

Rotary clipper school

14 December, 2006

Raute Controller, 24 GPM Servo Proportional Valves



COURSE CONTENT

Section

Topic

Tags

1

SAFETY

2

DESCRIPTION

3

CLIPPER THEORY

4

OPERATION

5

MAINTENANCE

6

TROUBLESHOOTING

CONTROLLER

O

Durand (old)

N

Raute (New)

AREA

M

Mechanic

E

Electric

LEVEL

1

General

2

Advanced



Section 1

SAFETY

GENERAL

References:

Plant safety procedures

Clipper Manual - Section 1

SPECIFIC

Critical points:

Hydraulic Power Unit (Knife & Rolls)

Conveyors and hold-downs

Non critical points:

Controller cabinet power



Section 1

SAFETY

IMPORTANT:

The safety procedures described in the following pages are intended only to highlight some specific points regarding the Rotary Clipper and are not meant to replace nor substitute, in any case nor to any extent, any other safety procedures applicable, whether issued by the mill or by any other local, federal or otherwise relevant authority.

In case of conflict or contradiction between the recommendations contained in this document and those emanating from these authorities, the latter will take precedence.



GENERAL PROCEDURES

MAIN POINTS

1. DO NOT OPERATE NOR SERVICE ANY MACHINERY UNTIL YOU GET THE **APPROPRIATE TRAINING** TO DO SO.
2. ALWAYS USE SAFETY GEAR: **HIGH VISIBILITY VEST, HARD HAT, SAFETY GLASSES, EAR PLUGS AND STEEL TOE SHOES.**
3. LOCATE AND KNOW HOW TO USE THE **EMERGENCY STOP** BUTTONS.
4. **LOCK-OUT** ALL SYSTEMS AS REQUIRED, BEFORE SERVICING ANY MACHINERY OR ENTERING ANY HAZARDOUS AREAS.
5. REFER AND COMPLY WITH **PLANT SPECIFIC** SAFETY PROCEDURES.



SPECIFIC PROCEDURES

MAIN POINTS

1. SHUT OFF AND LOCK-OUT **HYDRAULIC PUMP**
2. CLOSE **SHUT-OFF VALVE** AT THE HYDRAULIC TANK
3. TURN OFF **CONSOLE** POWER
4. TURN OFF ELECTRONIC **CONTROLLER** POWER
5. LOCK-OUT **INFEED** CONVEYOR
6. LOCK-OUT **HOLDOWN** BELTS
7. LOCK-OUT **OUTFEED** CONVEYOR
8. **DISCHARGE** ACCUMULATORS

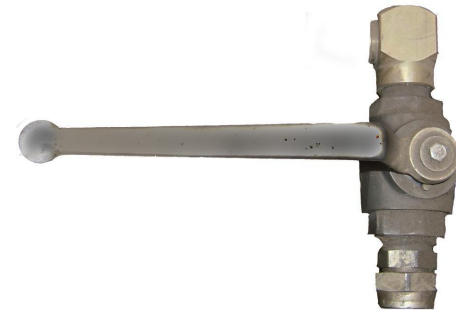
ALL SYSTEMS MUST BE AT ZERO ENERGY STATE



HYDRAULICS LOCK-OUT



**MAIN SWITCH
LOCKED OUT**



**SHUT-OFF VALVE
CLOSED AND
LOCKED OUT**

**ONLY WITH NEW
RAUTE
CONTROLLER**



**DISCHARGE VALVE
CLOSED AND
LOCKED OUT**

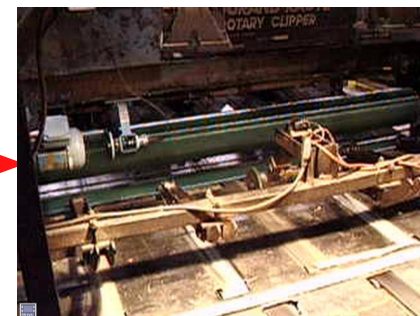


MECHANICAL LOCK-OUT

**MAIN SWITCH
OFF AND
LOCKED OUT**



**IN-FEED
LOCKED-OUT**



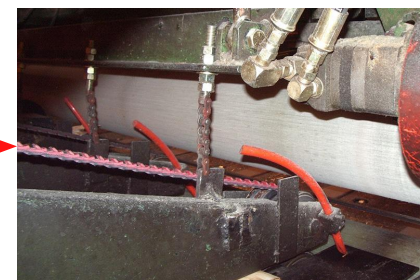
**OUT-FEED
LOCKED-OUT**



**HOLD DOWN AIR
VALVE CLOSED**



**HOLD DOWN
LOCKED-OUT**





Section 2

DESCRIPTION

CLIPPER FRAME

Knife Subsystem

Anvil rolls

HYDRAULIC UNIT

General view

Controls

CONTROLLER

General views

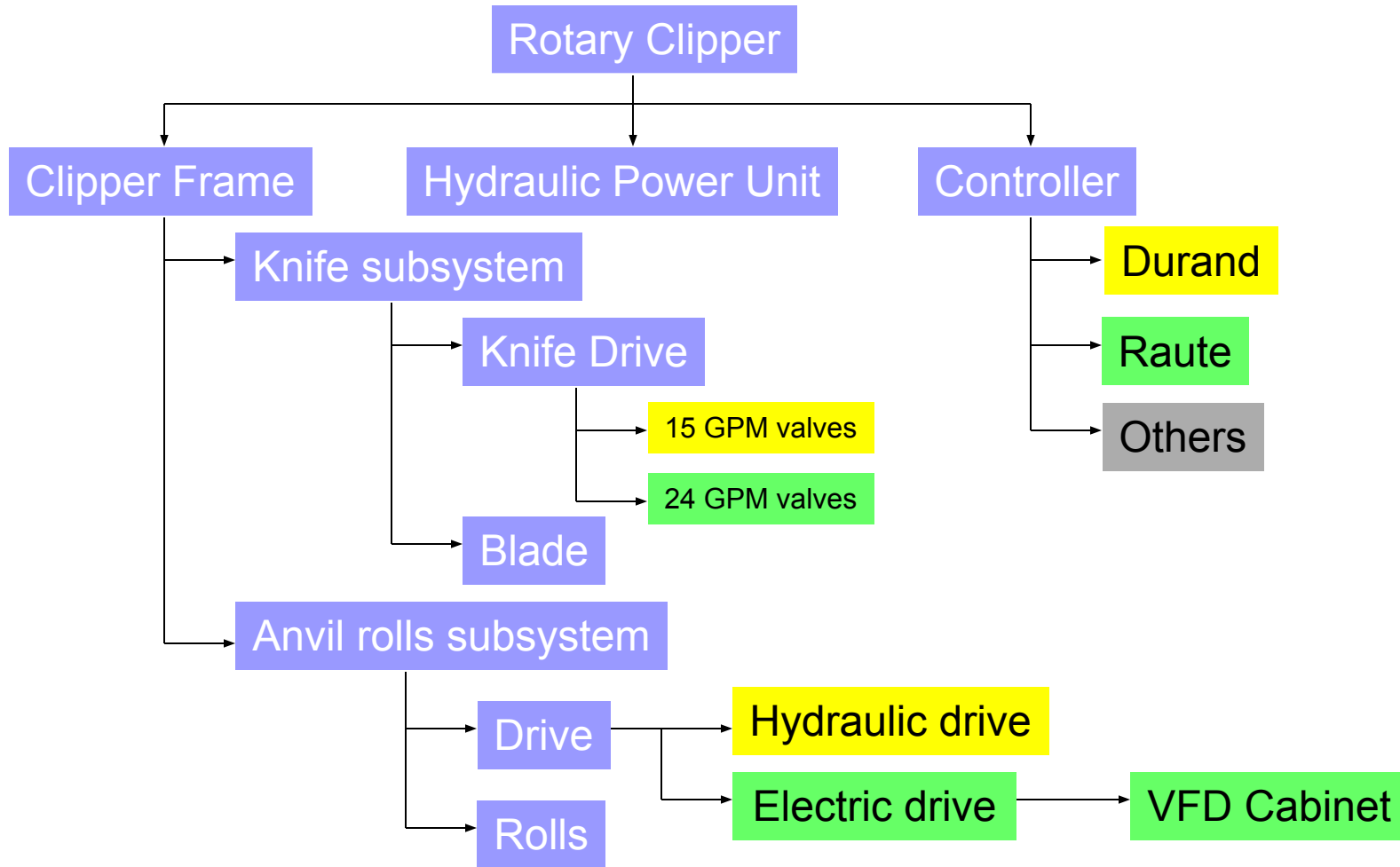
Basic wiring

CONTROL LOGIC

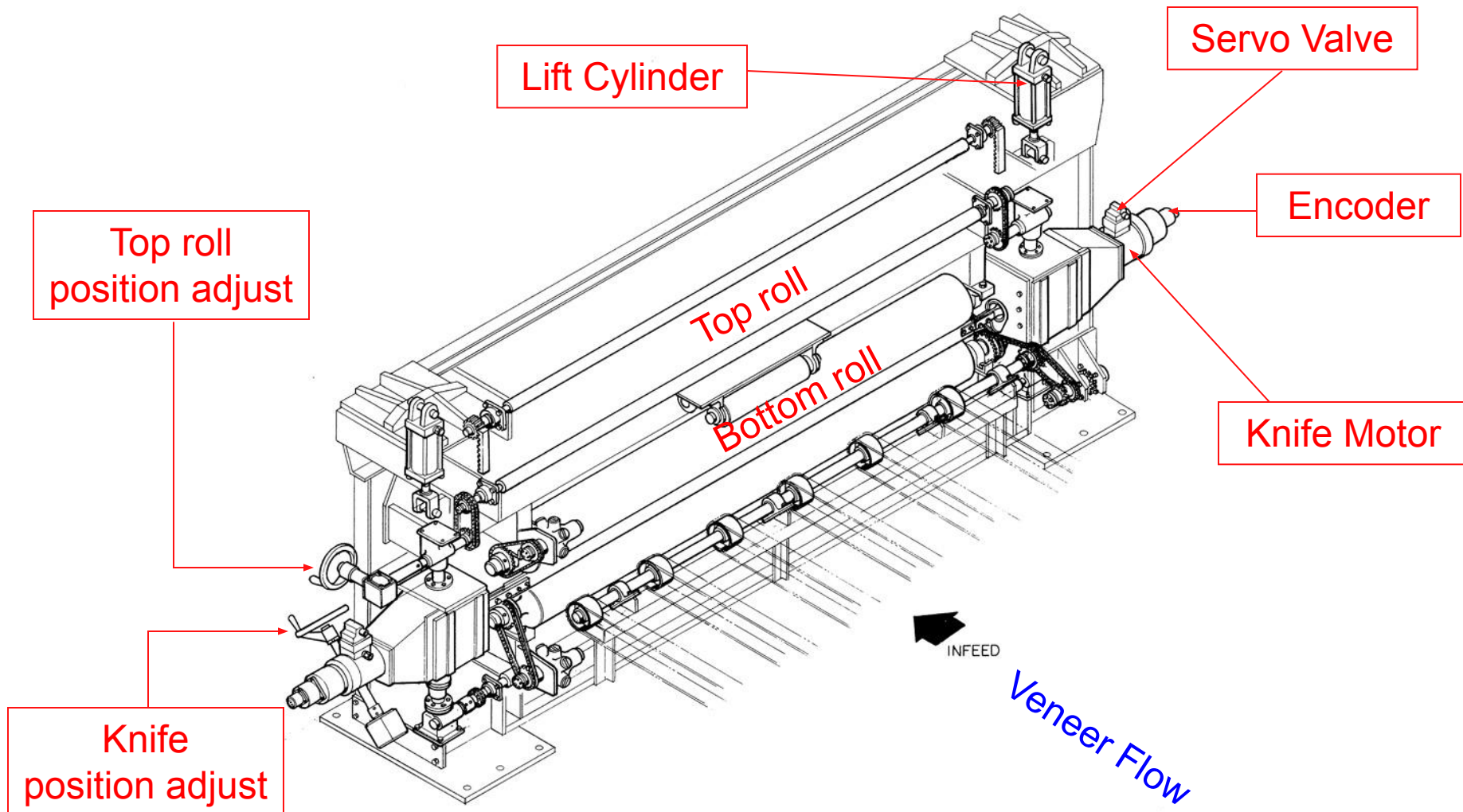
Hardwired logic



CLIPPER VERSIONS

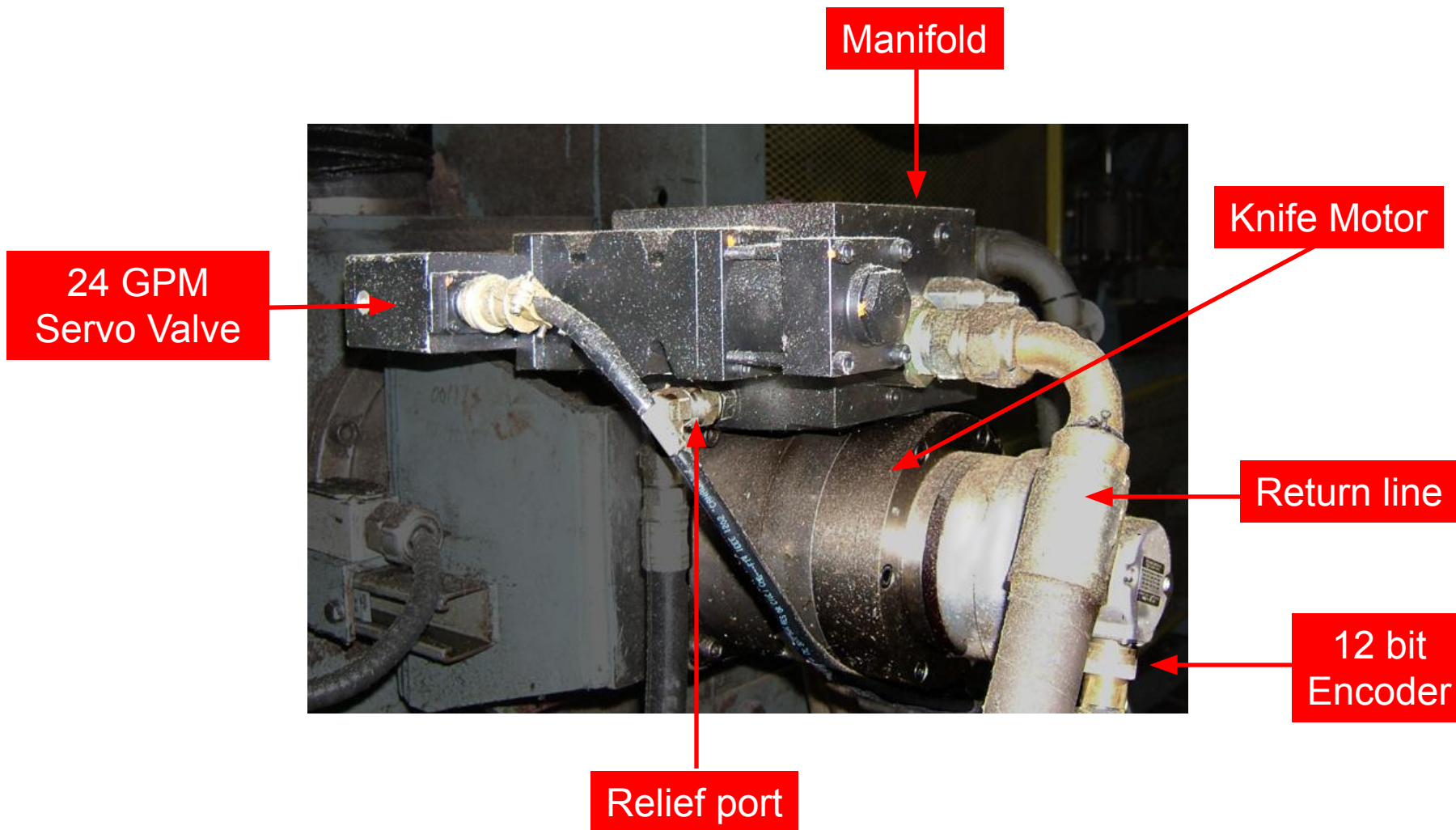


CLIPPER FRAME

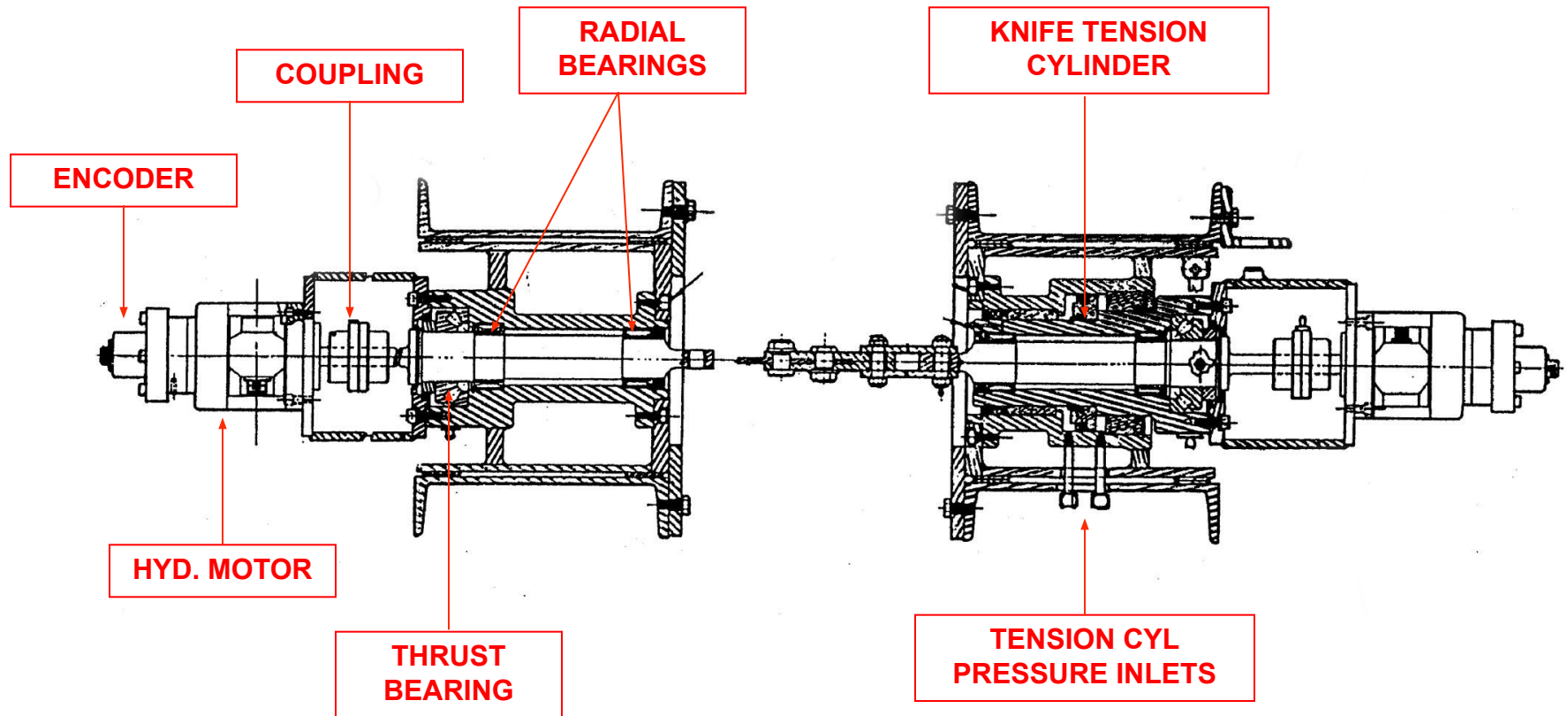




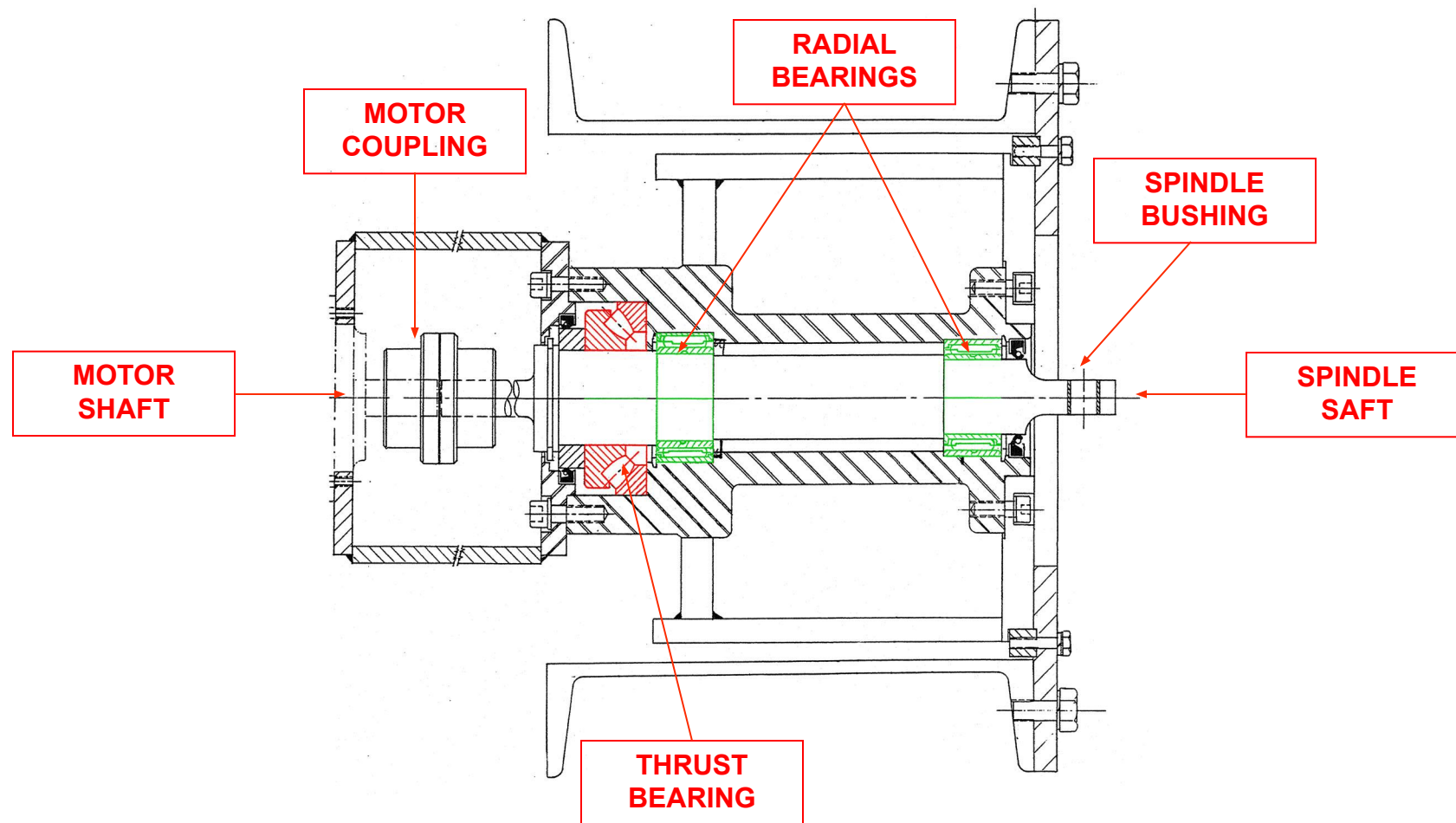
UPGRADED KNIFE DRIVE (24GPM)



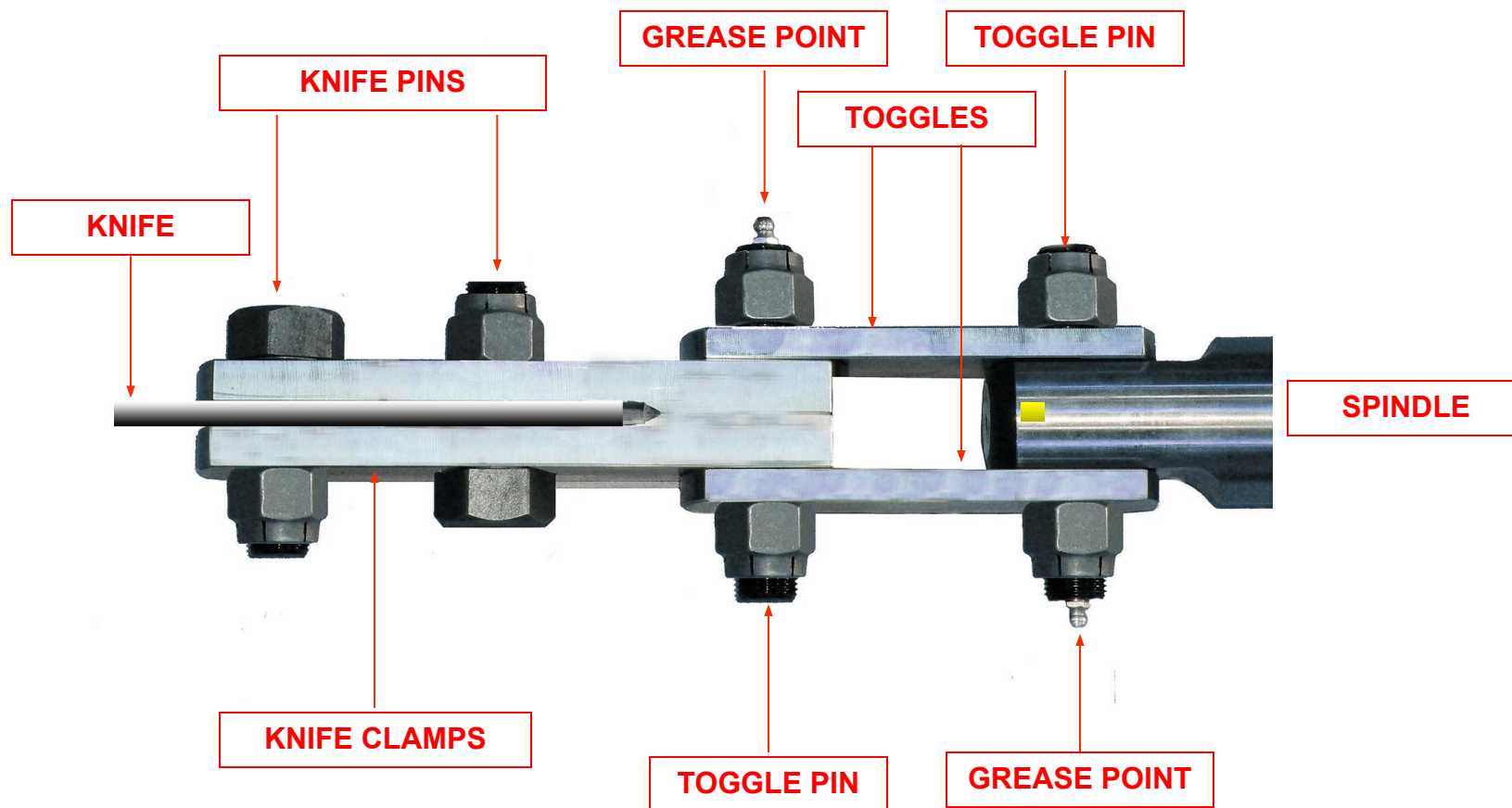
KNIFE LINKAGE



KNIFE DRIVE ASSEMBLY

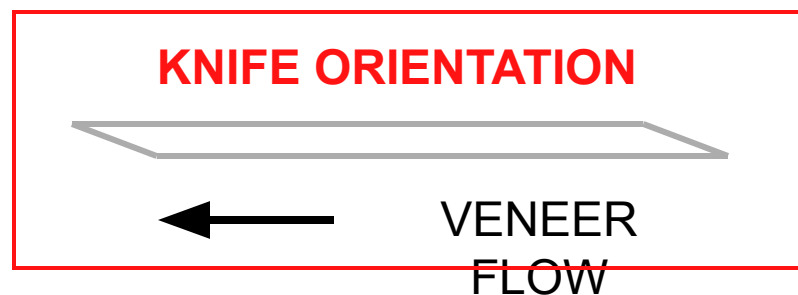
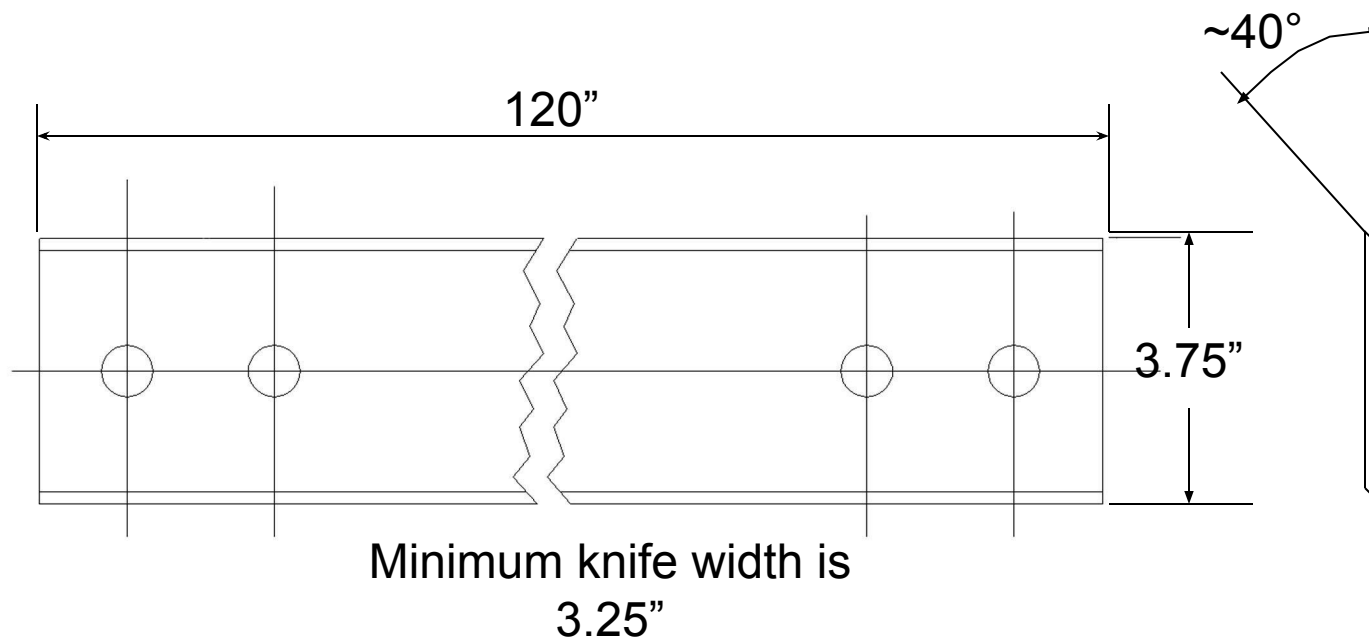


KNIFE COUPLINGS ASSEMBLY



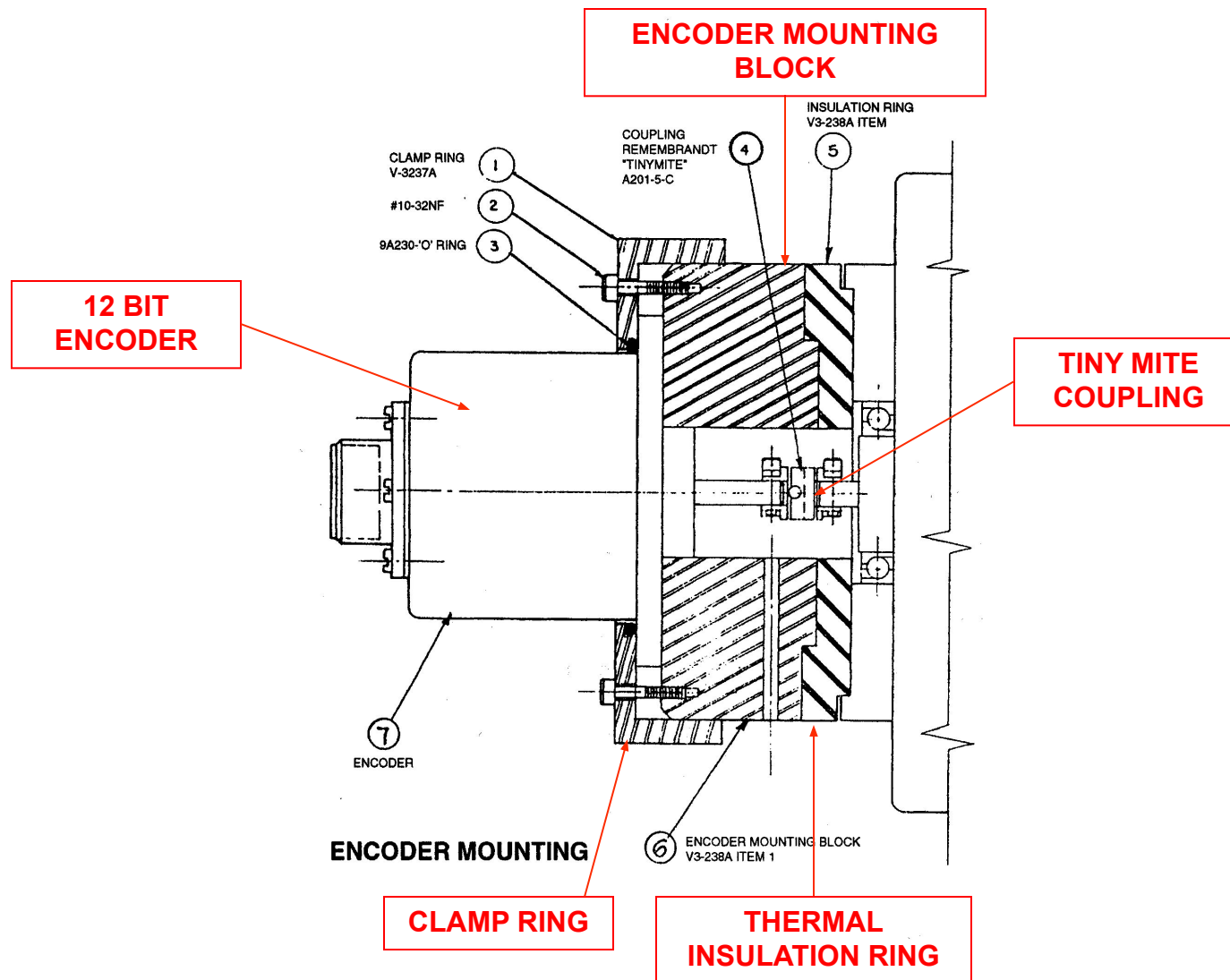


KNIFE BLADE

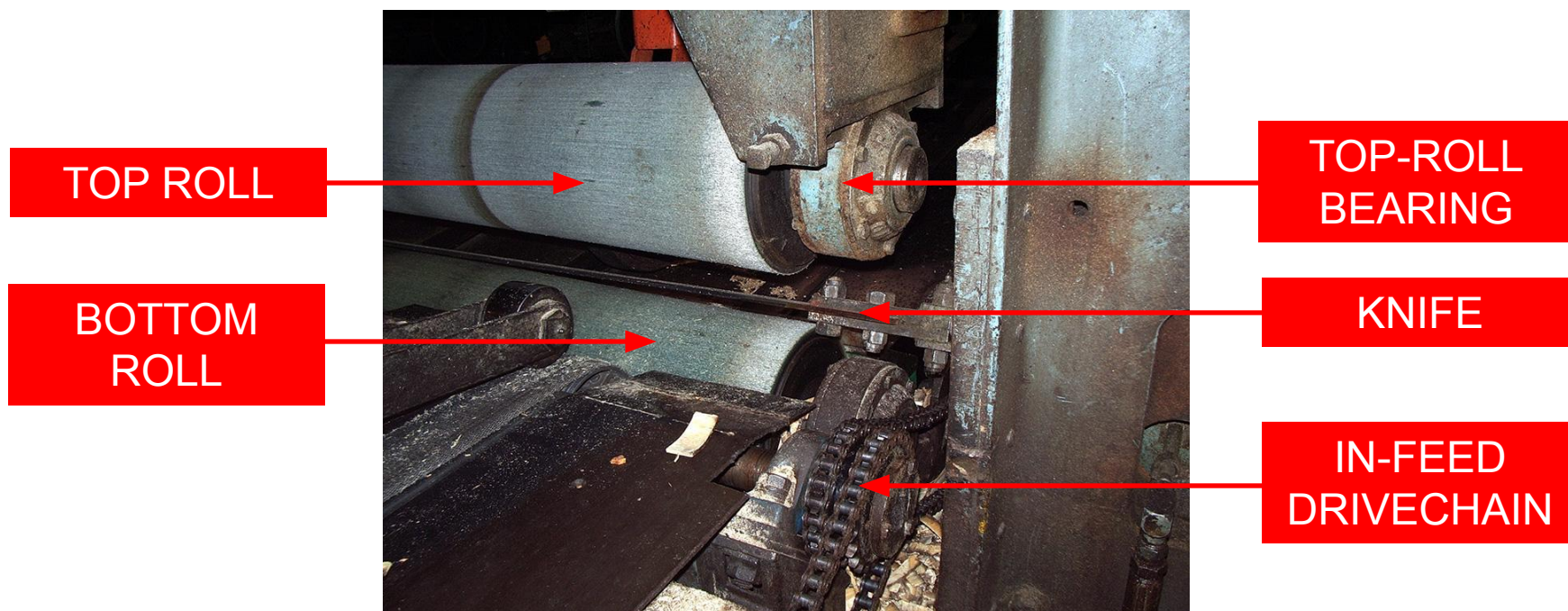




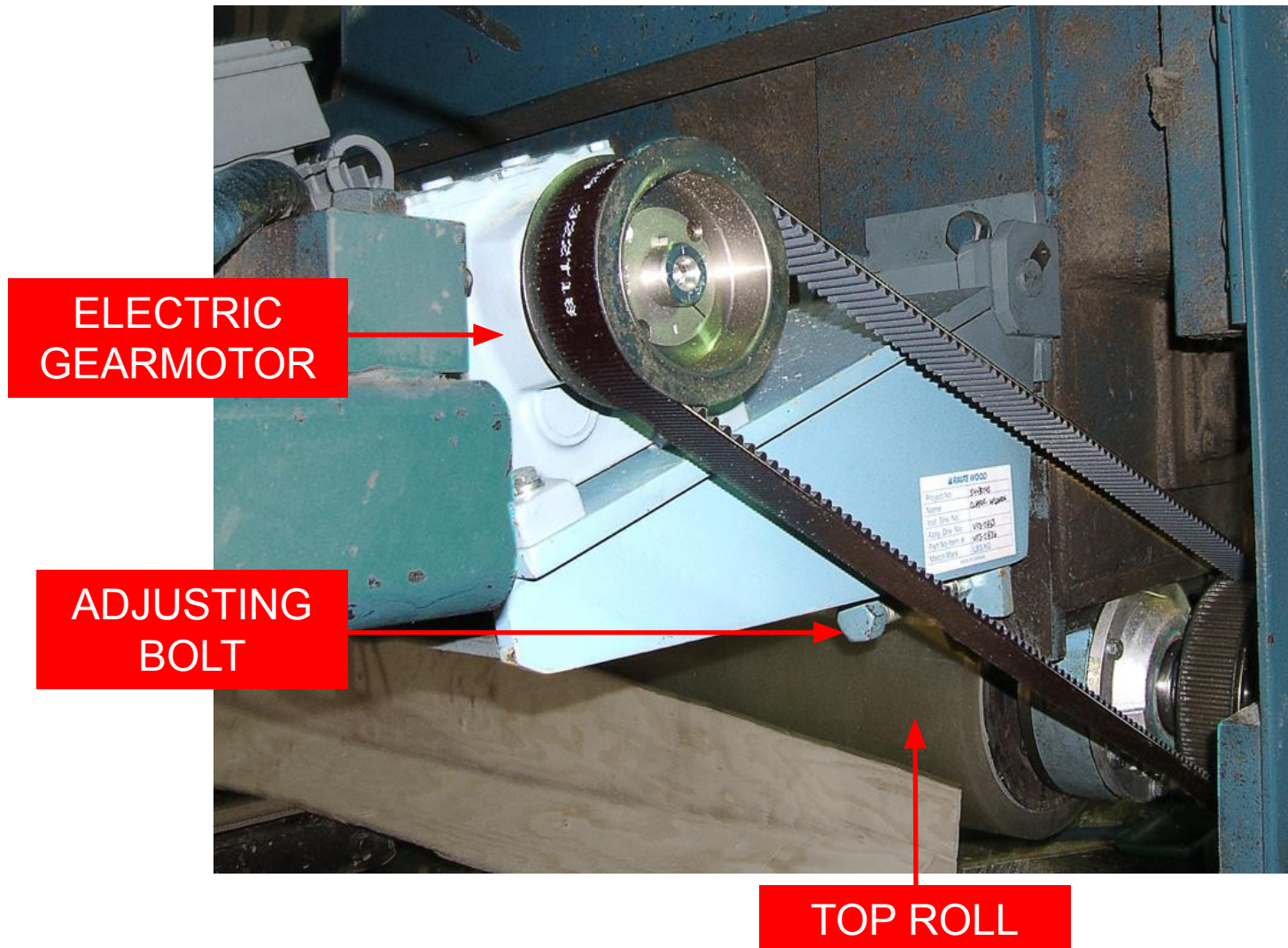
KNIFE ENCODER ASSEMBLY



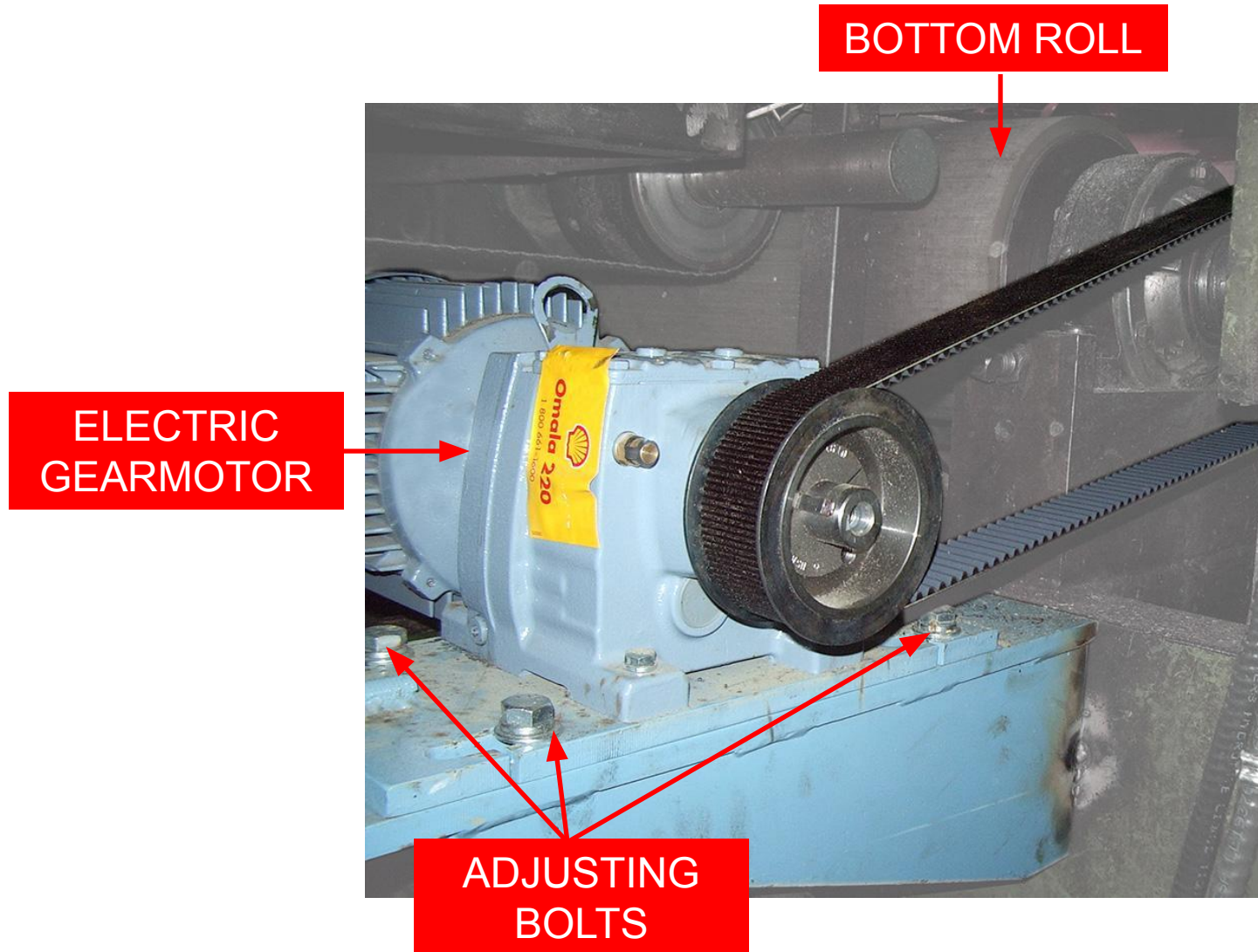
ANVIL ROLLS - IDLE SIDE VIEW



TOP ROLL ELECTRIC DRIVE

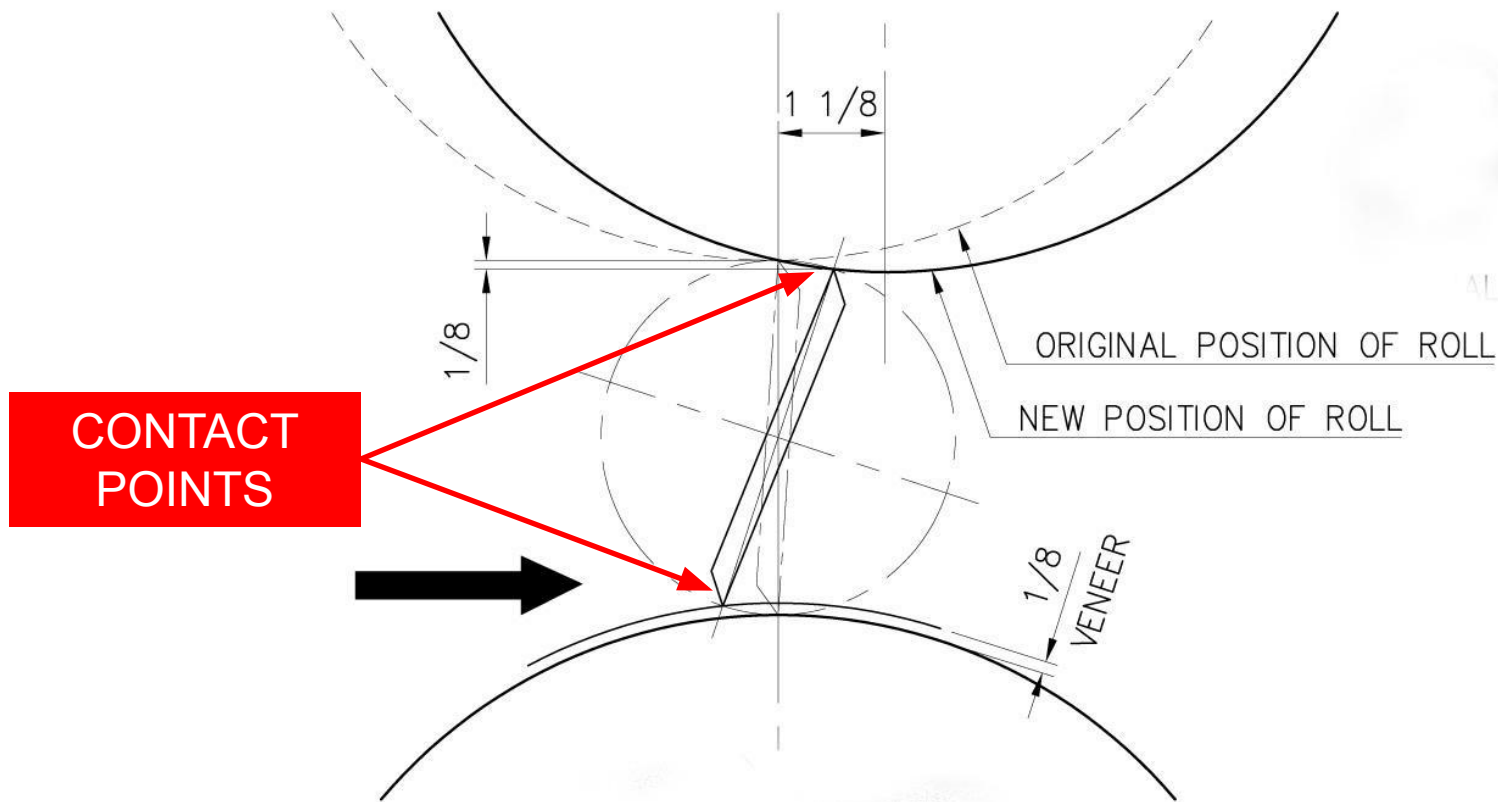


BOTTOM ROLL ELECTRIC DRIVE



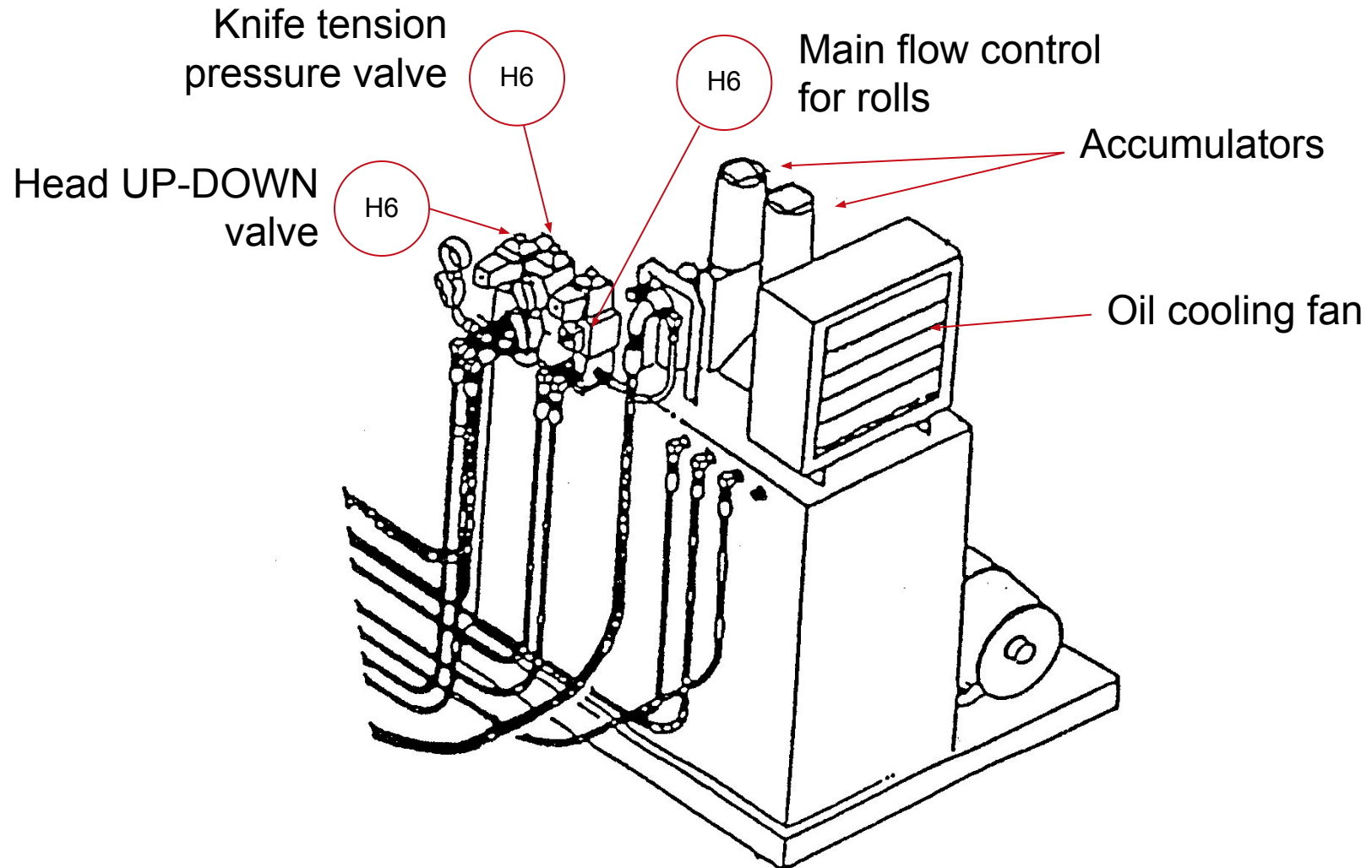


TOP ROLL OFFSET



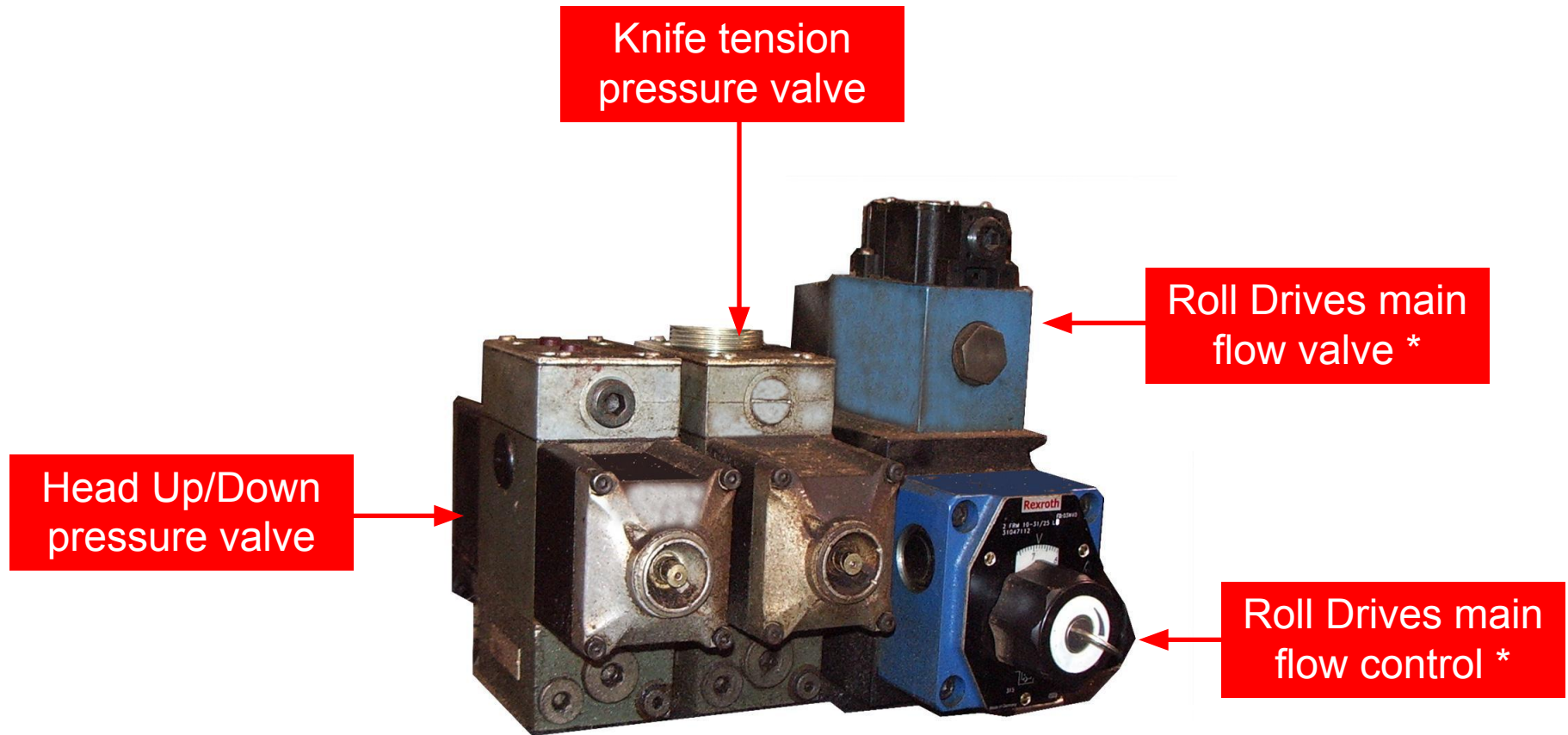
ROLL PRESSURE SETUP MUST BE DONE DIFFERENTLY!

HPU GENERAL VIEW





FLOW CONTROLS DETAIL

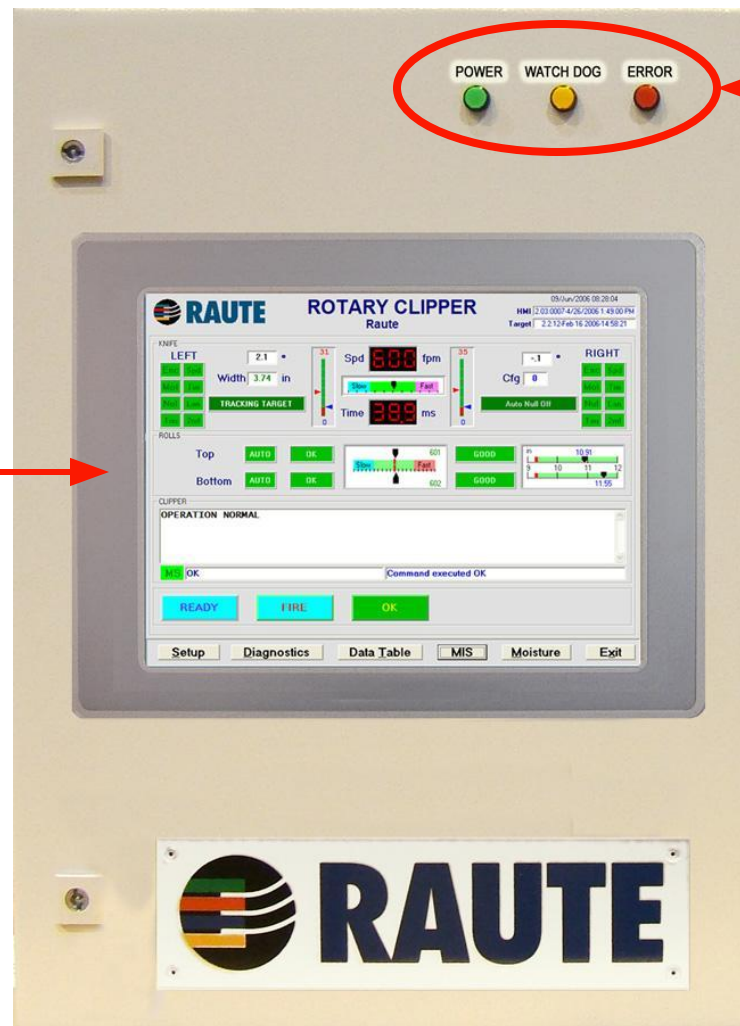


* Not used with electric roll

drives



RAUTE CONTROLLER - 1

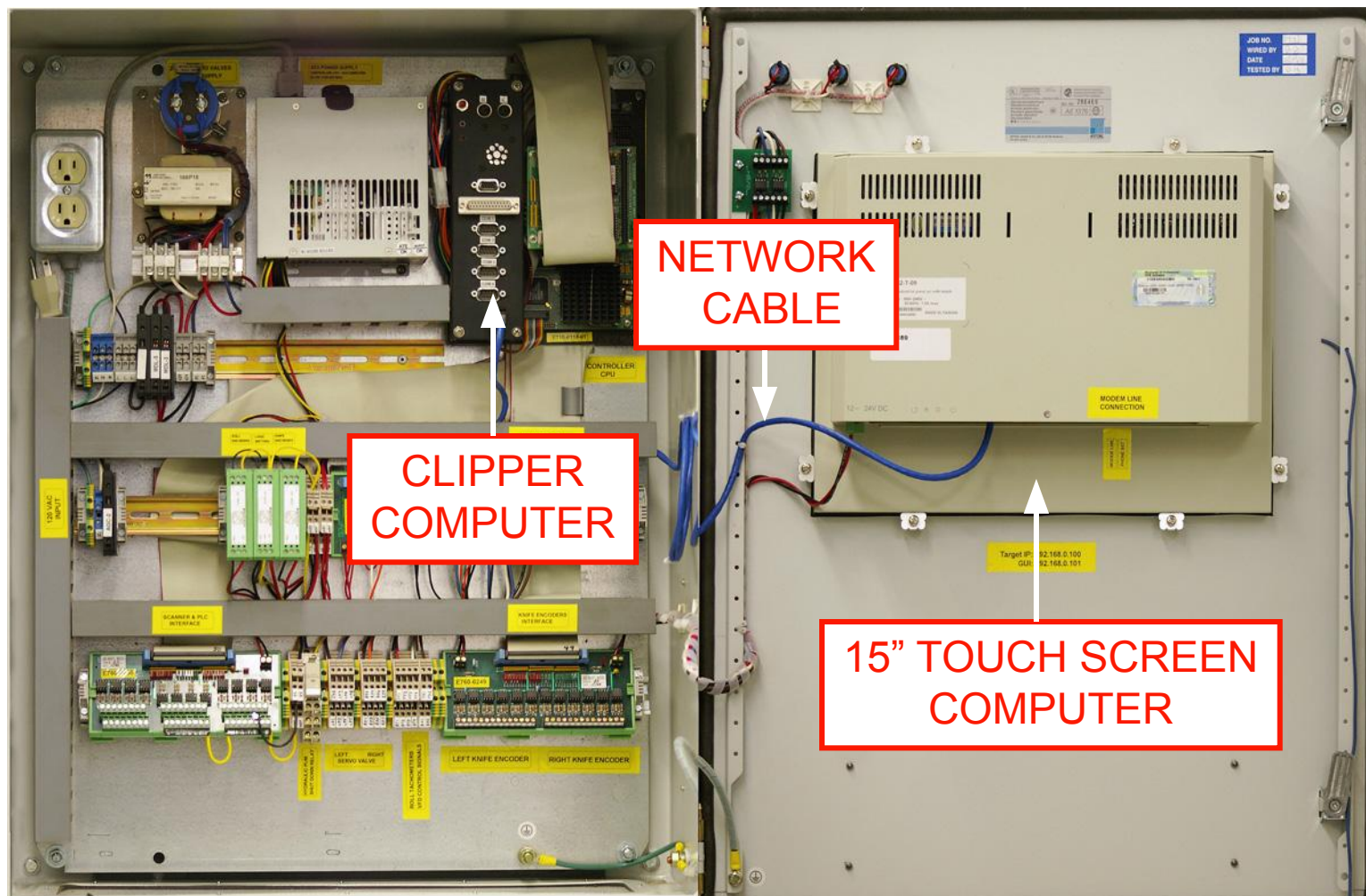


STATUS LAMPS

15" TOUCH SCREEN
COMPUTER

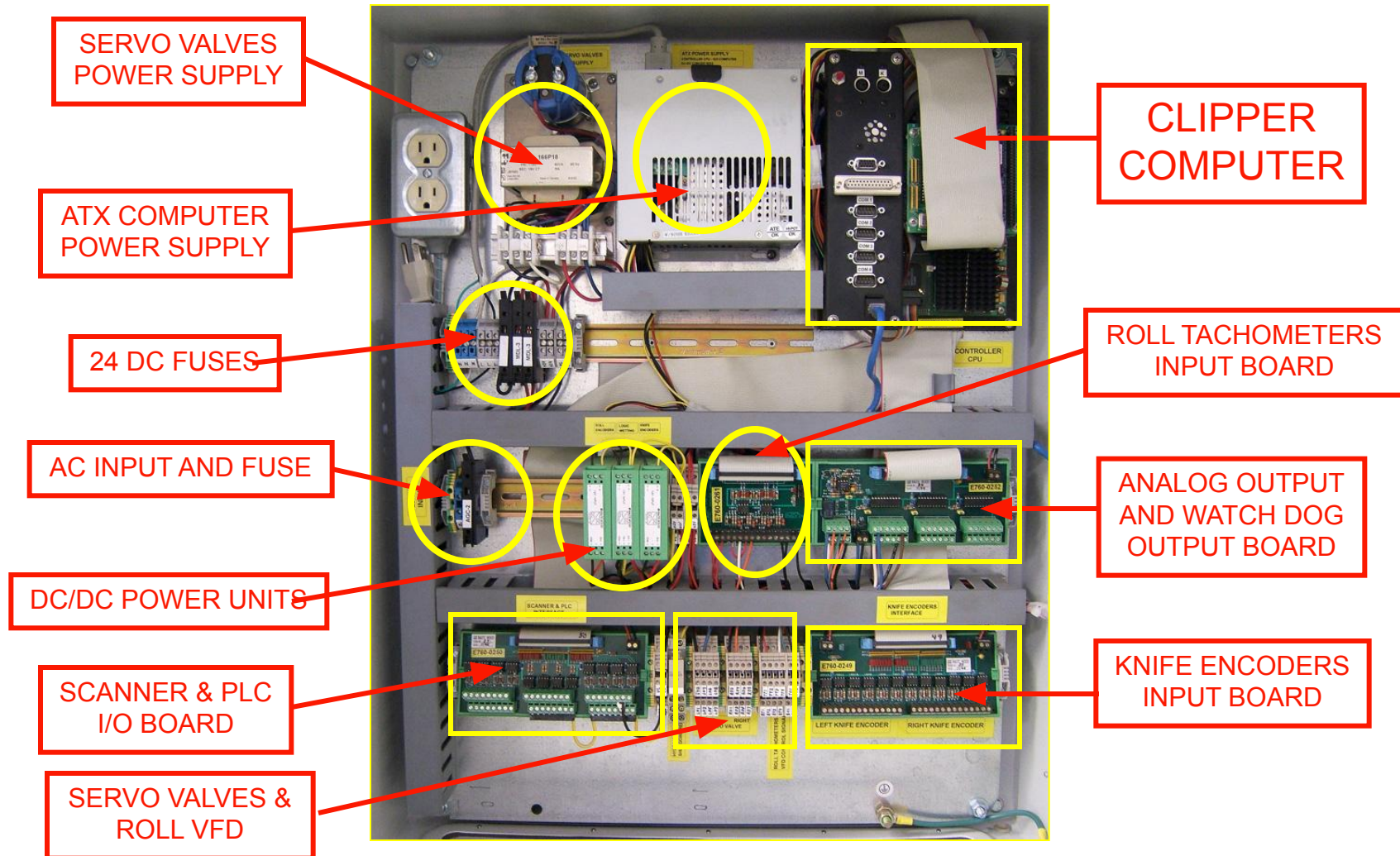


RAUTE CONTROLLER - 2



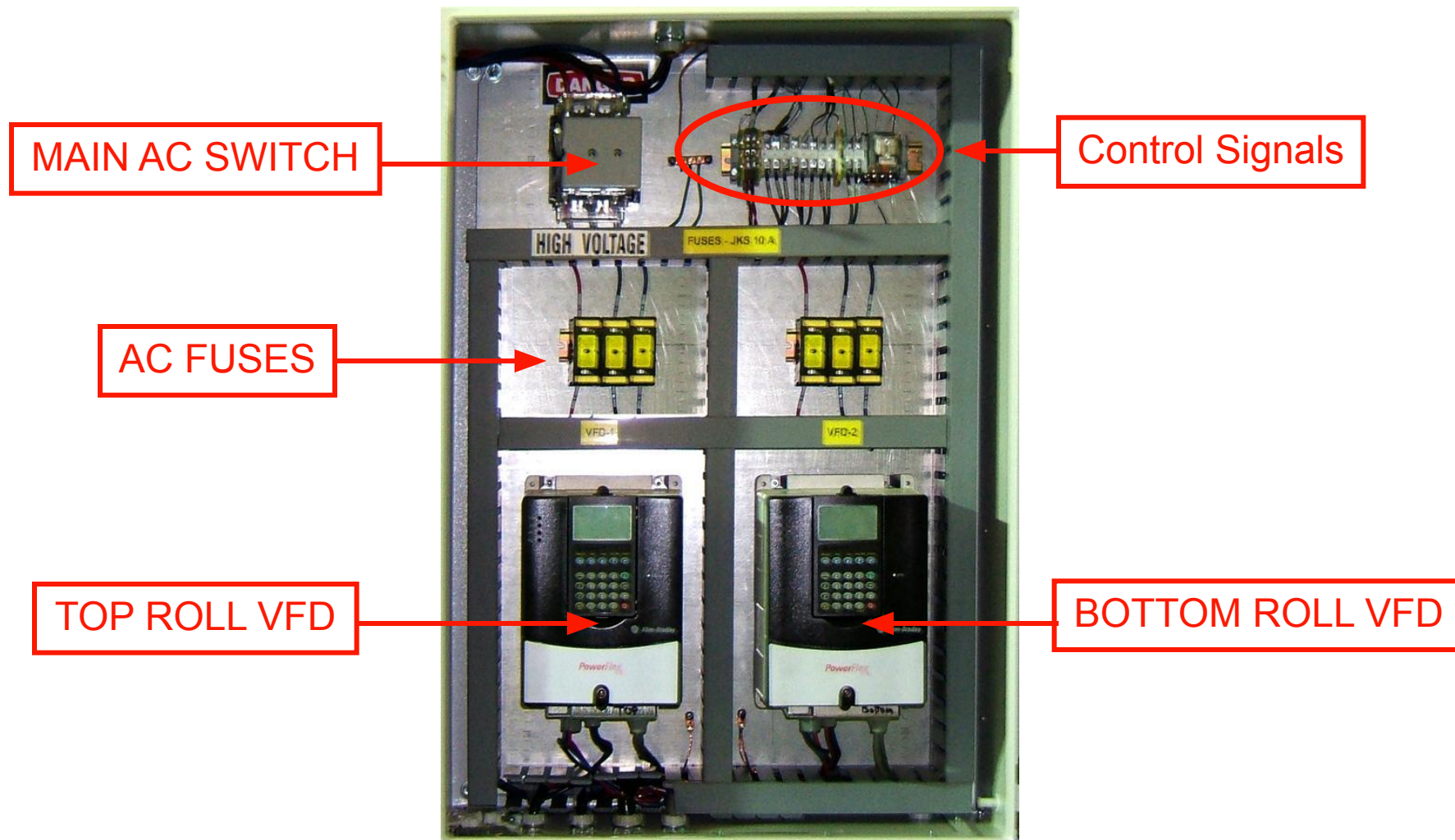


RAUTE CONTROLLER - 3



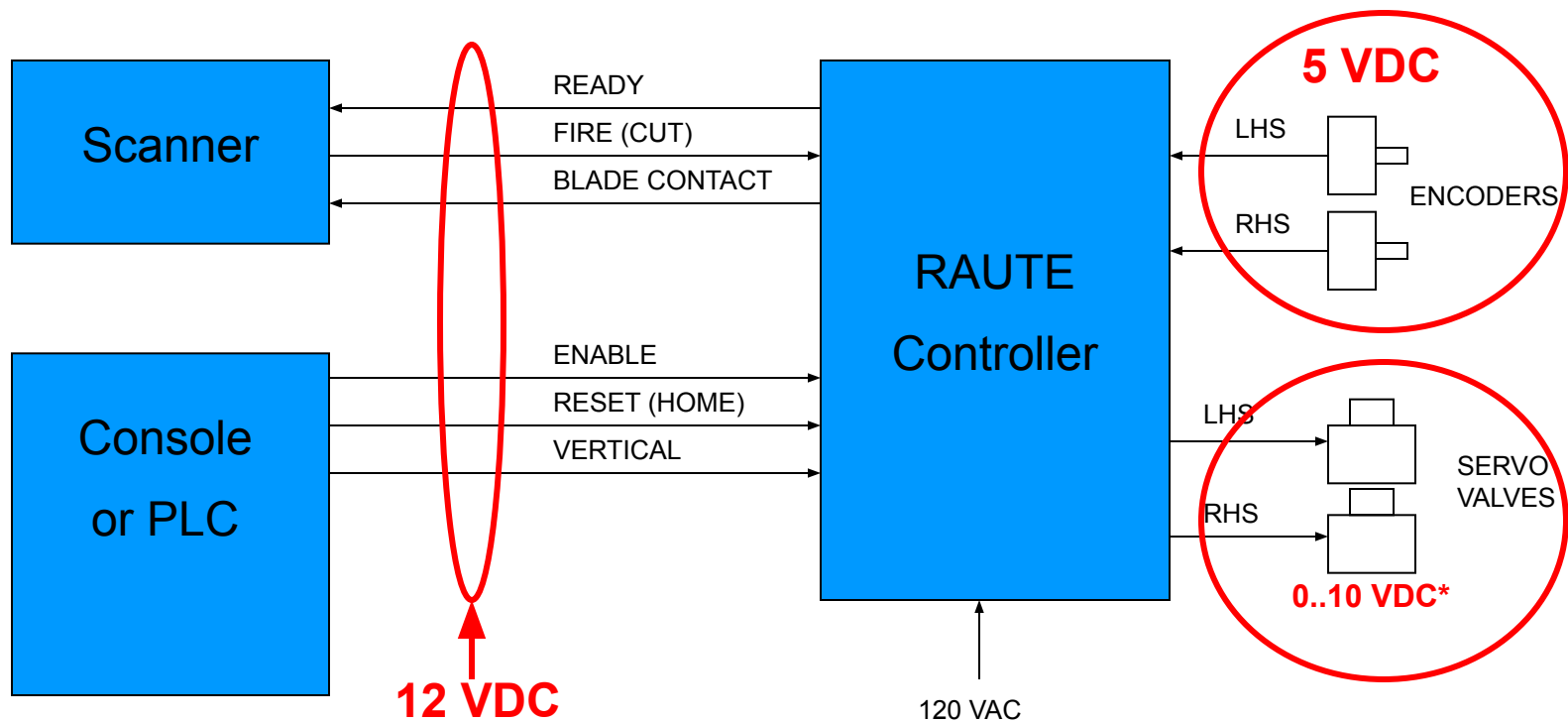


ROLLS VFD CABINET



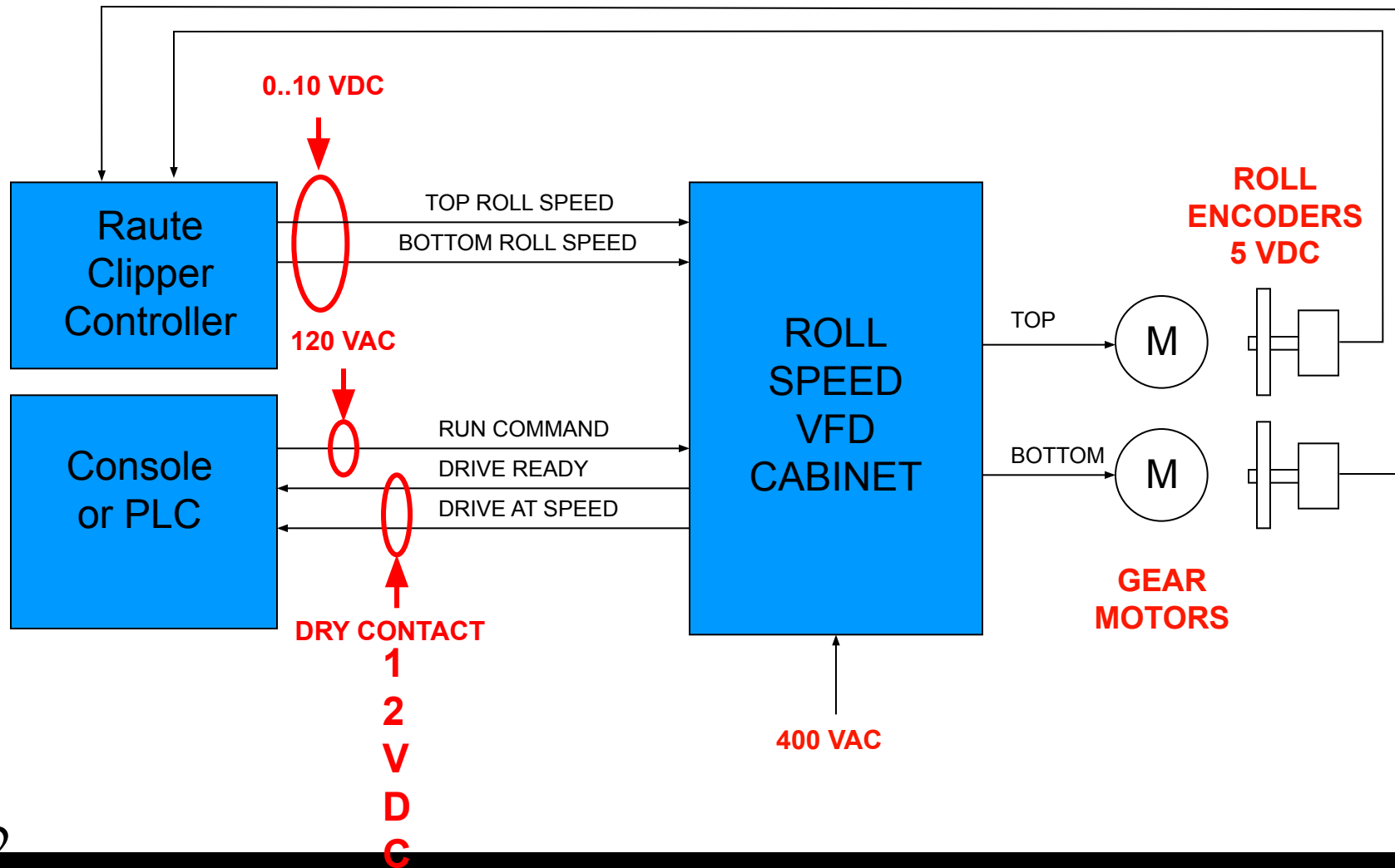


CONTROLLER - I/O WIRING





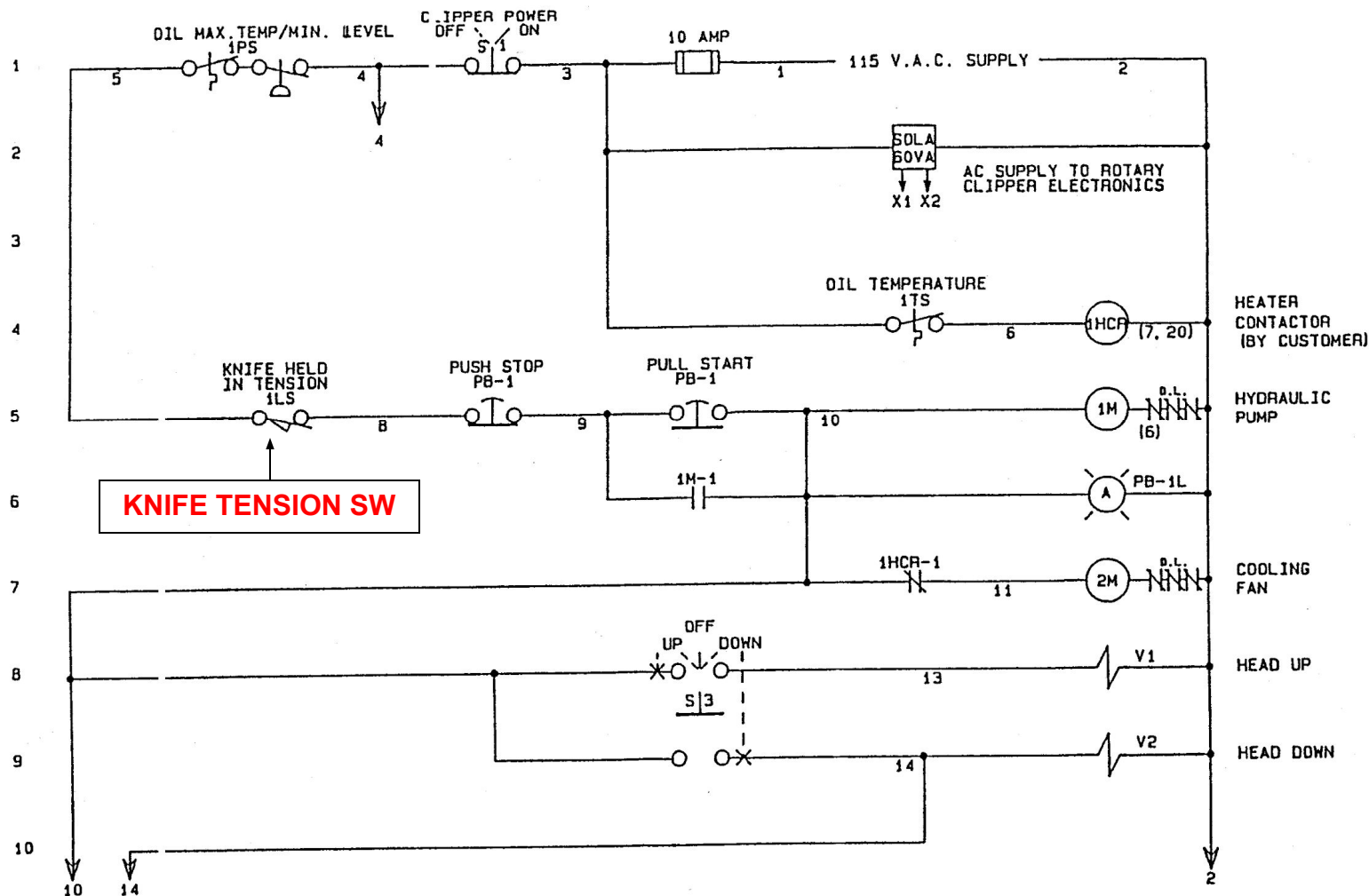
ROLL SPEED CONTROL SIGNALS





CONTROL LOGIC - PAGE 1 - AC

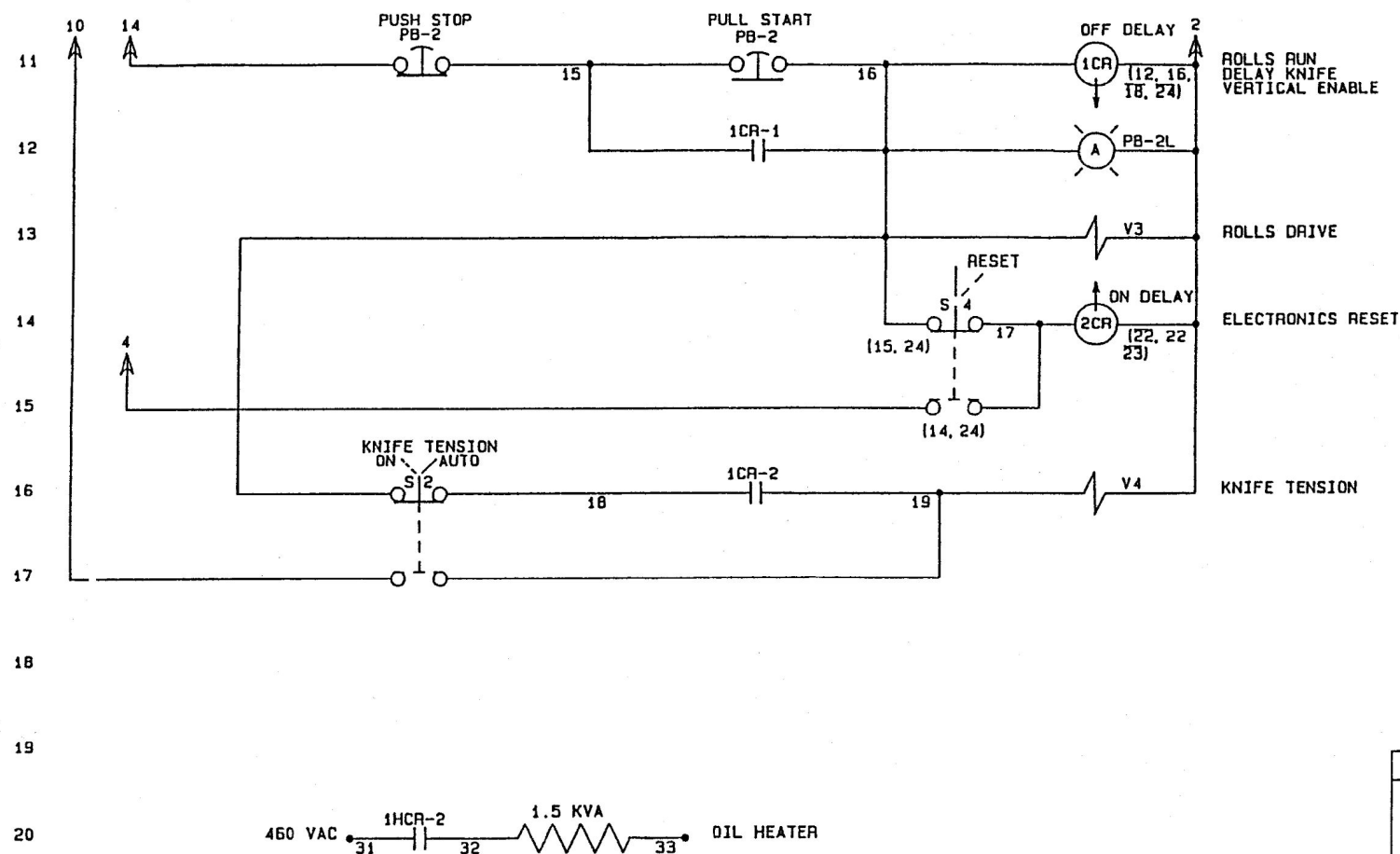
REF #



SPARES
7
12



CONTROL LOGIC - PAGE 2 - AC

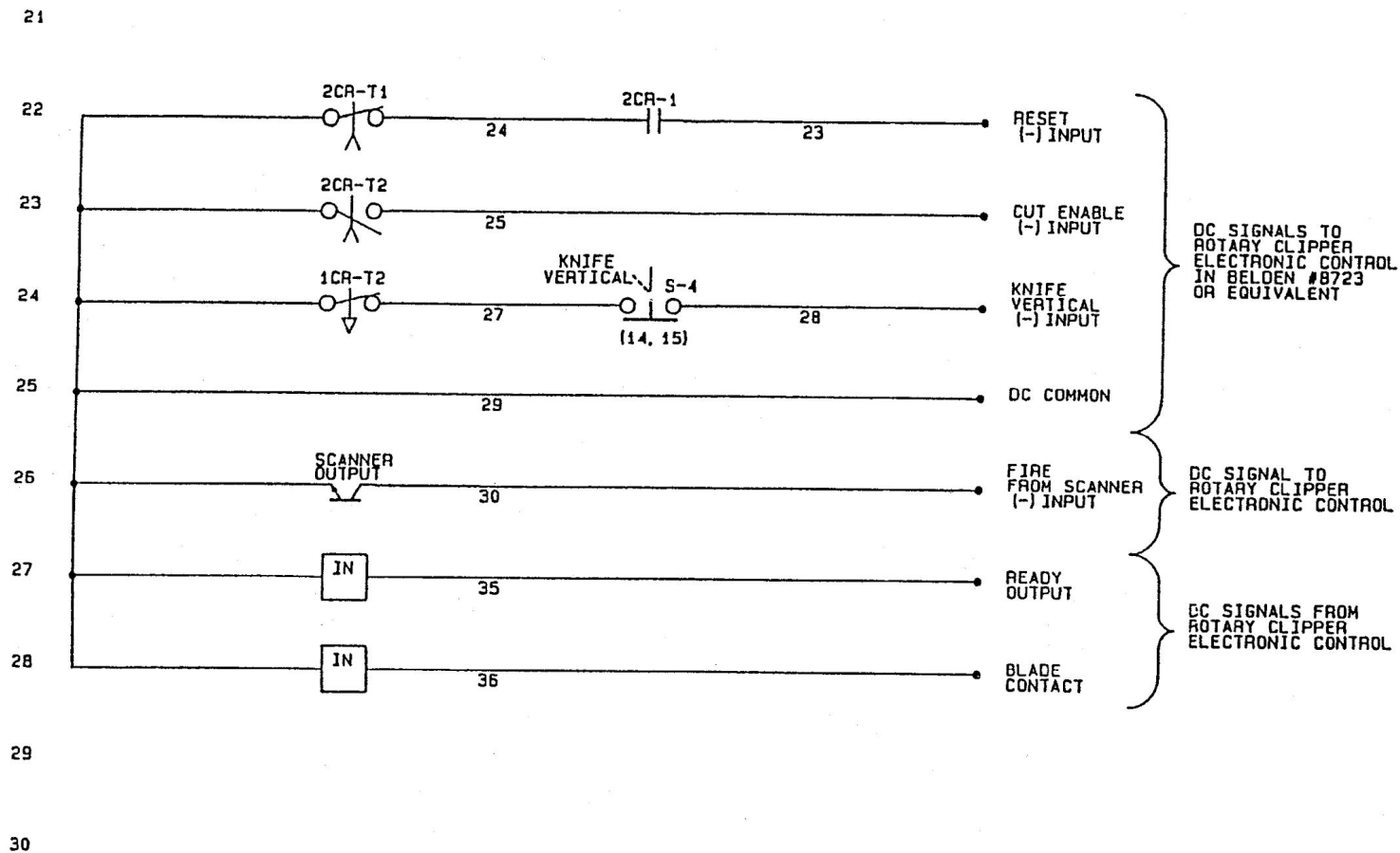


SPARES

20
21
22



CONTROL LOGIC - PAGE 3 - DC



SPARES

26
34
37



SECTION 3

CLIPPER THEORY

CLIPPER GOALS

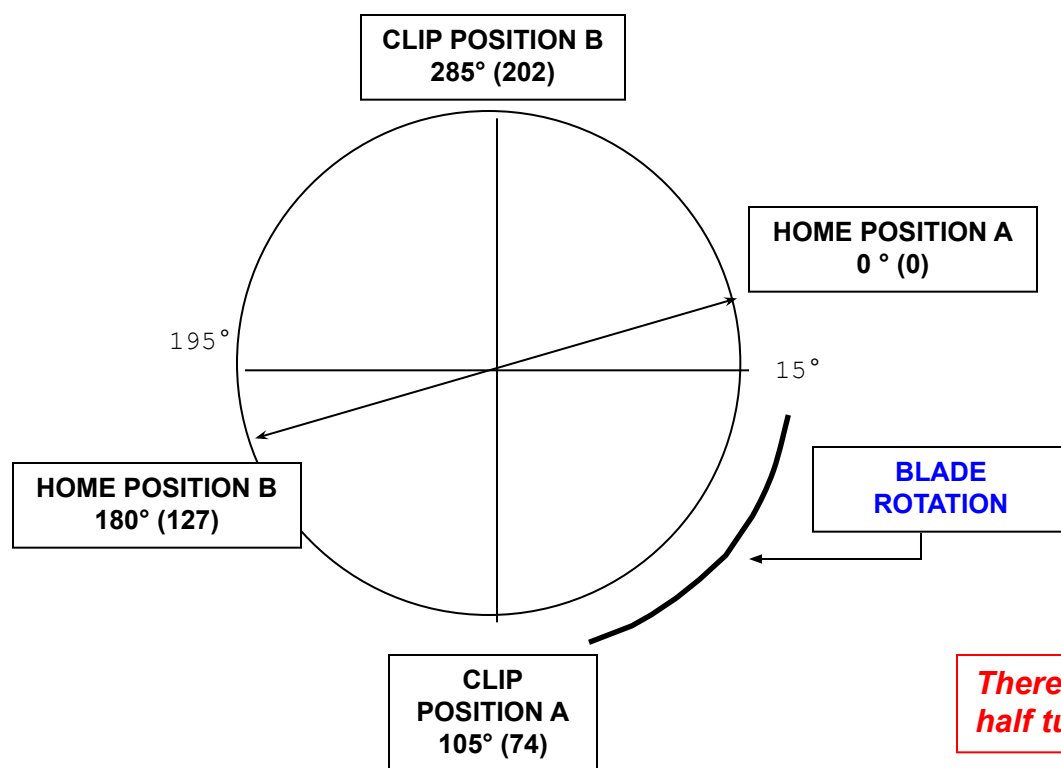
- Exact clip point
- Parallel clips
- Match knife/roll speeds
- Minimize response time
- Straight clips (no bias)

OPERATION

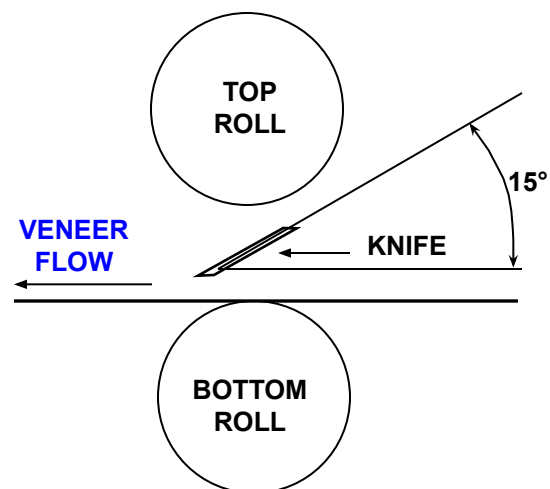
- Knife positions
- Clip steps
- Clip cycle
- Clip zone
- Knife/roll speed mismatch effects

KNIFE POSITIONS

BLADE ANGLE



HOME POSITION



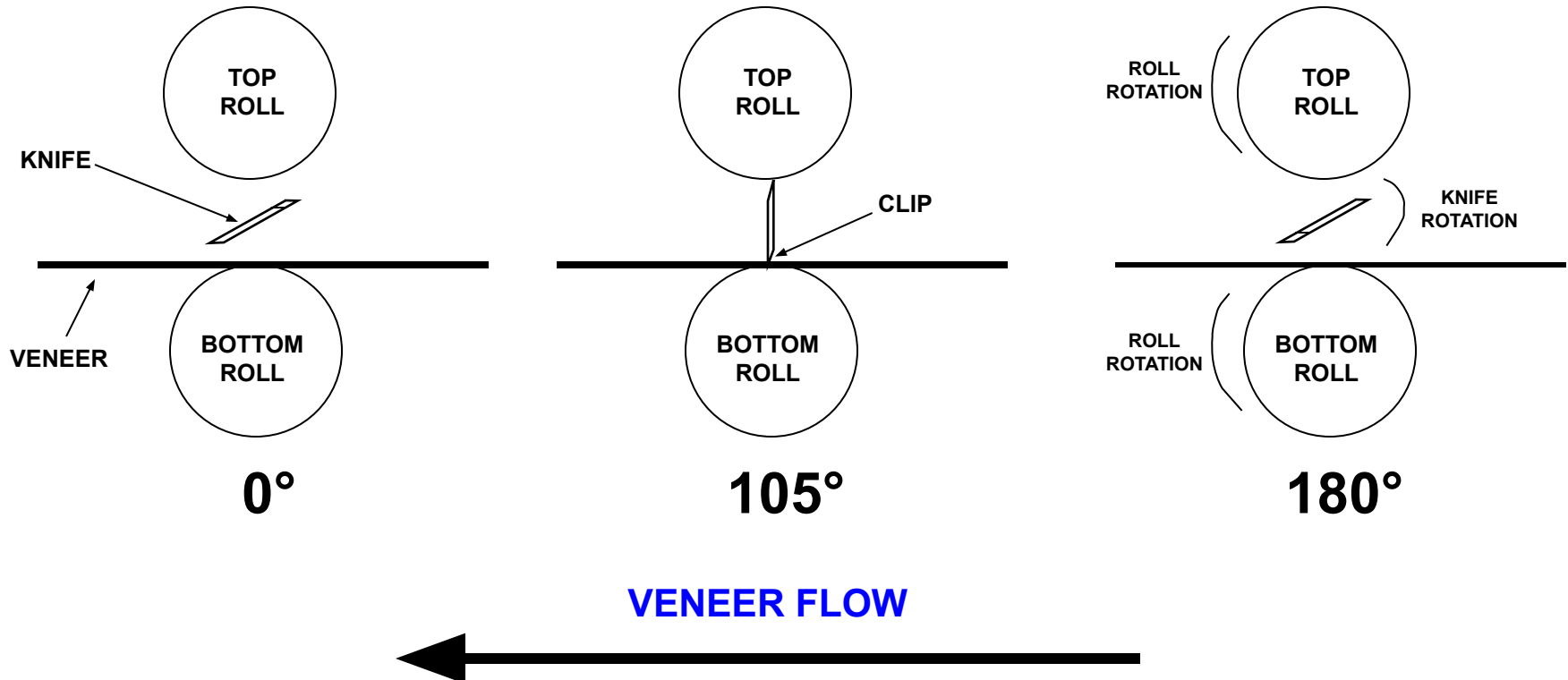
There are two home positions separated by half turn of the blade

CLIP STEPS

1 - HOME POSITION (A)
Knife begins to move upon receiving a FIRE signal from scanner

2 - CLIP POSITION
Knife in vertical position. Veneer is clipped between the blade and the bottom roll

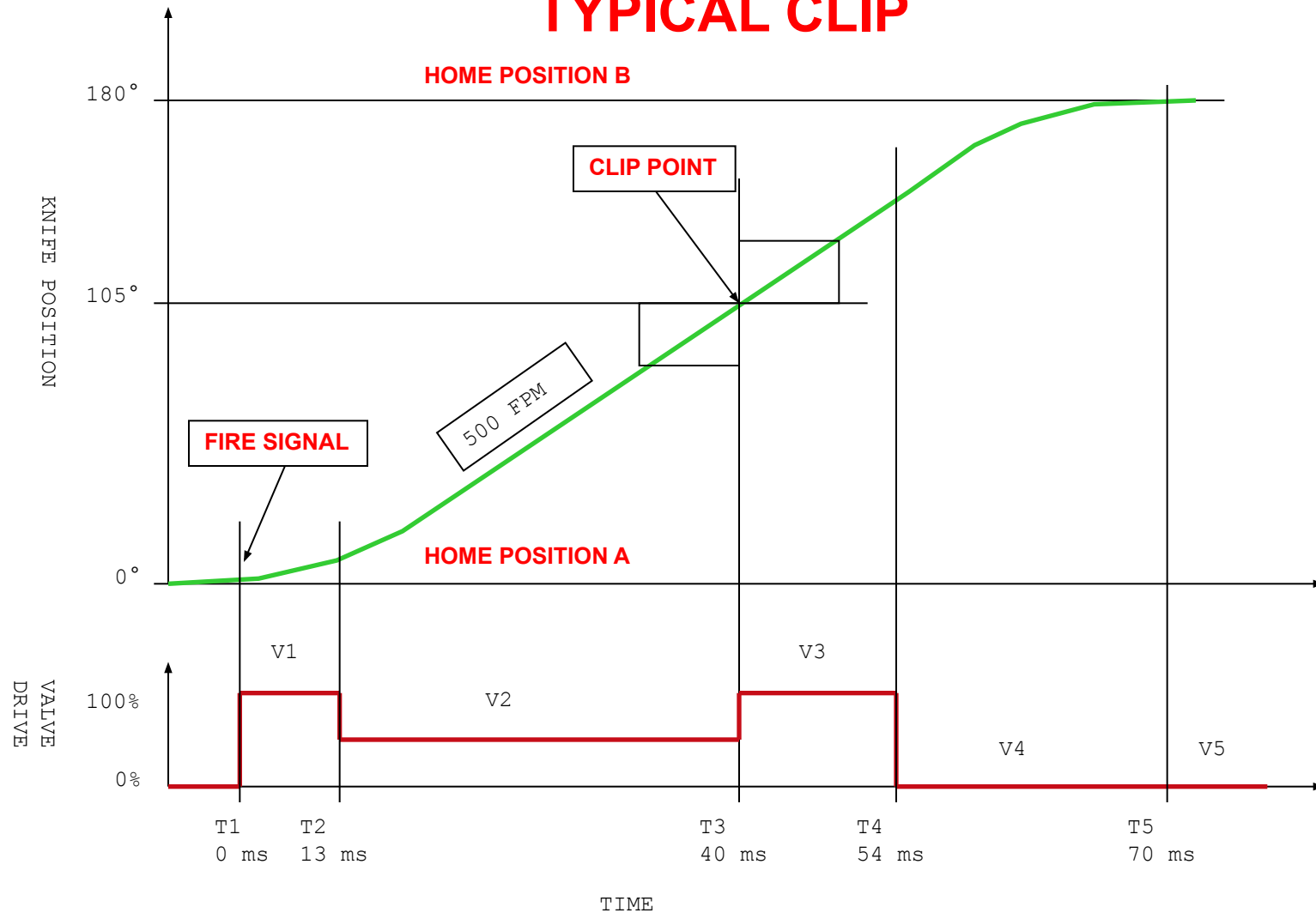
3 - HOME POSITION (B)
Knife stops after rotating half turn (180 degrees)



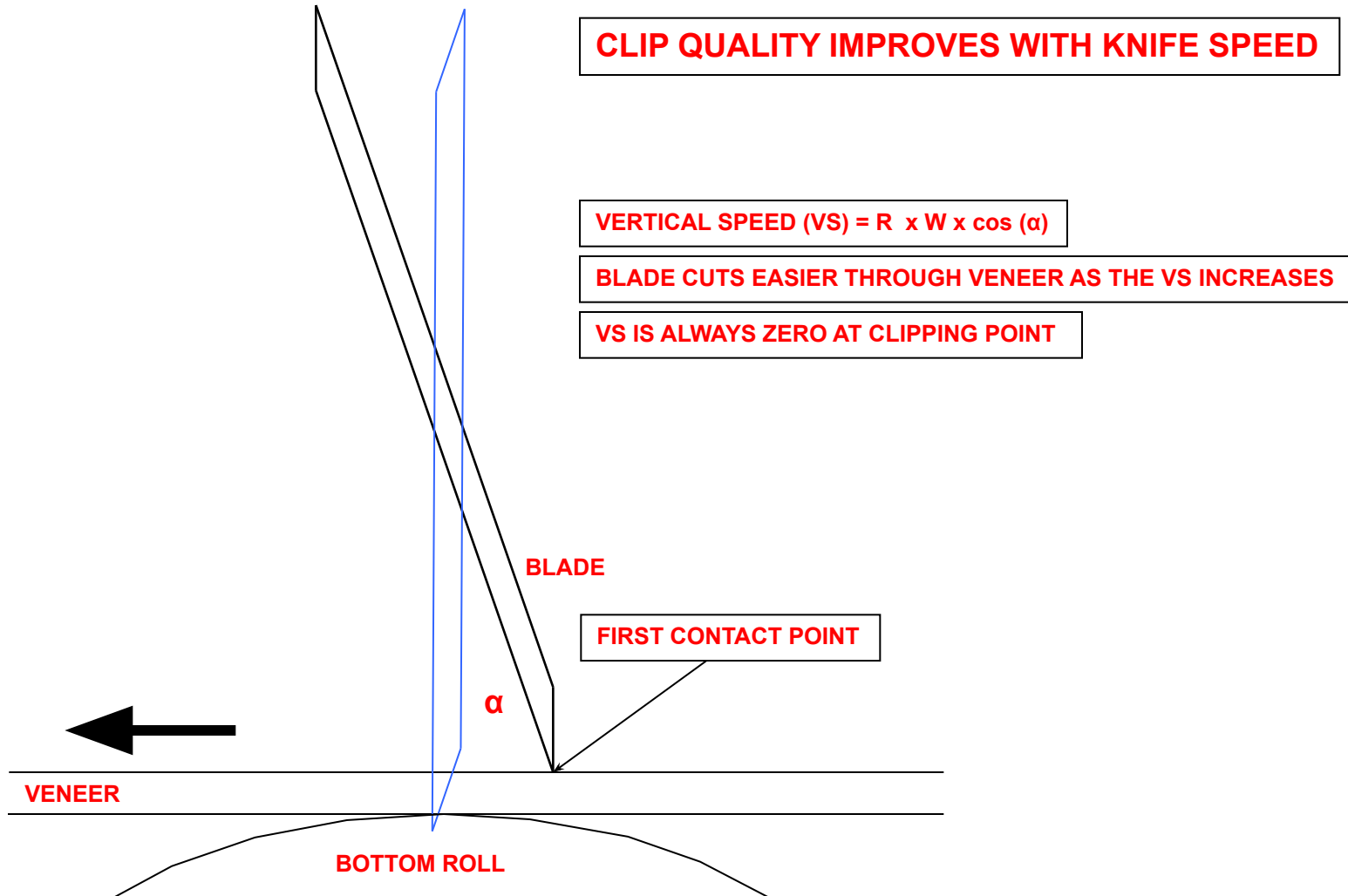


CLIP CYCLE

TYPICAL CLIP



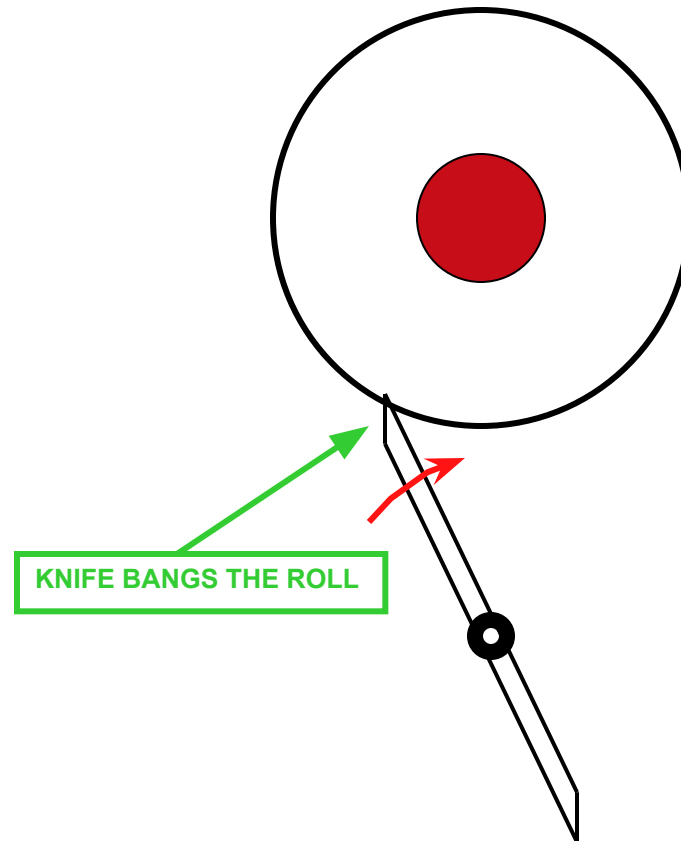
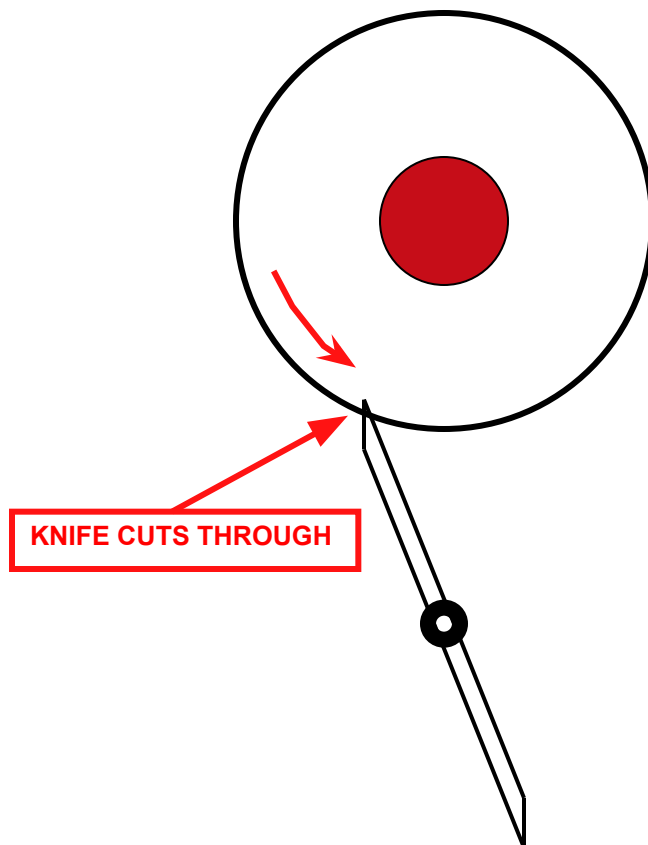
CLIP ZONE



KNIFE/ROLL SPEED MISMATCH

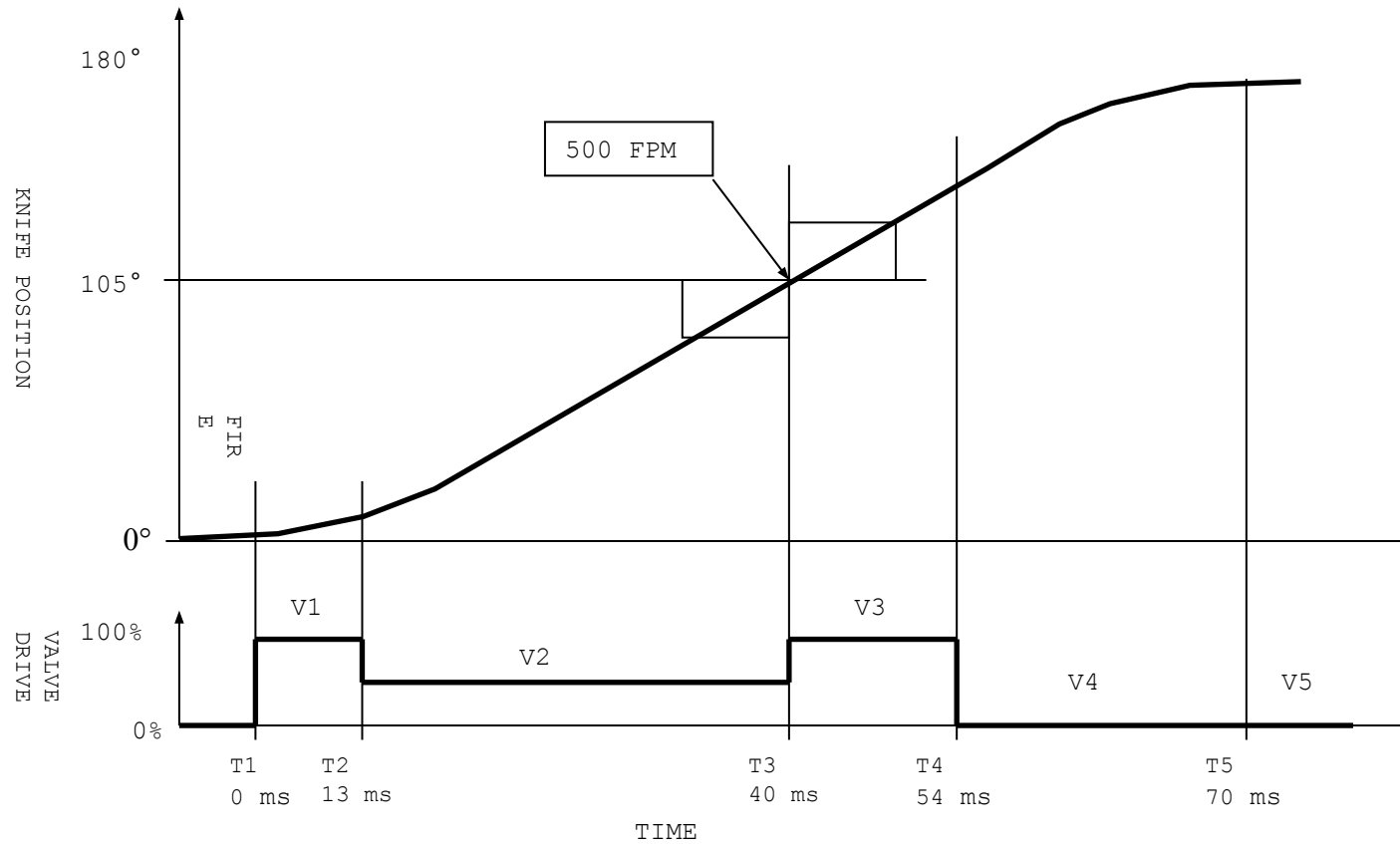
**ROLL > KNIFE
MORE WEAR**

**ROLL < KNIFE
LESS WEAR**



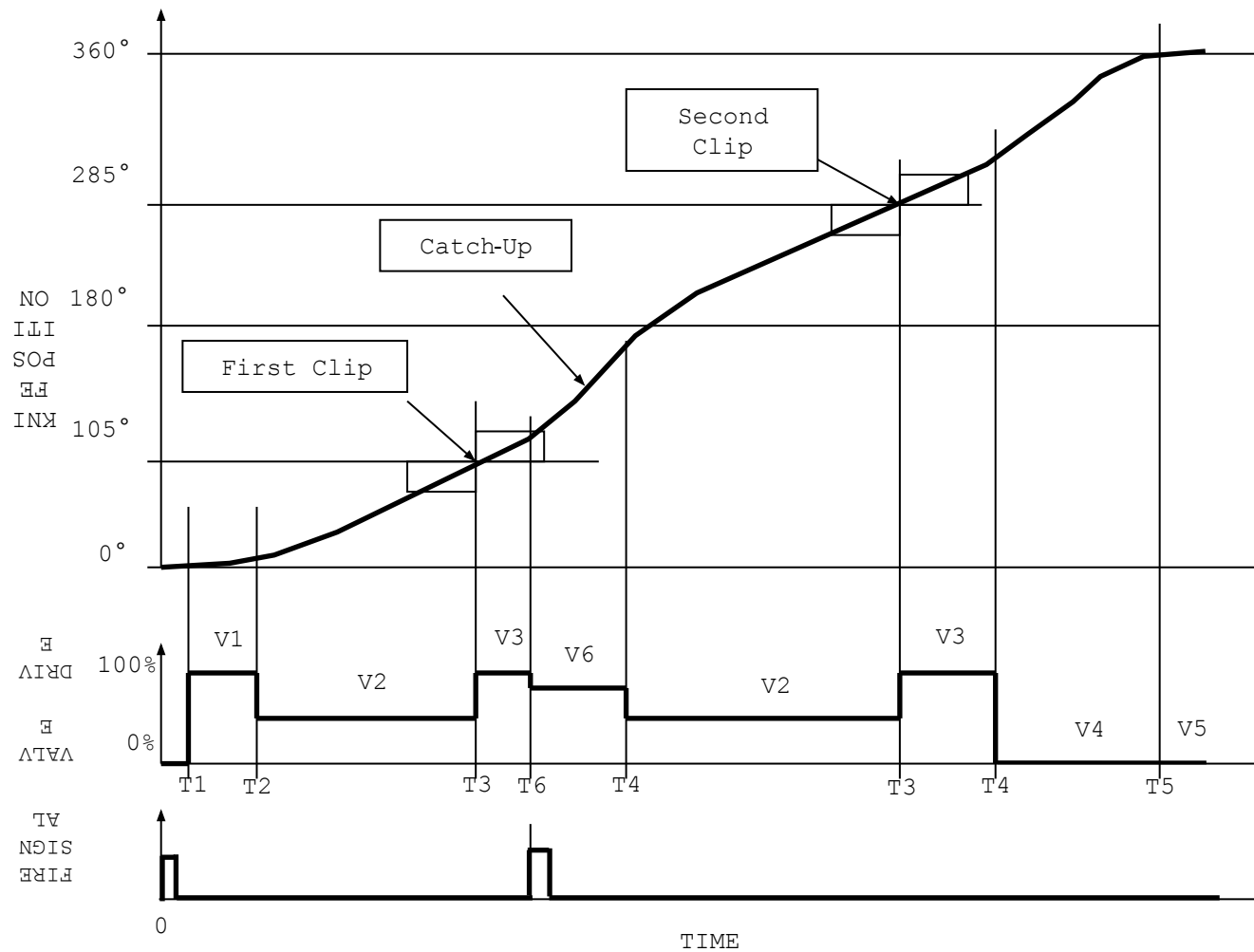


TYPICAL CLIP RESPONSE



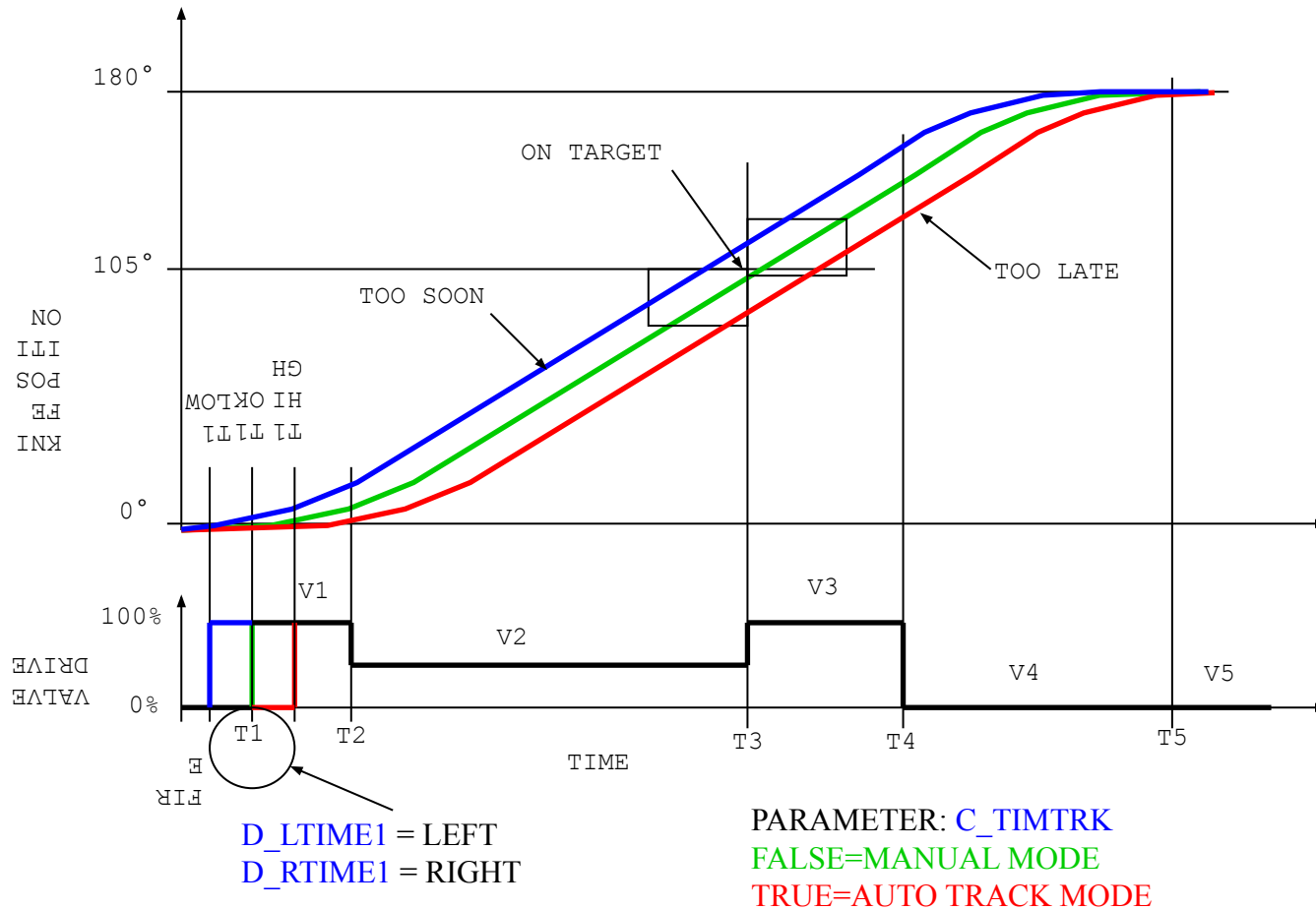


SECOND CLIP CATCH-UP



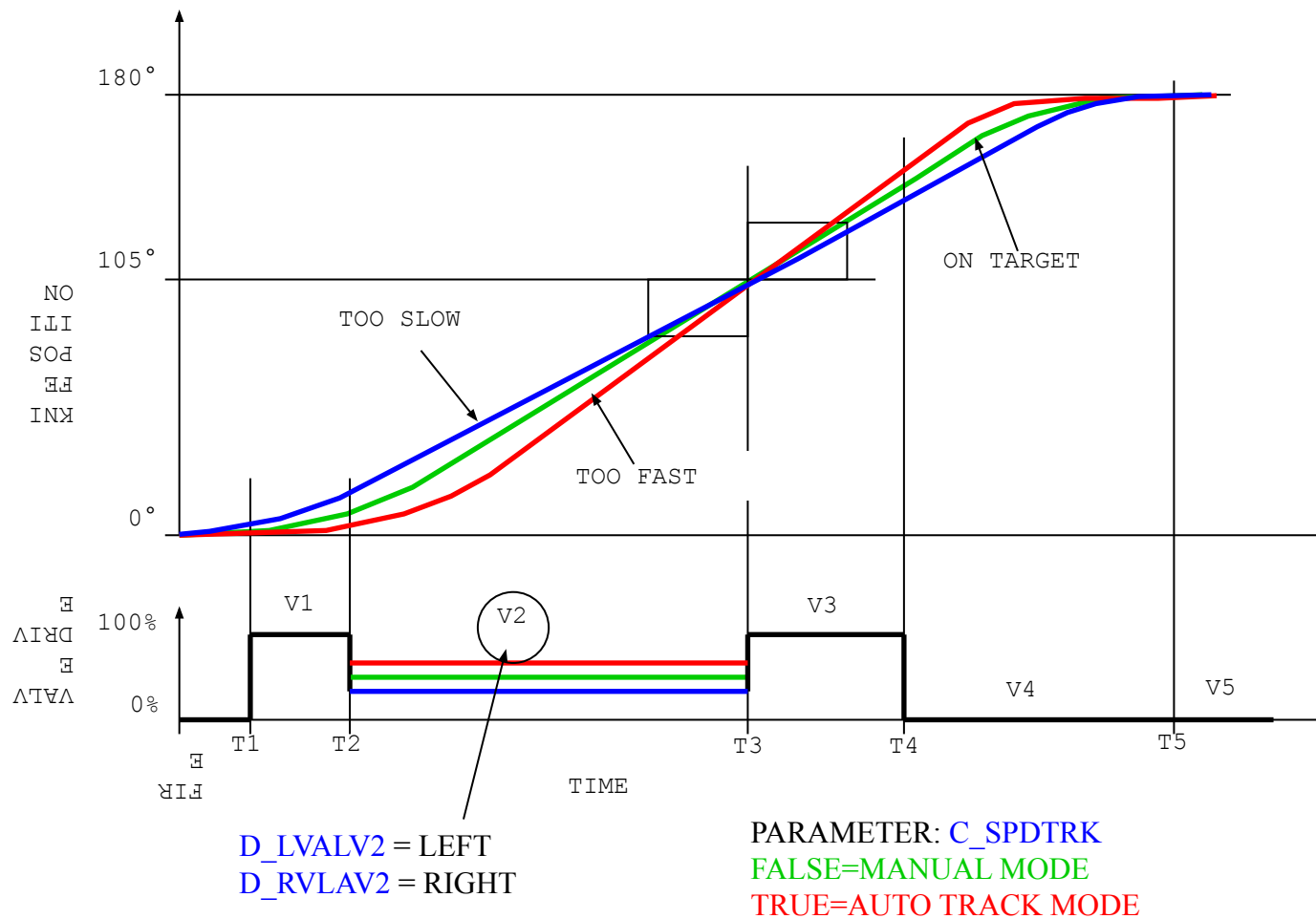


TIME RESPONSE ADJUSTMENT



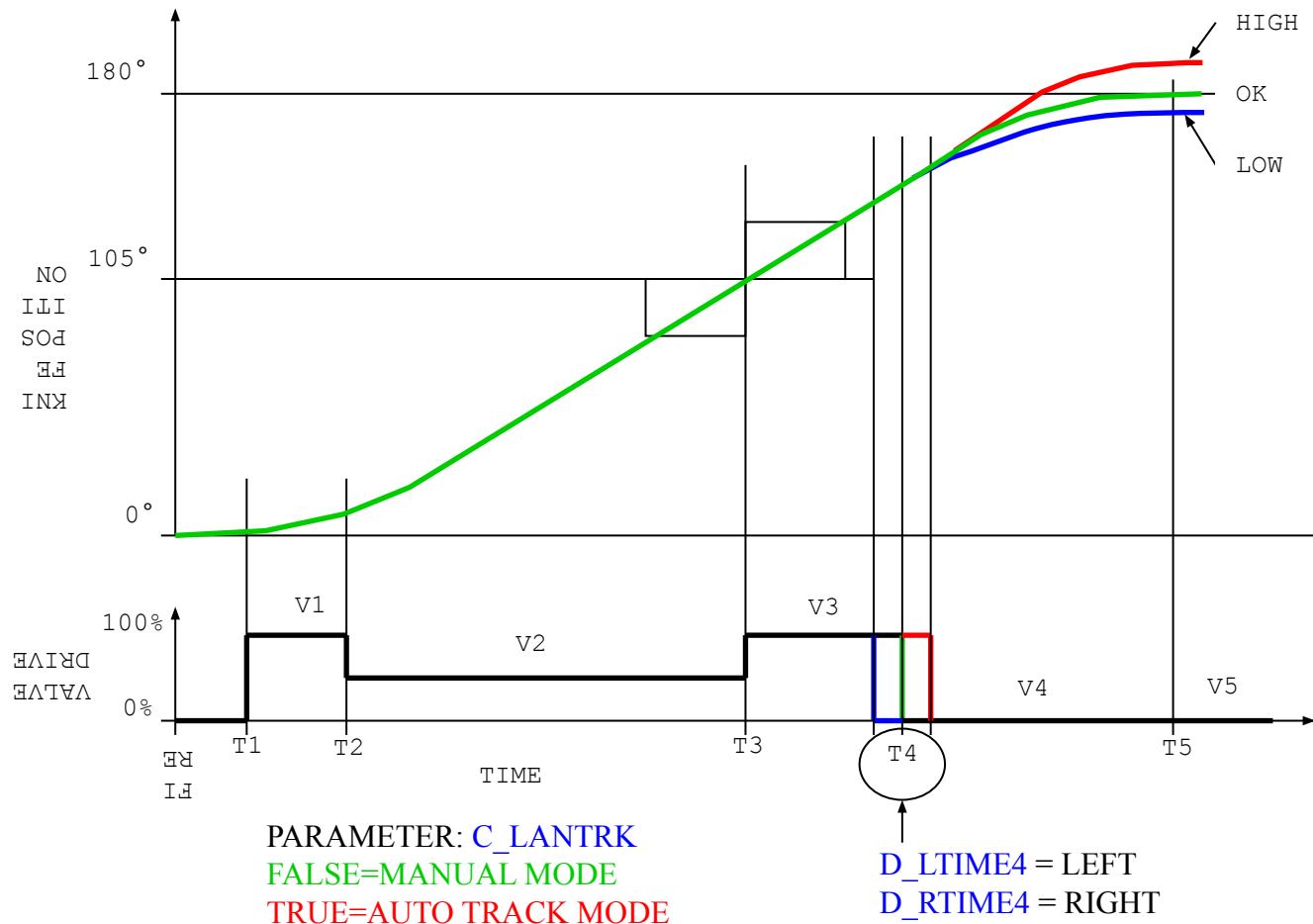


SPEED RESPONSE ADJUSTMENT



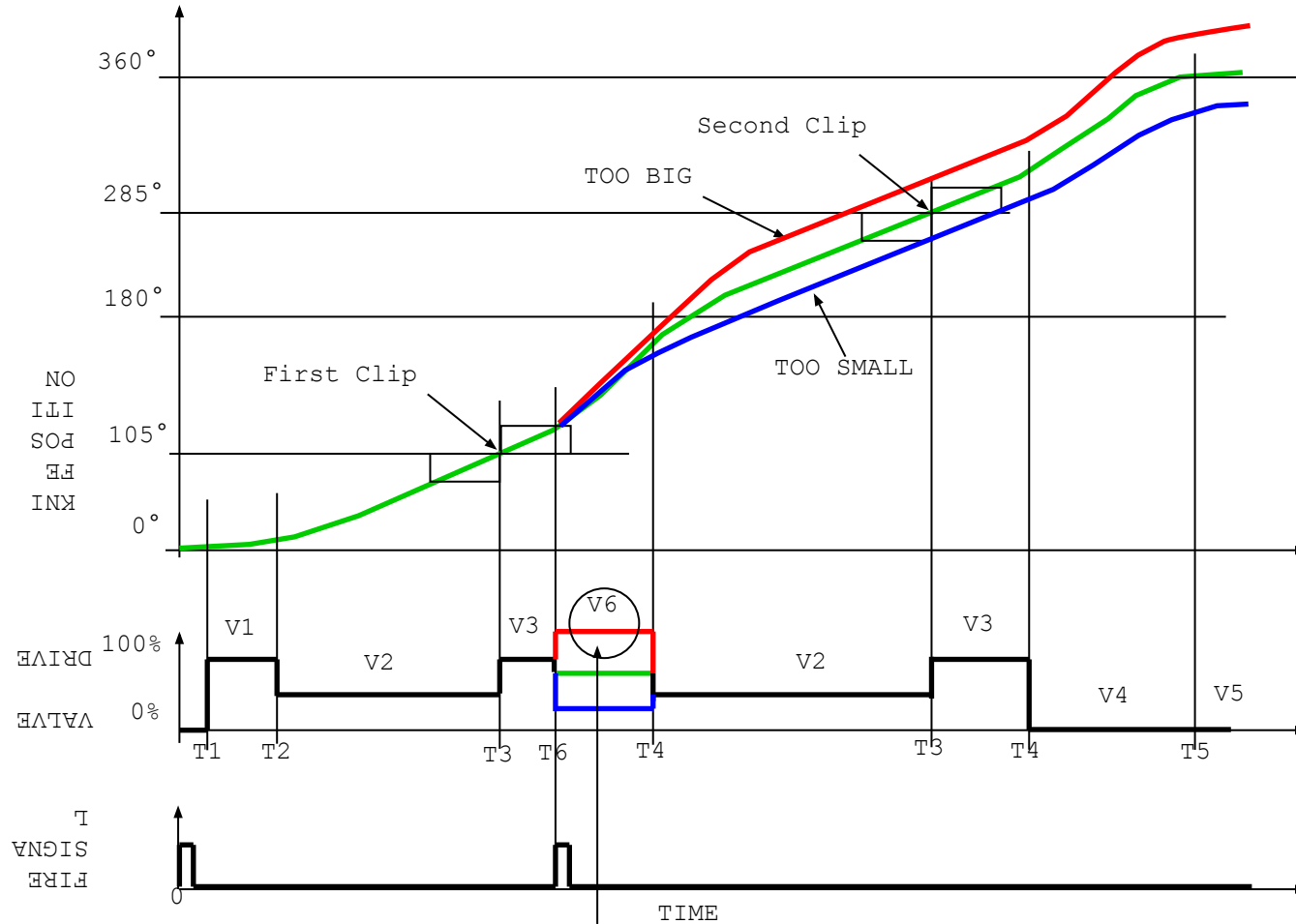


LANDING POSITION ADJUSTMENT





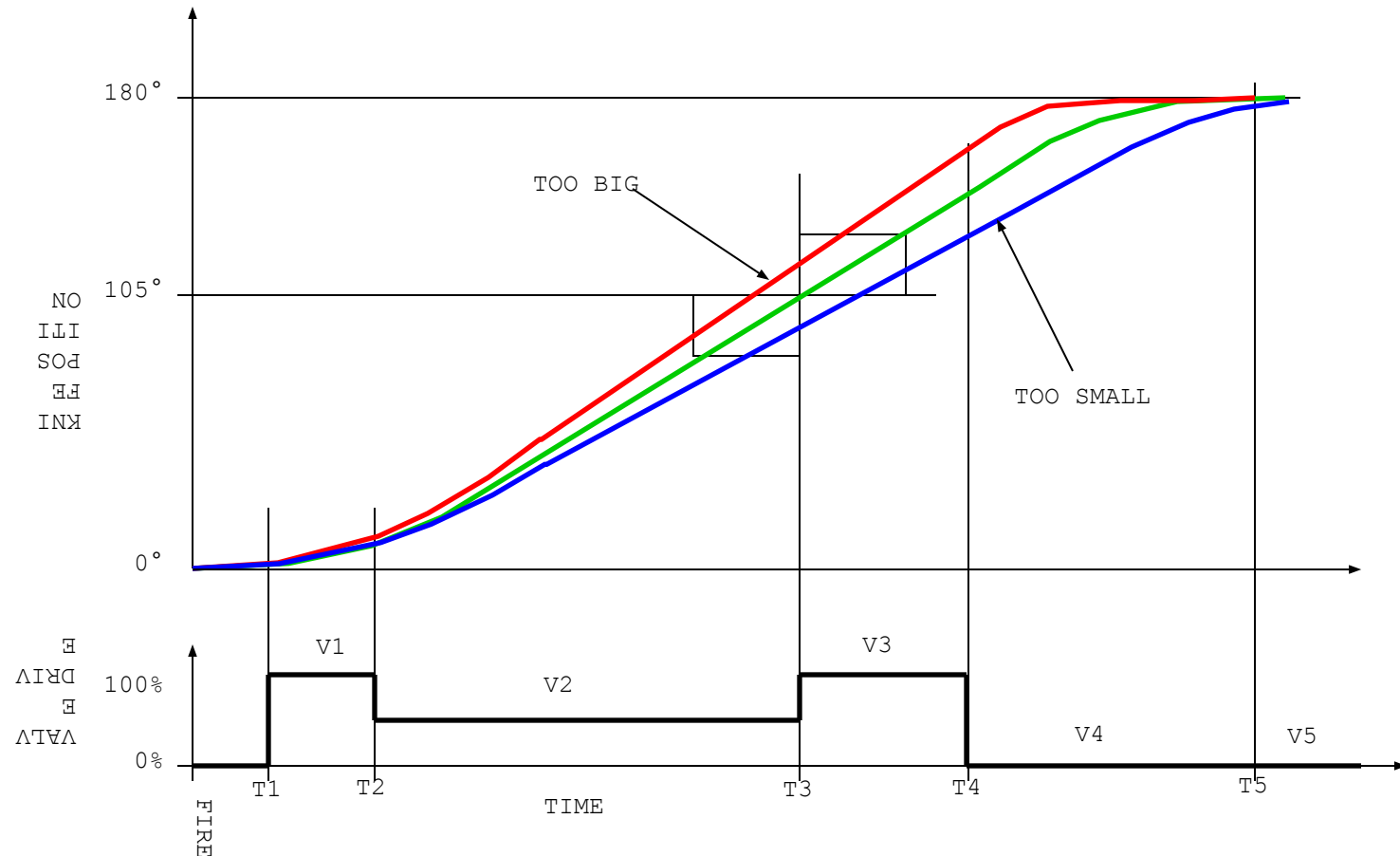
SECOND CLIP ADJUSTMENT



D_LVALV6 = LEFT
D_RVALV6 = RIGHT

PARAMETER: C_2NDTRK
FALSE=MANUAL MODE
TRUE=AUTO TRACK MODE

SPEED FACTOR



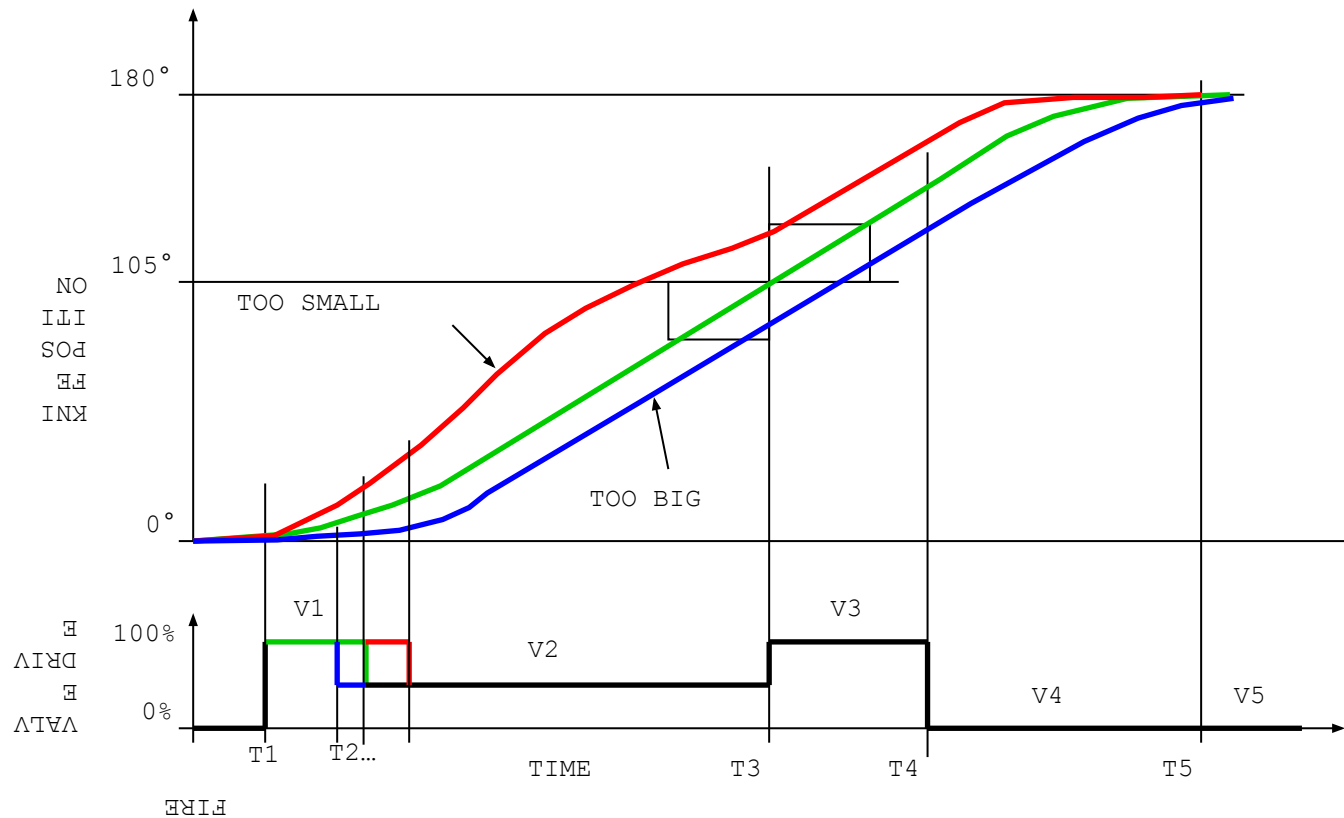
$$V2 = V_{\text{target}} / \text{Speed Factor(DEFAULT)}$$

$$\Delta V2 = \Delta V_{\text{target}} / \text{Speed Factor (AUTO TRACK)}$$

$$D_LSPFAC = \text{LEFT}$$

$$D_RSPFAC = \text{RIGHT}$$

ACCELERATION FACTOR

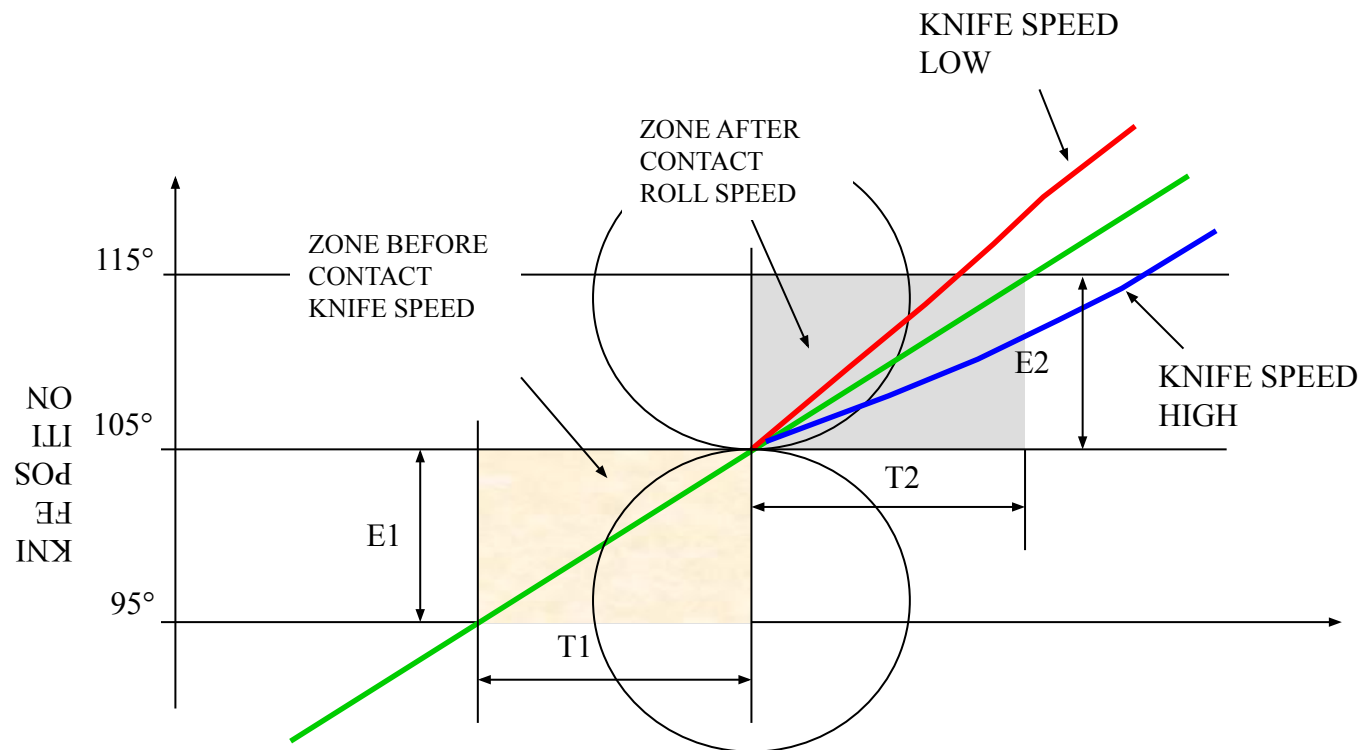


$$T2 - T1 = V_{\text{target}} / \text{Accel Factor(DEFAULT)}$$

$$\Delta(T2 - T1) = \Delta V_{\text{target}} / \text{Accel Factor(AUTO TRACK)}$$

$D_LSPFAC = \text{LEFT}$
 $D_RSPFAC = \text{RIGHT}$

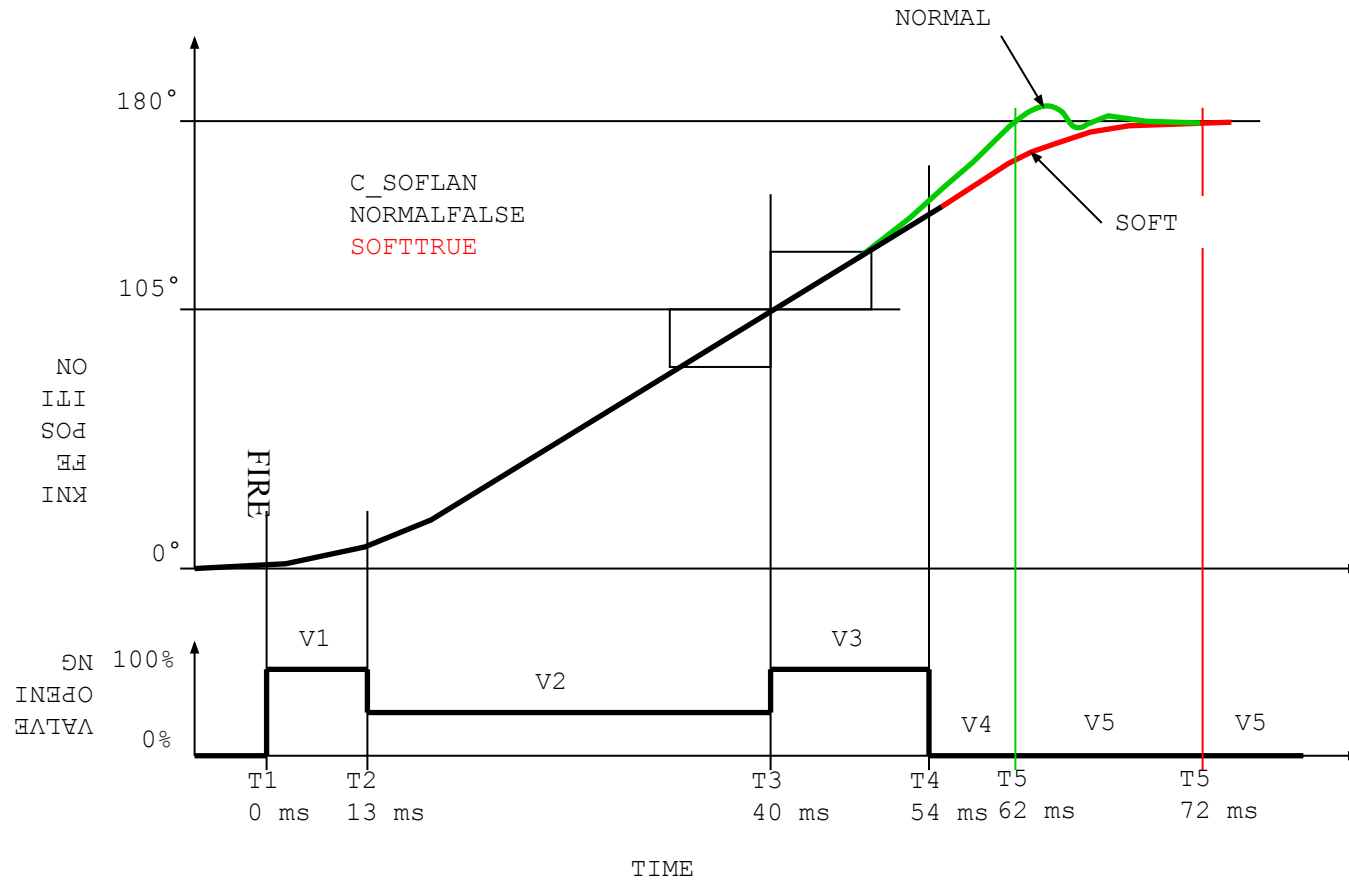
KNIFE/ROLL SPEED MEASURE



Speed Before = $E1/T1 \cdot \text{Knife Diam} \cdot \Pi$

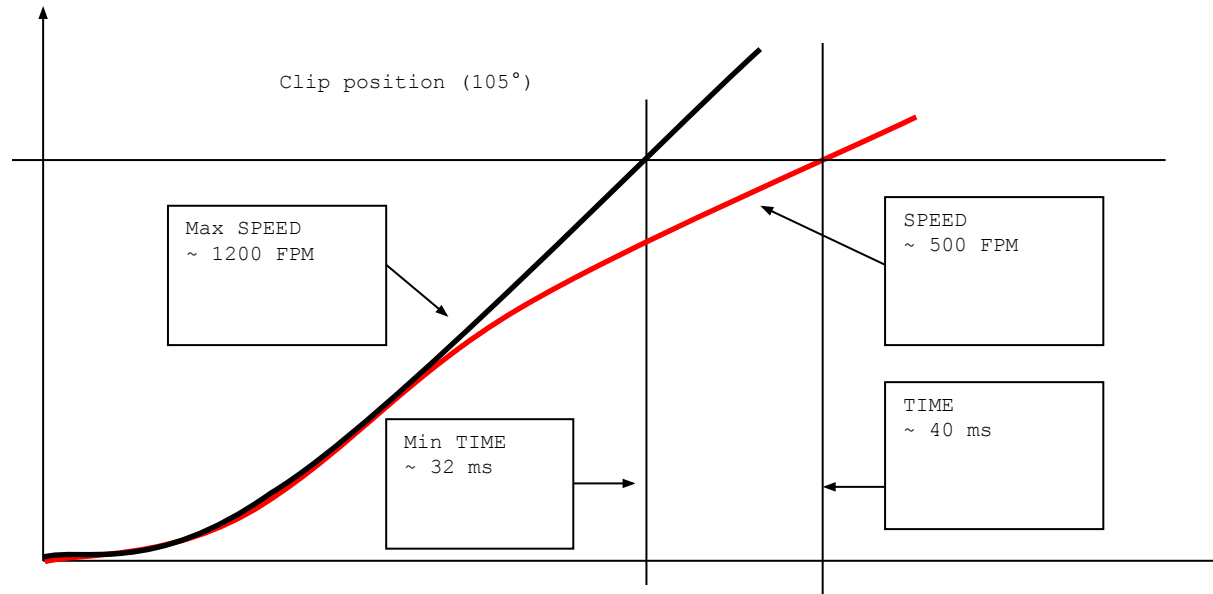
Speed After = $E2/T2 \cdot \text{Knife Diam} \cdot \Pi$

NORMAL/SOFT LANDING





RESPONSE VERSUS KNIFE SPEED





SECTION 4

OPERATION

***CLIPPER
CONSOLE***

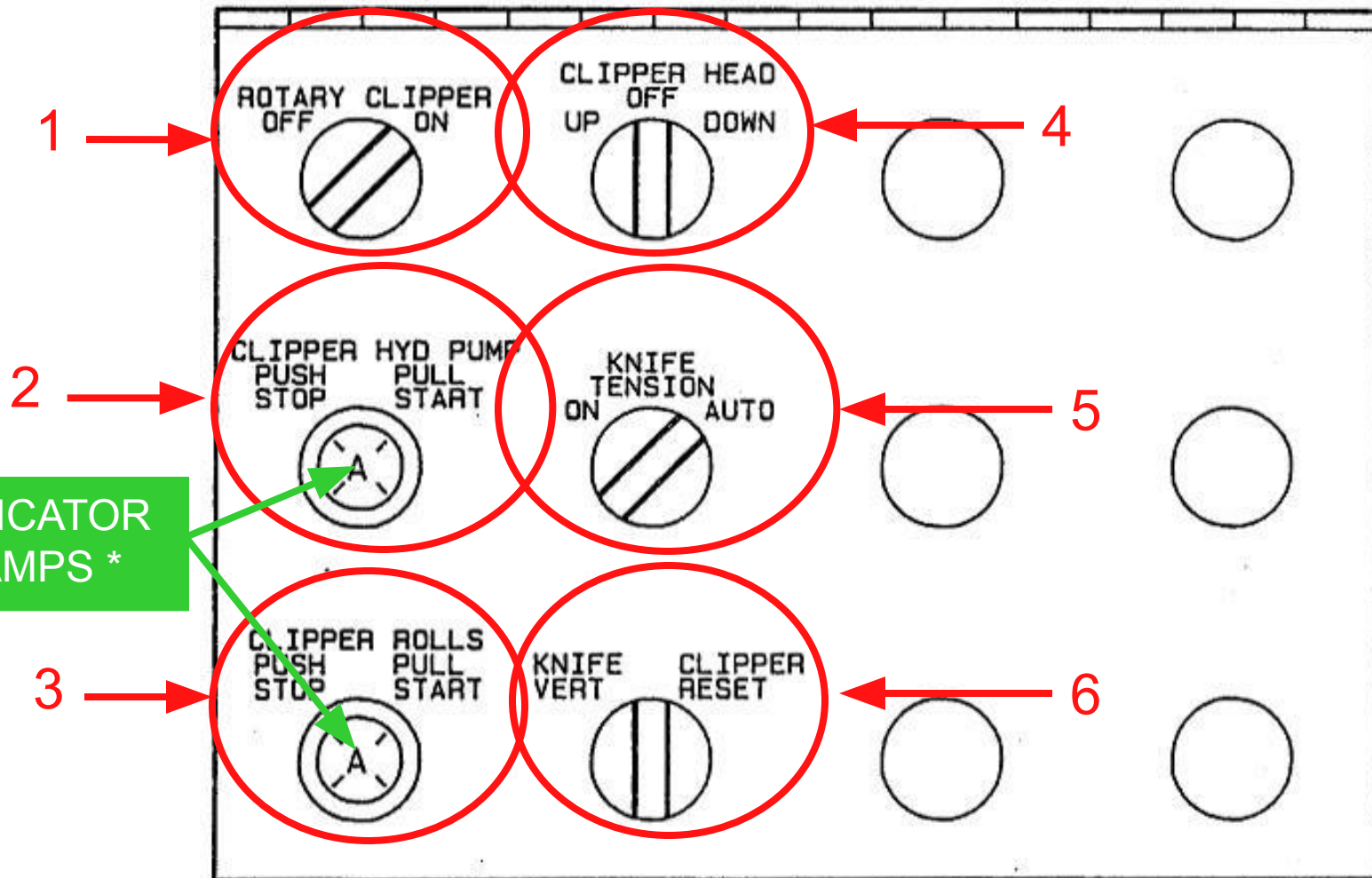
Operator's PB and SW console

CONTROLLER

Raute controller cabinet



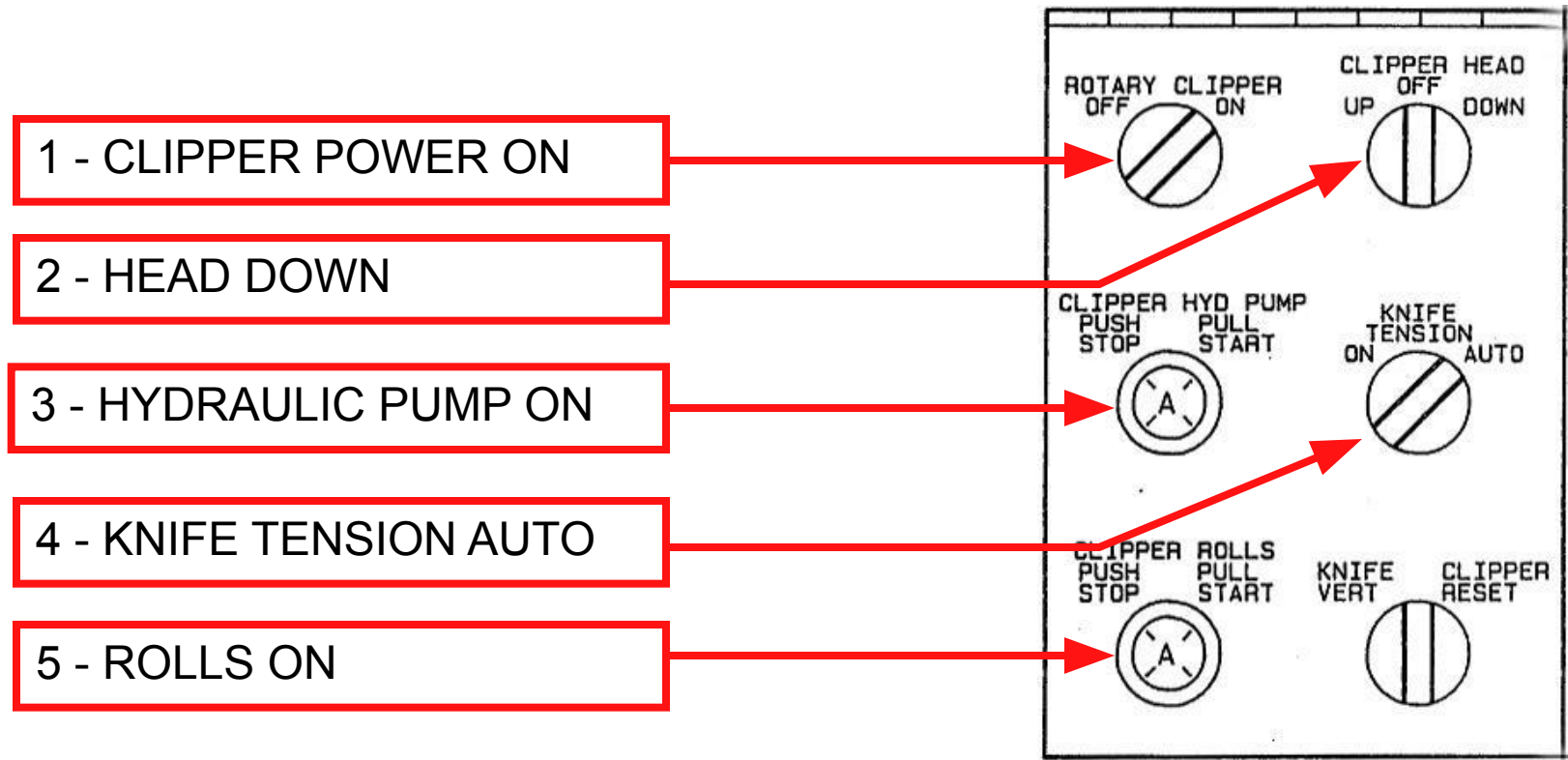
CLIPPER CONSOLE LAYOUT



*LAMPS BLINKING INDICATE FAULT



STARTUP SEQUENCE

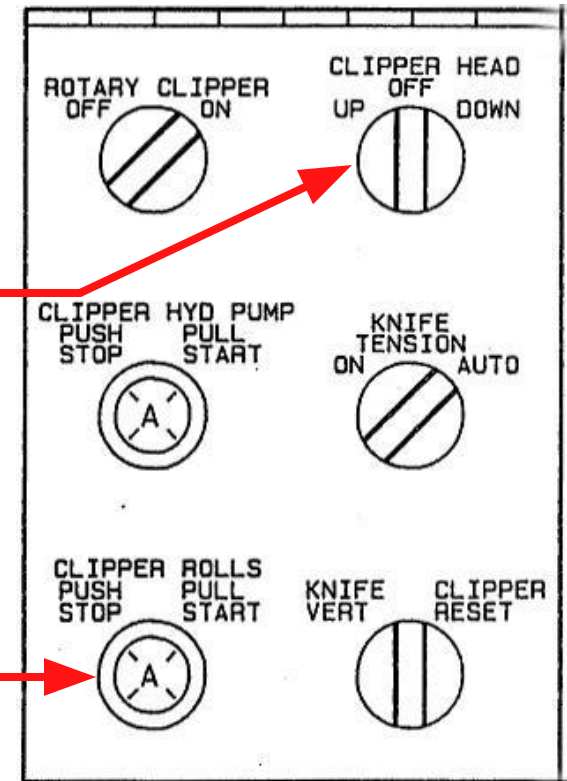




STOP TO CLEAR SEQUENCE

2 - HEAD UP

1 - ROLLS OFF



DO NO ENTER THE CLIPPER AREA!!

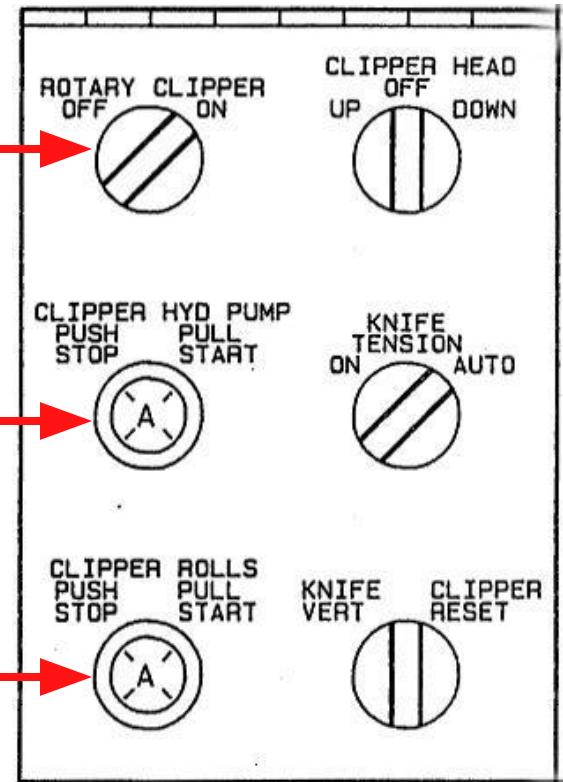


FULL STOP SEQUENCE

3 - CLIPPER POWER OFF

2 - HYDRAULIC PUMP OFF

1 - ROLLS OFF





HMI - MAIN SCREEN

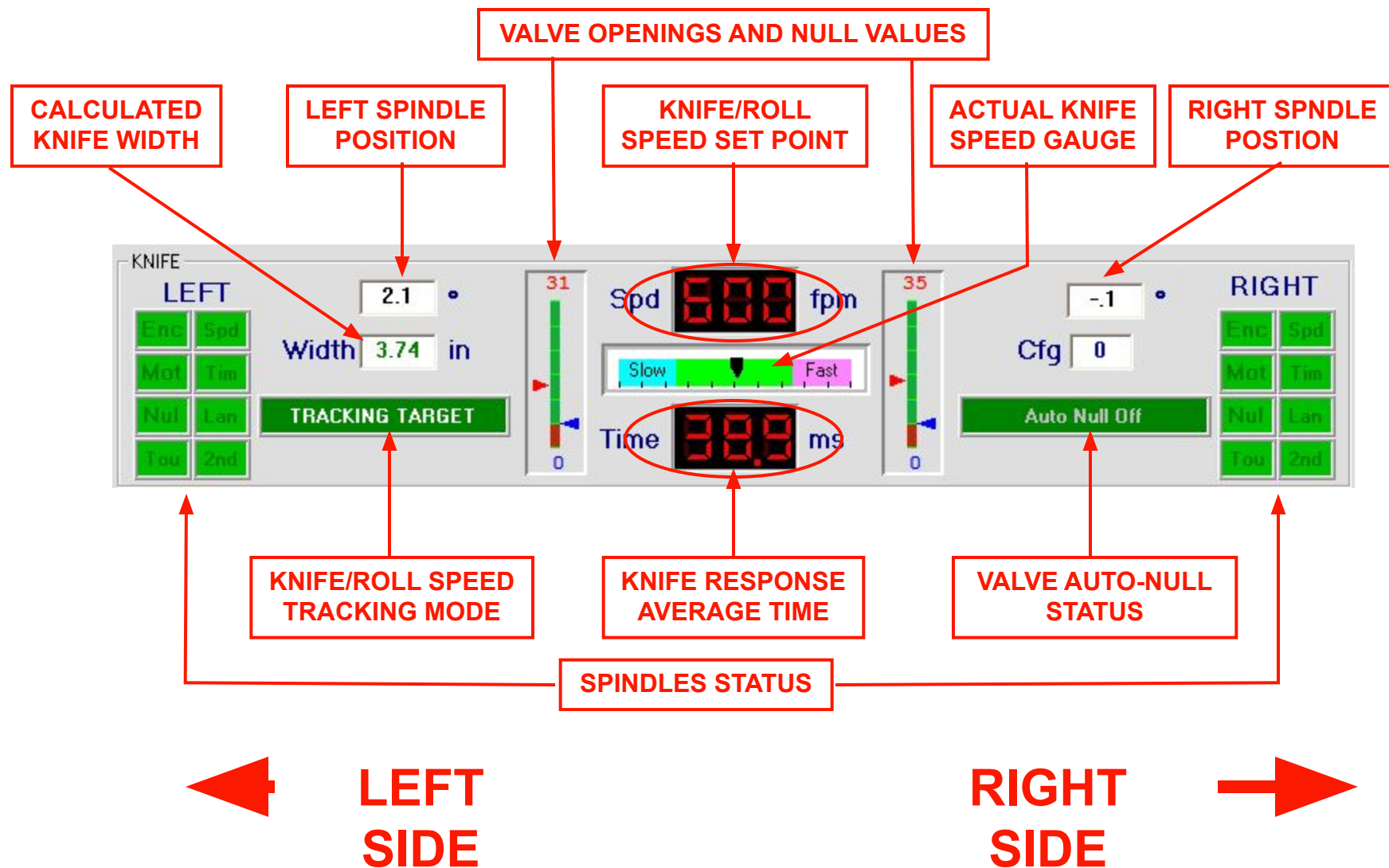
The screenshot displays the RAUTE Rotary Clipper HMI Main Screen. The interface is organized into several functional panels, each highlighted by a red box and labeled with an arrow:

- TITLE PANEL:** Located at the top left, it features the RAUTE logo and the text "ROTARY CLIPPER" and "TARGET IP:192.168.61.100".
- PROGRAM INFO:** Located at the top right, it displays the date and time "07/Nov/2006 10:32:15" and the HMI Target "2.03.0008-10/12/2006 7:17:34".
- KNIFE PANEL:** Located on the left side, it includes controls for "LEFT" and "RIGHT" knives, such as "Spd" (Speed) and "Width" (3.7 in).
- ROLLS PANEL:** Located in the middle, it shows "Top" and "Bottom" roll status with "AUTO" and "OK" buttons, and a "GOOD" indicator.
- CLIPPER PANEL:** Located below the ROLLS panel, it displays "OPERATION NORMAL" and a "MS OK" status.
- COMMAND PANEL:** Located at the bottom, it features a large blue button, a cyan "FIRE" button, and a green "OK" button.
- MENU PANEL:** Located at the very bottom, it includes navigation buttons: "Setup", "Diagnostics", "Data Table", "MIS", "Moisture", and "Exit".

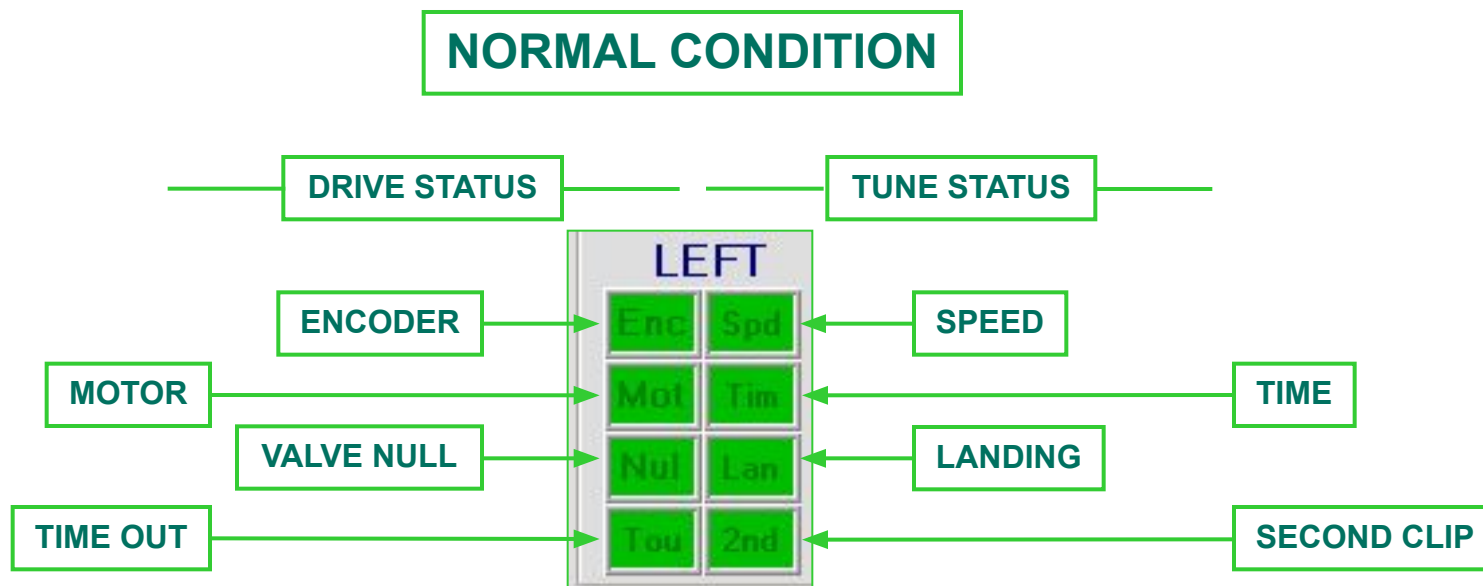
Additional context information is provided by a red box labeled "CONTEXT INFO" pointing to a status message: "Auto NULL is OFF during clip cycle or when clipper is not READY".



HMI MAIN SCREEN - KNIFE PANEL



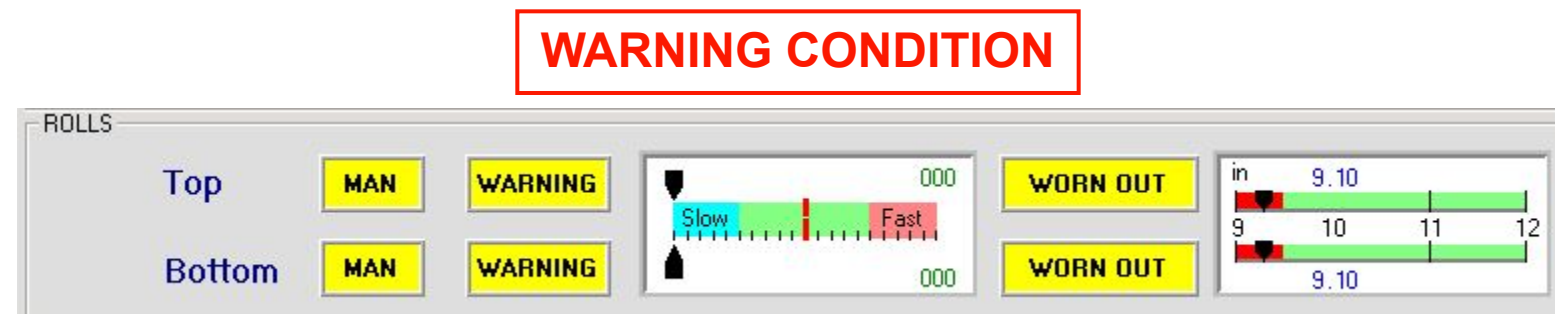
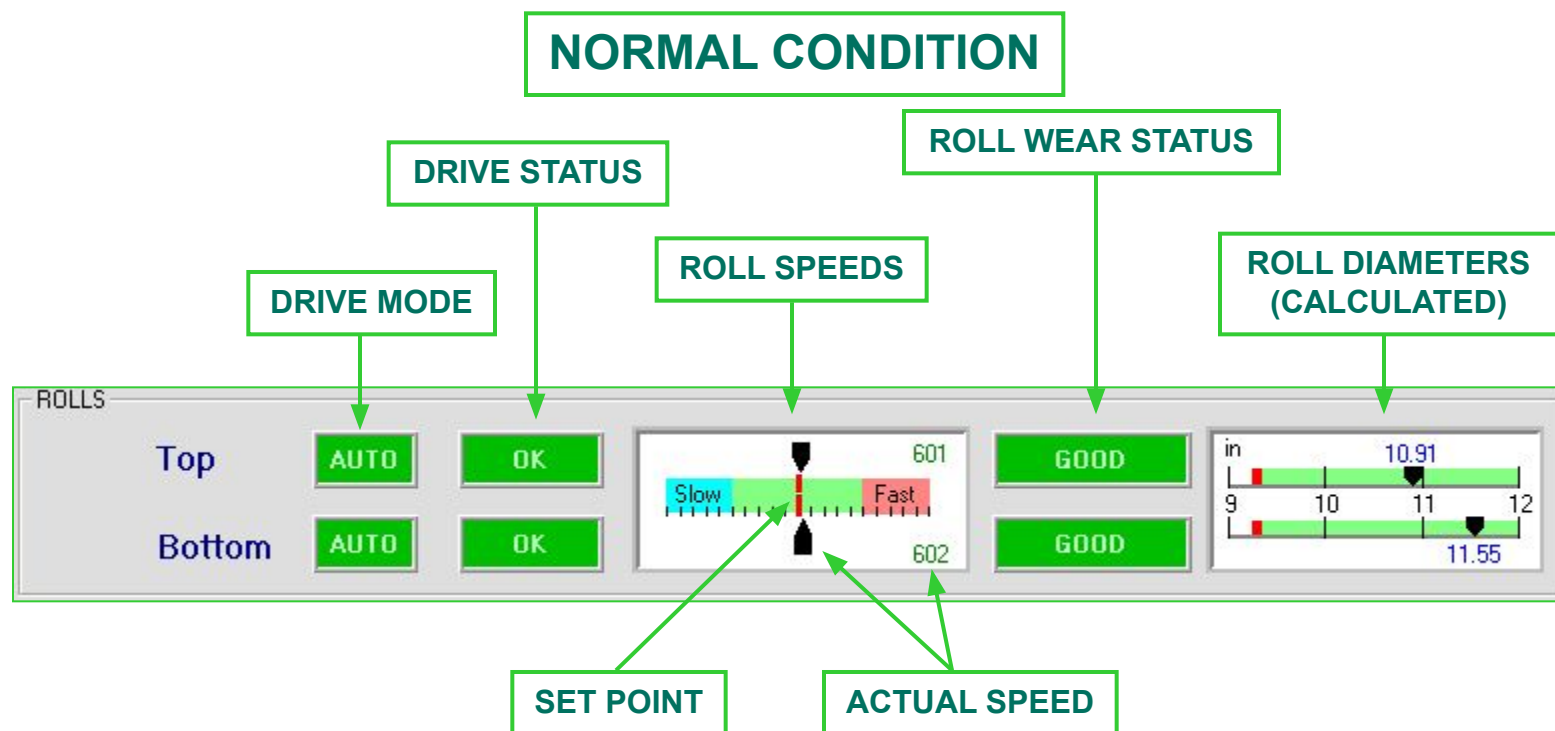
MAIN SCREEN - KNIFE STATUS



WARNING CONDITION

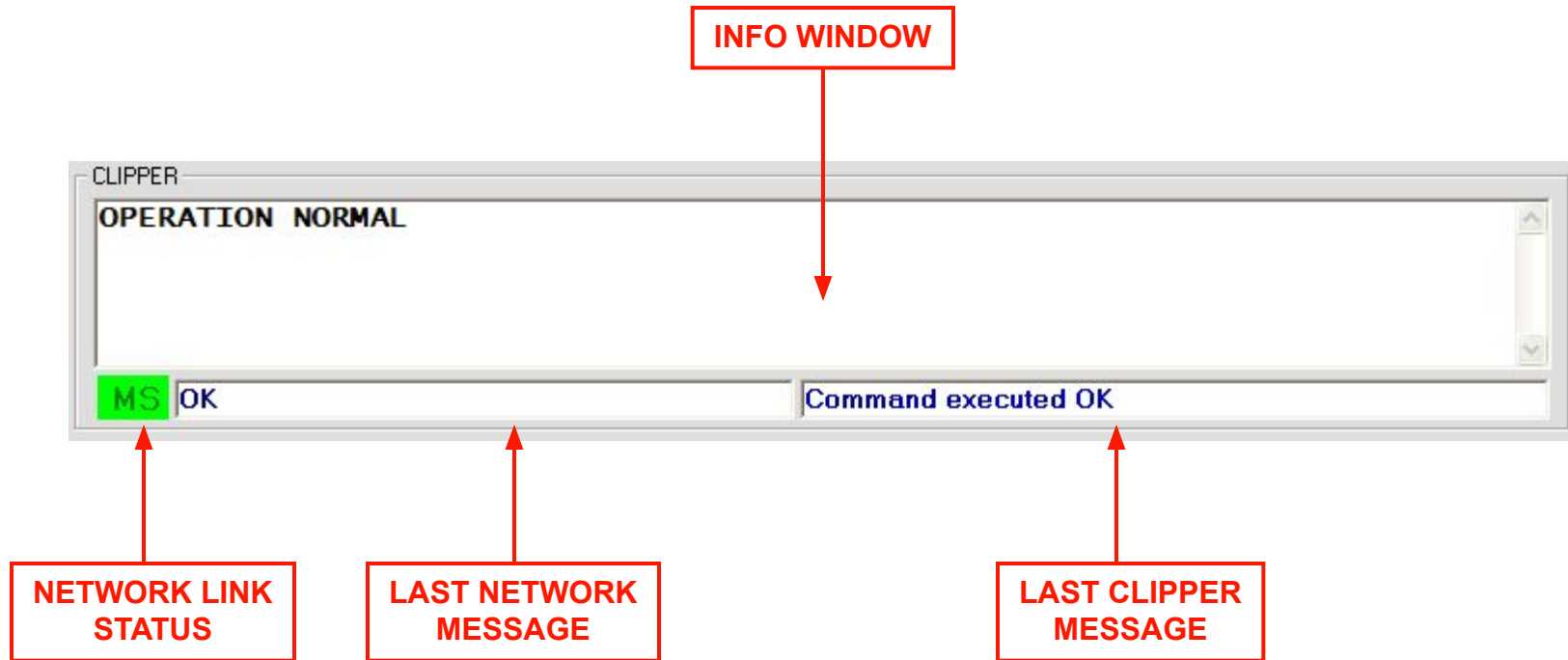


HMI MAIN SCREEN - ROLLS PANEL





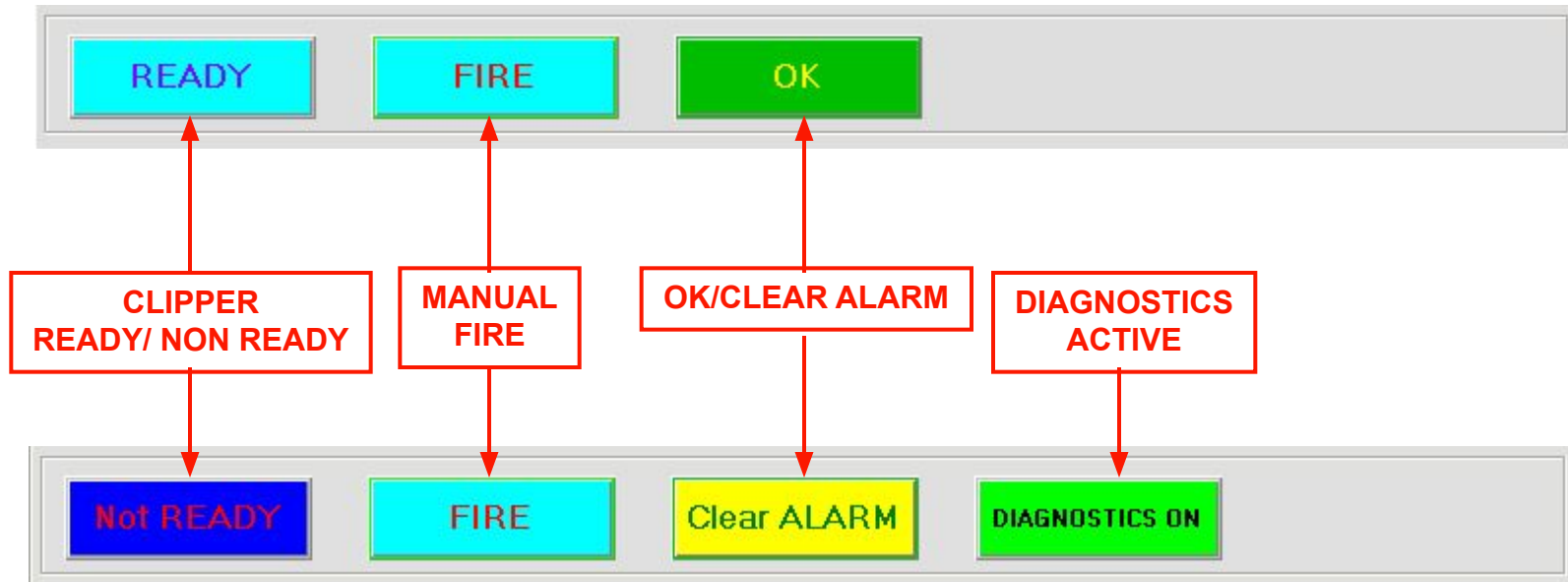
HMI MAIN SCREEN - INFO PANEL





HMI MAIN SCREEN - BUTTONS

COMMAND BUTTONS



MENU BUTTONS





HMI - KNIFE SETUP SCREEN

RAUTE **ROTARY CLIPPER SETUP** 09/Jun/2006 08:28:44

Raute

LEFT	Before CLIP	After CLIP	Targets	After Clip	Before CLIP	RIGHT
Spd	604	594	600	595	603	fpm AVG
Land	0	2				Land
70 ms	3736	Time	390	390	ms	3711
						1 ms 68

Left

Spd fac	100	T1 / V1	0	2000
Acc fac	350	T2 / V2	171	641
Dec fac	150	T3 / V3	400	2000
Toff	35	T4 / V4	434	0
Max Voff	100	T5 / V5	702	0
Voff	0	T6 / V6	200	756
		T7 / V7	682	700
		T8 / V8	292	28

Speed OK Land OK 2nd clip
Time OK

Right

Spd fac	100	T1 / V1	0	2000
Acc fac	350	T2 / V2	171	715
Dec Fac	150	T3 / V3	400	2000
Toff	35	T4 / V4	443	0
Max Voff	100	T5 / V5	702	0
Voff	0	T6 / V6	200	1435
		T7 / V7	682	700
		T8 / V8	292	28

Speed OK Land OK Time OK 2nd clip OK

Self Tune & Auto Tracking

SPEED	TIME	LANDING	2ND CLIP	
AUTO	AUTO	AUTO	AUTO	All
Speed	Time	Land	2nd clip	Abort

Auxiliary Commands

Knife width: 3700
 Chop delay: 1000
 2nd clip delay: 50

CHOP OFF 2nd clip OFF

Load CFG
Save CFG

Link OK Clipper Command executed OK

Network MS

Fire
Rolls
Graphics
Defaults
Main

ACTUAL VALUES

CLIP
PARAMETERS

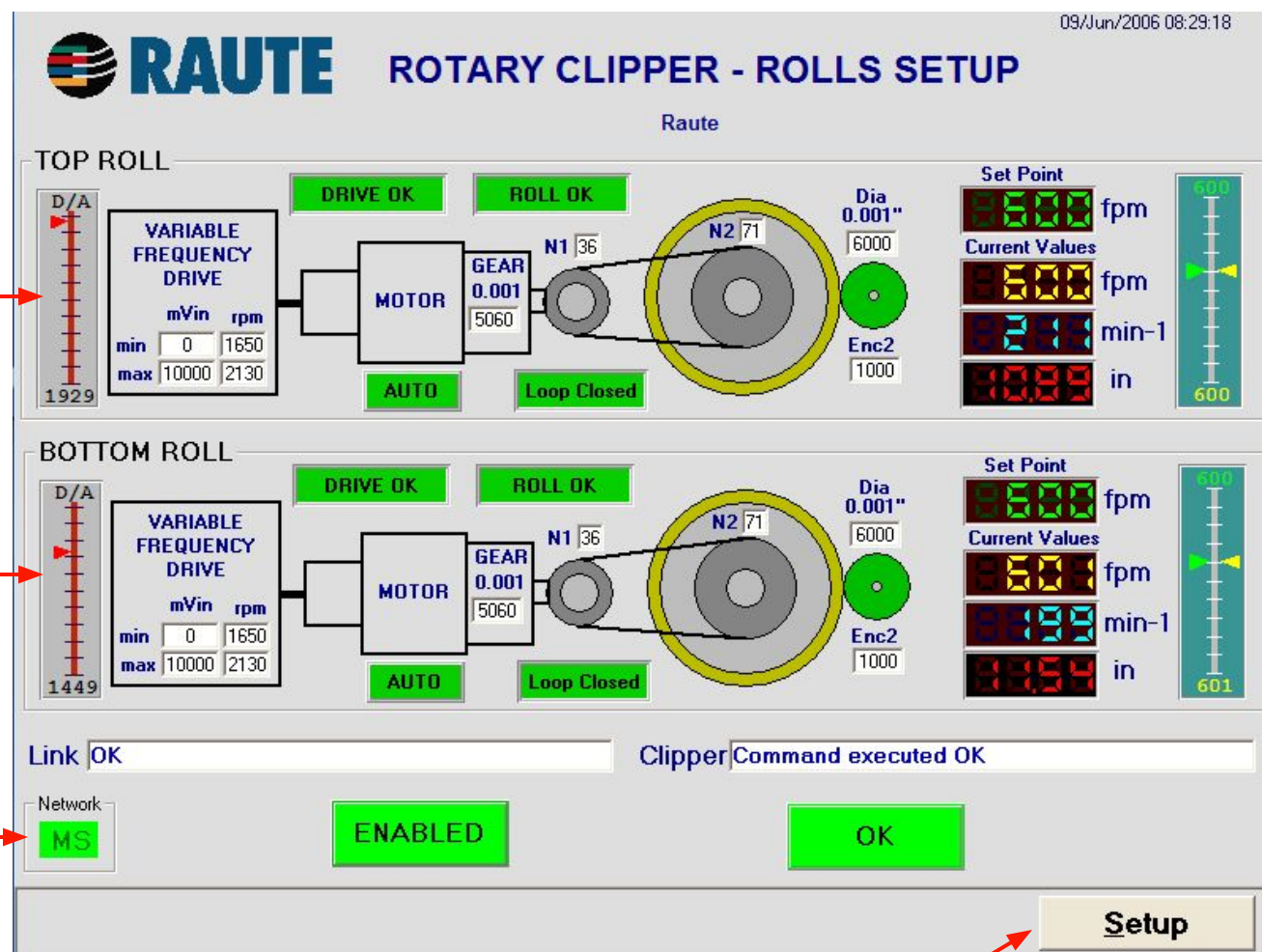
TUNE CONTROLS

AUX.
CTRLS.

COMMANDBUTTONS



HMI - ROLLS SETUP SCREEN

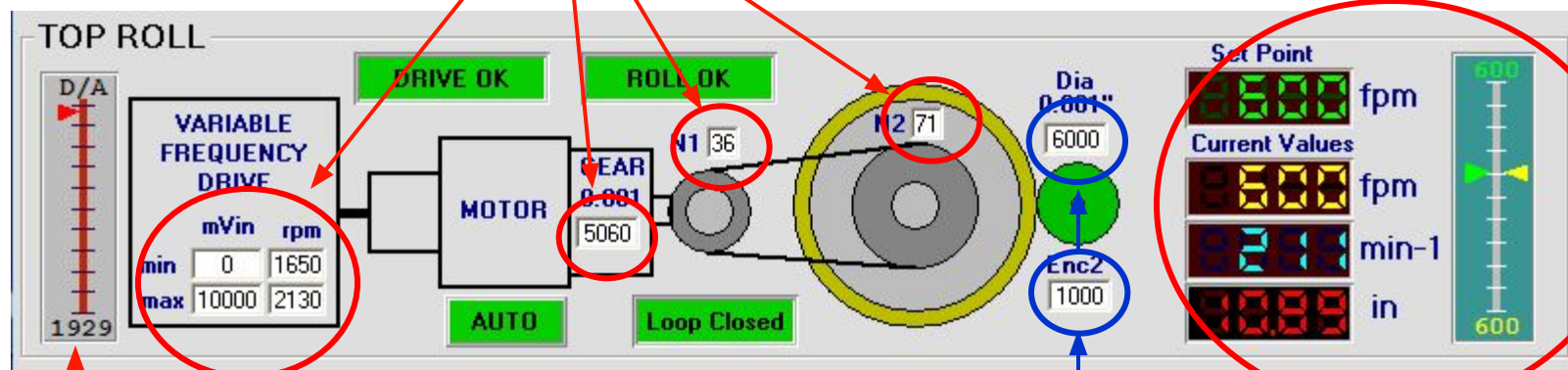


BACK TO PREVIOUS SCREEN

HMI - TOP ROLL SETUP PANEL

PHYSICAL PARAMETERS

LOOP VALUES

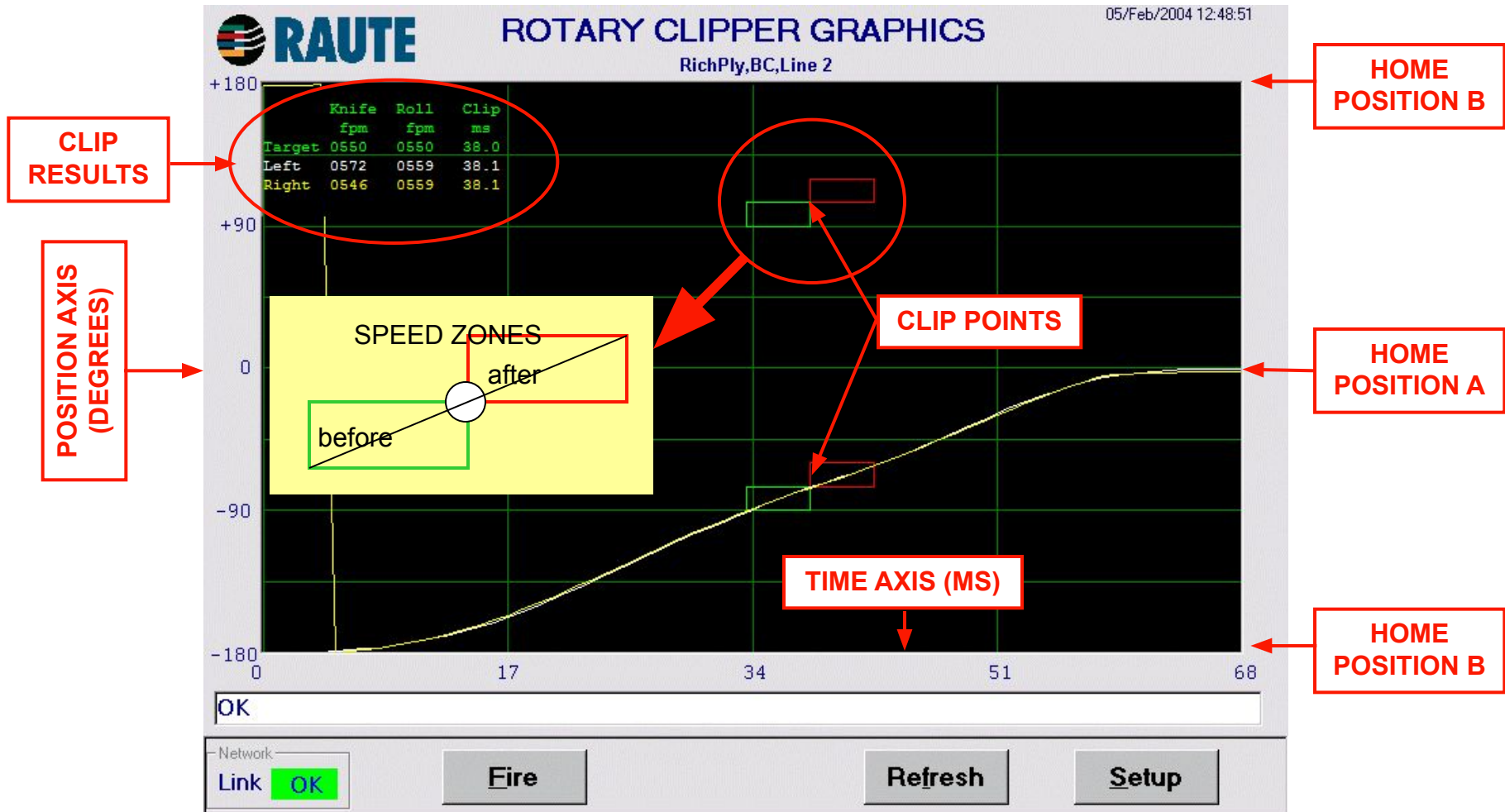


OUTPUT SIGNAL

ROLL TACHOMETER PARAMETERS



HMI - GRAPHICS SCREEN





HMI - DIAGNOSTICS SCREEN

RAUTE **CLIPPER DIAGNOSTICS** 14/Nov/2002 09:02:01
Coastland Wood Ind, Nanaimo

Select Test

Encoder Test

Motor Test

Vertical

Zero

Move To

TEST SELECTOR

Side **Left ON** **Right ON** Selected when blinking

Encoder + 00 + 00 Degrees

Bits (11..0) [11 bars] [11 bars] Green when OK

Speed + 8880 + 8880 fpm

Valve + 8800 + 8800 %

Auto Null **OFF** **DISABLED** **DIAGNOSTICS OFF**

Maximum Aperture -100 -50 0 50 100 % 20

Ramp time 5 10 15 20 25 30 s 5

None **Execute test** **Reset Test** **Big Numbers**

Clipper Response String-00

Link Message ERR= 1. Tag does not exist

Network Link **OK**

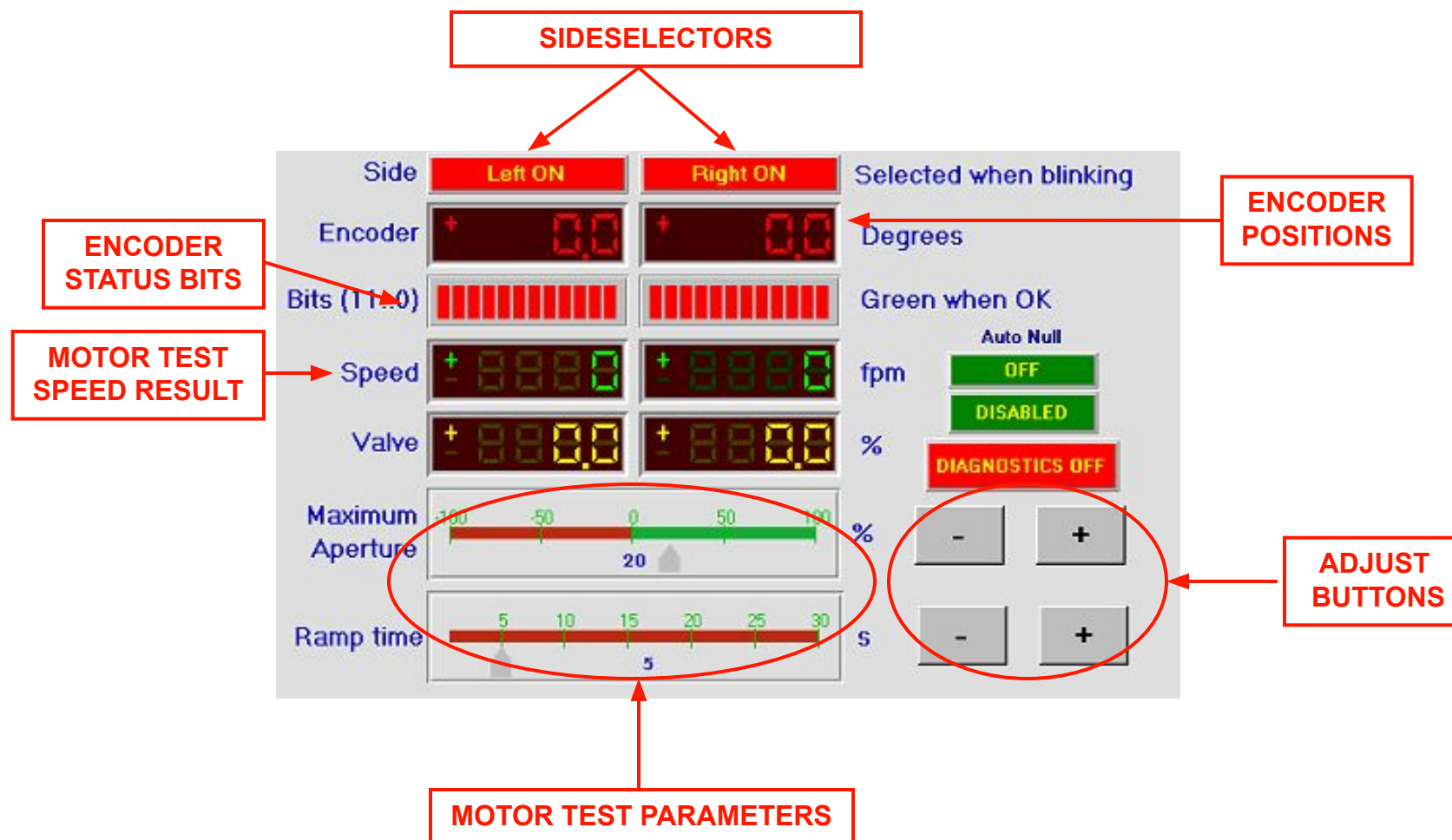
MOVE TO POSITION

VALVE NULL

BUTTONS

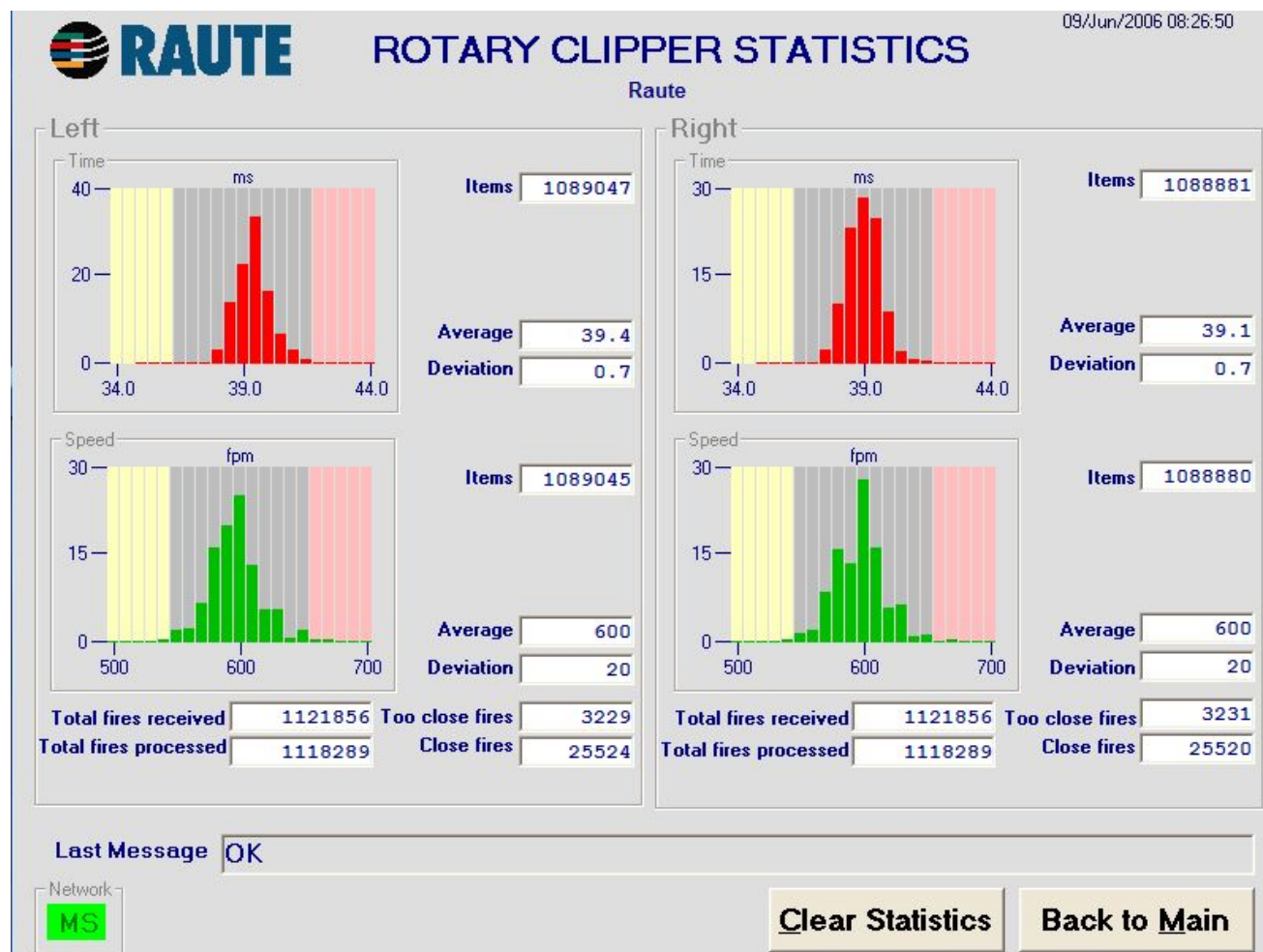
Back to Main

HMI - DIAGNOSTICS SCREEN



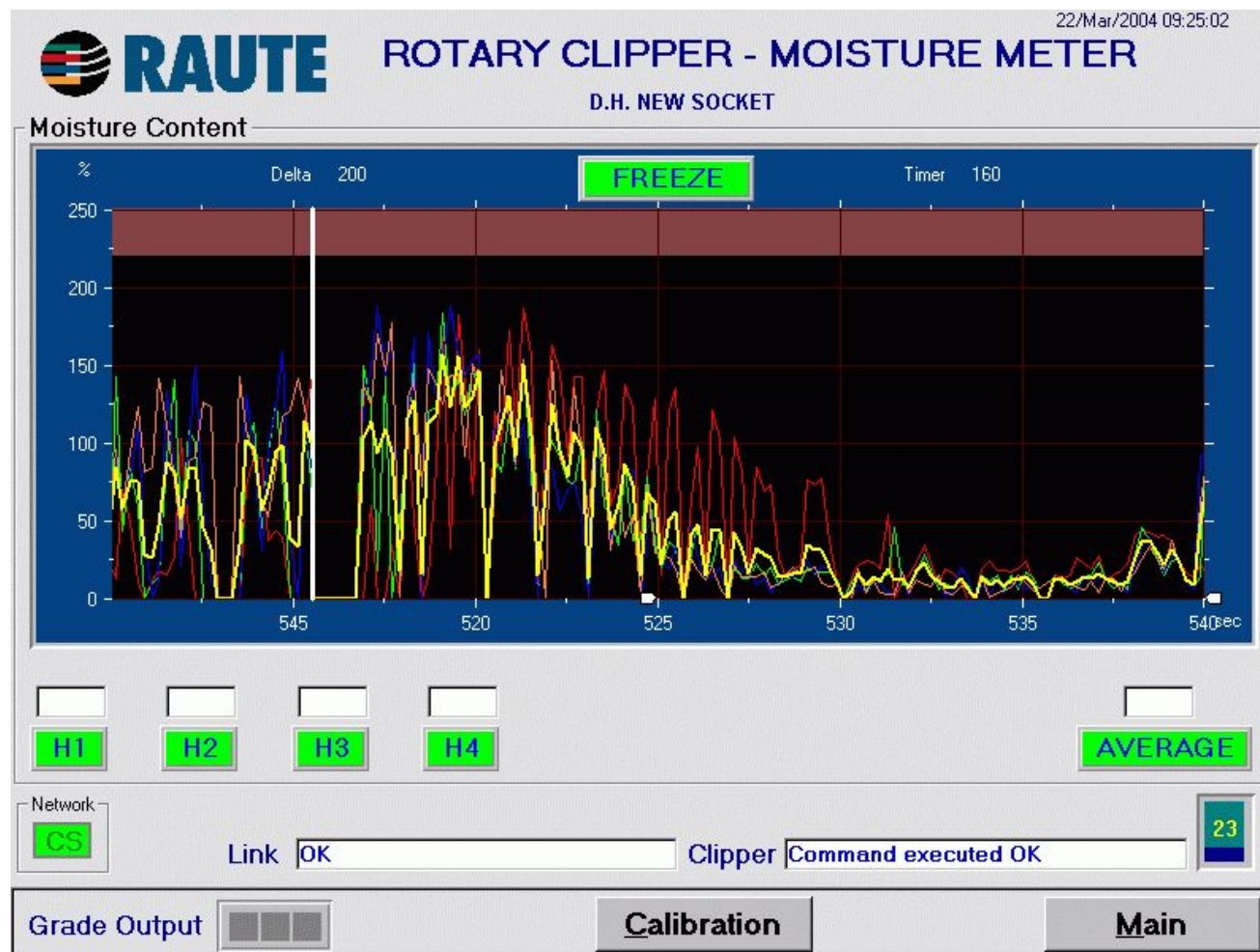


HMI - MIS SCREEN





HMI - MOISTURE SCREEN





HMI - MOISTURE SETUP SCREEN

11/Jun/2003 09:21:57



RC - MOISTURE METER CALIBRATION

RAUTE LTD. R&D

Moisture Heads Calibration

Head	Low	High	Cal. Factor	Parameters	Offset	Current Reading	A/D Reading	Input Volts
1	READ	??	1		0	0	0	0.000
2	READ	??	1		0	0	0	0.000
3	READ	??	1		0	0	0	0.000
4	READ	??	1		0	0	0	0.000
5	READ	??	1		0	0	0	0.000
6	READ	??	1		0	0	0	0.000
7	READ	??	1		0	0	0	0.000
8	READ	??	1		0	0	0	0.000

Grading

Grading Limits

Min 0 %MC

Max 220 %MC

Avg 0 %MC

Grade 0

Help Tips

Network

Link OK
Link OK
Clipper String-00

Restore Defaults
Save Calibration
Moisture



SECTION 5

MAINTENANCE

QUICK CHECKS

Roll wear
Servo, Spindles RPM
Filters
Shafts and bearings

HYDRAULIC SETUP

Adjusting the hydraulic pressures

ROLL ALIGNMENT

Vertical alignment
Horizontal alignment

ROLL SPEED SETUP

Match roll speed to knife speed

KNIFE HANDLING

Removal/Installation
Setup

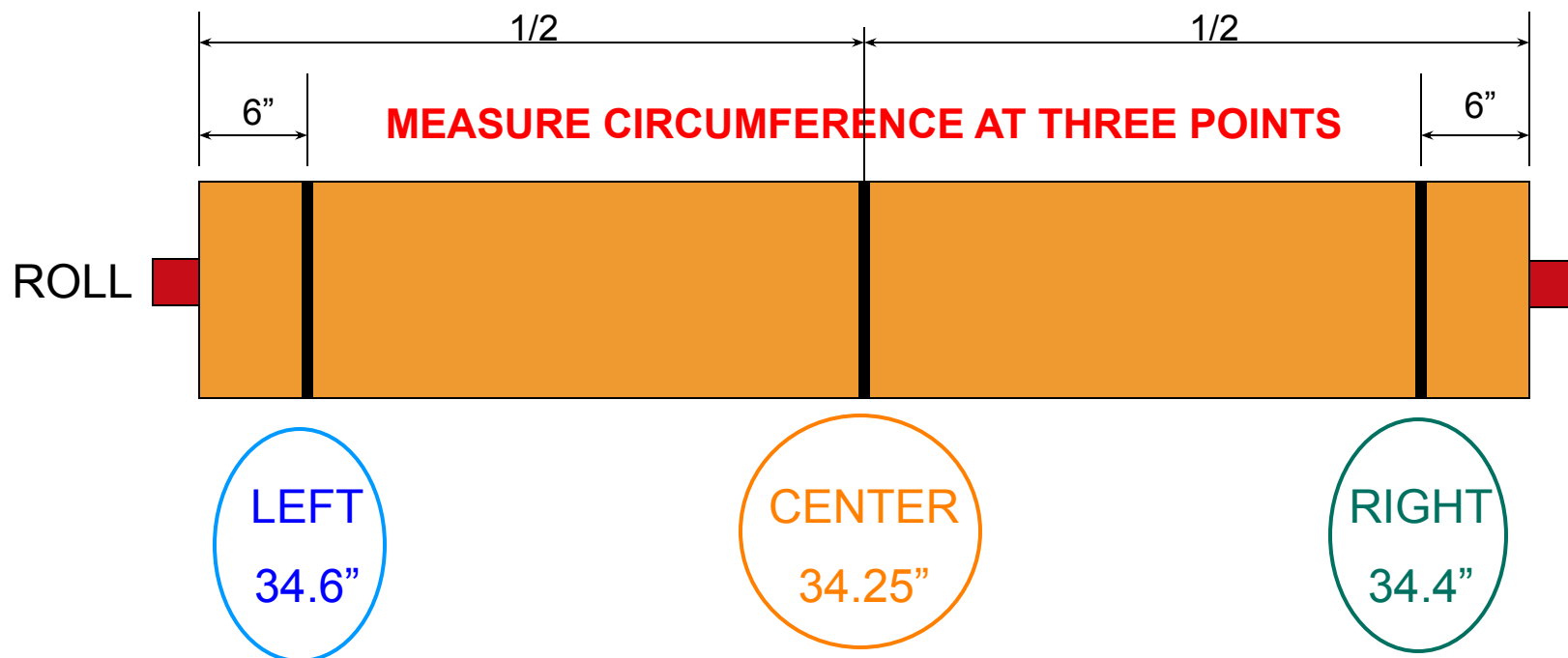
ENCODERS SETUP

General procedure
Only one spindle removed
Encoder replacement



ROLL WEAR & MISALIGNMENT

CLIPPER MUST BE LOCKED OUT FOR THIS PROCEDURE!



$$\text{AVERAGE OF LEFT/RIGHT} = (34.6" + 34.4)/2 = 34.5"$$

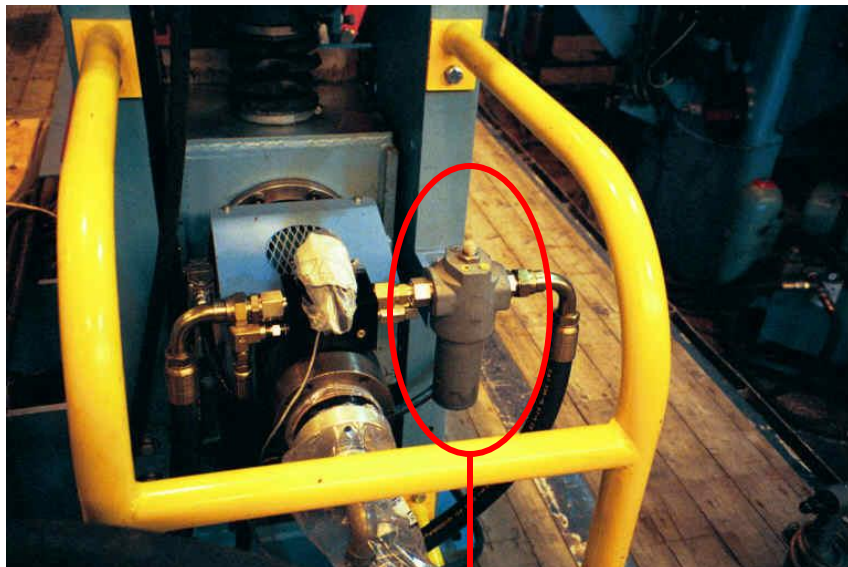
$$\text{ROLL WEAR (L,R - CENTER)} = 34.5" - 34.25 = 0.25"$$

$$\text{ROLL VERT. MISSALIGNMENT (L-R)} = 34.6" - 34.4 = 0.2"$$

EXAMPLE VALUES !



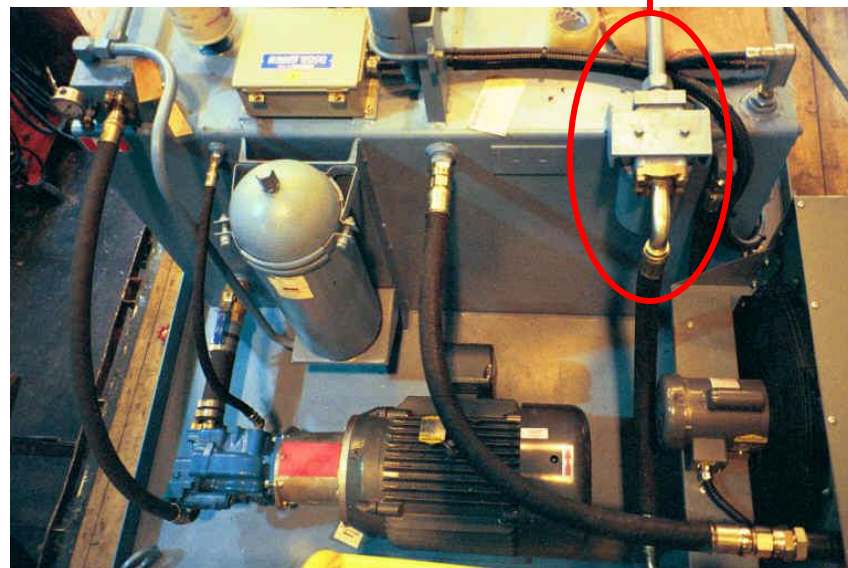
OIL FILTERS, CLASSIC CLIPPER



**HIGH PRESSURE FILTERS
(ONE PER SPINDLE) ***

**REPLACE FILTERS
EVERY 3 MONTHS**

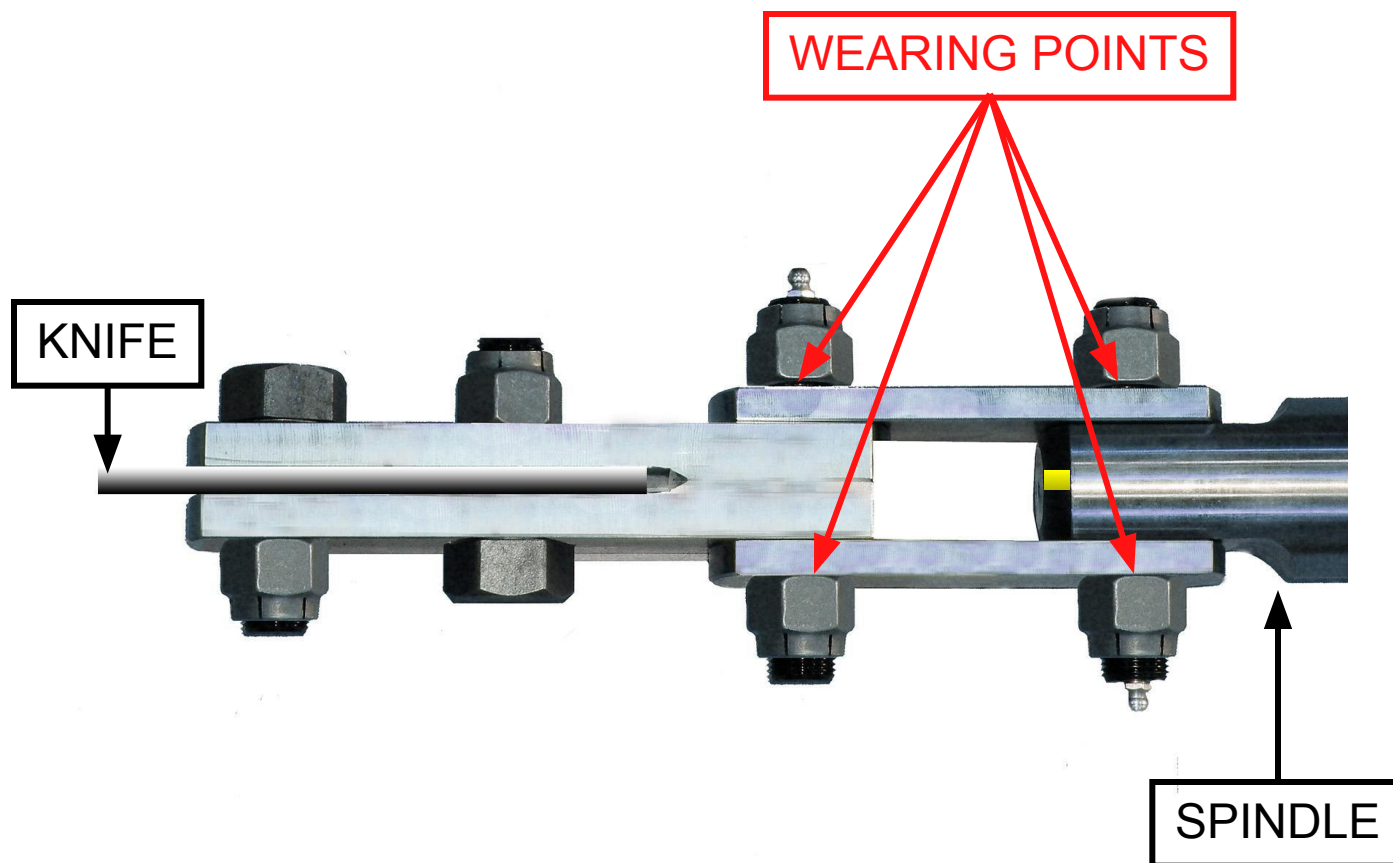
LOW PRESSURE FILTER



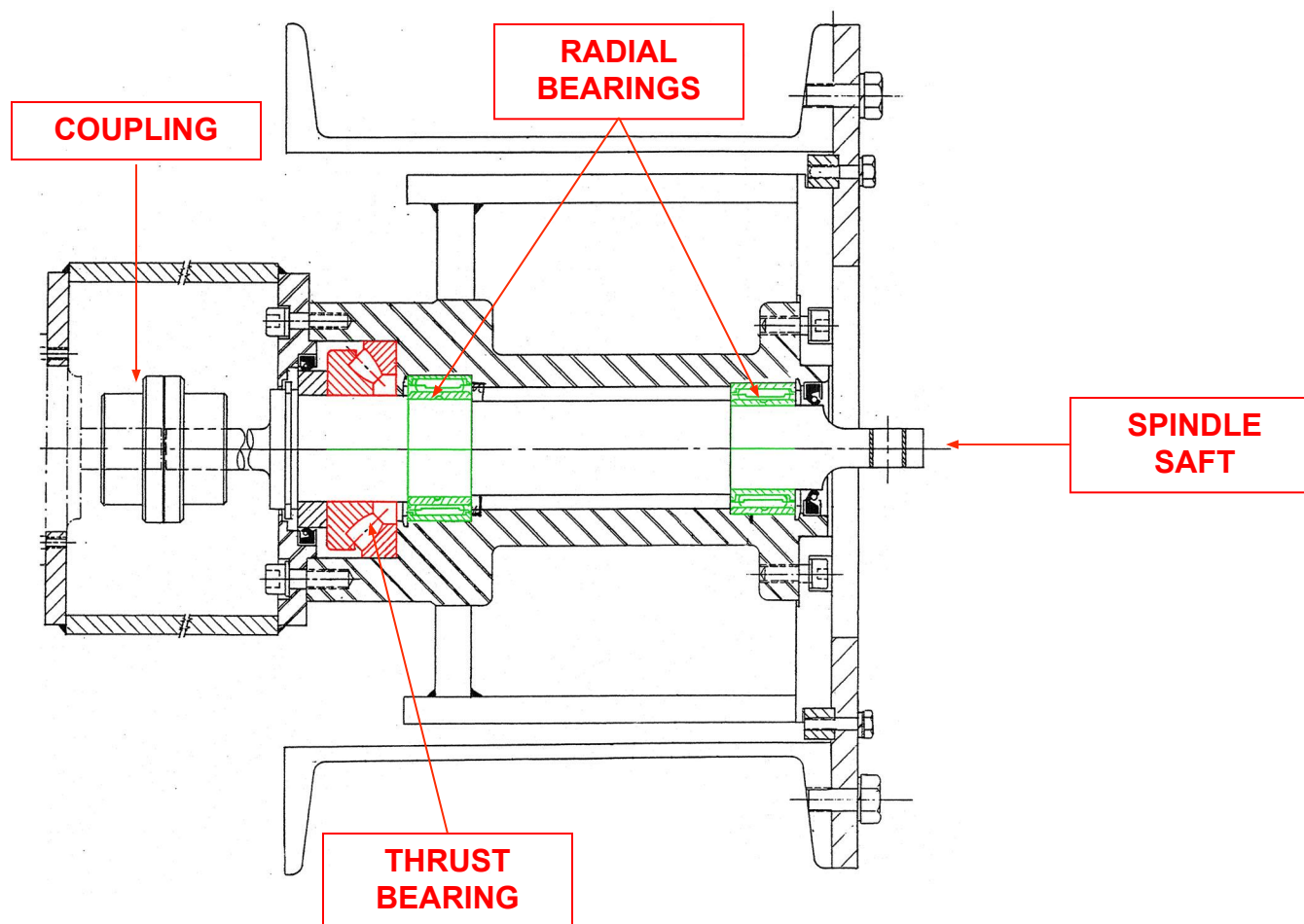
* Not present in upgraded

clipper

SPINDLES TOGGLES

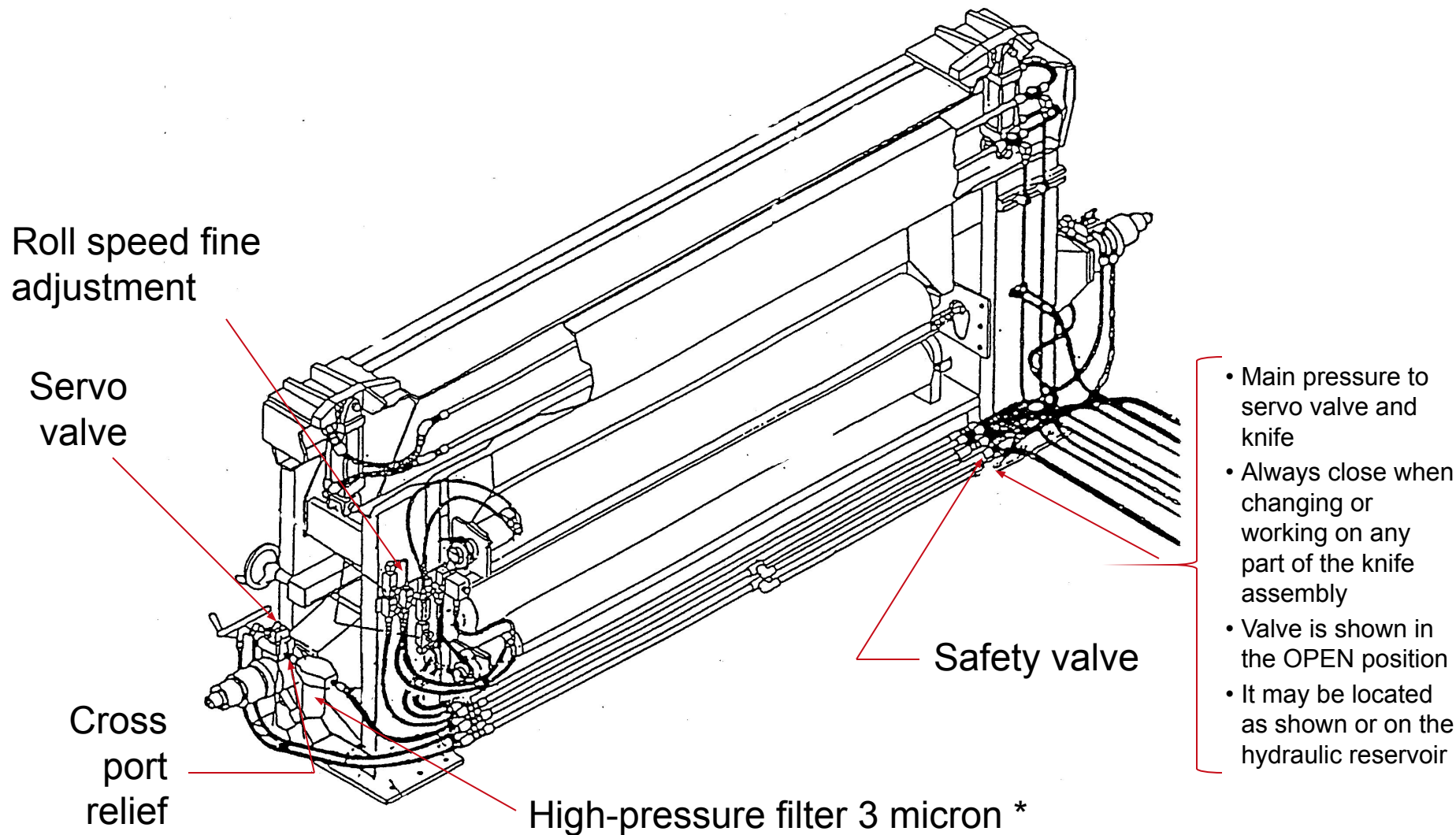


SPINDLES BUSHINGS



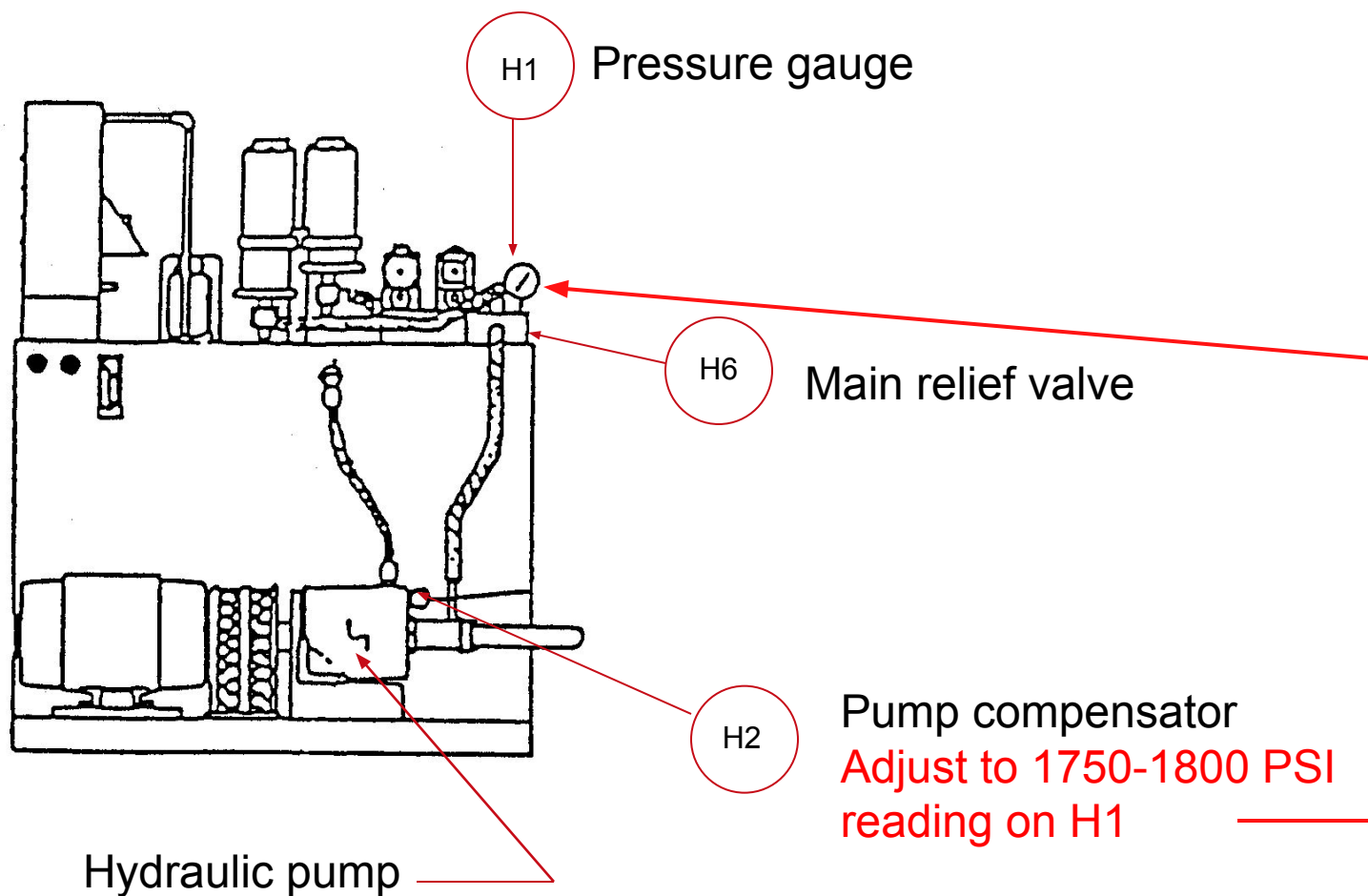


HYDRAULICS SETUP - 1





HYDRAULICS SETUP - 2





HYDRAULICS SETUP - 3

Knife tension
pressure valve

Adjust to 550-600 PSI

Head UP/Down
pressure valve

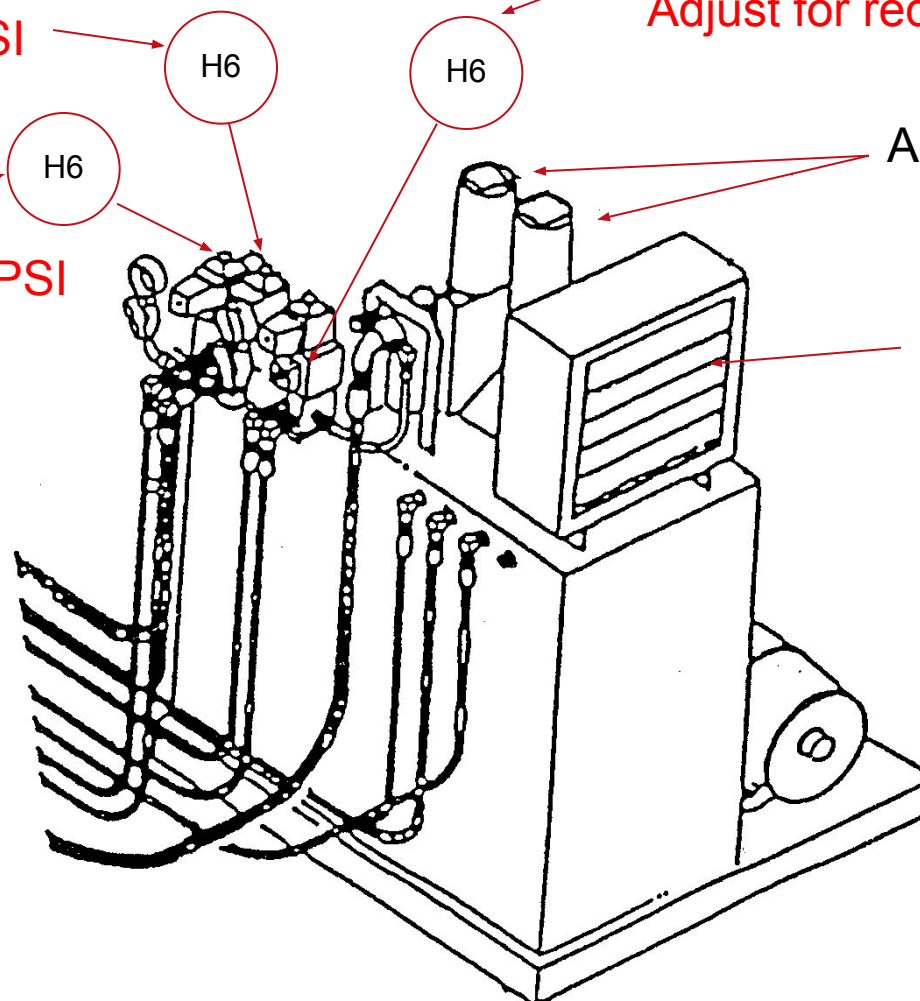
Adjust to 900-1000 PSI

Main flow control for rolls

Adjust for required roll speed

Accumulators

Cooling fan





ROLL ALIGNMENT PROCEDURE

ROLL ALIGNMENT TOOL SET *



TAIL END T-BAR

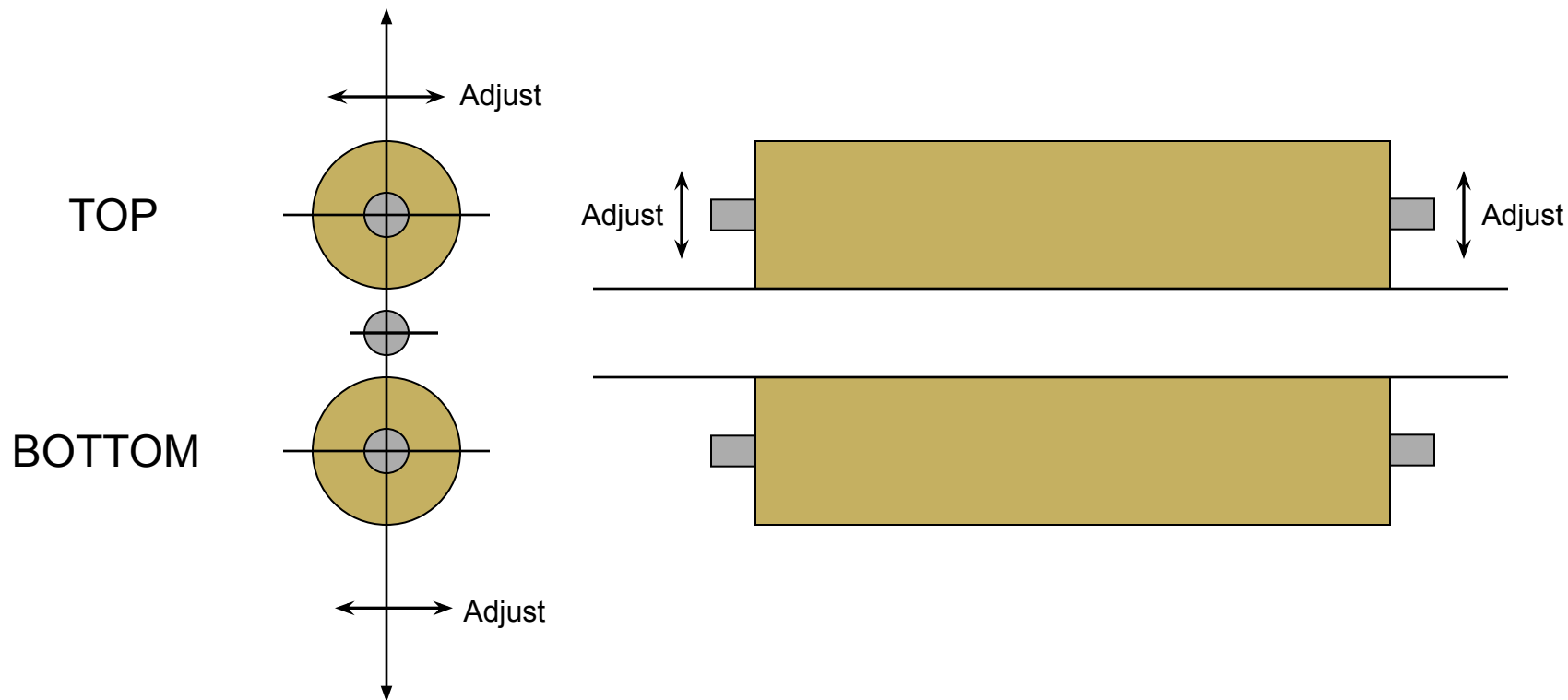
SLEEVE

DRIVE END T-BAR

* NOTE: There is a different set of T-bars for the clipper with top offset roll



ROLL ALIGNMENT - GOALS



VERTICAL ALIGNMENT

Rolls and spindle axis must be aligned

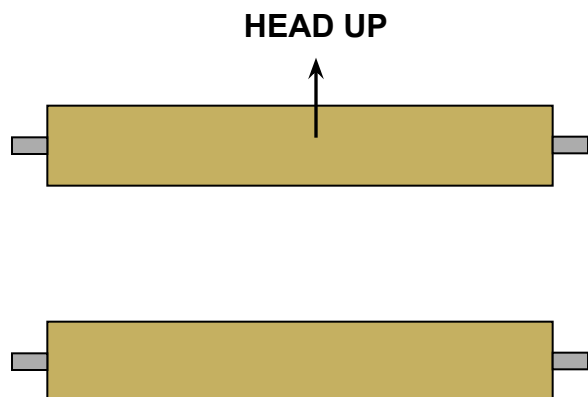
HORIZONTAL ALIGNMENT

Rolls must be parallel



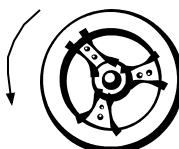
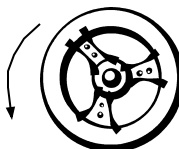
ROLL ALIGNMENT - SETUP

1 - Head UP



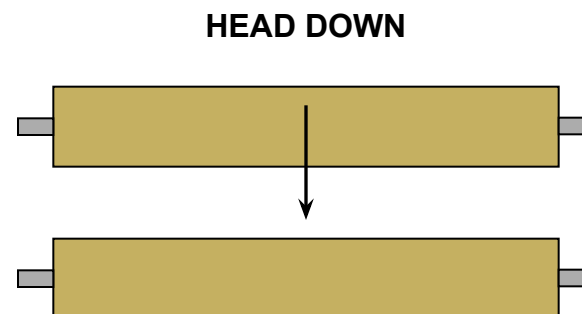
2 - Raise rolls & knife

Roll UP
(10-15 turns)



Knife UP
(10-15 turns)

3 - Head DOWN



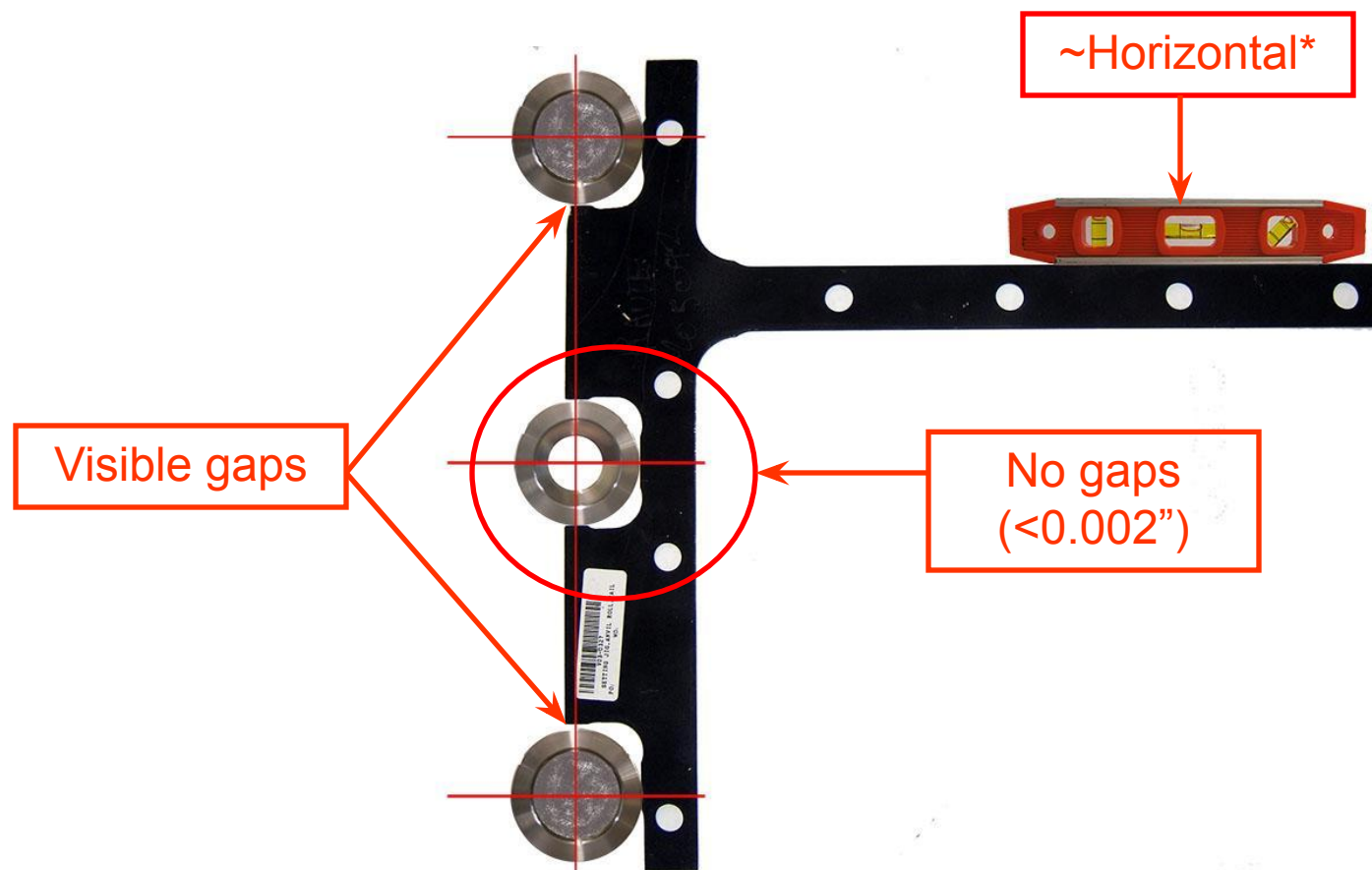
HYDRAULICS ON!





VERTICAL ROLL ALIGNMENT - 1

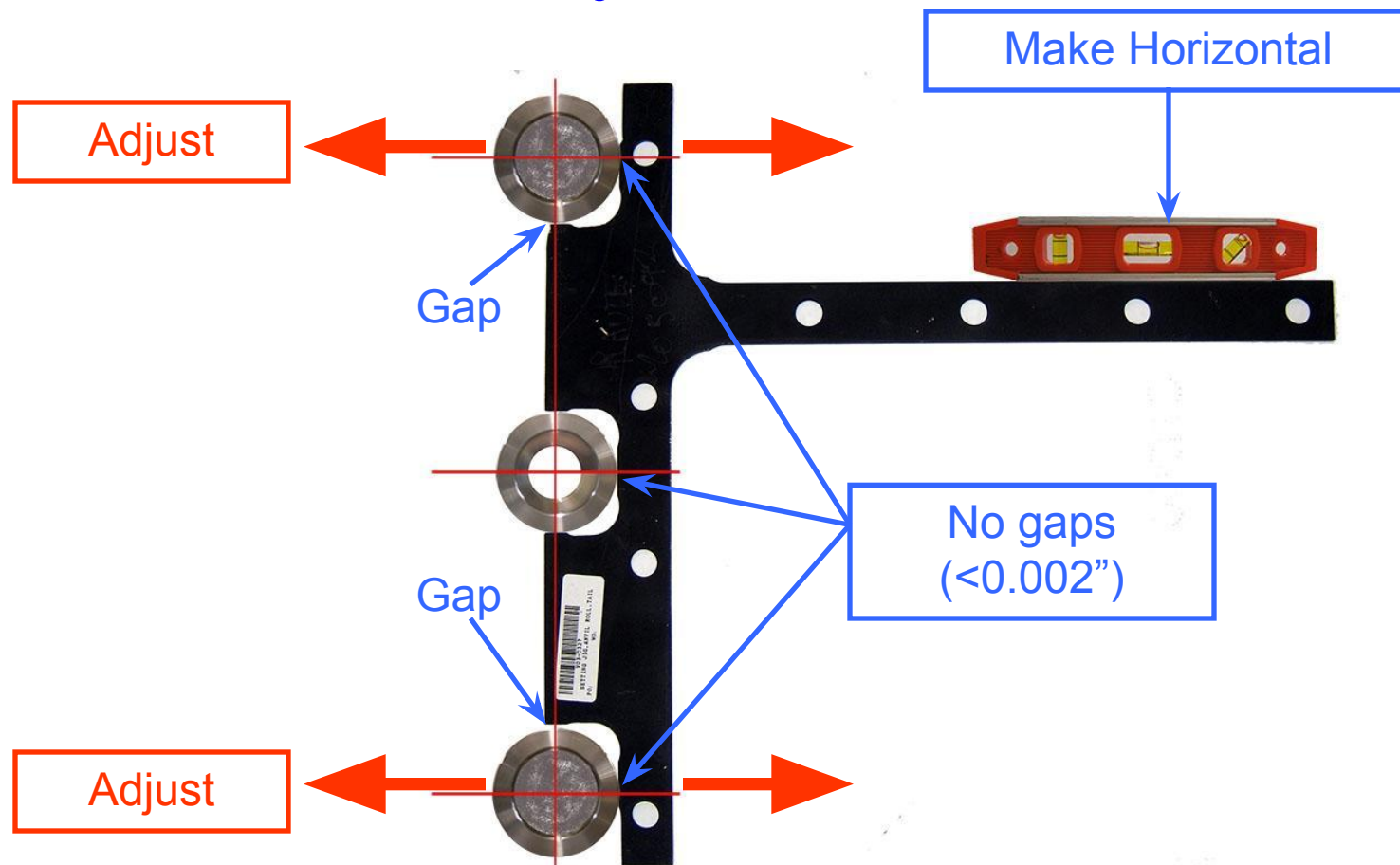
4 - Set T-bar & Level



* USE ONLY MACHINIST GRADE LEVEL

VERTICAL ROLL ALIGNMENT - 2

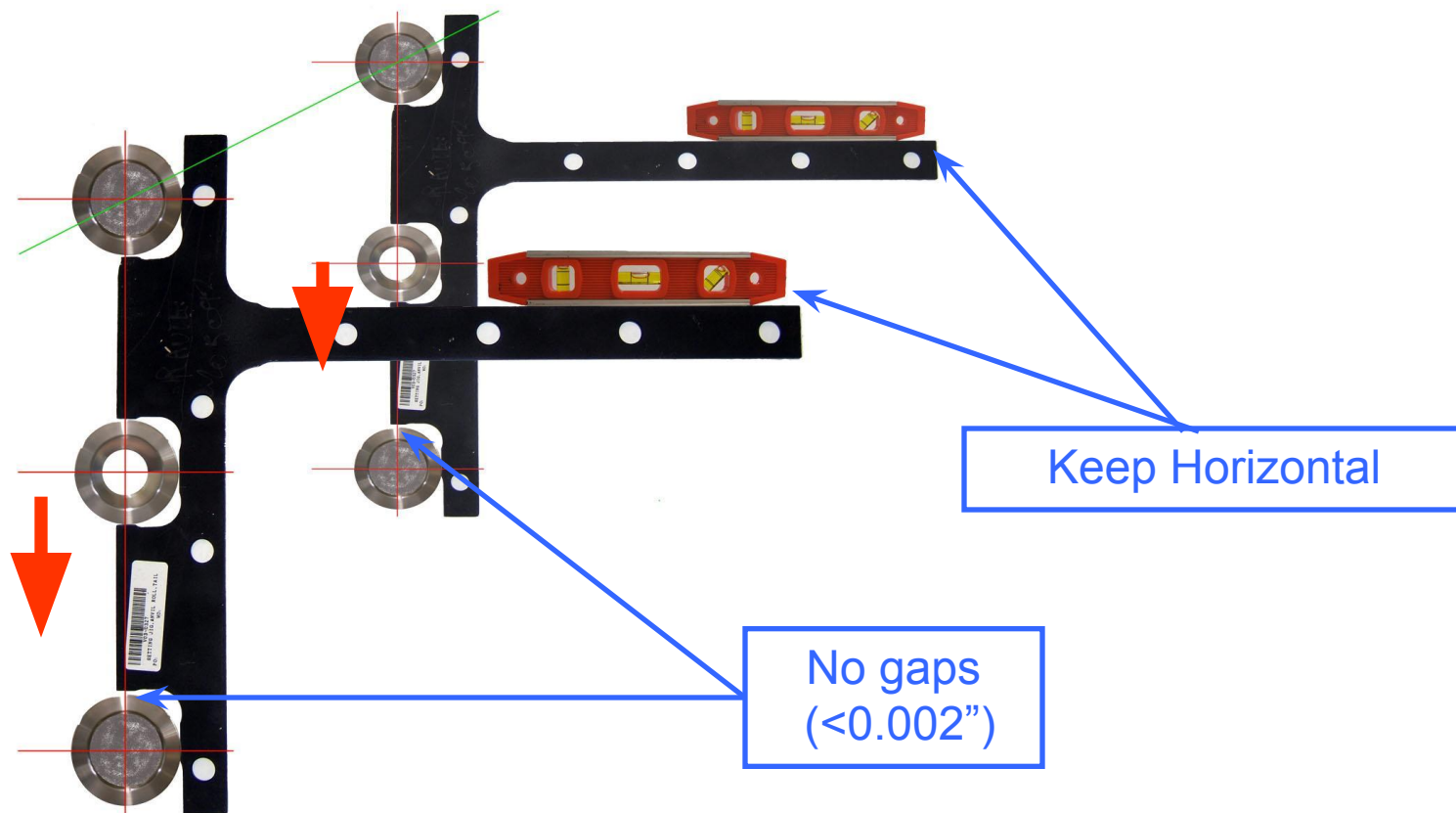
5 - Adjust rolls





HORIZONTAL ROLL ALIGNMENT - 1

6 - Lower Knife



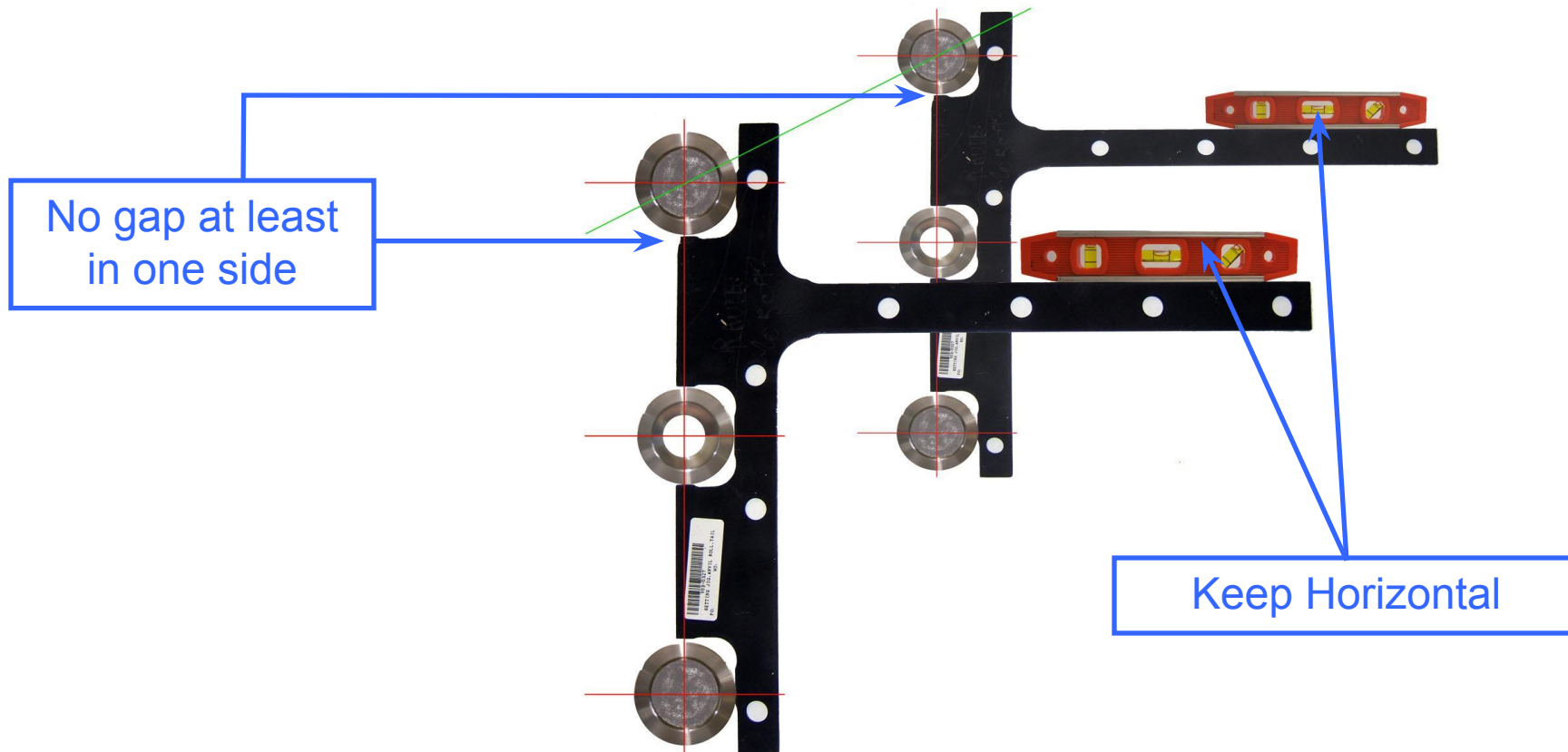
HYDRAULICS ON!





HORIZONTAL ROLL ALIGNMENT - 2

7 - Lower Top Roll



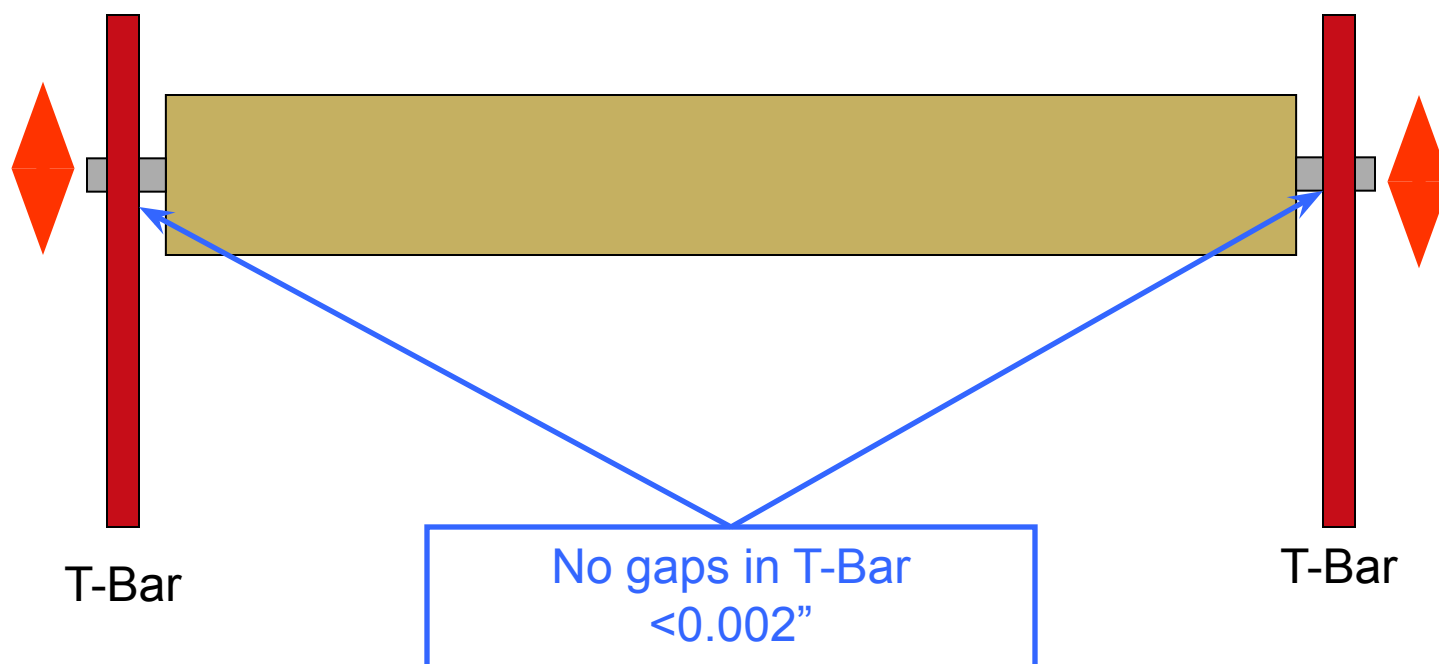
HYDRAULICS ON!





HORIZONTAL ROLL ALIGNMENT - 3

8 - Adjust Top roll

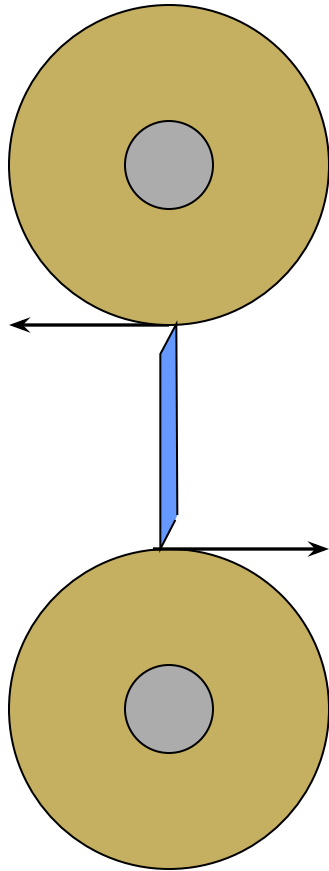


HYDRAULICS ON!





ROLL SPEED SETUP - GOALS



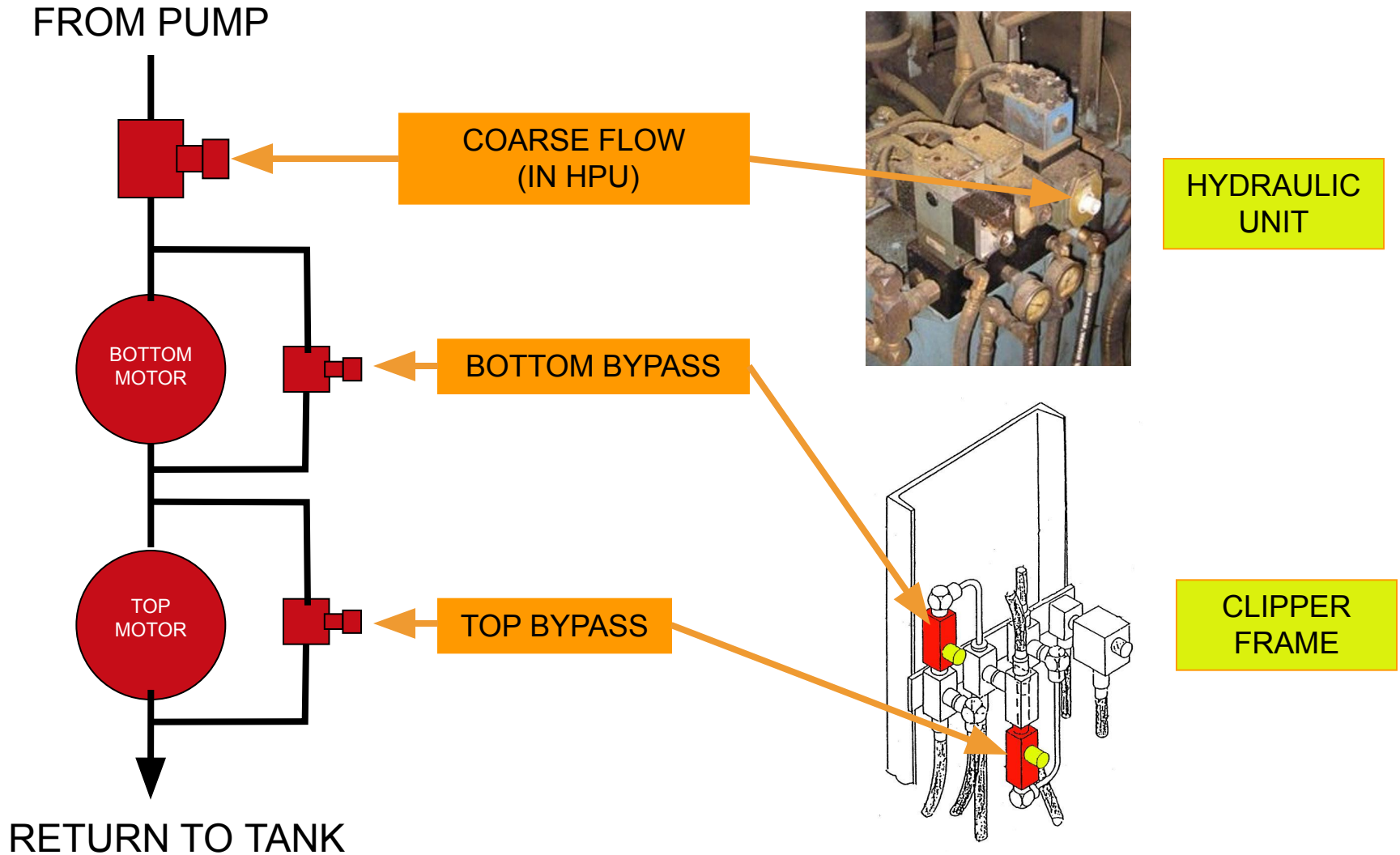
ROLL SPEEDS MUST BE EQUAL
TO KNIFE SPEED

TYPICAL KNIFE SPEED
VALUES

430 TO 480 FPM



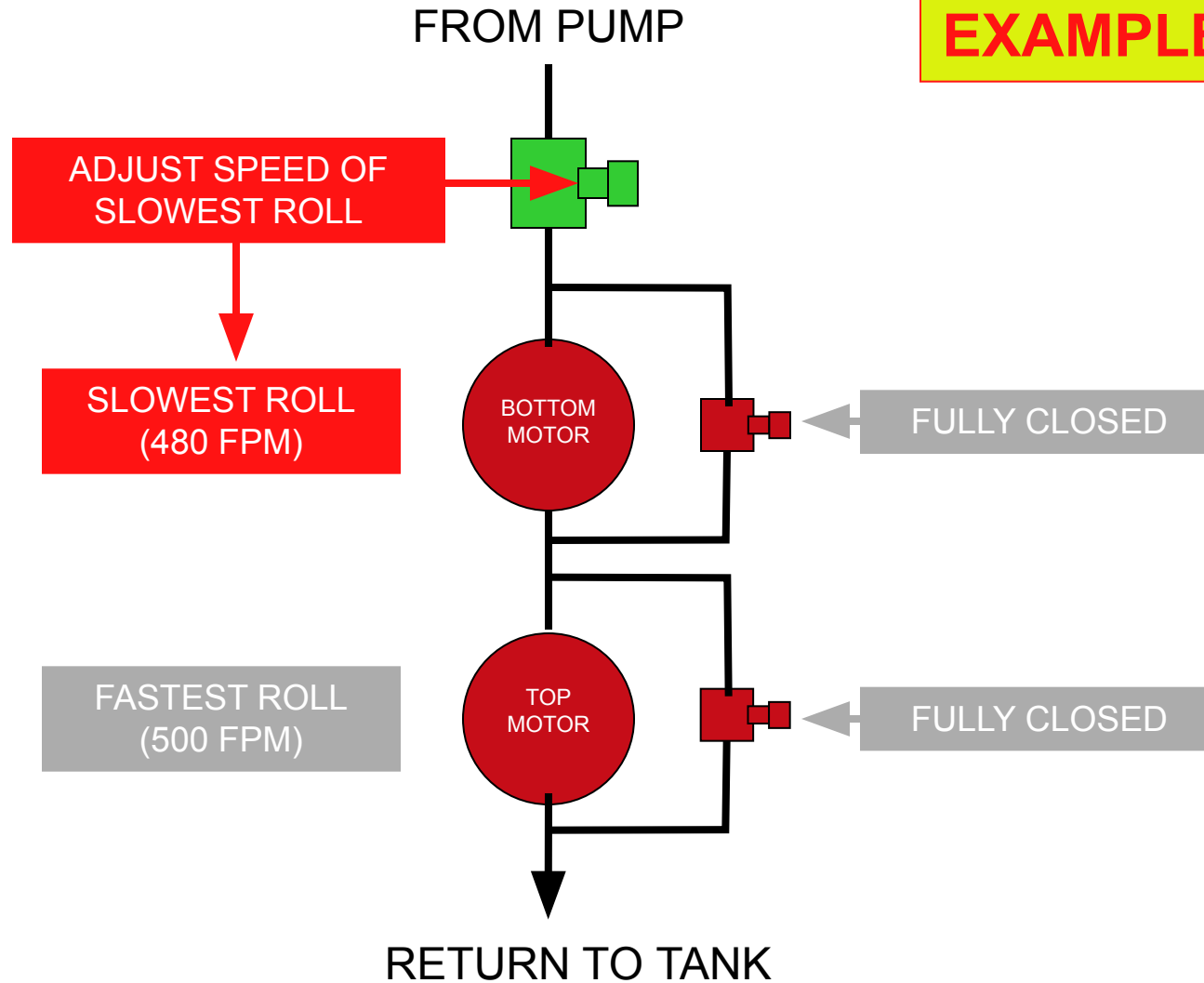
ROLL SPEED SETUP - 1





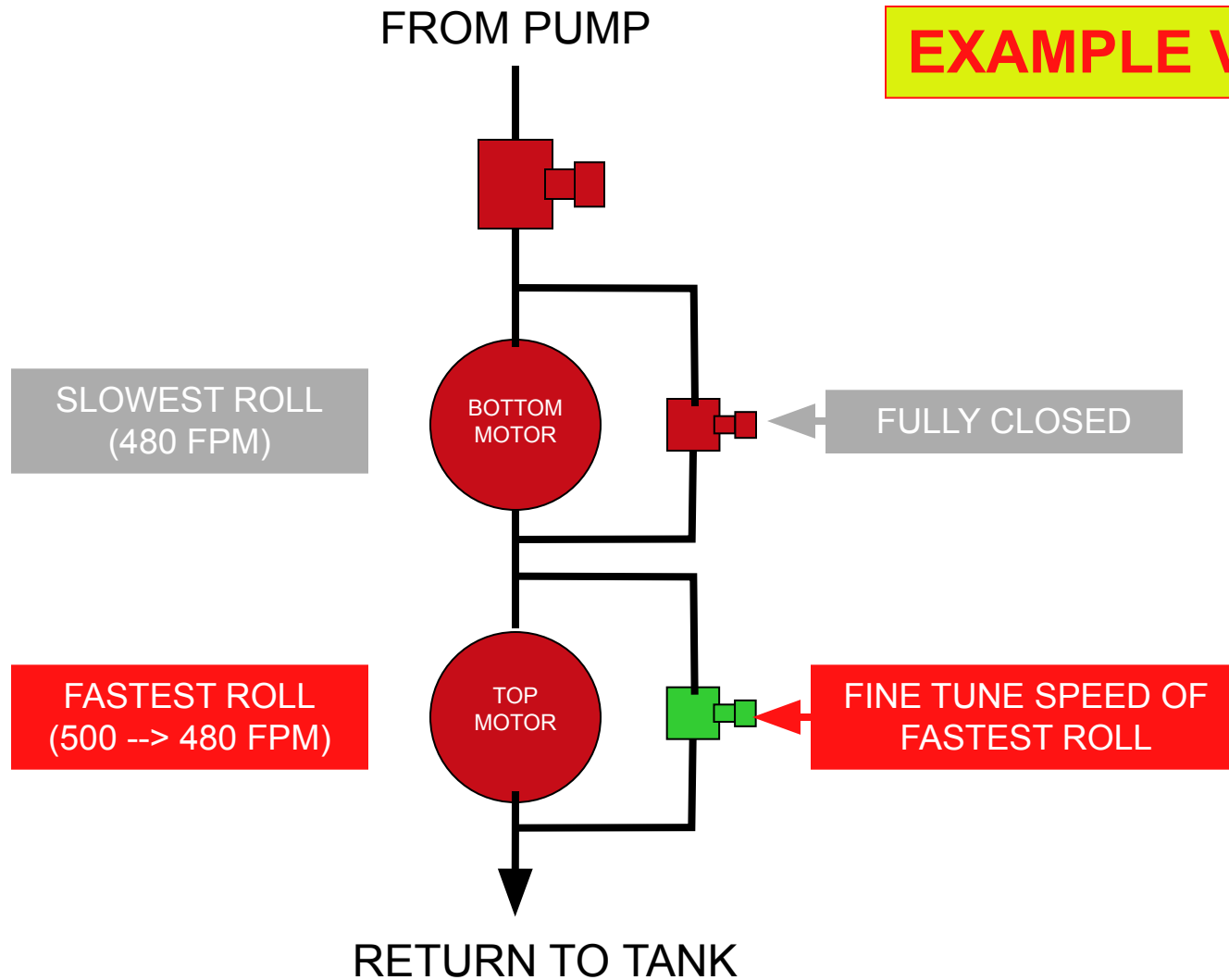
ROLL SPEED SETUP - 2

EXAMPLE VALUES !



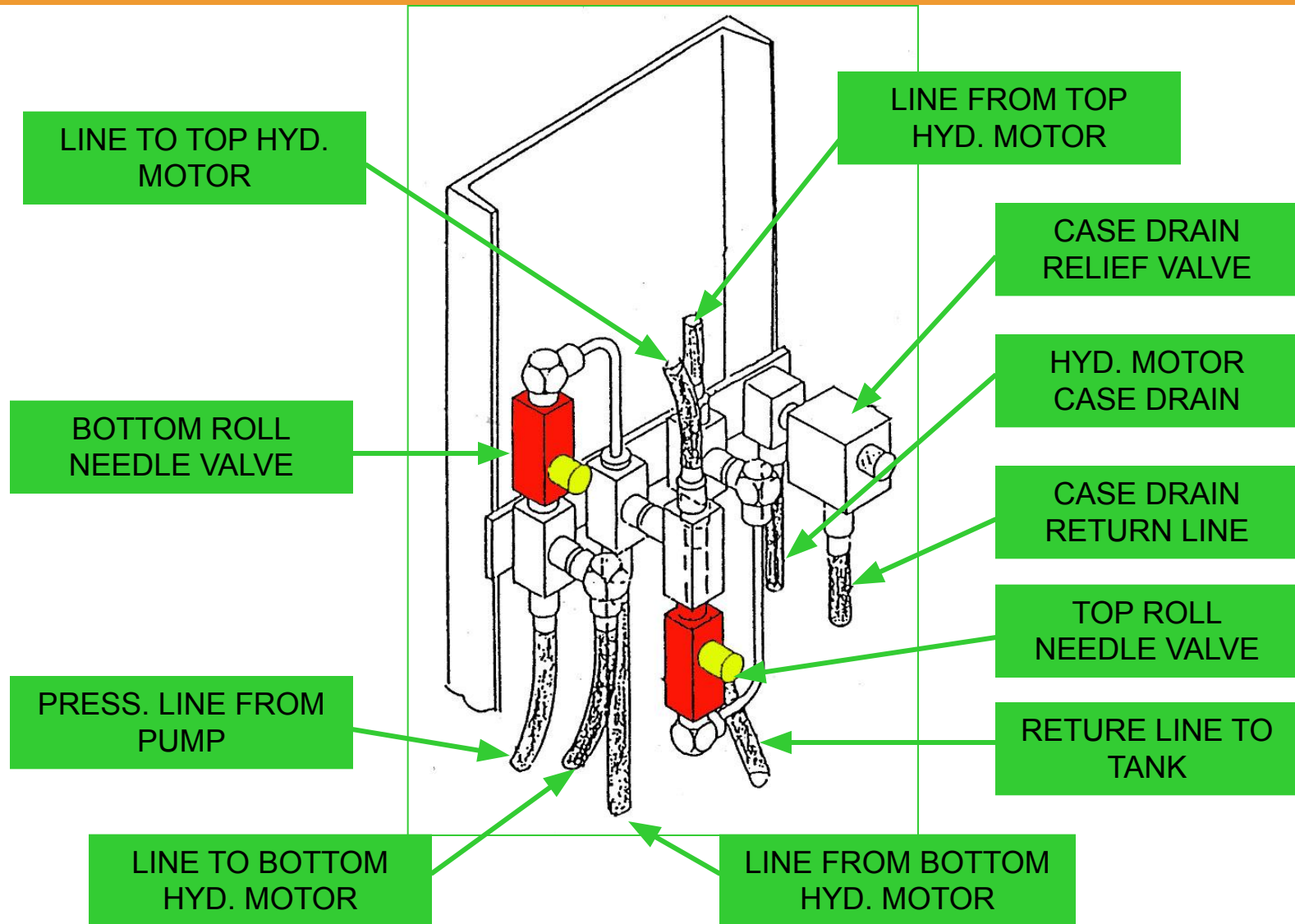


ROLL SPEED SETUP - 3





ROLL SPEED SETUP - 4





ROLL SPEED SETUP - 5

09/Jun/2006 08:29:18

RAUTE **ROTARY CLIPPER - ROLLS SETUP**

Raute

TOP ROLL

DRIVE OK **ROLL OK**

VARIABLE FREQUENCY DRIVE

	mVin	rpm
min	0	1650
max	10000	2130

MOTOR

GEAR 0.001

N1 36 **N2 71**

Dia 0.001" **6000**

Enc2 1000

Set Point **600 fpm**

Current Values **600 fpm**

2.1 min-1

10.89 in

1929

AUTO **Loop Closed**

BOTTOM ROLL

DRIVE OK **ROLL OK**

VARIABLE FREQUENCY DRIVE

	mVin	rpm
min	0	1650
max	10000	2130

MOTOR

GEAR 0.001

N1 36 **N2 71**

Dia 0.001" **6000**

Enc2 1000

Set Point **600 fpm**

Current Values **60 fpm**

0.19 min-1

1.54 in

1449

AUTO **Loop Closed**

Link **OK** Clipper **Command executed OK**

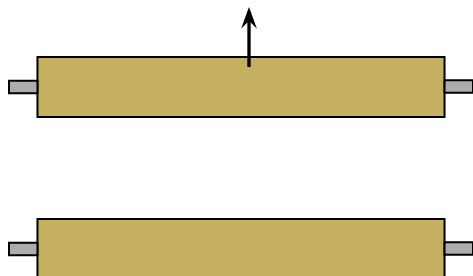
Network **MS** **ENABLED** **OK**

Setup



KNIFE HANDLING SETUP

**1 - Head UP
and Secure**



2 - Hydraulics OFF



3 - Shut-off valve OFF

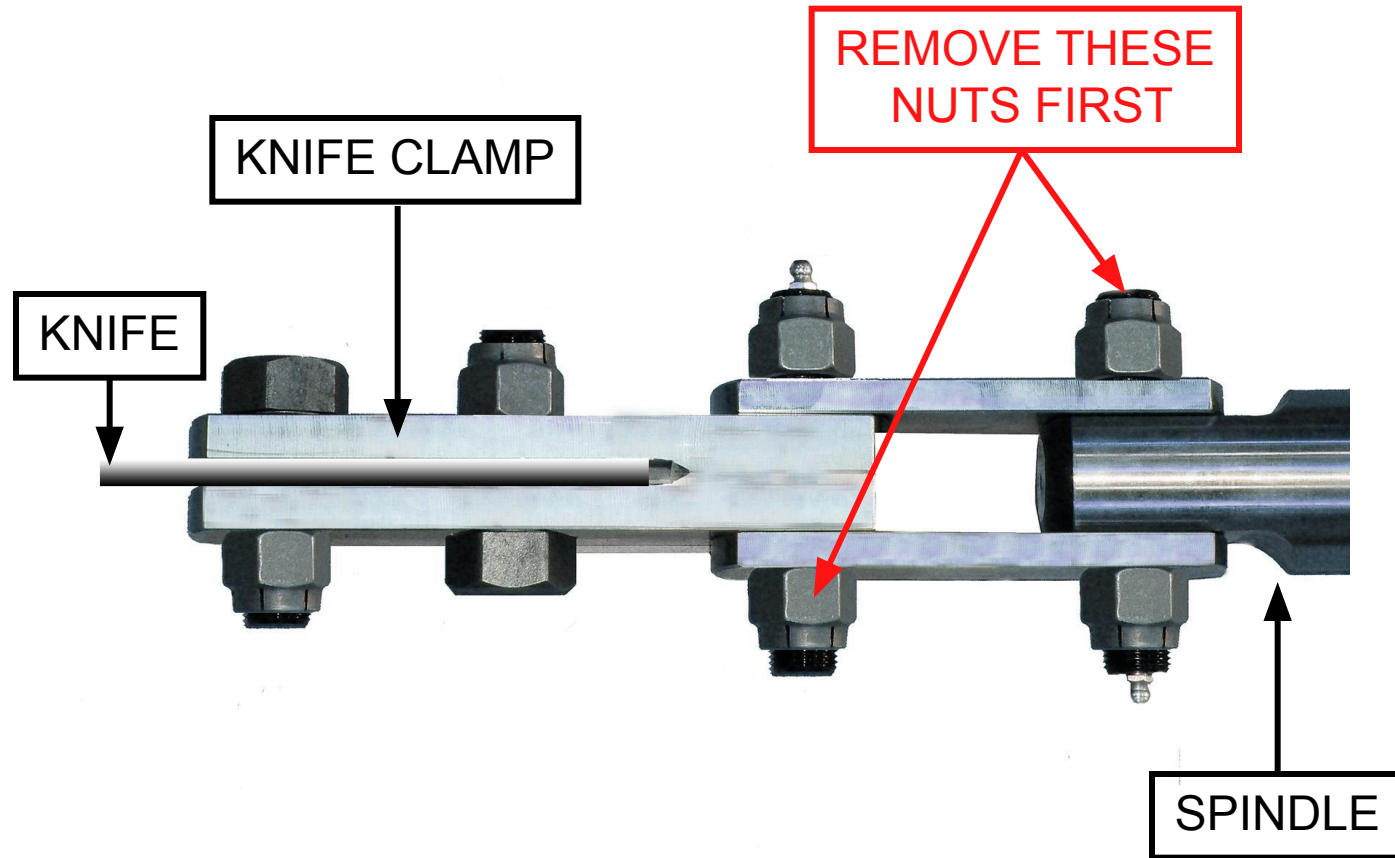


ONLY WITH NEW
RAUTE
CONTROLLER

DISCHARGE VALVE CLOSED
AND LOCKED OUT

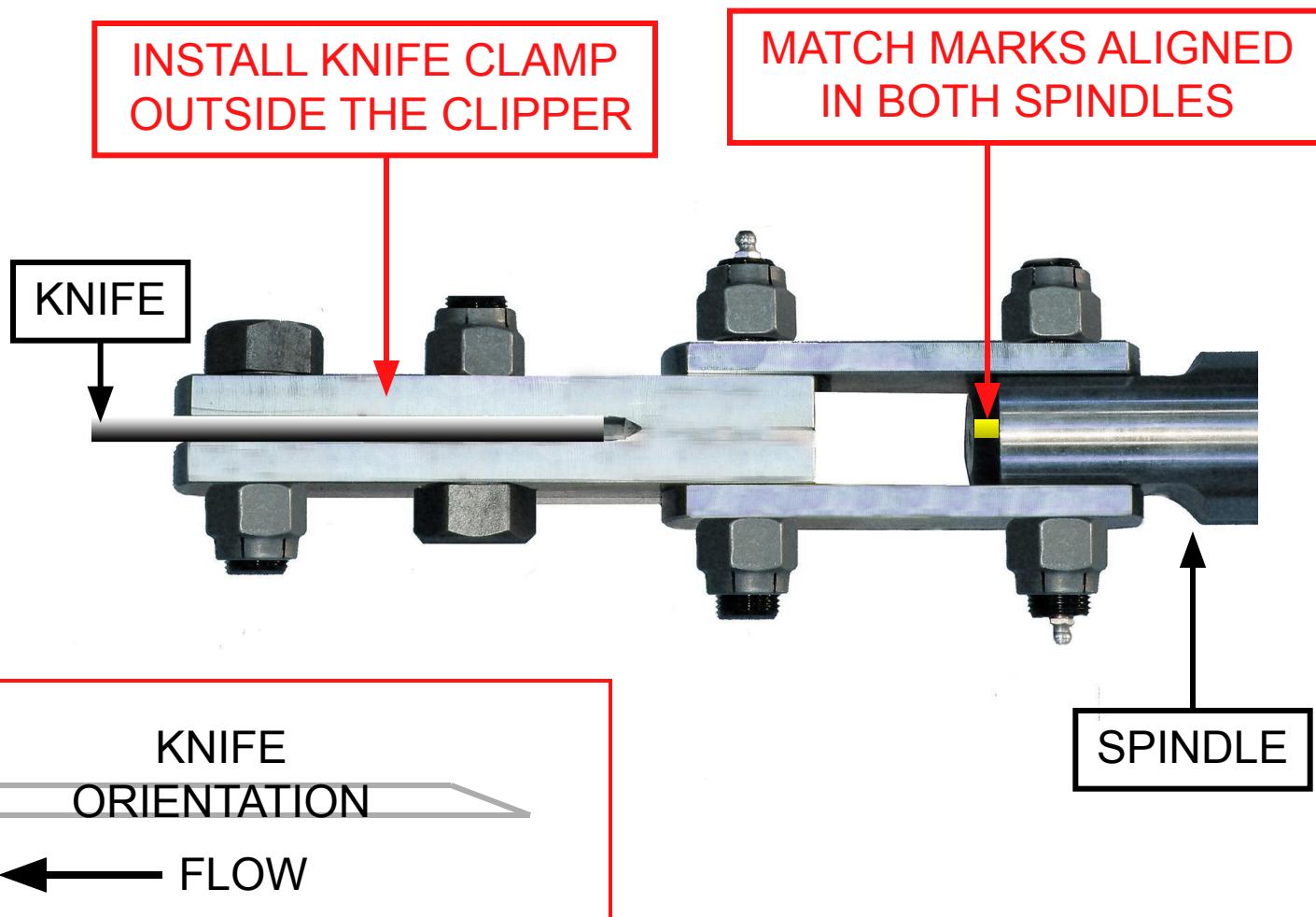


KNIFE REMOVAL





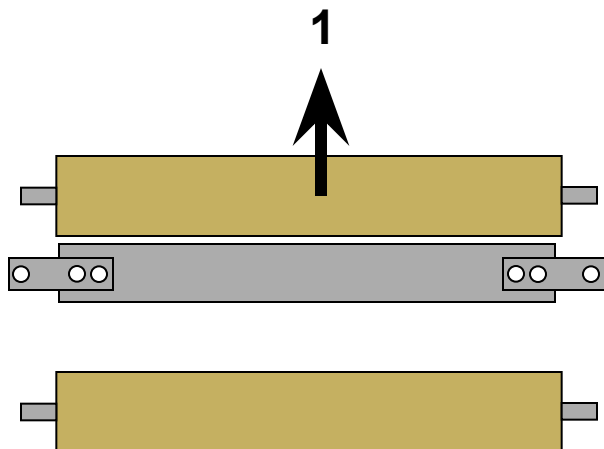
KNIFE INSTALLATION - 1





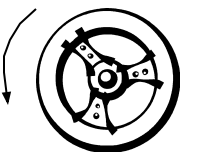
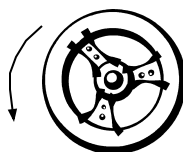
KNIFE INSTALLATION - 2

1 - Head UP



**2 - Raise top roll
and knife**

Roll UP
(10-15 turns)



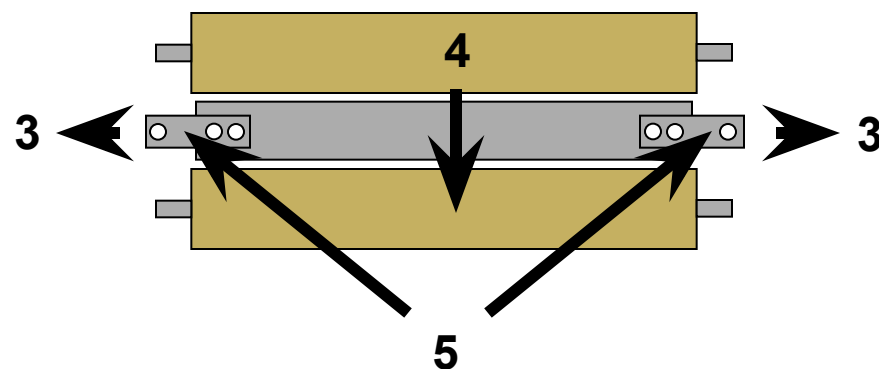
Knife UP
(10-15 turns)

2

3 - Knife Tension ON

4 - Lower Head

5 - Check toggles

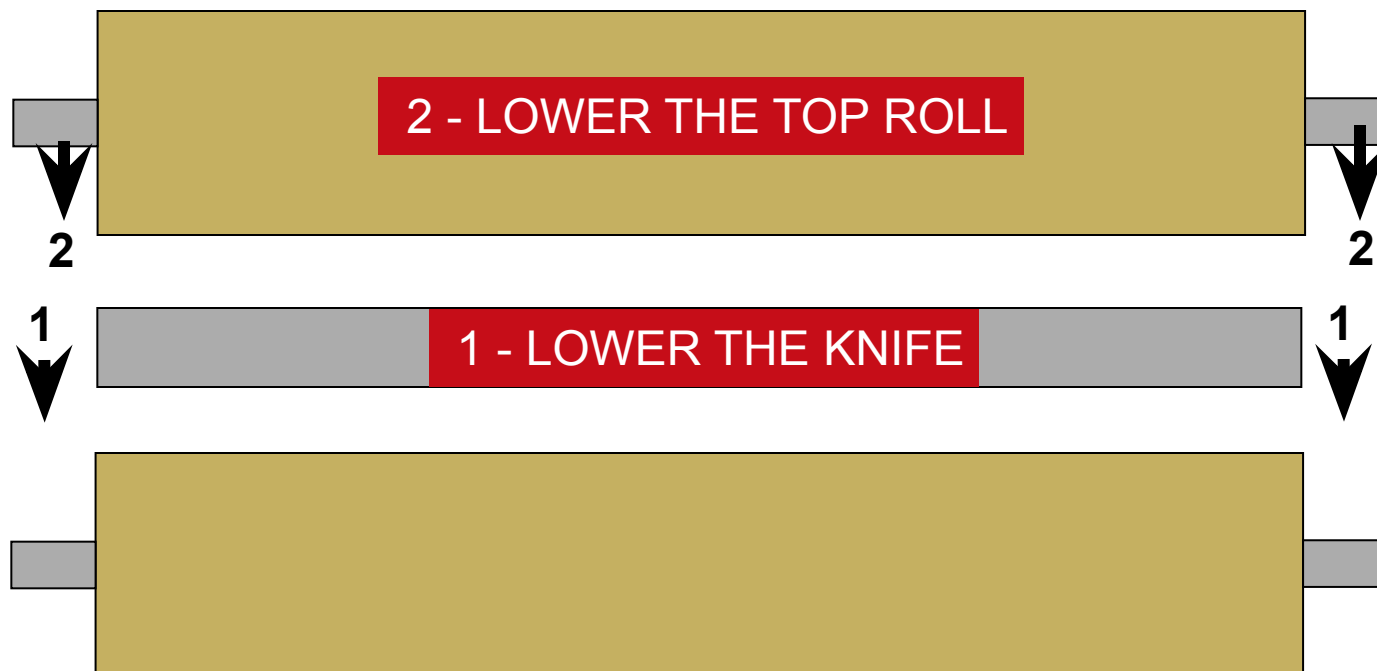


HYDRAULICS ON!





KNIFE SETUP

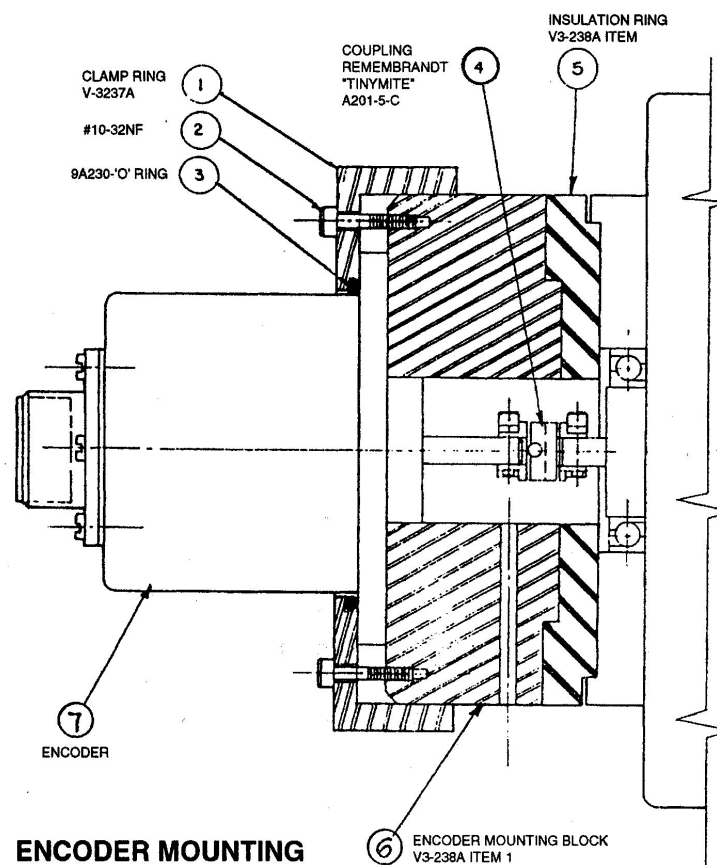


HYDRAULICS ON!





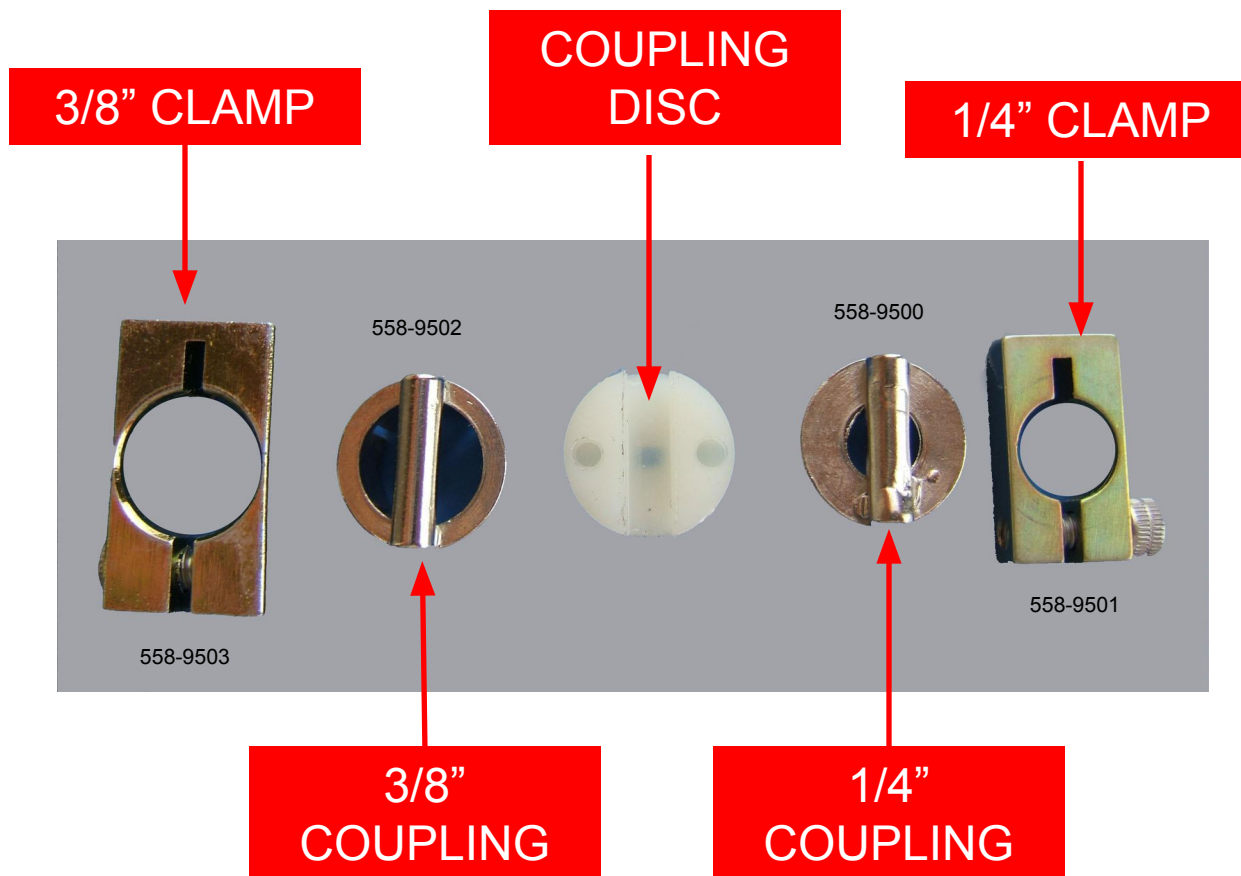
KNIFE ENCODER



MOUNTING DETAIL

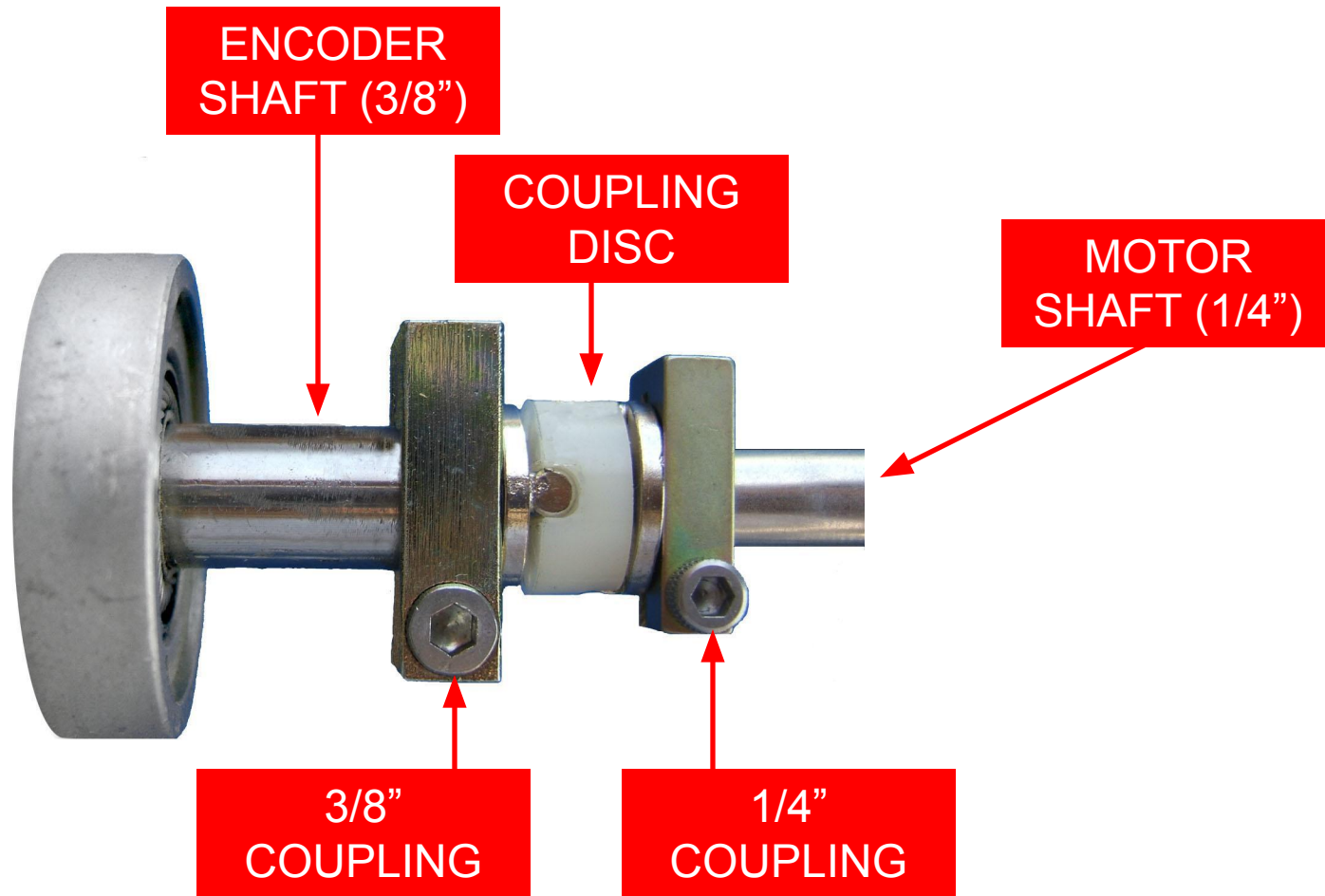


TINY-MITE COUPLING

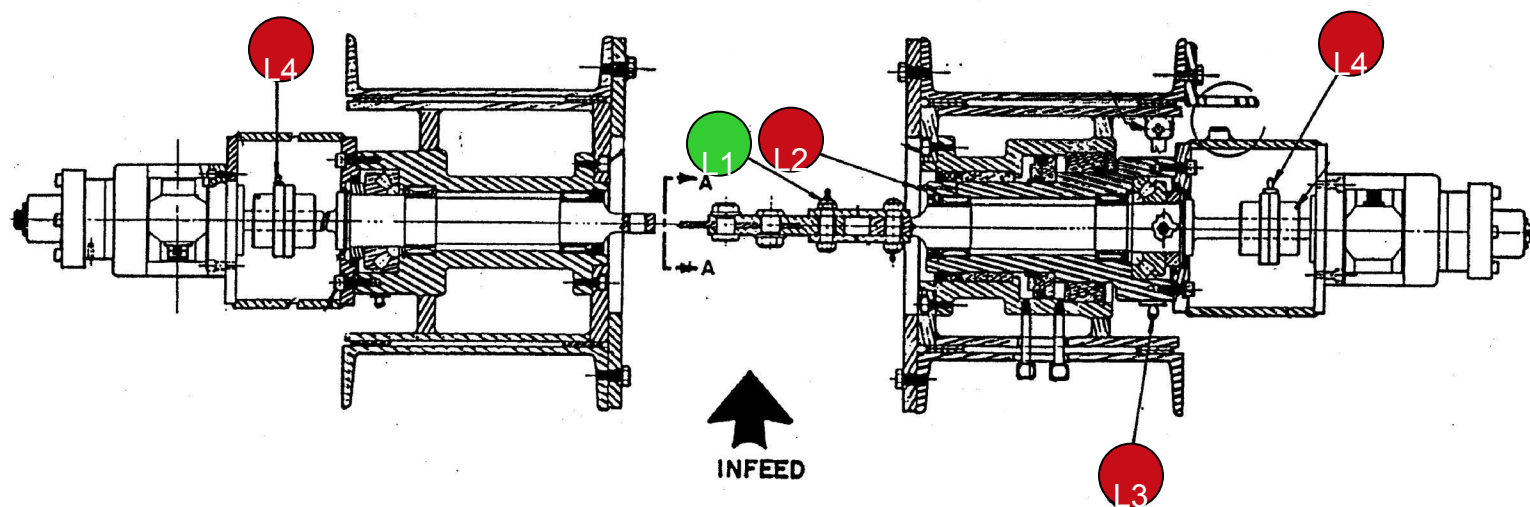




ENCODER COUPLING ASSEMBLY



LUBRICATION



USE ONLY GREASE TELLUS OR EQUIVALENT!



Section 6

TROUBLESHOOTING

GENERAL

Normal failures

Threshold failures

QUICK GUIDE

Symptom

Cause

Solution

CONTROLLER BASED

Diagnostics tests

Graphics



GENERAL

NORMAL FAILURES

- Originated by a single element (e.g.: broken spindle)
- Easy to diagnose
- Direct fixing by repair/substitution of parts

THRESHOLD FAILURES

- Multiple origins (e.g: Bias clip)
- Effects only seen after a certain “threshold” is passed
- Difficult to diagnose
- Multiple actions required to fix the problem



QUICK GUIDE - EXAMPLE

Response time		
SYMPTOM	PROBABLE CAUSE	ACTION
Response time above 42 ms on both sides	Low hydraulic pressure	Adhust pump to 1800 psi of higher
	Low clipping speed	Adjust rolls and knife speed to 450 fpm or higher
Response time above 42 ms only on one side	Local accumulator discharged	Recharge or replace accumulator
	Thrust bearing with excessive drag	replace bearing
	Faulty servo-valve	Replace servo-valve
	Faulty motor	replace motor
Response time difference between sides greater than 2 ms	Mechanical failure in the slowest spindle (motor, bearing, coupling)	repair
	Faulty servo-valve	Replace servo-valve



THRESHOLD ISSUES - EXAMPLE

BIAS CLIP

- **Symptoms:** Veneer sheets are not perfect rectangles but parallelograms.
- Possible causes
 - A. Spindles with different response times (1 ms ~ 0.1 in @ 500 FPM)
 - B. Outer in-feed belts with different speeds in both sides. Worn belt is a typical cause.
 - C. Hold down belts with different gap in each side. Incorrect hold down alignment.
- **Solution:** Multiple actions may be required.



Section 6

DIAGNOSTICS - ENCODER

The screenshot shows the RAUTE CLIPPER DIAGNOSTICS interface. The title bar includes the RAUTE logo, the text "CLIPPER DIAGNOSTICS", the location "Coastland Wood Ind, Nanaimo", and the date/time "14/Nov/2002 09:02:01".

On the left side, there is a vertical menu with buttons: "Select Test", "Encoder Test", "Motor Test", "Vertical", "Zero", and "Move To". A red circle labeled "1" highlights the "Encoder Test" button.

The main display area is divided into two columns for "Left ON" and "Right ON" tests. The "Side" label is at the top. Below it, the "Encoder" section shows two red digital displays showing "00" and the unit "Degrees". The "Bits (11.0)" section shows two green bar graphs. A red circle labeled "4" highlights the right bar graph, with a label "Green when OK" pointing to it. The "Speed" section shows two green digital displays showing "8880" and the unit "fpm". The "Valve" section shows two yellow digital displays showing "8800" and the unit "%".

Below these are two horizontal sliders: "Maximum Aperture" (ranging from -100 to 100, with a green bar and a value of 20) and "Ramp time" (ranging from 5 to 30, with a green bar and a value of 5). To the right of these sliders are buttons for "Auto Null" (OFF, DISABLED) and a red "DIAGNOSTICS OFF" button. There are also minus and plus buttons for each slider.

At the bottom of the main display area, there are three buttons: "None", "Execute test", and "Reset Test". A red circle labeled "3" highlights the "Execute test" button. To the right of these is a "Big Numbers" button.

Below the main display area, there is a "Clipper Response" field showing "String-00" and a "Link Message" field showing "ERR= 1. Tag does not exist". At the very bottom, there is a "Network" section with a "Link" status showing "OK" and a "Back to Main" button.

On the right side, there are two red circles labeled "2" and "4". Circle "2" points to the "Selected when blinking" text. Circle "4" points to the right bar graph in the "Bits (11.0)" section.



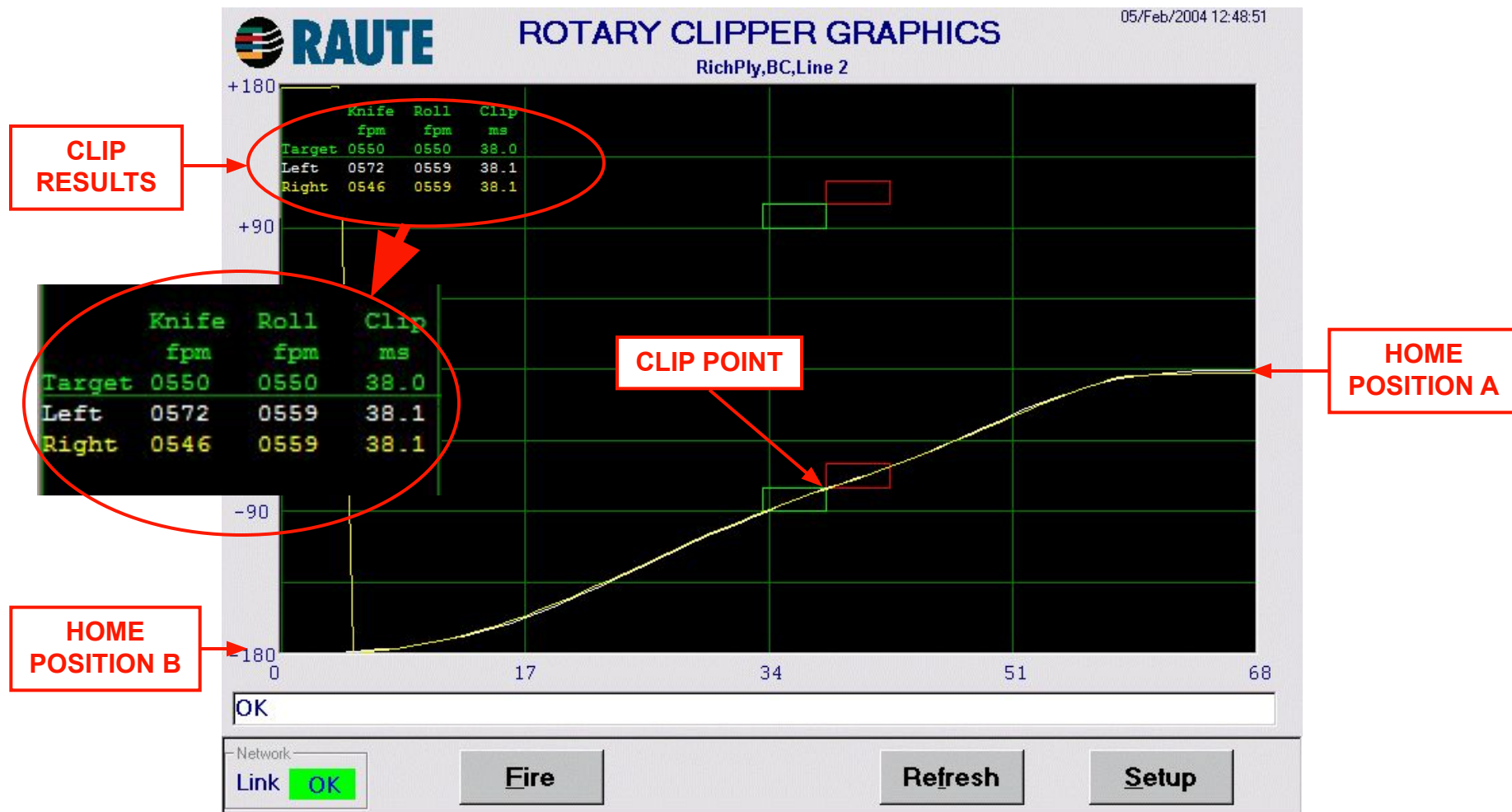
Section 6

DIAGNOSTICS - MOTORS

The screenshot shows the RAUTE CLIPPER DIAGNOSTICS interface for Coastland Wood Ind, Nanaimo, dated 14/Nov/2002 09:02:01. The interface includes a 'Select Test' menu on the left with options: Encoder Test, Motor Test (circled with a red line and labeled 1), Vertical, Zero, and Move To. Below this is a circular gauge showing 0°. The main display area shows two columns of data for 'Left ON' and 'Right ON' (labeled 2). The 'Encoder' section shows degrees (0.0) and bits (11..0) with a green bar indicator (labeled 6). The 'Speed' section shows rpm (8880) and a green bar indicator. The 'Valve' section shows percentage (88.00%) and a green bar indicator. The 'Maximum Aperture' section shows a percentage scale (100 to 0 to 100) with a green bar (labeled 3). The 'Ramp time' section shows a percentage scale (5 to 10 to 15 to 20 to 25 to 30) with a green bar (labeled 4). The 'Auto Null' section has buttons for OFF (labeled 6) and DISABLED. A red 'DIAGNOSTICS OFF' button is also present. At the bottom, there are buttons for 'None' (labeled 5), 'Execute test', 'Reset Test', and 'Big Numbers'. The 'Clipper Response' field shows 'String-00'. The 'Link Message' field shows 'ERR= 1. Tag does not exist'. The 'Network' section shows 'Link OK' and a 'Back to Main' button.

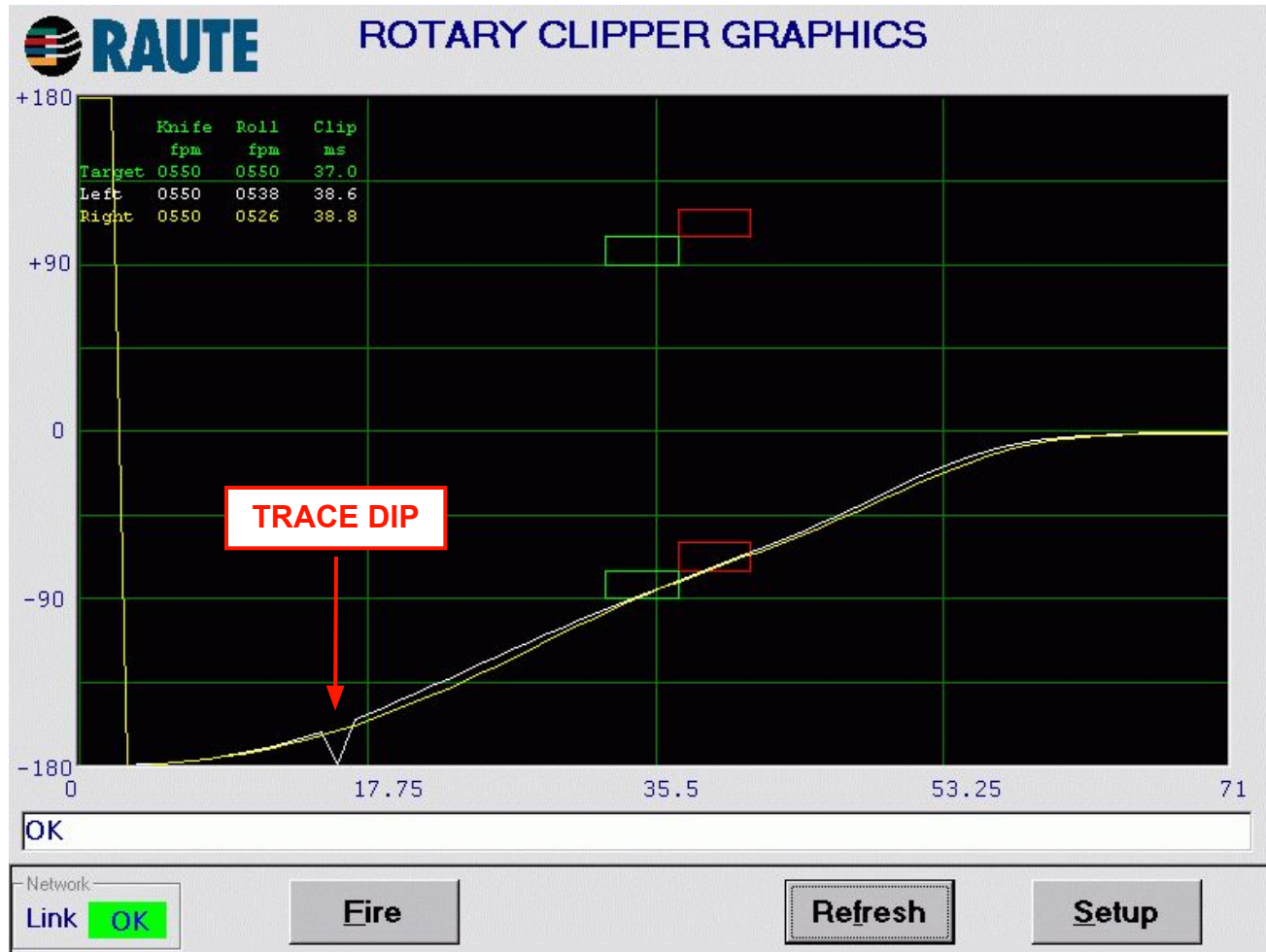


GRAPHIC OF A NORMAL CLIP



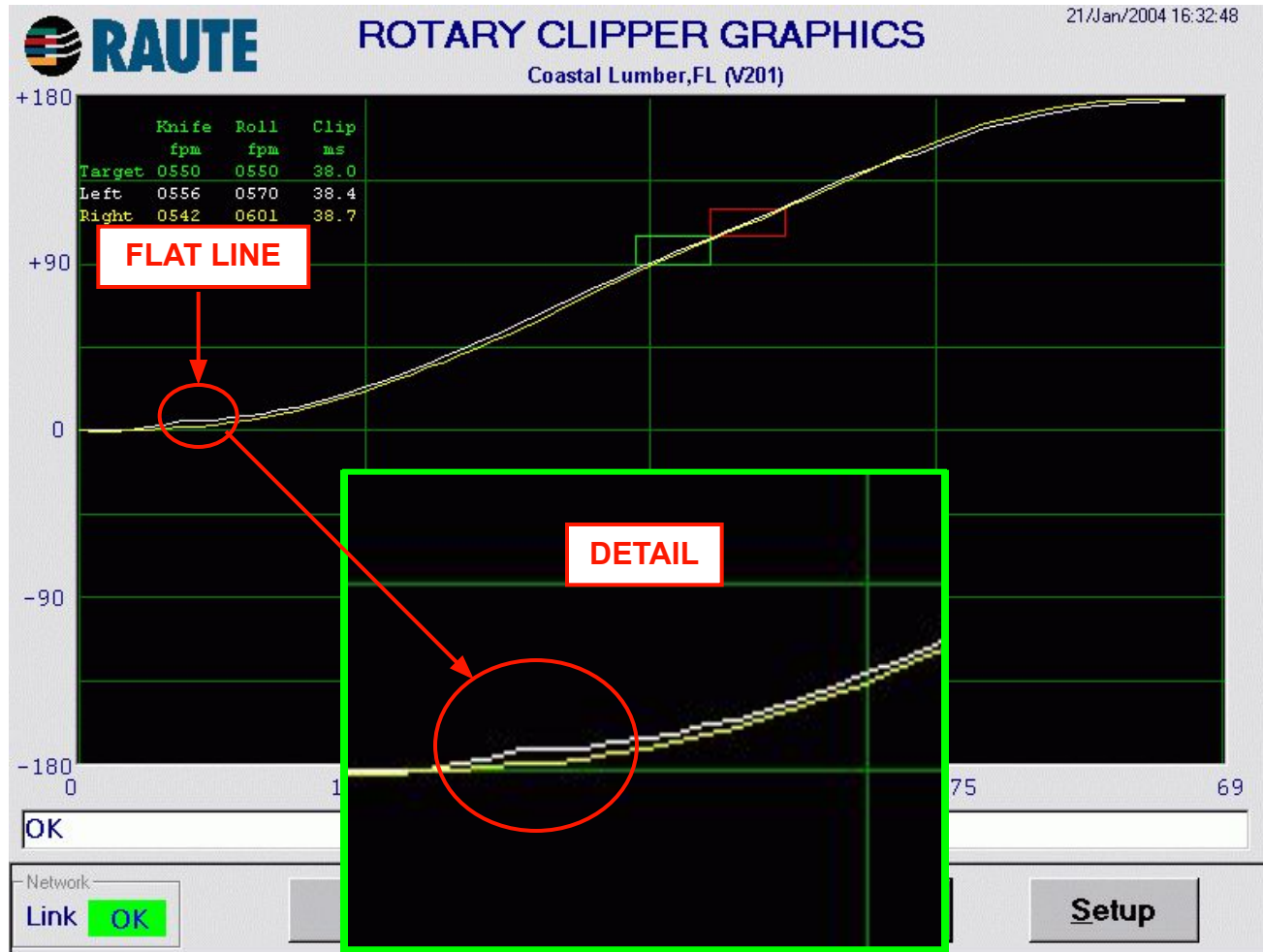


LEFT ENCODER FAILURE



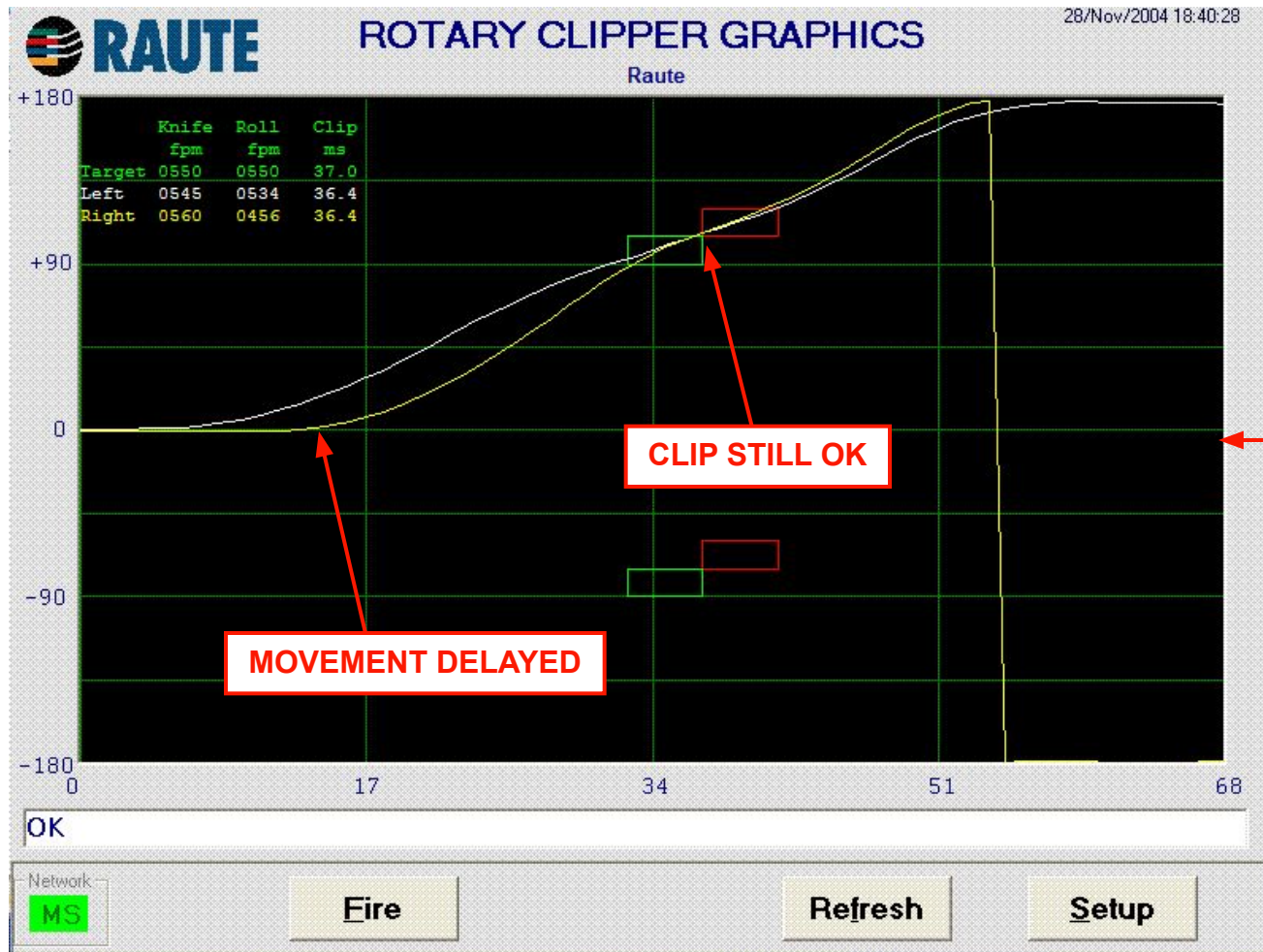


LEFT ENCODER BACKLASH



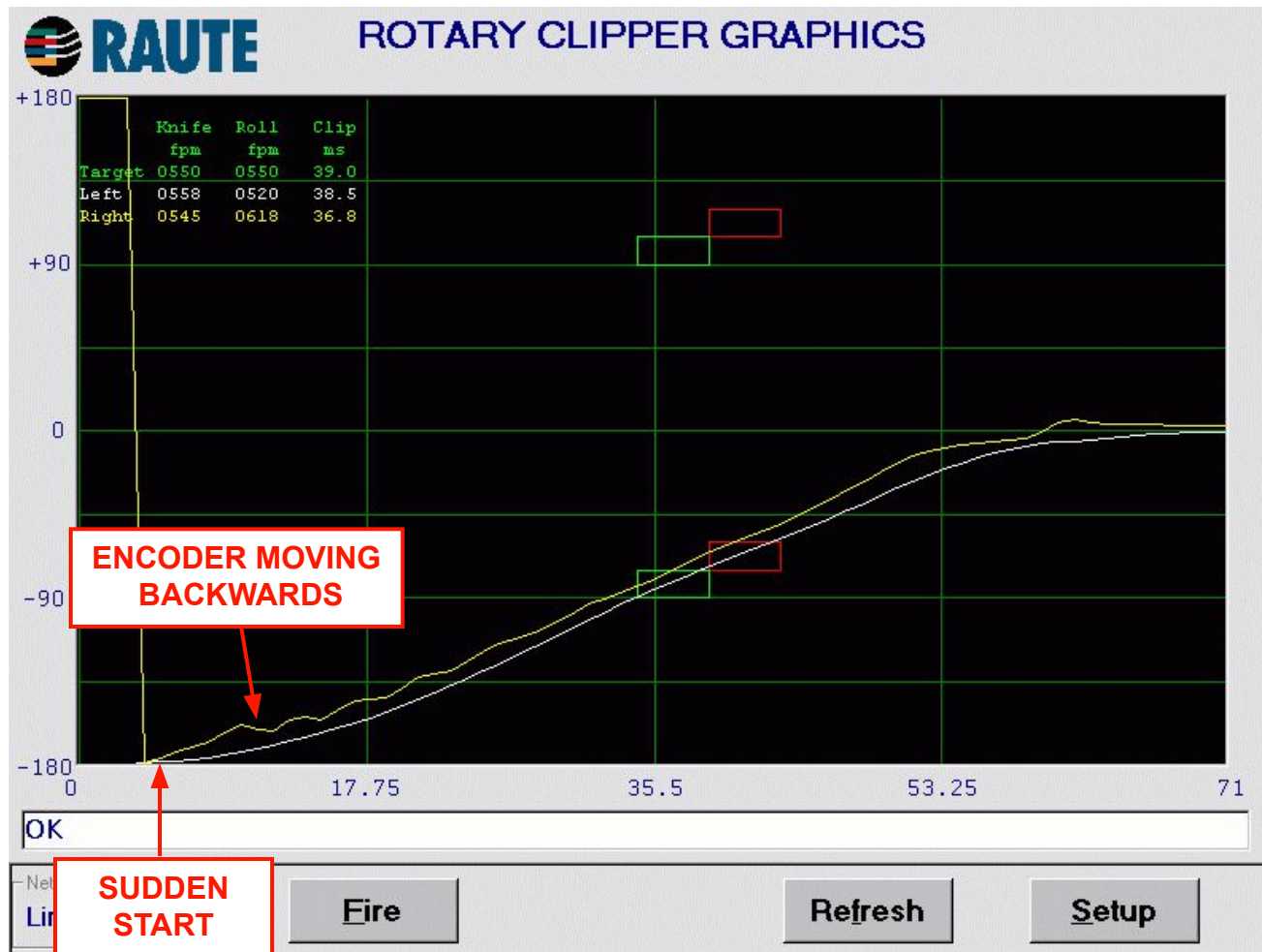


RIGHT MOTOR LAGGING





RIGHT COUPLING PROBLEM





Section 7

APPENDIX



PARTS



QUALITY RAUTE PARTS



PARTS & SERVICE



PARTS & SERVICE PHONE NUMBERS