wired incorrectly.	4. Test for good contacts; correct wiring.
	5. Power supply switched ***OFF*** or at fault.	5. Ensure hot lines have correct voltage on all legs and main power supply is switched ***ON***.
	6. Motor connection wired incorrectly.	6. Correct motor wiring connections.
	7. ON button or spindle direction switch at fault.	7. Replace faulty ON button or spindle direction switch.
	8. Motor windings or motor at fault.	8. Replace motor.
Machine stalls or is overloaded.	1. Tool path is too aggressive.	1. Use smaller or sharper tooling; reduce the feed rate; reduce the spindle speed; use coolant.
	2. Workpiece alignment is poor.	2. Eliminate workpiece binding; use vise or clamps as required for proper workpiece alignment control.
	3. Dull or incorrect cutting tool.	3. Use sharp and correct cutting tool for the operation.
	4. Plug/receptacle at fault or wired incorrectly; incorrect voltage coming from power source.	4. Test for good contact; correct wiring problems; ensure hot lines have correct voltage on all legs.
	5. Motor bearings at fault.	5. Test by rotating shaft; rotation grinding/loose shaft requires bearing replacement.
	6. Motor has overheated.	6. Clean off motor, let cool, and reduce workload.
	7. Motor is at fault.	7. Replace motor.
Machine has vibration or noisy operation.	1. Tool holder or cutter is at fault.	1. Replace out-of-round tool holder; replace/re-sharpen cutter; use appropriate feed rate spindle speed.
	2. Workpiece alignment is poor.	2. Eliminate workpiece binding; use vise or clamps as required for proper workpiece alignment control.
	3. Motor or component is loose.	3. Inspect/replace stripped or damaged bolts/nuts and re-tighten with thread locking fluid.
	4. Pulley is loose.	4. Re-align/replace shaft, pulley, set screw, and key as required.
	5. Machine is incorrectly mounted to floor or sits unevenly.	5. Re-tighten/replace mounting bolts in floor; relocate/shim machine.
	6. Motor fan is rubbing on fan cover.	6. Replace dented fan cover or fan.
	7. Pulley(s) slipping on shaft.	7. Replace loose pulley/shaft.
	8. Motor bearings at fault.	8. Test by rotating shaft; rotation grinding/loose shaft requires bearing replacement.
	9. Gearbox is at fault.	9. Rebuild gearbox for bad gear(s)/bearing(s).

Symptom	Possible Cause	Possible Solution
Workpiece chatters or vibrates during operation.	**1.** Table/saddle/knee locks not tight.	**1.** Tighten all locks on mill that are not associated with necessary table movement for the operation.
	2. Workpiece not securely clamped to table or mill vise.	**2.** Check that clamping is tight and sufficient for the operation; make sure mill vise is clamped tight to table.
	3. Tool not secure or is damaged.	**3.** Properly secure the tool; replace if damaged.
	4. Spindle speed too fast/feed rate too slow.	**4.** Use correct spindle speed and feed rate.
	5. Gibs are too loose.	**5.** Properly adjust gibs (**Page 44**).
Table hard to move.	**1.** Table/saddle/knee locks are tightened down.	**1.** Loosen the locks needed for movement.
	2. Chips have loaded up on the ways.	**2.** Frequently clean away chips from the ways that build up during operation.
	3. Ways are dry and in need of lubrication.	**3.** Troubleshoot the automatic oiler/refill (**Page 37**).
	4. Gibs are too tight.	**4.** Properly adjust gibs (**Page 44**).
Bad surface finish.	**1.** Wrong spindle speed/feed rate.	**1.** Use correct spindle speed and feed rate.
	2. Dull/damaged tool; wrong tool for operation.	**2.** Sharpen/replace tool; use correct tool for operation.
	3. Wrong spindle rotation direction for tool.	**3.** Check for proper spindle rotation direction for tool.
	4. Workpiece not securely clamped to table or mill vise.	**4.** Check that clamping is tight and sufficient for the operation; make sure mill vise is clamped tight to table.
	5. Gibs are too loose.	**5.** Properly adjust gibs (**Page 44**).
Machine is loud when cutting; overheats or bogs down in the cut.	**1.** Excessive depth of cut.	**1.** Decrease depth of cut and allow chips to clear.
	2. Dull tooling.	**2.** Use sharp tooling.
	3. Feed rate too fast.	**3.** Decrease feed rate.
Breaking tooling.	**1.** Spindle speed/feed rate too fast.	**1.** Use correct spindle speed and feed rate.
	2. Tooling getting too hot.	**2.** Use coolant; reduce spindle RPM/feed rate.
	3. Excessive depth of cut.	**3.** Correct tool path to decrease depth of cut and allow chips to clear.
	4. Workpiece not securely clamped to table or mill vise.	**4.** Check that clamping is tight and sufficient for the operation; make sure mill vise is clamped tight to table.
	5. Gibs are too loose.	**5.** Properly adjust gibs.

Electrical Safety Instructions

These pages are accurate at the time of printing. In the constant effort to improve, however, we may make changes to the electrical systems of future machines. Study this section carefully. If you see differences between your machine and what is shown in this section, call Technical Support at (360) 734-1540 for assistance BEFORE making any changes to the wiring on the machine.

Shock Hazard: It is extremely dangerous to perform electrical or wiring tasks while the machine is connected to the power source. Touching electrified parts will result in personal injury including but not limited to severe burns, electrocution, or death. For your own safety, disconnect machine from the power source before servicing electrical components or performing any wiring tasks!

Wire Connections: All connections must be tight to prevent wires from loosening during machine operation. Double-check all wires disconnected or connected during any wiring task to ensure tight connections.

Modifications: Using aftermarket parts or modifying the wiring beyond what is shown in the diagram may lead to unpredictable results, including serious injury or fire.

Motor Wiring: The motor wiring shown in these diagrams is current at the time of printing, but it may not match your machine. Always use the wiring diagram inside the motor junction box.

Circuit Requirements: Connecting the machine to an improperly sized circuit will greatly increase the risk of fire. To minimize this risk, only connect the machine to a power circuit that meets the minimum requirements given in this manual.

Capacitors/Inverters: Some capacitors and power inverters store an electrical charge for up to 10 minutes after being disconnected from the power source. To reduce the risk of being shocked, wait at least this long before working on capacitors.

Wire/Component Damage: Damaged wires or components increase the risk of serious personal injury, fire, or machine damage. If you notice that any wires or components are damaged while performing a wiring task, replace those wires or components before completing the task.

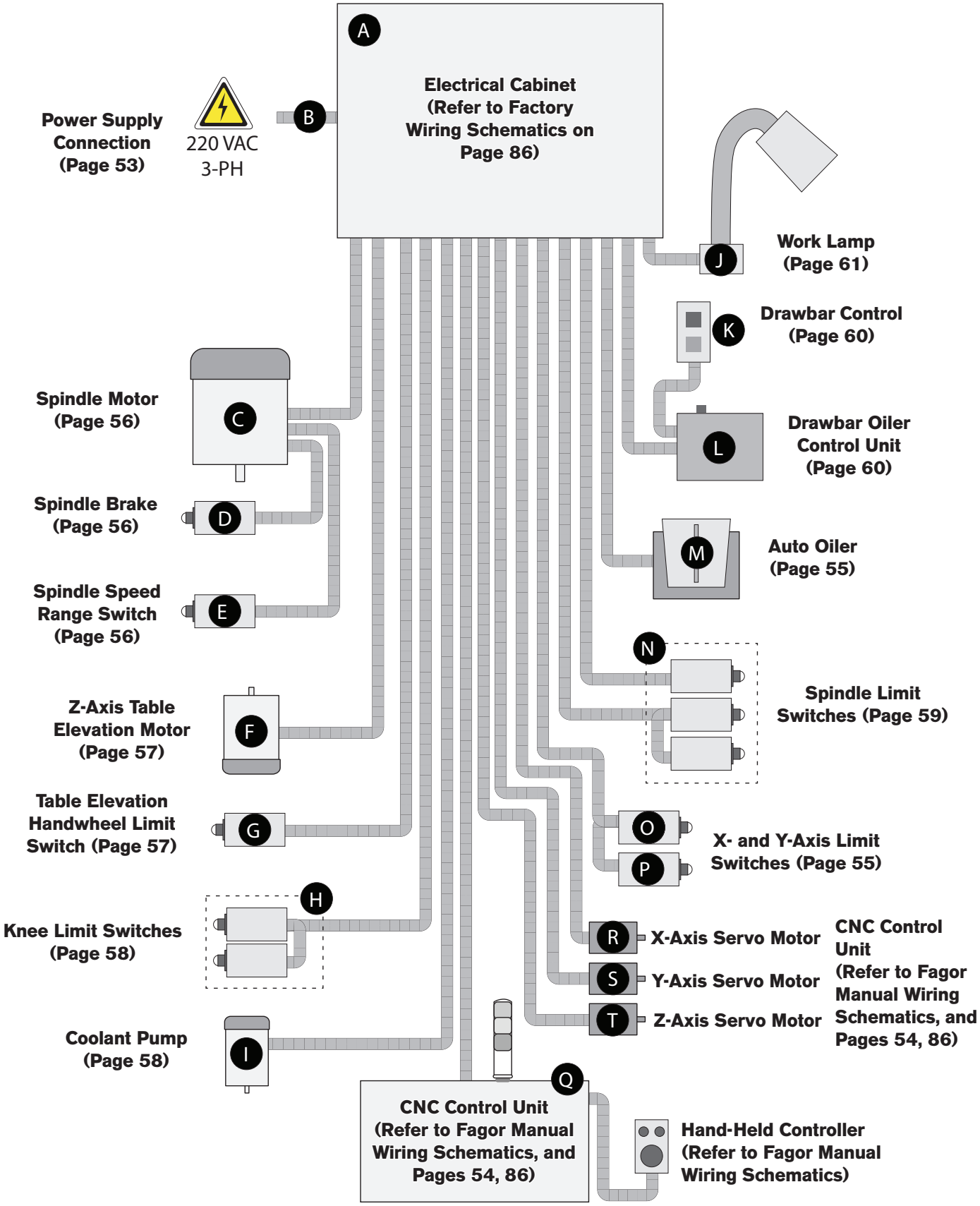
Experiencing Difficulties: If you are experiencing difficulties understanding the information included in this section, contact our Technical Support at (360) 734-1540.

WIRING DIAGRAM COLOR KEY

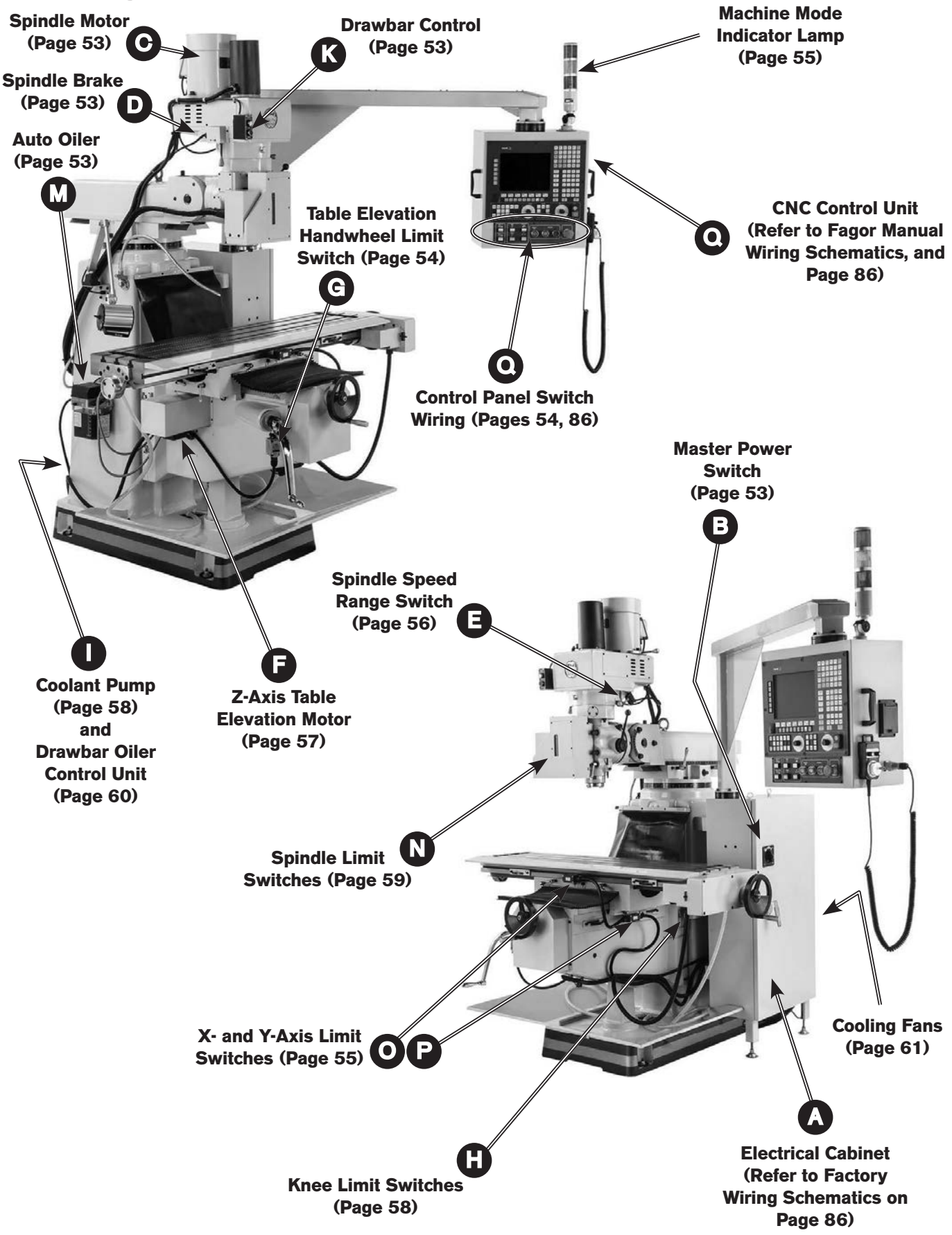
BLACK (Bk)	BLUE WHITE (Bw)	RED (Rd)	PINK (Pk)	WHITE (Wt)
BLUE (Bl)	GREEN (Gn)	LIGHT BLUE (Lb)	PURPLE (Pu)	YELLOW GREEN (Yg)
BROWN (Br)	GRAY (Gy)	ORANGE (Or)	TURQUIOSE (Tu)	YELLOW (Yl)
BLACK GRAY (Bg)	GRAY BLACK (Gb)	GRAY WHITE (Gw)	LIGHT GREEN (Lg)	YELLOW BROWN (Yb)

NOTICE: **The photos and diagrams included in this section are best viewed in color. You can see them in color at www.southbendlathe.com.**

Wiring Overview



Wiring Visual Index



General Component Wiring

Figure 57. Electrical cabinet wiring with equipment number tags.

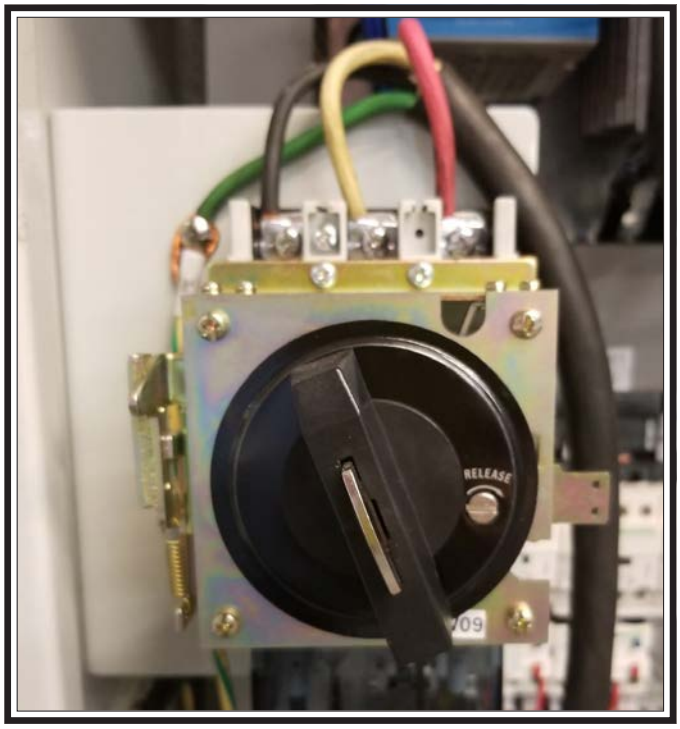
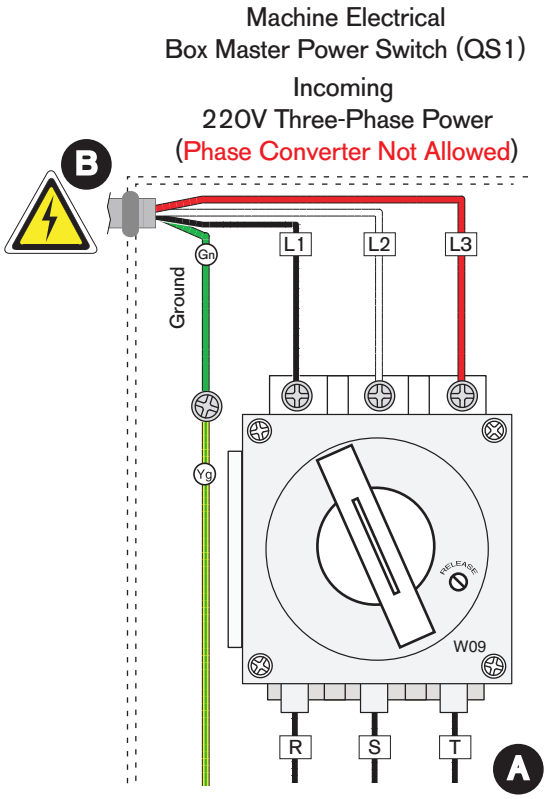


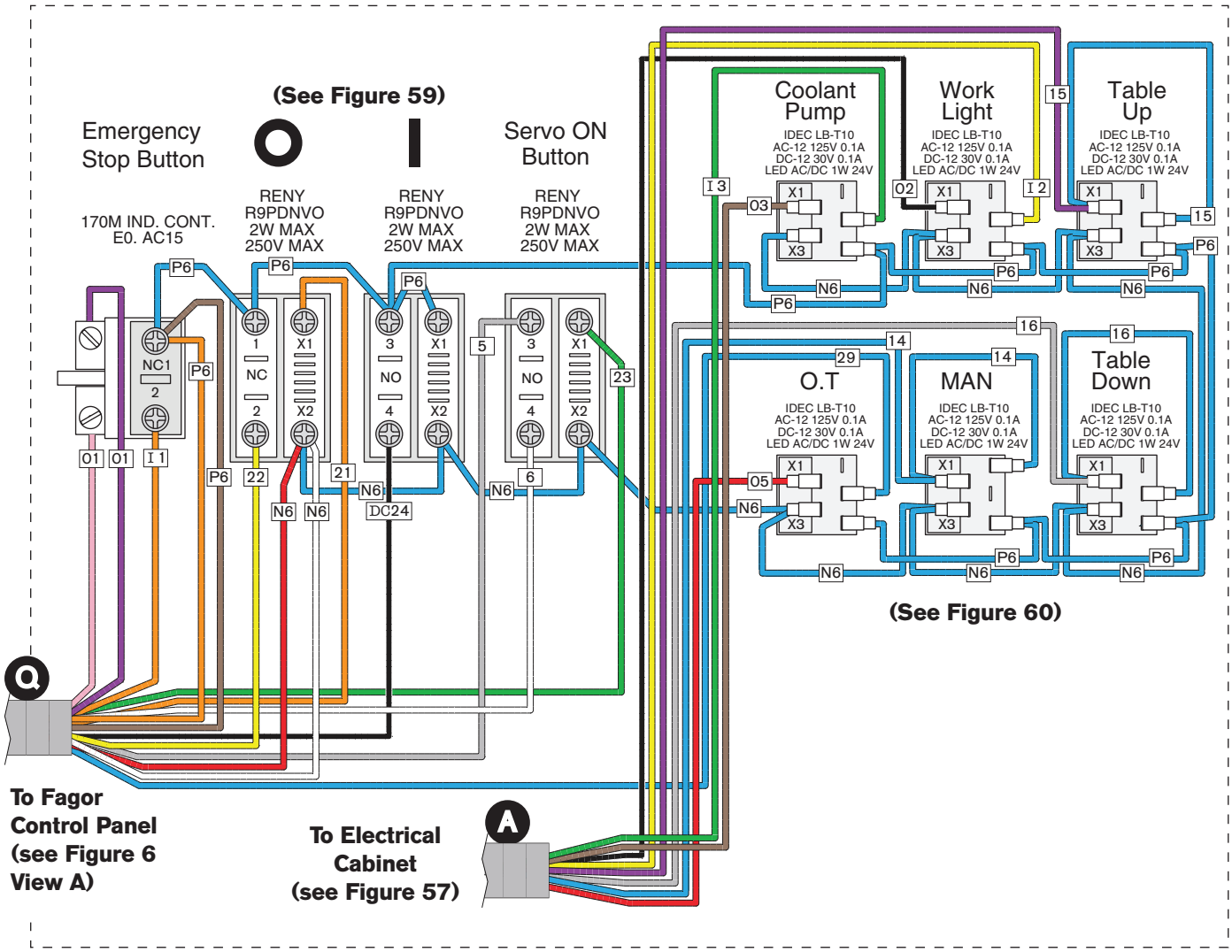
Figure 58. Master power switch (QS1).



Main Electrical Cabinet (see Figure 57)

General Component Wiring (Cont.)

Control Panel Switch Box (as seen from behind)



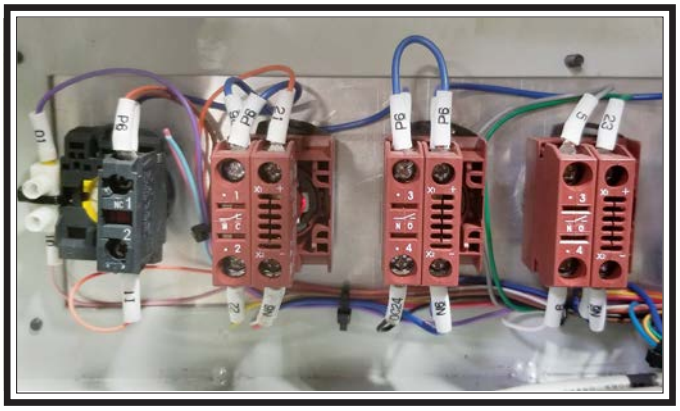


Figure 59. Control panel switches.

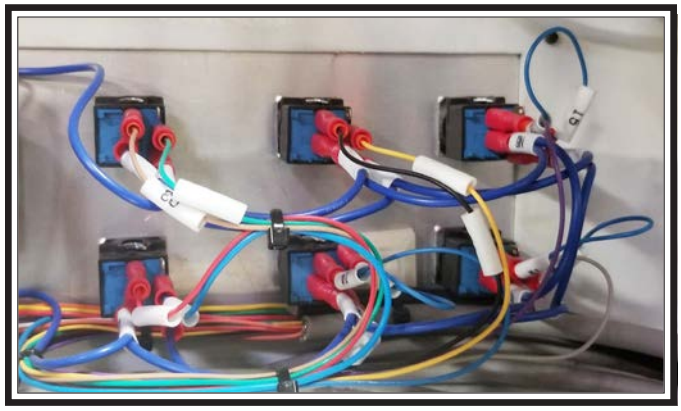


Figure 60. Control panel switches.

General Component Wiring (Cont.)

Figure 61. X-Axis limit switch (LS1).

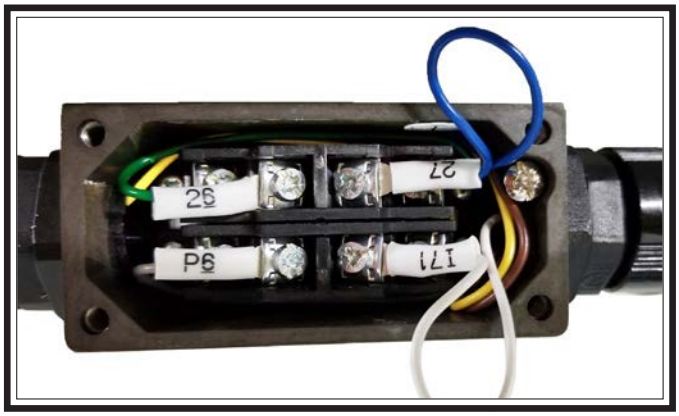
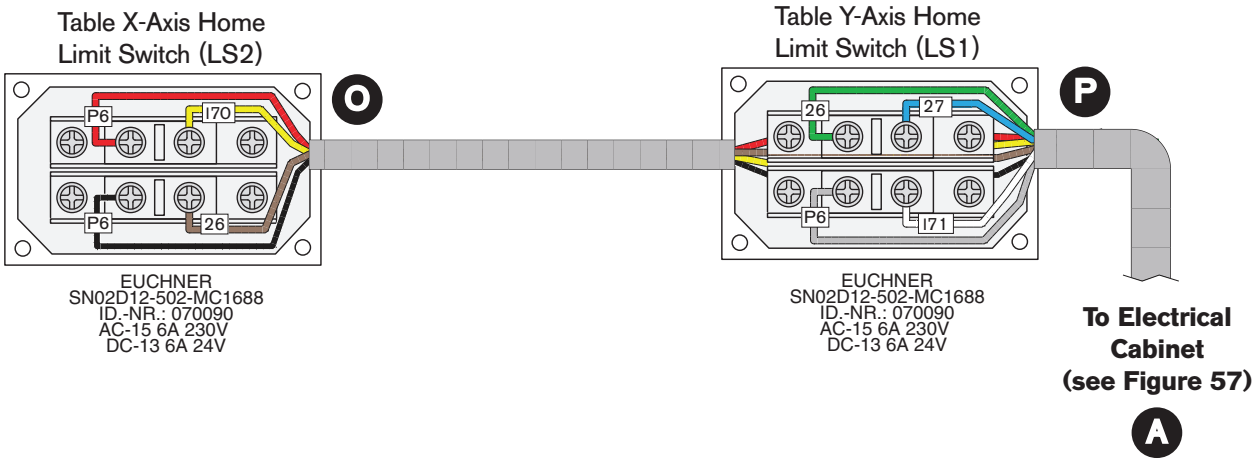


Figure 62. Y-Axis limit switch (LS2).



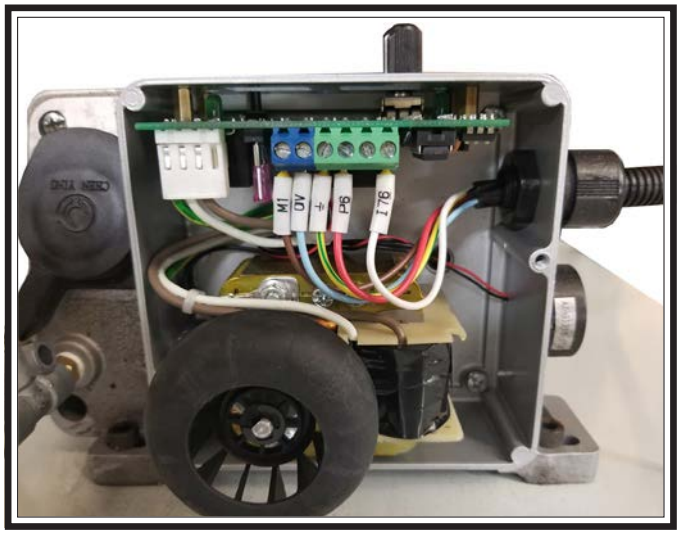
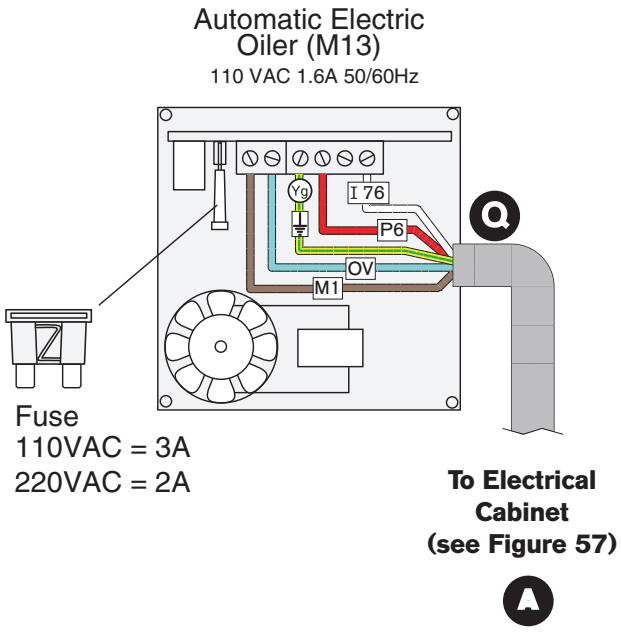


Figure 63. Automatic oiler (M13).



General Component Wiring (Cont.)

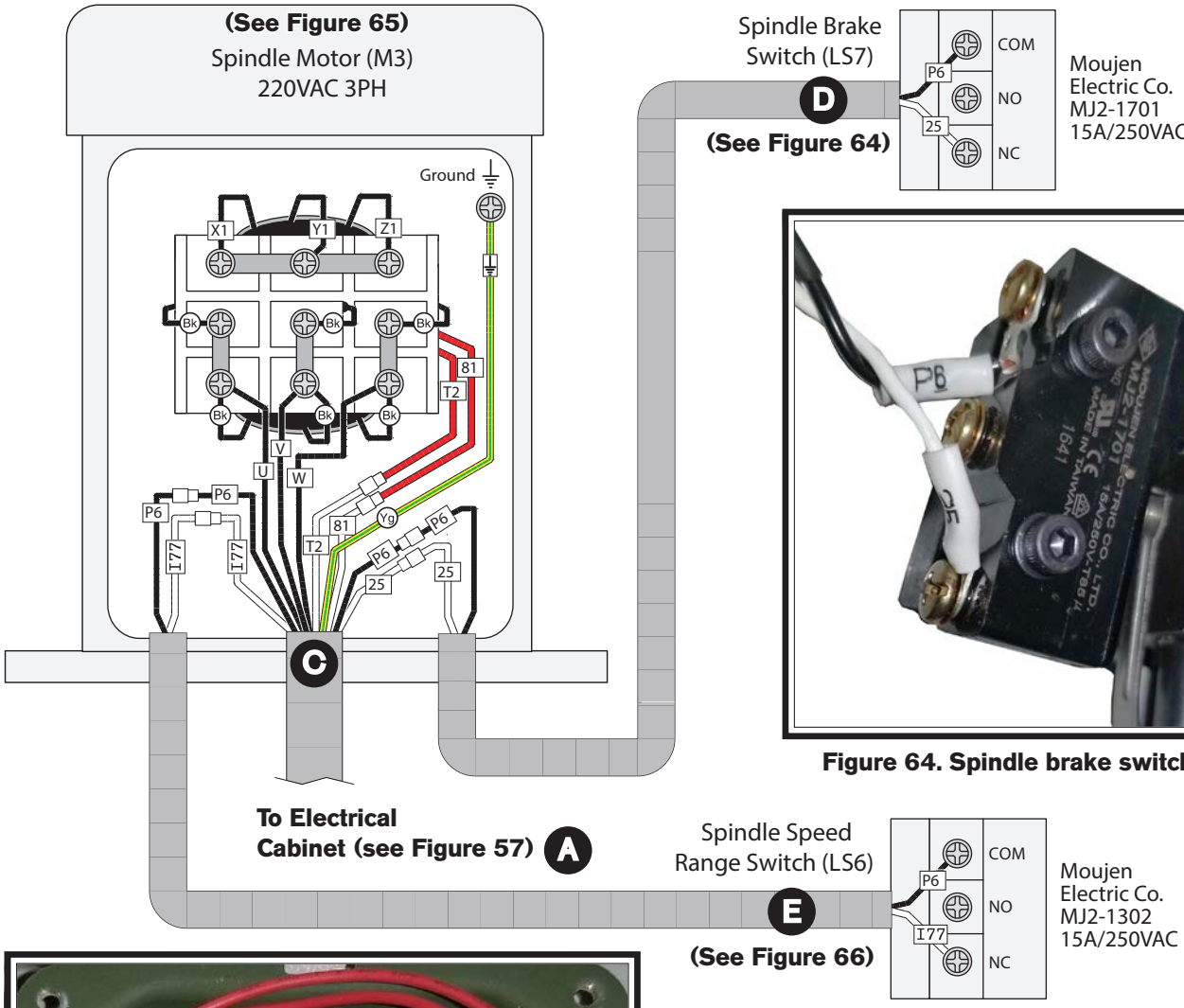


Figure 64. Spindle brake switch (LS7).

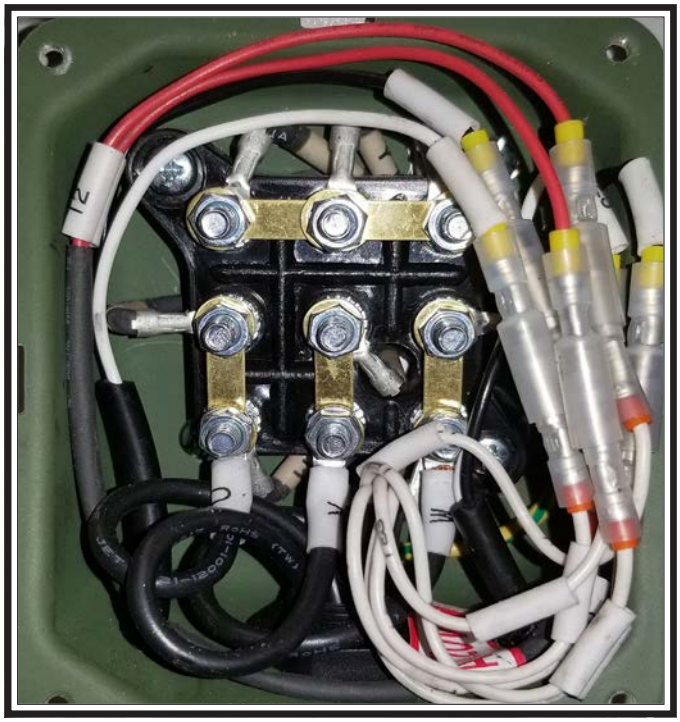


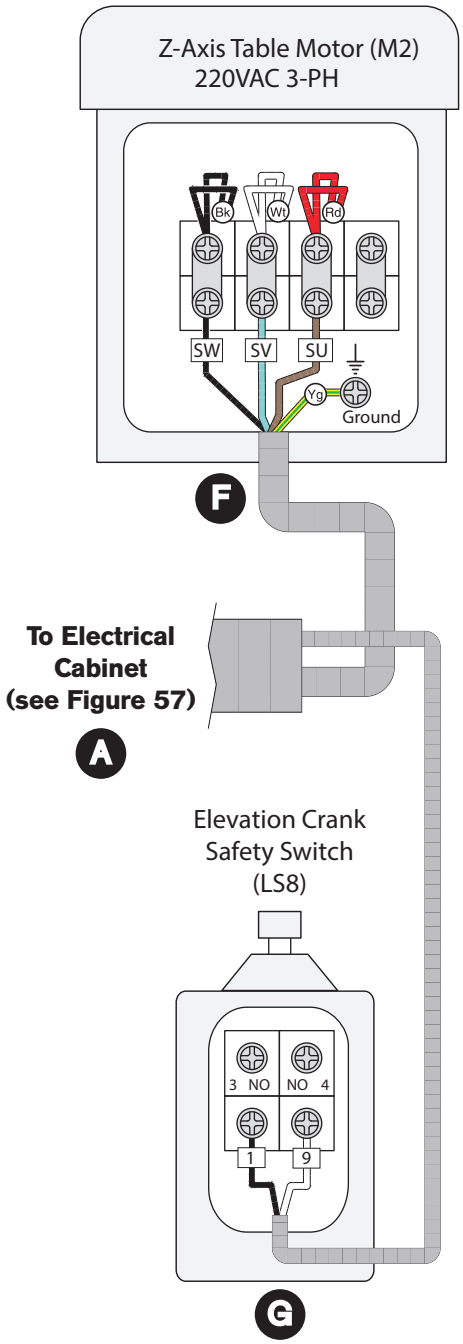
Figure 65. Spindle motor wiring (220V) (M3).

Figure 66. Spindle speed range switch (LS6).

General Component Wiring (Cont.)

Figure 67. Z-axis motor wiring (220V) (M2).

Figure 68. Z-axis crank safety switch (LS8).



General Component Wiring (Cont.)

Figure 69. Z-axis limit switches (LS9 & LS10).

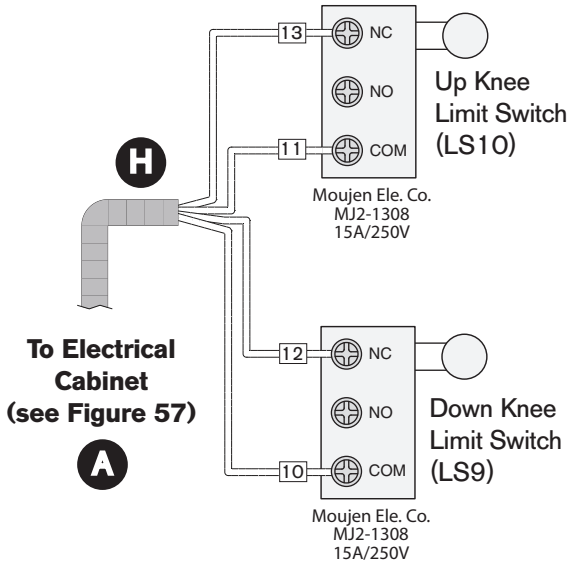
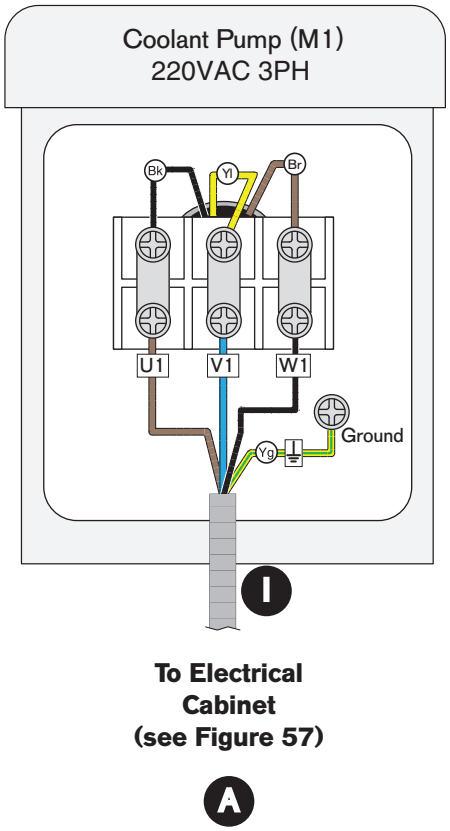


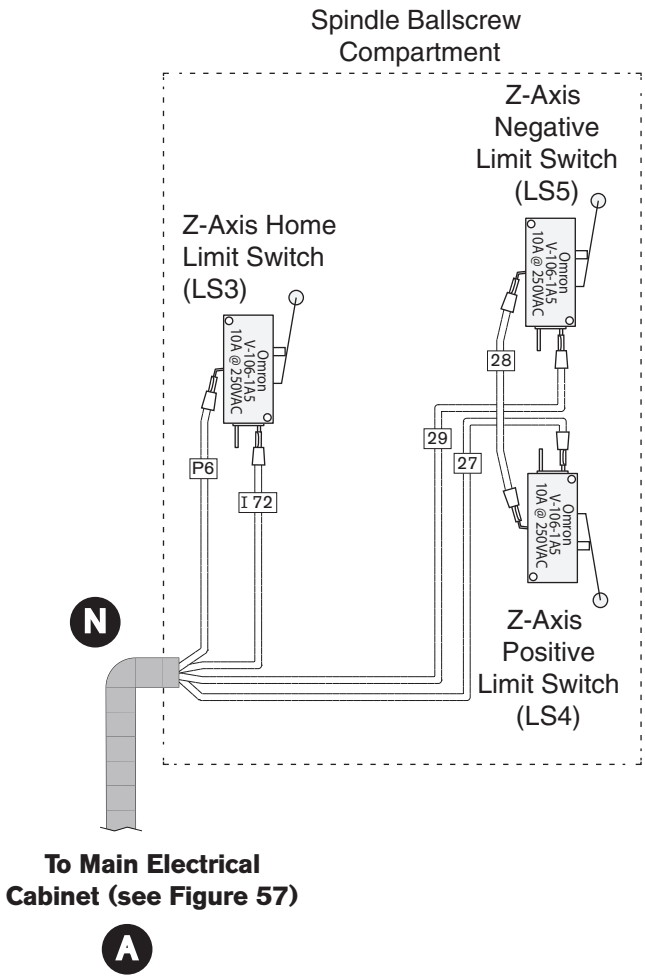
Figure 70. Coolant pump motor wiring (220V) (M1).



General Component Wiring (Cont.)

Figure 71. Spindle limit switches (LS3 & LS5).

Figure 72. Cooling fans (M9 & M10).



General Component Wiring (Cont.)

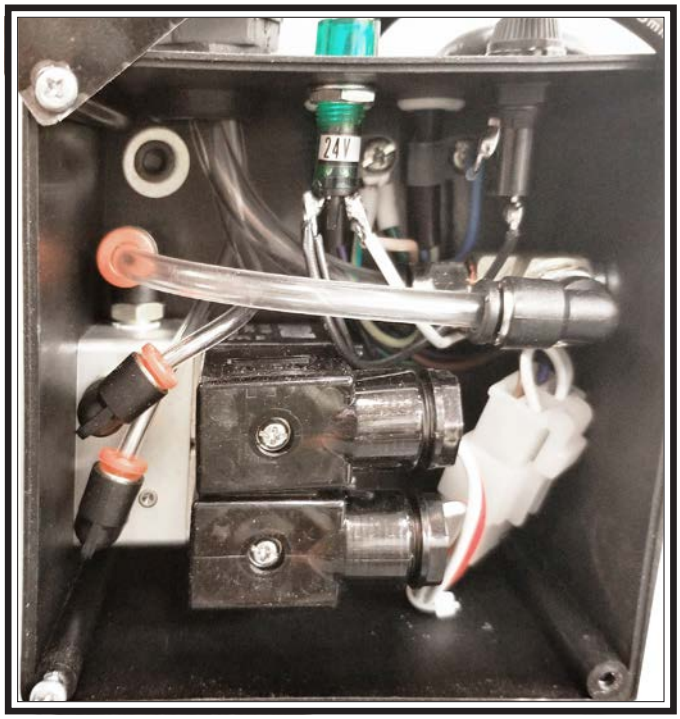


Figure 73. Power drawbar air and oil controller (SOL.1).

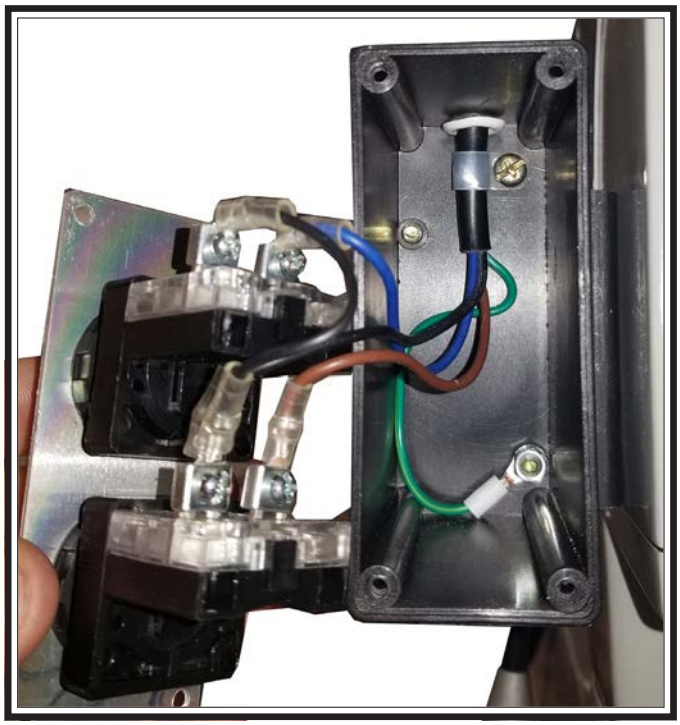
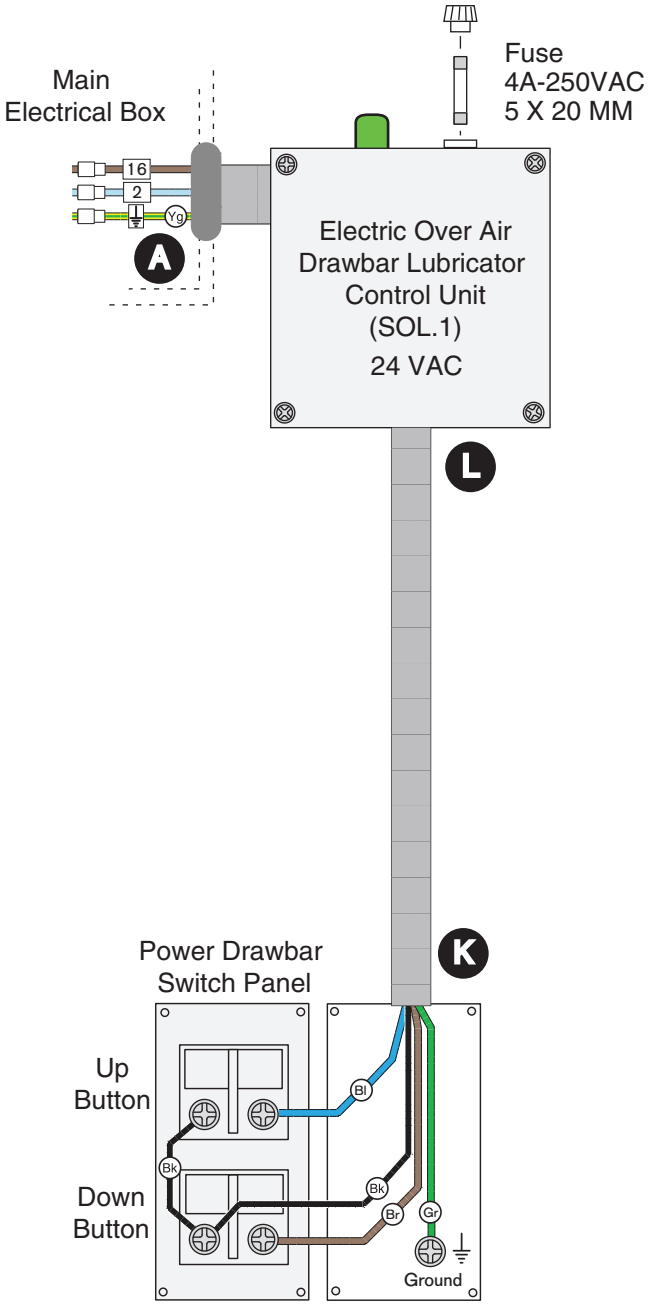


Figure 74. Power drawbar control switches.



General Component Wiring (Cont.)

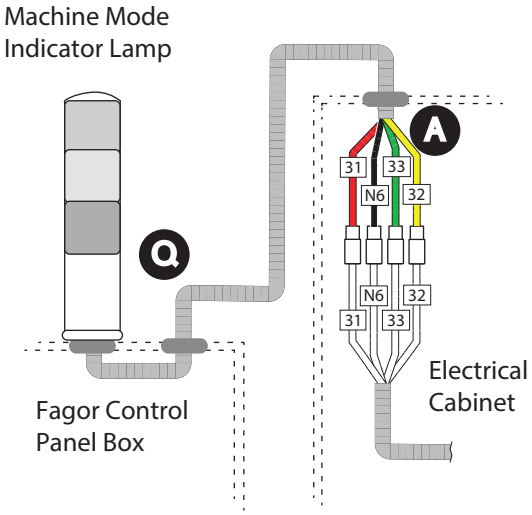


Figure 75. Machine mode indicator light.

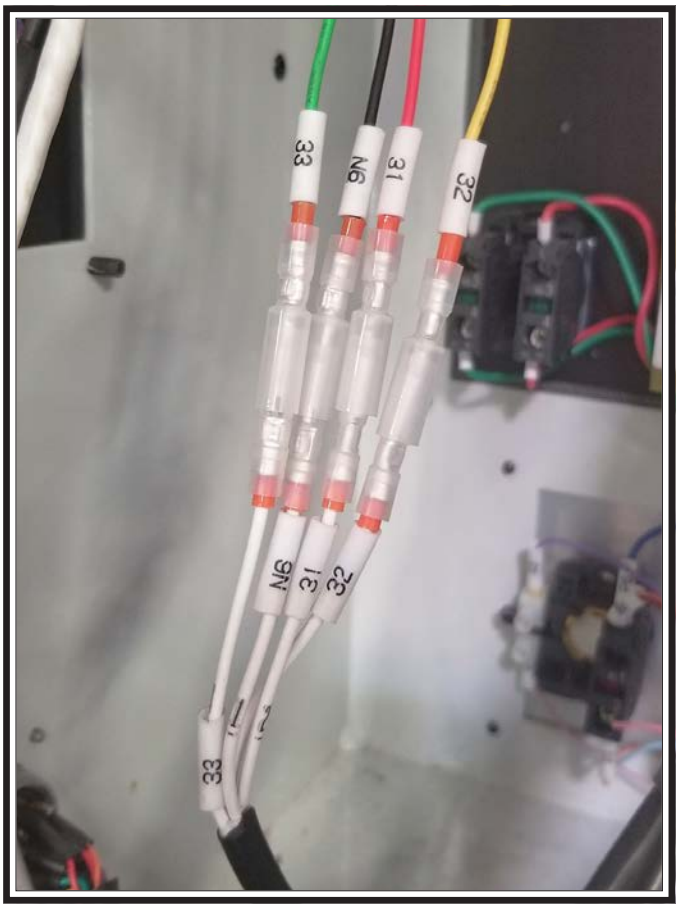
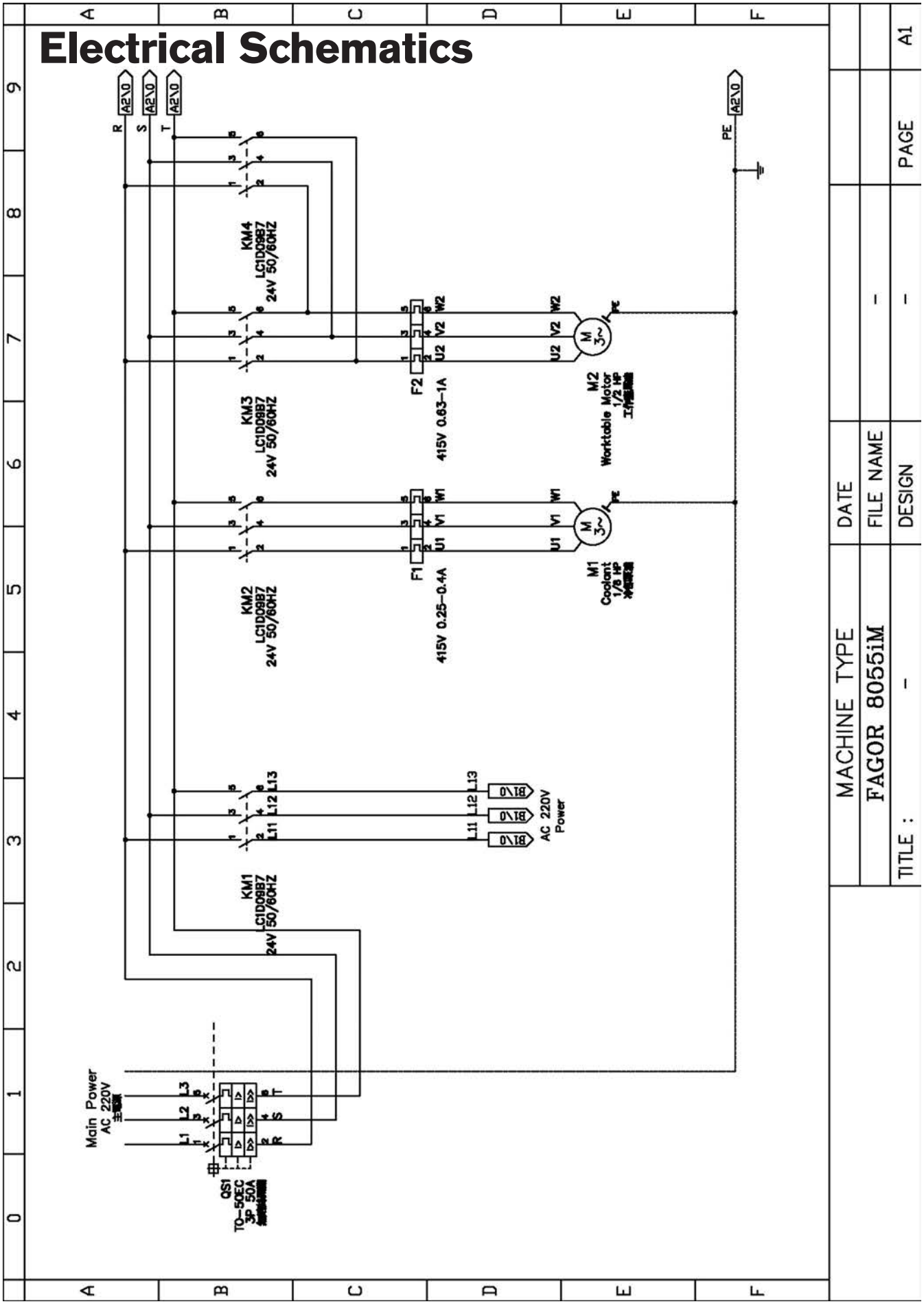
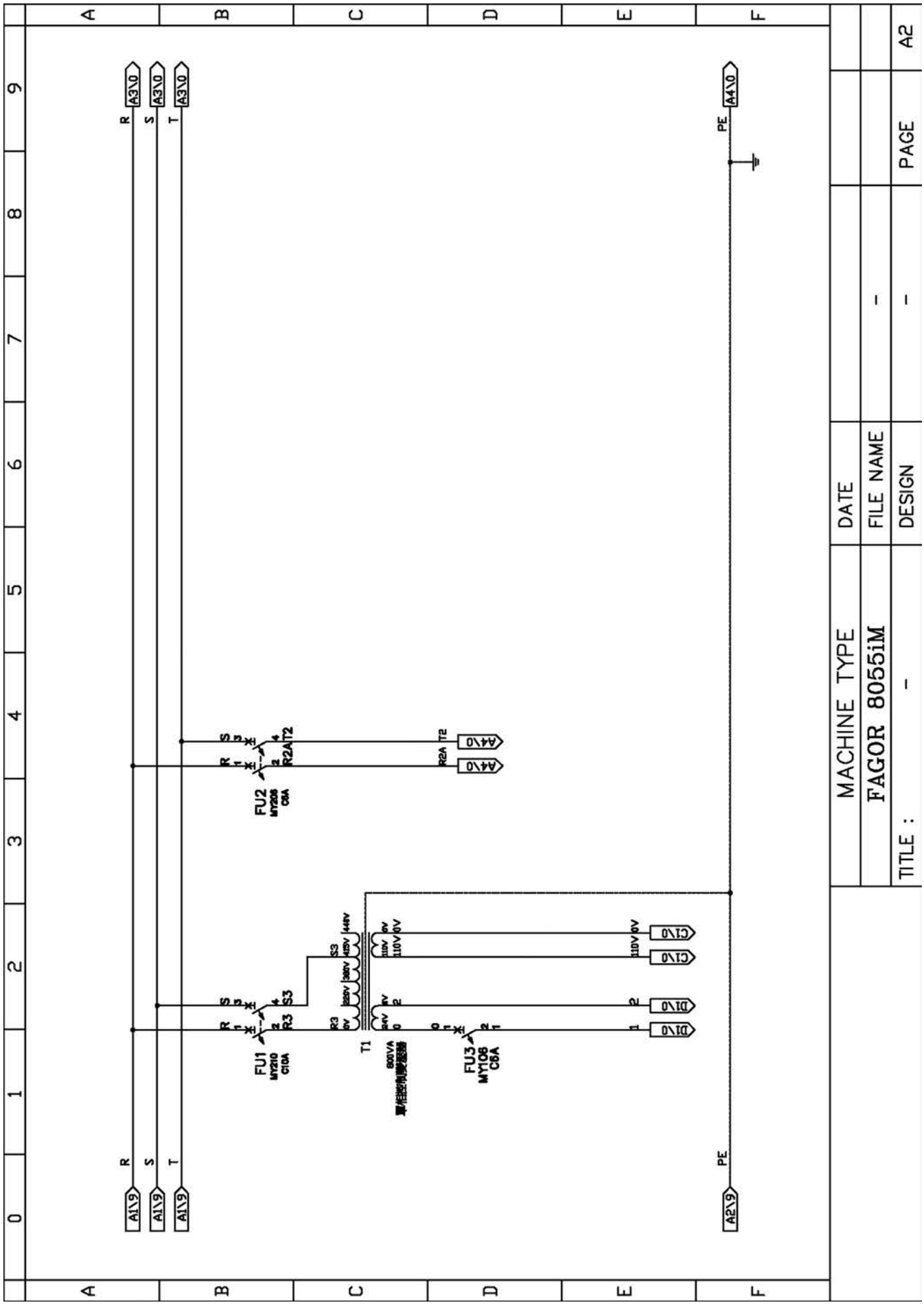


Figure 76. Machine mode indicator light pigtail.

Electrical Schematics

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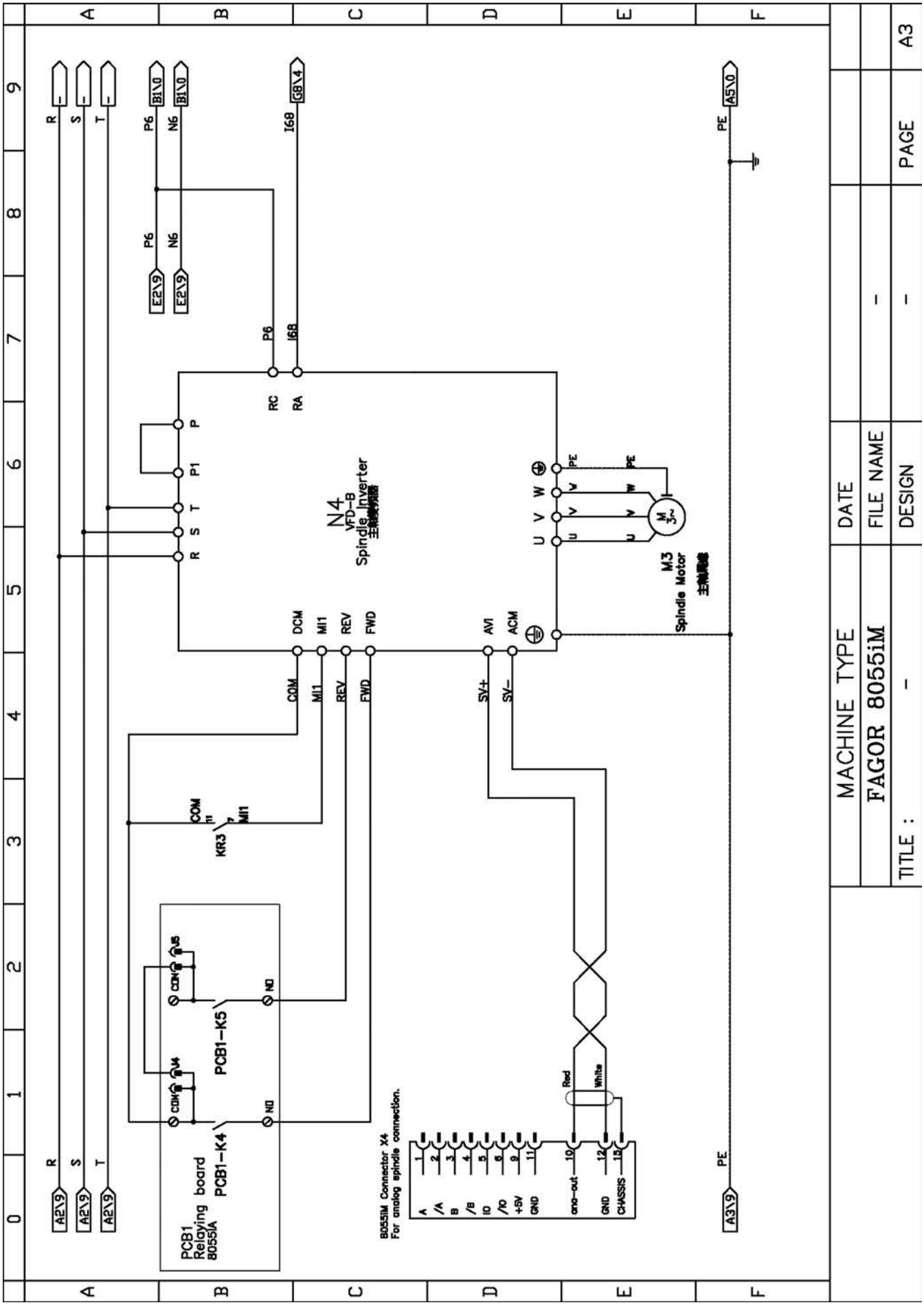
DATE
FILE NAME
DESIGN
PAGE
A2
FU1
FU2
FU3
T1
R
S
T
PE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FAGOR 8055iM
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DATE
FILE NAME -
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PAGE -
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N4
VFD-B
Spindle Inverter
M3
Spindle Motor
PCB1
Relaying board
8055iA
PCB1-K4
PCB1-K5
KR3
8055iM Connector X4
For analog spindle connection.
Red
White
R
S
T
P6
N6
B1\0
G8\4
I68
A5\0
E2\9
A2\9
A3\9
RC
RA
P
P1
R S T
U V W
PE
DCM
MI1
REV
FWD
AVI
ACM
COM
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SV-
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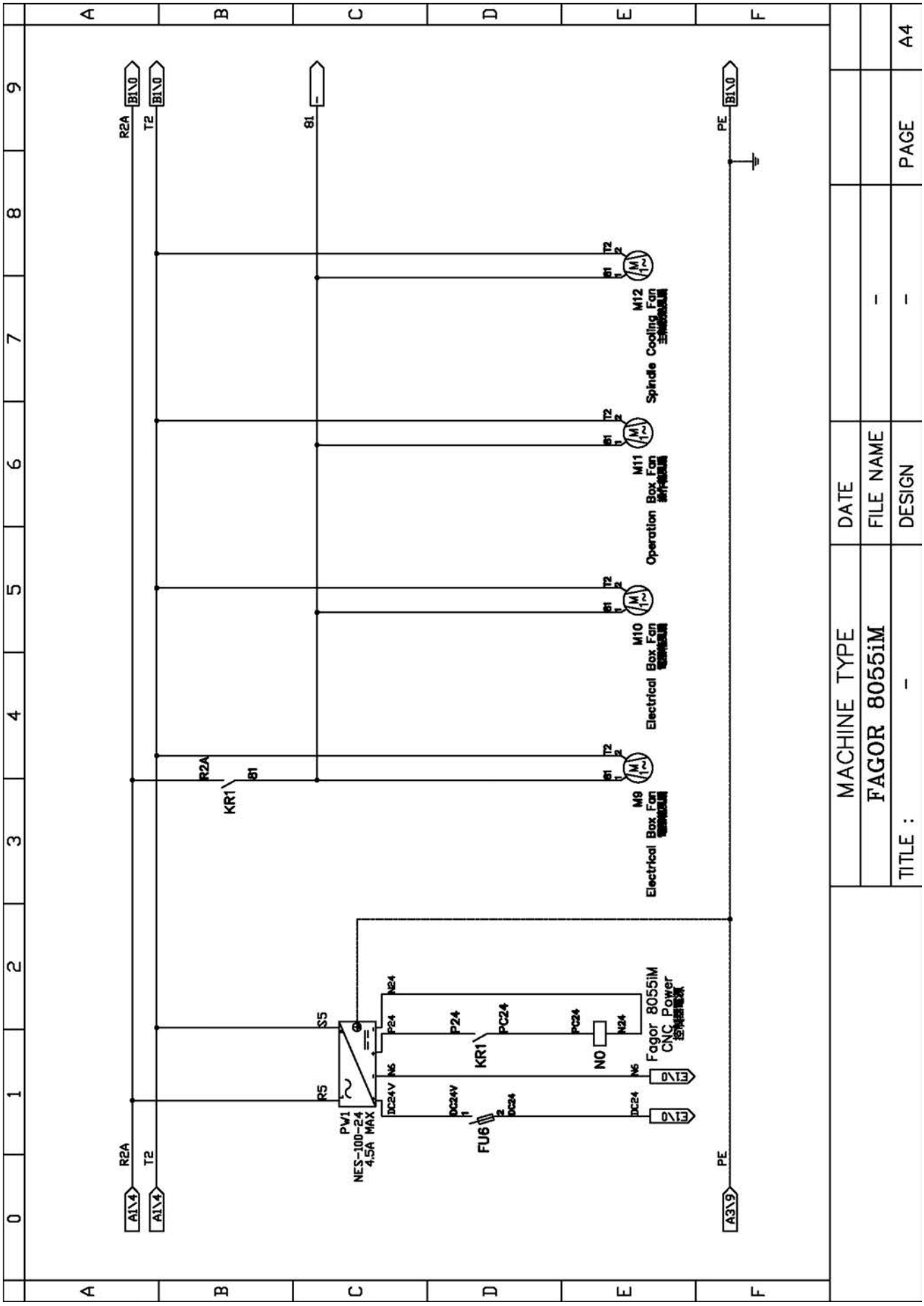
/A
B
/B
IO
/O
+5V
GND
ana-out
GND
CHASSIS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FAGOR 8055iM
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DATE
FILE NAME
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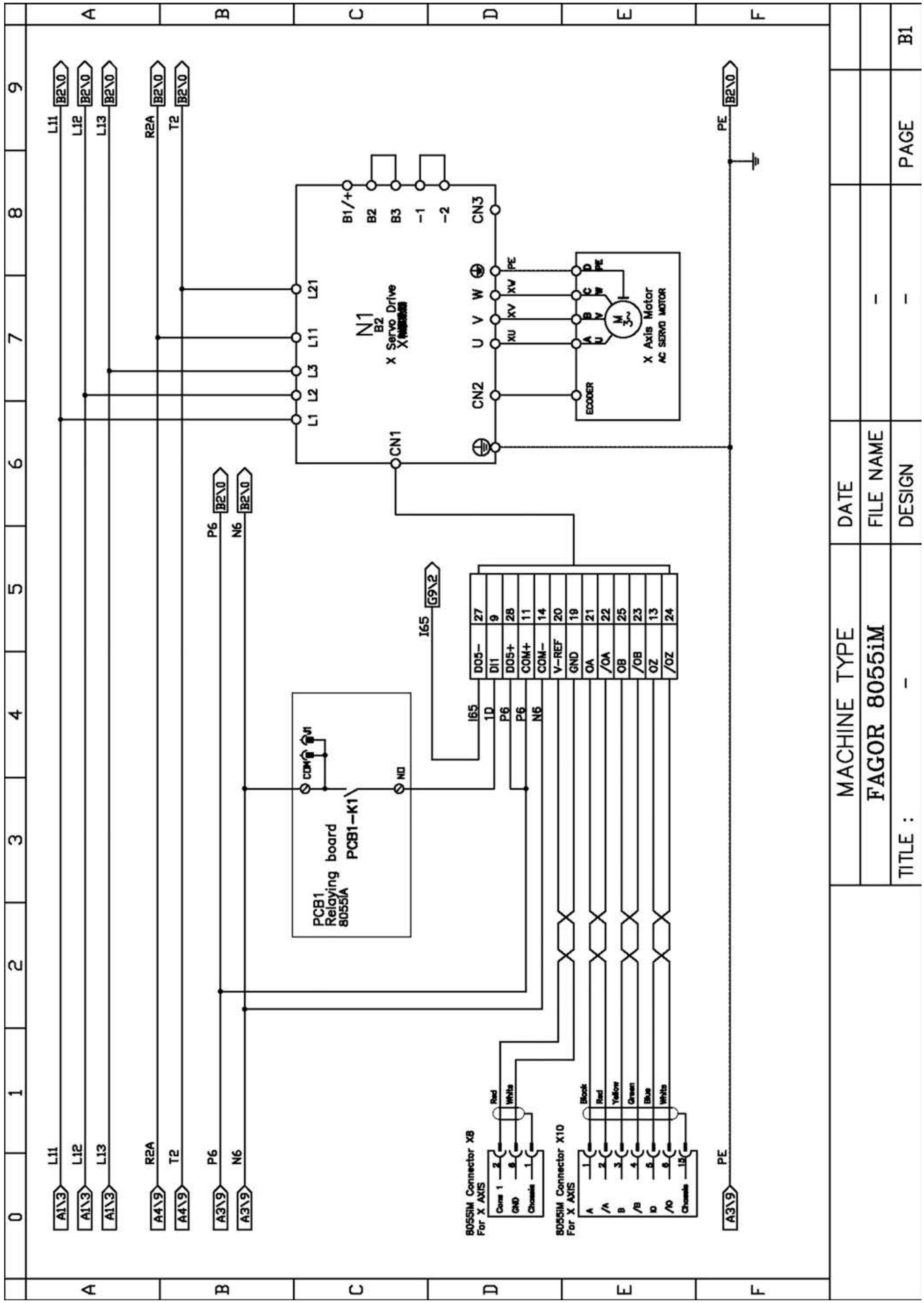
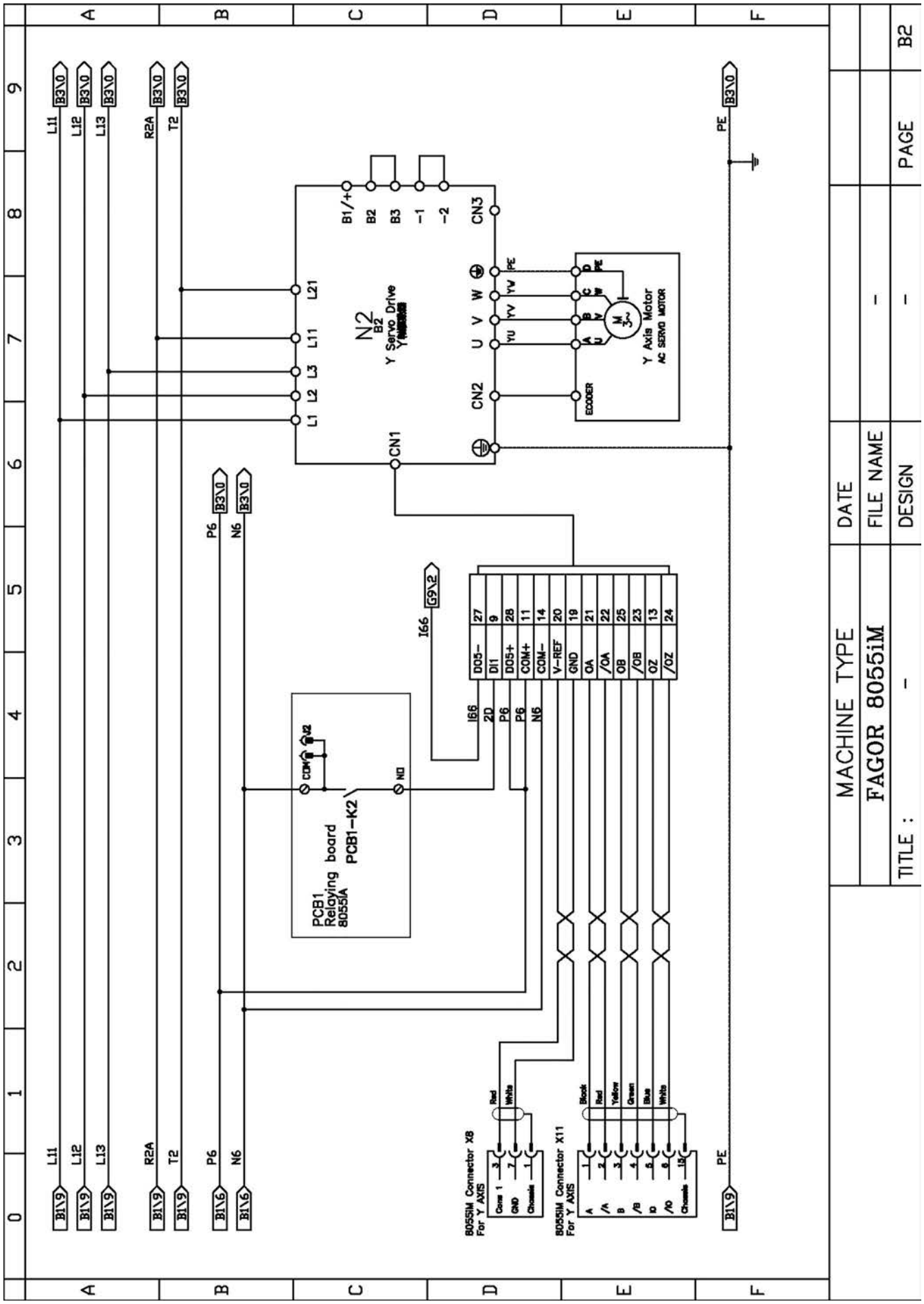
M11 Operation Box Fan
M10 Electrical Box Fan
M9 Electrical Box Fan
KR1
PW1 NES-100-24 4.5A MAX
FU6
Fagor 8055iM CNC Power
R2A
T2
B1\0
B1
PE
A1\4
A3\9
E1\3
E1\0


X Servo Drive
X Axis Motor
AC SERVO MOTOR
PCB1
Relaying board
8055IA
PCB1-K1
8055iM Connector X8
For X AXIS
8055iM Connector X10
For X AXIS
MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
B1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DATE
FILE NAME
DESIGN
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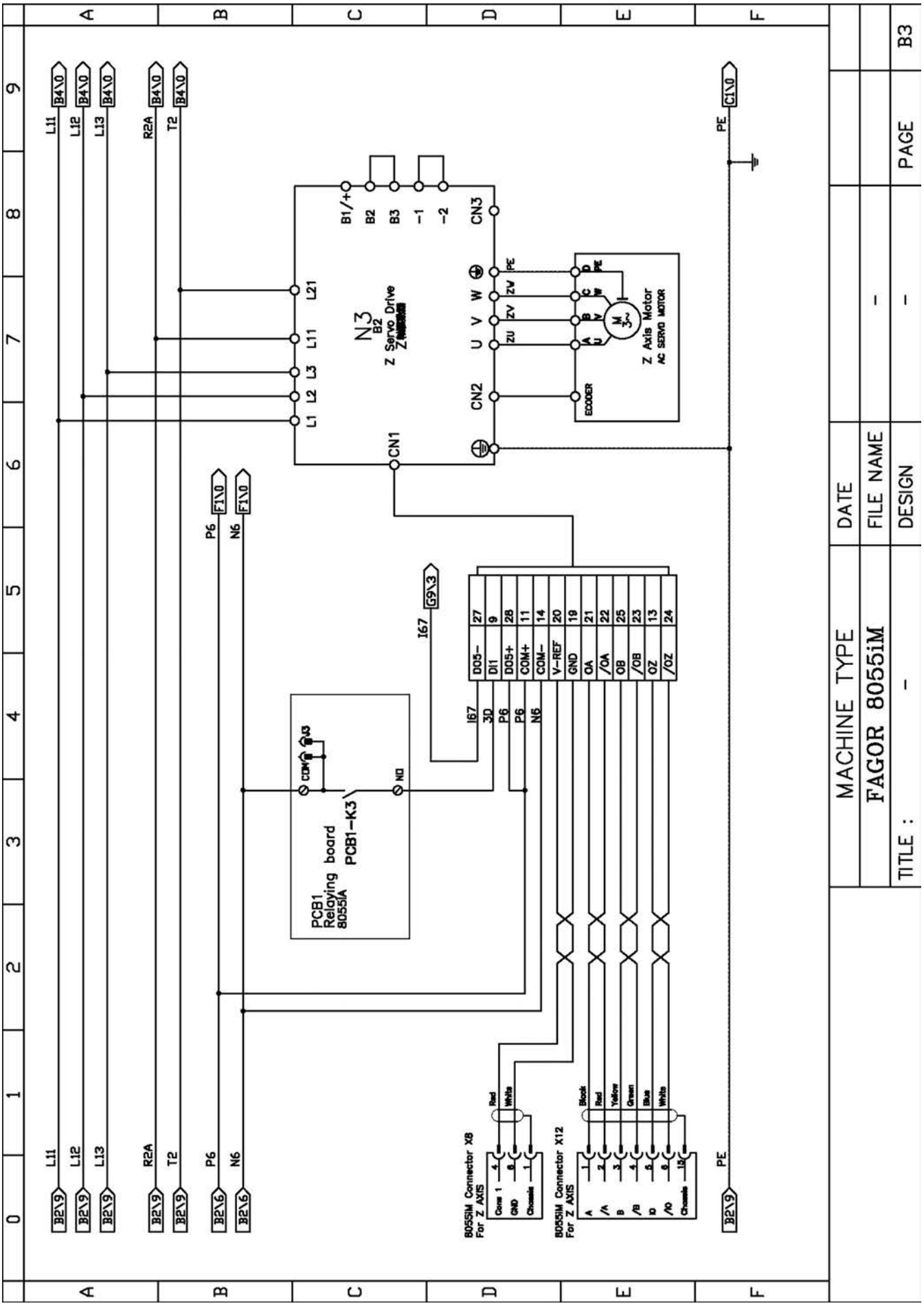
B2
N2
Y Servo Drive
Y Axis Motor
AC SERVO MOTOR
ENCODER
CN1
CN2
CN3
PCB1
Relaying board
8055iA
PCB1-K2
8055iM Connector X8
For Y AXIS
8055iM Connector X11
For Y AXIS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DATE
FILE NAME
DESIGN
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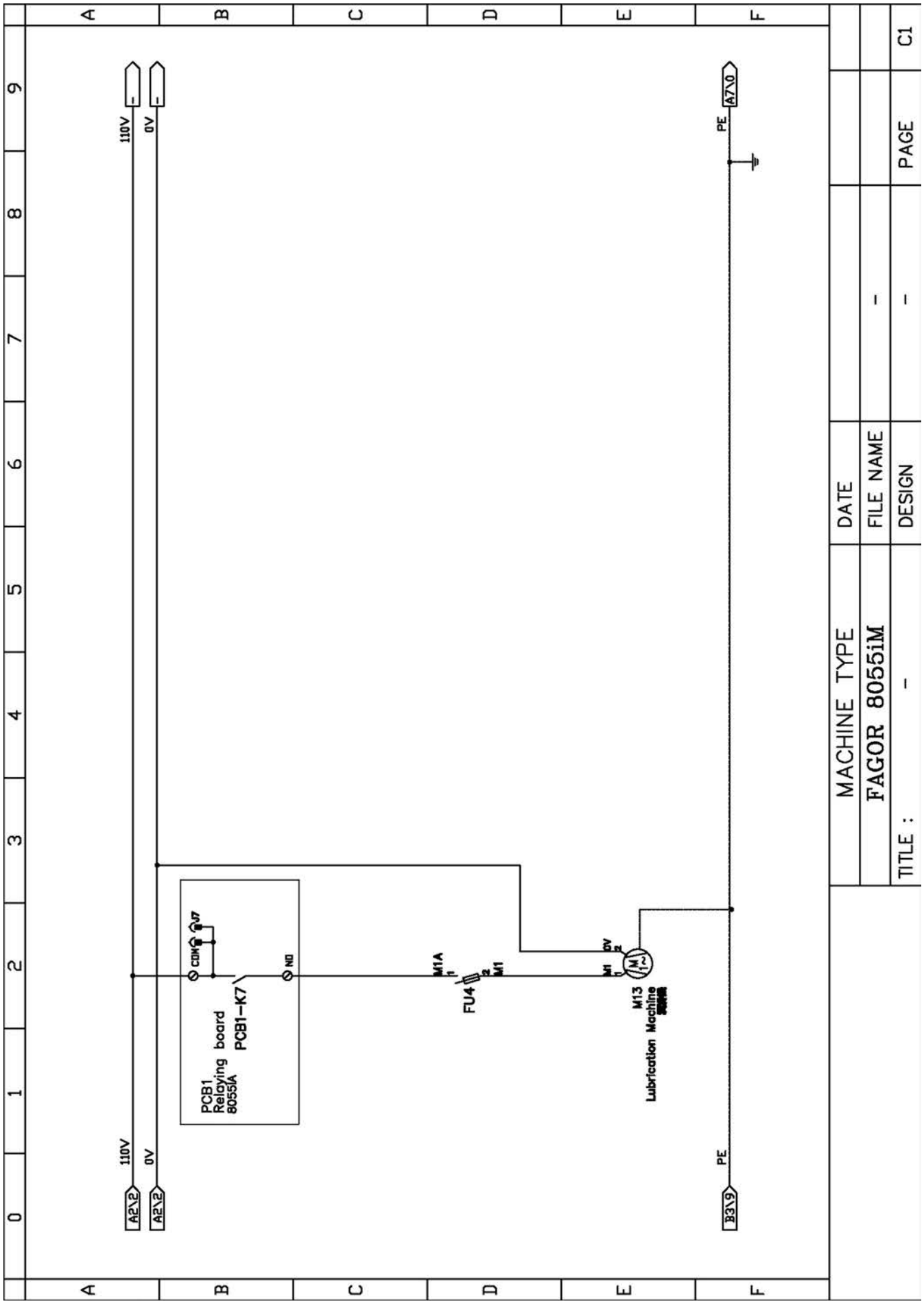
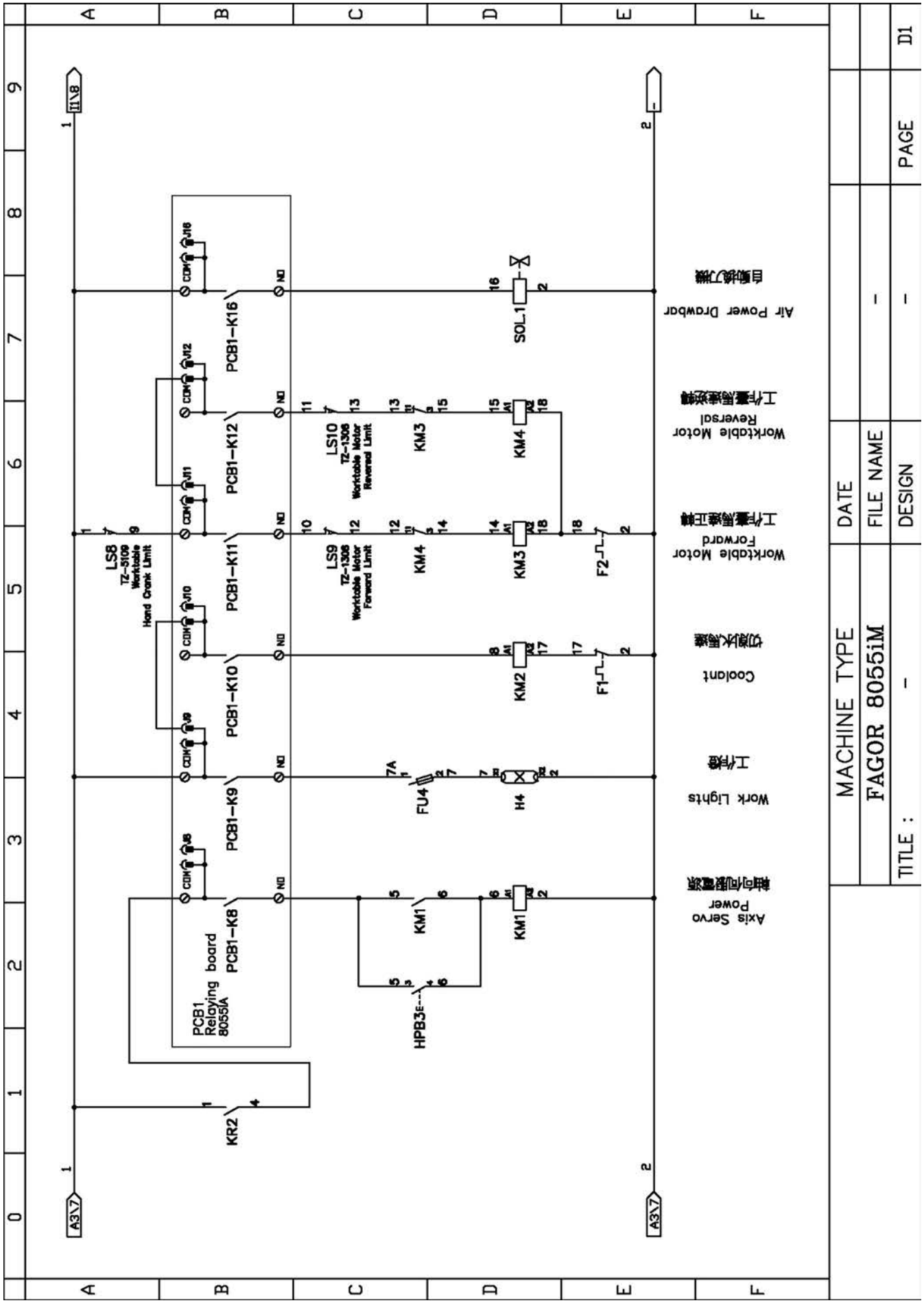
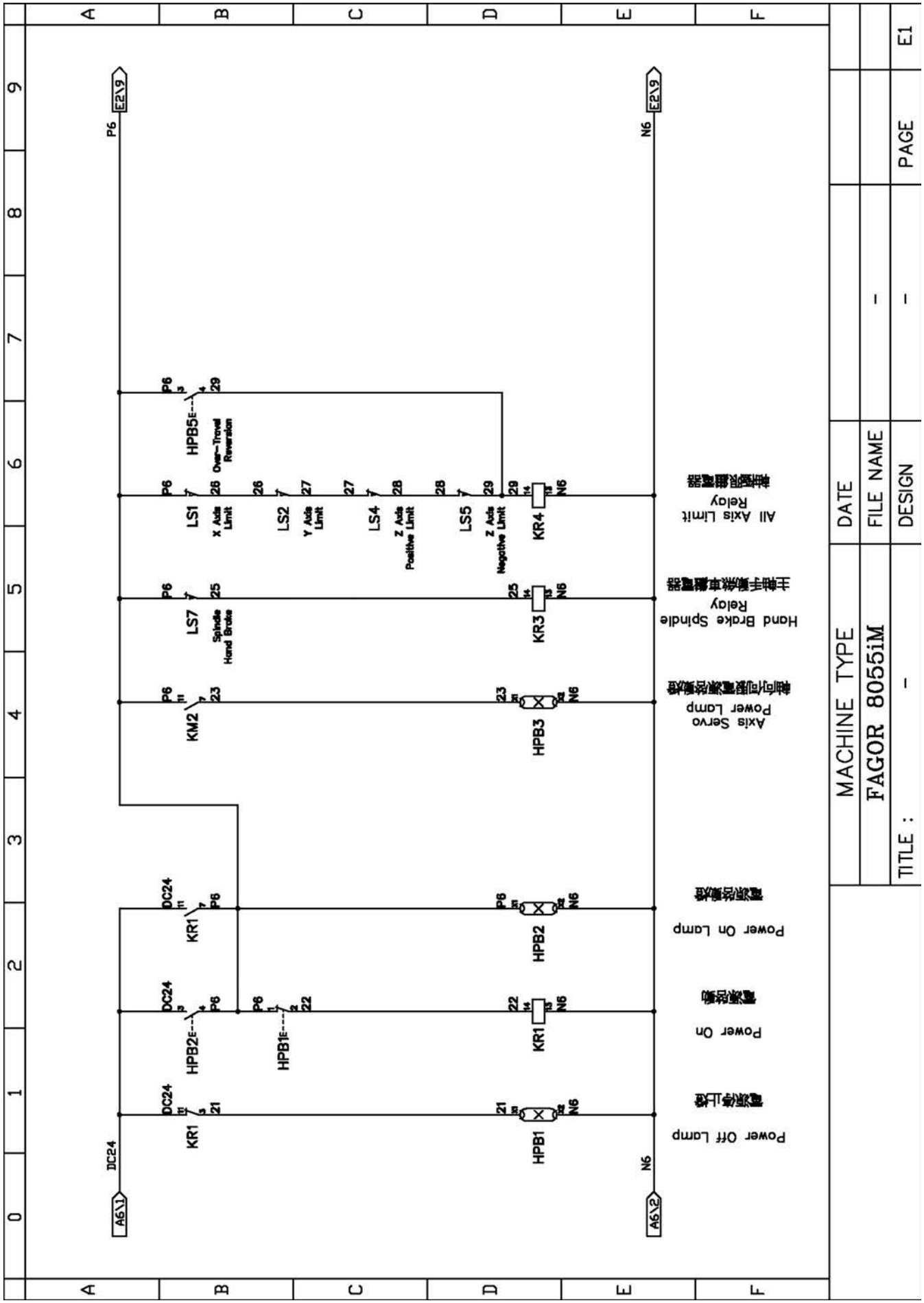
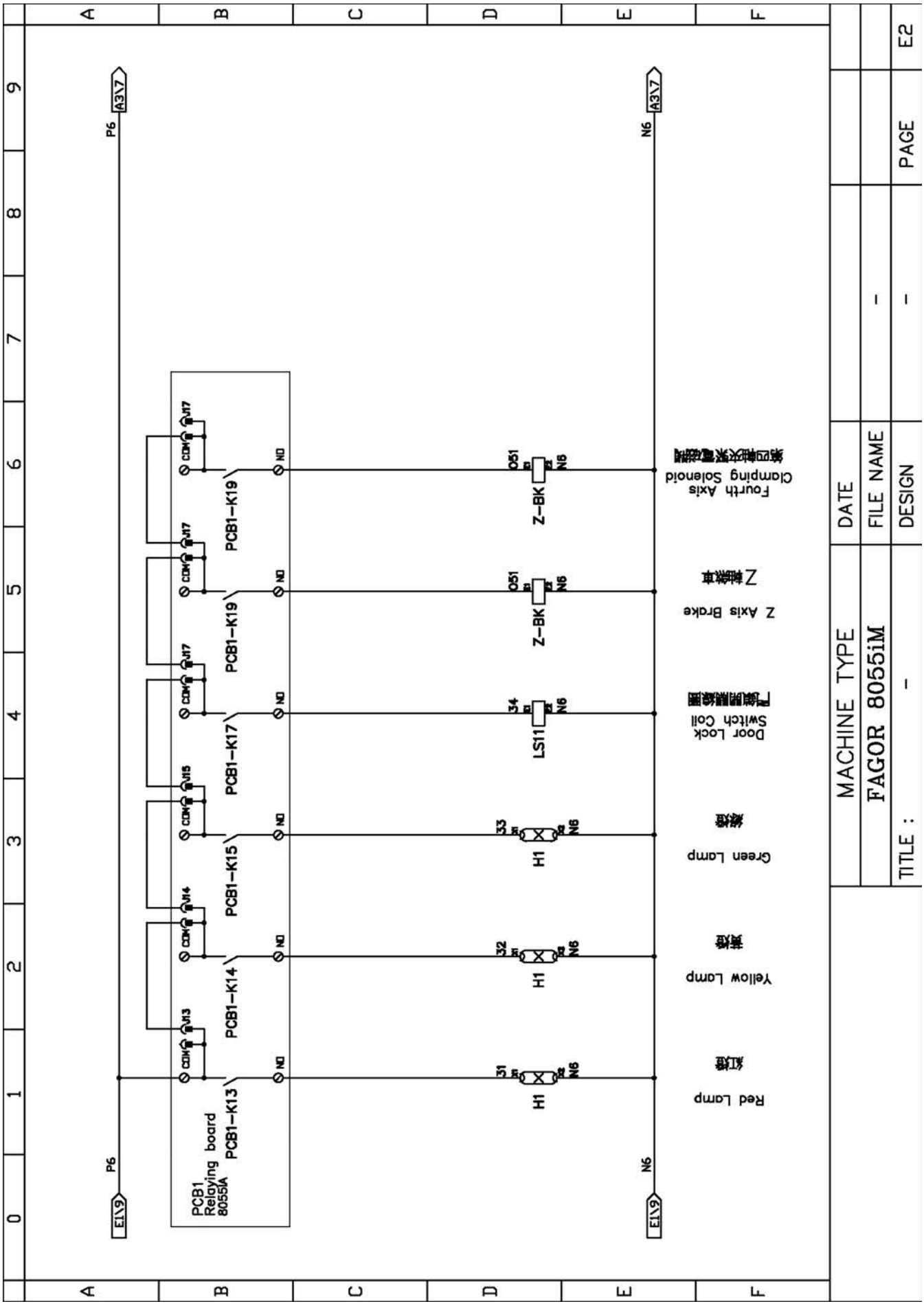
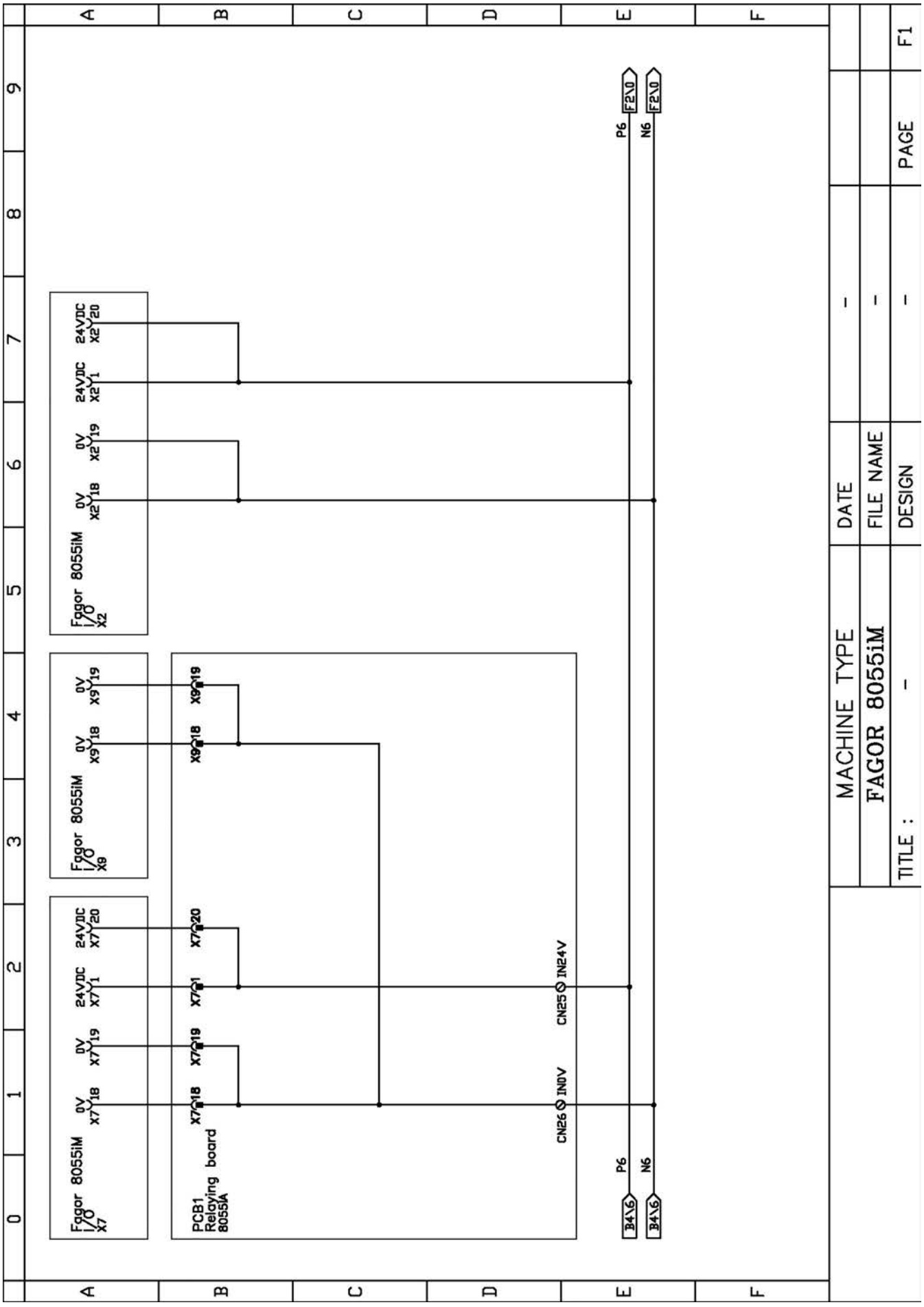
B3
Z Axis Motor
AC SERVO MOTOR
Z Servo Drive
PCB1 Relaying board 8055iA
PCB1-K3
8055iM Connector X8 For Z AXIS
8055iM Connector X12 For Z AXIS

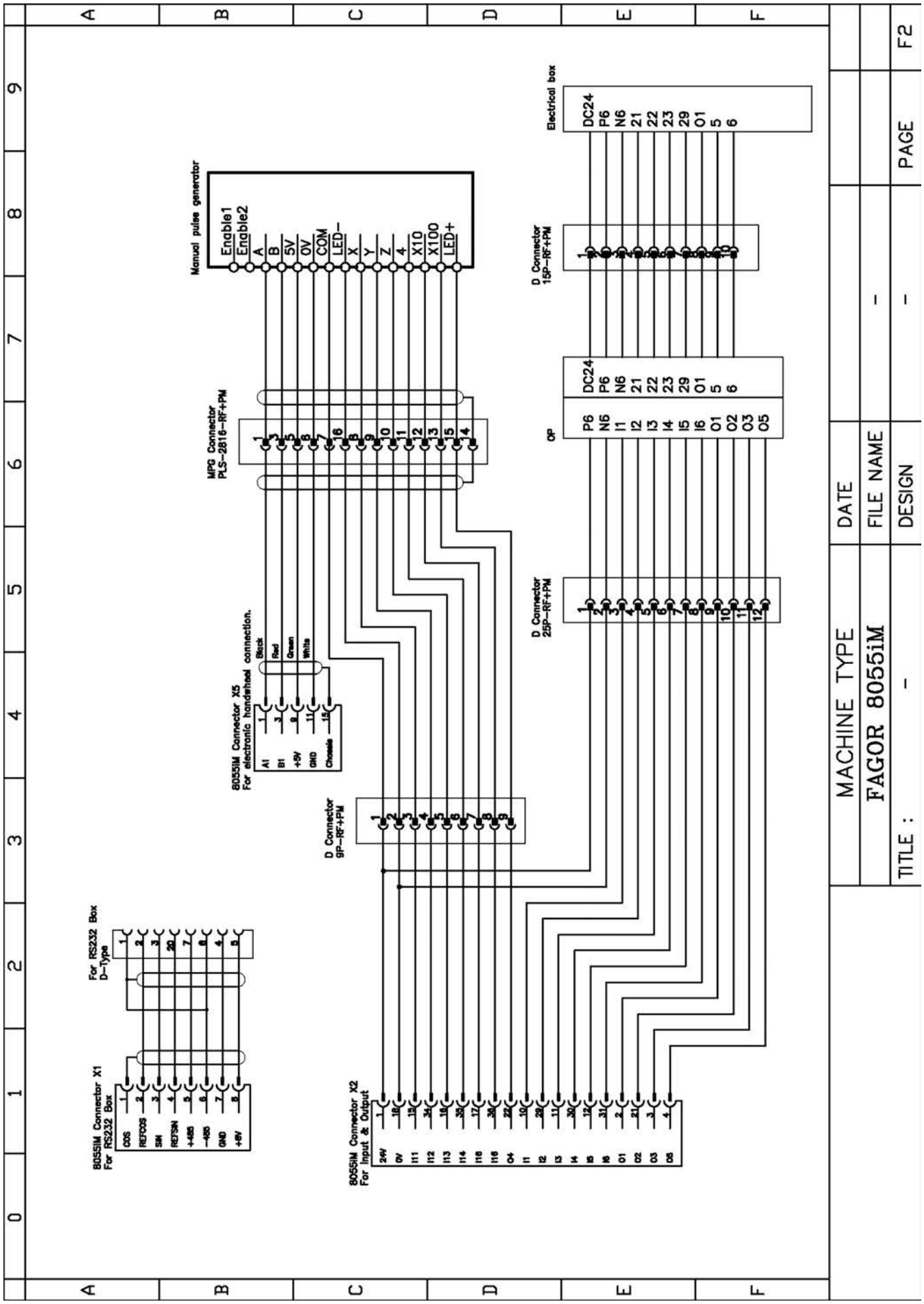

110V
0V
PE
A7\0
A2\2
B3\9
PCB1
Relaying board
8055A
PCB1-K7
COM
NO
M1A
FU4
M1
M13
Lubrication Machine
MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
C1

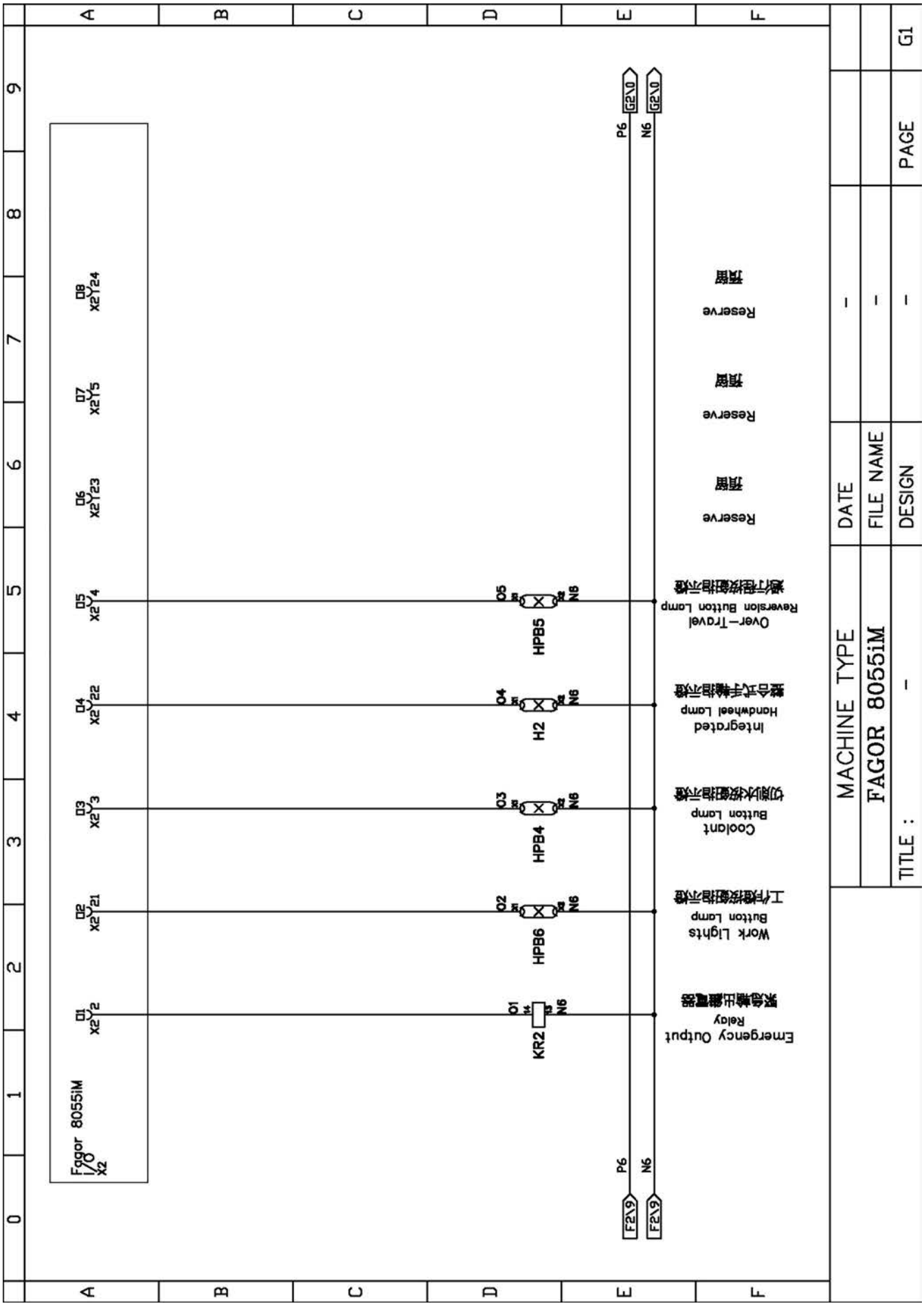

MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
D1
Air Power Drawbar
Worktable Motor Reversal
Worktable Motor Forward
Coolant
Work Lights
Axis Servo Power
PCB1 Relaying board 8055iA
PCB1-K16
PCB1-K12
PCB1-K11
PCB1-K10
PCB1-K9
PCB1-K8
SOL1
KM1
KM2
KM3
KM4
H4
FU4
KR2
HPB3
LS8 TZ-5109 Worktable Hand Crank Limit
LS9 TZ-1306 Worktable Motor Forward Limit
LS10 TZ-1306 Worktable Motor Reversal Limit
F1
F2
A3V7
A1V8

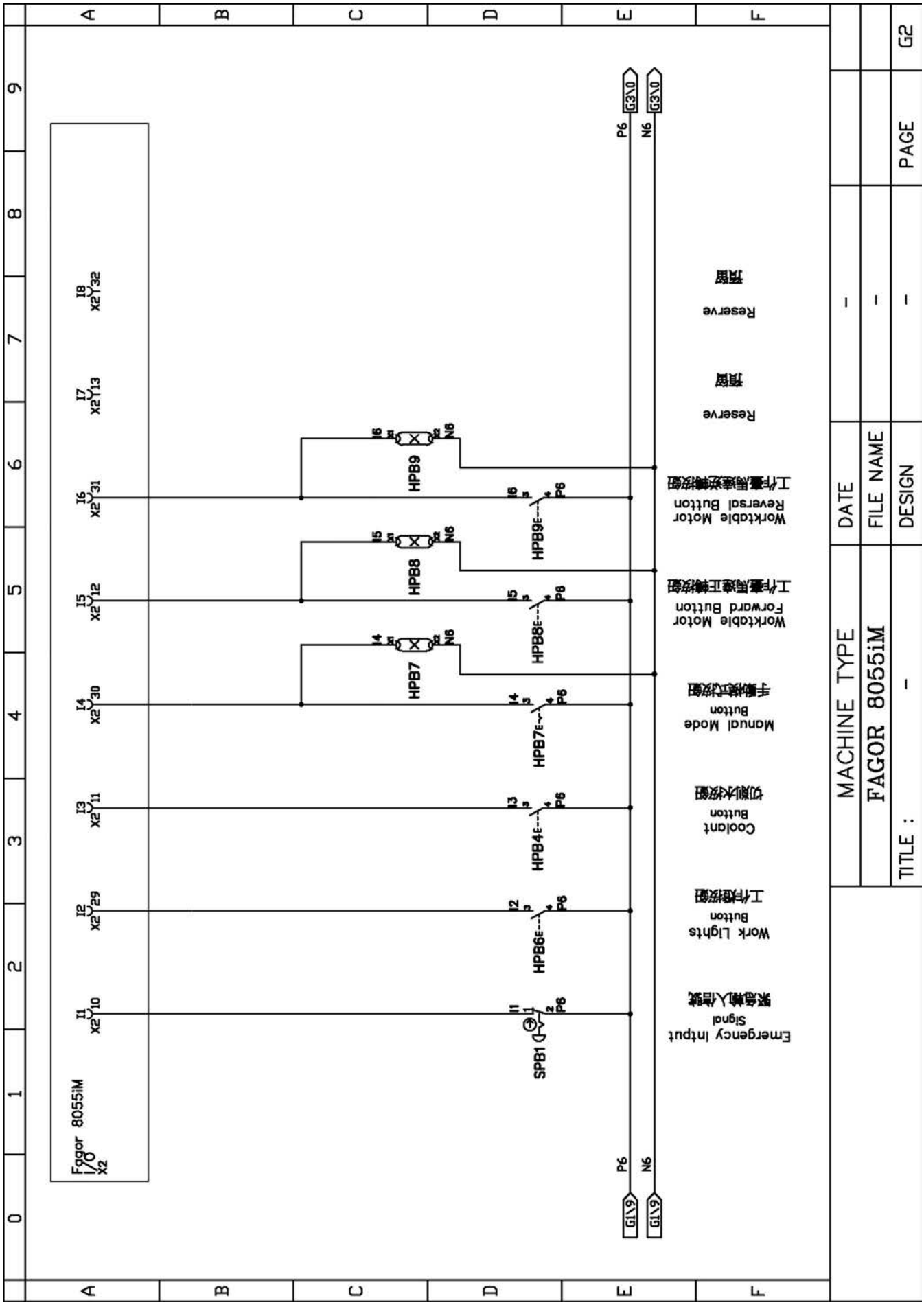

A6\1
A6\2
E2\9
E2\9
DC24
P6
N6
HPB5
Over-Travel Reversion
LS1
X Axis Limit
LS2
Y Axis Limit
LS4
Z Axis Positive Limit
LS5
Z Axis Negative Limit
KR4
All Axis Limit Relay
LS7
Spindle Hand Brake
KR3
Hand Brake Spindle Relay
KM2
HPB3
Axis Servo Power Lamp
KR1
HPB2
Power On Lamp
HPB2
HPB1
KR1
Power On
KR1
HPB1
Power Off Lamp
MACHINE TYPE
FAGOR 8055iM
TITLE : -
DATE
FILE NAME -
DESIGN -
PAGE -
E1

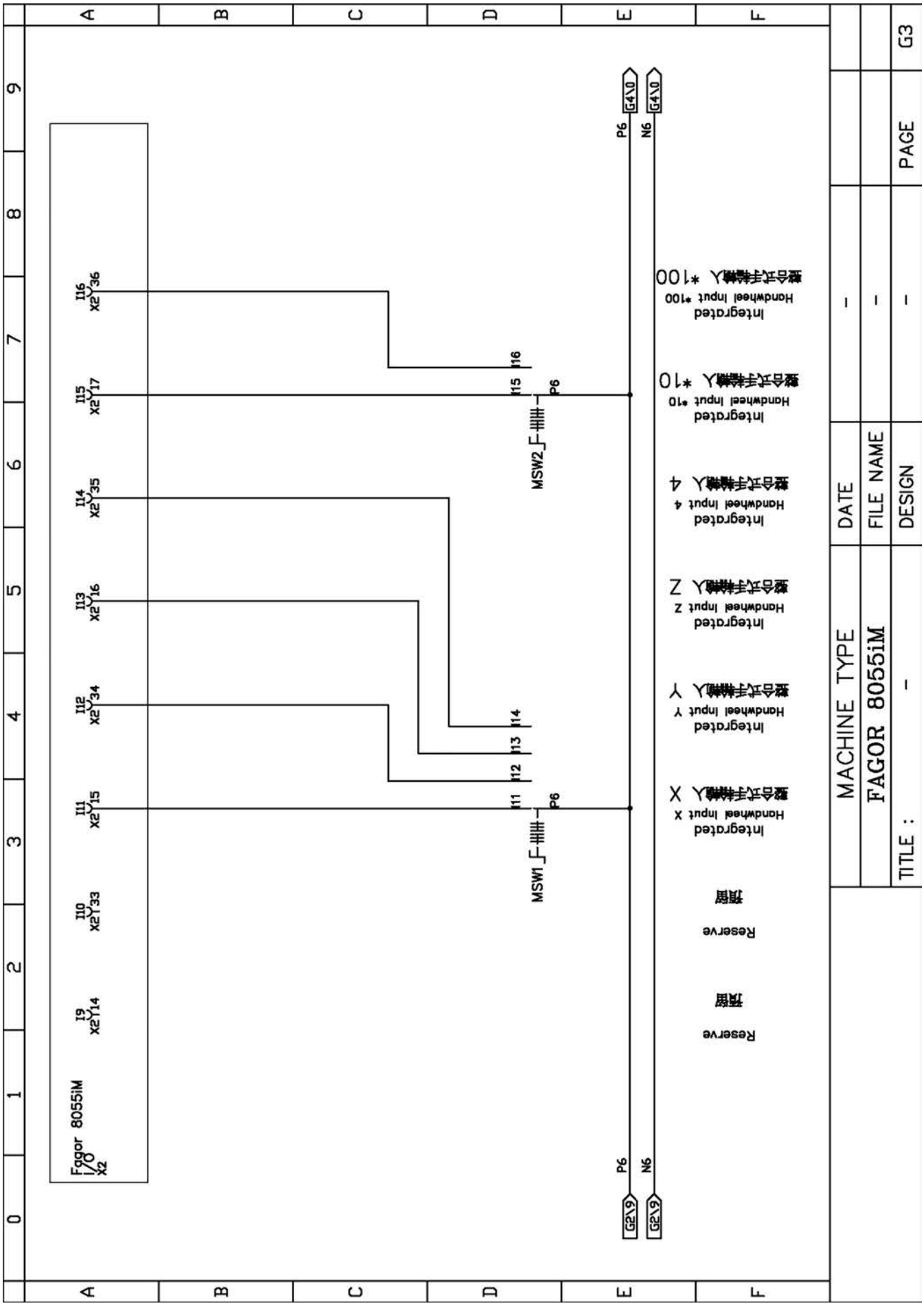

A3\7
P6
N6
E1\9
PCB1
Relaying board
8055iA
PCB1-K13
PCB1-K14
PCB1-K15
PCB1-K17
PCB1-K19
J13
J14
J15
J17
COM
NO
H1
LS11
Z-BK
31
32
33
34
051
Red Lamp
Yellow Lamp
Green Lamp
Door Lock Switch Coil
Z Axis Brake
Fourth Axis Clamping Solenoid
MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
E2

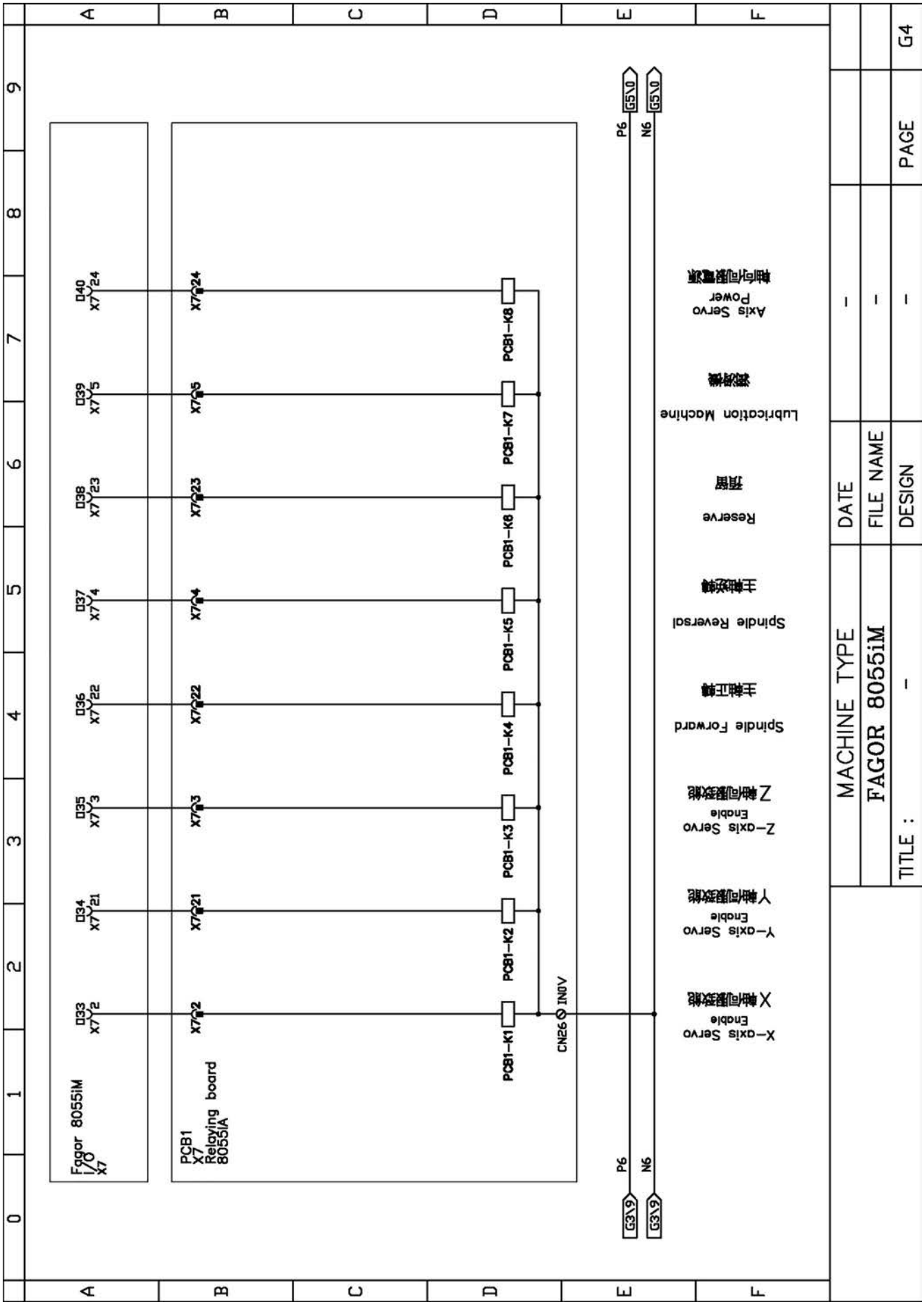

Fagor 8055iM I/O X7
0V X7 18
0V X7 19
24VDC X7 1
24VDC X7 20
Fagor 8055iM I/O X9
0V X9 18
0V X9 19
Fagor 8055iM I/O X2
0V X2 18
0V X2 19
24VDC X2 1
24VDC X2 20
PCB1 Relaying board 8055A
X7 18
X7 19
X7 1
X7 20
X9 18
X9 19
CN26 IN0V
CN25 IN24V
P6
N6
F2\0
F2\0
B4\6
B4\6
MACHINE TYPE
FAGOR 8055iM
TITLE : -
DATE -
FILE NAME -
DESIGN -
PAGE F1

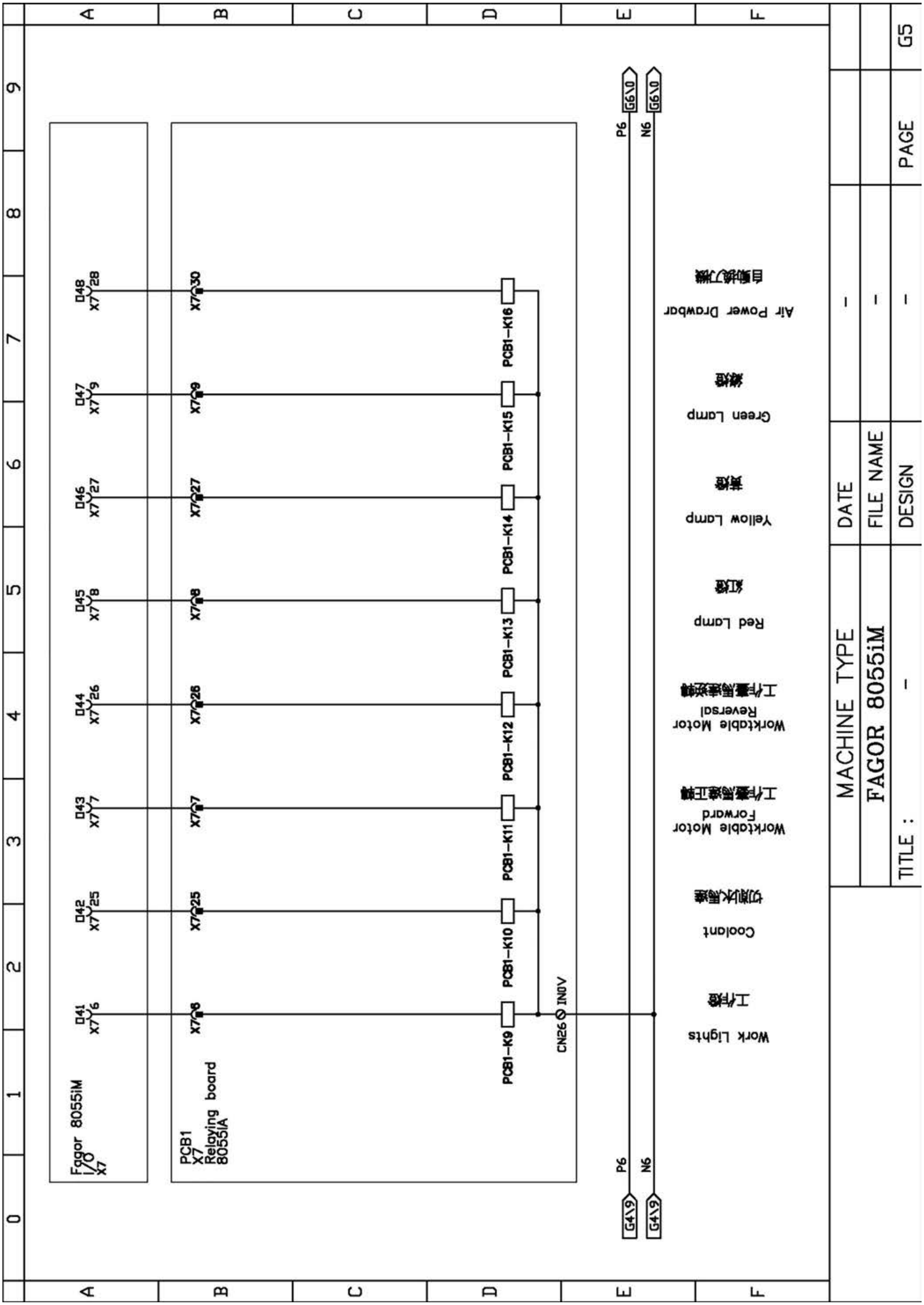

Manual pulse generator
Enable1
Enable2
A
B
5V
0V
COM
LED−
X
Y
Z
4
X10
X100
LED+
MPG Connector
PLS−2816−RF+PM
80551M Connector X5
For electronic handwheel connection.
Black
Red
Green
White
A1
B1
+5V
GND
Chassis
D Connector
9P−RF+PM
80551M Connector X2
For Input & Output
24V
0V
I11
I12
I13
I14
I15
I16
I17
I18
I1
I2
I3
I4
I5
I6
O1
O2
O3
O5
D Connector
25P−RF+PM
OP
P6
N6
I1
I2
I3
I4
I5
I6
O1
O2
O3
O5
Electrical box
DC24
P6
N6
21
22
23
29
O1
5
6
D Connector
15P−RF+PM
For RS232 Box
D−Type
80551M Connector X1
For RS232 Box
CDS
REFCOS
SIN
REFSIN
+485
−485
GND
+5V
MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
F2

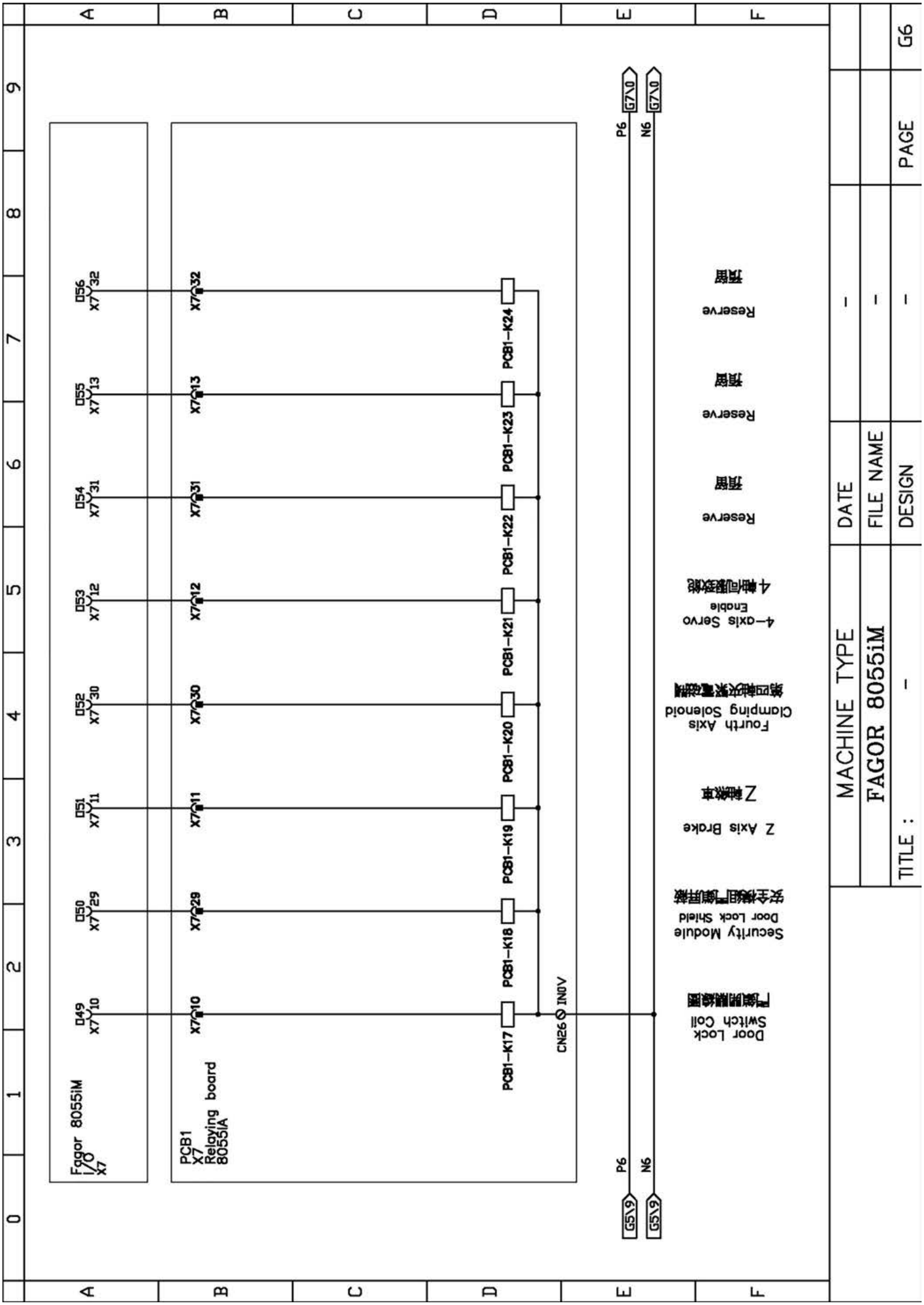

Fagor 8055iM
I/O
X2
X2Y2
X2Y21
X2Y3
X2Y22
X2Y4
X2Y23
X2Y5
X2Y24
KR2
HPB6
HPB4
H2
HPB5
Emergency Output
Relay
Work Lights
Button Lamp
Coolant
Button Lamp
Integrated
Handwheel Lamp
Over-Travel
Reversion Button Lamp
Reserve
Reserve
Reserve
P6
N6
G2\0
F2\9
MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
G1

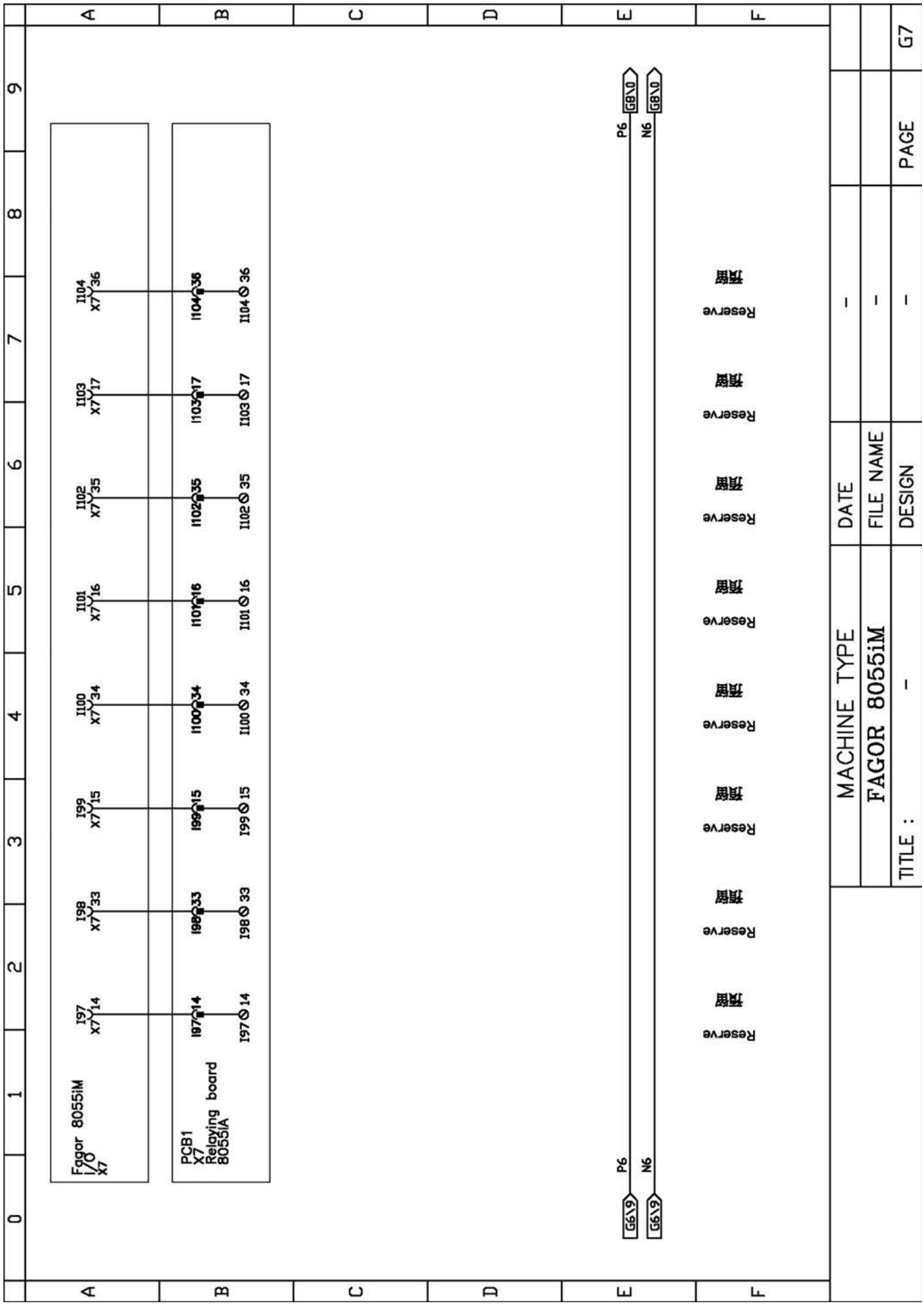

Fagor 8055iM I/O X2
I1 X2 Y10
I2 X2 Y29
I3 X2 Y11
I4 X2 Y30
I5 X2 Y12
I6 X2 Y31
I7 X2 Y13
I8 X2 Y32
SPB1
HPB6
HPB4
HPB7
HPB8
HPB9
Emergency Intput Signal
Work Lights Button
Coolant Button
Manual Mode Button
Worktable Motor Forward Button
Worktable Motor Reversal Button
Reserve
Reserve
G1\9
G3\0
P6
N6
MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
G2

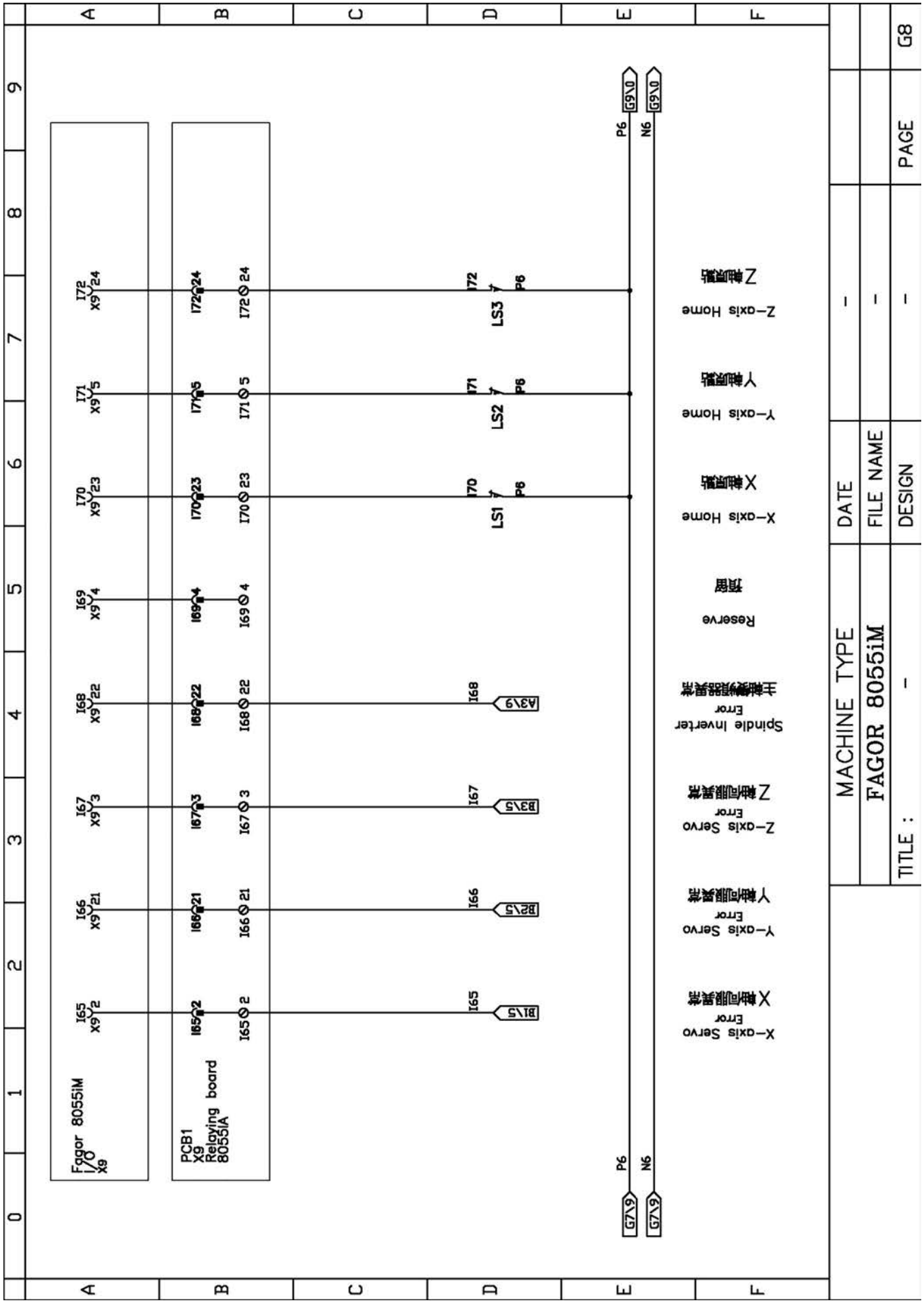

Fagor 8055iM
I/O
X2
I9 X2 Y14
I10 X2 Y33
I11 X2 Y15
I12 X2 Y34
I13 X2 Y16
I14 X2 Y35
I15 X2 Y17
I16 X2 Y36
MSW1
MSW2
P6
N6
G2\9
G4\0
Reserve
預留
Integrated Handwheel Input X
整合式手輪輸入 X
Integrated Handwheel Input Y
整合式手輪輸入 Y
Integrated Handwheel Input Z
整合式手輪輸入 Z
Integrated Handwheel Input 4
整合式手輪輸入 4
Integrated Handwheel Input *10
整合式手輪輸入 *10
Integrated Handwheel Input *100
整合式手輪輸入 *100
MACHINE TYPE
FAGOR 8055iM
DATE
FILE NAME
DESIGN
TITLE :
PAGE
G3

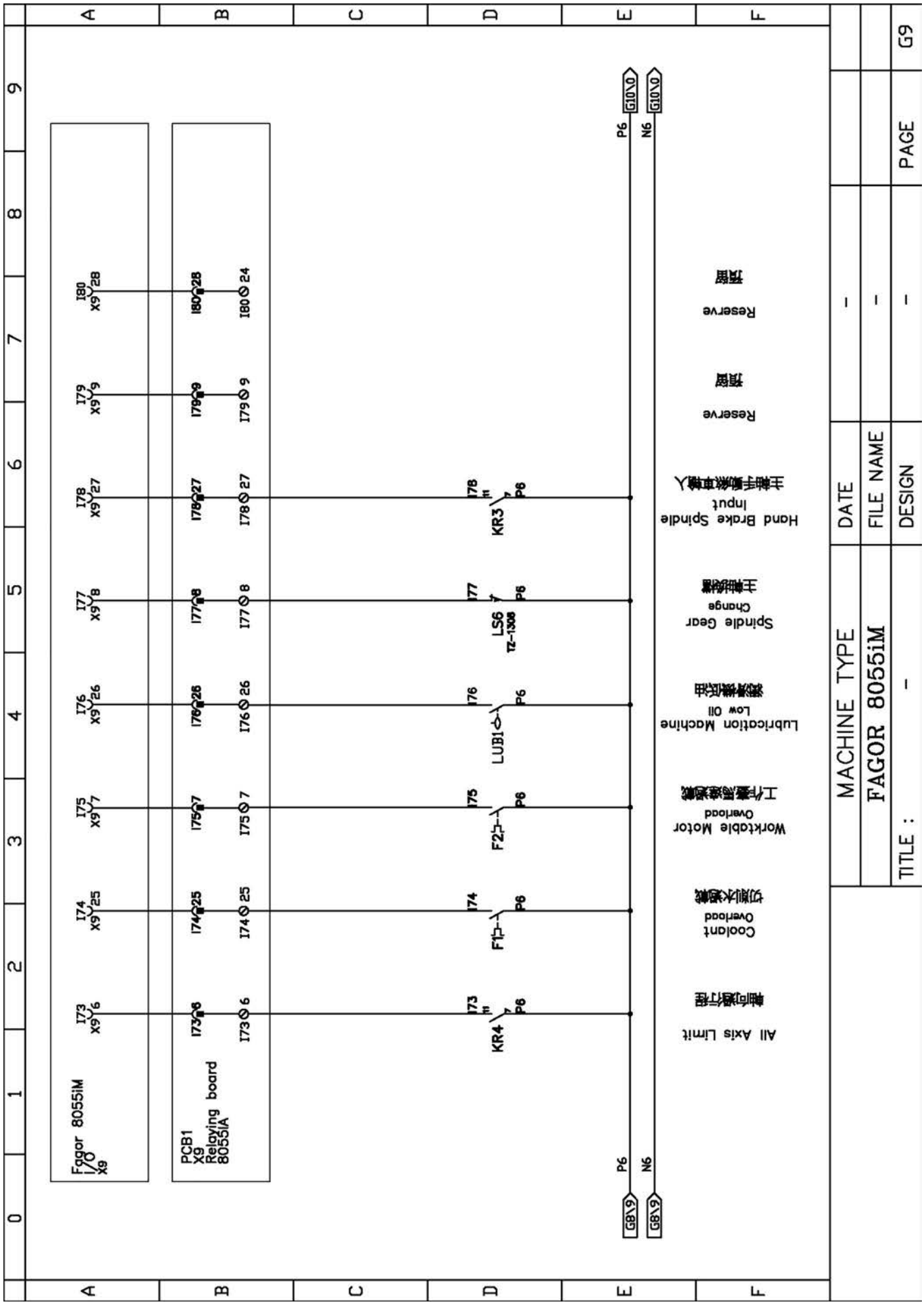

Fagor 8055iM
I/O
X7
PCB1
X7
Relaying board
8055iA
X7
X7
X7
X7
X7
X7
X7
X7
PCB1-K1
PCB1-K2
PCB1-K3
PCB1-K4
PCB1-K5
PCB1-K6
PCB1-K7
PCB1-K8
CN26
IN0V
P6
N6
G3\9
G5\0
X-axis Servo Enable
Y-axis Servo Enable
Z-axis Servo Enable
Spindle Forward
Spindle Reversal
Reserve
Lubrication Machine
Axis Servo Power
MACHINE TYPE
FAGOR 8055iM
DATE
FILE NAME
DESIGN
PAGE
TITLE :
G4

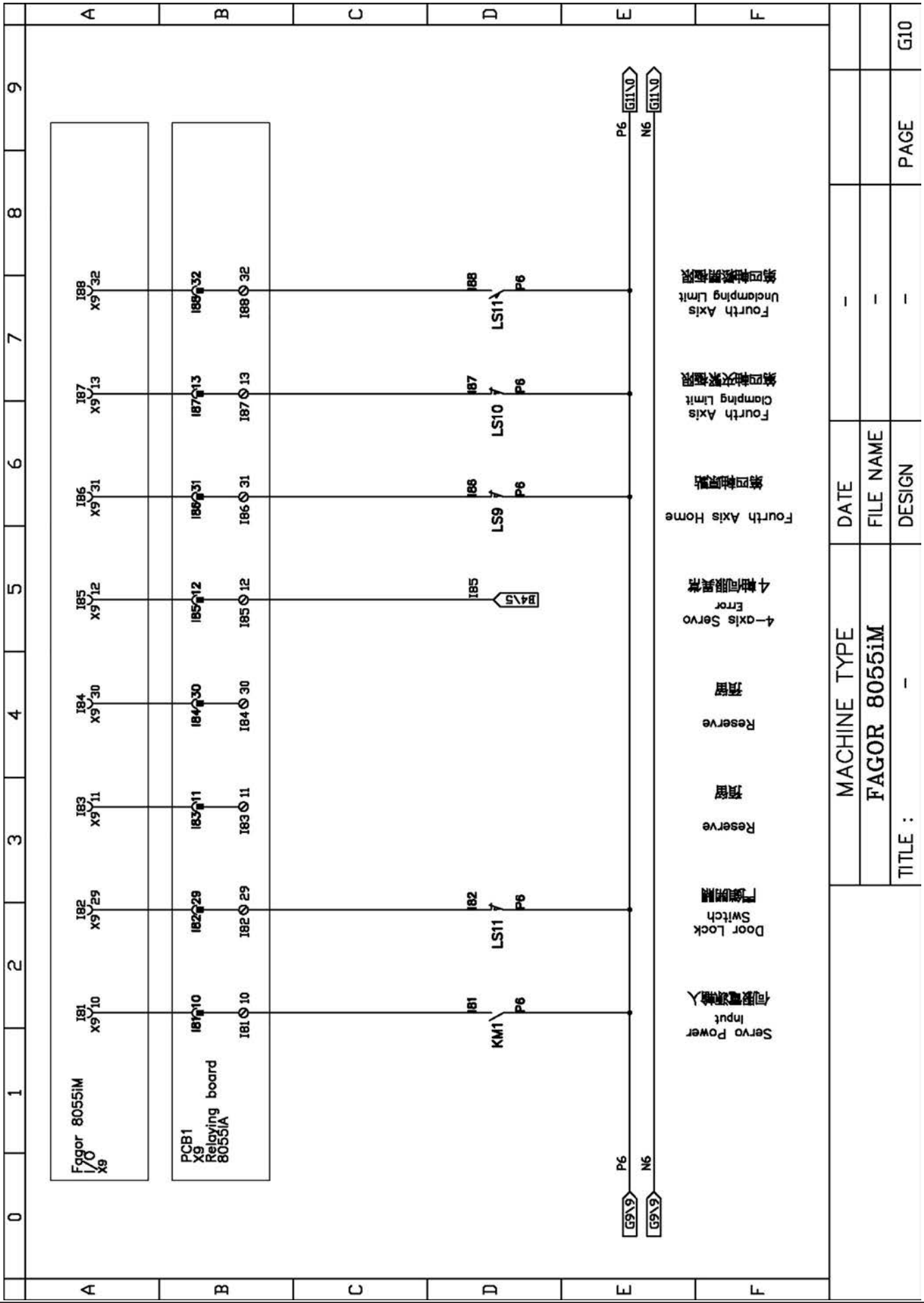

Fagor 8055iM
I/O
X7
PCB1
X7
Relaying board
8055iA
O41 X7 6
O42 X7 25
O43 X7 7
O44 X7 26
O45 X7 8
O46 X7 27
O47 X7 9
O48 X7 28
PCB1-K9
PCB1-K10
PCB1-K11
PCB1-K12
PCB1-K13
PCB1-K14
PCB1-K15
PCB1-K16
CN26 IN0V
P6
N6
G4\9
G6\0
Work Lights
Coolant
Worktable Motor Forward
Worktable Motor Reversal
Red Lamp
Yellow Lamp
Green Lamp
Air Power Drawbar
MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
G5

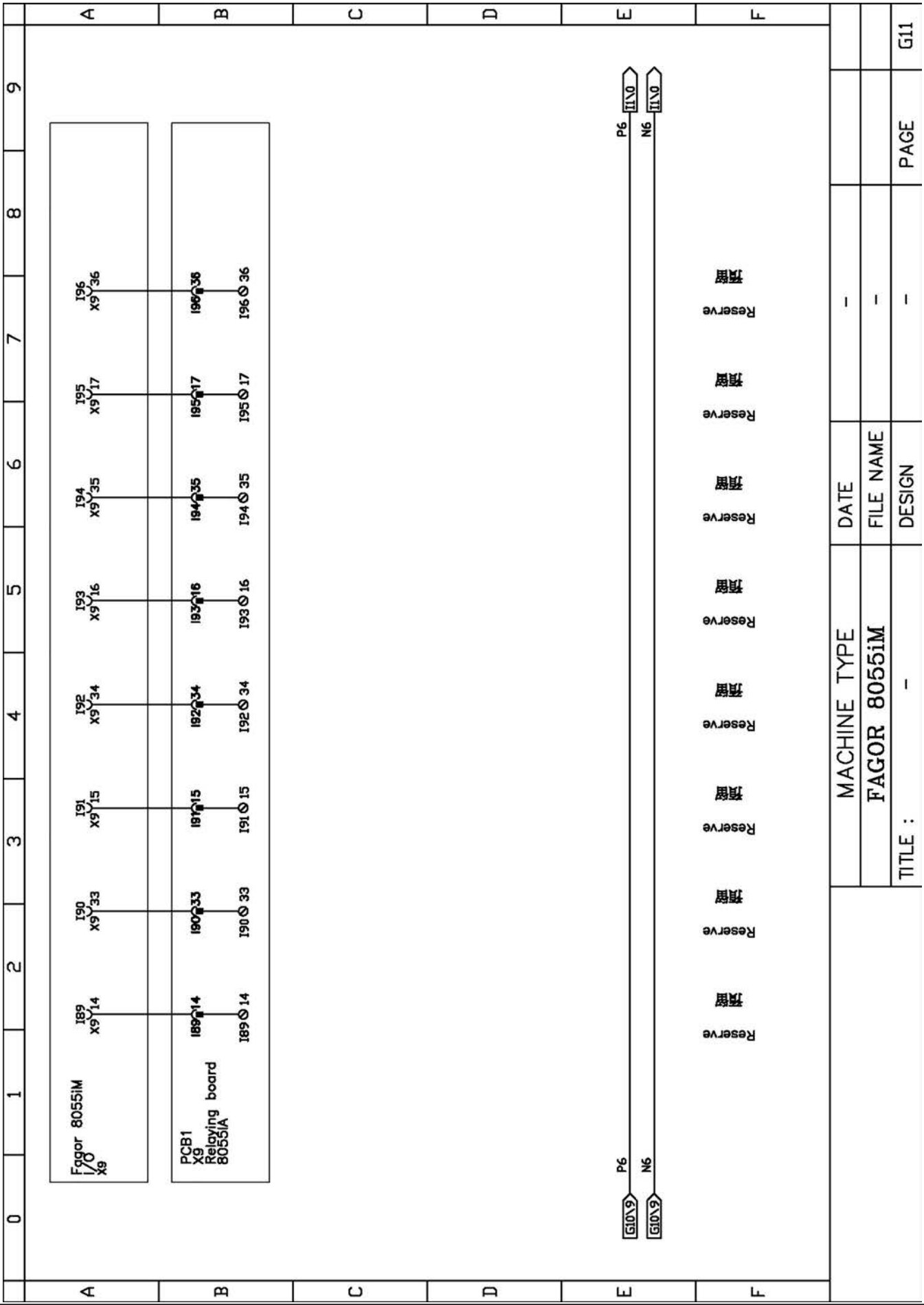

Fagor 8055iM
I/O
X7
PCB1
X7
Relaying board
8055IA
D49 X7 10
D50 X7 29
D51 X7 11
D52 X7 30
D53 X7 12
D54 X7 31
D55 X7 13
D56 X7 32
PCB1-K17
PCB1-K18
PCB1-K19
PCB1-K20
PCB1-K21
PCB1-K22
PCB1-K23
PCB1-K24
CN26 IN0V
P6
N6
G5\9
G7\0
Door Lock Switch Coil
Security Module Door Lock Shield
Z Axis Brake
Fourth Axis Clamping Solenoid
4-axis Servo Enable
Reserve
Reserve
Reserve
MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
G6


Fagor 8055iM
I/O
X7
I97 X7 14
I98 X7 33
I99 X7 15
I100 X7 34
I101 X7 16
I102 X7 35
I103 X7 17
I104 X7 36
PCB1
X7
Relaying board
8055iA
I97 14
I98 33
I99 15
I100 34
I101 16
I102 35
I103 17
I104 36
P6
N6
G8\0
G8\0
G6\9
G6\9
Reserve
MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
G7

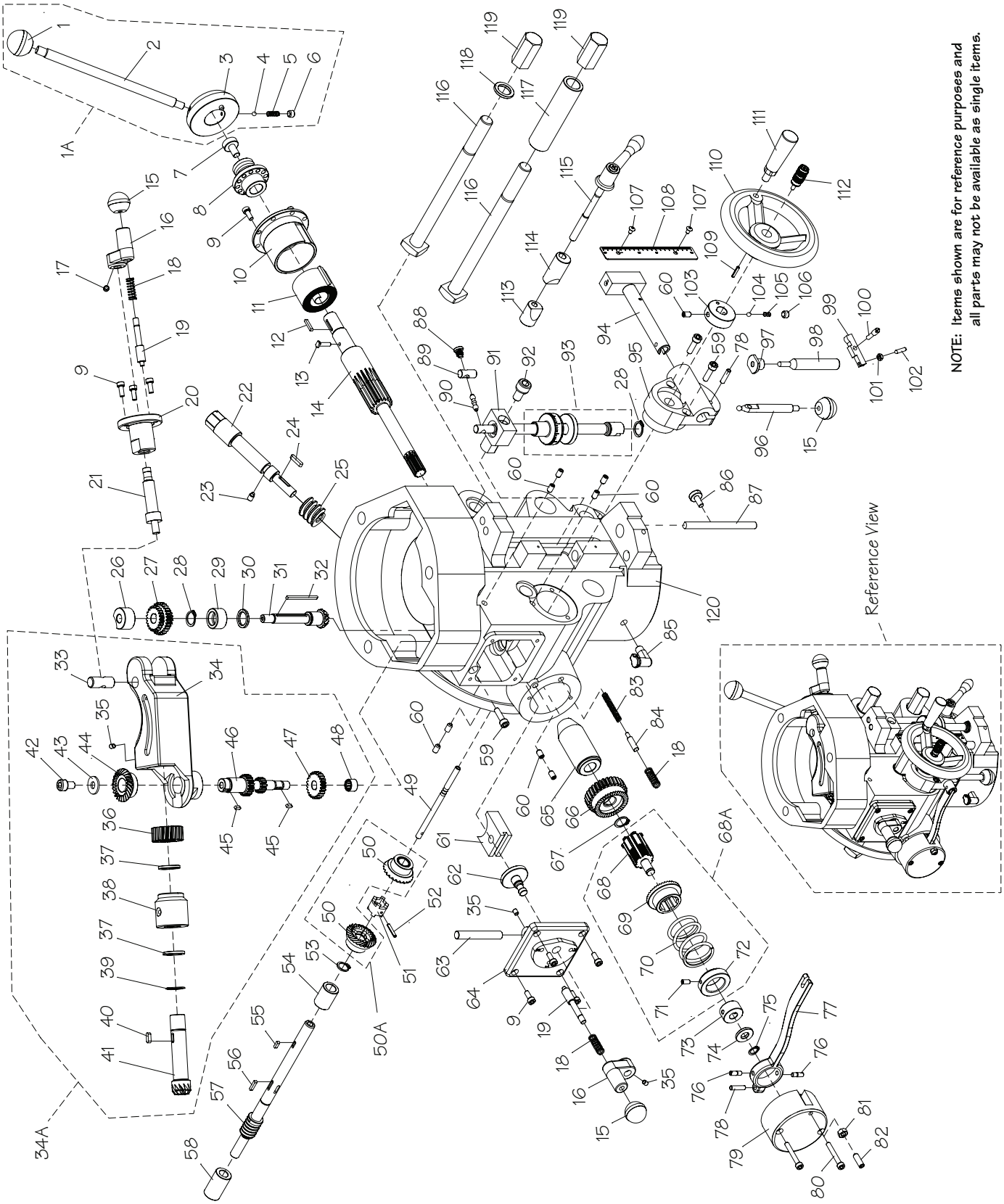

Fagor 8055iM
I/O
X9
PCB1
X9
Relaying board
8055iA
X-axis Servo Error
Y-axis Servo Error
Z-axis Servo Error
Spindle inverter Error
Reserve
X-axis Home
Y-axis Home
Z-axis Home
LS1
LS2
LS3
MACHINE TYPE
FAGOR 8055iM
DATE
FILE NAME
DESIGN
PAGE
TITLE :


All Axis Limit
Coolant Overload
Worktable Motor Overload
Lubrication Machine Low Oil
Spindle Gear Change
Hand Brake Spindle Input
Reserve
Reserve
Fagor 8055iM I/O X9
PCB1 X9 Relaying board 8055iA
KR4
F1
F2
LUB1
LS6
KR3
MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
G9


Fagor 8055iM
I/O
X9
PCB1
X9
Relaying board
8055iA
I81 X9 10
I82 X9 29
I83 X9 11
I84 X9 30
I85 X9 12
I86 X9 31
I87 X9 13
I88 X9 32
I81 10
I82 29
I83 11
I84 30
I85 12
I86 31
I87 13
I88 32
KM1
LS11
LS10
LS9
LS11
P6
N6
G11\0
G9\9
Servo Power Input
伺服電源輸入
Door Lock Switch
門鎖開關
Reserve
預留
Reserve
預留
4-axis Servo Error
4軸伺服異常
Fourth Axis Home
第四軸原點
Fourth Axis Clamping Limit
第四軸夾緊極限
Fourth Axis Unclamping Limit
第四軸鬆開極限
MACHINE TYPE
FAGOR 8055iM
TITLE :
DATE
FILE NAME
DESIGN
PAGE
G10


Fagor 8055iM
I/O
X9
I89 X9 14
I90 X9 33
I91 X9 15
I92 X9 34
I93 X9 16
I94 X9 35
I95 X9 17
I96 X9 36
PCB1
X9
Relaying board
8055iA
I89 14
I90 33
I91 15
I92 34
I93 16
I94 35
I95 17
I96 36
P6
N6
G10\9
G10\9
P6
N6
0\11
0\11
Reserve
Reserve
Reserve
Reserve
Reserve
Reserve
Reserve
Reserve
MACHINE TYPE
FAGOR 8055iM
TITLE : -
DATE -
FILE NAME -
DESIGN -
PAGE -
G11

Headstock


NOTE: Items shown are for reference purposes and all parts may not be available as single items.
Reference View

Headstock Parts List

REF	PART #	DESCRIPTION
1A	PSB10630001A	LEVER HANDLE AND HUB ASSEMBLY
1	PSB10630001	BALL KNOB 3/8-16
2	PSB10630002	LEVER HANDLE
3	PSB10630003	DOWNFEED SHAFT HUB
4	PSB10630004	STEEL BALL 3/16
5	PSB10630005	COMPRESSION SPRING
6	PSB10630006	CAP SCREW 5/16-18 X 1/4
7	PSB10630007	HUB RETAINER
8	PSB10630008	PINION SHAFT HUB SLEEVE
9	PSB10630009	CAP SCREW M5-.8 X 12
10	PSB10630010	RETURN SPRING COVER
11	PSB10630011	FLAT COIL SPRING
12	PSB10630012	KEY 3 X 3 X 18 RE
13	PSB10630013	BLOCK HEAD STUD
14	PSB10630014	QUILL PINION GEAR SHAFT 10T/16T
15	PSB10630015	BALL KNOB 1/4-20
16	PSB10630016	SHIFT CRANK
17	PSB10630017	SET SCREW 1/4-20 X 1/4
18	PSB10630018	COMPRESSION SPRING
19	PSB10630019	GEAR SHIFT PLUNGER
20	PSB10630020	SHIFT SLEEVE
21	PSB10630021	WORM LINK
22	PSB10630022	WORM SHAFT
23	PSB10630023	SET SCREW M6-1 X 10
24	PSB10630024	KEY 4 X 4 X 18 RE
25	PSB10630025	WORM GEAR
26	PSB10630026	CLUSTER GEAR BEARING
27	PSB10630027	FEED CLUSTER GEAR 17T/28T/22T
28	PSB10630028	EXT RETAINING RING 16MM
29	PSB10630029	BUSHING
30	PSB10630030	THRUST SPACER
31	PSB10630031	FEED REVERSE PINION GEAR
32	PSB10630032	KEY 3 X 3 X 45 RE
33	PSB10630033	FEED ENGAGE PIN
34A	PSB10630034A	WORM GEAR CRADLE ASSEMBLY
34	PSB10630034	WORM GEAR CRADLE
35	PSB10630035	SET SCREW M5-.8 X 6
36	PSB10630036	FEED DRIVE WORM GEAR
37	PSB10630037	SPACER
38	PSB10630038	WORM CRADLE SLEEVE
39	PSB10630039	EXT RETAINING RING 18MM
40	PSB10630040	KEY 4 X 4 X 12
41	PSB10630041	FEED REVERSE PINION GEAR
42	PSB10630042	CAP SCREW 5/16-18 X 1/2
43	PSB10630043	FLAT WASHER 8 X 21 X 2
44	PSB10630044	FEED BEVEL GEAR 24T
45	PSB10630045	KEY 3 X 3 X 8 RE
46	PSB10630046	CLUSTER GEAR SHAFT 18T/12T
47	PSB10630047	FEED DRIVE CLUSTER GEAR 23T
48	PSB10630048	NEEDLE BEARING BZ66Z
49	PSB10630049	REVERSE CLUTCH ROD
50A	PSB10630050A	FEED REVERSE BEVEL GEAR SET

REF	PART #	DESCRIPTION
50	PSB10630050	FEED REVERSE GEAR
51	PSB10630051	FEED REVERSE CLUTCH
52	PSB10630052	ROLL PIN 3 X 20
53	PSB10630053	EXT RETAINING RING 12MM
54	PSB10630054	BUSHING
55	PSB10630055	KEY 3 X 3 X 10 RE
56	PSB10630056	KEY 3 X 3 X 15 RE
57	PSB10630057	WORM SHAFT
58	PSB10630058	BUSHING
59	PSB10630059	CAP SCREW M6-1 X 20
60	PSB10630060	SET SCREW M6-1 X 10
61	PSB10630061	FEED GEAR SHIFTER FORK
62	PSB10630062	CLUSTER GEAR SHIFT CRANK
63	PSB10630063	FEED SHIFT ROD
64	PSB10630064	CLUSTER GEAR COVER
65	PSB10630065	QUILL PINION SHAFT BUSHING
66	PSB10630066	OVERLOAD CLUTCH WORM GEAR 30T
67	PSB10630067	EXT RETAINING RING 15MM
68A	PSB10630068A	PINION OVERLOAD CLUTCH ASSY
68	PSB10630068	PINION OVERLOAD CLUTCH SHAFT
69	PSB10630069	OVERLOAD CLUTCH
70	PSB10630070	COMPRESSION SPRING
71	PSB10630071	SET SCREW M5-.8 X 10
72	PSB10630072	PINION OVERLOAD CLUTCH COLLAR
73	PSB10630073	CLUTCH RING
74	PSB10630074	CLUTCH WASHER
75	PSB10630075	EXT RETAINING RING 10MM
76	PSB10630076	PIVOT STUD
77	PSB10630077	OVERLOAD CLUTCH TRIP LEVER
78	PSB10630078	ROLL PIN 5 X 20
79	PSB10630079	CLUTCH ARM COVER
80	PSB10630080	CAP SCREW M5-.8 X 35
81	PSB10630081	HEX NUT 1/4-20
82	PSB10630082	SET SCREW 1/4-20 X 3/4
83	PSB10630083	COMPRESSION SPRING
84	PSB10630084	OVERLOAD CLUTCH PLUNGER
85	PSB10630085	OIL CUP FITTING 1/8 PT
86	PSB10630086	INDICATOR ROD LOCK KNOB
87	PSB10630087	INDICATOR ROD
88	PSB10630088	REVERSE TRIP HEAD STUD
89	PSB10630089	FEED REVERSE TRIP PLUNGER
90	PSB10630090	REVERSE TRIP BALL LEVER
91	PSB10630091	QUILL STOP BLOCK
92	PSB10630092	CAP SCREW 3/8-16 X 5/8
93	PSB10630093	QUILL MICRO STOP (INCH)
94	PSB10630094	STOP TRIP BAR
95	PSB10630095	FEED TRIP BRACKET
96	PSB10630096	LEVER HANDLE (STOP SHAFT TRIP)
97	PSB10630097	TRIP PLUNGER BUSHING
98	PSB10630098	FEED TRIP PLUNGER
99	PSB10630099	FEED TRIP LEVER
100	PSB10630100	TRIP LEVER PIN

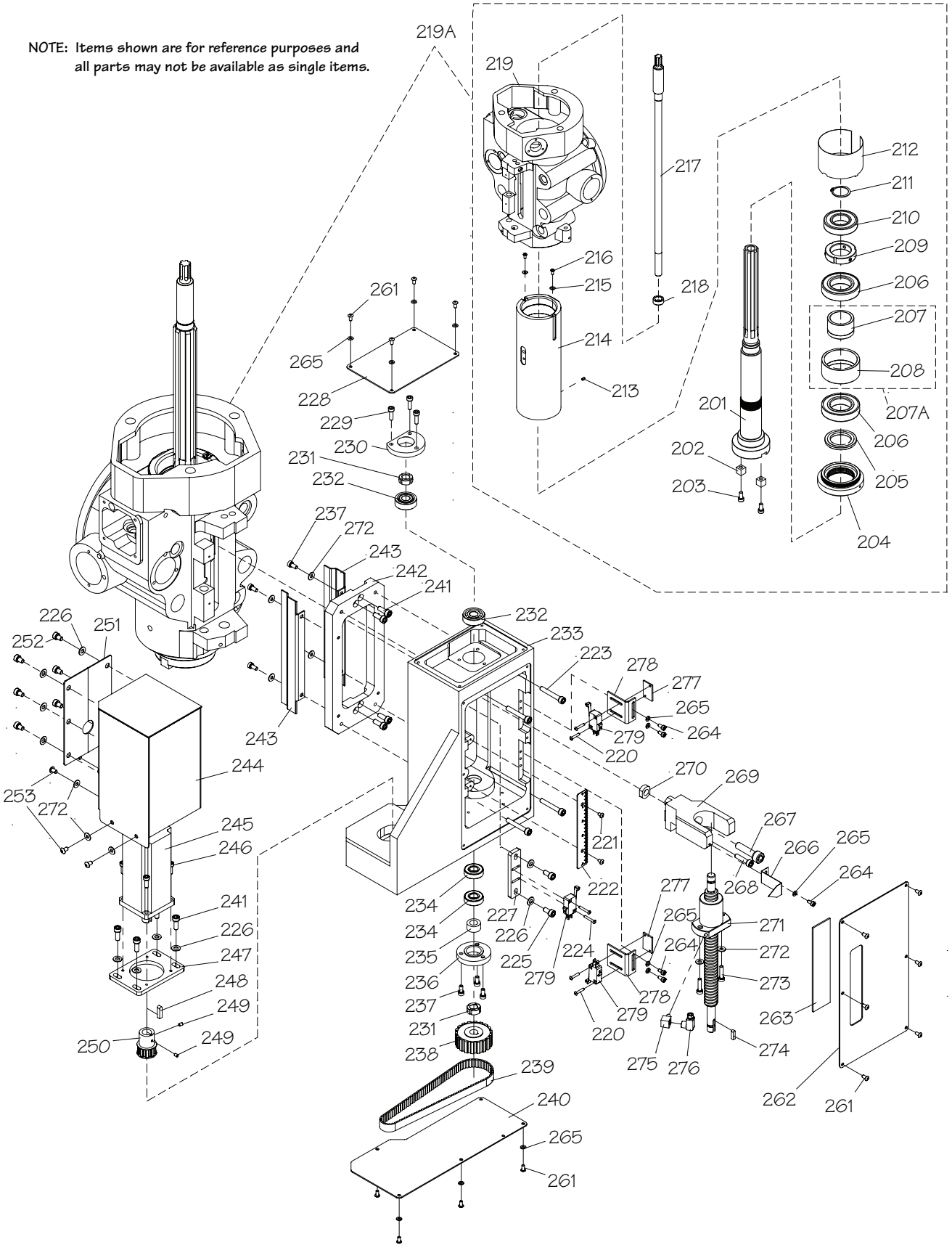
Headstock Parts List, continued

REF	PART #	DESCRIPTION
101	PSB10630101	HEX NUT M4-0.7
102	PSB10630102	SET SCREW M4-.7 X 16
103	PSB10630103	HANDWHEEL CLUTCH
104	PSB10630104	STEEL BALL 5MM
105	PSB10630105	COMPRESSION SPRING
106	PSB10630106	SET SCREW M8-1.25 X 6
107	PSB10630107	PHLP HD SCR M4-.7 X 6
108	PSB10630108	QUILL DEPTH SCALE
109	PSB10630109	ROLL PIN 3 X 16
110	PSB10630110	HANDWHEEL TYPE 3

REF	PART #	DESCRIPTION
111	PSB10630111	FIXED HANDLE
112	PSB10630112	KNURLED SLEEVE
113	PSB10630113	QUILL WEDGE NUT
114	PSB10630114	QUILL WEDGE SLEEVE
115	PSB10630115	ADJUSTABLE LOCK HANDLE
116	PSB10630116	SQUARE HEAD HARDENED BOLT
117	PSB10630117	SPACER
118	PSB10630118	HARD WASHER
119	PSB10630119	HIGH NUT
120	PSB10630120	QUILL HOUSING

Quill & Spindle Feed

NOTE: Items shown are for reference purposes and all parts may not be available as single items.

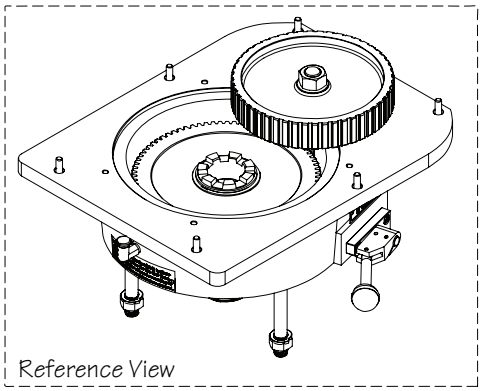


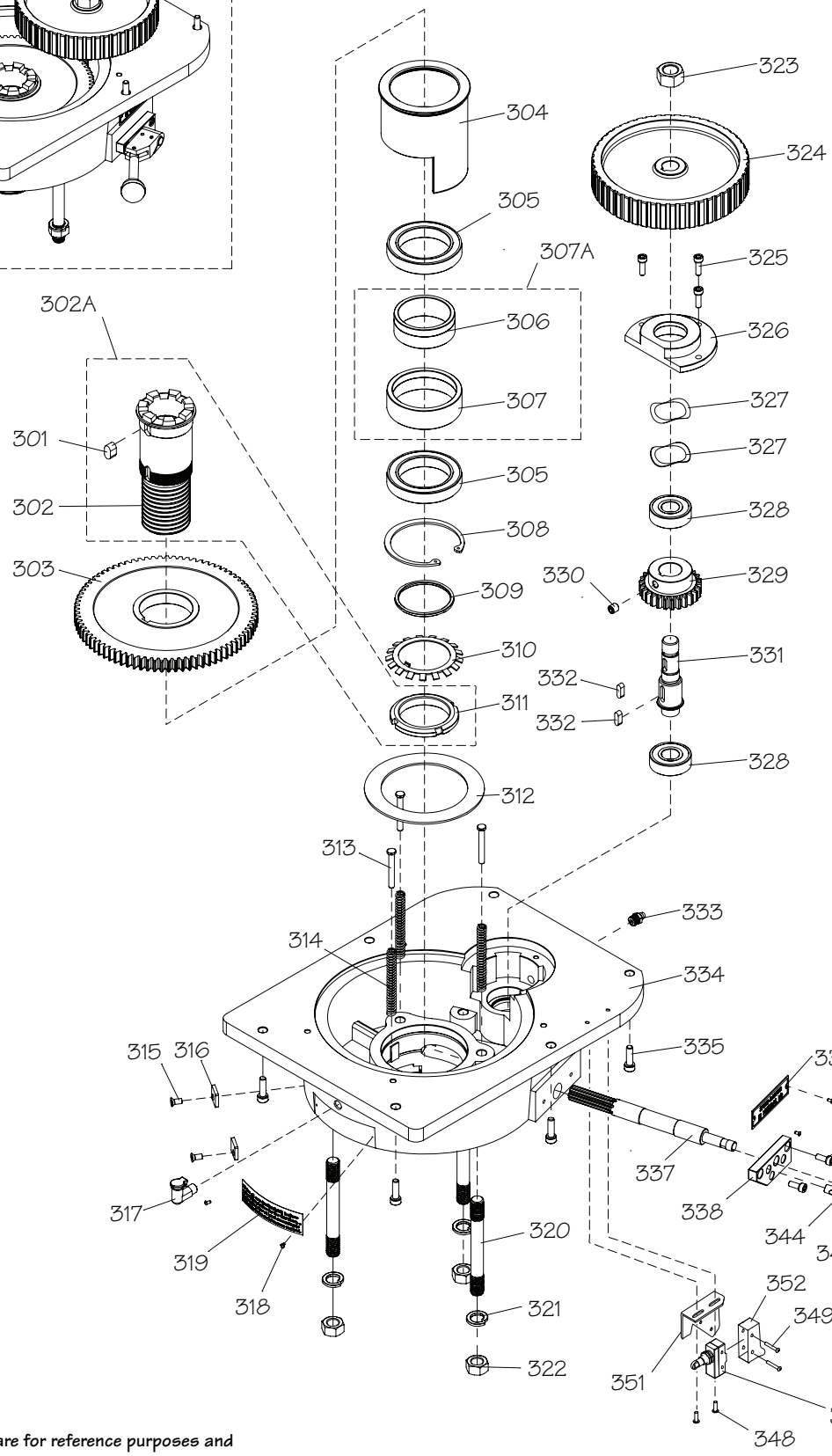
Quill & Spindle Feed Parts List

REF	PART #	DESCRIPTION
201	PSB10630201	SPINDLE NT40
202	PSB10630202	LOCK LUG
203	PSB10630203	CAP SCREW M8-1.25 X 16
204	PSB10630204	NOSE CAP NT40
205	PSB10630205	QUILL END CAP
206	PSB10630206	BALL BEARING 7210A5/P4
207	PSB10630207	BEARING SPACER
208	PSB10630208	BEARING SPACER
209	PSB10630209	SPANNER NUT LSM M50 X 1.5P-L
210	PSB10630210	BALL BEARING 6206ZZ
211	PSB10630211	EXT RETAINING RING 40MM
212	PSB10630212	QUILL SKIRT
213	PSB10630213	SET SCREW M5-.8 X 6
214	PSB10630214	QUILL NT40
215	PSB10630215	FLAT WASHER 5MM
216	PSB10630216	PHLP HD SCR M5-.8 X 10
217	PSB10630217	DRAWBAR NT40
218	PSB10630218	DRAWBAR SPACER NT40
219	PSB10630219	QUILL HOUSING NT40
219A	PSB10630219A	QUILL HOUSING NT40 ASSEMBLY
220	PSB10630220	BUTTON HD CAP SCR M3-.5 X 16
221	PSB10630221	BUTTON HD CAP SCR M4-.7 X 6
222	PSB10630222	SPINDLE DEPTH SCALE
223	PSB10630223	CAP SCREW M6-1 X 40
224	PSB10630224	BUTTON HD CAP SCR M3-.5 X 20
225	PSB10630225	CAP SCREW M6-1 X 12
226	PSB10630226	FLAT WASHER 6MM
227	PSB10630227	LIMIT SWITCH MOUNT
228	PSB10630228	SPINDLE COVER
229	PSB10630229	CAP SCREW M5-.8 X 16
230	PSB10630230	SPACER RING
231	PSB10630231	RADIAL LOCK NUT M12 X 1P (VSR)
232	PSB10630232	BALL BEARING 7201B
233	PSB10630233	SPINDLE CASTING
234	PSB10630234	BALL BEARING 6001UU
235	PSB10630235	SPACER
236	PSB10630236	FLANGE RING

REF	PART #	DESCRIPTION
237	PSB10630237	CAP SCREW M5-.8 X10
238	PSB10630238	SYNCHRONOUS PULLEY
239	PSB10630239	TIMING BELT HTD5M-187-13 HTD TYPE-5M
240	PSB10630240	SPINDLE COVER
241	PSB10630241	CAP SCREW M6-1 X 16
242	PSB10630242	ADAPTER PLATE
243	PSB10630243	SIDE COVER
244	PSB10630244	MOTOR COVER
245	PSB10630245	SPINDLE SERVO MOTOR
246	PSB10630246	CAP SCREW M5-.8 X 14
247	PSB10630247	MOTOR MOUNT
248	PSB10630248	KEY 5 X 5 X 20 SRE
249	PSB10630249	SET SCREW M4-.7 X 5
250	PSB10630250	TIMING PULLEY
251	PSB10630251	MOTOR SIDE COVER
252	PSB10630252	CAP SCREW M6-1 X 8
253	PSB10630253	BUTTON HD CAP SCR M5-.8 X 8
261	PSB10630261	BUTTON HD CAP SCR M4-.7 X 8
262	PSB10630262	SPINDLE COVER
263	PSB10630263	WINDOW
264	PSB10630264	CAP SCREW M4-.7 X 8
265	PSB10630265	FLAT WASHER 4MM
266	PSB10630266	POINTER BRACKET
267	PSB10630267	CAP SCREW 3/8-16 X 1-1/2
268	PSB10630268	CAP SCREW M6-1 X 25
269	PSB10630269	FEED NUT FORK
270	PSB10630270	LUG KEY
271	PSB10630271	BALL SCREW R20-5T4-FSI-20
272	PSB10630272	FLAT WASHER 5MM
273	PSB10630273	CAP SCREW M5-.8 X 20
274	PSB10630274	KEY 4 X 4 X 15 SRE
275	PSB10630275	FITTING FEMALE 90 DEG 1/8 X M6-1
276	PSB10630276	FITTING MALE 90 DEG 4 X 1/8
277	PSB10630277	HEX NUT M3-.5
278	PSB10630278	LIMIT SWITCH MOUNT
279	PSB10630279	LIMIT SWITCH V-106-1A5 [LS3] AND [LS4]

Gearbox





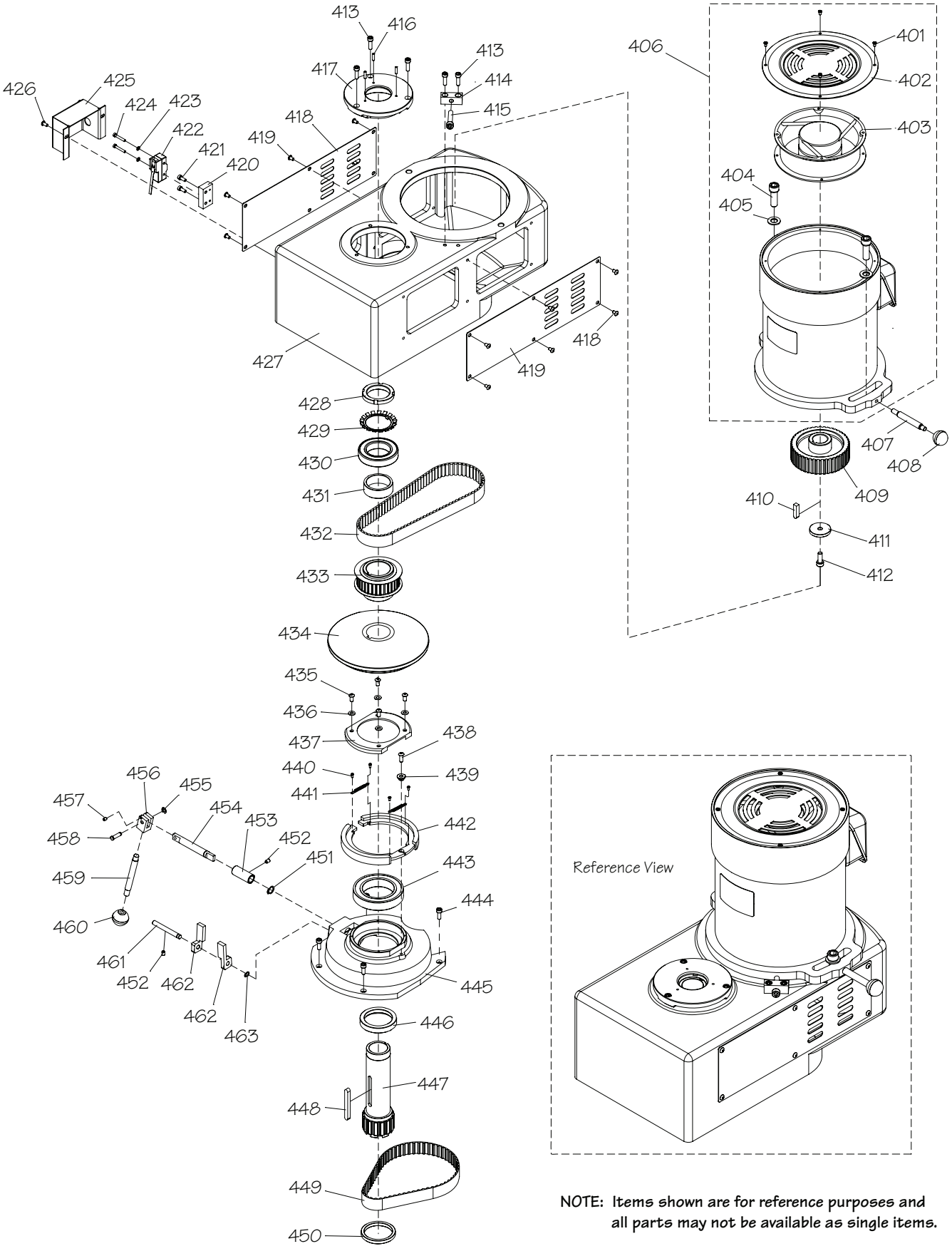
NOTE: Items shown are for reference purposes and all parts may not be available as single items.

Gearbox Parts List

REF	PART #	DESCRIPTION
301	PSB10630301	KEY 8 X 8 X 15 RE
302A	PSB10630302A	SPINDLE GEAR HUB ASSEMBLY
302	PSB10630302	SPLINED GEAR HUB
303	PSB10630303	SPINDLE BULL GEAR
304	PSB10630304	BEARING SLEEVE
305	PSB10630305	BALL BEARING 6910W
306	PSB10630306	BEARING SPACER
307A	PSB10630307A	BULL GEAR SPACER ASSEMBLY
307	PSB10630307	BEARING SPACER
308	PSB10630308	INT RETAINING RING 62MM
309	PSB10630309	SPACER
310	PSB10630310	EXT TOOTH WASHER
311	PSB10630311	SPANNER NUT
312	PSB10630312	BEARING SLEEVE WASHER
313	PSB10630313	HEADED STEP PIN
314	PSB10630314	COMPRESSION SPRING
315	PSB10630315	FLAT HD CAP SCR M5-.8 X 10
316	PSB10630316	SQUARE BLOCK TAB
317	PSB10630317	OIL CUP FITTING 1/8 PT
318	PSB10630318	STEEL FLUTED RIVET 2 X 5MM
319	PSB10630319	GEARBOX ID PLATE
320	PSB10630320	STUD 1/2-13
321	PSB10630321	LOCK WASHER 1/2
322	PSB10630322	HEX NUT 1/2-13
323	PSB10630323	HEX NUT 5/8-11
324	PSB10630324	BELT PULLEY GEAR
325	PSB10630325	CAP SCREW M5-.8 X 16

REF	PART #	DESCRIPTION
326	PSB10630326	BULL GEAR PINION BEARING CAP
327	PSB10630327	WAVEY WASHER
328	PSB10630328	BALL BEARING 6203W NSK
329	PSB10630329	PINION GEAR 26T
330	PSB10630330	SET SCREW M8-1.25 X 8
331	PSB10630331	PINION GEAR SHAFT
332	PSB10630332	KEY 5 X 5 X 15 RE
333	PSB10630333	GREASE FITTING 1/8 PT STRAIGHT
334	PSB10630334	GEARBOX HOUSING
335	PSB10630335	CAP SCREW M6-1 X 20
336	PSB10630336	DATA PLATE
337	PSB10630337	BULL GEAR SHIFT PINION
338	PSB10630338	HIGH-LOW DETENT PLATE
339	PSB10630339	CAP SCREW M5-.8 X 12
340	PSB10630340	ROLL PIN 3 X 15
341	PSB10630341	SET SCREW M4-.7 X 5
342	PSB10630342	HIGH-LOW PINION BLOCK
343	PSB10630343	CAP SCREW M4-.7 X 16
344	PSB10630344	HIGH-LOW DETENT PLUNGER
345	PSB10630345	COMPRESSION SPRING
346	PSB10630346	LEVER HANDLE (HIGH-LOW)
347	PSB10630347	BALL KNOB 1/4-20
348	PSB10630348	PHLP HD SCR M5-.8 X 8
349	PSB10630349	CAP SCREW M4-.7 X 30
350	PSB10630350	SPINDLE GEAR CHANGE LIMIT SW [LS6]
351	PSB10630351	LIMIT SWITCH MOUNT
352	PSB10630352	LIMIT SWITCH BOOT RUBBER

Belt Housing



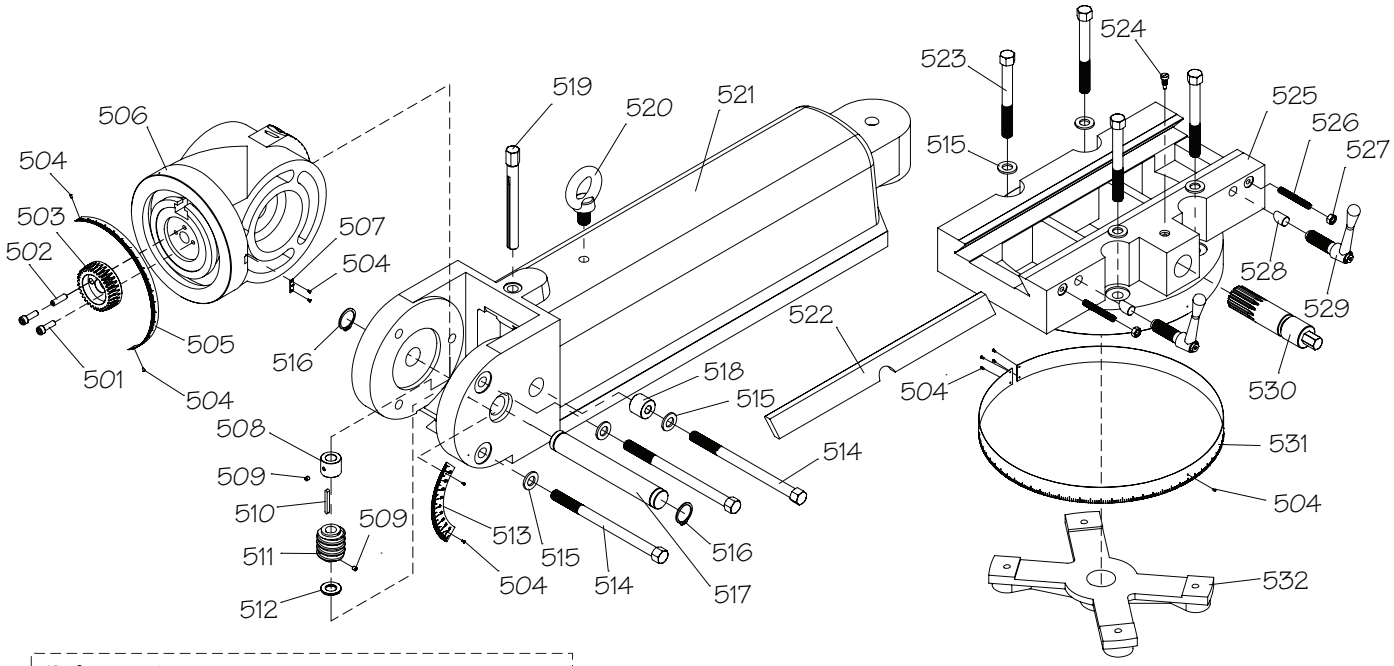
NOTE: Items shown are for reference purposes and all parts may not be available as single items.

Belt Housing Parts List

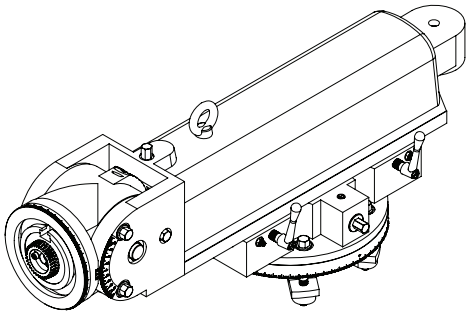
REF	PART #	DESCRIPTION
401	PSB10630401	BUTTON HD CAP SCR M4-.7 X 6
402	PSB10630402	MOTOR FAN COVER
403	PSB10630403	MOTOR FAN
404	PSB10630404	CAP SCREW M12-1.75 X 35
405	PSB10630405	FLAT WASHER 12MM
406	PSB10630406	MOTOR 5HP 220V 3-PH [M3]
407	PSB10630407	BELT TENSION ADJUSTMENT LEVER
408	PSB10630408	BALL KNOB 5/16-18
409	PSB10630409	MOTOR PULLEY
410	PSB10630410	KEY 8 X 7 X 30 SRE
411	PSB10630411	HARD WASHER
412	PSB10630412	CAP SCREW M8-1.25 X 20
413	PSB10630413	CAP SCREW M6-1 X 20
414	PSB10630414	MOTOR ADJUSTMENT BLOCK
415	PSB10630415	CAP SCREW M8-1.25 X 40
416	PSB10630416	SET SCREW M4-.7 X 16
417	PSB10630417	BEARING COVER
418	PSB10630418	BELT HOUSING COVER
419	PSB10630419	PHLP HD SCR M5-.8 X 8
420	PSB10630420	LIMIT SWITCH MOUNTING BLOCK
421	PSB10630421	CAP SCREW M5-.8 X 16
422	PSB10630422	LIMIT SWITCH MJ2-1701 [LS7]
423	PSB10630423	FLAT WASHER 4MM
424	PSB10630424	CAP SCREW M4-.7 X 30
425	PSB10630425	LIMIT SWITCH COVER
426	PSB10630426	PHLP HD SCR M5-.8 X 10
427	PSB10630427	BELT HOUSING
428	PSB10630428	SPANNER NUT M45 X 1.5P
429	PSB10630429	EXT TOOTH WASHER 45MM
430	PSB10630430	BALL BEARING 6009W
431	PSB10630431	BEARING SPACER
432	PSB10630432	TIMING BELT 800-8YU-25

REF	PART #	DESCRIPTION
433	PSB10630433	SPINDLE TIMIMG PULLEY
434	PSB10630434	BRAKE ASSEMBLY COVER
435	PSB10630435	BUTTON HD CAP SCR M6-1 X 12
436	PSB10630436	FLAT WASHER 6MM
437	PSB10630437	BRAKE BEARING CAP
438	PSB10630438	BUTTON HD CAP SCR M6-1 X 16
439	PSB10630439	BRAKE SHOE PIVOT SLEEVE
440	PSB10630440	PHLP HD SCR M3-.5 X 6
441	PSB10630441	EXTENSION SPRING
442	PSB10630442	BRAKE SHOE SET
443	PSB10630443	BALL BEARING 6012W
444	PSB10630444	CAP SCREW M6-1 X 16
445	PSB10630445	BRAKE SEAT
446	PSB10630446	SPACER
447	PSB10630447	SPINDLE PULLEY HUB
448	PSB10630448	KEY 8 X 7 X 70 RE
449	PSB10630449	TIMING BELT 230L-100
450	PSB10630450	SPINDLE PULLEY HUB COLLAR
451	PSB10630451	EXT RETAINING RING 13MM
452	PSB10630452	SET SCREW M6-1 X 8
453	PSB10630453	BRAKE SHAFT SLEEVE
454	PSB10630454	BRAKE SHAFT
455	PSB10630455	E-CLIP 4MM
456	PSB10630456	BRAKE LEVER PIVOT BRACKET
457	PSB10630457	SET SCREW M5-.8 X 6
458	PSB10630458	HEADED PIN
459	PSB10630459	LEVER HANDLE (BRAKE)
460	PSB10630460	BALL KNOB 3/8-16
461	PSB10630461	BRAKE OPERATING FINGER
462	PSB10630462	BRAKE FINGER PIVOT STUD
463	PSB10630463	EXT RETAINING RING 7MM

Ram



Reference View

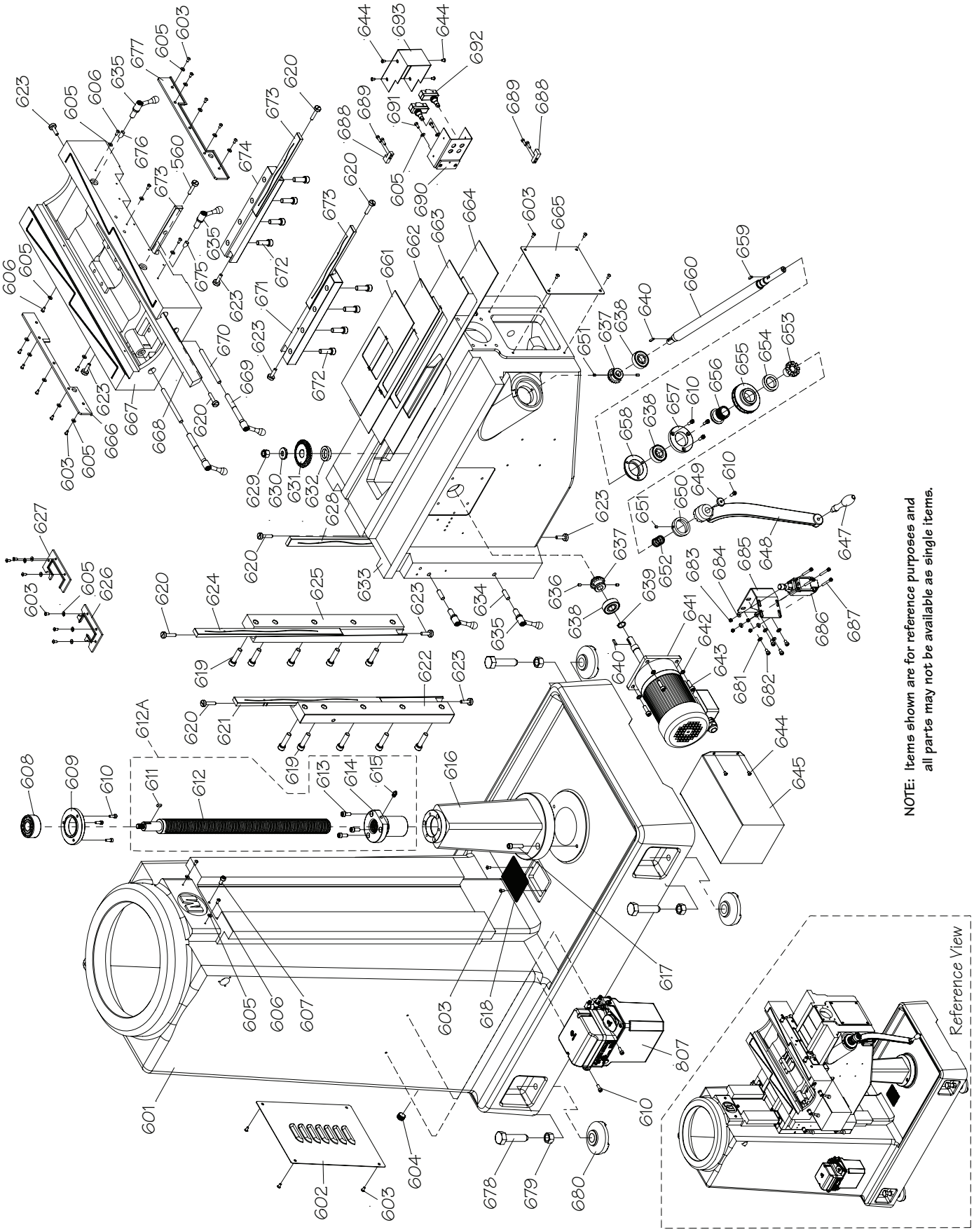


NOTE: Items shown are for reference purposes and all parts may not be available as single items.

REF	PART #	DESCRIPTION
501	PSB10630501	CAP SCREW M8-1.25 X 25
502	PSB10630502	DOWEL PIN 8 X 30
503	PSB10630503	GEAR 33T
504	PSB10630504	STEEL FLUTED RIVET 2 X 5MM
505	PSB10630505	HEAD ROTATION SCALE
506	PSB10630506	RAM ADAPTER, NT40
507	PSB10630507	POINTER
508	PSB10630508	LOCK COLLAR
509	PSB10630509	SET SCREW M6-1 X 6
510	PSB10630510	KEY 5 X 5 X 45 RE
511	PSB10630511	HEAD TILT WORM GEAR
512	PSB10630512	THRUST WASHER
513	PSB10630513	HEAD TILT SCALE
514	PSB10630514	TILT LOCK BOLT
515	PSB10630515	FLAT WASHER 14MM
516	PSB10630516	EXT RETAINING RING 32MM

REF	PART #	DESCRIPTION
517	PSB10630517	PIVOT PIN
518	PSB10630518	BUSHING
519	PSB10630519	HEAD TILT WORM SHAFT
520	PSB10630520	EYE BOLT 3/4-10
521	PSB10630521	RAM
522	PSB10630522	RAM TURRET GIB
523	PSB10630523	TURRET CLAMP BOLT
524	PSB10630524	SHOULDER SCREW
525	PSB10630525	RAM TURRET
526	PSB10630526	ADJUSTMENT STUD
527	PSB10630527	HEX NUT 3/8-16
528	PSB10630528	RAM LOCK PLUNGER
529	PSB10630529	ADJUSTABLE HANDLE
530	PSB10630530	TOOTHED PINION SHAFT
531	PSB10630531	ROTATION SCALE
532	PSB10630532	TURRET BRACKET

Column, Knee & Saddle



Column, Knee & Saddle Parts List

REF	PART #	DESCRIPTION
601	PSB10630601	COLUMN
602	PSB10630602	COOLANT RESERVOIR COVER
603	PSB10630603	PHLP HD SCR M5-.8 X 10
604	PSB10630604	DRAIN PLUG 1/2 PT
605	PSB10630605	FLAT WASHER 5MM
606	PSB10630606	PHLP HD SCR M5-.8 X 12
607	PSB10630607	CAP SCREW M8-1.25 X 16
608	PSB10630608	ANGULAR CONTACT BEARING 3305
609	PSB10630609	BEARING CAP
610	PSB10630610	CAP SCREW M6-1 X 16
611	PSB10630611	KEY 5 X 5 X 15 RE
612A	PSB10630612A	ELEVATION BALLSCREW ASSEMBLY
612	PSB10630612	ELEVATION BALLSCREW
613	PSB10630613	CAP SCREW M8-1.25 X 20
614	PSB10630614	ELEVATION BALLSCREW NUT
615	PSB10630615	GREASE FITTING 1/8" NPT STRAIGHT
616	PSB10630616	ELEVATING BALLSCREW HOUSING
617	PSB10630617	CAP SCREW 3/8-16 X 1-1/2
618	PSB10630618	DRAIN SCREEN
619	PSB10630619	CAP SCREW 1/2-13 X 1-3/4
620	PSB10630620	GIB ADJUSTMENT SCREW
621	PSB10630621	KNEE GIB (LH)
622	PSB10630622	KNEE GIB PLATE (LH)
623	PSB10630623	GIB PLATE SCREW
624	PSB10630624	KNEE GIB (RH)
625	PSB10630625	KNEE GIB PLATE (RH)
626	PSB10630626	COLUMN WIPER (LH)
627	PSB10630627	COLUMN WIPER (RH)
628	PSB10630628	KNEE GIB (CENT)
629	PSB10630629	HEX NUT 1/2-20
630	PSB10630630	HARD WASHER
631	PSB10630631	BEVEL GEAR
632	PSB10630632	SPACER
633	PSB10630633	KNEE
634	PSB10630634	KNEE LOCK HANDLE PLUNGER
635	PSB10630635	ADJUSTABLE HANDLE
636	PSB10630636	SET SCREW M6-1 X 8
637	PSB10630637	BEVEL PINION GEAR
638	PSB10630638	BALL BEARING 6204ZZ
639	PSB10630639	EXT RETAINING RING 20MM
640	PSB10630640	KEY 4 X 4 X 20 RE
641	PSB10630641	MOTOR 3-PH 220V [M2]
642	PSB10630642	LOCK WASHER 8MM
643	PSB10630643	CAP SCREW M8-1.25 X 25
644	PSB10630644	PHLP HD SCR M5-.8 X 8
645	PSB10630645	ELEVATION MOTOR COVER
647	PSB10630647	FIXED HANDLE

REF	PART #	DESCRIPTION
648	PSB10630648	ELEVATION CRANK
649	PSB10630649	FLAT WASHER 6MM
650	PSB10630650	BUSHING
651	PSB10630651	SET SCREW M6-1 X 6
652	PSB10630652	COMPRESSION SPRING
653	PSB10630653	ELEVATION SHAFT CLUTCH
654	PSB10630654	DIAL RETAINER (FR)
655	PSB10630655	VERTICAL DIAL (INCH)
656	PSB10630656	DIAL RETAINER (RR)
657	PSB10630657	BEARING RETAINER
658	PSB10630658	BEARING SEAT
659	PSB10630659	KEY 4 X 4 X 15 RE
660	PSB10630660	ELEVATION SHAFT
661	PSB10630661	CHIP GUARD (TOP)
662	PSB10630662	CHIP GUARD (MIDDLE)
663	PSB10630663	CHIP GUARD (MIDDLE)
664	PSB10630664	CHIP GUARD (BOTTOM)
665	PSB10630665	KNEE COVER (FR)
666	PSB10630666	SADDLE WIPER (RR)
667	PSB10630667	SADDLE
668	PSB10630668	SADDLE GIB
669	PSB10630669	ADJUSTABLE HANDLE
670	PSB10630670	SADDLE LOCK PLUNGER
671	PSB10630671	SADDLE GIB PLATE (LH)
672	PSB10630672	CAP SCREW M12-1.75 X 35
673	PSB10630673	SADDLE GIB
674	PSB10630674	SADDLE GIB PLATE (RH)
675	PSB10630675	HANDLE PLUNGER (LH)
676	PSB10630676	HANDLE PLUNGER (RH)
677	PSB10630677	SADDLE WIPER (FR)
678	PSB10630678	HEX BOLT 3/4-10 X 4
679	PSB10630679	HEX NUT 3/4-10
680	PSB10630680	FOOT PAD
681	PSB10630681	FLAT WASHER 6MM
682	PSB10630682	CAP SCREW M6-1 X 10
683	PSB10630683	HEX NUT M5-.8
684	PSB10630684	FLAT WASHER 5MM
685	PSB10630685	LIMIT SWITCH BRACKET (LH)
686	PSB10630686	ELEV CRANK LIMIT SWITCH TZ-5109 [LS8]
687	PSB10630687	CAP SCREW M5-.8 X 40
688	PSB10630688	TRAVEL STOP BRACKET
689	PSB10630689	CAP SCREW M5-.8-16
690	PSB10630690	LIMIT SWITCH BRACKET (RH)
691	PSB10630691	CAP SCREW M5-.8-12
692	PSB10630692	LIMIT SWITCH MJ2-1308 [LS9] AND [LS10]
693	PSB10630693	LIMIT SWITCH COVER

Table

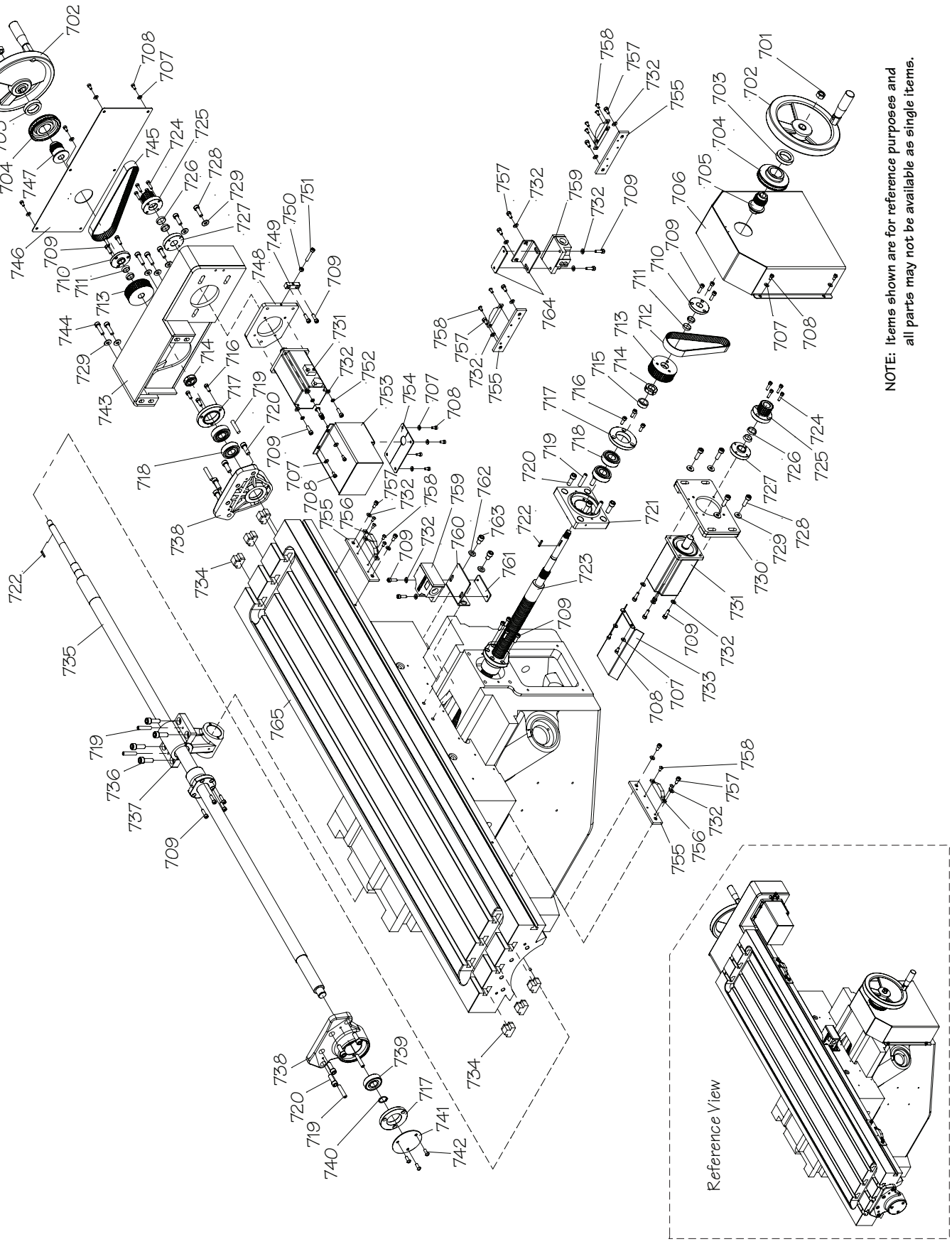
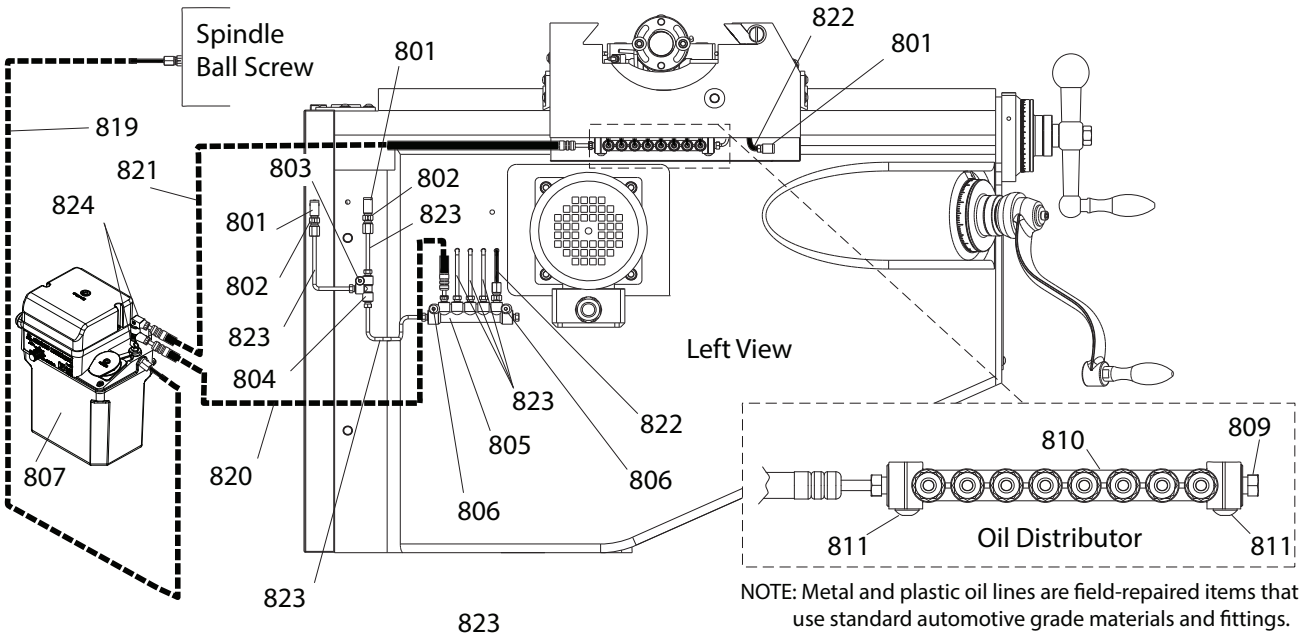

NOTE: Items shown are for reference purposes and all parts may not be available as single items.
Reference View

Table Parts List

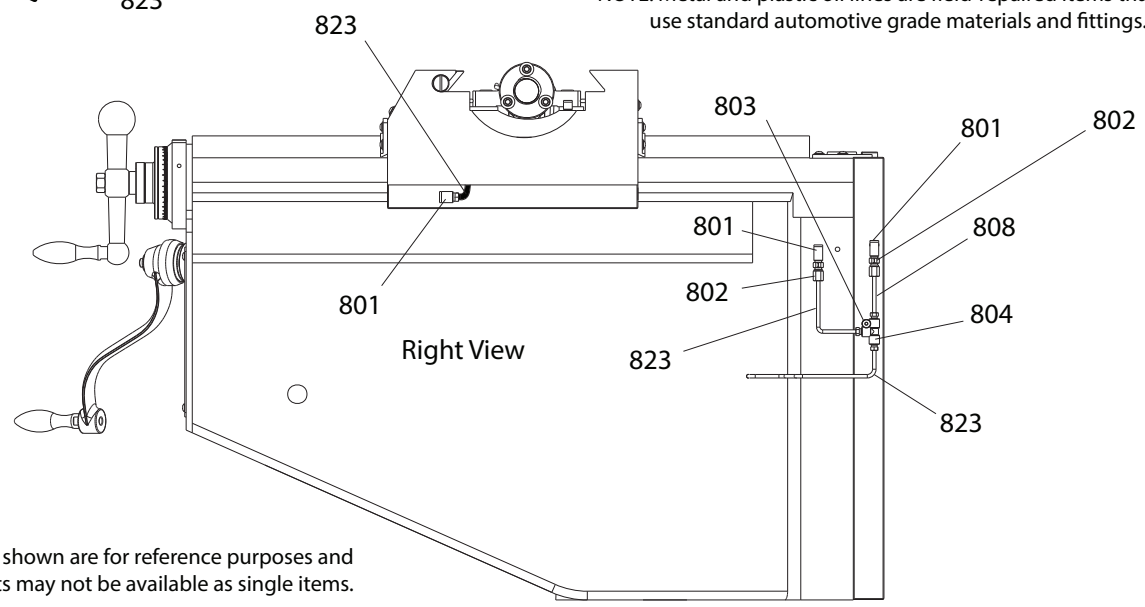
REF	PART #	DESCRIPTION
701	PSB10630701	HEX NUT 1/2-20
702	PSB10630702	HANDWHEEL TYPE-3 W/HANDLE
703	PSB10630703	OUTER DIAL RETAINER
704	PSB10630704	DIAL SCALE
705	PSB10630705	INNER DIAL RETAINR (LH)
706	PSB10630706	PULLEY COVER (FR)
707	PSB10630707	FLAT WASHER 5MM
708	PSB10630708	CAP SCREW M5-.8 X10
709	PSB10630709	CAP SCREW M6-1 X 20
710	PSB10630710	BEARING RETAINER OUTER
711	PSB10630711	RING KEY SGE 300 17 X 21
712	PSB10630712	TIMING BELT
713	PSB10630713	PULLEY WHEEL HTD5M44T-17
714	PSB10630714	BEARING LOCK NUT YSR M20-1
715	PSB10630715	SPACER
716	PSB10630716	CAP SCREW M6-1 X 16
717	PSB10630717	INNER BEARING RETAINER
718	PSB10630718	ANGULAR CONTACT BEARING
719	PSB10630719	ROLL PIN
720	PSB10630720	CAP SCREW 3/8-16 X 1
721	PSB10630721	CROSSFEED BEARING BRACKET
722	PSB10630722	KEY 3 X 3 X 20 RE
723	PSB10630723	LATERAL BALLSCREW
724	PSB10630724	CAP SCREW M5-.8 X 20
725	PSB10630725	PULLEY WHEEL HTD5M22T-19
726	PSB10630726	RING KEY SGE 300 19 X 24
727	PSB10630727	BEARING RETAINER
728	PSB10630728	CAP SCREW M8-1.25 X 25
729	PSB10630729	FLAT WASHER 8MM
730	PSB10630730	MOTOR MOUNTING BRACKET
731	PSB10630731	SERVO MOTER ECMA-C20807ES
732	PSB10630732	FLAT WASHER 6MM
733	PSB10630733	COVER

REF	PART #	DESCRIPTION
734	PSB10630734	RUBBER TABLE T-SLOT PLUG
735	PSB10630735	LONGITUDINAL BALLSCREW
736	PSB10630736	CAP SCREW M10-1.5 X 30
737	PSB10630737	FEED NUT BRACKET
738	PSB10630738	BEARING BRACKET
739	PSB10630739	BALL BEARING 6204ZZ
740	PSB10630740	EXT RETAINING RING 20MM
741	PSB10630741	BALLSCREW COVER
742	PSB10630742	PHLP HD SCR M6-1 X 16
743	PSB10630743	BELT BOX
744	PSB10630744	CAP SCREW M8-1.25 X 30
745	PSB10630745	TIMING BELT
746	PSB10630746	PULLEY COVER
747	PSB10630747	INNER DIAL RETAINER (RH)
748	PSB10630748	MOTOR MOUNTING BRACKET (RH)
749	PSB10630749	MOTOR ADJUSTMENT BLOCK
750	PSB10630750	HEX NUT M6-1
751	PSB10630751	CAP SCREW M6-1 X 35
752	PSB10630752	LOCK WASHER 6MM
753	PSB10630753	MOTOR COVER
754	PSB10630754	MOTOR ACCESS COVER
755	PSB10630755	STOP DOG BRACKET
756	PSB10630756	STOP DOG
757	PSB10630757	CAP SCREW M6-1 X 12
758	PSB10630758	PHLP HD SCR M5-.8 X 10
759	PSB10630759	LIMIT SWITCH 0519HU, X=[LS1], Y=[LS2]
760	PSB10630760	LIMIT SWITCH FIXED SEAT
761	PSB10630761	THREADED PLATE
762	PSB10630762	FLAT WASHER 10MM
763	PSB10630763	CAP SCREW 3/8-16 X 1/2
764	PSB10630764	LIMIT SWITCH BRACKET (LH)
765	PSB10630765	TABLE 12.5" X 58"

Lubrication System and Parts List



NOTE: Metal and plastic oil lines are field-repaired items that use standard automotive grade materials and fittings.

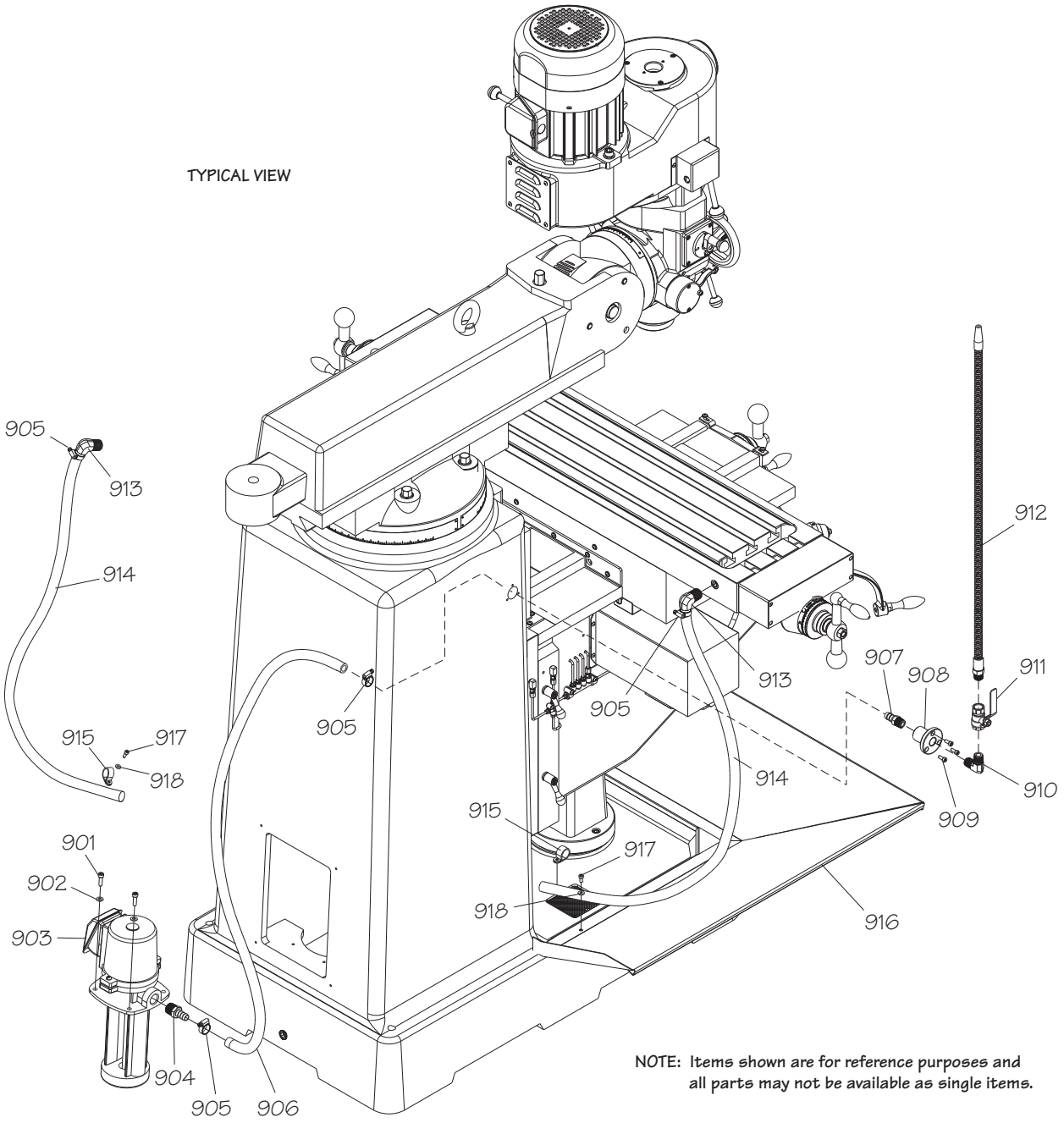


NOTE: Items shown are for reference purposes and all parts may not be available as single items.

REF	PART #	DESCRIPTION
801	PSB10630801	ELBOW JOINT M4 X 1/8PT
802	PSB10630802	STRAIGHT TUBE ADAPTER NO 3
803	PSB10630803	CAP SCREW M6-1 X 25
804	PSB10630804	TUBE T-ADAPTER 4 X 4MM
805	PSB10630805	OIL DISTRIBUTOR (7 PORT)
806	PSB10630806	CAP SCREW M6-1 X 20
807	PSB10630807	AUTO OILER ASSEMBLY
809	PSB10630809	THREADED PLUG M8-1.25

REF	PART #	DESCRIPTION
810	PSB10630810	OIL DISTRIBUTOR (10 PORT)
811	PSB10630811	CAP SCREW M5-.8 X 25
819	PSB10630819	OIL LINE (SPINDLE SUPPLY)
820	PSB10630820	OIL LINE (KNEE SUPPLY)
821	PSB10630821	OIL LINE ASSY (TABLE SUPPLY)
822	PSB10630822	PLASTIC OIL LINE
823	PSB10630823	METAL OIL LINE
824	PSB10630824	PUMP OUTPUT FITTING

Coolant System

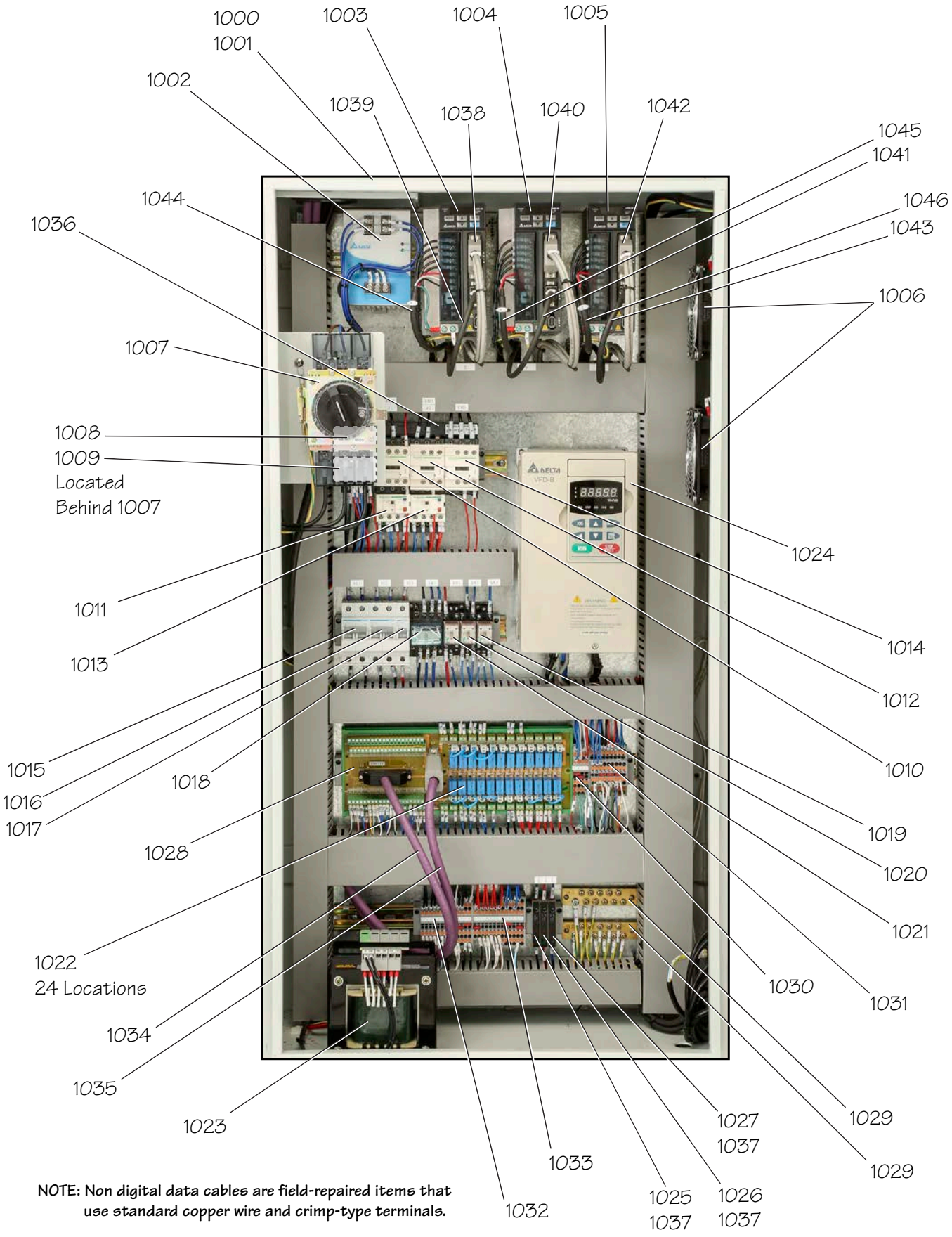


NOTE: Items shown are for reference purposes and all parts may not be available as single items.

REF	PART #	DESCRIPTION
901	PSB10630901	CAP SCREW M6-1 X 20
902	PSB10630902	FLAT WASHER 6MM
903	PSB10630903	PUMP 1/8HP 220V1-PH [M1]
904	PSB10630904	BARBED HOSE FITTING 3/8 PT X 1/2 IN
905	PSB10630905	THREADED HOSE CLAMP 3/4 IN
906	PSB10630906	COOLANT HOSE 1/2 X 50 IN
907	PSB10630907	BARBED HOSE FITTING 3/8 PT X 1/2 IN
908	PSB10630908	COOLANT NOZZLE BRACKET
909	PSB10630909	CAP SCREW M5-.8 X 12

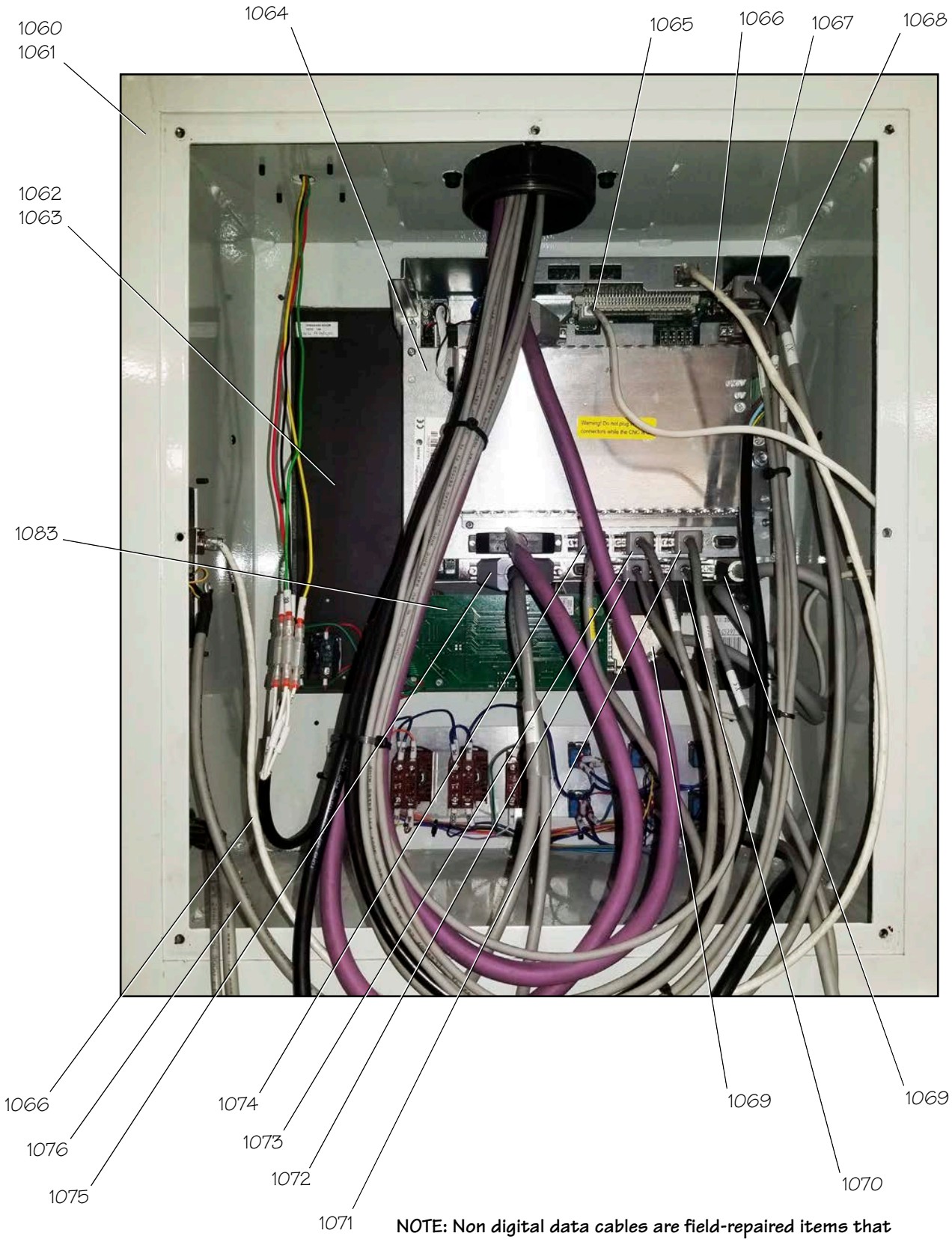
REF	PART #	DESCRIPTION
910	PSB10630910	PIPE ELBOW 90 DEG 3/8 PT X 3/8 IN
911	PSB10630911	COOLANT VALVE
912	PSB10630912	COOLANT NOZZLE 3/8 X 30 IN
913	PSB10630913	PIPE ELBOW 90 DEG 3/8 PT X 1/2 IN
914	PSB10630914	COOLANT HOSE 1/2 X 72 IN
915	PSB10630915	HOSE CLAMP 3/4 IN
916	PSB10630916	SPLASH PAN
917	PSB10630917	CAP SCREW M5-.8 X 10
918	PSB10630918	FLAT WASHER 5MM

Main Electrical Box



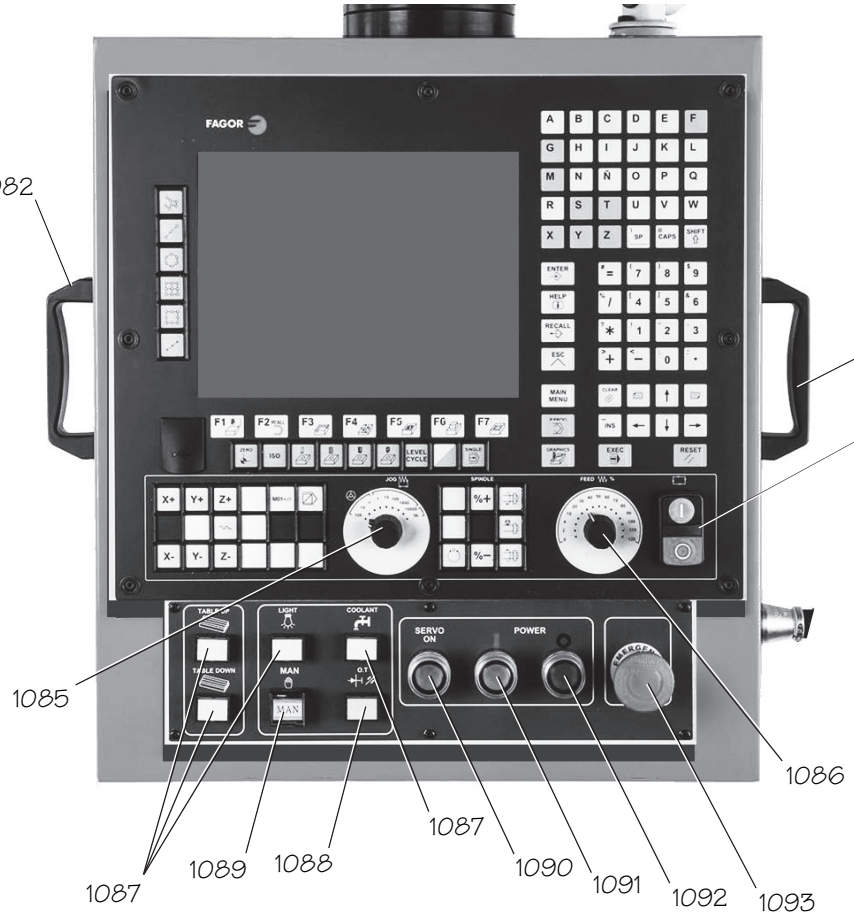
NOTE: Non digital data cables are field-repaired items that use standard copper wire and crimp-type terminals.

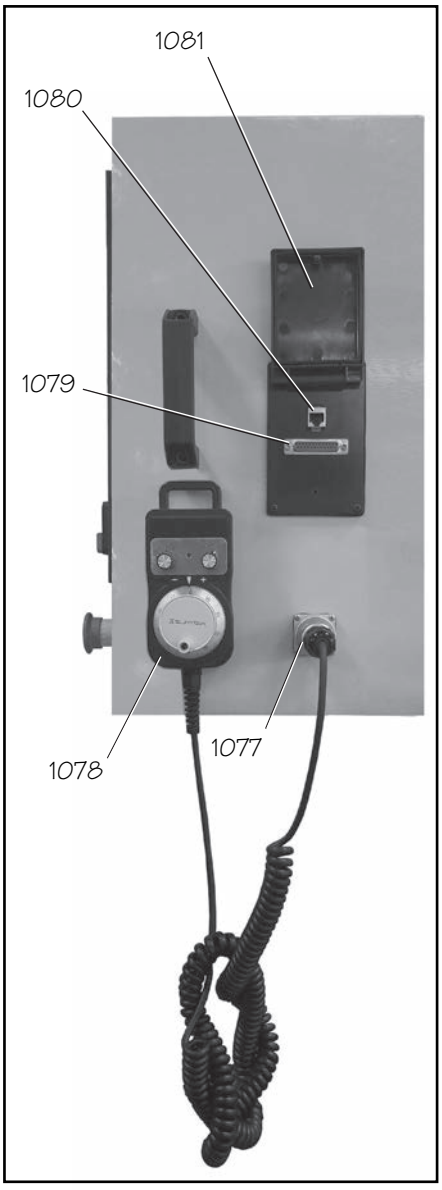
Electrical Control Box (Internal)



NOTE: Non digital data cables are field-repaired items that use standard copper wire and crimp-type terminals.

Electrical Control Box (External)



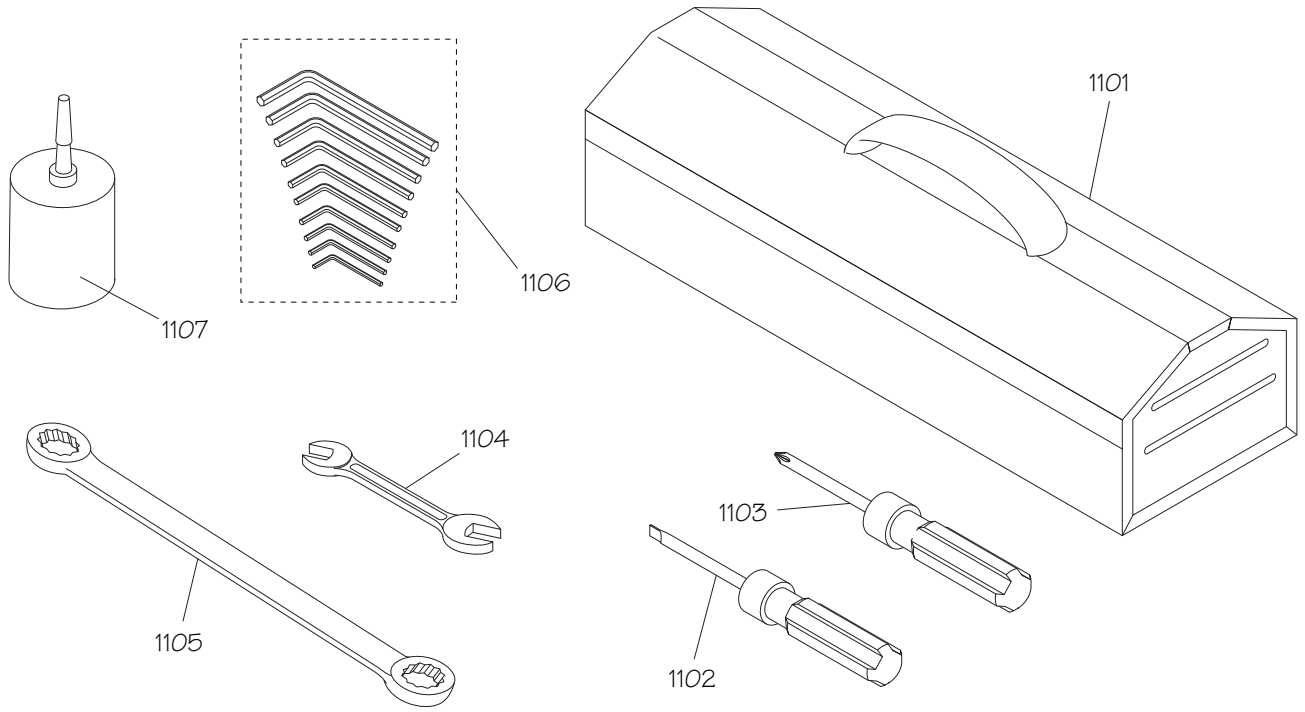


Electrical Box & Control Panel Parts List

Note: The alpha-numeric equipment number in shown in [brackets] below directly link electrical part number to the exact electrical part shown on the wiring schematics in this manual.

REF	PART #	DESCRIPTION
1000	PSB10631000	MAIN ELECTRICAL BOX ASSEMBLY
1001	PSB10631001	MAIN ELECTRICAL BOX (EMPTY)
1002	PSB10631002	DELTA POWER SUPPLY (SETTING 4.5A) [PW1]
1003	PSB10631003	SERVO DRIVE X, ASD-B2-0421-B [N1]
1004	PSB10631004	SERVO DRIVE Y, ASD-B2-0421-B [N2]
1005	PSB10631005	SERVO DRIVE Z, ASD-B2-0421-B [N3]
1006	PSB10631006	COOLING FAN [M9], [M10]
1007	PSB10631007	POWER SWITCH 220V 3PH-50A [QS1 + LS11]
1008	PSB10631008	CONTACTOR 24V 50/60 HZ [KM1]
1009	PSB10631009	RELAY [KM1]
1010	PSB10631010	CONTACTOR 24V 50/60 HZ [KM2]
1011	PSB10631011	THERMAL RELAY 415V (SET TO 0.25-0.4A) [F1]
1012	PSB10631012	CONTACTOR 24V 50/60 HZ [KM3]
1013	PSB10631013	THERMAL RELAY 415V (SET TO 0.63-1A) [F2]
1014	PSB10631014	CONTACTOR 24V 50/60 HZ [KM4]
1015	PSB10631015	CIRCUIT BREAKER HAGER MY210 C10A [FU1]
1016	PSB10631016	CIRCUIT BREAKER HAGER MY210 C10A [FU2]
1017	PSB10631017	CIRCUIT BREAKER HAGER MY106 C6A [FU3]
1018	PSB10631018	RELAY 24VDC [KR1]
1019	PSB10631019	RELAY 24VDC, 5A, 30VDC/250VAC [KR2]
1020	PSB10631020	RELAY 24VDC, 5A, 30VDC/250VAC [KR3]
1021	PSB10631021	RELAY 24VDC, 5A, 30VDC/250VAC [KR4]
1022	PSB10631022	RELAY 24VDC, 10A, 30VDC/250VAC [K1-K24]
1023	PSB10631023	TRANSFORMER 50/60HZ 1PH [T1]
1024	PSB10631024	VFD INVERTER 3.7KW/5HP 230V, 3PH [N4]
1025	PSB10631025	FUSE HOLDER 110-250 AC (5A FUSE) [FU4]
1026	PSB10631026	FUSE HOLDER 10-30 AC/DC (5A FUSE) [FU5]
1027	PSB10631027	FUSE HOLDER 10-30 AC/DC (5A FUSE) [FU6]
1028	PSB10631028	RELAY BOARD, 24 SOCKET [PCB1]
1029	PSB10631029	GROUNDING PLATE
1030	PSB10631030	JUNCTION BLOCK
1031	PSB10631031	JUNCTION BLOCK
1032	PSB10631032	JUNCTION BLOCK
1033	PSB10631033	JUNCTION BLOCK
1034	PSB10631034	DATA CABLE (CNTRL PNL TO MAIN ELE BOX)
1035	PSB10631035	DATA CABLE (CNTRL PNL TO MAIN ELE BOX)
1036	PSB10631036	CIRCUIT BREAKER COMB BUSBAR GV2 G445
1037	PSB10631037	FUSE 5A, 5 X 20MM
1038	PSB10631038	COMM CABLE X-SERVO X-AXIS [CN1]
1039	PSB10631039	AC SERVO MOTOR CABLE X-AXIS [CN2]
1040	PSB10631040	AC SERVO MOTOR CABLE Y-AXIS [CN1]
1041	PSB10631041	AC SERVO MOTOR CABLE Y-AXIS [CN2]
1042	PSB10631042	AC SERVO MOTOR CABLE Z-AXIS [CN1]
1043	PSB10631043	AC SERVO MOTOR CABLE Z-AXIS [CN2]
1044	PSB10631044	WIRE HARNESS X-SERVO
1045	PSB10631045	WIRE HARNESS Y-SERVO
1046	PSB10631046	WIRE HARNESS Z-SERVO
1060	PSB10631060	CONTROL BOX ASSEMBLY
1061	PSB10631061	CONTROL BOX (EMPTY)
1062	PSB10631062	PANEL UNIT FP8055/55IK MCUSB, VERS 14A
1063	PSB10631063	CONTROL PANEL MEMBRANE
1064	PSB10631064	FAGOR UNIT CN55IF-MC-CK-AIX-B-4-ABEHAV
1065	PSB10631065	USB DATA CABLE
1066	PSB10631066	CAT-5 DATA CABLE
1067	PSB10631067	DATA CABLE (X1 CONNECTION)
1068	PSB10631068	3-CORD DATA CABLE (X8 CONNECTION)
1069	PSB10631069	DATA CABLE (CNC TO CNTRL PANEL)
1070	PSB10631070	DATA CABLE (X5 CONNECTION)
1071	PSB10631071	DATA CABLE (X12 CONNECTION)
1072	PSB10631072	DATA CABLE (X4 CONNECTION)
1073	PSB10631073	DATA CABLE (X11 CONNECTION)
1074	PSB10631074	DATA CABLE (X10 CONNECTION)
1075	PSB10631075	4-CORD DATA CABLE (X2 CONNECTION)
1076	PSB10631076	DATA CABLE FOR CANNON PLUG ITEM #1077
1077	PSB10631077	CANNON PLUG RECEPTACLE
1078	PSB10631078	HAND-HELD CONTROLLER W/CORD
1079	PSB10631079	SERIAL PORT RECEPTACLE
1080	PSB10631080	CAT-5 PORT RECEPTACLE
1081	PSB10631081	DATA CONNECTION HOUSING AND COVER
1082	PSB10631082	FIXED HANDLE
1083	PSB10631083	AXIS INTERFACE BOARD
1084	PSB10631084	STATUS LIGHT TOWER [H1]
1085	PSB10631085	JOG CONTROL RHEOSTAT
1086	PSB10631086	FEED CONTROL RHEOSTAT
1087	PSB10631087	PLAIN BUTTON SW [HPB4, HPB6, HPB8, HPB9]
1088	PSB10631088	BUTTON SWITCH YELLOW [HPB5]
1089	PSB10631089	MAN BUTTON SW W/SAFETY COVER [HPB7]
1090	PSB10631090	SWITCH BUTTON SERVO [HPB3]
1091	PSB10631091	SWITCH BUTTON W/GREEN LIGHT [HPB2]
1092	PSB10631092	SWITCH BUTTON W/RED LIGHT [HPB1]
1093	PSB10631093	SWITCH BUTTON EMERGENCY STOP [SPB1]

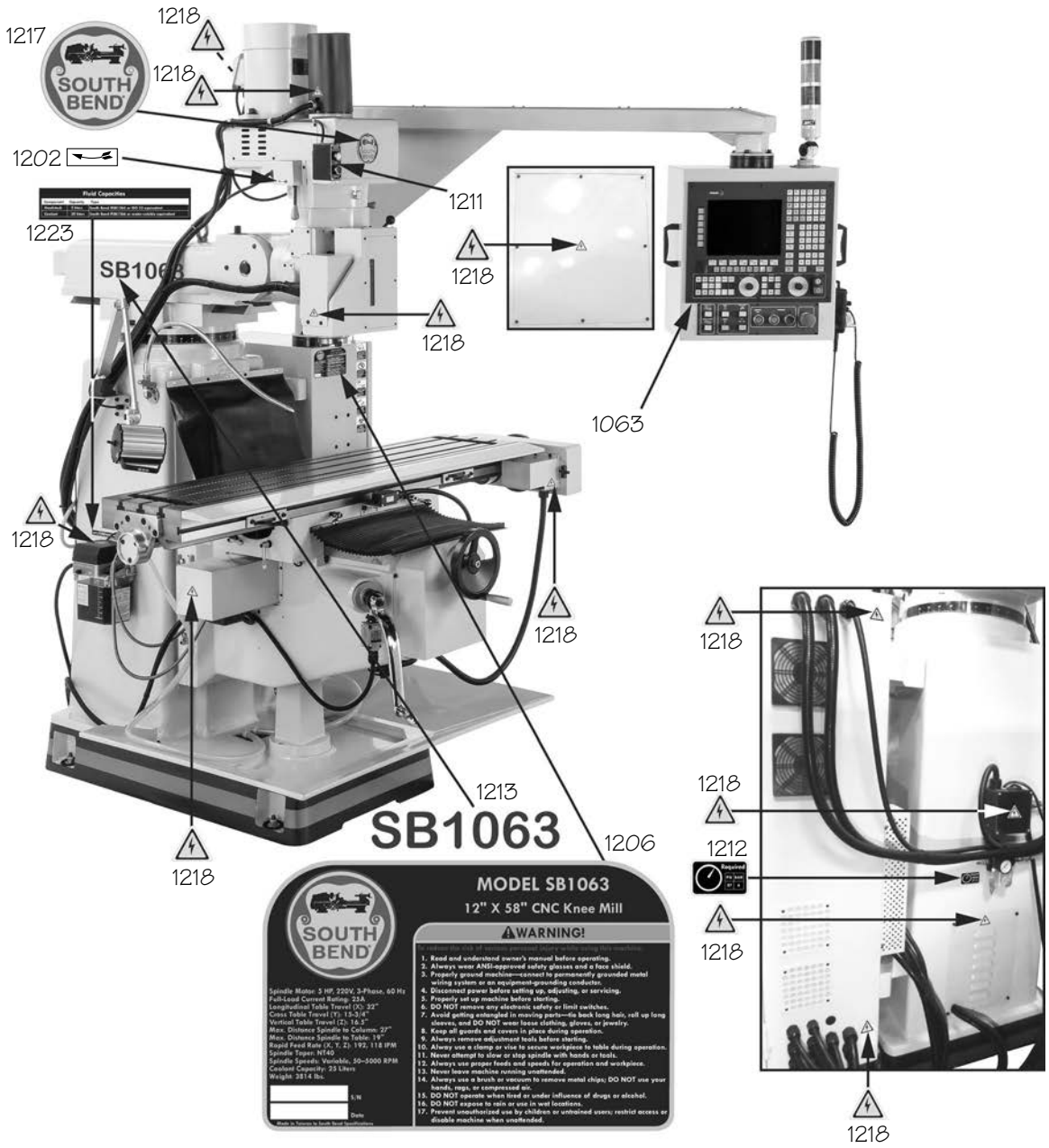
Accessories



REF	PART #	DESCRIPTION
1101	PSB10631101	TOOL BOX
1102	PSB10631102	SCREWDRIVER #2 FLAT TIP
1103	PSB10631103	SCREWDRIVER #2 PHILLIPS
1104	PSB10631104	WRENCH 12 X 14 OPEN-ENDS

REF	PART #	DESCRIPTION
1105	PSB10631105	WRENCH 19 X 21 CLOSED ENDS
1106	PSB10631106	HEX WRENCH 10PC SET 1.5-10MM
1107	PSB10631107	OIL BOTTLE

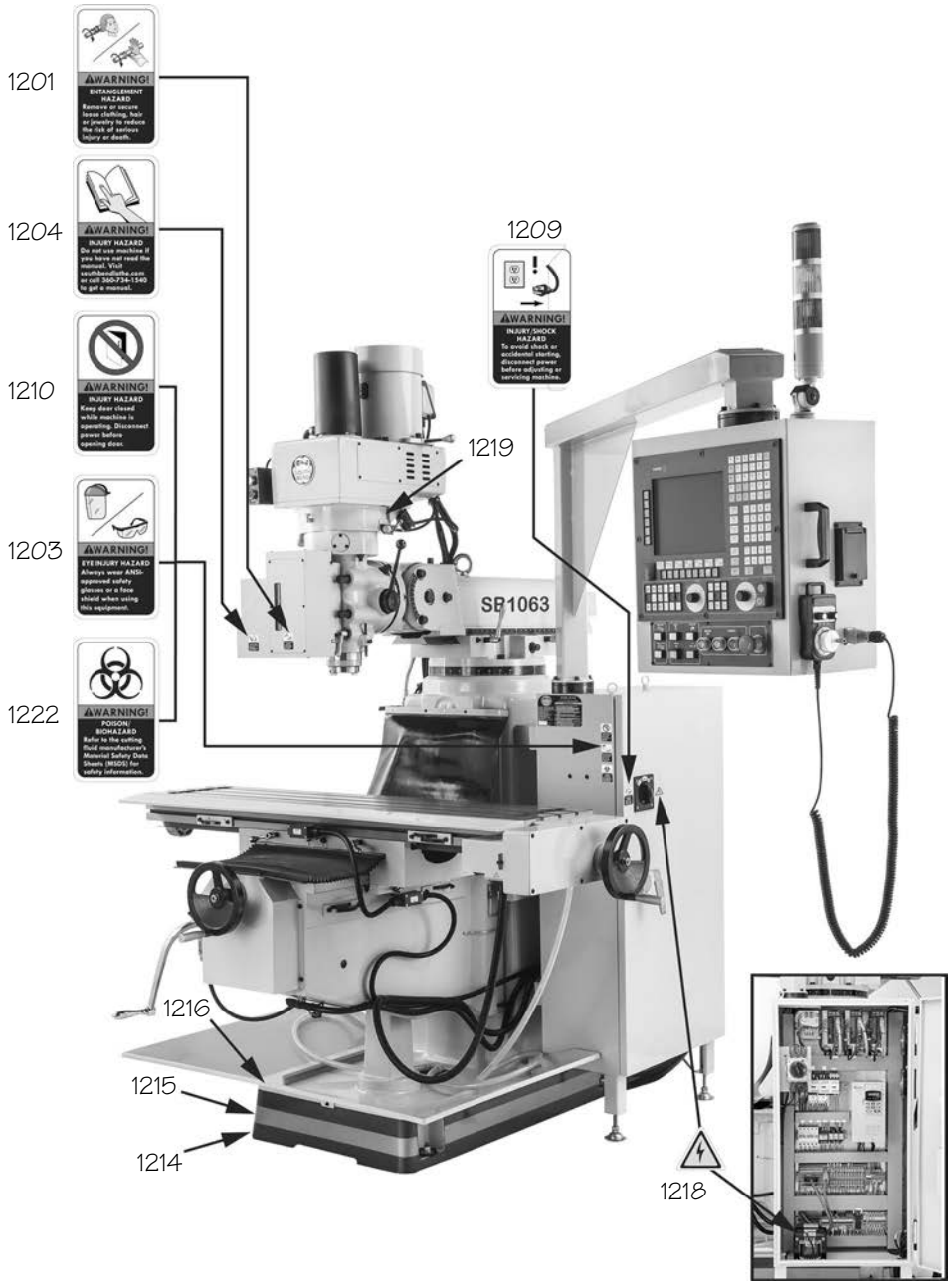
Machine Labels (Left)



⚠WARNING

The safety labels provided with your machine are used to make the operator aware of the machine hazards and ways to prevent injury. The owner of this machine MUST maintain the original location and readability of these safety labels. If any label is removed or becomes unreadable, REPLACE that label before using the machine again. Contact South Bend Lathe Co. at (360) 734-1540 or www.southbendlathe.com to order new labels.

Machine Labels (Right)



REF	PART #	DESCRIPTION
1201	PSB10631201	ENTANGLEMENT LABEL
1202	PSB10631202	DIRECTION ARROW LABEL
1203	PSB10631203	FACESHIELD/GLASSES LABEL
1204	PSB10631204	READ MANUAL LABEL
1206	PSB10631206	MACHINE ID LABEL
1209	PSB10631209	POWER LABEL
1210	PSB10631210	DOOR CLOSED LABEL
1211	PSB10631211	DRAWBAR SWITCH FACEPLATE
1212	PSB10631212	AIR CONNECTION LABEL

REF	PART #	DESCRIPTION
1213	PSB10631213	MODEL NUMBER LABEL
1214	PSB10631214	TOUCH-UP PAINT, SB DARK BLUE
1215	PSB10631215	TOUCH-UP PAINT, SB LIGHT BLUE
1216	PSB10631216	TOUCH-UP PAINT, SB GRAY
1217	PSB10631217	SOUTH BEND NAMEPLATE
1218	PSB10631218	ELECTRICITY LABEL
1219	PSB10631219	SPINDLE SPEED RANGE LABEL
1222	PSB10631222	BIOHAZARD LABEL
1223	PSB10631223	FLUID CAPACITIES LABEL

This quality product is warranted by South Bend Lathe Company to the original buyer for one year from the date of purchase. This warranty does not apply to consumable parts, or defects due to any kind of misuse, abuse, negligence, accidents, repairs, alterations or lack of maintenance. We do not reimburse for third party repairs. In no event shall we be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our products.

We do not warrant or represent that this machine complies with the provisions of any law, act, code, regulation, or standard of any domestic or foreign government, industry, or authority. In no event shall South Bend's liability under this warranty exceed the original purchase price paid for this machine. Any legal actions brought against South Bend Lathe Company shall be tried in the State of Washington, County of Whatcom.

This is the sole written warranty for this machine. Any and all warranties that may be implied by law, including any merchantability or fitness, for any purpose, are hereby limited to the duration of this warranty. To take advantage of this warranty, contact us by mail or phone to give us the details of the problem you are having.

Thank you for your business and continued support.

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