![ATS Systems logo]

ATS BAR FEED
MD SERIES, ML SERIES AND MX SERIES

Complete Your Investment

- CNC Lathe Bar Feeder With Mini / Touch Screen
- Installation, Operation And Maintenance Manual

ATS ML-580

ATS Systems, Inc.

manML565/580en V3.2.doc (valid from the program version BF 3.49)

Before starting the work with the barfeeder pay attention to the following instructions:

With regard to continuous improving of barfeeders it is possible that the illustrations and descriptions provided in this manual can differ in detail from the delivered equipment. When working with electric circuits follow the regularly updated diagrams in this manual. If you find diagrams attached to this manual, please use them, because they contain changes which have not yet been addressed in the printed copy of the manual sent to you.

The barfeeder enables the simplest and safest feeding of bars into the spindles of standard CNC lathes.

Some common workshop practices do not meet the labor safety principles and should be checked or revised according to the following recommendations. Any barfeeder operator should observe the labor safety principles. Furthermore, the operator should ensure that the machine is installed by a specialist and should carry out regular inspection of the barfeeders functions and condition.

Before starting the work with the barfeeder read carefully the following instructions:

- Before barfeeder operation or maintenance, read carefully both this Manual and the attached supplementary information. Make sure that you have understood everything well.
- Make sure that the barfeeder is properly set, aligned with the lathe and fastened to the ground.
- Do not work with the equipment which has not been properly installed, checked and prepared for operation and is not regularly maintained.
- Do not remove any safety plates and labels with signs or warnings, and follow the instructions shown on them.
- Do not slacken screw joints which are secured by paint.
- Do not work with the equipment which produces excessive noise, heat or vibration. In your own interest call immediately attention of the personnel responsible for the barfeeder operation and maintenance to the problem.
- Make sure that the machine is properly grounded in accordance with valid standards.
- Disconnect the machine from electric power supply before any repair or maintenance.
- Do not touch electric control or power parts until they are disconnected from electric power supply.
- Do not touch electric equipment by wet hands or while you are standing in a moist environment.
- Electric equipment of the barfeeder can only be repaired by an authorized person.
- Replace the fuses only by the fuses of the same rating and type as those which have been installed by the manufacturer.
- Keep the space around the machine dry, clean and properly lighted.
- Have suitable extinguishers ready at work with flammable substances.
- Remove turnings and all other waste, especially flammable one, from the barfeeder regularly.
- Do use flammable or toxic substances instead of cleaning agents.
- Do not change the connection or function of safety switches, indicators and fuses, and do not short-circuit or otherwise by-pass this equipment.

ML-565/580T/S

Safety Instructions

- Before the use the barfeeder remove all parts and tools from the barfeeder and its vicinity, from the vicinity of its moving parts.
- If the machine has been out of service for a longer time, check the machining program, part clamping and setting of the barfeeder parameters before fully automatic operation of the lathe with the barfeeder.
- Do not remove or unlock safety guards during barfeeder operation.
- Do not remove or add bars while the barfeeder is running.
- Do not wear rings, bracelets, watches, too free clothing etc at work with the barfeeder. Long hair should be protected by a suitable cap.
- Do try to stop or slow down the barfeeder by your own hands.
- Accessories, which were not delivered by the manufacturer within the basic shipment, must be checked thoroughly by authorized personnel in installation.
- Be especially careful close to unprotected moving parts, in their initial setting. Beware of sharp edges of parts.
- Use only hammers with a soft head (if you must use the hammer).
- Observe operating limits of the equipment given in the specification.
- Use spindle insert to ensure correct position of the bar in the lather spindle.
- Do not process the bars exceeding the length of the lathe spindle/spindle insert.
- Make sure that the channel is empty before loading a bar from the table into the channel.
- Always set the parameter #101 with a enough margin to eliminate contact of the pusher with the rotating spindle
- Set a minimum value of the parameter #300. Too high feeding force overloads both the barfeeder and the lathe.
- Before start of the work make sure that all safety circuits are active.
- Check where all Stop and Total Stop pushbuttons are located.
- Prior to activation of the automatic cycle make sure that all required functions are properly set and that all controls are set to correct position.

		Observe labor safety principles!!!

TABLE OF CONTENTS

Table of Contents

LIST OF FIGURES

IDENTIFICATION OF INSTRUCTIONS

- Important instructions are emphasized in this manual as follows:

	⚠ DANGER	**Failure to observe these instructions can result in injury of the operator.**

	⚠ WARNING	**Failure to observe these instructions can result in damage to the barfeeder or the lathe.**

	⚠ NOTICE	**Other important instructions**

- Parameter numbers are identified as #xxx in this manual, where xxx is the parameter number.

1 DESCRIPTION

1.1 GENERAL DESCRIPTION

The barfeeder ML-565/580 T/S has been designed for work with any type of CNC lathe equipped with a suitable interface. The length of the bars is limited by the length of the lathe spindle (with a clamping cylinder and clamping device). As the barfeeder does not touch any rotating part of the lathe or rotating bar, it is possible to utilize full range of operating speed of the lathe. Barfeeder design enables automatic loading and feeding of bars into the lathe with minimum built-up area required. Barfeeder setting up and programming is easy and fast.

Bars must be guided by the spindle insert in the lathe. The remnant of the bar, from which it is not possible to make a part, is forced by the barfeeder into the lathe workspace, with no additional equipment needed.

The barfeeder is designed for work with bars of any cross sections. For feeding of non-circular cross section bars the lathe must be equipped with a spindle orientation. At work with bars of common cross sections a section insert must be installed in the movable channel of the barfeeder; the insert is not a part of the standard equipment of the barfeeder.

1.2 APPLICATION

Barfeeders of ML-565/580 series are manufactured in the following modifications:

Barfeeder	Feeding mode	Other important functions
T	Stopper	
S	Stopper or Position	Remnant Ejecting by New Bar

Barfeeders of ML-565/580 series provide:

Function	T	S
Cheap and effective automation of operation of any CNC lathe	✓	✓
Workspace saving thanks to side storage and loading of bars	✓	✓
Automatic loading of a new bar after processing of the previous bar	✓	✓
Precise work at high speed of the lathe spindle unaffected by the barfeeder	✓	✓
Processing of bars of imperfect shape or dimensions	✓	✓
Bar feed against the lathe stopper	✓	✓
Bar feed to a programmed position (without stopper)		✓
For double-spindle lathes, feeding through the second spindle without time delays necessary for the barfeeder operation	✓	✓

1.3   CONCEPT

The barfeeder ML-565/580 T/S is a powerful machine with a long service life and minimal maintenance required. Its operation and functions are simple which facilitates the work even to less skilled workers.

The barfeeder is controlled by means of the control panel in the right part of the machine. There is an E-Stop pushbutton for emergency stop on the control panel. In the left part of the barfeeder frame there is a Q1 switch.

Bars are loaded in the magazine. Loading of bars into the lathe is ensured by a loading channel with a flag and pusher.

On the rear side of the frame there are connectors X1, X2 for barfeeder interconnection with the lathe.

1.4   TECHNICAL SPECIFICATION

Application

For all CNC lathes equipped with a suitable interface.

Scope of application		Bar dimension
Bar round cross section	ML-565	1/4 -2 5/8 Inch
		6 to 67mm
	ML-580	1/4-3 1/8 Inch
		6 to 80 mm
Bar hexagonal cross section	ML-565	3/8 -2 1/4 Inch
		8 to 58mm
	ML-580	3/8 -2 1/2 Inch
		8 to 68 mm
Bar square cross section	ML-565	3/8 -1 3/4 Inch
		8 to 47mm
	ML-580	3/8 -2 1/8 Inch
		8 to 55 mm

Bar weight	
Maximum weight of per loaded bar	132 Lbs. 60 kg

Bar length	
Maximum length of the bar handled by the barfeeder	60" 1525 mm

		Actual max. length of the bar is limited by the length of the spindle (with clamping cylinder and clamping device).

Magazine capacity depending on the bar diameter

8 bars	⌀ 3 1/8" 80 mm
The number of bars limited by the table capacity	⌀

🏋	⚠ NOTICE	**Total weight of all bars on the table must not exceed 550 lbs 250 kg.**

Pusher stroke

Design stroke	65.5" 1665 mm
Working stroke	65.25" 1660 mm
Maximum distance of the clamping device face from the pusher point in back position	65.16" 1655 mm

Technology of bar handling

The bar is cantered in the lathe spindle by spindle inserts, and shifted by the pusher to a stopper in the tool head.

Spindle speed

Depending on lathe design and quality of spindle insert.

Bar preparation

No specific requirements for bar preparation.

Bar straightness

Bar must freely go into the user selected spindle insert.

Bar loading cycle

approx. 30 s

Setting time at change of bar diameter

Max. 1 minute at change to other diameter + time of lathe spindle insert replacement

Colour design

Light grey

Weight

approx. 825 lbs 375 kg

Packaging

Transport dimensions	length 88" x width 46" x height 48 " length 2230 x width 1150 x height 1220 mm

Barfeeders are sealed in plastic sheet and transported on non-returnable pallets or in boxes. Pallet weight is approx. 35 kg, the weight of the whole box approx. 170 kg.

Electrical equipment

Power supply	200/230/400 VAC, 50/60 Hz, 320 VA
Power circuits	200 VAC, 24 VDC
Logic circuits	24 VDC

Noise emission

B: 150 mm

A: 150 mm
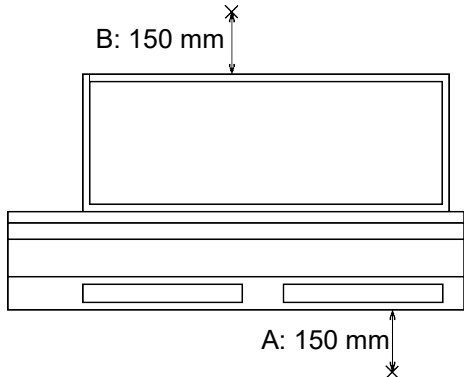
The values have been stated in accordance with ČSN EN ISO 4871 and basic standard ČSN EN ISO 11201.

	A		B	
	w/o bars	with bars	w/o bars	with bars
Measured emission level of sound pressure A, P_{pAd} at the operator workplace (dB)	67	69	68	71
Uncertainty, K_{pA} (dB)	4	4	4	4

Main dimensions
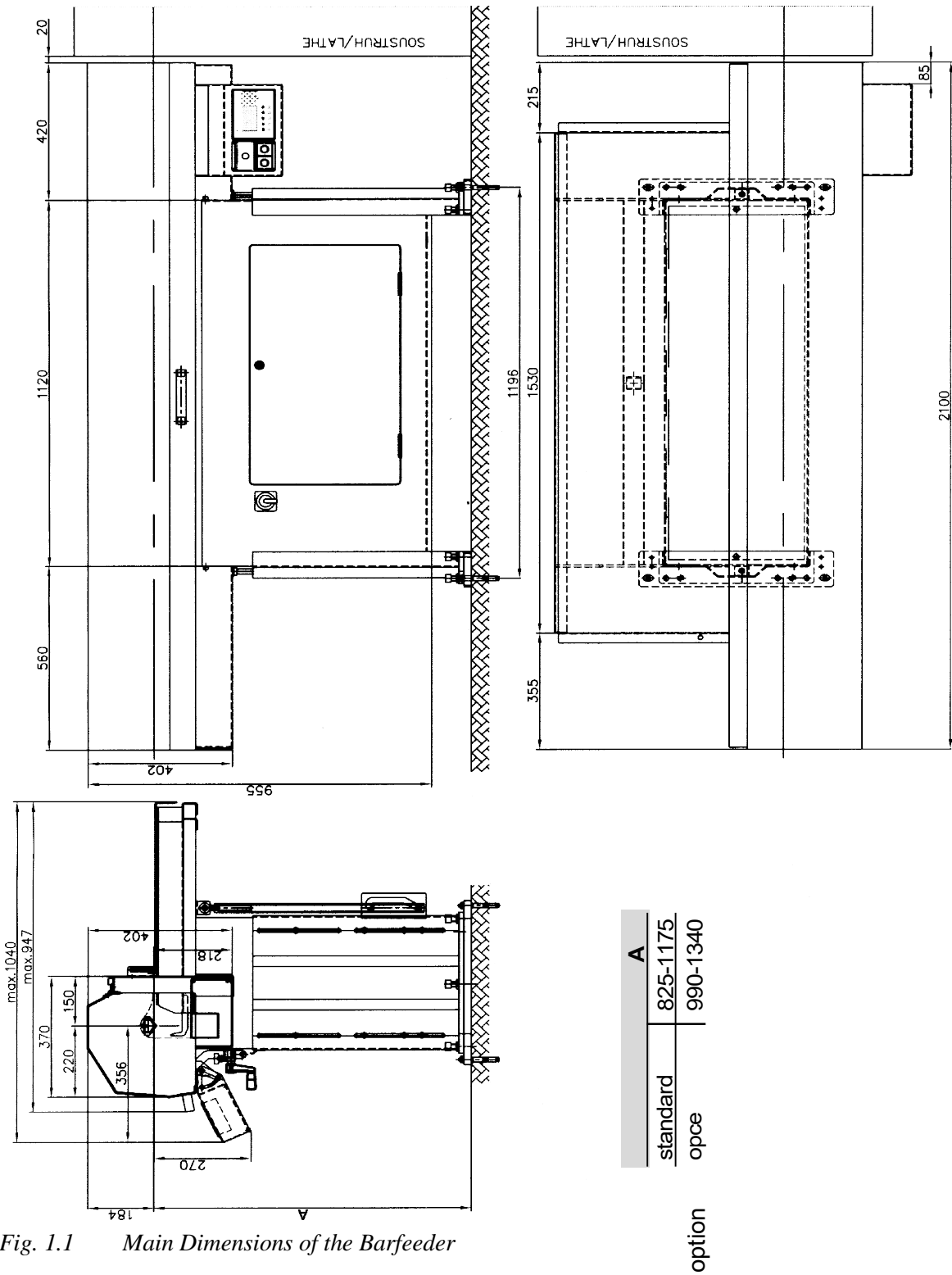
Fig. 1.1   Main Dimensions of the Barfeeder

	A
standard	825-1175
opce	990-1340

option

1.5 PROCESS DESCRIPTION

ML-565/580 T/S barfeeder feeds bars into the lathe as follows:

- The channel takes a bar from the magazine and lifts it to the lathe spindle axis level.
- The flag shifts the bar into the spindle and after it returns to back limit position.
- The channel moves to the lower limit position and the pusher is tilted to the spindle axis.
- The pusher pushes the bar through the open clamping device against the stopper in the tool head (T/S) or to a required position in front of the clamping device (S).
- The clamping device closes, and the pusher returns.
- The lathe machines the part.
- Next bar feed is executed, when the spindle stops, and clamping device opens.
- If the bar length is insufficient to make another part, the barfeeder sends the End of Bar signal. The signal is tested by the lathe program which issues a command to eject the remnant of the bar and load a new bar.
- Following the End of Bar signal the clamping device opens to enable ejection of the remnant of the bar by the pusher.
- After ejection of the remnant of the bar into the lathe workspace, the pusher tilts to upper position, the channel takes a bar from the magazine, and the whole cycle is repeated.

1.6 INSTALLATION

It is recommended that installation should be carried out by the manufacturer's staff or by persons authorized by the manufacturer. Prior to installation, check the items specified in the installation form, and verify whether suitable interface is installed on the lathe for the barfeeder with the magazine.

1.7 IDENTIFICATION AND SERIAL NUMBER

Serial number of the barfeeder is shown on the nameplate fastened under the magazine.
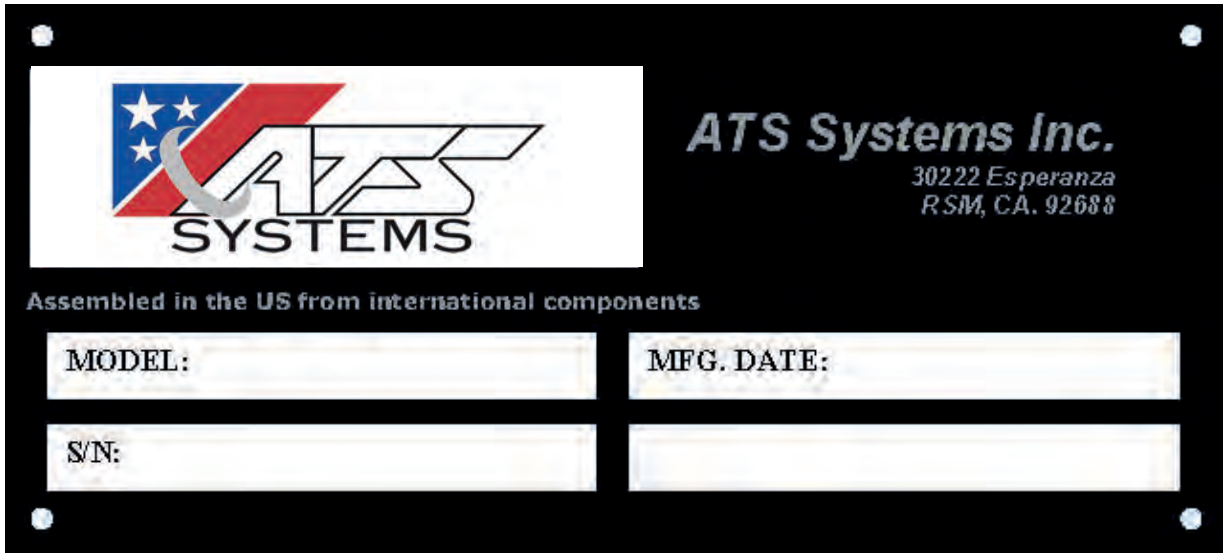
Fig. 1.2   Nameplate

2 TRANSPORT AND UNPACKING

Barfeeders are sealed in plastic sheet and transported on pallets or, exceptionally, in wooden boxes (see Chapter 1.4 for dimensions). They are fastened by screws to the box bottom/pallet.

	⚠️ NOTICE	**To eliminate any damage, the following procedure must be observed during unpackaging, otherwise the manufacture will bear no liability for any damage in unpackaging not carried out according to this procedure.**

Unpacking

- Put the box/pallet behind the lathe to the place where the barfeeder is to be installed.
- If the barfeeder is in the box, remove the cover and sides of the box.
- Remove the plastic sheet.
- Check whether the shipment is in order and complete (according to the packing list attached to the Manual).
- Lift the barfeeder by high-lift truck with forks under the lower part of the casing. If it is difficult to slide the forks under the barfeeder, increase the height of the barfeeder pusher axis, see Chapter 2.

	⚠️ WARNING	**Lift the Barfeeder only under the lower part of the casing. Never lift it otherwise, or you could cause a damage.**

- Put the barfeeder on the rear side of the lathe as shown in Fig. 2.1. The distance between the rear side (rear end) of the lathe spindle and front cover of the barfeeder should be as small as possible. The gap between the barfeeder cover and lathe cover must not exceed 20 mm or it is necessary to disable insertion of the hand palm between the barfeeder and the lathe.
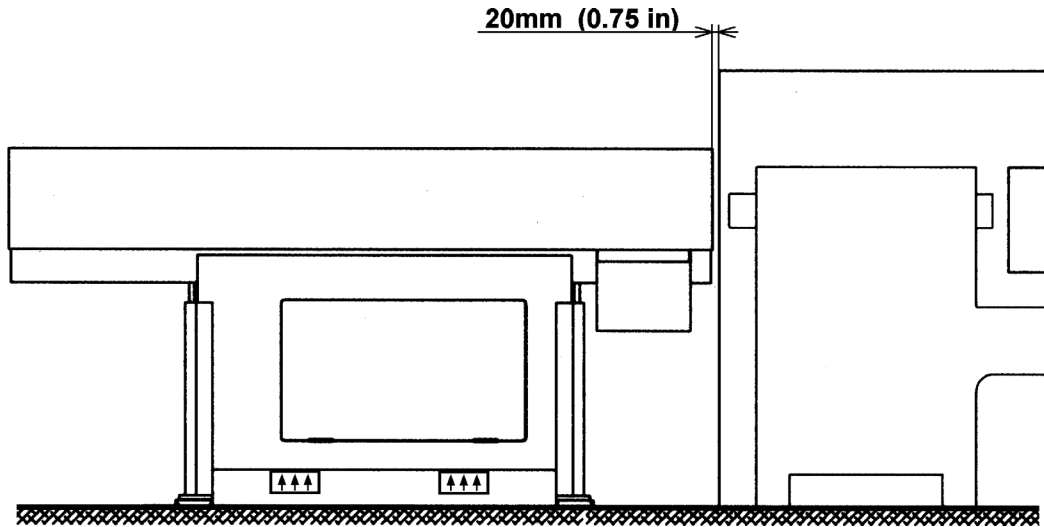
Fig. 2.1   Barfeeder Lifting and Setting

In unpacking check the completeness of standard accessories.

Standard accessories of the barfeeder ML-565/580	
Type	**Quantity**
anchor bolts	4
washers under anchor bolts	4
setting kit	1
setting wrench (speeder)	1
User Manual	1
pusher with fix point $\varnothing$10 mm	1

See the packing list for complete list of the delivered accessories.

3   INSTALLATION

3.1   PREPARATION

It is appropriate for easy and quick installation that the installation and the first start-up of the barfeeder should be carried out by the manufacturer's technician or a by a person authorized by the manufacturer. It is in the user's interest to ensure presence of the barfeeder operation and maintenance staff during installation in order for them to be familiarized with the principles of the barfeeder use in collaboration with the lathe. Furthermore, it is necessary to prepare and check the following items before installation.

1. Lathe
- The lathe should be anchored to ground to eliminate its eventual motion in relation to the barfeeder.
- The lathe must be equipped with a suitable electric interface for the barfeeder with a magazine.
- The lathe must have automatic clamping device (a collet or chuck).
- The clamping device should clamp by the motion of the pull tube backwards (to the barfeeder). Otherwise it is not possible to feed the bar to a position (S).
- If functional check of the barfeeder is required on a real part, the lathe must be prepared for the part production with debugged NC program, and must be equipped with necessary tools.
- The lathe must be free on the installation day. Neither production nor program debugging can take place on it.

> **If you want to feed bars to a programmed position (without stopper) it is necessary, that the clamping device clamps the material by motion of the pull tube backwards (from the lathe to the barfeeder).**

2. Spindle inserts
It is the user's responsibility to ensure centering spindle inserts for the bars to be machined on the lathe in start of production. Some lathe manufacturers deliver these inserts within accessories. You can find detailed information on the spindle inserts in Chapter 4.3.

3. Bar stock for testing
The user must prepare a bar stock for the trial run of the barfeeder in installation (cut the bars to an appropriate length).

4. Foundations
Barfeeder foundations must be of high-quality concrete. Barfeeder legs shall be fastened in the concrete by anchor bolts. The foundations must provide sufficiently strong connection of the lathe and the barfeeder without transfer of vibration.

Note: *Before installation it is suitable to carry out the last inspection of completion of the preparatory work and to inform the installation personnel of its result in order to prevent from wastage in consequence of unexpected problems that may occur before installation.*

3.2 BARFEEDER ALIGNMENT

1. GENERAL

Barfeeder alignment regarding the lathe is the most important installation step and must be carried out as thoroughly as possible. The time spent by this process is negligible compared to possible damage to the lathe or the barfeeder in wrong alignment.

Proper alignment of the barfeeder is important for its trouble-free run.

Observe prescribed distances in installation, see Fig. 2.1.

2. PRESETTING THE HEIGHT AND SIDE POSITION

- Install the pusher see Chapter 4.8.
- Slacken 4 locking screws 3.1/3 and the lock nut 3.1/1 securing the set screw on each leg.
- Using 6 screws 3.1/5 and 4 studs 3.1/4, align the barfeeder into horizontal position to compensate unevenness of the floor and to eliminate barfeeder twisting. Tighten the screws.
- Set the barfeeder roughly into correct position by means of the set screw and crank 3.1/6 and horizontal displacement of the whole barfeeder (including the pad 3.1/8). Pusher axis should be approximately aligned with the lathe spindle axis.
- Continue the setting according to the following chapter.
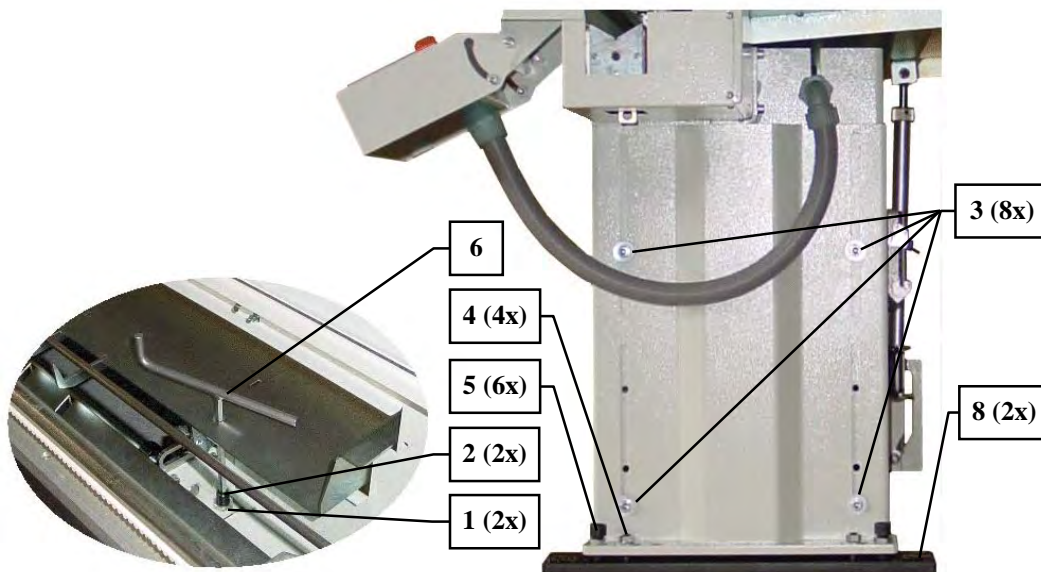
Fig. 3.1   Setting the Height and Side Position

---

3. GEOMETRIC ALIGNMENT WITH THE LATHE
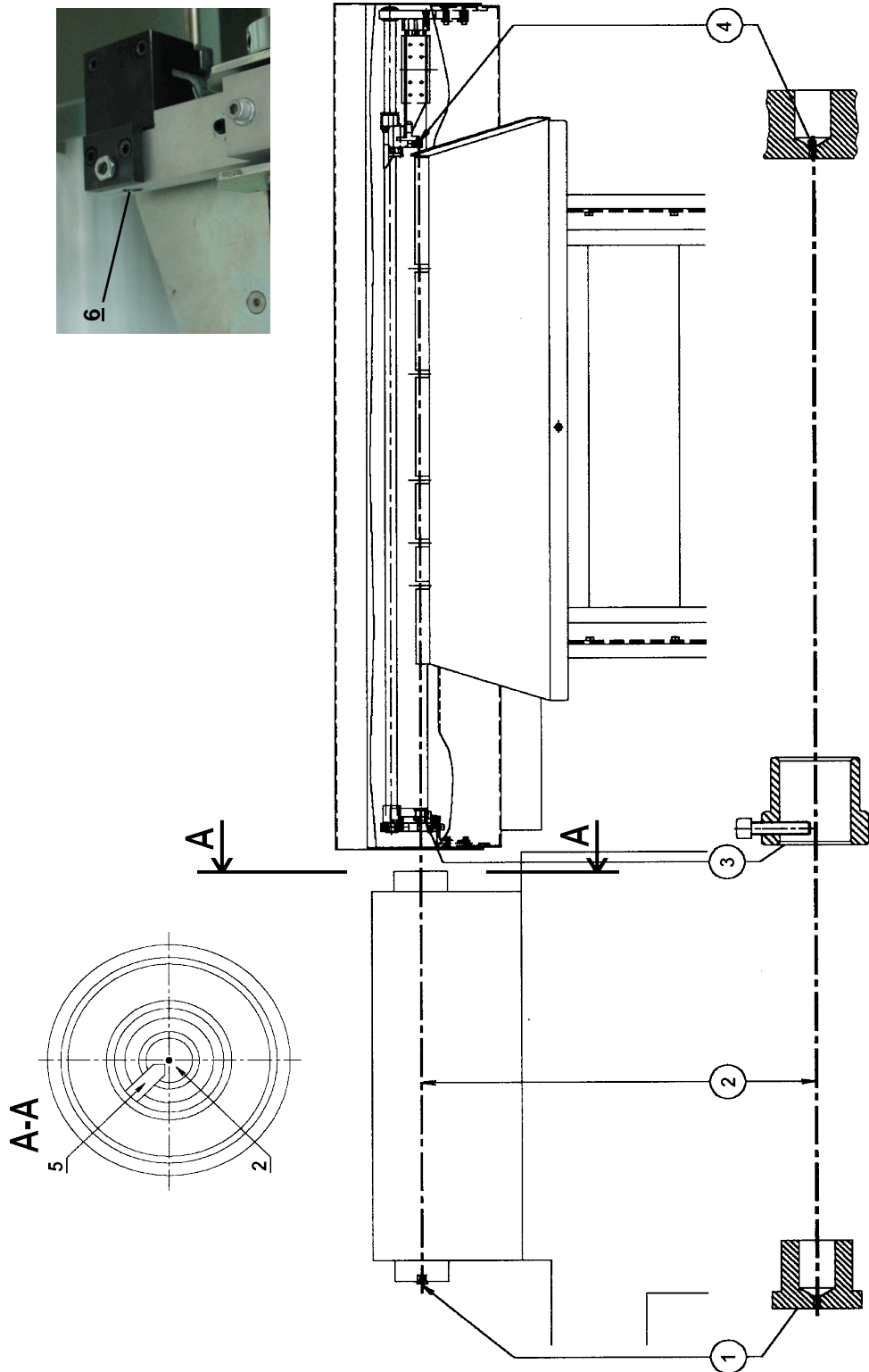
Fig. 3.2   Setting Kit

a)   Preparation

- Dismantle the pusher.
- Install setting jigs, see Fig.3.2.
    1. Part 3.2/1 into the clamping device of the lathe.
    2. Part 3.2/3 into the front grip of the pusher.
    3. Part 3.2/4 into the rear grip of the pusher.
- Pull the string 3.2/2 through sleeves 3.2/4, 3.2/3 and 3.2/1, and secure it by knot in the part 3.2/4.
- Fix the flag (pusher) in the back position by screw 3.2/6.
- Tighten the string to approx. 50 kg, and fasten it on the front part of the spindle to sleeve 3.2/1, using, for example, a clamp, locking pliers or a suitable grip.
- Place the centering plate 3.2/5 (not included in the delivery) on the rear part of the lathe to a place where the string runs. You can make the plate e.g. from paste-board and fasten it by means of a magnet. Set the plate towards the spindle center.

b)   Presetting before anchoring

Perform all vertical and horizontal adjustments needed for the alignment of the barfeeder and the lathe by changing the barfeeder position (changing the position and height of the front and rear leg).

To achieve correct height, use the set screws 3.1/2. Lateral alignment shall be made by shifting the barfeeder on the floor. The centering shall be assessed by centering the string against the revolving spindle with the plate 3.2/5, and against the revolving centering sleeve 3.2/3.

First adjust the rear part of the barfeeder and then the front part (closer to the lathe). The change of the rear part of the barfeeder affects significantly the front part position.

Final position tolerance should be ±0.2 mm.

1. Check that the string touches no obstacle.
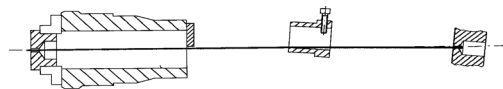
2. Align roughly the Barfeeder.
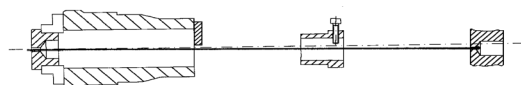
3. Centre the string on the rear face of the spindle by moving the rear legs and recheck that the string does not touch anything.
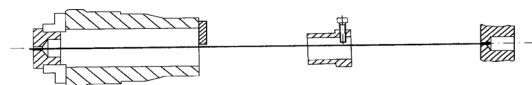
4. Centre the string on the front face of the barfeeder pusher bracket by shifting the front legs and recheck that the string does not touch anything.
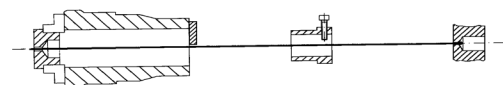
5. Tighten the screws you have slackened, see Chapter 2. Check whether the string has been centered within the specified tolerance. Repeat steps 3-5, if need be.

c)   Anchoring

After proper alignment, fasten the Barfeeder to the ground by means of expansion anchor screws (2 per each leg).

- Drill holes according to dimensions of the delivered anchor screws. The holes must be sufficiently deep. The screws must not seat on the bottom of the hole.
- Insert the screws in the holes and tighten them properly.
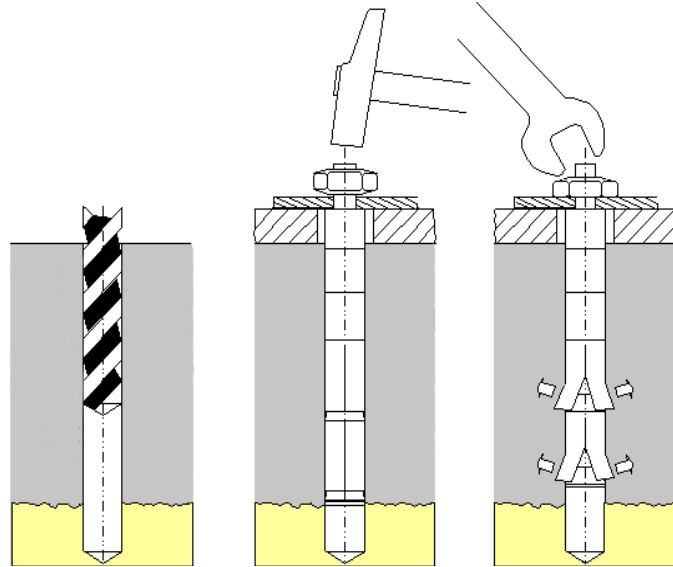
Fig.3.3   Barfeeder Anchoring

d)   Final Alignment

- It is possible that small position corrections will be necessary to finish the barfeeder alignment. Repeat the procedure described in p. b), but move with the barfeeder only on the fastened pad 3.1/8.
- After alignment, tighten all screws and lock nuts (connection of the leg with the pad and vertical alignment) and recheck the barfeeder alignment. Final alignment tolerance should be ±0.2 mm.
- After the alignment, dismantle the setting kit and store it for eventual future use.

3.3 ELECTRICAL CONNECTION

- Interconnect the barfeeder and lathe interfaces.
- Set the barfeeder transformer to proper supply voltage.
- Install fuses F1, F2 of proper values see Chapter 5.3.3.

Note: *Some types of lathes use a single cable harness for both power and communication conductors, while other types use two separate harnesses. The barfeeder connection is modified accordingly.*

Fig. 3.4   Electrical Connection

4 OPERATION

4.1 PRIMARY PREREQUISITES

4.1.1 PUTTING INTO OPERATION, ANCHORING, ALIGNMENT

The barfeeder must be thoroughly installed according to Chapter 3.

4.1.2 SAFETY OF OPERATION

Interface and safety circuits between the lathe and the barfeeder must be properly connected and checked. The manufacturer bears no responsibility for the barfeeder operation, it the barfeeder and lathe interconnection is not carried out in accordance with the interface drawing.

4.1.3 ATTENDANCE

Perfect knowledge of the lathe and barfeeder is necessary both from the viewpoint of proper function of the whole equipment and from the viewpoint of its safe attendance.

4.2 WORKING PROCEDURES

4.2.1 FEEDING TO STOPPER

In this mode the barfeeder feeds the bar to a previously set stopper which is fastened in the lathe tool head. Thus the stopper position determines the position the bar is fed to.

At change of work piece parameters:

At change of the bar diameter:
Change the spindle insert.
Select the correct bar see Setup Wizard
Change the length of the pusher retract position see Setup Wizard.

In significant change of the bar diameter it may be also necessary to:
Change the pusher size.
Set the feeding force, see Auto Mode

At change of the part length:
Set the remnant length see Setup Wizard.

At change of jaws, change of clamping device type, change of pusher length:
Set the distance of the clamping device from the barfeeder, see Operator Parameters.

4.2.2   FEEDING TO POSITION (S)

In this mode the barfeeder feeds the bar to a position set in the barfeeder. In this case the stopper is not needed.

At change of work piece parameters:

At change of the bar diameter:
Change the spindle insert.
Select the correct bar, see Setup Wizard
Change the length of the pusher retract position, see the parameter #101.

In significant change of the bar diameter it may be also necessary to:
Change the pusher size.
Set the feeding force, see Auto Mode.

At change of the part length.
Set the remnant length, see Setup Wizard.
Set the length of feeding of the new bar to the face of the clamping device, see Setup Wizard
Set the feed length see Setup Wizard.

At change of jaws, change of clamping device type, change of pusher length:
Set the distance of the clamping device from the barfeeder, see Operator Parameters

4.3   BAR GUIDING

Bars are guided by the spindle insert in the lathe. The insert ensures bar centring in the spindle. The insert should be made of a seamless steel tube.
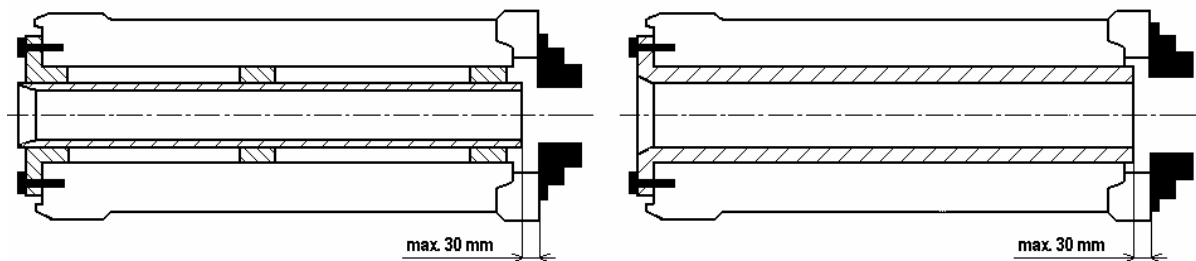
Fig. 4.1   Bar Guiding in the Spindle Insert

Spindle insert	
Insert diameter	bar diameter + (0.5 to 2.5) mm
Insert/spindle misalign	max. 0.1 mm
Insert bevel	min. 3x30˚
Pulled bar straightness	max. 0,5 mm/m
Clearance between the insert face and clamping device	max. 30 mm

4.4   BAR FEEDING

Bars are as a rule fed by the pusher into the lathe workspace. The lathe spindle must not turn during feeding. If the parameter #011 is set to *Magazine Only*, it is possible to feed the bar using e.g. the second spindle of the lathe. In this case it is possible to feed the bar without stopping the spindle. In all cases the bar must be centered by the spindle insert.
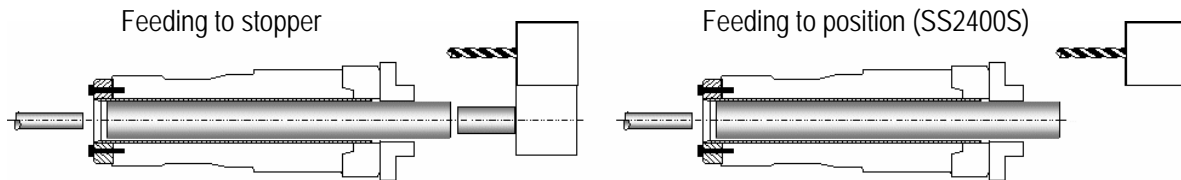
Fig. 4.2   Bar Feeding

4.4.1   FEEDING TO STOPPER

In bar feeding to a preset stopper which is as a rule fixed in the lathe tool head, the barfeeder always acts on the bar by a force which maximum value is set in the parameter #300.

4.4.2   FEEDING TO POSITION (S)

In bar feeding to a predefined position the barfeeder feeds the bar by the length set in the parameter #105 (#106). During feeding no obstacle (lathe tool head) must be on the bar travel! If the bar hits the obstacle, the barfeeder will push the bar with a maximum possible force. In this case the pusher $\varnothing$ 6 mm can be bent. In the *Position* feeding mode the parameter #300 limits only the force by which the pusher ejects the remnant of the bar and pushes the new bar into the lathe spindle.

4.5 INSTALLATION OR REPLACEMENT OF SPINDLE INSERT (AT CHANGE OF THE BAR DIAMETER)

The user shall ensure appropriate spindle inserts, see Chapter 4.3. **How to replace the spindle insert**

- Switch over the barfeeder to manual mode, and move the channel into the position, where neither the channel nor the pusher prevents from the access to the spindle.
- Release the insert in the lathe spindle and move it out in the barfeeder direction.
- Push the new insert into the lathe spindle and fix it.

4.6 SETTING THE LOADING CHANNEL POSITION (AT CHANGE OF THE BAR DIAMETER)

See the parameter #200.

4.7 SETTING THE MAGAZINE POSITION (AT CHANGE OF THE BAR DIAMETER)

To ensure proper separation of individual bars in loading, the bar magazine position must be set correctly with regard to the loading channel.

How to set the magazine position

- Insert best of all two bars into the magazine and set a suitable angle using the leg 4.3/1.
- In the manual mode shift the loading mechanism to ensure that the channel is closely under the stops 4.3/4.
- Slacken the retaining nut 4.3/2 and using the 8mm hex wrench set the magazine to such position that the channel will take only one bar in upward motion.
- Secure the magazine position by the retaining nut 4.3/2 and test the loading in the manual mode.

Magazine Angle Setting

Fig.4.3.1
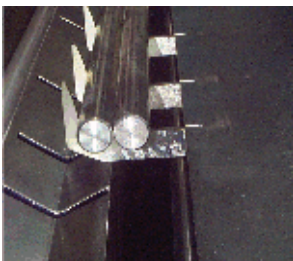
Magazine Position Setting

Fig.4.3.2

4.8   PUSHER

Barfeeders ML-565/580 is delivered with the following pushers.

Pusher	Bar ∅	T	S
∅ 6 mm with fixed point	6 – 15 mm	option	option
∅ 10 mm with fixed point	12 – 80 mm	standard	standard
∅ 18 mm with fixed point	30 – 80 mm	option	option

How to replace the pusher

- Release 2 fixing screws 4.4/2 in the pusher lock and pull the pusher 4.4/1 out from the front sleeve 4.4/3.
- Replace the bush 4.4/3 in the front holder of the pusher by the bush corresponding to the new pusher diameter.
- Insert the new pusher in the front bush, put the rear holder to the pusher lock, and tighten the screws 4.4/2.
- Check or set the parameter #102.
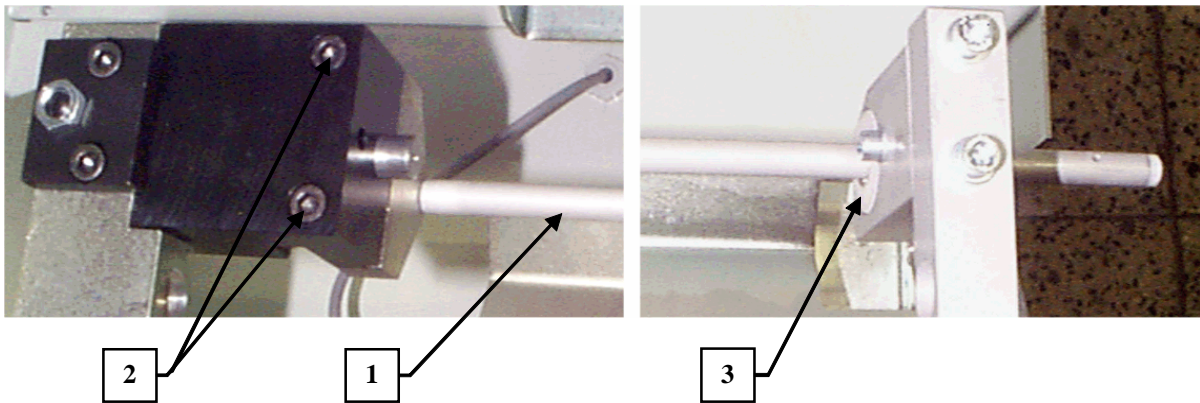
Fig. 4.4   Pusher Dismantling and Mounting

4.9 BARFEEDER CONTROL

All controls of the ML-565/580 barfeeder are on the touch screen control panel.

E-stop (S1)   **Power On (S10)**

Fig. 4.5 Control Panel

4.9.1 E-STOP (S1)

E-Stop panel is located on the top part of the HMI and is used for the control of safety elements of the barfeeder. The HMI also contains Emergency Stop button (S1), Power On button (S10).

4.9.1.1 POWER ON BUTTON (S10)

If all safety circuits are closed (Emergency Stop button is not pressed and barfeeder cover is closed), it is possible to connect the power part of the barfeeder by the Power On button located on the touch screen Auto Mode or Manual Mode pages.

The power part must be connected after every start-up of the barfeeder, after inappropriate opening of the cover or following the pressing of the Emergency Stop button on the barfeeder or on the lathe.

4.9.1.2 MODE SWITCHES

Mode function keys allows for work in the manual mode even with the cover open, which facilitates the barfeeder adjustment by the operator.

Position	Meaning
AUT	If the switch is in AUT position, it is possible to run the Barfeeder in automatic cycle. If the cover is open, the power part of the barfeeder is disconnected. In this position of the switch it is not possible to work in the manual mode.
MAN	If the switch is in MAN position, it is possible to open the cover and work with the barfeeder in the manual mode. Automatic cycle is locked in this case.

Warning!

If the mode switch is in MAN position, the barfeeder can move even with the cover open. Be especially careful when operating the barfeeder in the manual mode.

Your inattention can result in your injury!!!

4.9.2 KEYS
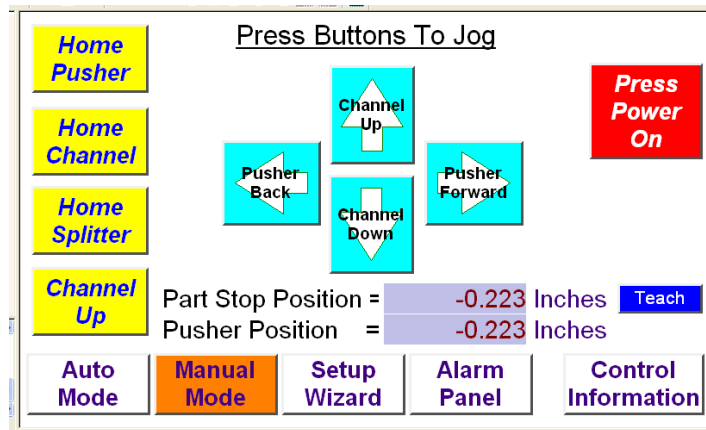
Fig. 4.6 Manual screen

4.9.2.1 MODE KEYS AUTO, MANUAL, SETUP, ALARM, CONTROL

Key	Mode	Meaning
Auto	Automatic	It is possible to run the barfeeder in the automatic cycle.
Manual	Manual	It is possible to drive the barfeeder manually using the navigation keys.
Setup Wizard	Setup wizard	It is used to set the barfeeder parameters.
Alarm Panel	Alarm Panel	It is used to view the current and last 3 alarms
Control Information	Control Information	It is used to get control information, set job files and access all parameters including operation and service parameters.
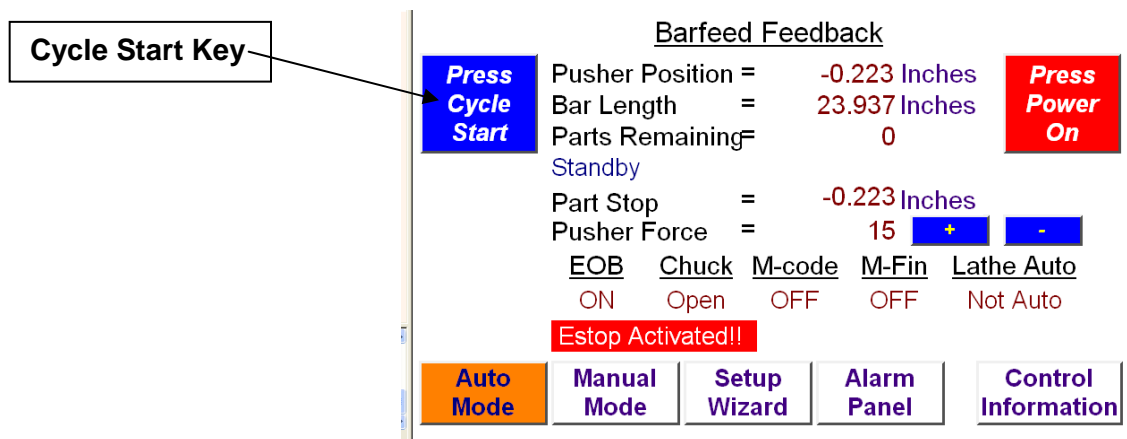
4.9.2.2 CYCLE START KEY

The key (Cycle Start) Key is used to start the automatic cycle of the barfeeder. All axes will return/find home position prior to starting initialization cycle.

4.9.2.3 FUNCTION KEYS

Function keys Auto Mode, Manual Mode, Setup Wizard, Alarm Panel and Control Information are universal keys, which meaning changes depending on current situation and is displayed by Orange color highlight in the lower part of the display.

4.9.2.4 CONTROL INFORMATION KEY

The key (Control Information) calls barfeeder diagnostics and other information on the machine such as barfeeder software options etc. Using this key, it is possible to enter a service password which makes the machine service parameters accessible for writing.

4.9.2.5 NAVIGATION KEYS

Navigation keys are Blue or Yellow in color and have generally the following meaning.

Mode	Key	Meaning	
Auto	+ or -	Increase or decrease pusher force	
Manual	▲ ▼ ◄ ►	Barfeeder motion control Left, right, up or down	
	Home Pusher	Sends pusher to home switch position	
	Home Channel	Sends the channel to the home switch (down) position	
	Home Splitter	Sends the splitter to the home switch (back away) position	
	Channel Up	Sends the channel to an up position to raise the pusher out of the way for spindle liner exchange.	
Setup Wizard	Round Bar	Selects between round and square material calculations	
	EOB Auto or Manual	Selects between End of Bar Automatic calculation or manual setting.	
	Enter new value	When any yellow button is pressed an numerical Key pad is displayed to enter a setup value.	
	Inch/Metric	Selects between Inch and Metric programming and operation	
	Save	Must be pressed to save any value in memory. Current Value will change to correspond to new values.	
Alarm Panel	Clear Alarm	Will clear all alarm set in memory	
Control Information	Next Info	Jumps to other I/O status screen and UTC/HMI System Information	
	Job Setup	Job Setup Page	
		Load Job	Will load saved job information for operation (Current Job# will display same as Next Job#.
		Clear Job	Will clear job in Next Job # (EMPTY will display)
		Save Job	Will save job in Next Job # (In Use will display)
		Next Job#	When the yellow key is pressed and numerical key pad will be displayed to select the next job from 0 thru 249.

Mode	Key	Meaning
Control Information	Operator Parameters	Settings for all Operator accessible parameters
	Service Only	These parameters are for Service use only as setup on new machine. All service settings are accessed by a security password. When this yellow button is pressed a numerical key pad will come up to enter a password.

4.9.3 STATUS BAR

In the automatic mode ithe display will have a status bar which displays interface information.
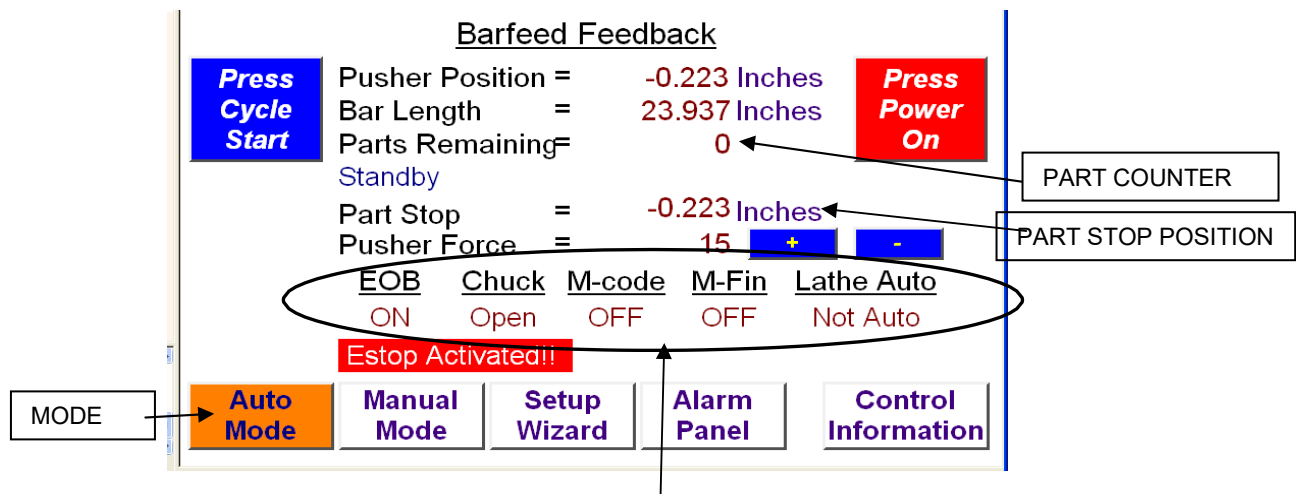
Fig. 4.7.

4.9.4 USER LEVELS AND THEIR MEANING

Level	Password	Meaning
Operator		Operator level is so called permanent level i.e. after the barfeeder restart just the operator level is always activated. This means that the user always has only the operator's rights following the barfeeder switching on.
		The Operator level is not protected by a password. The operator can right all parameters of the barfeeder. However edited can only be technological parameters (operator parameters, channel positions, Jobs Table).
Service	4268	Service level is intended for the setting of interface behaviour for given lathe and other parameters not related to the production technology.

4.9.4.1 CHANGING USER LEVEL

- Press the key,   **Control Information**

  then press key.   **Service Only**

- A numerical keypad will show after pressing the Service Only key Enter the Service password and confirm it by pressing OK.

Barfeed Control Service Page1

Pusher Position =   -0.223 Inches

B34 Calibration

Model Number	:	ML2-565
PLC Version	:	3.25
HMI Version	:	7.01

Back To Home Page

System Parameters

Connection Setup

| Auto Mode | Manual Mode | Setup Wizard | Alarm Panel | Control Information |
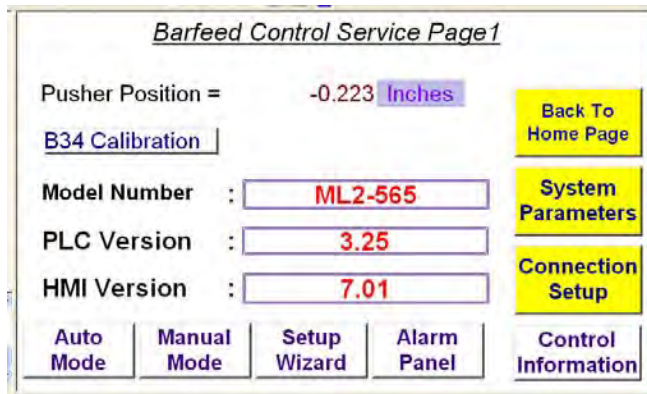
Entering a wrong code will result in the keypad going away with no display change.

WARNING

Common user should not change the service parameter settings. The parameters have been set by the serviceman who installed the barfeeder in such a way that the cooperation between the barfeeder and the lathe is optimized to maximum possible extent.

Consult eventual change of these parameters with the machine vendor or manufacturer first.

DANGER

Improper selection of service parameters can cause an irreversible loss of all parameters set by the user or wrong function of the lathe interface!!!

4.9.5 MANUAL MODE

Manual mode allows barfeeder motions by means of the navigation keys. This mode is also used for the move to a reference.

4.9.5.1 MOVE TO A REFERENCE

Always after the barfeeder is switched on, first it is necessary to go to press Home Pusher. Then press Home Splitter and then press Home Channel.

If the unit seems to not move by the arrow keys, always follow the sequence of Home Pusher, Home Splitter and then Home channel.
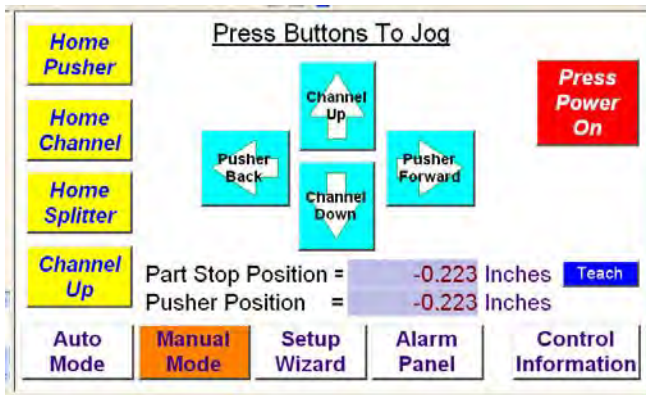
4.9.5.2 STANDARD MOTIONS OF THE BARFEEDER

In the manual mode it is possible to move with the flag and the loading mechanism using the navigation arrows. Horizontal motion of the flag is only enabled when the loading mechanism is in the lower limit position or in a position corresponding to the selected bar size; see the bar size parameter in Setup wizard. The channel up mechanism can only be moved if the flag is in the back limit position. The barfeeder moves as long as the relevant navigation key is pressed and the moving part is not in its limit position.

Note: In the manual mode in the forward motion of the flag (toward the lathe) the barfeeder exerts only a limited force. This force corresponds to the value of the Pusher force in percent. Consequently, if a bar to be fed is inserted into the barfeeder, it is possible in the manual mode to check the feeding force value which is set in the parameter.

4.9.5.3   LOADING MECHANISM JOGGING

In case of need it is possible to jog the loading mechanism. Use jogging at the channel motion in non-standard situations (bar jammed in the loading mechanism), when it is necessary to move the channel irrespective of its initial position or machine reference point.

How to jog the loading mechanism
- By pressing Manual key manual mode screen is available.
- Now at pressing the key corresponding Arrow key the loading motor (M3) splitter motor moves to existing bar size position then the (M2) channel moves up to bar position.
- Cancel the jogging by releasing the arrow key.
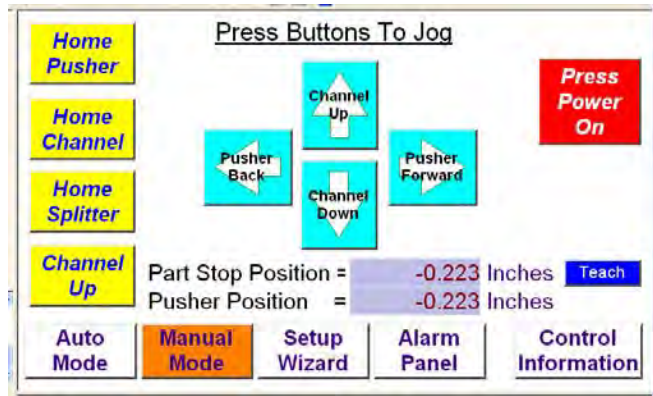
4.9.5.4   MATERIAL SWITCH CALIBRATION (B34)

In the front part of the channel (on the lathe side) of the barfeeder there is a material switch B34, by means of which the length of bars fed into the lathe is measured. The barfeeder must know the switch position with regard to the origin of coordinate system. For this purpose the material switch calibration function is used.

How to calibrate the material switch

The Service screen must be selected by password and then the B34 Calibration button is pressed. The channel will automatically move to full up position and flag will move forward to B34 switch. The calculated data will be automatically entered Material Switch Position on the Parameter IV screen.
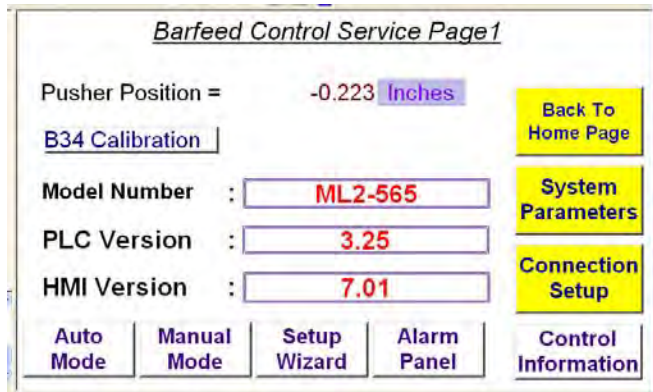
When to calibrate the material switch

The material switch must always be calibrated after any modification/maintenance of the barfeeder such as replacement or modification of the switch diaphragm which may result in possible change of the switch position relatively to its reference point.

> **Do not write in the Material Switch Position parameter directly, but always use the material switch calibration function. Only this function will ensure precise setting of the parameter#108.**

ML-565/580T/S

4.9.5.4-13

ATS Systems | 30222 Esperanza, Rancho Santa, Margarita, CA 92688 | Toll Free: 800.321.1833 or 949.888.1744 | Email: sales@atssystems.us | www.atssystems.us

4.9.6 AUTOMATIC MODE

Automatic mode is used for startup of fully automatic working cycle of the barfeeder.
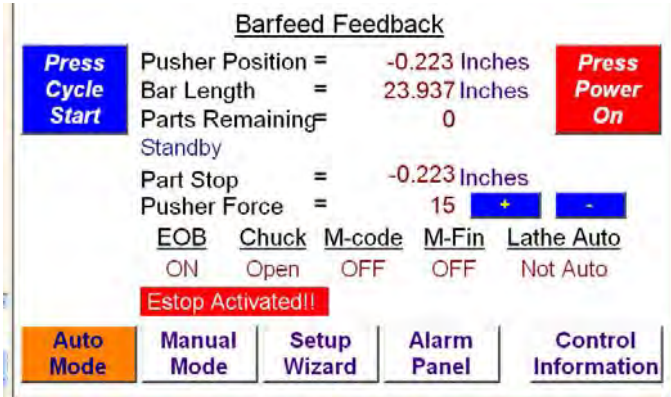
Fig. 4.8 Automatic Mode

4.9.6.1 INDICATOR OF BAR HANDLING METHOD

In the Setup Wizard, an indicator of the method of bar handling by the barfeeder is displayed in the middle part of the screen; the indicator indicates the basic behavior of the barfeeder in automatic cycle depending on parameters settings.

Indicator	Barfeeder	Meaning
Turret stop	ML - T/S	Bar is always fed by the barfeeder. The bar is fed to the lathe stopper.
Position	ML - S	Bar is always fed by the barfeeder. The bar is fed to a position.
Barfeeder	ML - T/S	Bar is fed by the lathe in other way (e.g. by the second spindle). The new bar is moved by the barfeeder to the lathe stopper.
Magazine	ML - S	Bar is fed by the lathe in other way (e.g. by the second spindle). The new bar is moved by the barfeeder to a set position in front of the clamping device.
Part Stop	ML - S	The barfeeder can be used as a part stop in the lathe spindle by teaching the Parts Stop Position in the Manual screen.

4.9.6.2 REMAINING NUMBER

If the Feed out Length per push (Setup Wizard), End of Bar (Setup Wizard) and Collet Face position (Operator Parameters) parameters are set correctly, this field shows the remaining number of parts which can be made from the bar in the lathe (i.e. the remaining number of feedings).

4.9.6.3 AUTOMATIC CYCLE START

- Before starting up the lathe with the barfeeder check whether the barfeeder is in its basic position (the loading mechanism in the lower limit position and the pusher in the back-limit position). If not the barfeed will automatically send all motors to home position,
- Go to the lathe to set the machine reference and perform preparatory actions. Be sure to have a part clamped in the spindle. .
- Press AUTO on barfeeder to set in automatic mode. Press Cycle Start and the barfeeder will go to the reference point (if it is not known). After this, it slides the pusher in the spindle to measure the length of eventual bar clamped in the lathe. Finally, it moves the pusher to the Retract Position (Operator Parameters).
- Using the Reset, cancel the barfeeder alarm on the lathe, if any.
- Search relevant CNC program in the lathe, switch over the lathe into the Automatic mode, and start the CNC program.

4.9.6.4 AUTOMATIC CYCLE TERMINATION

The run of the lathe with the barfeeder can be terminated as follows:
- By finishing the part on the lathe and pressing the Cycle Stop button on the touch screen.
- By activating the bar counter and waiting until the set number of bars is processed.
- By processing of all bars from the barfeeder magazine.

4.9.6.5 QUICK ADJUSTMENT OF THE FEEDING FORCE

The Plus+ and Minus- buttons next to Pusher Force are used for quick adjustment of the feeding force directly in the automatic mode without the need of searching the parameter. Thus the feeding force can be adjusted operatively under the barfeeder run in the active automatic cycle. The new value will be used by the barfeeder in its next forward motion.

4.9.6.6 OPENED MAGAZINE COVER

Barfeeders with CE certificate are equipped with the magazine cover, which, if open, locks the barfeeder motion in the automatic cycle. If the cover is open during the automatic cycle at an ill-timed moment (during bar feeding or replacement), it may cause an error of the barfeeder and stoppage of the lathe.

It is recommended to replenish the magazine only with automatic cycle switched off. If it is necessary to replenish the material under operation (with the automatic cycle switched on), use the following procedure: If during replenishing the lathe sends the M-code, the barfeeder will remain at standstill, and the display shows the error. In this case the barfeeder waits for the cover closing and cancellation of the message.

		Even if the above described procedure is observed, a lathe error may arise. It may be caused by exceeding of permitted M-code time in the lathe.
	NOTICE	**If the barfeeder feeds only to the "open clamping device" (without M-code), it will send an error message no. 6 independently of the above described procedure.**

Material should not be replenished under the machine operation, if not necessary.

4.9.7 LATHE OPERATION WITHOUT BARFEED

Lathe operation is possible without the barfeeder provided the power part of the barfeeder is connected and the flag is in the back-limit position. In this case the barfeeder does not issue the error message, and do not lock the spindle turning.

> **⚠ DANGER**
>
> **Some lathes can "disconnect" the barfeeder and ignore its signals. This function enables barfeeder switching off by the Q1 switch without causing a lathe error. In this case however the lathe ignores the barfeeder signals, and therefore there is a risk in any barfeeder handling that the pusher can get into contact with the rotating spindle and be damaged!**

4.10 BARFEEDER PARAMETERS

Barfeeder operation is controlled by parameters, which are divided into the following groups:

- Operator Parameters
- Service Parameters

Operator Parameters together with bar number the channel position corresponds to are technological parameters. The values of the technological parameters can be stored as so-called jobs in the Jobs Table and reloaded into the barfeeder memory, see below.

4.10.1 CONTROL INFORMATION MODE

Using the Control Information button, it is possible to access all parameters of the barfeeder.
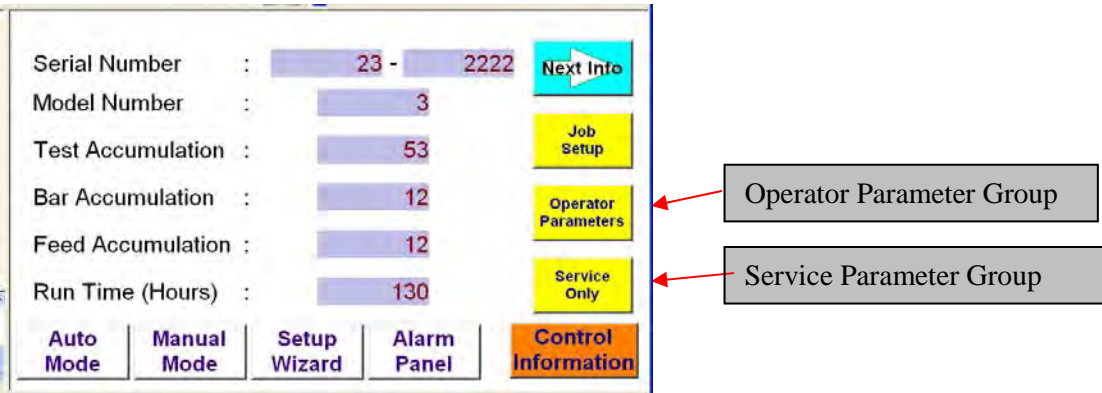
Fig. 4.9 Control Information

4.10.1.1 PARAMETER SELECTION

All parameters of the barfeeder have unique values assigned. These values can be selected or changed by pressing one of the ▮ **orange** buttons. At this time the Current value will change to show your selection. To change numerical values, press the ▮**yellow** button corresponding to the value to be changed. A numerical key pad will come up. Upon entering the new value and pressing OK the value will be set into Current Value.

4.10.1.2 PARAMETER TYPES AND THEIR SETTING
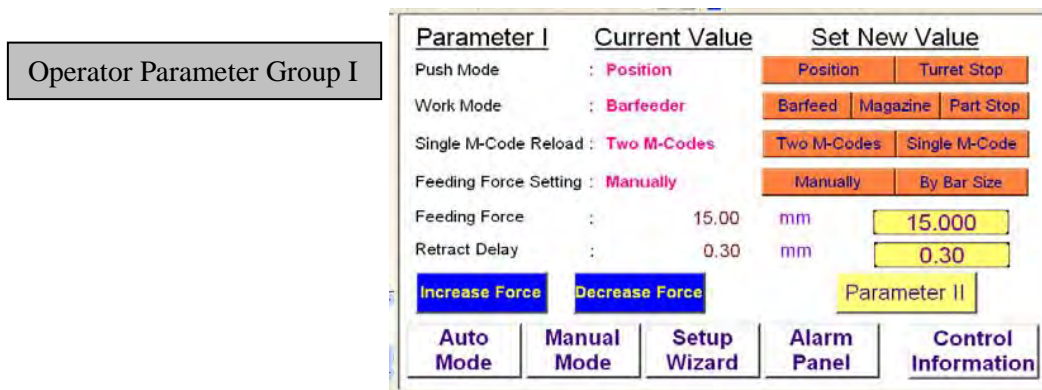
Operator Parameter Group II

Parameter II		Current Value		Enter New Value
EOB Length	Press Manual	3.250	Inches	3.250
Retract Position	:	1.500	Inches	1.500
Collet Face Position	:	40.000	Inches	40.000 [Teach]
Actuator Position	:	0.000	Inches	0.000
Second Feed Length	:	0.000	Inches	0.000
Reload Position	:	2.000	Inches	2.000

Pusher Back   Pusher Forward   Parameter I

| Auto Mode | Manual Mode | Setup Wizard | Alarm Panel | Control Information |

Service Parameters can only be accessed by password. Care must be taken when changing the Service level parameters as damage to machine or barfeed can occur.

Service Parameter Group III

Parameter III		Current Value	Set New Value		
Automatic Mode	:	Automatic	Auto		Test
Feeding On M-Code	:	On	On		Off
End Of Bar Timing	:	Standard	Short	Long	Standard
Bar Check M-Code	:	Pusher Move	Check	Stand Still	Part Count
Remnant Eject Mode	:	By New Bar	On	Off	By New Bar
Clamping Device	:	Standard	Standard		Inverse

Back To Service   Parameter IV

| Auto Mode | Manual Mode | Setup Wizard | Alarm Panel | Control Information |

Service Parameter Group IV

Parameter IV		Current Value		Enter New Value
Material Switch Position	:	82.674	Inches	82.674
Global Splitter Offset	:	0.000	Inches	0.000
Barfeeder Stroke	:	85.295	Inches	85.295
Global Channel Offset	:	0.000	Inches	0.000
Stopper Safety Limit	:	0.000	Inches	0.000
Part Stop Position	:	-0.223	Inches	

Back To Service   Parameter III

| Auto Mode | Manual Mode | Setup Wizard | Alarm Panel | Control Information |

4.10.1.2.1 JOB SELECTION FUNCTION

Job Selection is a function which enables archiving the value of technological parameters.

How to change the value of the Job Selection:

To change numerical job value, press the ☐ **yellow** button adjacent to the Next Job #. A numerical key pad will come up. Upon entering the new value and pressing OK the value will be set into Current Job #.

Job Setup Page

Current Job # : 249

Next Job # : 249

In Use

Load Job

Clear Job

Save Job

Auto Mode | Manual Mode | Setup Wizard | Alarm Panel | Control Information

Pressing the ☐ **yellow** Save Job button will change Empty to In Use and will save all information presently in the current value on the Setup Wizard screen.

Pressing the ☐ **yellow** Clear Job button will change In Use to Empty.

Pressing the ☐ **yellow** Load Job button will change change all Current Values in the Setup Wizard to values saved during the Save Job.

4.10.2 OPERATOR PARAMETERS

Operator parameter setting is directly dependent on the part production technology in the lathe.
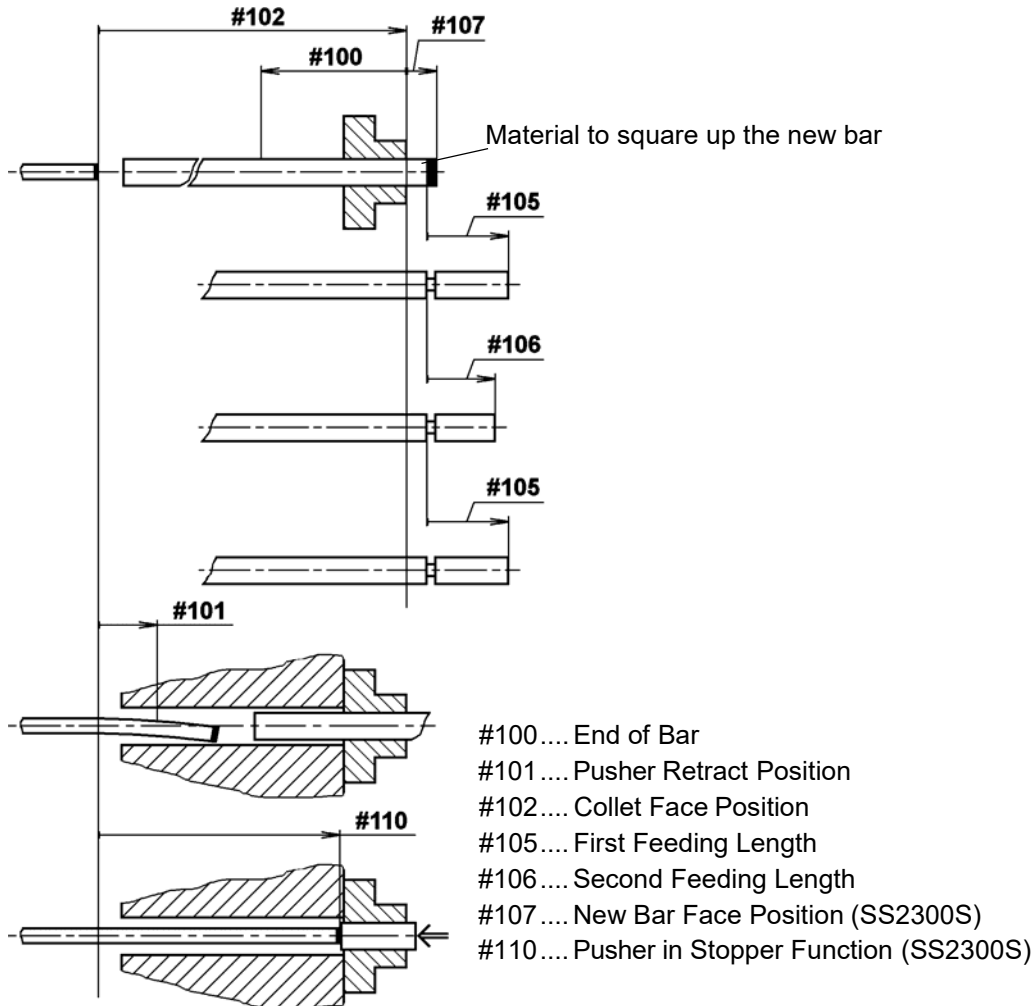
Fig. 4.10   Linear Operator Parameters

#100 .... End of Bar
#101 .... Pusher Retract Position
#102 .... Collet Face Position
#105 .... First Feeding Length
#106 .... Second Feeding Length
#107 .... New Bar Face Position (SS2300S)
#110 .... Pusher in Stopper Function (SS2300S)

Material to square up the new bar

4.10.2.1 #100 – END OF BAR

Using the parameter #100 the barfeeder checks the bar length in the lathe and decides whether the bar is or is not sufficiently long to manufacture a part.
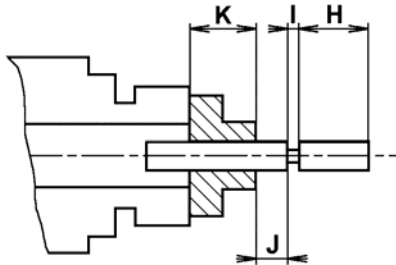
H......part length with squarring allowance
I ....cut-off tool length
J ......safety zone (is not a part of the parameter #100)
K......minimum clamping length

$$\#100 = H + I + K$$

Fig. 4.11   Setting the Parameter #100 – End of Bar

Parameter #100 is formed by the following components:

Longest feed length (H + I)........mostly the part length with squaring allowance + cut-off tool width
Minimum clamping length (K)....mostly the length of clamping device jaws

The remnant length ranges between:

Minimum remnant length...........K + J
Maximum remnant length..........K + J + I + H

DANGER

Actual length of the remnant is always dependent on the length of the machined bar. The remnant length can be minimized by suitable length of the loaded bars. Do not reduce the remnant length by shortening the parameter #100. Shortening the parameter #100 means a reduction of the minimum clamping length!!!

4.10.2.2 #101 – PUSHER RETRACT POSITION

By appropriate setting of the parameter #101 it is possible to reduce the bar feeding time.

In forward motion the pusher sags by effect of its own weight. Consequently, it touches the spindle insert and the rotating spindle could damage it. Parameter #101 sets such motion of the pusher from the back position, at which the pusher cannot yet touch the spindle insert.

If the parameter #101 > 0 (e.g. 400 mm), the feeding will take place as follows:
The barfeeder feeds the bar and moves back by 50 mm. If the pusher moves more than 400 mm from its back position, the barfeeder will move back to the position set in the parameter #101 (400 mm).

DANGER	**Set the parameter #101 with a sufficient safety distance from the pusher contact with the spindle insert to avoid the pusher accident!!!**

If it is necessary to extend the pusher from the lathe spindle, enter the safe position 0 mm.

4.10.2.3 #300 – FEEDING FORCE

Parameter #300 sets forth a maximum force, by which the barfeeder will push the bar to the stopper, eject the bar remnant, slide the new bar in the spindle lathe, and go forward (toward the lathe) in the manual mode.

Standard working range of the parameter #300 is 0 to 100%. Exceptionally the parameter #300 can be set up to 167%.

NOTICE	**Feeding force higher than 100% loads the barfeeder excessively, which can result in frequent drive overload error messages.**

NOTICE	**Parameter #300 does not limit the feeding force in feeding without the stopper. If the barfeeder is not able in *Position* feeding to feed a bar to the required measure (an obstacle in the bar travel), it exerts up to 133% force on the bar irrespective of the value in the parameter #300.**

4.10.2.4 #010 – PUSH MODE (S)
Parameter #010 sets forth the way of bar feeding into the lathe.

#010	Description
Turret Stop	The barfeeder will feed the bar to the lathe stopper, on which it may exert by the maximum force stored in the parameter #300.
Position	The barfeeder will feed the bar to a set position (#105, #106, #107). In feeding to Position it can apply up to 133% force on the bar independently on setting of the parameter #300.

4.10.2.5 #105, #106 – FEEDING LENGTH

Parameters #105 and #106 set the length, by which the barfeeder will move the bar in feeding to *Position* (#010). The feeding length is also used in case when the barfeeder works in *Magazine Mode* (#011), irrespective of the value of the parameter #010.

The barfeeder differs between *First Feeding Length* (#106) and *Second Feeding Length* (#107), which alternate as follows depending on the values entered in them.

#105	#106	Description
0 mm	0 mm	The barfeeder always arrives to the bar position and there it stops. The bar will always be "fed" by 0 mm.
30 mm	0 mm	If #106=0, it is ignored. At each feeding the barfeeder feeds the bar by 30 mm.
30 mm	30 mm	At each feeding the barfeeder feeds the bar by 30 mm.
30 mm	50 mm	At each odd feeding after the automat start-up or after the bar replacement the barfeeder feeds the bar by 30 mm. At each even feeding by 50 mm. The driver controlling the feeding order is reset after the automat start-up and after replacement of the bar. The new bar will first always be fed by the *First Feeding Length*.
0 mm	50 mm	At each odd feeding the barfeeder only arrives to the bar position. At each even feeding it feeds the bar by 50 mm.

If the barfeeder runs in the *Magazine Mode* (#011), it alternates the feeding length in the same way. However the difference is that in this mode the barfeeder does not go with the pusher into the spindle, but only deducts relevant feeding length from the bar length in the lathe. See the parameter #011 for details.

4.10.2.6 #107 – NEW BAR FACE POSITION (S)

Parameter #107 sets for the length, by which the new bar will be moved in front of the clamping device in the *Position* mode (#010).
If you want to move the new bar 27 mm in front of the face of the clamping device, enter the value 27 mm in the parameter #107.

4.10.2.7 #011 – MACHINE WORK MODE

Parameter #011 states the basic mode of the barfeeder operation.

#011	Description
Barfeeder	In *Barfeeder* mode, all motions of the bar are realized by means of the barfeeder i.e. the barfeeder feeds the bar, ejects the bar remnant, and moves the new bar into the lathe workspace.
Magazine Only	*Magazine Only* is the mode intended for such technologies when it is not necessary that the barfeeder should feed a bar to make another part i.e. technologies at which the bar is fed by the second lathe spindle or by other feeding equipment In this case the barfeeder on the feeding request (normally the first M-code with open clamping device) deducts the feeding length from the bar length, see the parameter #105 and #106. In this way it monitors the length of the bar in the lathe. If the bar is not long enough, it sends the End of Bar signal. Loading cycle takes place in the standard way. The barfeeder ejects the bar remnant into the lathe workspace, load a new bar and, depending on the setting of the parameter #010, moves it in front of the clamping device, either against the stopper or to a set position #107. After it, it returns the pusher and again only deducts the feeding length from the length of the bar. The advantage of this feeding mode is that the feeding is very quick and accurate, as it is performed by the second spindle of the lathe. In this case the barfeeder only function as an automatic magazine, which at a suitable moment loads the new bar into the lathe. Another advantage of this feeding mode is that it is not necessary to stop the lathe spindle at the feeding, which further reduces the feeding time. **After setting the parameter #011 to** *Magazine Only,* **do not forget to set the parameters #105 and #106 correctly!!!**

Part Stop *(S)*	In the *Part Stop* the barfeeder is used as a fixed mechanical stop in the lathe spindle. In this case the barfeeder moves the pusher to the position saved in the parameter #110 when the clamping device opens. It remains in the position until the clamping device is closed. As soon as the clamping device is closed, the barfeeder returns (to the position saved in the parameter #101).
	This mode is suitable for manual inserting the material into the clamping device, when it is necessary to push the material to the fixed stop in the lathe spindle.

> ⚠ **DANGER**
>
> **In the *Part Stop* mode the barfeeder <u>IGNORES</u> the lathe signal in automatic to enable manual insertion of the material. The barfeeder moves with the pusher <u>INDEPENDENTLY</u> of this safety signal!!**
>
> **Be careful in operating the lathe to prevent personal injury!!!!**

4.10.2.8 #110 – PART STOP POSITION (S)

The parameter #110 sets the position (distance from the back-limit position) to which the barfeeder is to move the pusher in the *Part Stop* mode, see #011.
The value set in the parameter #110 must not be higher than the value in the parameter #102. Otherwise the barfeeder will send the error message no. 5.

4.10.2.9 #102 – COLLET FACE POSITION

Parameter #102 sets the distance of the clamping device face from the barfeeder (from the end of the pusher in the back position). In setting this parameter it is necessary to observe the following procedure, which ensures correct setting of clearances, and thus correct setting of the parameter #102.

How to set the parameter #102:

Remove the bar from the lathe spindle, and make sure that the loading mechanism is in the lower limit position (pusher is in the spindle axis). If reference is not known, go to the reference. Find the parameter #102.

Move the pusher by hand to approx. 10 mm in front of the clamping device. Take a straight solid object and push the pusher back to ensure that its point matches the face of the collet or chuck jaws.

Using the Teach function key will copy the value of the position and set parameter #102.

> **The value of the parameter #102 must be checked at replacement of the clamping device or its jaws and in change of the pusher (pusher length).**

4.10.2.10 #301 – RETRACT DELAY

Parameter #301 states how long after the clamping the barfeeder is to push on the bar (or remain with the bar at position). This function is very important for precise feeding, because it compensates time advance of the Clamping Device Closed before the actual clamping of the material in the clamping device of the lathe. This parameter is as a rule set between 0.5 and 1 s. If there is a high clearance between the jaws of the clamping device and the bar, the barfeeder can be retracted from the spindle before actual clamping of the bar. This can be eliminated by increasing the value of the parameter #301.

> **Increasing the value of the parameter #301 extends the time which is necessary for feeding.**

4.10.2.11 #003 – END OF BAR M-CODE (EOB M-CODE)

Parameter #003 defines the barfeeder behavior in situation, when the clamping device is closed and the lathe sends the M-code.

If the lathe sends the M-code at the clamping device closed, the M-code is not understood as a feed command, but as an end of bar test. This M-code is called EOB M-code.

#003	End of Bar	Description
Pusher Movement	Not present	At leading edge of the EOB M-code the barfeeder starts the same motion as at start of the automatic cycle. When the pusher stops in contact with the clamped bar or when it arrives to the position #102, the barfeeder signs off the EOB M-code and returns the pusher back to initial position. If during the forward motion the barfeeder detects End of Bar, it processes the End of Bar signal in accordance with the setting of the parameter #002.
		This function can be used for the measurement of the length of the bar in the lathe.
	Present	If the barfeeder has already declared the End of Bar, the pusher will not move at the leading edge of EOB M-code. In this case the barfeeder waits 0.5 s, and after it signs off the EOB M-code. The End of Bar signal is processed in accordance with the setting of the parameter #002.
Stand Still	Not present	Immediately after the receipt of the EOB M-code, the barfeeder signs it off.
	Present	After the receipt of the EOB M-code the barfeeder wait 0.5 s, and after it sings off the EOB M-code.

4.10.2.11.1 SPECIAL EOB M-CODE CASE

The EOB M-code also means the M-code with the clamping device open, in the following situations.

#001	Description
ON	If the barfeeder feeds on M-code (#001=*ON*), then the first M-code after the clamping device opening is the M-code initiating the feeding.
	If the lathe sends other M-code after the sign-off of the first M-code, the barfeeder deems all these other M-codes as EOB M-codes. Consequently, the barfeeder signs them off either immediately after the receipt or after 0.5 dwell, depending on the state of the end of bar.
	In this case EOB M-codes do not cause any motion of the pusher. At this moment the barfeeder continues the feeding i.e. it pushes on the stopper or stands with the pusher in the position as long as the clamping device is open.
OFF	The barfeeder behaves like at *ON* state. However, with the open clamping device all M-codes are deemed EOB M-codes, as the barfeeder feeds not on the M-code, but on the clamping device open only.

4.10.2.11.2 EOB M-CODE USE

EOB M-code is used, for example, by Mazak lathes, which in the end of bar testing send the M-code (M69) to the barfeeder. The barfeeder must be able to differentiate this code from the code intended as a feeding command and must process the EOB M-code properly.

4.10.2.12 #004 – REMNANT EJECTING MODE

Parameter #004 influences the way of ejecting the bar remnant into the lathe workspace.

#004	Description
Control ON	In this case the rest of bar can be ejected in the following ways: • The lathe tool head departs to a sufficient distance from the remnant of the bar, the lathe opens the clamping device and sends an M-code. The barfeeder pushes the pusher through the spindle to the ejecting position (#102 + 1 mm), sings off the M-code and begins to load a new bar. This is the case of so-called direct ejection, when the remnant of the bar is ejected by the pusher directly into the lathe workspace. • The lathe arrives with the stopper in front of the remnant of the bar, opens the clamping device, and sends an M-code. The barfeeder pushes the remnant of the bar to the stopper and sings off the M-code. At this the rest continues to exert force on the stopper, see #300. The lathe begins to move the stopper from the barfeeder. The barfeeder pushes on the bar which leans against the stopper until it does not reach the ejecting position (#102 + 1 mm). As soon as the pusher reaches the ejecting position, it moves back and the barfeeder begins to load a new bar. This is the case of controlled ejection of the rest of bar.
Control OFF	In this case the barfeeder supports only direct ejection of the remnant.
By New Bar (S)	The remnant of the bar is not ejected by the pusher; instead it is ejected by a new bar. This reduces the time needed for loading of the new bar. If this mode is selected, the bar replacement will take place as follows: 1. After the last feeding (EOB reached) the barfeeder moves the pusher to the back-limit position, lifts it up, and load a new bar from the magazine to the channel. In this position waits for CNC. 2. After opening the clamping device and sending the M-code from the lathe, the barfeeder pushes the new bar by its flag into the spindle, returns back, swings the pusher to the spindle axis, and pushes a new bar to 1 mm in front of the clamping device (#102 + 1 mm). At this the new bar ejects the remnant of the old bar from the lathe workspace. In this case the tool head (stopper) must be out of the path of the ejected remnant! 3. The barfeeder confirms the fulfilment of the first M-code, backs the pusher by 12 mm and waits for the second M-code. 4. After receipt of the second M-code, it feeds the new bar to the lathe stopper or to the position set in the Reload Position and confirms the fulfilment of the second M-code.

5. After closing the clamping device, it moves the pusher to the back position. The replacement operation is finished.

> ⚠ **NOTICE**
>
> **In remnant ejecting by a new bar and feeding to position, #107 must be ≥ 3.5 mm. Otherwise there will be an error!**

4.10.2.13 #200 – CHANNEL POSITION

The barfeeder loads bars from the magazine into the lathe as follows: First of all, it moves the stoppers (splitters) to such position that just one bar will be in the space above the channel. After it, the channel begins movement from down to up. During this movement, one bar is loaded from the magazine into the channel. Then, the channel moves to such upper position that the bar axis in the channel coincides with the axis of the lathe spindle. Consequently, the barfeeder shall move the channel into various positions depending on the bar size (diameter) in order to align the bar with the axis of the lathe spindle. After it, the stoppers return to their initial positions, and the flag inserts the new bar into the lathe spindle.

Target positions are direct numeric setting calculations from (B31) Channel down reference switch.

Channel Positions are offset to the reference point of the channel position by *Global Channel Offset* (#104). The splitter positions are offset to the stopper position reference point by *Global Splitter Offset* (#109).

Consequently, the final target channel position is the sum of the specific channel position calculation and the parameter #104. Analogously, the final target position of the splitter is the sum of its position calculation and the parameter #109.

The meaning of the parameters #104 and #109 is described in relevant chapter, see hereinafter.

4.10.2.13.1 BAR SELECTION CALCULATION

If the barfeeder is installed properly, and the parameter #104 set correctly, the user is to in most cases only find a bar of relevant size and section and set it as current bar.

How to select the correct channel position (correct bar)

Press the Setup Wizard button. To change numerical job value, press the ▭ **yellow** button adjacent to the Bar Diameter. A numerical key pad will come up. Upon entering the new value and pressing OK the value will be set into Current Job #. At each new entry into the parameter #200 the barfeeder displays a current bar size under the Current Value. The character thus determines the current upper limit position, to which the loading mechanism moves the channel. Only one bar can be selected at a time.

Fig. 4.12 Channel Position

To change the Material type from round to Square, pressing the ▇ **Blue** button adjacent to the Bar Diameter, will select round or square bar and the channel position will adjust automatically.

From this moment the loading mechanism will stop the channel in such position that the axis of the bar selected is in the axis of the lathe spindle. Try the channel positioning in the manual mode.

If the bar does not go into the spindle (the channel of the barfeeder is not in correct position and the bar is too low or too high), make a correction of the channel position.

4.10.2.13.2 CHANNEL POSITION CORRECTION

If the selected bar is correct and the loading mechanism does not stop the channel in correct upper limit position (the bar axis does not coincide with the spindle center), correct this upper limit position as follows:

How to correct the channel position corresponding to given bar size

> ⚠ **NOTICE**
> **Before first correction of individual channel positions make sure that the Global channel offset parameter is set correctly!!! This is necessary especially for newly installed barfeeders, where the reference sensor of the loading mechanism B31 has been handled with.**

- Estimate the difference between the required and actual position of the bar in relation to the lathe spindle.
  Let us assume that the axis of the bar in the channel is lower by approx. 1.5 mm than the axis of the lathe spindle.

- Open the Setup Wizard and subtract 1.5mm from the current bar and directly input this data.

- In Manual Mode press the Home Splitter and Home Channel button to the fully lowered position and then press the up arrow to bring channel back to up position.

If the bar goes into the spindle, the loading mechanism is set and ready for automatic operation. Otherwise, repeat the procedure.

Using this procedure, you are able to position the channel in such a way that the bar can be inserted into the lathe spindle.

4.10.2.13.3 SPLITTER POSITION CORRECTION

If the selected bar is correct and the loading mechanism does not stop the splitter in correct limit position (the channel does not pick up the bar or picks up more than one bar), correct this limit position as follows:

How to correct the splitter position corresponding to given bar size

> ⚠ **NOTICE**
>
> **Before first correction of individual splitter positions make sure that the Global splitter offset parameter is set correctly!!! This is necessary especially for newly installed barfeeders, where the reference sensor of the loading mechanism B31 has been handled with.**

- Estimate the difference between the required and actual position of the bar in relation to the channel fingers.
  Let us assume that the bar misses loading into the channel by approx. 1.5 mm.
- Open the Service Parameters and add 1.5mm from the Global Splitter parameter. Directly input this data.
- Move the splitter mechanism to the fully Home position and then return to the load position in manual mode using the up-arrow button

If the bar goes into the channel, the loading mechanism is set and ready for automatic operation. Otherwise, repeat the procedure.

4.10.2.13.3 INSERTING NONSTANDARD BAR INTO THE CHANNEL

If you use a bar of a non-standard size you can change directly input bar size data into the Bar Diameter in inch or mm. You can change both the size and section, and to adapt the positions of the channel and the stoppers accordingly up to the maximum bar capacity.

4.10.2.14 #400 – JOBS TABLE

Operator parameters together with the current bar number are technological parameters of the barfeeder. The technological parameters shall always correspond to the job performed on the lathe. At change of the job it is usually necessary to change at least some of the technological parameters. If a job is frequently repeated, you can save the values of technological parameters of the job and download them when they are required. The Jobs Table, in which you can save all values of technological parameters as so called "job", is used for this purpose. You can work with the Jobs Table.

With the Jobs Table you can reduce the probability of parameter setting error, as you need not directly write data in the barfeeder memory time after time. Instead you only have to download a specific set of parameter values from the table. Such approach reduces the time required for the barfeeder setting significantly, as the barfeeder setting is very quick and easy with the Jobs Table. The parameters corresponding to given job are saved and downloaded all at once.

Jobs Table Capacity	
250 jobs	Standard
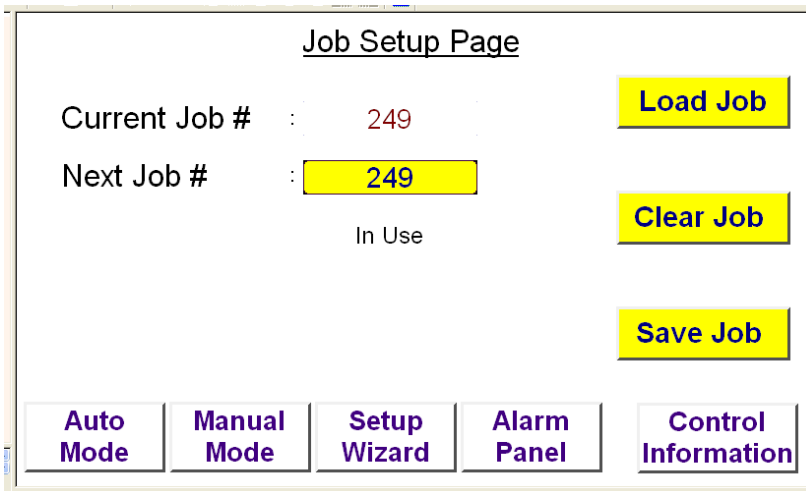
Fig. 4.13   Jobs Table

4.10.3 SERVICE PARAMETERS

Service parameters are parameters which do not relate to the method of part making in the lathe. These parameters influence the timing of the interface signals, user interface and other important features of the barfeeder.

| ⚠ WARNING | Common user should not change the service parameter settings. The parameters have been set by the serviceman who installed the barfeeder in such a way that the cooperation between the barfeeder and the lathe is optimized to maximum possible extent. Consult eventual change of these parameters with the machine vendor or manufacturer first. |

| ⚠ DANGER | **Improper selection of service parameters can cause an irreversible loss of all parameters set by the user or wrong function of the lathe interface!!!** |

4.10.3.1 #000 – AUTOMATIC MODE

sets the basic mode of barfeeder operation after the startup of the automatic cycle. The barfeeder distinguishes 2 basic work modes. Only normal automatic mode is used for machining. The other modes are only intended for servicemen of the manufacturer and the vendor. **These modes shall not be used for machining!**

#000	Current Value	Meaning
Auto	Auto	Normal automatic mode for machining.
Test	Test	Mode for barfeeder running-in in production.

4.10.3.1.1 NORMAL AUTOMATIC MODE

Only this mode of the barfeeder operation is used for bar loading and feeding for their further processing in the lathe. After successful installation of the barfeeder and testing of the lathe/barfeeder set it is necessary to activate the normal automatic mode (if not already activated) before barfeeder handing over to the user.

Activation of the normal automatic mode

Normal automatic mode is so called permanent automatic mode of the barfeeder i.e. this mode is activated automatically (independently of the operator) after the barfeeder switching on. Therefore, to activate the normal automatic mode it is sufficient to simply switch the barfeeder off and on.

ML-565/580T/S

4.10.2.3-33

ATS Systems | 30222 Esperanza, Rancho Santa, Margarita, CA 92688 | Toll Free: 800.321.1833 or 949.888.1744 | Email: sales@atssystems.us | www.atssystems.us

4.10.3.1.3 TEST MODE

The *Test* mode is particularly used for the barfeeder running-in.

After start of this mode the barfeeder moves the pusher to the position saved in the parameter #102. After it, it returns, moves the channel to the upper position, see #200, shifts the flag into the front position, returns the flag, moves the channel to the lower limit position, and repeats the whole cycle.

<table>
<tr><td rowspan="2">⚠ DANGER</td><td><h1>Attention!</h1>
<p>In the <i>Test</i> mode the barfeeder cannot work with the open cover !!!</p>
<p>Your inattention can cause your injury!!!</p></td></tr>
</table>

4.10.3.2 #001 – FEEDING ON M-CODE

Parameter #001 determines whether the barfeeder is to begin the feeding only at the clamping device open or to wait to a special command sent from the lathe.

#001	Description
ON	The barfeeder feeds to a special command (M-code) sent from the lathe. The barfeeder begins to feed the bar after receipt of the M-code.
	If the bar is moved to a stopper/to a set position, the barfeeder signs off the M-code using the M-code end signal (M-fin), and continues to push the bar to the stopper/remains in the position as long as the clamping device is open in the lathe.
OFF	The barfeeder feeds only at the clamping device opened. The barfeeder begins to feed as soon as the lathe opens the clamping device.
	The barfeeder terminates the feeding, as soon as the lathe closes the clamping device.

4.10.3.3 #002 – END OF BAR TIMING

Parameter #002 sets forth the method of sending the End of Bar signal to the lathe if there is a short bar in the lathe.

#002	Description
Short	End of Bar is only sent, if the clamping device is closed. This timing is the most frequently used timing of the End of Bar signal.
Long	End of Bar is sent to the lathe as soon as the barfeeder detects a short bar in the lathe. The signal is reset by the leading edge of termination of the second M-code (M-fin signal) at the bar replacement. Thus the signal is active from the moment of detection of the end of bar to the moment of completion of the bar replacement.
Standard	End of Bar is sent to the lathe as soon as the barfeeder detects a short bar in the lathe. The signal is reset by the leading edge of M-code for ejection.

4.10.3.4 #005 – CLAMPING DEVICE

Parameter #005 sets the logic of the open clamping device.

#005	Description
Standard	Clamping device is open, if the signal is ON. The clamping device is closed, if the signal is OFF.
Inverse	Clamping device is open, if the signal is OFF. Clamping device is closed, if the signal is ON.

4.10.3.7 #008 – M-CODE STYLE

Parameter #008 sets for the method of signing the M-code off.

#008	Description
Dynamic	*Dynamic* M-code is such M-code, which can be deactivated by the lathe independently of the barfeeder.
	If *Dynamic* M-code is set in the barfeeder, the barfeeder always after the end of the activity which started on M-code, sends the M-code end signal long 0.5 s to the lathe. If the lathe is able to generate M-code only as a pulse of a constant length and at the same time it is necessary that the barfeeder reports the end of activity started by the M-code, it is necessary to set #008 to *Dynamic*.
Static	*Static* M-code is such M-code, which is sent by the lathe until it receives the M-code end signal from the barfeeder.
	If *Static* M-code is set in the barfeeder, the barfeeder always after the end of the activity which started on M-code, sends the M-code end signal only if the lathe sends the M-code. However no longer than 0.5 s.

Overwhelming majority of new lathes use the static M-code. In this case it does not matter from the functional point of view whether the parameter #008 is set to *Dynamic* or *Static*. However, if it was, for technological reasons, necessary for the lathe to send M-codes quickly in succession (with a dwell less than 0.5 s) and the parameter #008 was set to *Dynamic*, such quickly sent M-codes could "merge" in one code. The barfeeder is able to distinguish the M-code leading edge only if it does not report the M-code end to the lathe. For this reason, it is recommended to set the parameter #008 to *Static* on new lathes.

In every case the lathe should not begin to send the new M-code in approx. 0.2 s after termination of the previous M-code. If the barfeeder is not able to distinguish individual M-codes, it will most probably report the error no.9.

4.10.3.8 #103 – BARFEEDER STROKE

Parameter #103 states a maximum working stroke of the barfeeder flag. The maximum working stroke of the barfeeder flag must be shorter than the travel done by the flag from the back-limit position to the front limit position. An optimal difference of these two lengths is approx. 2 to 3 mm.

Usual value of the parameter #103

Approx. 1750 mm

4.10.3.9 #108 – MATERIAL SWITCH POSITION (B34)

Parameter #108 states the distance of the material switch B34 from the barfeeder reference point.

Usual value of the parameter #108

Approx. 1682 mm

Use the material switch calibration function for precise setting of the parameter #108, see Chapter 4.9.5.4.

4.10.3.10 #104 – GLOBAL CHANNEL OFFSET

Parameter #104 sets the offset of the Channel Position Table in relation to the position of the reference switch of the loading mechanism B31. This table contains the upper limit positions of the channel relating to individual sizes and sections of the loaded bars. Parameter #104 can have the values from 0 to 20 mm. In production, the barfeeder should be set in such a way that the value of this parameter is approx. 10 mm.
When installing the barfeeder, always check correct setting of this parameter, see hereinafter.

How to set the parameter #104

- Prepare a straight bar, and install a spindle insert of a suitable diameter in the lathe.
- In the Channel Position, set a bar which parameters correspond to the parameters of the prepared bar as the current bar.
- Insert the bar into the magazine and move the channel to the upper limit position in the manual mode.
- Estimate the difference between the bar axis position and the spindle axis position, and change the value set in the parameter #104 by this difference.
- Move the channel to the lower limit position and back to the upper limit position.
- Check the bar position in relation to the spindle position, and make another correction of the parameter #104, if need be.

After barfeeder installation, the correction of the parameter #104 must always be made. The correction should also be made after handling the loading mechanism reference switch B31.

If the user has not a suitable spindle insert and bar at installation of the barfeeder, it should make the correction himself later on. Until the correction nobody should make corrections of the channel positions in the Channel Position Table (#200). Otherwise these changes will impair the preset data saved in the table.

If the correction of the parameter #104 is omitted, the loading mechanism will not lift bars precisely into the spindle axis, and the user will have to correct all channel positions used by him in the Channel Position Table!

4.10.3.11 #109 – GLOBAL SPLITTER OFFSET

Parameter #109 sets the offset of the Splitter Position in relation to the position of the loading mechanism reference switch B30.

After handling the loading mechanism reference switch B30 it will be probably necessary to make a correction of the parameter #109.

If the correction of the parameter #109 is not made, it can result in the loading mechanism inability to load just one bar of given size.

Parameters

Reset function saves initial values into all operator and service parameters. It sets the bar no. 4 as the current bar in the Channel Position Table. It also resets the function evaluating successful and failed go to reference. In move to reference you will have to move the reference point.

Finally, it restarts the barfeeder's PLC.

Initial values of the parameters

Parameter	T	S
#000	*Automat*	*Automat*
#001	*ON*	*ON*
#002	*Short*	*Short*
#003	*Stand Still*	*Stand Still*
#004	*Control OFF*	*Control OFF*
#005	*Standard*	*Standard*
#006	*English*	*English*
#007	*OFF*	*OFF*
#008	*Static*	*Static*
#009	*No Reset*	*No Reset*
#010	---	*Stopper*
#011	*Barfeeder*	*Barfeeder*
#012	*Manually Only*	*Manually Only*
#100	0 mm	0 mm
#101	30 mm	30 mm
#102	500 mm	500 mm
#103	1750 mm	1750 mm
#104	10 mm	10 mm
#105	0 mm	0 mm
#106	0 mm	0 mm
#107	---	0 mm
#108	---	1 mm
#109	10 mm	10 mm
#110	---	0 mm
#300	10 %	10 %
#301	1 s	1 s

4.11 HOW TO PROGRAM A LATHE WITH THE BARFEEDER

There are many ways of programming a lathe with the ML barfeeder. Generally, the End of Bar test should be in the program before feeding to ensure that an arbitrarily long bar can be clamped in the lathe at start of the automatic cycle.

4.11.1 FEEDING TO STOPPER

If end of bar is not reached, the barfeeder moves the bar to the stopper in the tool head. The arrival at the end of bar initiates the bar replacement subprogram.

Main program (feeding)
1. Tool head departure to the tool replacement position
2. Alignment of the tool head stopper with the spindle axis
3. Spindle stop
4. End of bar test (at end of bar, jump to subprogram for new bar loading)
5. Stopper arrival in front of the cut-off bar
6. Clamping device opening
7. M-code (the barfeeder pushes the bar to the stopper)
8. Stopper departure to the machining position (the barfeeder continues to push the bar to the stopper)
9. Clamping device closing (the barfeeder returns)
10. Dwell for pusher retraction to the rear position
11. Tool head departure to the tool replacement position
12. Technological program
13. Jump to program start

Subprogram (new bar loading)
14. Spindle positioning (necessary for non-circular sections)
15. Clamping device opening
16. M-code (the barfeeder ejects the rest)
17. 8 s dwell for ejection evaluation
18. Stopper arrival in front of the clamping device
19. M-code (the barfeeder pushes the new bar to the stopper)
20. Stopper departure to the position for new bar squaring
21. Clamping device closing (the barfeeder returns)
22. Dwell for pusher retraction to the rear position
23. Tool head departure to the tool replacement position
24. Tool replacement
25. New bar squaring
26. Tool head departure to the tool replacement position
27. Stopper selection
28. Return from the subprogram to line 5

4.11.2 FEEDING TO POSITION (S)

If end of bar is not reached, the barfeeder moves the bar by a pre-programmed feeding length.
The end of bar initiates the bar replacement subprogram.

Main program (feeding)
1. Tool head departure to safe position
2. Spindle stops
3. End of Bar test (at end of bar the jump to subprogram for new bar loading)
4. Clamping device opening
5. M-code (the barfeeder moves the bar see #105, #106)
6. Clamping device closing (the barfeeder returns)
7. Dwell for pusher retraction to the rear position
8. Technological program
9. Jump to program start

Subprogram (new bar loading)
50. Spindle positioning (necessary for non-circular sections)
51. Clamping device opening
52. M-code (the barfeeder ejects the rest)
53. 8 s dwell for ejection evaluation
54. M-code (the barfeeder moves the new bar in front of the clamping device, see #107)
55. Clamping device closing (the barfeeder returns)
56. Dwell for pusher retraction to the rear position
57. Tool replacement
58. New bar squaring
59. Tool head departure to safe position
60. Return from the subprogram to line 44

ML SERIES DIRECT CONNECT INSTRUCTIONS

The ML Series Barfeeds are capable of RS232 communications, allowing certain Parameters to be altered from the Host CNC machine. This allows the Programmer to feed material for one job, and without interruption, change parameters to allow feeding for a different length part for the remaining material.

The host machines macro, and RS232 communication capabilities will sometimes limit the ability to address all issues. Some machines will require options to be purchased from the OEM to allow the Direct Connect functions to operate. Consult your OEM specifications to determine if your machine has the capabilities required for Direct Connect use.

The following is the Macro Programming for Direct Connect, the logic will require that all parameters be addressed in the G-code macro call. If a parameter is left blank, the macro will display the appropriate alarm warning of a missing value. This is done to ensure that the new value for the parameters are what is desired, and not a partial change made in error. This sample is for a Fanuc based control and will require modifications to allow use in other machine controls.

Sample

Feeding in Barfeed mode, servo position.
Bar Diameter = 1.25
Feeding length = 1.425-part length + .120 cut off tool + .03 for face = 1.575
New Bar Face Position = .750
End Of Bar = Feeding length + Minimum Gripping length (1.575 + 1.250 = 2.825)

Syntax for above sample,

G180 A1 B1 C1.25 D1.575 F.75 H2.825

Variables for sample;

A   Work mode, 1 = Barfeed, 2 = Magazine mode, 3 = Parts Stop
B   Pusher Mode, 1 = Position (servo), 2 = Feed to Turret
C   Bar Diameter, Enter Bar diameter (Ex 1.25)
D   Feeding Length, Total of part length, cutoff tool, and face. (Ex 1.575)
F   New Bar Face Position, Material extending from work holding after
        reloading. (Ex .750)
H End of Bar, Value "D" plus minimum gripping length. (Ex 2.825)

TYPICAL FANUC MACRO PROGRAM

```
O9014(G180 BARFEED DATA INPUT)
IF[#1EQ#0]GOTO3001
IF[#2EQ#0]GOTO3002
IF[#3EQ#0]GOTO3003
IF[#7EQ#0]GOTO3004
IF[#9EQ#0]GOTO3005
IF[#11EQ#0]GOTO3006
POPEN
DPRNT[ZIWRK#1[11]X] (work mode - barfeed, magazine, parts stop. var# "A")
DPRNT[ZIPMD#2[11]X] (pusher mode - position, turret. var# "B")
DPRNT[ZIBAR#3[34]X] (bar diameter. var#"C")
DPRNT[ZIFLO#7[34]X] (feeding length odd, 1st. var"D")
DPRNT[ZINBF#9[34]X] (new bar face position. var#"F")
DPRNT[ZIEOB#11[34]X] (end of bar value. var#"H")
PCLOS
M99
N3001#3000=1(INVALID BARFEED MODE)
N3002#3000=2(INVALID PUSH MODE)
N3003#3000=3(NO BAR DIAMETER)
N3004#3000=4(NO FEEDING LENGTH)
N3005#3000=5(NO NEW BAR VALUE)
N3006#3000=6(NO END OF BAR SET)
%
```

(***note*** the "if" statements at the top of the macro look to
ensure all parameters are filled in to prevent erroneous data.
delete all parameters that are not required to eliminate extra fields.
when removing a parameter be sure to remove in all 3 portions of the macro)

4.11.3 PARAMETER SETTING EXAMPLE

Example – Single feeding

Task:

Produce a part long 15 mm from the bar ∅ 50 mm. Allowance for bar squaring after feeding is 0.3 mm, the width of the cut-off tool is 3 mm. Minimum clamping length is 30 mm.

Let us suppose that cutting off will take place 10 mm in front of the clamping device. As bar ends are of bad quality (curved), we will first cut off the new bar face by 1.5 mm.

Allowance for bar squaring after feeding
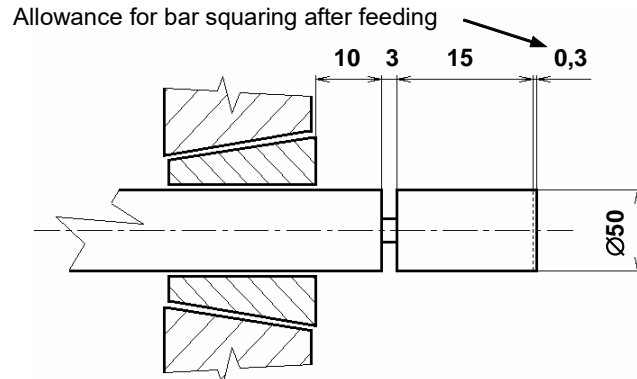
Barfeeder feeding to the lathe stopper		
Parameter	**Parameter**	**Parameter**
#100	48.3 mm	48.3 = 15 + 3 + 0.3 + 30
#101	???	Depends on the pusher sag.
#300	50 %	---
#010	*Stopper*	S
#105	18.3 mm	The parameter is used for the display of remaining number of feedings of the bar (i.e. remaining number of parts).
#106	0 mm	Parameter is not used.
#107	0 mm	S; Parameter is not used.
#011	*Barfeeder*	---
#110	0 mm	It is not used, see #011
#102	???	Specific distance to the clamping device face.
#301	1 s	Usual value.
#003	*Stand Still*	---
#004	*Control OFF*	---

Barfeeder feeding to position (S)

Parameter	Value	Note
#100	48.3 mm	48.3 = 15 + 3 + 0.3 + 30
#101	???	Depends on the pusher sag.
#300	50 %	---
#010	*Position*	---
#105	18.3 mm	18.3 = 15 + 3 + 0.3
#106	0 mm	---
#107	11.5 mm	11.5 = 10 + 1.5
#011	*Barfeeder*	---
#110	0 mm	It is not used, see #011
#102	???	Specific distance to the clamping device face.
#301	1 s	Usual value.
#003	*Stand Still*	---
#004	*Control OFF*	---

Feeding by the 2nd spindle of the lathe; new bar loading to stopper		
Parameter	**Value**	**Note**
#100	48.3 mm	48.3 = 15 + 3 + 0.3 + 30
#101	???	Depends on the pusher sag.
#300	50 %	---
#010	*Stopper*	---
#105	18.3 mm [1]	18.3 = 15 + 3 + 0.3
#106	0 mm	---
#107	0 mm [1]	S; the parameter is not used.
#011	*Magazine Only*	---
#110	0 mm	It is not used, see #011
#102	???	Specific distance to the clamping device face.
#301	1 s	Usual value.
#003	*Stand Still*	---
#004	*Control OFF*	---

[1] As *Magazine Only* (#011) is set, it is necessary to enter the feeding length (#105, or #106). In this case these parameters mean the length to be deducted by the barfeeder from the length of the bar. it is very important for correct evaluation of the bar end. As the feed of the new bar in front of the clamping device is controlled by the stopper in the lathe, it is not necessary to enter the parameter #107. The value saved in it is ignored.

Feeding by the 2nd spindle of the lathe; new bar loading to position (S)		
Parameter	**Value**	**Note**
#100	48.3 mm	48.3 = 15 + 3 + 0.3 + 30
#101	???	Depends on the pusher sag.
#300	50 %	---
#010	*Position*	---
#105	18.3 mm [2]	18.3 = 15 + 3 + 0.3
#106	0 mm	---
#107	11.5 mm	11.5 = 10 + 1.5
#011	*Magazine Only*	---
#110	0 mm	It is not used, see #011
#102	???	Specific distance to the clamping device face.
#301	1 s	Usual value.
#003	*Stand Still*	---
#004	*Control OFF*	---
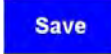
[2] As the *Magazine Only* (#011) is set, it is necessary to set the feeding length (#105, or #106). In this case these parameters mean the length to be deducted by the barfeeder from the length of the bar. it is very important for correct evaluation of the bar end.

4.11.4 WIZARD PROGRAMMING

Programming the WIZARD in with Turret Stop or Position function

To change numerical value, press the **yellow** button adjacent to the Bar Diameter. A numerical key pad will come up. Upon entering the new value and pressing OK the value will be set into Enter New Value.

Setup Parameter		Current Value	Enter New Value
Bar Diameter	Round Bar :	2.000 Inches	2.000
Feedout Length Per Push	:	2.000 Inches	2.000
Reload Position	:	2.000 Inches	2.000
Barfeed, Magazine, Chucking Parts Stop	:	Barfeed	Barfeed
Turret Stop or Position Mode	:	Position	Position
End Of Bar	EOB Auto :	3.250 Inches	3.250
	Exit	Save	Inch Metric

To change numerical value, press the **yellow** button adjacent to the Feedout Length. A numerical key pad will come up. Upon entering the new value and pressing OK the value will be set into Enter New Value. The Feedout length is calculated by: Part Length + Cut off tool + space to cut off part

To change numerical value, press the **yellow** button adjacent to the Reload Position. A numerical key pad will come up. Upon entering the new value and pressing OK the value will be set into Enter New Value. The Reload Position is calculated by:
Part Length + Cut off tool + space to cut off part + facing material.

To change the pusher mode, press the **yellow** button adjacent to the Turret Stop or Position Mode. This will change between these 2 modes

The END OF BAR is automatically calculated depending on BAR DIAMETER.
Press SAVE and all new values will move to Current Value.
Press Exit to go to Auto Mode.

5 MAINTENANCE

5.1 ROUTINE MAINTENANCE

Weekly
Remove any dirt from the barfeeder.

Monthly	
11	Clean the profile, guide bars and guide rollers. Grease the guide bars with grease LV2.
12	Lubricate the bearings of the pusher tilting and of the loading mechanism with machine oil.
13	Clean and oil the pusher lock bar and pin.
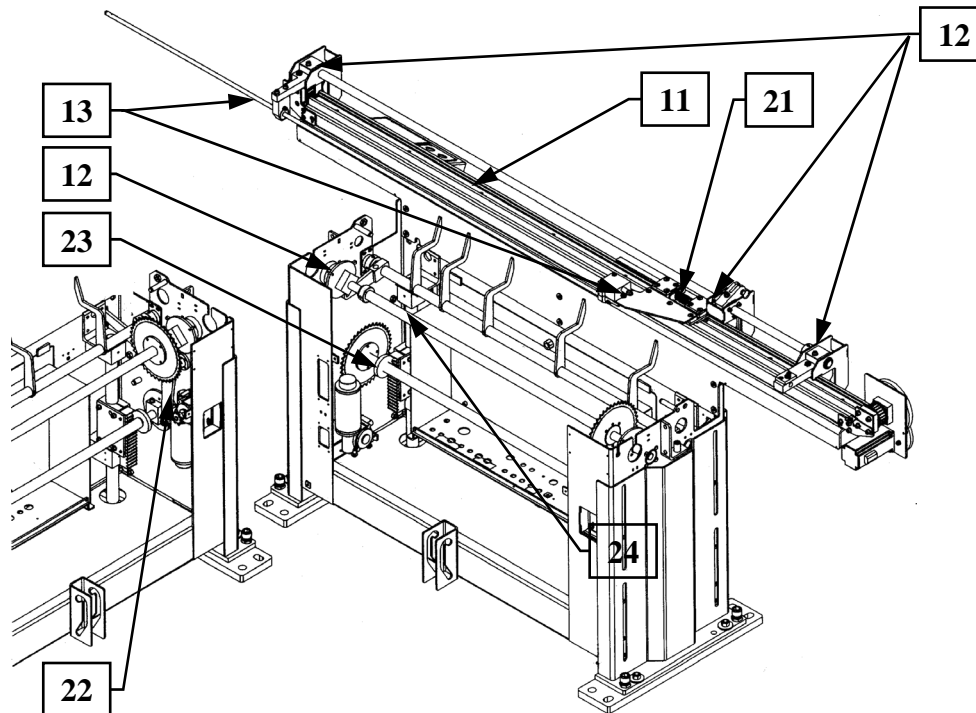
Fig. 5.1   Routine Maintenance

Every two months	
21	Check the tightening of the toothed belt of the horizontal unit.
22	Check the loading mechanism chain tension (both motors).
23	Spray chain oil on the chain of the loading mechanism (both motors). Grease the gears of the loading mechanism with grease LV2 (both motors).
24	Clean vertical guide of the loading mechanism.

5.2 ERROR MESSAGES

If the barfeeder evaluates certain situation as an error status, an error message is displayed on the control panel.

Cancel the error by the ⌨️ or 🛑 key.

Error Message	Cause	Corrective Action
1 Motor power not on (M25)	Motor power was disrupted by E-stop, switching to Auto with cover open or opening cover during cycle	Check all E-stop buttons on both the lathe and barfeeder. Ensure that no E-stop is on the lathe. Close the barfeeder cover and select F2 Manual press Power Key 🟢
3 Lathe Not In AUTO (M21)	If the barfeeder works in automatic mode (it feeds, replaces or measures the length of the bar on the basis of EOB M-code), the lathe must be in automatic mode.	Ensure that the lathe is continuously in the automatic mode in course of feeding, replacement and measurement of the length of the bar. Depending on interface this signal is often replaced by the signal from the door of the lathe workspace.
4 No Collet Open Signal	Clamping device closed in course of bar feeding or replacement.	Ensure that the clamping device is open in course of bar replacement. Clamping device must also be open for the whole duration of M-code in course of feeding.
6 (CE) Magazine Cover Isn't Closed (M12)	If the Barfeeder runs in the automatic mode, the magazine cover must be closed.	Replenish the material in accordance with Chapter 0. Check the function of SQ32 switch.
7 Magazine is empty	The magazine is empty.	Replenish the magazine and renew the automatic operation.
8 No Collet Close Signal	In course of measurement of the length of the bar clamped in the lathe the clamping device opened. Risk of uncontrollable extension of the bar into the lathe workspace.	Ensure that the clamping device is closed during the measurement of the length of the bar after the automat start and in course of EOB M-code duration.
9 M-code isn't finished	In the automatic mode the barfeeder monitors the lathe reaction to the M-fin signal. If the lathe does not terminate M-code in 3s after the end of M-fin signal, the barfeeder sends this error message. If the barfeeder cannot separate (distinguish) 2 successive M-codes, it can also send this error message.	Check that the lathe reacts correctly to the M-fin signal sent from the barfeeder (K7 relay). If you send 2 M-codes in succession, insert a dwell of at least 0.2 s between them.
10 Bar is too long	This error is displayed if the barfeeder handle too long bar. The length of the bar cannot exceed the total length of the lathe headstock from clamp device face to end of actuator.	Check the length of the bar in the lathe. The bar must be so long that the barfeeder can move back at least 50mm after its clamping. Check the setting of parameters #102 or #107 and 110. If the parameters are OK, calibrate the material switch B32 see Chapter 4.9.5.4.

Error Message	Cause	Corrective Action
12 Barfeed not in AUTO Mode	F1 key is not in AUT position during active automatic mode of the barfeeder.	If automatic mode is active, do not press other "F" function keys
15 (S) Material switch fault. (B34)	At start of pushing a new bar in the spindle or at start or calibration of the switch B34, the switch must be active (its diaphragm must be in standstill position).	Check the function of the material switch B34.
17 Channel or Splitter Moving to slow	Maximum permitted time of the loading mechanism motion exceeded (↑ max. 15 s, ↓ max. 4 s).	Check that no obstacle is in the way of the loader motion. Check fuse. Check the function of the switches B30 and B31. Check the function of encoders E2 and E3.
19 No Bar Found at Check for Bar Length	During reload cycle B34 switch was not activated by new bar.	Check the function of the switch B34. Bar Magazine is empty.
20 (S) Push Incomplete	Pusher has been prematurely stopped during automatic cycle.	Check that no obstacle is in the way of the flag in forward and back motion.
21 Initialization Error	Maximum permitted time of the pusher motion exceeded in measurement of the bar length (max. 16 s).	Check the value of the parameter #300. Probably small feeding force is set.
22 Retract Incomplete	Maximum permitted time for flag to retract to home position.	Check flag for binding Check B33
23 Part Over Push	During push cycle and error was detected by the encoder that the pusher travelled too far.	Check that material does not hang up in clamp device or spindle liner. Check that feeding Force is not to high.
24 Bar length exceeds Max. headstock capacity	During reload the calculation of the B34 switch indicates bar stock length is too long.	Check that barstock is not longer than headstock from clamping face to end of actuator.
26 Homing Error	During Auto cycle the flag or pusher never returned to home position.	Check for binding or obstruction.
29 M1 Pusher Drive Fault	SM1 drive of M1 motor signalled an error. If the drive is not reset, it is possible to read the drive error directly on the SM1 drive see Chapter **Error! Reference source not found.**.	Check fault on Yaskawa servo drive.

Error	Cause	Corrective Action
40 Motor already moving or Not in Manual Mode		
41 Bar Too Short	During reload check by B34, found bar to short to load.	Check bar size, should be 2.5 X gap between lathe and barfeed
42 Lathe in E-Stop	Lathe is in E-Stop condition	Check and clear E-stop condition on lathe.
43 Barfeed in E-Stop M18	Barfeed in E-Stop condition K2 relay may not be energized	Check if M18 input is HIGH (1) Check K2 Relay
44 Handheld in E-Stop M13	Handheld E-stop is on	Check if M13 input is HIGH (1)
45 Barfeed Not In Position	Barfeed is not in correct operating position.	Move barfeed to position and lock slides. Check if M14 is HIGH (1)
46 Channel Not In Correct Position	Channel is in between Home position and bar load position.	In Manual mode jog channel down to home position.
47 Splitter Not Home	Splitter is in between Home position and bar load position.	In Manual mode jog splitter back to home position.
48 Pusher Not Fully Back	Pusher did not return to home position or not fully back to raise channel	Check that pusher is in fully back position. In Manual Mode send to check for home.
49 Bar Size Setting Error	Bar size has been set out of barfeed channel range.	Check bar size setting.
50 No Valid Data for This JOB NUMBER	Data has not been set or saved for this job number	Check that Job Number has been activated and data has been saved.
51 Not Allowed to Go to Manual Mode	Tried to activate Manual Mode while running in AUTO cycle.	Stop AUTO cycle prior to activating Manual Mode Function.
53 Remnant Ejection Time Over	During reload cycle the pusher must reach the remnant ejection position in less than 15sec.	Check for obstruction at clamping device.
54 Pusher Motor Following Error	Servo has detected excessive following error in the pusher motor.	Check for pusher obstruction. Check that pusher force is set correctly

Error	Cause	Corrective Action
60 Barfeed Not In Auto		
61 Cover Is Open	Access cover is open and can only run in Manual Mode	Close Cover to run in AUTO Mode
62 Collet Is Not Closed	During initialization cycle the PLC detect ed that the clamp device is not closed	Close clamping device and restart Auto initialization.
63 Barfeed E-Stop Locked	NOT USED	
64 Lathe E-Stop Locked	NOT USED	
65 Position Over Limit	During position check, bar has moved from previous position	Check clamping device The part was moved by someone or something
66 Not In Manual Mode	Trying to move any axis while not in Manual Mode	Select Manual Mode to move axis

5.3   ELECTRIC EQUIPMENT

5.3.1   ARRANGEMENT AND PURPOSE OF SWITCHES
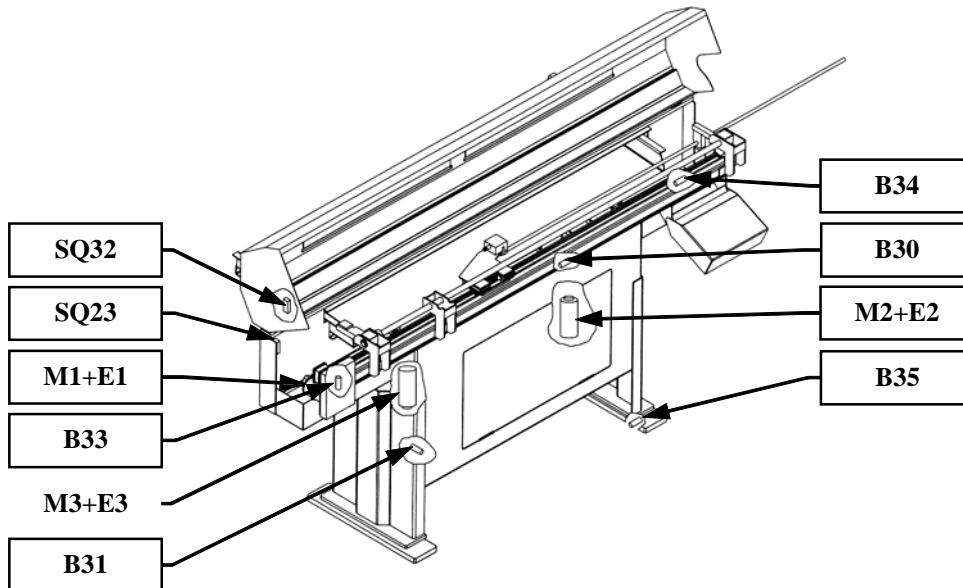
Fig. 5.2   Electric Element Layout

Switch	Name	Description
SQ23	Cover switch	If the key S3 is in AUT position, the switch SQ23 switches off the safety relay K1, thus causing emergency stop of the barfeeder. The barfeeder cover opening shows itself in the lathe as a barfeeder error and spindle revolution inhibition.
B30	Stoppers in basic position	Active, if the stoppers are in basic position.
B31	Loader down	Active, if the barfeeder channel is in the lower limit position.
SQ32 (CE)	Magazine closed	Active, if the magazine cover is closed. (Connect Switch to M12 and +24G)
B33	Flag back	Active, if the flag is in the back limit position.
B34 (S)	Material not present	Active, if the switch diaphragm is in standstill state (no bar lies on the diaphragm).
B35 (option)	Barfeeder position OK	Active if the barfeeder is in the working position on the rails. (Connect switch to X135 pins 1 and 3 or to M14 and +24G)

5.3.2 INTERFACE DESCRIPTION

You can find the diagram of standard interface connection in 5.3.3.

Barfeeder power supply	
Single-cable interface	X1/1, X1/2, X1/PE
Twin-cable interface	X2/1, X2/2, X2/PE

Signals from the lathe to the barfeeder

The signals from the lathe to the barfeeder should be implemented by contacts of relays or switches on the lathe side. The signals are supplied with 24 VDC from the barfeeder (X1/14).

Name	Interface	Description
Lathe E-stop	X1/10-X1/11 X1/12-X1/13	---
Lathe in AUTO	X1/15	Signal is active - lathe in automatic mode (barfeeder function enabled) Signal is inactive - barfeeder function disabled This signal enables the barfeeder operation in the automatic cycle. The signal is a precondition for bar feeding and loading in the automatic cycle. In fact, it is a lathe safety signal, which informs the barfeeder that its automatic operation has been enabled by the lathe. This signal can be replaced by the signal of the lathe workspace door closing. The barfeeder can then work in the automatic mode only if the lathe door is closed.
Clamping device opened	X1/16	Signal is active - Clamping device is open Signal is inactive - Clamping device is closed The meaning of this signal can be inverted, see the parameter #005.
M-code	X1/17	Signal is active - request to perform an action is sent Signal is inactive - standstill This signal is used as a command for bar feeding, ejection, new bar feeding into the lathe workspace, etc. M-code should be sent from the lathe as a permanent signal, on which bases the barfeeder performs certain action. After completion of the action the M-code is deactivated by the lathe on receipt of the End of M-code signal from the barfeeder.

Signals from the barfeeder to the lathe

The signals from the barfeeder to the lathe are implemented by relay contacts in the barfeeder. The signals should be supplied with 24 VDC from the lathe (X1/19).

Name	Interface	Description
Barfeeder E-stop	X1/6-X1/7 X1/8-X1/9	---
Barfeeder OK	X1/20	<u>Signal is active</u> K2 is closed - the barfeeder without error <u>Signal is inactive</u> K2 is open - the barfeeder signals an error If the barfeeder does not run in the automatic cycle, K2 is closed, if the safety relay K1 is closed and the flag is in the back-limit position. This enables lathe operation without the barfeeder.
K4	X1/24	<u>Signal is active</u> K4 is closed <u>Signal is inactive</u> K4 is open K4 relay is a reserve relay of the interface. Its meaning can be set in the parameter #007. Under normal circumstances the relay is always open (disconnected).
End of Bar (EOB)	X1/21	<u>Signal is active</u> K5 is closed - End of Bar reached (the bar is short) <u>Signal is inactive</u> K5 is open - enough material The End of Bar signal is usually sent to the lathe after completion of feeding (clamping) at which the End of Bar was evaluated and deactivated by subsequent opening of the clamping device (for ejection). Precise timing of this signal varies depending on the lathe type and interface. The method of End Of Bar Timing is set in the parameter #002.
Revolution enabled	X1/23	<u>Signal is active</u> K6 is closed - spindle revolution is enabled <u>Signal is inactive</u> K6 is open - spindle revolution is disabled This signal is not mandatory. However, it is recommended to use it, as it protects the pusher of the barfeeder against damage (the lathe cannot turn the spindle, if the pusher is in the spindle).
End of M-code (M-fin)	X1/22	<u>Signal is active</u> K7 is closed - end of M-code <u>Signal is inactive</u> K7 is open - standstill By this signal, the barfeeder informs the lathe that the action the barfeeder began to perform based on M-code has been completed. Thus, the lathe can deactivate the M-code and continue program execution. The way of generating the signal is influenced by parameter #008.

ATS SYSTEMS
ML 565/580

200-230-400V
50/60HZ

LATHE

X21 X22 X1 PE

E-STOP FROM BARFEED

S1

X1 6 X1 7 X1 8 X1 9

E-STOP FROM LATHE

X110 X111 X112 X113

X114 +24V

X117 M-CODE

X115 LATHE IN AUTO

X116 COLLET OPEN

COM

X119

X1 20 K2 BARFEED OK

X1 24 K4 RESERVE

X1 21 K5 END OF BAR

X1 23 K6 SPINDLE ENABLE

X1 24 K7 M-FIN

Input Signals Status

B30	B31	SQ32	B33	B35	S03	SQ23	B34
OFF	OFF	ON	ON	ON	OFF	OFF	OFF

L.auto	C.open	M.code	L.stop	E-stop
No	Open	OFF	Stop	Stop

Output Signals Status

K11	K12	K16	K02	K05	K06	K07
OFF	OFF	OFF	ON	OFF	OFF	OFF

Next Info

Job Setup

Operator Parameters

Service Only

Auto Mode	Manual Mode	Setup Wizard	Alarm Panel	Control Information

INPUT SIGNALS	DECRIPTION I/O LED	OUTPUT SIGNALS	DECRIPTION
B30	Splitter Home Position (M15)	K11	Loader in Load Direction
B31	Channel Home position (M11)	K12	Loader active
SQ32	Magazine Cover Closed (M12)	K16	M3 Motor Active
B33	Flag/Pusher Home Position(M120)	K02	Barfeed OK
B34	Bar Measurement Switch (M122)	K04	Not used
B35	Barfeed In Position switch (M14)	K05	End of Bar
S2	Manual Mode (M16=0)	K06	Spindle Enable
S3	Auto Mode (M16=1)	K07	M-code Finish
SQ23	Cover/Hood Safety Switch (M17)		
L.auto	Auto mode input from lathe		
C.open	Collet open input from lathe		
M.code	M-code input from lathe		
L.stop	Lathe in E-stop		
E.stop	Barfeed in E-stop		
H.stop	Handheld in E-stop		

5.3.3 ML CONTROL DIAGRAMS

ML CONNECTION DIAGRAM

Terminal Strip

PE
L1
L2
PE
L1
L2
PE
AC0V
AC200V
AC230V
AC400V
PE
R2
R2
R2
S2
S2
S2
PE
+24VG
+24V
+24V

MC1

| A1+ | 21 | L3 | L2 | L1 | A2- | 22 | T3 | T2 | T1 |

E.STOP-MODULE

33			34
24	S39	S12	
	S34		S22
23		S11	
	S33		S21
13		A2	
	A1		14

FUSE

| R1 | FUSE2 | R |
| S1 | FUSE1 | S |

LF1

| S2 | R2 | LF1 | S1 | R1 | PE |

DELTA Driver

| L1C | L2C | R | S | T | U | V | W | P+ | D | C | ⊖ | PE |

DC Power Supply 1

| +24V |
| -24V |
| PE |
| AC200V |
| AC200V |

Transformer

| AC 0V | AC 200V | AC 20V | AC 20V | PE |
| AC 0V | AC 230V | AC 400V | | |
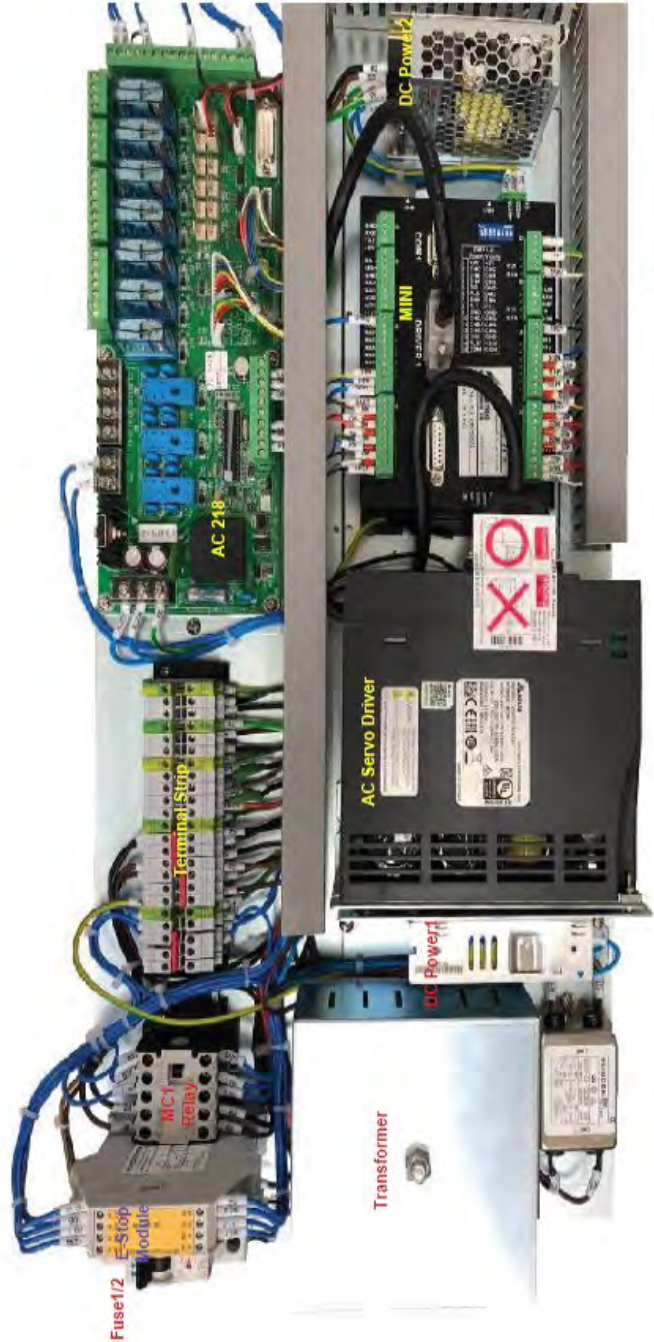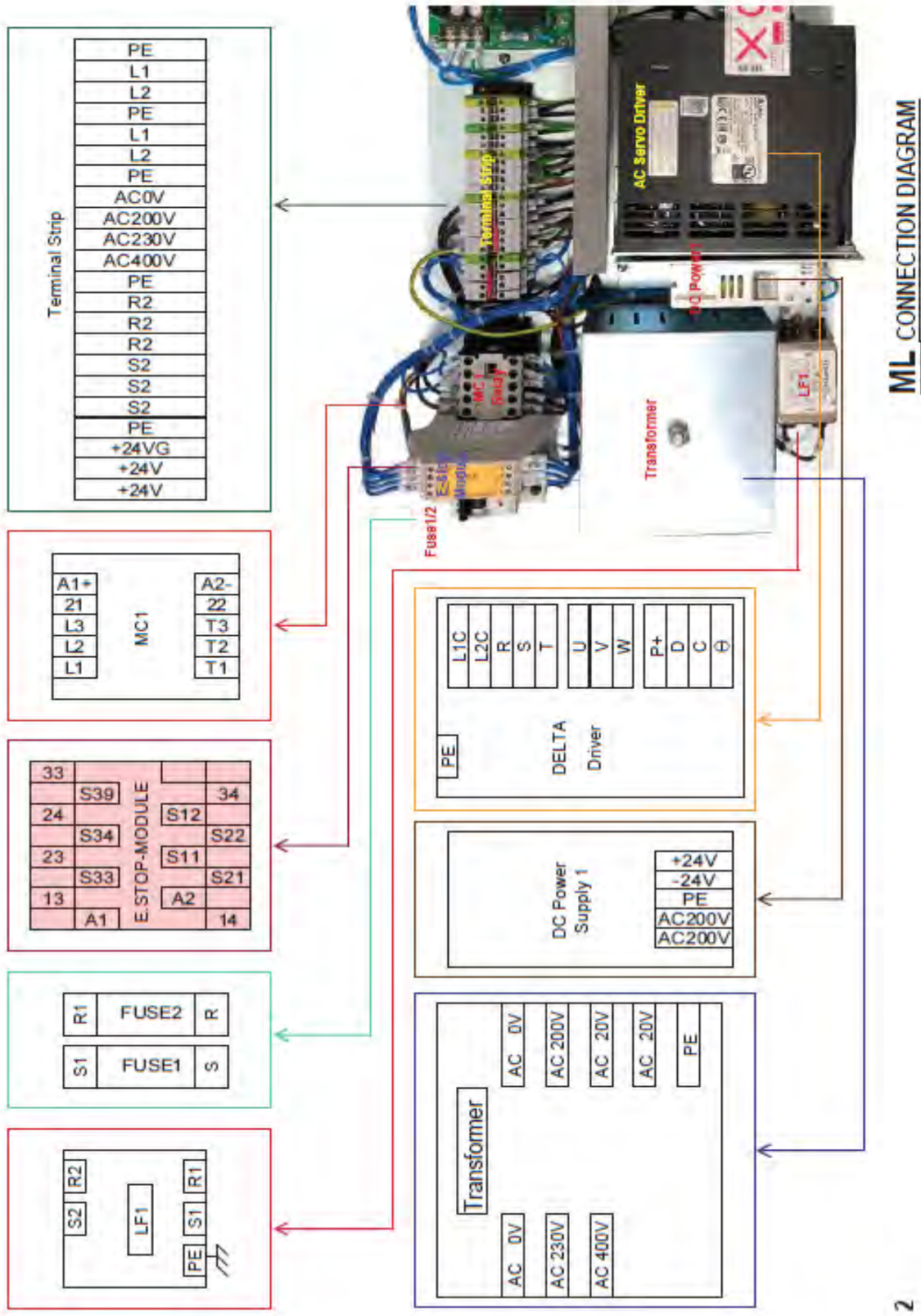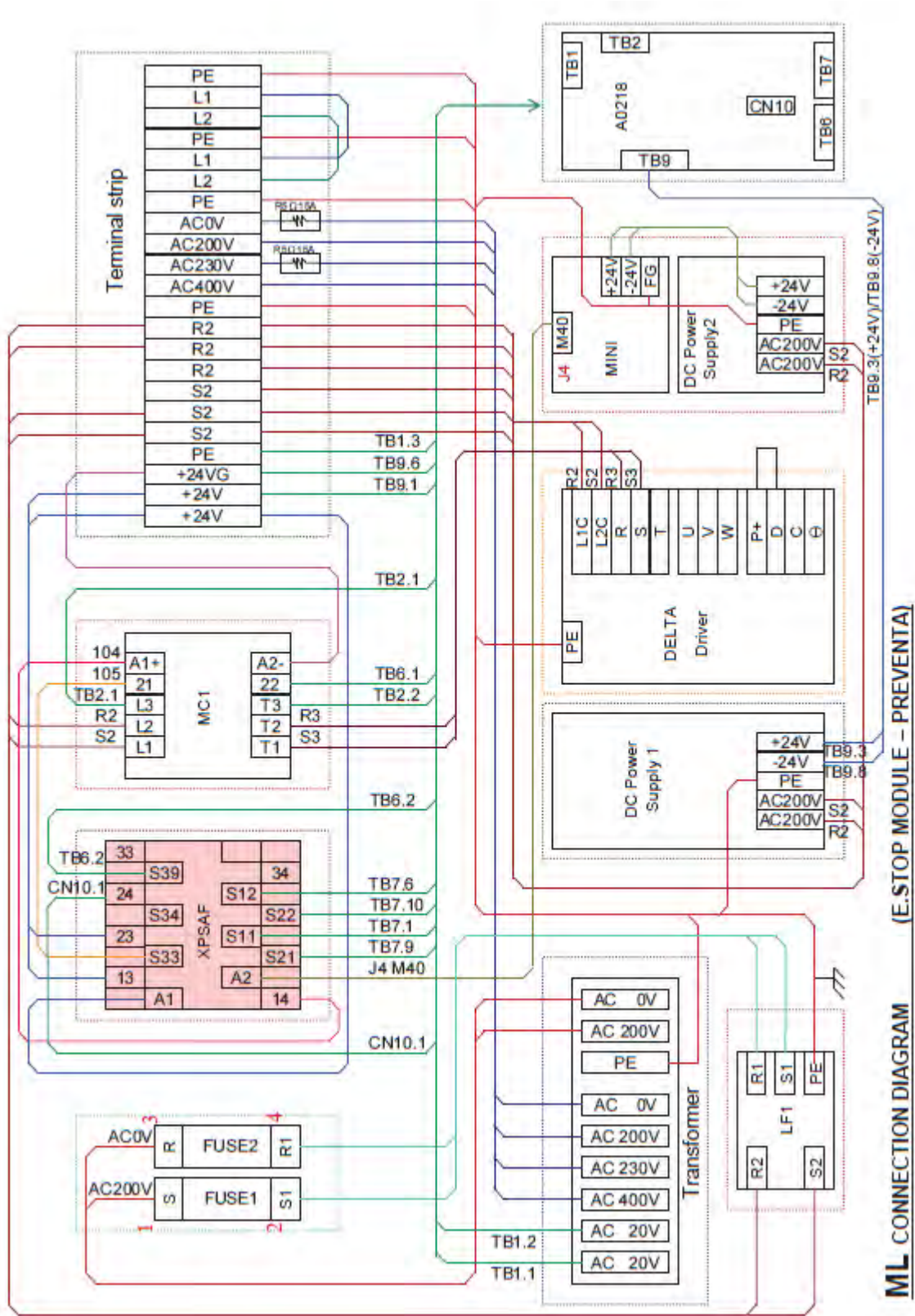
ML CONNECTION DIAGRAM (E.STOP MODULE – PREVENTA)

ML
CONNECTION DIAGRAM

Connect slide inposion switch to M14 and +24G

Out
| N.O3 | COM | N.C3 | N.O4 | N.C4 | N.O5 | N.C5 |

K2 · K4 · K5

A0218 TB4
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Out
| N.O6 | N.C6 | N.O7 | N.C7 | N.O8 | COM | N.C8 |

K6 · K7 · K8

A0218 TB5
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

X133 Flag Home
| to B33 Signal | to B33 VG | to B33 +V |
| 1 | 2 | 3 |

X134 Material Detect
to B34 Signal	to B34 VG	to B34 +V
+24VG	+24V
1	2	3

X135 BF Position OK
to B35 Signal	to B35 VG	to B35 +V
+24VG	+24V
1	2	3

X130 Splitter Home
to B30 Signal	to B30 VG	to B30 +V
+24VG	+24V
1	2	3

X131 Loader Down
to B31 Signal	to B31 VG	to B31 +V
+24VG	+24V
1	2	3

X132 Magazine Closed
to SQ32 Signal	to SQ32 VG	to SQ32 +V
+24VG	+24V
1	2	3

TB10
| X3.119 to X1.14 | X3.120 to X1.17 | X3.121 to X1.16 | X3.122 to X1.15 |
| 1 | 2 | 3 | 4 |

A0218 TB8
X1.10	X1.11	X1.12	X1.13
Lathe E-stop1	Lathe E-stop1	Lathe E-stop2	Lathe E-stop2
1	2	3	4

A0218 TB7
| SQ23X3.113 | SQ23X3.112 | SQ23X3.111 | SQ23X3.114 |
| 2 | 3 | 4 | 5 |

A0218 TB6
| X3.115 to X1.6 | X3.118 to X1.7 | X3.116 to X1.8 | X3.117 to X1.9 |
| 3 | 4 | 5 | 6 |

D.C.Gear Motor

GR80*2
| X3.131 | X3.132 | X3.141 | X3.142 |
| M2 | M2 | M3 | M3 |

A0218 TB3
| 1 | 2 | 3 | 4 |

A0218 TB1
| 1 | 2 | PE |

A0218 TB2
| 1 | 2 |

A0218 TB9
| 1 | 6 |

A0218 TB6
| 1 | 2 |

A0218 TB7
| 1 | 6 | 9 | 10 |

A0218 CN10
| 1 |

Transformer
| AC20V | AC20V | PE |

MC1
| L3 | T3 |

Terminal strip
| +24V | +24VG |

MC1
| 22 | S39 |

E-Stop mode
| S11 | S12 | S21 | S22 |

E-Stop mode
| 34 |

ML CONNECTION DIAGRAM

DELTA ASDA-B Series

		UTC-X00V	
Green	CN1 10 (OA)	4 (CHA)	
Blue	CN1 23 (/OA)	12 (CHA/)	
Red	CN1 12 (OB)	3 (CHB)	
Pink	CN1 11 (/OB)	11 (CHB/)	
Yellow	CN1 24 (OZ)	2 (CHC)	
Orange	CN1 25 (/OZ)	10 (CHC/)	
Gray	CN1 8 (GND)	5 (AGND)	
Purple	CN1 6(T-REF)	6 (DAC)	
	CN1 9(V-REF)		
Black	CN1 8 (GND)	9 (DGND)	
Yellow.Green	CN1 17 (DI1-)	7 (ENA)	
Yellow.Green.Black	CN1 13 (COM-)	15 (COM)	
Light.Green	CN1 16 (DO1+)	8 (FLT)	
Light.Green.Black	CN1 13 (COM-)	15 (COM)	
	CN1 4 (COM+)		
	CN1 7 (VDD)		
	FG		

Shielding

*Parameter
P1-01=03 (T-Com)
P1-01=02 (V-Com)
P2-13=122
P2-14=123
P2-15=121

P2.66=4

5.3.2-16

ML-565/580 T/S

ATS Systems | 30222 Esperanza, Rancho Santa, Margarita, CA 92688 | Toll Free: 800.321.1833 or 949.888.1744 | Email: sales@atssystems.us | www.atssystems.us

5.4 SPARE PARTS

ELEMENT	ATS #	ITEM	ENGLISH DESCRIPTION
MT CONTROL	45200500		Complete MT Control Assy.
BOARDS, MT CONTROL	45130039	A0190	MT CPU Board
BOARDS, MT CONTROL	45130040	A0195	Connector I/O Board
BOARDS, MT CONTROL	45130041	A0128	Relay board
BOARDS, MT CONTROL	45130036	A0190 & A0195	CPU STACK- MT-0190 & MT-0195D
B30; B31; B33; B34;	45201730		Proximity switch
B30; B31; B33; B34;	45201731		Cable, Prox switch 5m
G1	45130050		Transformer, ML Multi-Tap
G2	45130042		MT 24VDC Power Supply
K1	45130049		Safety Relay Module
K2; K4; K5; K6; K7			Interface relay
K10; K11; K12; K14; K16	45200501		Relay, Omron G2RL-2
M1+E1 (ML-565)	45200507		Delta Pusher Motor (ML Barfeeds)
M1 ML Servo Drive	45200508		Drive, Delta SuperT ASDB2-0421B
CABLE, DELTA MOTOR	45200509		Delta, Motor Cable 3M
CABLE, DELTA ENCODER	45200510		Delta, Encoder Cable
CABLE, DELTA DRIVER1	45200513		Cable, Delta Driver to MT Control
MC1 CONTACTOR	45130043		Contactor, MC1 - MT-Control
M2+E2; M3+E3	46010135		Motor, Lifter/Splitter
S1	45130025		Emergency Stop Switch
	45200215		Yellow Cover (E-stop)
SQ23	45202818		SAFETY SWITCH
PD6	45120002	p018-24000	ML Pusher D6
PD10	45120004	p018-27000	ML Pusher D10
PD18	45120005	p018-23000	ML Pusher D18
PLASTIC GEAR	46-10-20-007	v1020007	Gear, ML Pusher 90T
HOOD, MD-ML METAL	46-18-36-100/A		Hood ML-565,ML-580
GEAR, PUSHER	45120031		ML Pusher Motor
TOUCH SCREEN	46010100		HMI, ML Barfeeds
HANDLE, HOOD	45130038		HANDLE - FRONT ML565/580
KIT,RETRACT ELECTRICAL	45200179		ML Barfeeds
X-AXIS SLIDE ASSY.	45200180		ML Barfeeds
SLIDE STOPPER	45200180-1		ML Barfeeds

ADDENDUM

Barfeed Control Power Supply Structure

- **Power Supply Structure Block Diagram**
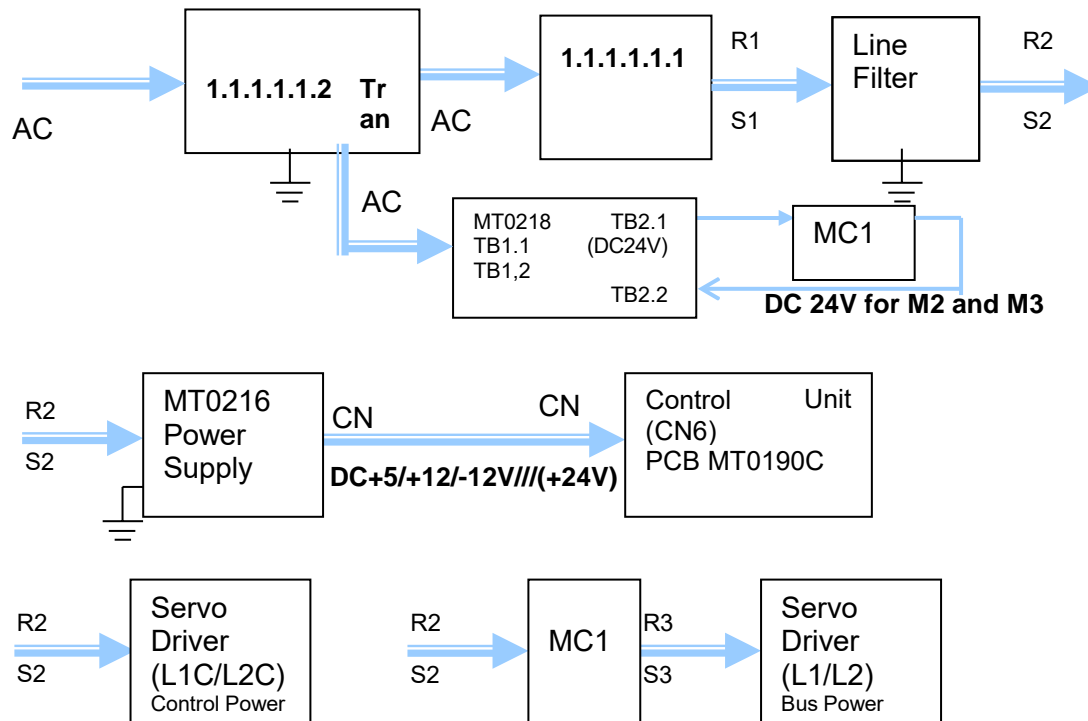
- **AC Power Input Description**

  After power switch turns on, AC power 200/230/400V goes to transformer input.
  Then, transformer 200VAC output goes through fuse1/2 and line filter, here we get R2 and S2.
  The R2/S2 supplies to ----
  1. MT-0216 power-supply board for UTC control.
  2. Yaskawa driver L1C/L2C control power
  3. Through MC1, controlled by E-stop module, to get R3/S3 for Yaskawa driver L1/L2 bus power.
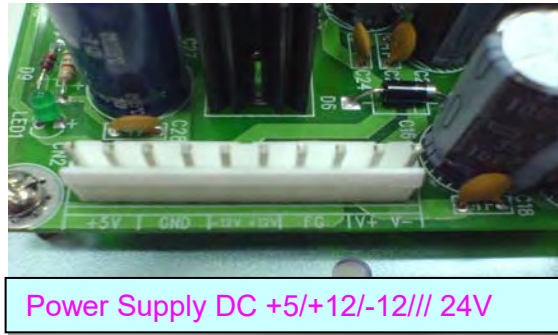
- **DC Power Supply Path Description**

  MT0216 switching mode power supply input 200ACV from CN1 and output to CN2.
  ------ CN2 Pin Description ------

1. +5V (for UTC System Operation)	6. +12V (for UTC +/-10V Analog Output)
2. +5V (for UTC System Operation)	7. FG (Frame Ground)
3. GND	8. FG (Frame Ground)
4. GND	9. +24V (Separated) (For external I/O)
5. –12V (for UTC +/-10V Analog Output)	10. +24VG (Separated) (For external I/O)

The connector locations are shown in the following pictures.
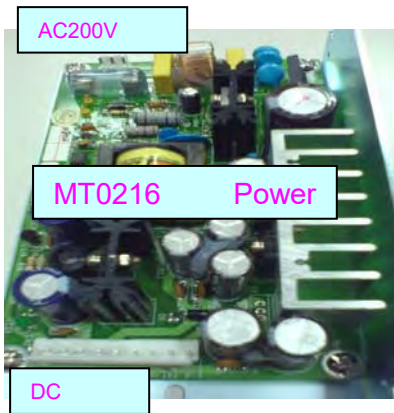
The MT0216 CN2 is connected to control unit bottom layer (MT0190C) CN6.
All the DC powers on top layer (MT0195C) terminal strips come from bottom layer.

- **M2/M3 Power Supply (+26VDC) Description**
  The M2/M3 power connected from transformer 20VAC and goes to MT0218 TB1.1 and TB1.2. This AC power rectified in MT0218 and get DC 26V to supply M2 and M3.
  But, this +26VDC first goes to TB2.1 ➔ MC1 ➔TB2.2, to be controlled by E-STOP module.

- **How to find out control unit voltage drop or no voltage output problem.**
  If there is a short circuit at external connection, the MT0216 power supply will automatically shut down. In this situation, we may find voltage drop from the terminal strips. We can pull all the terminal, driver and RS232 connections out from PCB MT-0195C.
  If the DC voltage backs to normal after pulling out connections, we can plug the terminal strips back one by one and check voltage each time. Then, we can find out which terminal strip make a short circuit.
  If the DC voltage does not back to normal after unplug everything, we may need to replace the power supply board (MT0216).
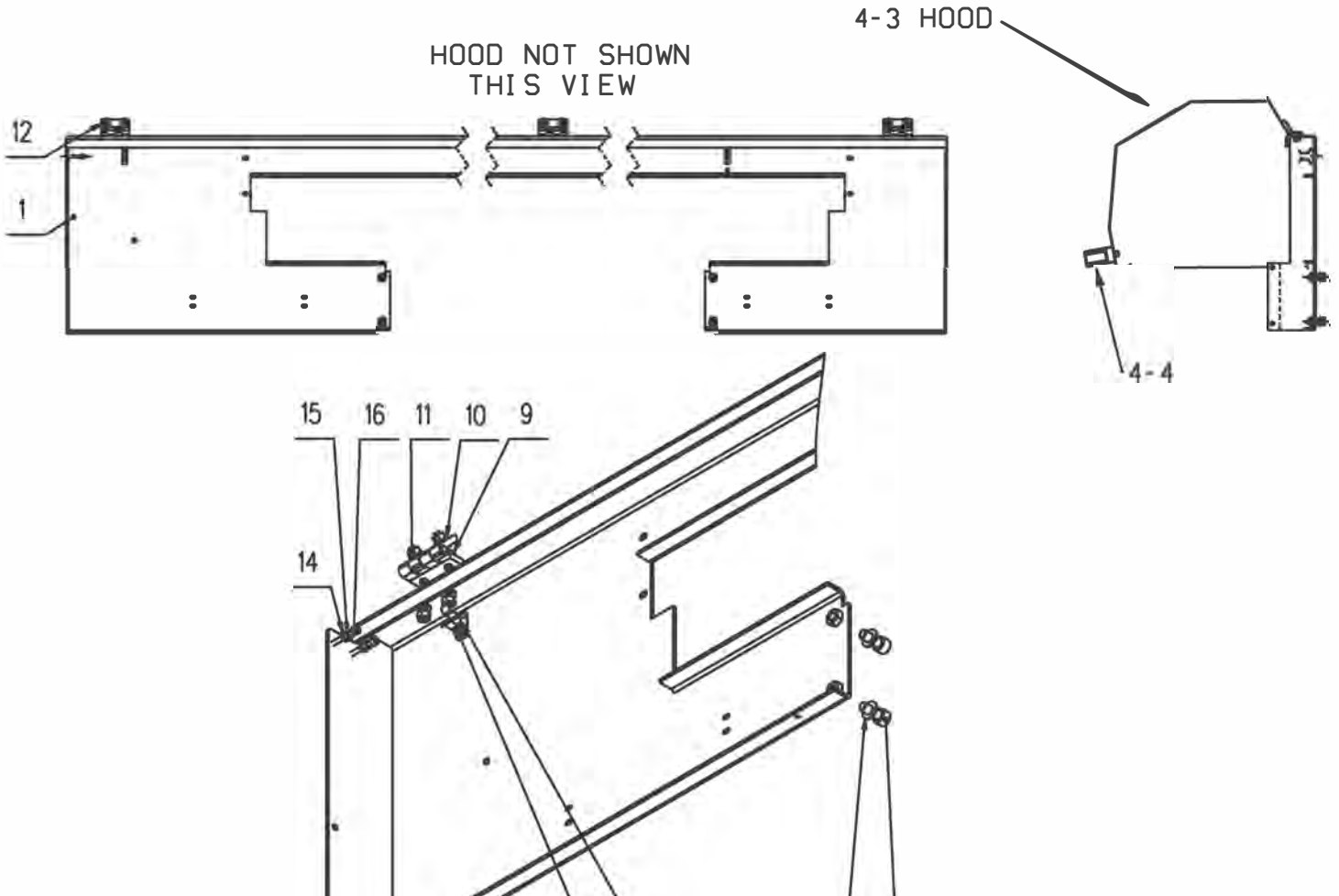
  If no power output what so ever, we may check the 2 Amp fuse on the power supply board before replacing.
  We may also unplug the CN2 connection from power supply board, then measure each set of DC outputs. However, in this absolutely no-load condition, the separated 24V power will raise up to 30V, this is normal.

ML PARTS LIST

## SECTION 4 – HOOD & HOOD SUPPORT

ITEM	PART NUMBER	DESCRIPTION	QTY
4-1	46-19-03-500B	HOOD SUPPORT	1
4-2	43100047	HINGE	3
4-3	46-18-36-100/A	HOOD	1
4-4	43010043	HANDLE	1
4-5			
4-6		SCREW, SOC HD CAP M8X20	4
4-7		WASHER, M8 FLAT	4
4-8	46010064	CLIP	2
4-9		RIVET	4
4-10		SCREW, SOC HD CP M4X30	2
4-11		WASHER, M4 LOCK	2
4-12		WASHER, M4 FLAT	2
4-13		SCREW, SOC HD CP M6X16	12
4-14		WASHER, M6 FLAT	12
4-15		NUT, M6 HEX	12

HOOD NOT SHOWN
THIS VIEW

4-3 HOOD

4-4

15 16 11 10 9

14

SECTION 2 – LEGS

ITEM	PART Number	Description	Qty
2-1	46-19-02-100A	LEG	2
2-3	46-09-02-300A	SCREW, LIFTING	2
2-4	46-19-02-001A (IF NO SLIDE)	PLATE, FLOOR	2
2-5		SCREW, SET M16x45	2
2-6		STUD, M12x35	4
2-7		SCREW, FLT PNT SET	2
2-8		WASHER, M16 FLAT	4
2-9		NUT, M16 JAM	4
2-10		WASHER, M12 FLAT	4
2-11		NUT, M12 HEX	4
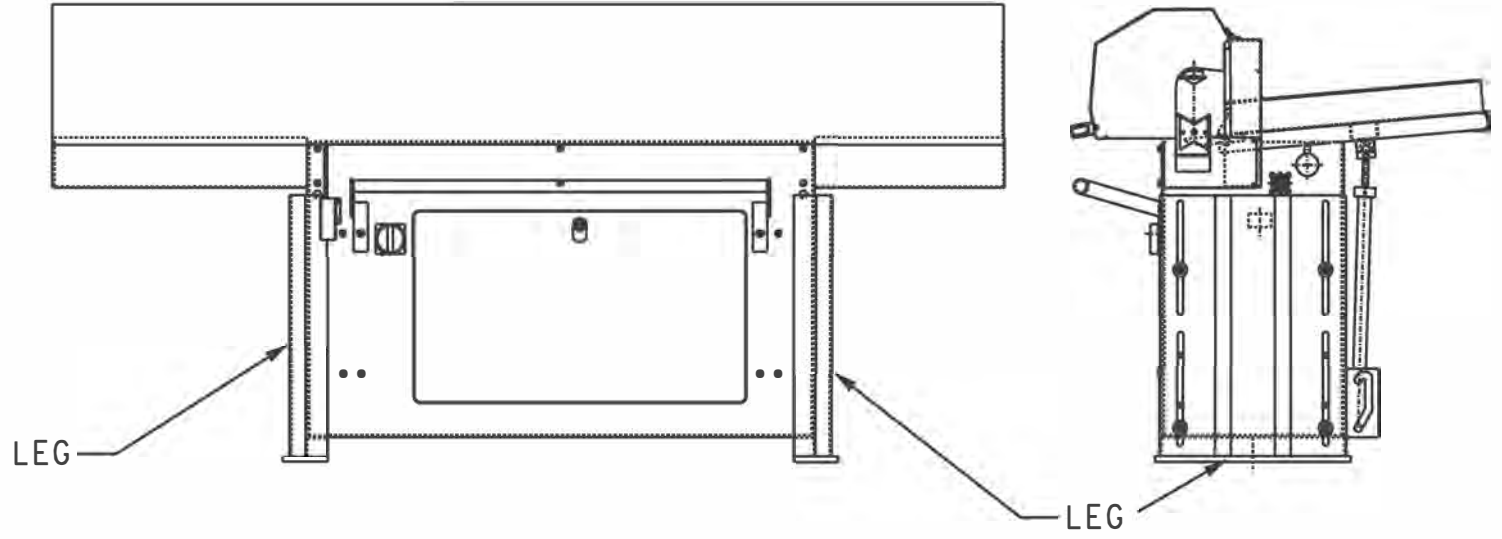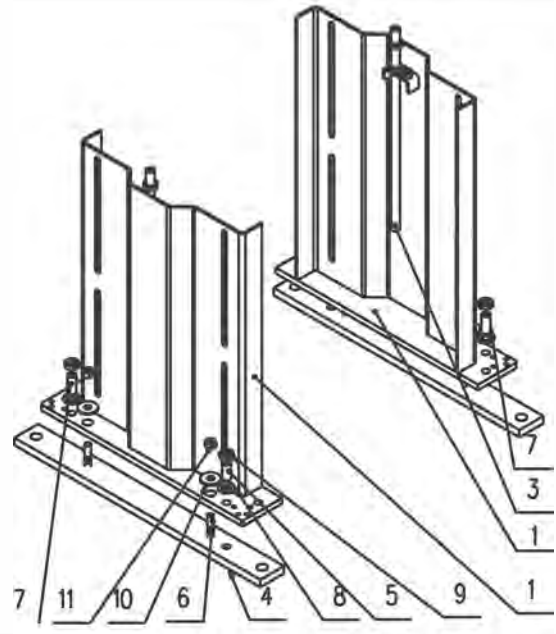
ITEM	PART NUMBER	DESCRIPTION	QTY
3-1	46-19-03-100	TRAY	1
3-2	46-17-03-200B	HEIGHT ADJUSTING SCREW	1
3-3	46-17-03-005A	HEIGHT ADJUSTING NUT	1
3-4	46-17-03-002A	TRAY SUPPORT	1
3-5	801462	DOWEL, M16X50	1
3-6	801463	SPRING PIN, M16X50	1
3-7		SCREW, SOCKET SET M6X8	2
3-8		SCREW, SOCKET SET M4X10	1

UNDERSIDE

TOP VIEW

3

ML PARTS LIST

SECTION 4 – HOOD & HOOD SUPPORT

ITEM	PART NUMBER	DESCRIPTION	QTY
4-1	46-19-03-500B	HOOD SUPPORT	1
4-2	43100047	HINGE	3
4-3	46-18-36-100/A	HOOD	1
4-4	43010043	HANDLE	1
4-5			
4-6		SCREW, SOC HD CAP M8X20	4
4-7		WASHER, M8 FLAT	4
4-8	46010064	CLIP	2
4-9		RIVET	4
4-10		SCREW, SOC HD CP M4X30	2
4-11		WASHER, M4 LOCK	2
4-12		WASHER, M4 FLAT	2
4-13		SCREW, SOC HD CP M6X16	12
4-14		WASHER, M6 FLAT	12
4-15		NUT, M6 HEX	12

HOOD NOT SHOWN
THIS VIEW

4-3 HOOD

4-4

12

1

15 16 11 10 9

14

ML PARTS LIST

SECTION 5 – MATERIAL CHANNEL ASSEMBLY

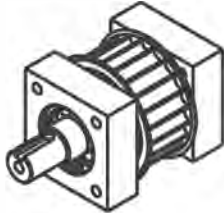| ITEM	PART NUMBER	DESCRIPTION	QTY
5-1	45140050	CHANNEL	1
5-2	46-452-510-0010	FLAPPER	1
5-3	46-18-18-001A	SHAFT	1
5-4	800055	WASHER, M6 FLAT	2
5-5	800869	NUT, M6 HEX	1
5-6		E-CLIP, 6MM SHAFT	1
5-7	8001278	NUT, M8 HEX	2
5-8		SCREW, SET M8X20	2
5-9	46-18-18-300A	GUIDE, REAR CHANNEL	1
5-10	46-18-18-200A	GUIDE, FRONT CHANNEL	1
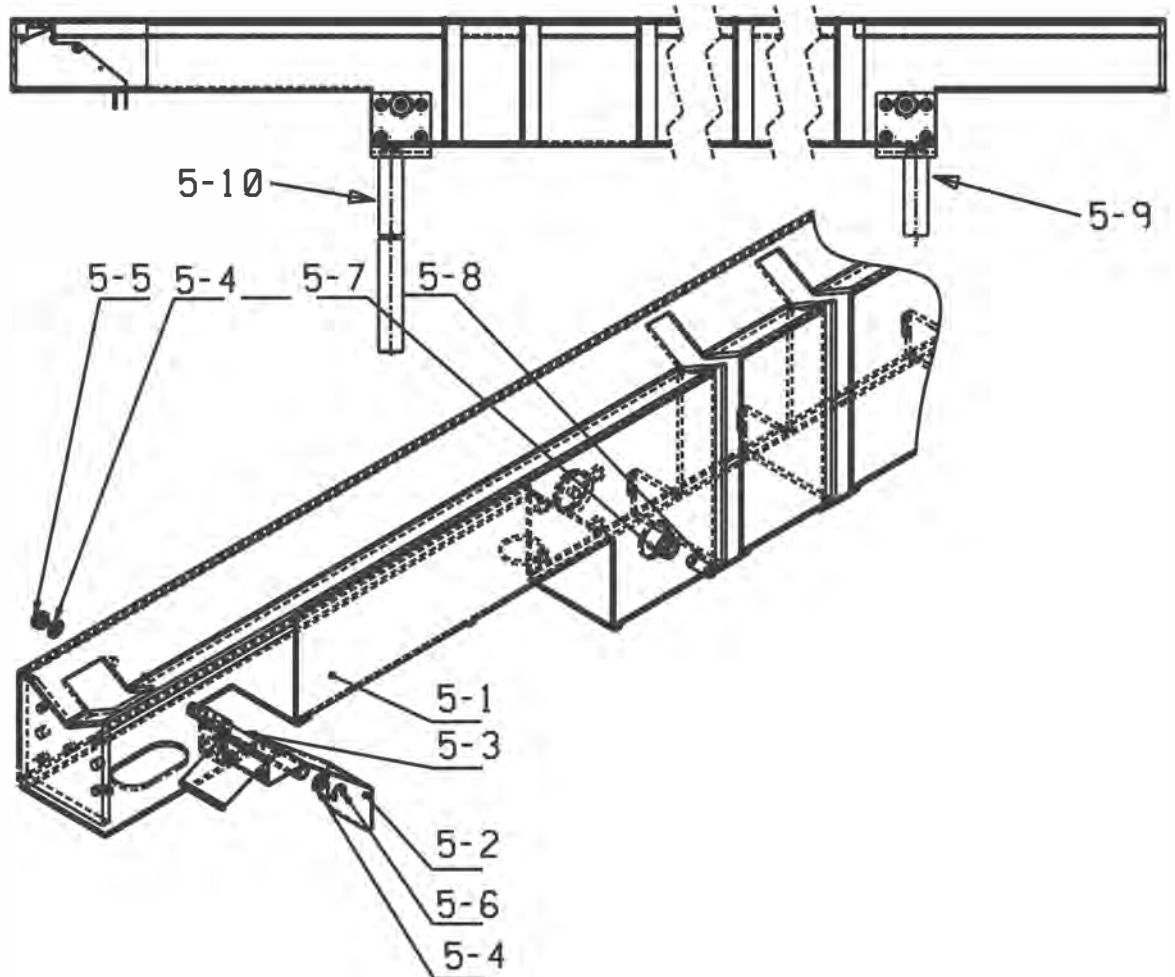
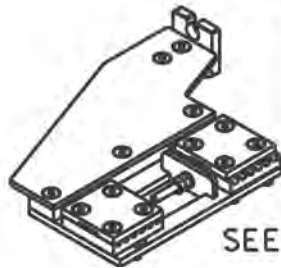SECTION 6 - LINEAR DRIVE
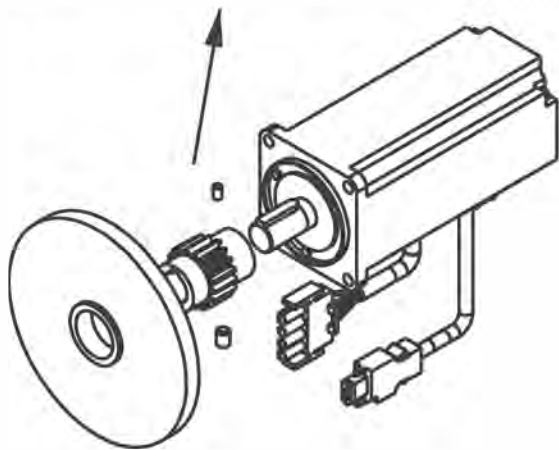

SEE PAGE
6-LD-2
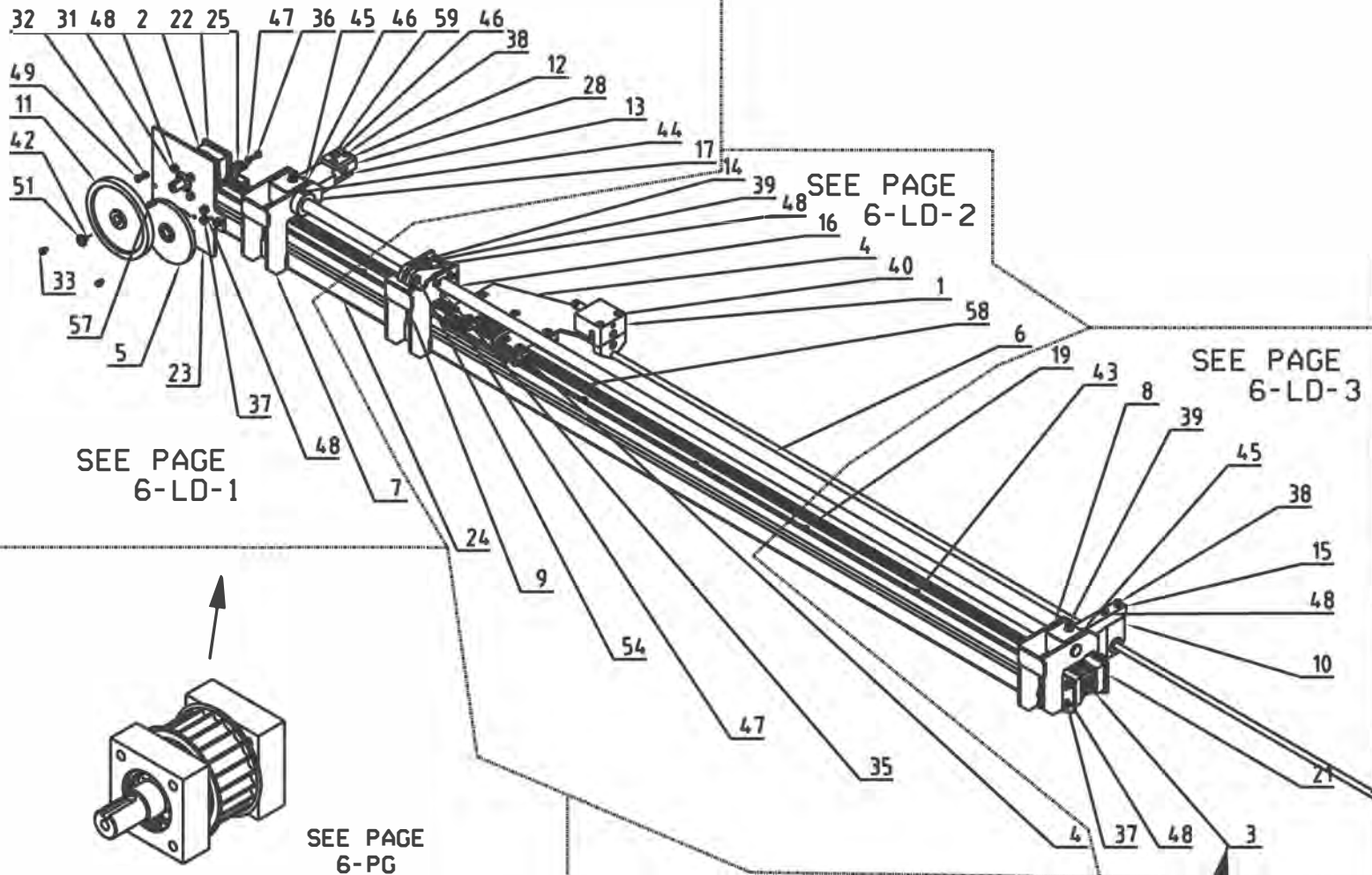
SEE PAGE
6-LD-3

SEE PAGE
6-LD-1

SEE PAGE
6-PG
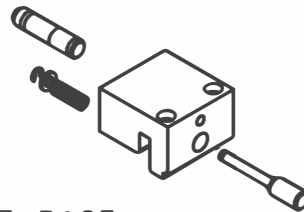
SEE PAGE
6-M

SEE PAGE
6-F

SEE PAGE
6-PD

SEE PAGE
6-PE
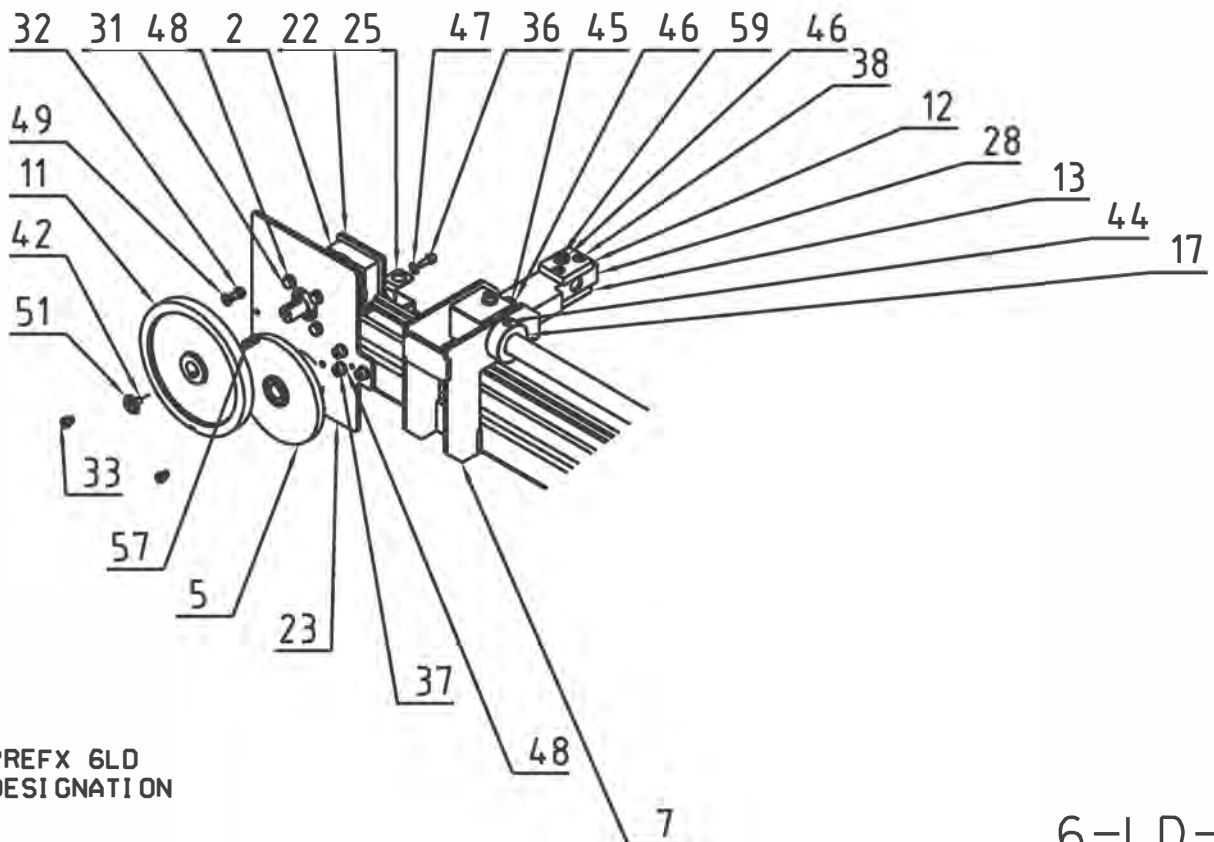
10 MM PUSHER - SEE PAGE 6-P10
18 MM PUSHER - SEE PAGE 6-P18

6-LD

SECTION 6 – LINEAR DRIVE

ITEM	PART NUMBER	DESCRIPTION	QTY
6LD-2	PULLEY ASSEMBLY	SEE PAGE 6-PG	1
6LD-5	MOTOR ASSEMBLY	SEE PAGE 6-M	1
6LD-7	46-18-20-200	SUPPORT, MOTOR END	1
6LD-11	46-10-20-007	GEAR, 90T DRIVE	1
6LD-12	46-10-22-013	PLATE, DETENT MNTG.	1
6LD-13	46-10-22-014	PLATE, THREADED	1
6LD-17	46-22-004	COLLAR	1
6LD-22	46-18-20-009	BRACKET	1
6LD-23(565)	46-19-20-010	PLATE, 400W MTR MNTG.	1
6LD-23(580)	4530035	PLATE, 750W MTR MNTG.	1
6LD-25	46-18-20-018A	BRACKET, SWITCH MNTG.	1
6LD-28	46-17-22-002	ARM, PICK-UP	1
6LD-31		SCREW, HX HD CAP	4
6LD-32		SCREW, SOC HD CAP	1
6LD-33		SCREW, SOC HD CAP	2
6LD-36		SCREW, SOC HD CAP	2
6LD-37		SCREW, SOC HD CAP	14
6LD-38		SCREW, SOC HD CAP	4
6LD-42		SCREW, SOC HD CAP M6	1
6LD-44		SCREW, SET M8	2
6LD-45		SCREW, HX HD SET	2
6LD-46		NUT, HEX M6	3
6LD-47		WASHER, M6 LOCK	2
6LD-48		WASHER, M6 FLAT	20
6LD-49		WASKER, SERRATED	1
6LD-51	801447	WASHER, 6MM C'SINK	1
6LD-57	801458	KEY, M5X20	1
6LD-59	801422	DETENT, BALL M8X16	1
6LD-60		NUT, M8	1

NOTE: ADD PREFX 6LD
TO NUMBER DESIGNATION

6-LD-1

6-LD-2

ITEM	PART NUMBER	DESCRIPTION	QTY
6LD-1		PUSHER LOCK ASSY SEE PAGE 6-PE	1
6LD-4		FLAG ASSEMBLY SEE PAGE 6-F	1
6LD-6		PUSHER, ASSEMBLY 10MM PUSHER SEE 6-P10	1
		PUSHER, ASSEMBLY 18MM PUSHER SEE 6-P18	1
6LD-9	46-18-20-200	BRACKET	1
6LD-14	46-17-20-007	LIFTER	1
6LD-16	46-17-22-003	SHAFT	1
6LD-24	46-18-20-017B	TUBE, DRIVE SUPPORT	1
6LD-35		SCREW, SOC HD CAP M5	3
6LD-39		SCREW, SOC HD CAP M6	1
6LD-40		SCREW, SOC HD CAP M6	2
6LD-47		WASHER, LOCK	5
6LD-48		WASHER, M6 FLAT	21
6LD-54	46-18-20-022A	PIN	1
6LD-58	46010026	BELT	1
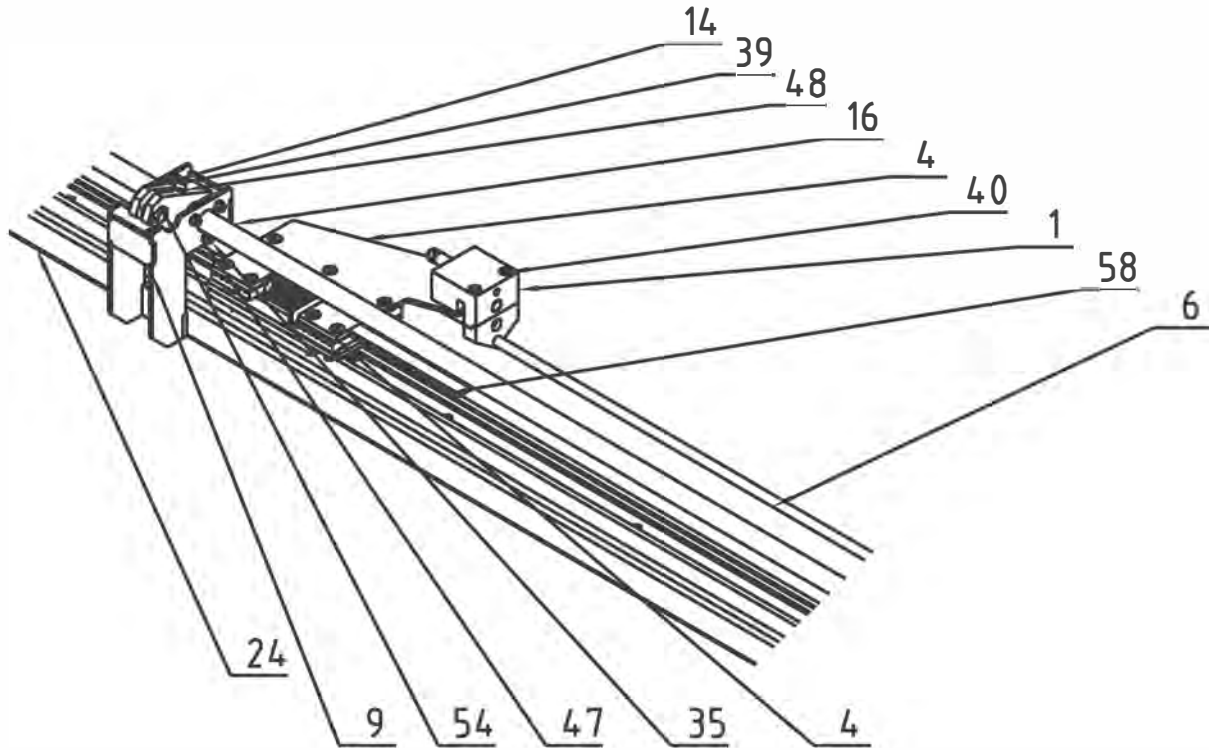
NOTE: ADD PREFX 6LD
TO NUMBER DESIGNATION

6-LD-2

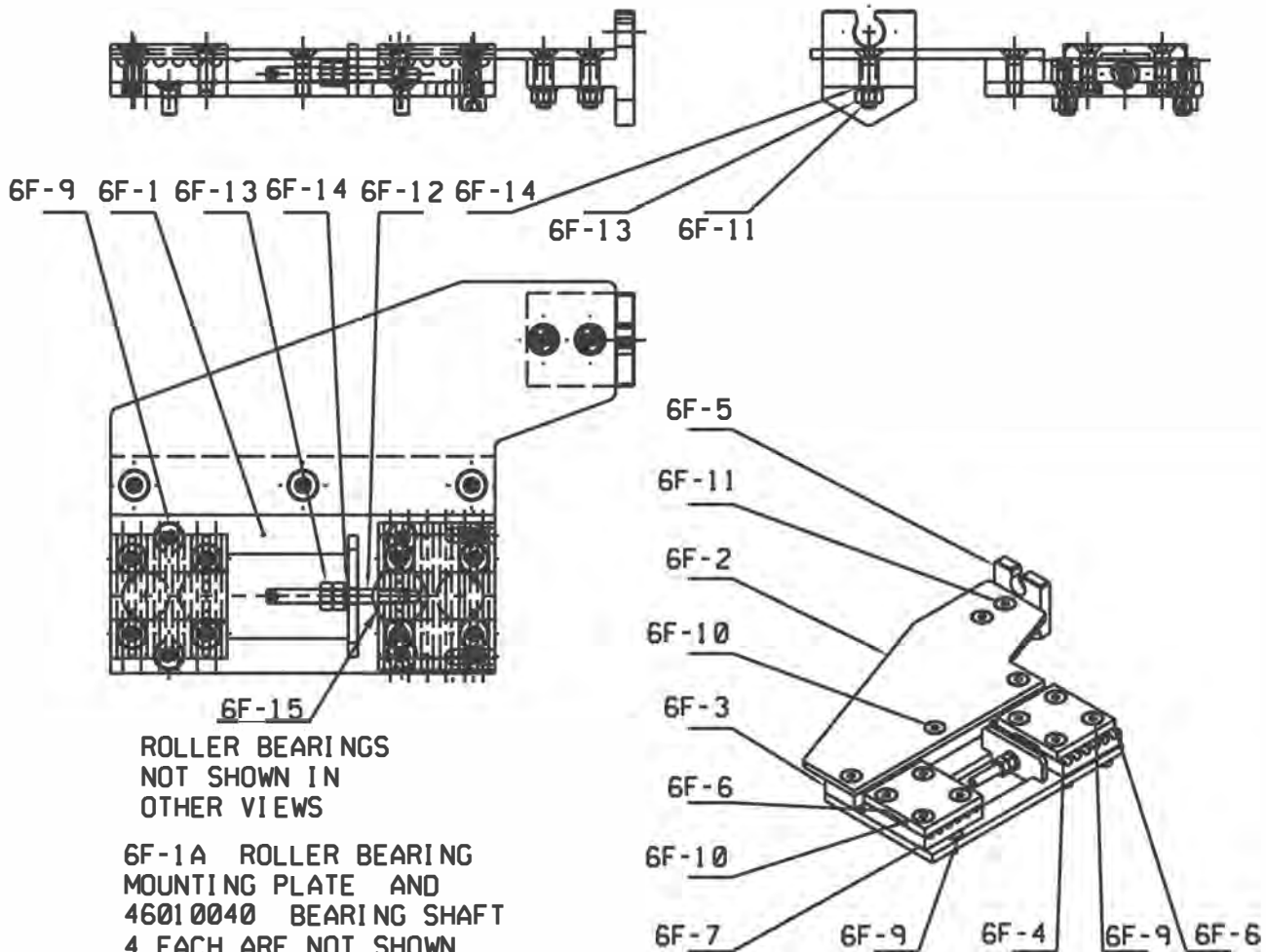| ITEM	PART NUMBER	DESCRIPTION	QTY
6LD-3	PULLEY ASSEMBLY	SEE PAGE 6-PD	1
6LD-8	46-18-20-300	SUPPORT, END	1
6LD-10	46-09-22-021A	HOLDER, PUSHER	1
6LD-15	46-17-22-001	ARM, PUSHER SUPPORT	1
6LD-19	46010024	RAIL, LINEAR	1
6LD-21	46-18-20-008	BRACKET	1
6LD-37		SCREW, SOC HD CAP	8
6LD-38		SCREW, SOC HD CAP	2
6LD-39		SCREW, SOC HD CAP	3
6LD-43		SCREW, BUT HD CAP	11
6LD-45		SCREW, HX HD SET	2
6LD-48		WASHER, M6 FLAT	16

PUSHER (REF)
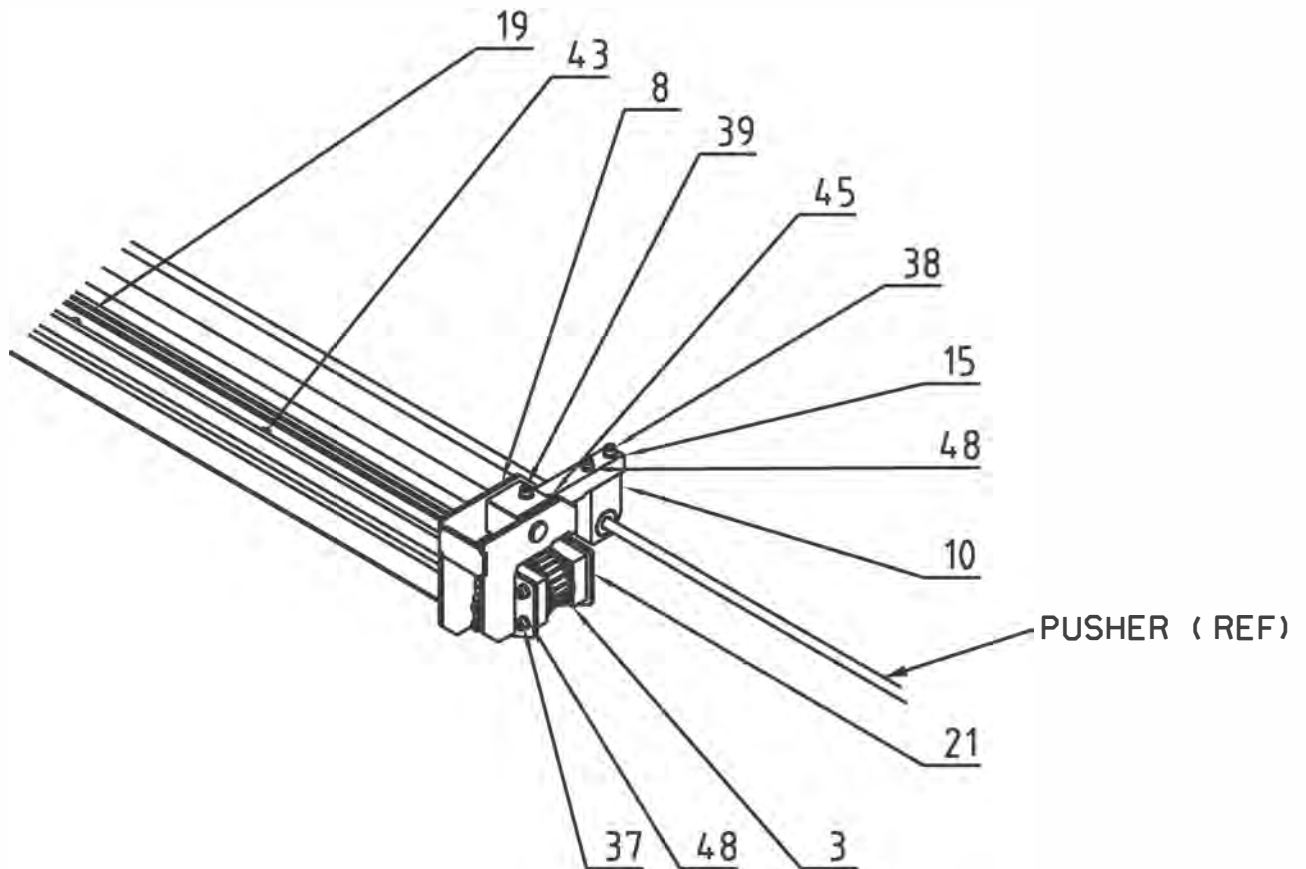
NOTE: ADD PREFX 6LD
TO NUMBER DESIGNATION

6-LD-3

SECTION 6 - LINEAR DRIVE / FLAG ASSEMBLY

ITEM	PART NUMBER	DESCRIPTION	QTY
6F-1	46-18-20-100	PLATE, UPPER FLAG ASSY	1
6F-1A	46-18-20-003	PLATE, ROLLER MOUNTING	1
6F-2	46-18-20-001	PLATE, FLAG MOUNTING	1
6F-3	46-18-20-002	RISER, FLAG PLATE	1
6F-4	46-18-20-005	CLAMP, BELT (ADJ. END)	1
6F-5	46-10-22-015A	FLAG	1
6F-6	46-220-000-0010	PLATE, BELT CLAMP	2
6F-7	46-220-000-0090	CLAMP, BELT (FIXED END)	1
6F-8		SCREW, SOC HD, M6X12	2
6F-9		SCREW, SOC C'SINK, M6X14	8
6F-10		SCREW, SOC C'SINK, M6X20	7
6F-11		SCREW, SOC C'SINK, M6X25	2
6F-12		SCREW, SOC SET, M6X60	1
6F-13		NUT, M6 HEX	4
6F-14		WASHER, M6	3
6F-15	46010025	BEARING, GOTHIC ROLLER	4

6F-9 6F-1 6F-13 6F-14 6F-12 6F-14

6F-13 6F-11

6F-15

ROLLER BEARINGS
NOT SHOWN IN
OTHER VIEWS

6F-1A ROLLER BEARING
MOUNTING PLATE AND
46010040 BEARING SHAFT
4 EACH ARE NOT SHOWN

6F-5
6F-11
6F-2
6F-10
6F-3
6F-6
6F-10
6F-7 6F-9 6F-4 6F-9 6F-6

6-F

ITEM	PART NUMBER	UNIT	DESCRIPTION	QTY
6M-1	45140050	565	MOTOR, 400W YASKAWA	1
	45160090	580	MOTOR, 750W YASKAWA	1
6M-2	45120031	565	DRIVE GEAR	1
	45130030	580	DRIVE GEAR	1
6M-3	45120030	565/580	FLYWHEEL	1
6M-4		565/580	SCREW, SOCKET SET M6	1
6M-5		565/580	SCREW, SOCKET SET M4	1

6M-3 6M-2 6M-5 6M-1

6M-4

ENCODER & POWER
CONNECTORS SUPPLIED
ON MOTOR LEADS
STD. FROM YASKAWA

CONTROL MATING CABLES:
45130045 – ENCODER CABLE
45130044 – POWER CABLE

6-M

ML PARTS LIST

ITEM	PART Number	Description	Qty
6PD-1	46-18-20-016	SHAFT, PULLEY	1
6PD-2	46-18-20-014	BLOCK, BEARING	2
6PD-3	801387	RING, SMALLEY	2
6PD-5	46-18-20-006	PULLEY	1
6PD-6	801386	KEY, 4x4x25	1
6PD-7	801381	BEARING, 6201Z	2
6PD-8	801384	RING, SNAP 32MM INTERNAL	2
6PD-9	801385	SHIM, 12x18x1	3
6PD-10	801383	RING, SNAP 12MM EXTERNAL	1
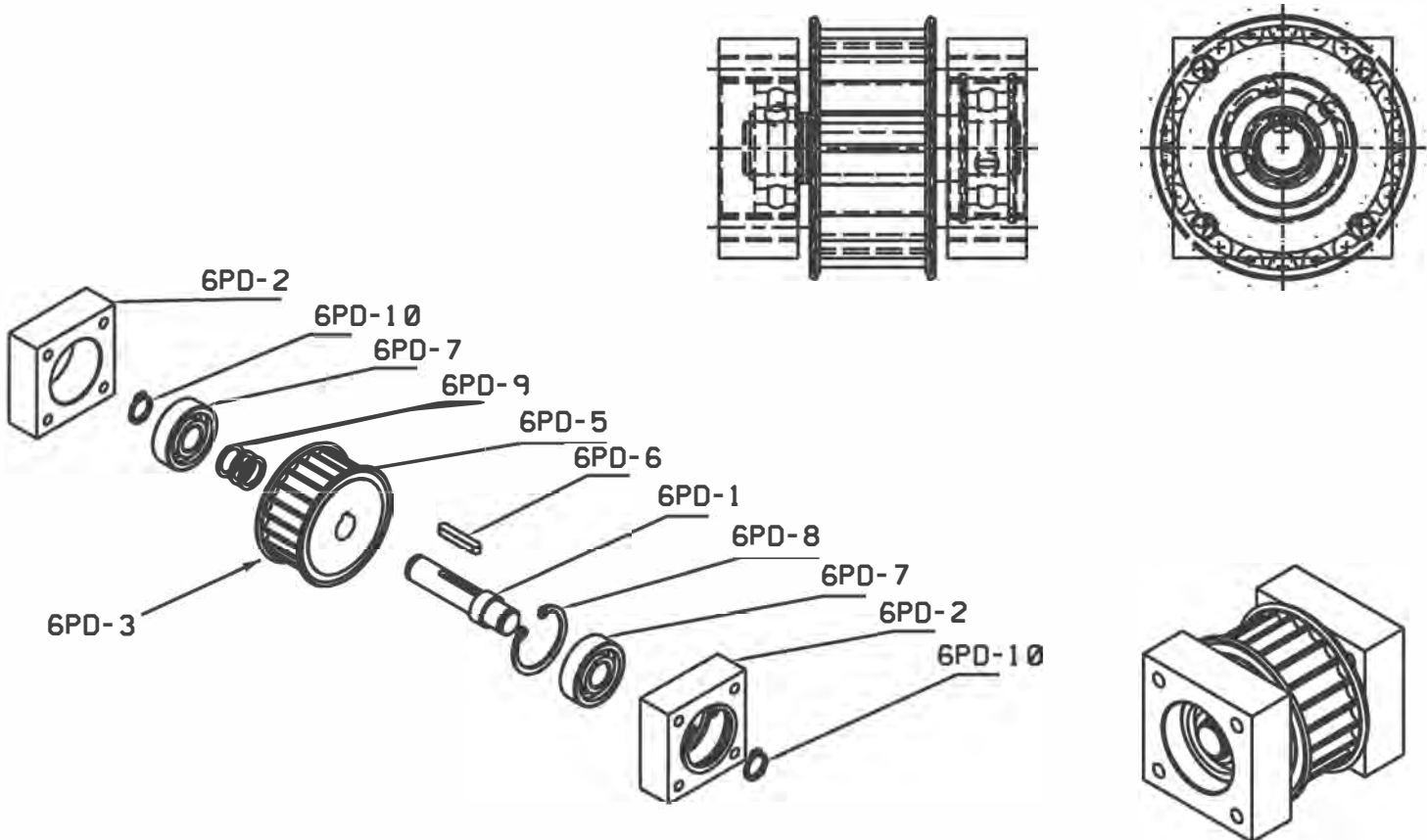
6-PD

ML PARTS LIST

SECTION 6 – LINEAR DRIVE / GEAR DRIVE PULLEY

ITEM	PART Number	Description	Qty
6PG-1	46-19-29-015	SHAFT, PULLEY DRIVE	1
6PG-2	46-18-20-014	BLOCK, BEARING	2
6PG-3	801387	RING, SMALLEY	2
6PG-4	46-18-20-012	SPACER	1
6PG-5	46-18-20-006	PULLEY	1
6PG-6	801386	KEY, 4x4x25	1
6PG-7	801381	BEARING, 6201Z	2
6PG-8		RING, SNAP 32MM INTERNAL	2
6PG-9	801385	SHIM, 12x18x1	3
6PG-10		RING, SNAP 12MM EXTERNAL	1

6PG-1 6PG-8 6PG-7 6PG-2 6PG-4 6PG-5 6PG-3 6PG-10
6PG-6 6PG-9

6-PG

ITEM	PART NUMBER	DESCRIPTION	QTY
LB-1	46-17-10-200	WELDMENT, BOOMERANG	1
LB-2	46-09-10-018	WASHER	1
LB-3	46-09-10-019	PIN, SHOULDER	1
LB-4	46-09-10-020	ROLLER	1
LB-5	46-09-10-022	PIN	1
LB-6	46-17-01-009	SHAFT, LEVER	1
LB-7	800402	NUT, M10 HEX	1
LB-8	801351	SNAP, RING M20 EXTERNAL	1
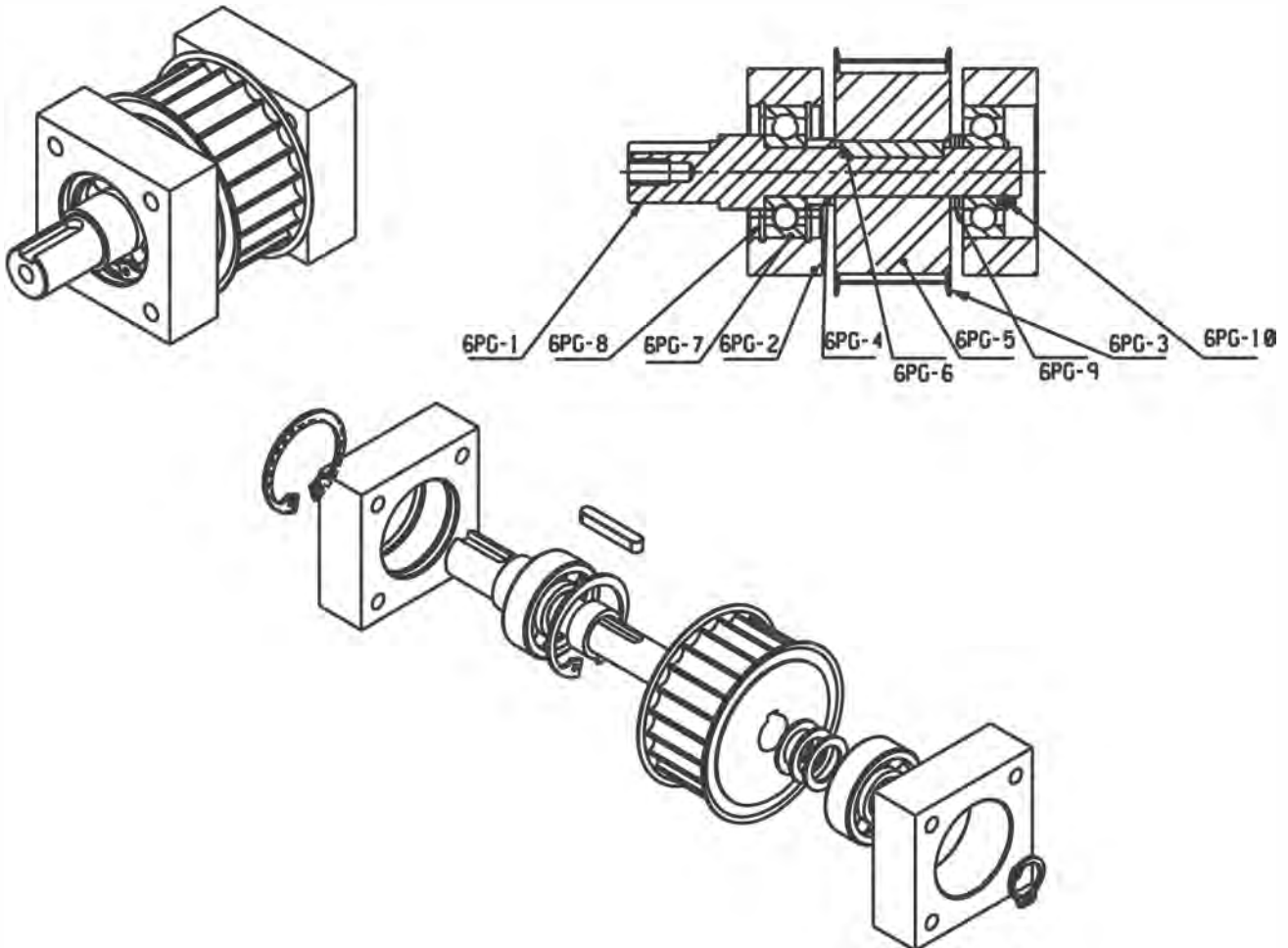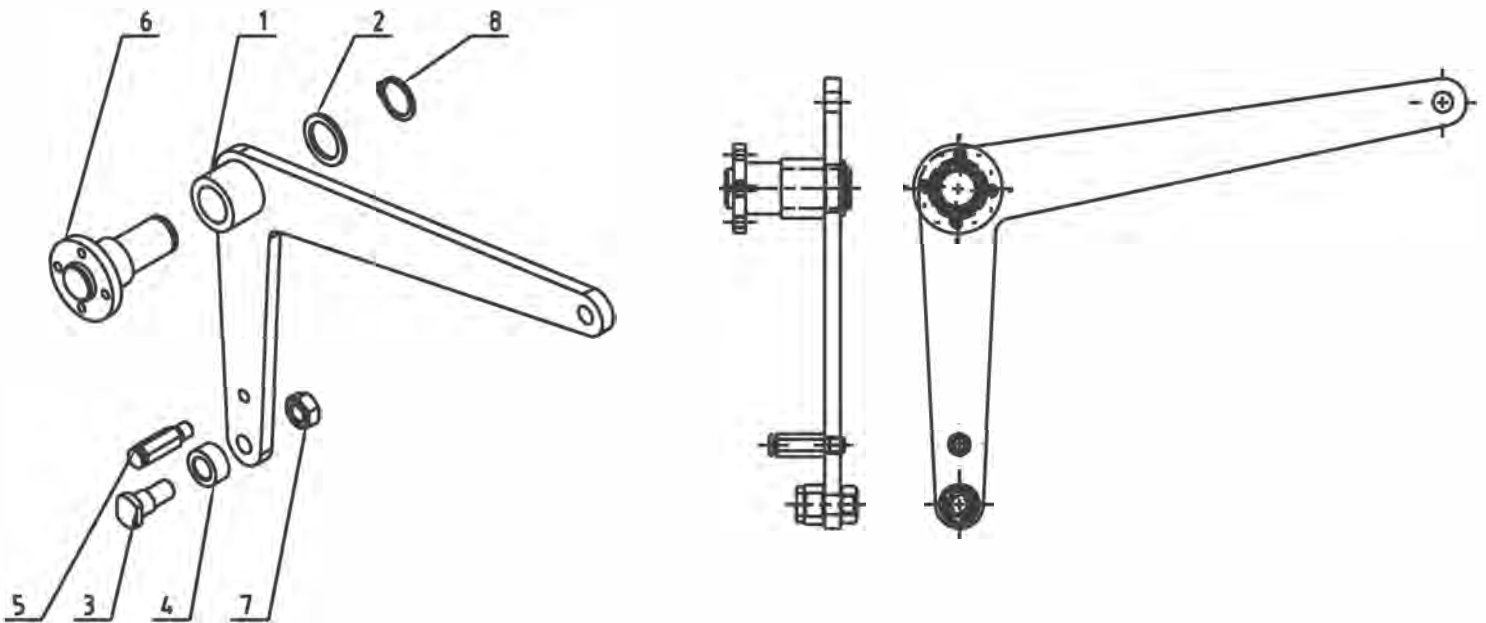
ML PARTS LIST

SECTION 7 - LOADING RACK ASSEMBLY

ITEM	PART NUMBER	DESCRIPTION	QTY
LR-1	46-17-10-002	BLOCK, RACK MOUNTING	4
LR-3	46-17-10-004	PLATE, RACK SIDE MNTG	2
LR-4	46-17-10-005	RACK	2
LR-5	46-18-10-007	PLATE, SWITCH TRIP	1
LR-6	800149	SCREW, SOC HD CAP M4X8	2
LR-7	800454	SCREW, SOC HD CAP M6X16	8
LR-8	800105	SCREW, SOC HD CAP M6X40	6
LR-9	800159	SCREW, SOC HD CAP M8X25	4
LR-10	800952	WASHER, M4 FLAT	2
LR-11	800955	WASHER, M6 FLAT	6
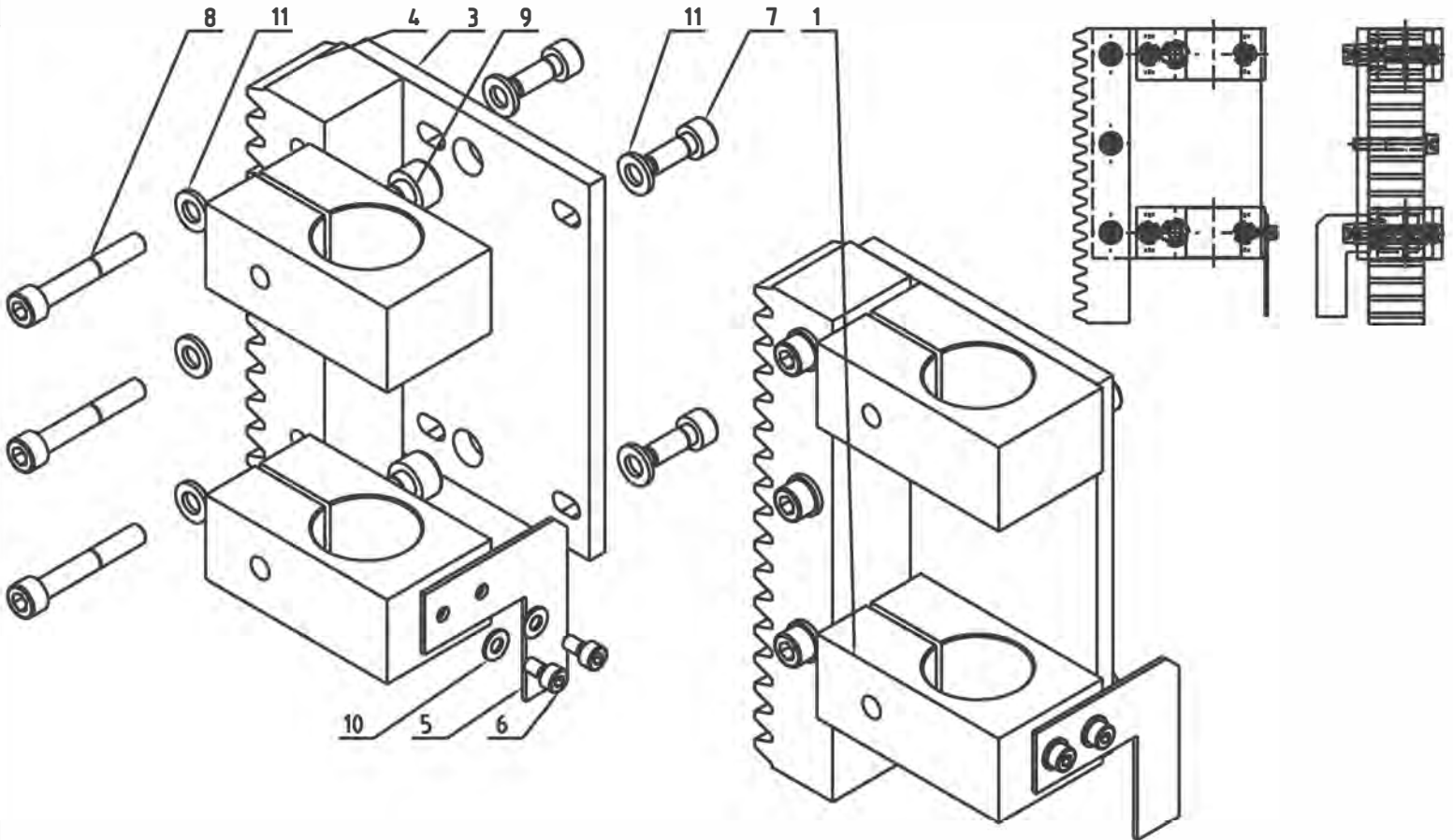
NOTE; TWO ASSEMBLIES PER BARFEED

7-R

SECTION 8 – LOADING SHAFT ASSEMBLY

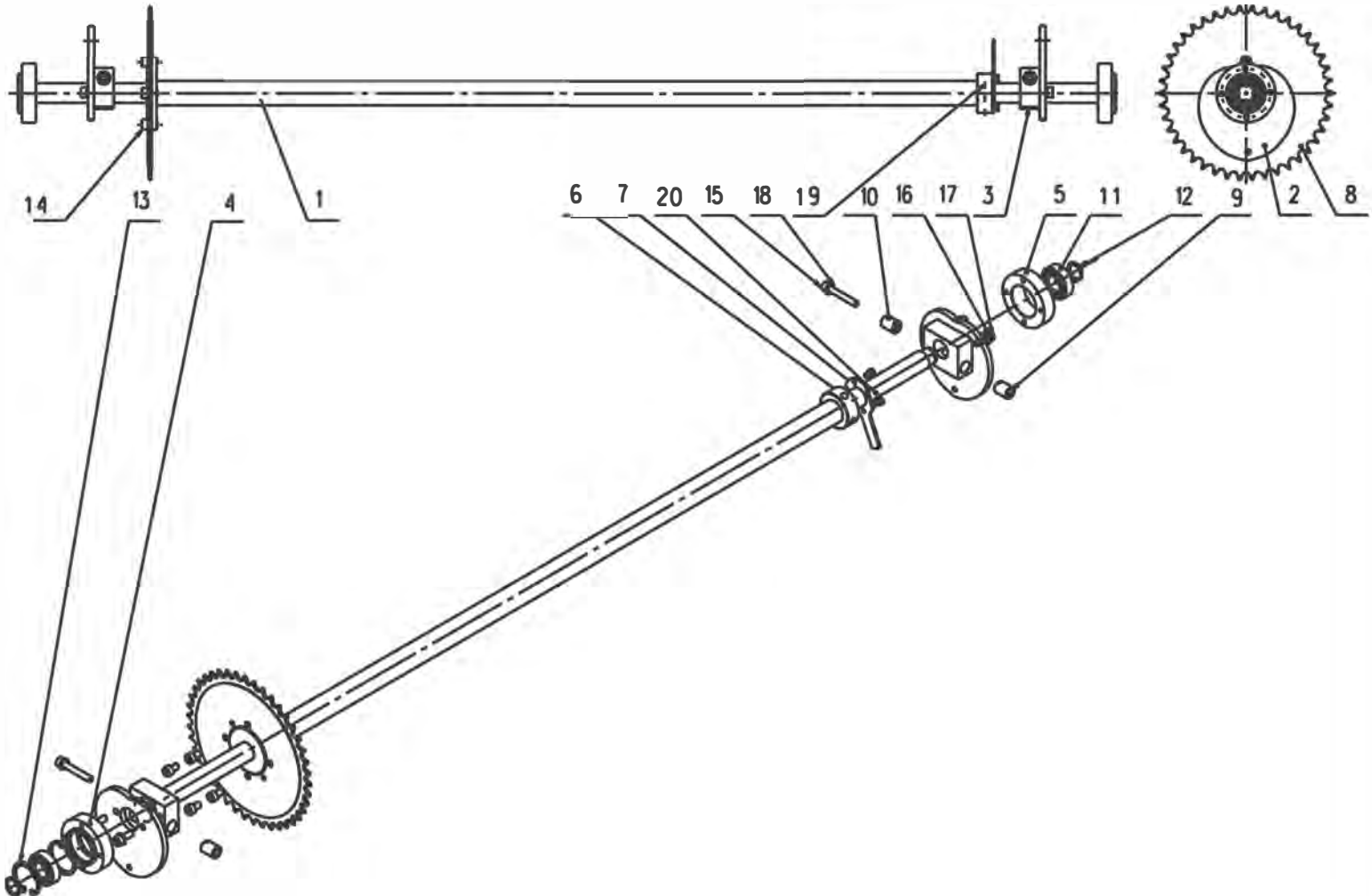| ITEM	PART NUMBER	DESCRIPTION	QTY
8-1	46-17-10-100	SHAFT, WELDMENT	1
8-2	46-11-10-004	CAM	1
8-3	46-17-10-009	CLAMP	1
8-4	46010013	SPROCKET, 42T	1
8-5	46-302-000-0010	CLAMP, SHAFT	1
8-6	46-302-000-0020	CLAMP, THREADED SHAFT	1
8-7	46-18-10-010	CAP, BEARING	2
8-9	801355	SCREW, SOC HD CAP M6X10	4
8-10	800454	SCREW, SOC HD CAP M6X16	2
8-11	800105	SCREW, SOC HD CAP M6X40	1
8-12	800905	WASHER, M6 FLAT	1
8-13	800832	WASHER, M6 LOCK	2
8-14	801354	BEARING, 17X35X10	2
8-15	801352	RING, SNAP M17 EXT	2
8-16	801353	RING, SNAP M35 INT	2
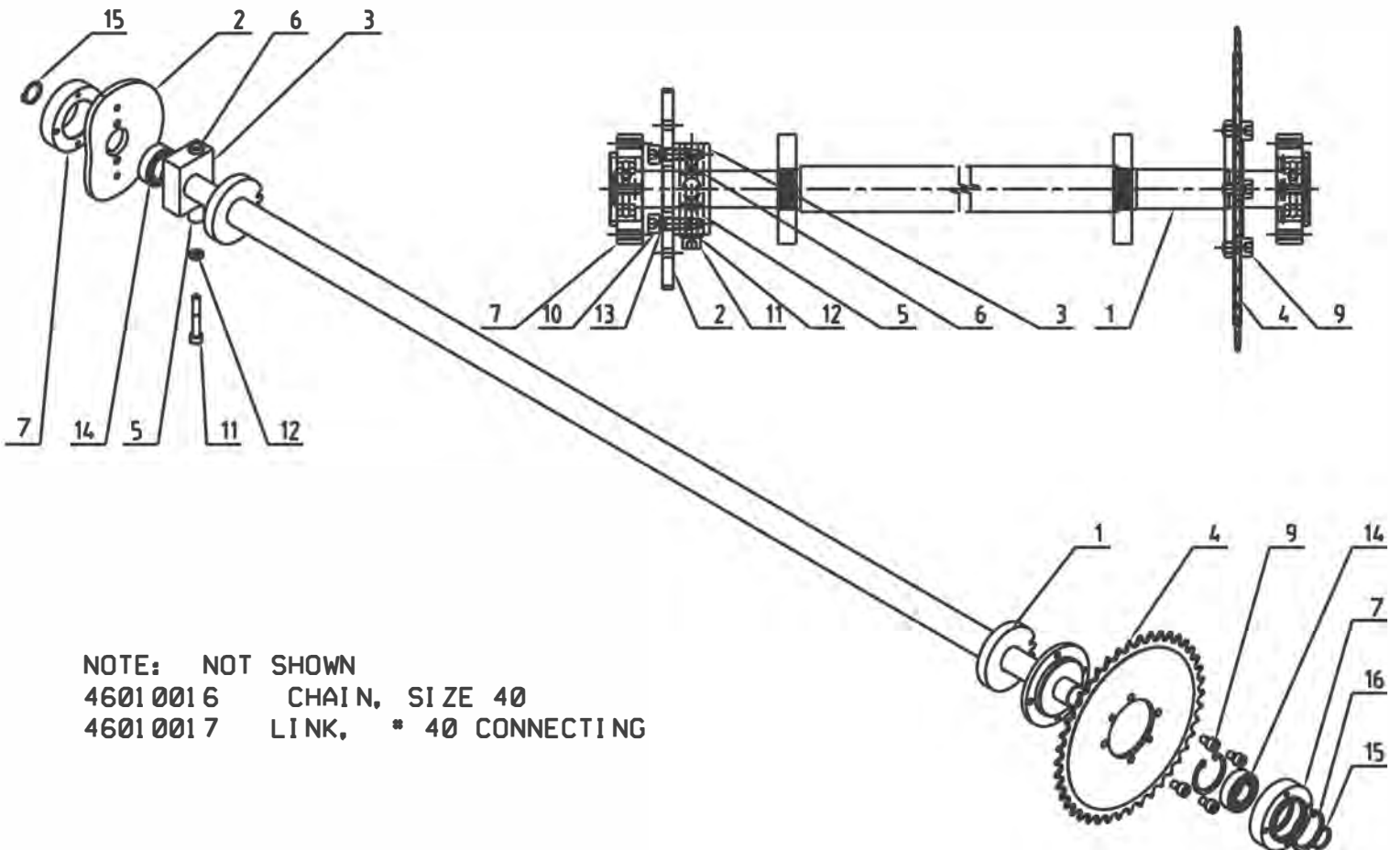
NOTE: NOT SHOWN
46010016   CHAIN, SIZE 40
46010017   LINK, # 40 CONNECTING

8

SECTION 9 - CAM SHAFT ASSEMBLY

ITEM	PART NUMBER	DESCRIPTION	QTY
9-1	46-19-10-300	SHAFT, CAM (WELDMENT)	1
9-2	46-19-10-005	CAM	2
9-3	46-17-10-009	CLAMP	2
9-4	46-17-10-010	CAP, BEARING	2
9-5		(NOT USED)	
9-6	46-19-10-011	COLLAR	1
9-7	46-19-10-012	BRACKET, PROX. DOG	1
9-8	46010013	SPROCKET, 42T	1
9-9	46-302-000-0020	CLAMP, THREADED SHAFT	2
9-10	46-302-000-0010	CLAMP, SHAFT	2
9-11	801354	BEARING, 17X35X10	2
9-12	801352	RING, SNAP M17 EXT	2
9-13	801353	RING, SNAP M35 INT	2
9-14		SCREW, SOC HD CP M6X10	4
9-15	800955	WASHER, FLAT M6	4
9-16	800454	SCREW, SOC HD CP M6X16	4
9-17	800832	WASHER, LOCK M6	4
9-18		SCREW, SOC HD CP M8X40	2
9-19		SCREW, SOC HD CP M8X10	2
9-20		SCREW, SOC HD CP M4X6	2

9

ML PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QTY
10-1	46-19-10-400	SHAFT, WELDMENT	1
10-2	46-19-10-500	ARM, FNGER SHAFT LEVER	2
10-3	46-09-10-020	ROLLER,	2
10-4	46-09-10-022	PIN	2
10-5	46-09-10-019	PIN, SHOULDER	2
10-6	46-10-22-002	COLLAR	2
10-7	46-302-000-0010	CLAMP, SHAFT	2
10-8	46-302-000-0020	CLAMP, THREADED SHAFT	2
10-9	800402	NUT, M10 HEX	2
10-10	800905	WASHER, M6 FLAT	2
10-11	800105	SCREW, SOC HD CAP M6X40	2
10-12		SCREW, SOC HD CAP M8X10	4

10
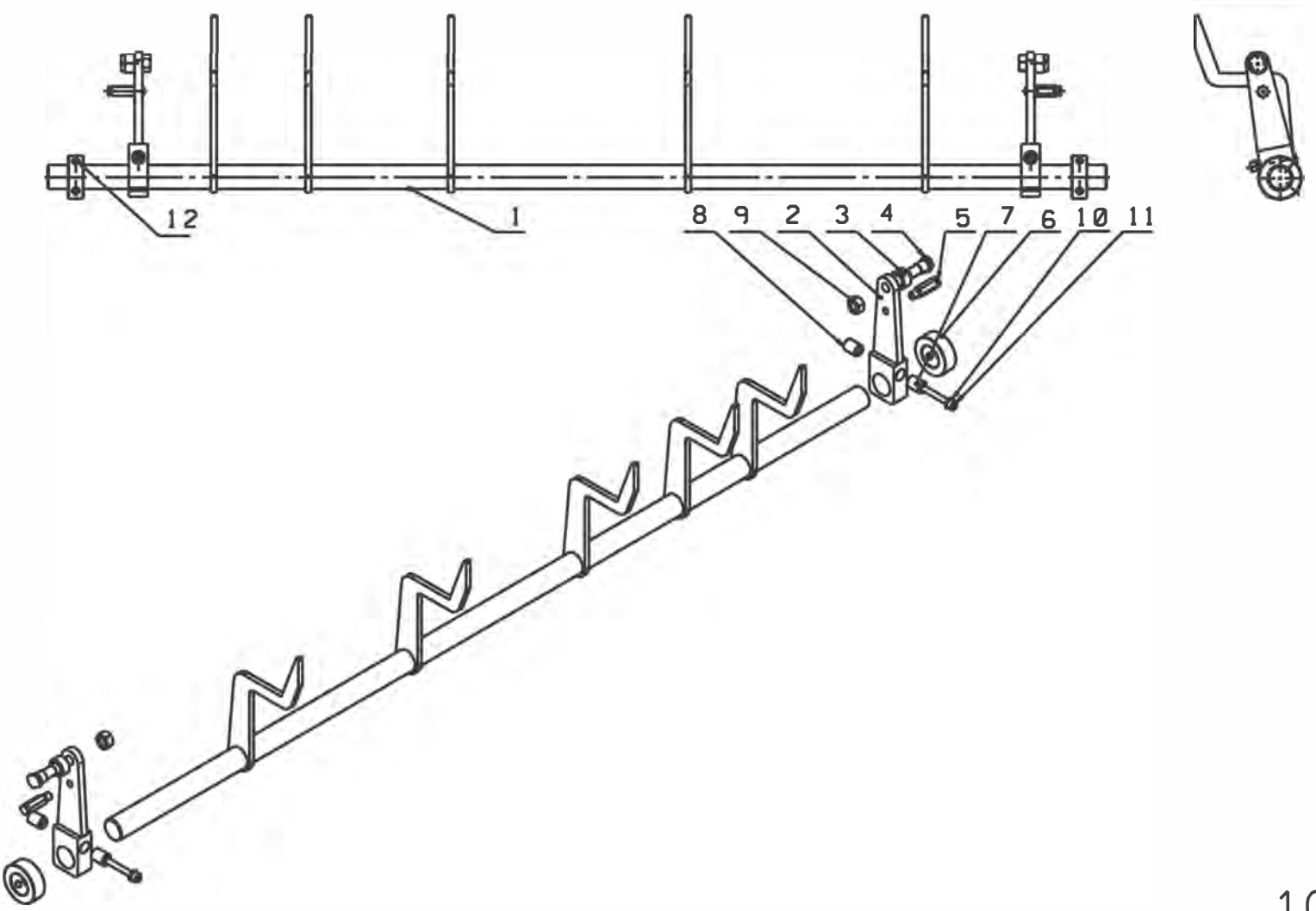
ML PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QTY
11-1	46010019	SPROCKET, 8T	2
11-2		SCREW, SET	2
NOTE: EITHER OF TWO MOTOR MANUFACTURERS			
11-3	45120014	DUNKERMOTOREN	2
	46010039	BUSHING (REQ. DNKRMTRN)	2
11-3	46010060	BODINE	2
	46010061	ADAPTER (REQ. BODINE LIFTING)	1
11-4		SCREW, SOC. HD. CAP	8
11-5		WASHER, FLAT WASHER	8

MOTORS CAN BE EITHER DUNKERMOTOREN (SHOWN)
OR BODINE - QTY 2 EACH
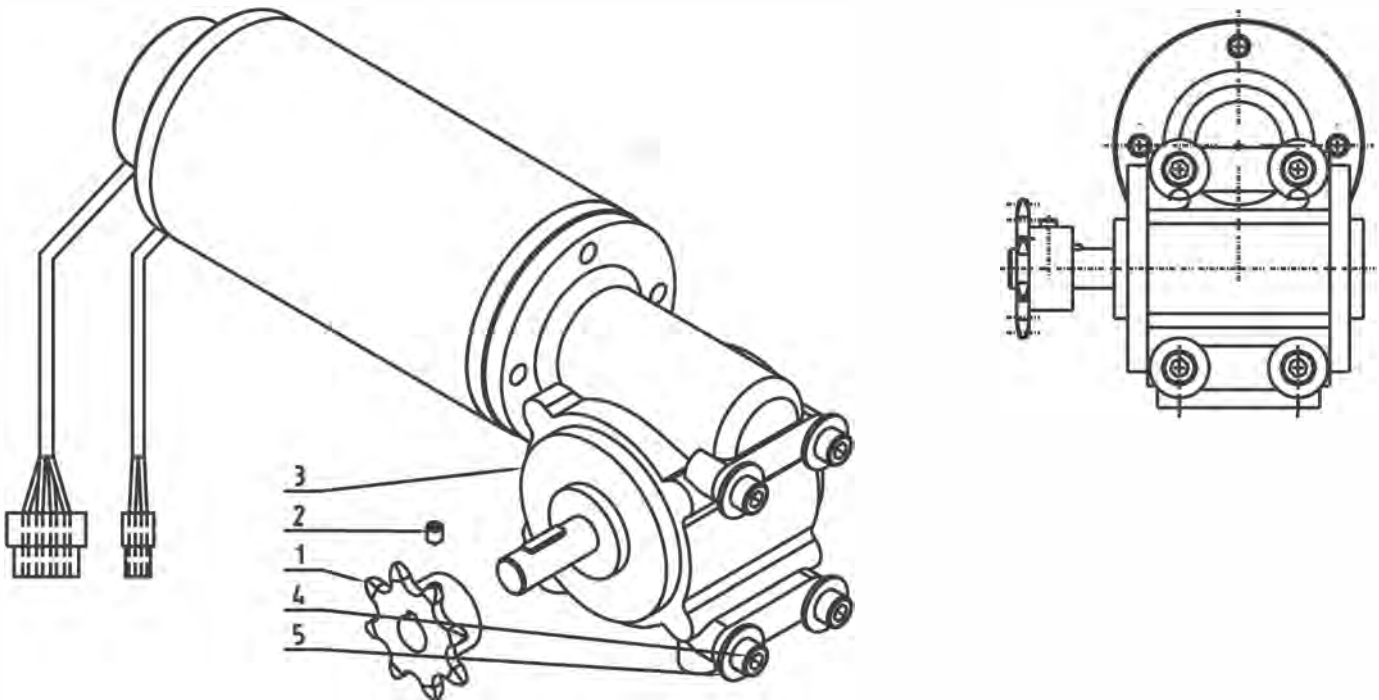
TWO IDENTICAL MOTOR ASSEMBLIES
1. LIFTER MOTOR
2. SPLITTER MOTOR

11

45120014 - MOTOR, DUNKERMOTOREN
46010060 - MOTOR, BODINE (NOT SHOWN)
CONTROL TERMINOLOGY & LABLELNG:
LIFTING MOTOR -   REFERED TO AS M2
SPLITTER MOTOR - REFERRED TO AS M3

RED   BLACK

MOTOR POWER
LEADS
18 AWG

ENCODER
4 LEADS
24 AWG

ENCODER AMP CONNECTOR
LEAD LENGTH 10 IN. - M2
LEAD LENGTH 6 IN. - M3
AMP # 350777-1
PINS # 350547-1 (2 MALE)

BLK - 0V
RED - +5v...24V
GRN - CHNL B
YLW - CHNL A

ENCODER AMP CONNECTOR
LEAD LENGTH 10 IN. - M2
LEAD LENGTH 6 IN. - M3
AMP # 350779-1
PINS # 350547-1 (4 MALE)

NOTE: KEY / PIN
ORIENTATION with WIRE COLOR

11-2
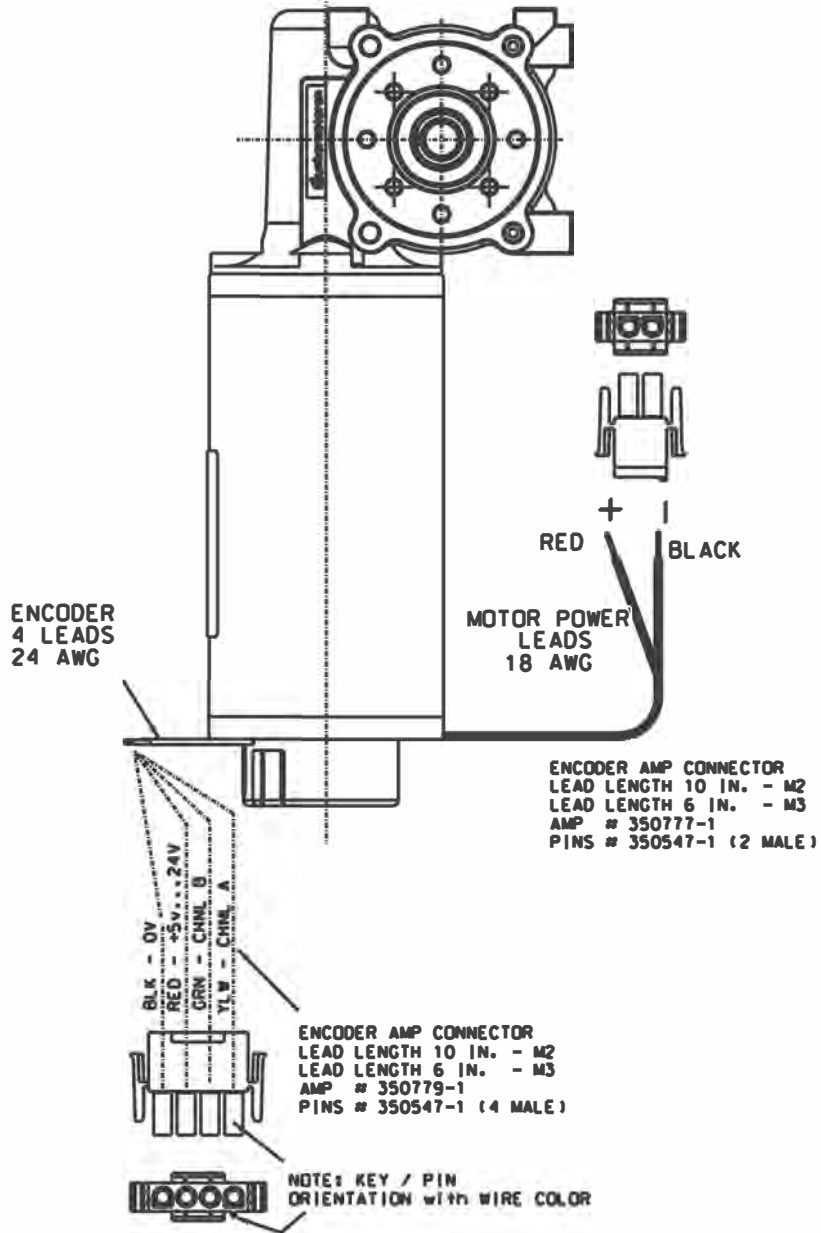
ITEM - 46P018-65029 - SPLITTER MOTOR (M3) ENCODER CABLE

LABEL
X232

LABEL

CONTROL
CONNECTION   LABEL

A0190C-J9-2   0V
A0190C-J9-4   5V
A0190C-J9-3   B
A0190C-J9-2   A

ENCODER CONNECTOR:
AMP - 350780
Sockets (4) - 350550
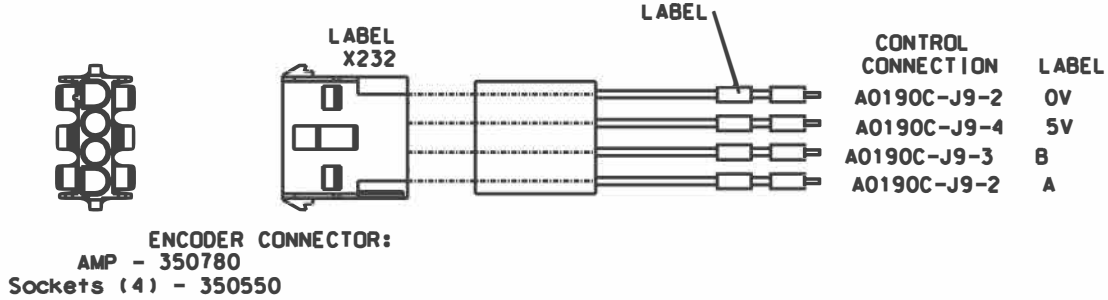
ITEM - 46P018-65027 - LIFTING MOTOR (M2) ENCODER CABLE

LABEL
X222

LABEL
DRIVER 2

CONNECTION

DRIVER2   0V
DRIVER2   5V
DRIVER2   B
DRIVER2   A

ENCODER CONNECTOR:
AMP - 350780
Sockets (4) - 350550

CN1 - 2 POS JUMPER
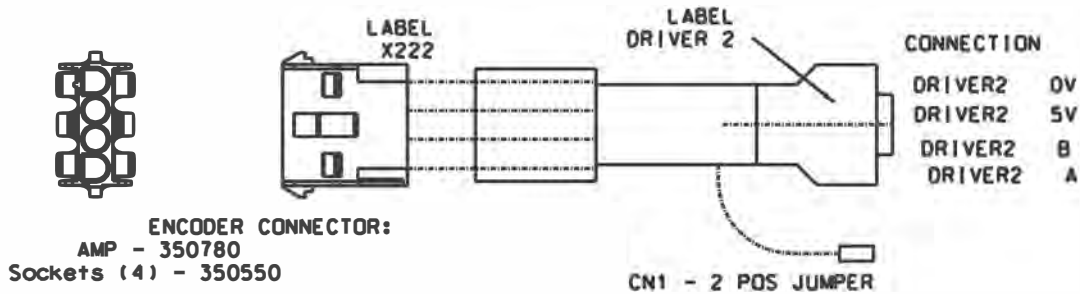
ITEM - 46P018-65028 - SPLITTER (M3) MOTOR POWER CABLE

LABEL

CONNECTION

A0218 TB3-3

A0218 TB3-4

X231:

Motor Side:	Cable	Length	PIN	Label	Control Connection	
AMP - 350778	18 AWG - 2C Jacketed	66"	1 - Brown	X3/141	A0218 TB3-3	Mates with mtr - RED
Sockets (2) - 350550			2 - Blue	X3/142	A0218 TB3-4	Mates with mtr - BLK

Jacket stripped back 2" @ AMP
Jacket stripped back 6" @ Pin End

ITEM - 46P018-65026 - LIFTING (M2) MOTOR POWER CABLE

LABEL

CONNECTION

A0218 TB3-1
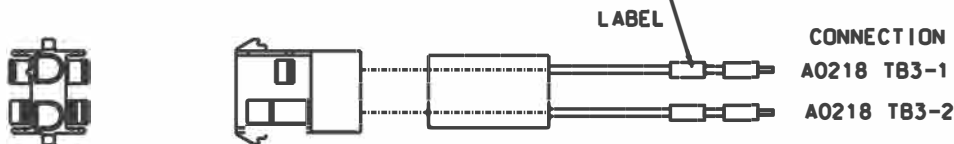
A0218 TB3-2

X221:

AMP - 350778   18 AWG - 2C Jacketed   54"   1 - Brown   X3/131   A0218 TB3-1   Mates with mtr - RED
Sockets (2) - 350550   2 - Blue   X3/132   A0218 TB3-2   Mates with mtr - BLK
Jacket stripped back 2" @ AMP
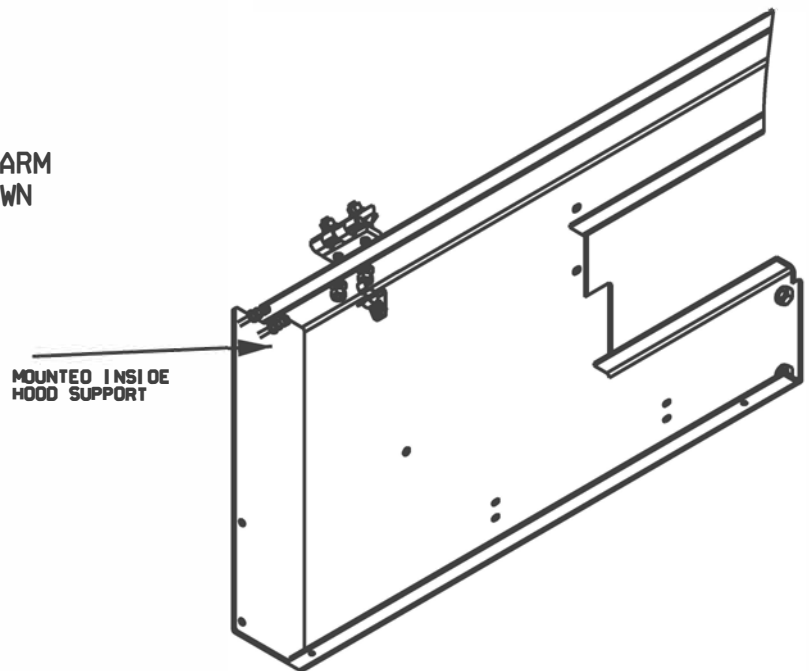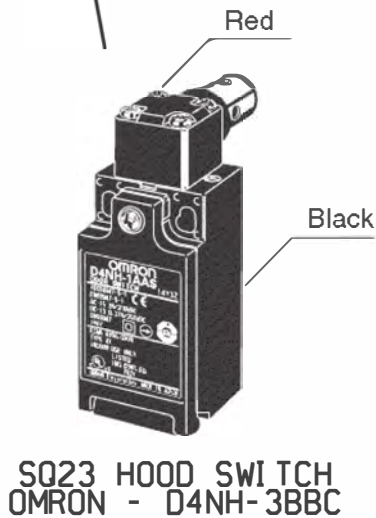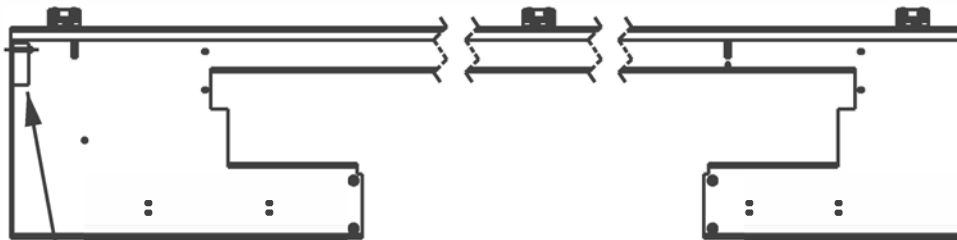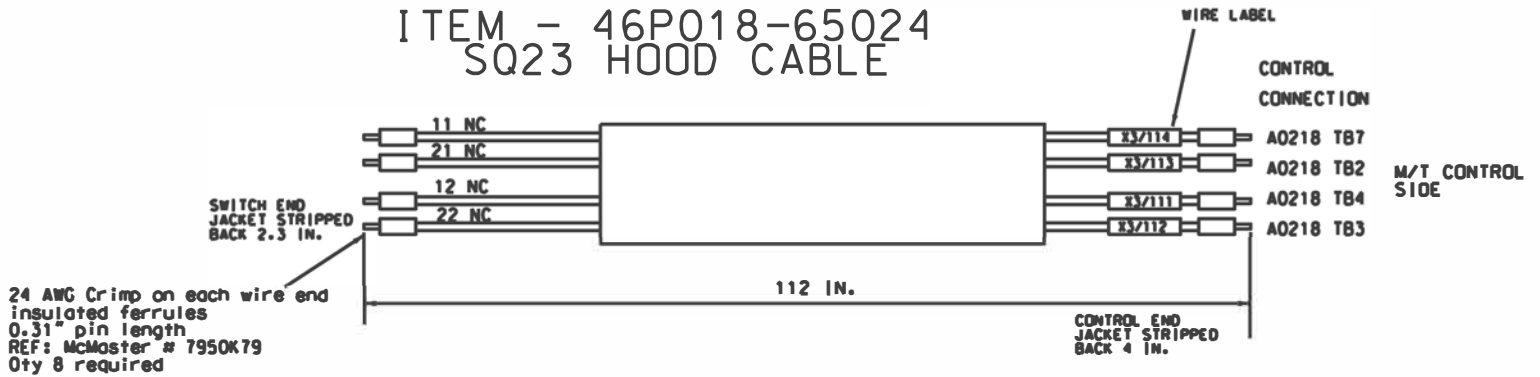Jacket stripped back 6" @ Pin End

11-3

SECTION 12 – ELECTRICAL – HOOD SWTICH & CABLE

SECTION 12 - ELECTRICAL - HOOD SWITCH & CABLE

ITEM	PART NUMBER	DESCRIPTION	QTY
12-1	45202818	SWITCH, SQ23 HOOD	1
12-2	46010125	ARM, OMRON SWITCH	1
12-3	46P018-65024	CABLE, ML2 - SQ23	1

ITEM – 46P018–65024
SQ23 HOOD CABLE

WIRE LABEL

CONTROL CONNECTION

11 NC — X3/114 — A0218 TB7
21 NC — X3/113 — A0218 TB2
12 NC — X3/111 — A0218 TB4
22 NC — X3/112 — A0218 TB3

M/T CONTROL SIDE

SWITCH END JACKET STRIPPED BACK 2.3 IN.

112 IN.

24 AWG Crimp on each wire end
insulated ferrules
0.31" pin length
REF: McMaster # 7950K79
Qty 8 required

CONTROL END JACKET STRIPPED BACK 4 IN.

Red

Black

SWITCH ARM NOT SHOWN

MOUNTED INSIDE HOOD SUPPORT

SQ23 HOOD SWITCH
OMRON - D4NH-3BBC

12

COMMENT: HOME FLAG SWITCH REFERRED TO AS THE B33 SWITCH

ITEM	PART NUMBER	DESCRIPTION	QTY
13-1	45201732	SWITCH, FLAG HOME PROX.	1
13-2	46-18-20-018A	BRACKET, SWITCH MOUNTING	1
13-3	46P018-65022	CABLE, FLAG HOME (B33)	1

B33 FLAG REFERENCE CABLE
(FLAG HOME REFERENCE)
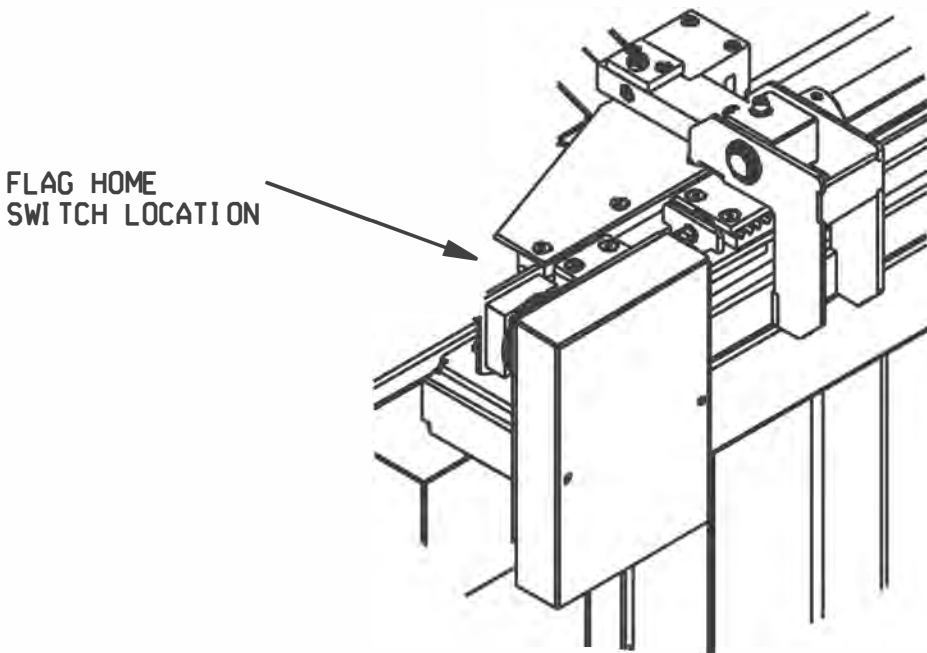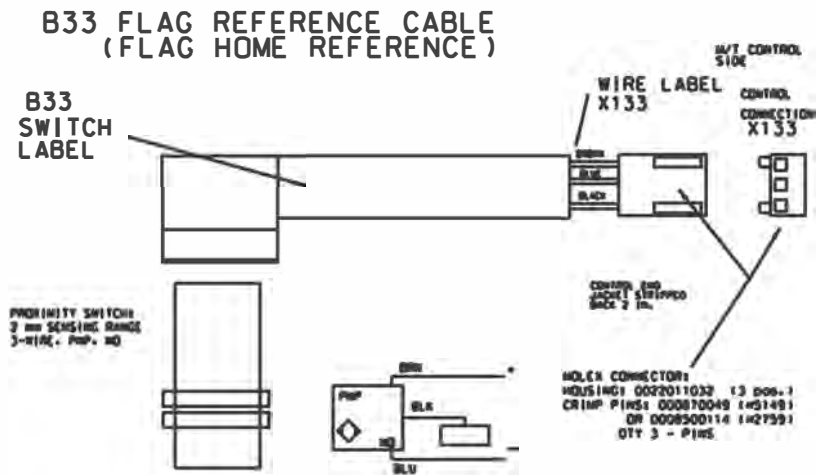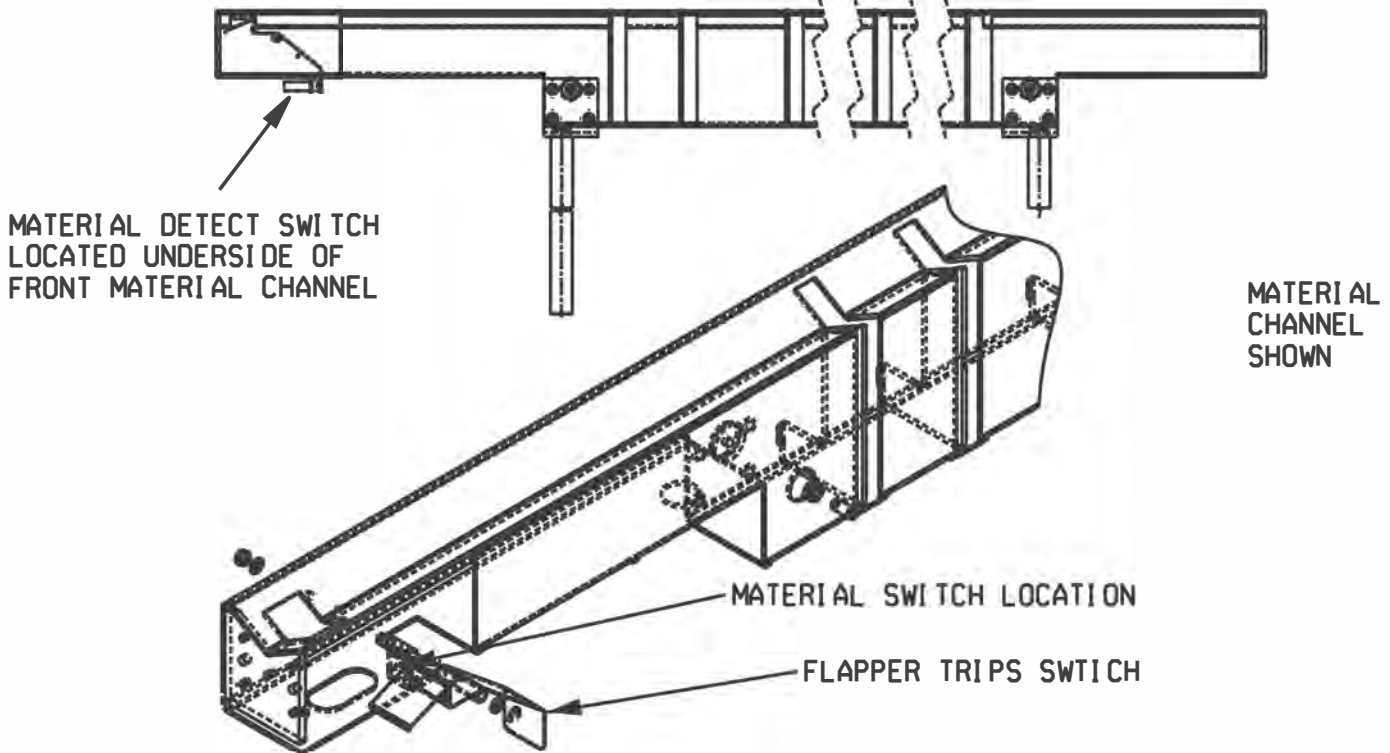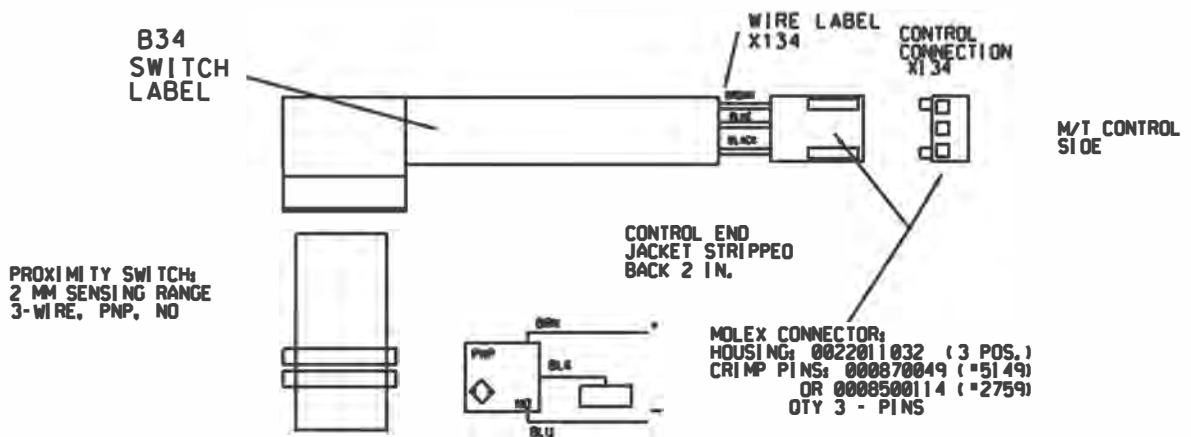

FLAG HOME
SWITCH LOCATION

13

ML PARTS LIST

SECTION 12 - ELECTRICAL - MATERIAL DETECT SWITCH & CABLE

COMMENT: MATERIAL SWITCH REFERRED TO AS THE B34 SWITCH

ITEM	PART NUMBER	DESCRIPTION	QTY
14-1	45201732	SWITCH, SWITCH PROX.	1
14-2	46P018-65022	CABLE, MATERIAL DETECT (B34)	1

B34 MATERIAL DETECT CABLE

B34 SWITCH LABEL

WIRE LABEL X134

CONTROL CONNECTION X134

M/T CONTROL SIOE

PROXIMITY SWITCH:
2 MM SENSING RANGE
3-WIRE, PNP, NO

CONTROL END JACKET STRIPPEO BACK 2 IN.

MOLEX CONNECTOR:
HOUSING: 0022011032 (3 POS.)
CRIMP PINS: 000870049 (*5149)
       OR 0008500114 (*2759)
      OTY 3 - PINS

MATERIAL DETECT SWITCH LOCATED UNDERSIDE OF FRONT MATERIAL CHANNEL

MATERIAL CHANNEL SHOWN

MATERIAL SWITCH LOCATION
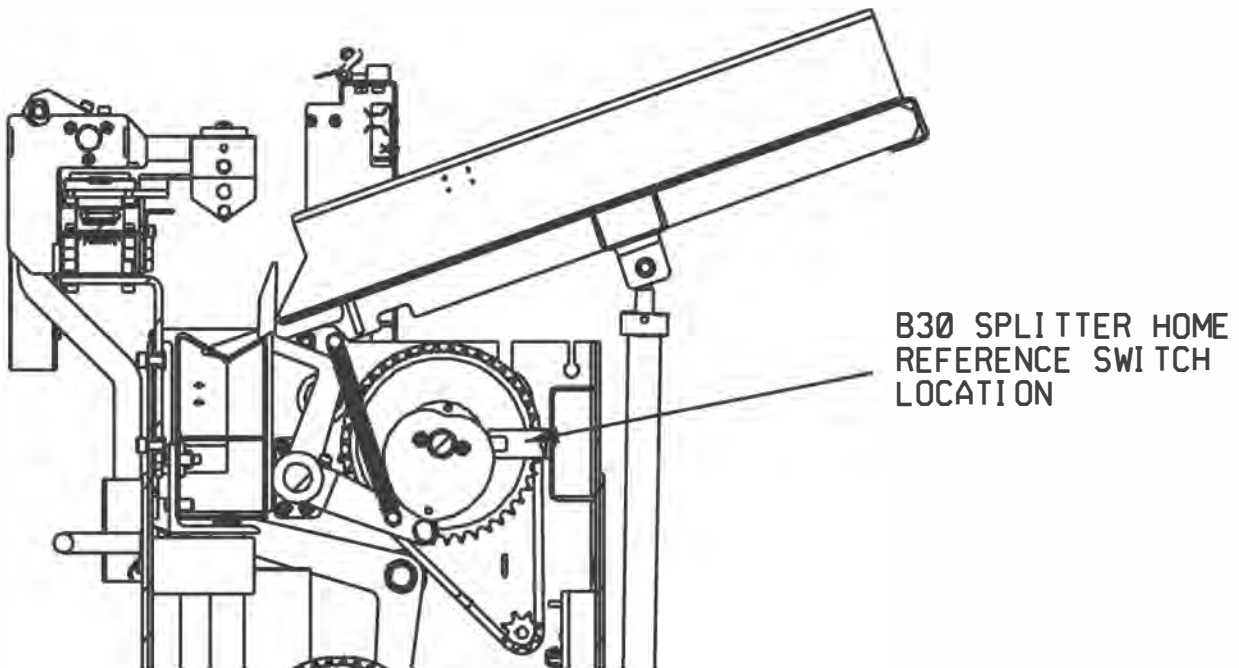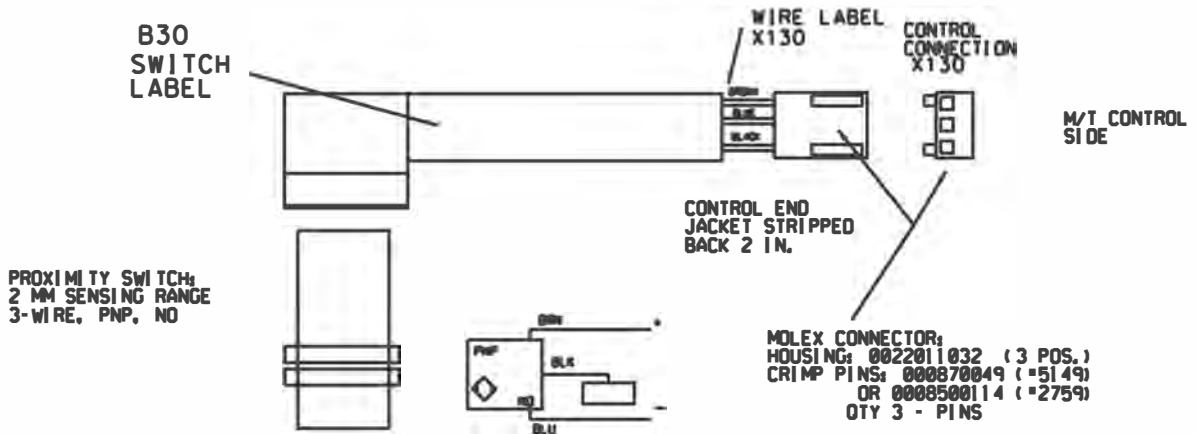
FLAPPER TRIPS SWTICH

14

ML PARTS LIST

SECTION 12 — ELECTRICAL — SPLITTER HOME SWITCH & CABLE

COMMENT: MATERIAL SWITCH REFERRED TO AS THE B30 SWITCH

ITEM	PART NUMBER	DESCRIPTION	QTY
15-1	45201732	SWITCH, SWITCH PROX.	1
15-2	46-19-10-013	BRACKET, SWTICH MNTG	1
15-3	46P018-65021	CABLE, SPLITTER (B30)	1

B30 SPLITTER CABLE
(SPLITTER HOME REFERENCE)

B30
SWITCH
LABEL

WIRE LABEL
X130

CONTROL
CONNECTION
X130

M/T CONTROL
SIDE

CONTROL END
JACKET STRIPPED
BACK 2 IN.

PROXIMITY SWITCH:
2 MM SENSING RANGE
3-WIRE, PNP, NO

MOLEX CONNECTOR:
HOUSING: 0022011032 (3 POS.)
CRIMP PINS: 000870049 (=5149)
OR 0008500114 (=2759)
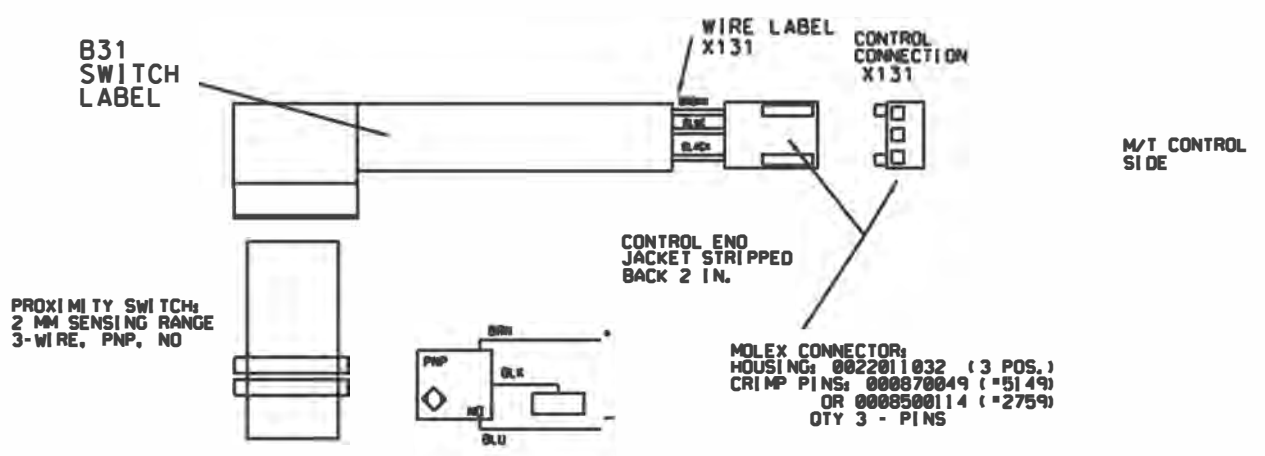QTY 3 - PINS

B30 SPLITTER HOME
REFERENCE SWITCH
LOCATION

15

SECTION 12 – ELECTRICAL – CHANNEL HOME SWITCH & CABLE

COMMENT: MATERIAL SWITCH REFERRED TO AS THE B31 SWITCH

ITEM	PART NUMBER	DESCRIPTION	QTY
16-1	45201732	SWITCH, SWITCH PROX.	1
16-2	46-17-10-006	BRACKET, SWTICH MNTG	1
16-3	46P018-65023	CABLE, CHANNEL REF (B31)	1

B31 LOADER CABLE
(CHANNEL HOME REFERENCE)

B31
SWITCH
LABEL

WIRE LABEL X131

CONTROL CONNECTION X131

M/T CONTROL SIDE

CONTROL END JACKET STRIPPED BACK 2 IN.

PROXIMITY SWITCH:
2 MM SENSING RANGE
3-WIRE, PNP, NO

PNP

BRN

BLK

BLU

MOLEX CONNECTOR:
HOUSING: 0022011032 (3 POS.)
CRIMP PINS: 000870049 (=5149)
OR 0008500114 (=2759)
QTY 3 - PINS

MOTORS
NOT SHOWN

B31 CHANNEL HOME
REFERENCE SWITCH
LOCATION

16
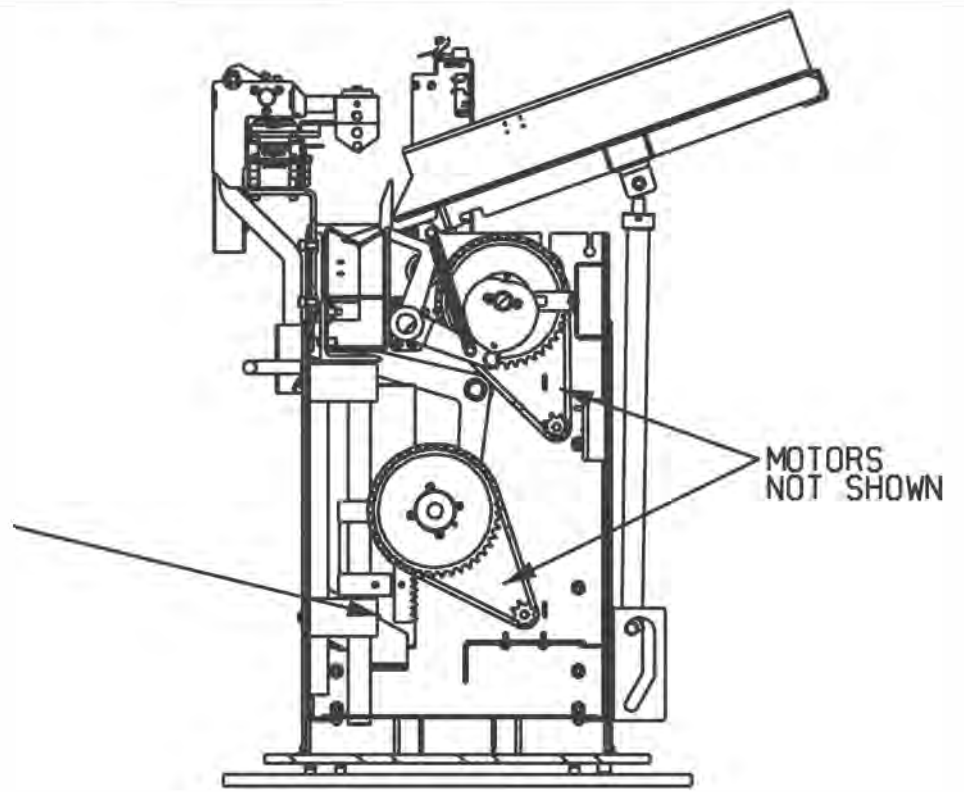
ML PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QTY
17-1	46010126	SWITCH, ON/OFF	1
17-2	46P018-65030	CABLE, ON/OFF SWITCH	1

17-1
17-2

17