SG9MTS HEAVY DUTY CYLINDER HEAD SEAT & GUIDE MACHINE

MACHINE MAINTENANCE AND PARTS MANUAL

8029 S 200th Street, Kent, WA 98032 USA | www.rottlermfg.com | Ph: (253) 872-7050 | Fax: (253) 393-0230
Rev 082621

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For fastest service ordering parts or equipment, contact us via e-mail with the information below. For customers within the U.S., send emails to parts@rottlermfg.com, for customers outside of the U.S., use intlparts@rottlermfg.com

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2. Customer number, or your billing address if you do not have a customer number
3. Shipping address if different from the billing address
4. Machine model and serial number
5. Part number and description of the item(s) to order
6. Preferred method of shipment

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THERE IS A MINIMUM ORDER OF $25.00

MANUAL SECTIONS

INTRODUCTION

MAINTENANCE

TROUBLESHOOTING

MACHINE PARTS

SDS

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INTRODUCTION

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Introduction

READ THE SAFETY CHAPTER BEFORE INSTALLING MACHINE. THOROUGHLY UNDERSTAND ALL SAFETY ISSUES BEFORE OPERATING MACHINE.

ATTENTION OWNER/BUSINESS MANAGER

To validate the warranty on your new Rottler machine, please be sure to sign and complete the "Installation Report" located in the Installation Chapter of this manual.

We suggest that the new user of the SG9MTS read the CONTROL DEFINITIONS to get an idea how the machine operates.

The Operating Instructions chapter should be read in order to familiarize the user with the actual button pushing sequences required to carry out a job. These chapters in the manual should be considered an introduction. As the operators of the SG9MTS series machines gain experience with using the different functions of the machine, complicated setups and programs will make more sense.

The rest of the manual contains information and part number reference on fixtures, cutting tools, and machine maintenance. The operator should read and become familiar with these areas as well.

Description

The SG9MTS uses the proven patented UNIPILOT tooling system. The machine has 2 modes of operation:

MANUALMATIC – a brand new concept has been added to these machines which should increase productivity by 30-50%. During seat cutting, the operator does not have to operate any buttons or switches, simply turn the spindle feed steering wheel up and down and the control takes care of all the functions like workhead float/clamp, pilot centering in the valve guide and spindle on/off. When depth of

seat is reached, the control automatically changes spindle RPM to high/finish speed to give equal depth of every seat and consistent surface finish results.

MANUAL – the buttons on touch screen are the same as the previous SGM machines. There is no external dial gage, the spindle vertical position is displayed on the touch screen. Simply feed the spindle down until the cutting insert touches the valve seat, touch set zero button and then the digital display will show exactly where the spindle is at all times. The change from low to high/finishing speed is easier as there are 2 separate buttons. The foot pedal for clamp and float of workhead has been eliminated and now controlled on touch screen for manual and automatically for MANUALMATIC.

The Rottler SG9MTS spindle is mounted on a sphere which allows the UNIPILOT to automatically center with the valve guide centerline while the Workhead is floating on air cushions. Once air floating stops and the Workhead clamps, the UNIPILOT and valve guide centerline are maintained while cutting the valve seat.

ACTIVE SPINDLE - Spherical Pneumatic Automatic Alignment System built into the Spindle for fast location of the pilot into the Valve Guide and Accurate Centering (Patent Pending)

Rottler Automatic Tightening and Quick Release Spindle Lock Nut System for One Hand Operation for fitting and removing tooling to and from the spindle – never comes loose!

Gives Best Concentricity
Rottler’s Rigid Precision carbide centering UNIPILOTS are manufactured to less than one tenth (.002mm) tolerance. Combined with the light weight air float Workhead the SG9MTS gives perfect centering in the valve guide and the best concentricity of any machine on the market.

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Limited Warranty

Rottler Manufacturing Company Model SG9MTS parts and equipment is warranted as to materials and workmanship. This limited warranty remains in effect for one year from the date of installation or two years from the date of the original shipment from Rottler or whichever date occurs first. This only applies is the machine is owned and operated by the original purchaser and is operated and maintained as per the instructions in the manual. A machine is warranted only if the Installation Report has been properly executed by a certified installation person and received by Rottler at the time of actual installation.

The products are warranted upon delivery to conform to their published specifications and to be free from defects in material and workmanship under normal use for a period of one year from shipment. Should a product not be as warranted, Rottler sole obligation shall be, at its option, to repair, correct or replace the product or to refund the amounts paid for the Product upon its return to a location designated by Rottler. No warranty shall extend to rapid wear Products (including tooling) or to Products which have been subject to misuse (including any use contrary to Rottler instructions), neglect, accident (including during shipment), improper handling or installation, or subject to any modification, repair or service not certified by Rottler. Rottler shall not be liable for any consequential, direct or indirect damages or for any other injury or loss. Buyer waives any right, beyond the foregoing warranty, to make a claim against Rottler. No warranty is provided for any Products not paid in full.

Merchandise cannot be returned to Rottler without prior approval. Customer must contact the Parts Department to get approval and to be issued a Return Goods Authorization number **(RGR#).** Merchandise authorized for return must be returned prepaid. If merchandise is returned with shipping charges collect, the actual amount of these charges may be deducted from any credit which may be due the customer. The **RGR #** assigned by the Parts Department should be written on the shipping label and must appear on a copy of the invoice(s) covering the original shipment. This invoice copy must be included in the box with the parts. Shipment must contain ONLY those items on the **RGR** as approved for return. Merchandise must be received within 10 days of the date of **RGR** or the **RGR** will be canceled. All returned merchandise may be subject to a 20% restocking fee on under $1,000.00 amount or 10% on any items over $1,000.00. Parts or tooling over 30 days old are considered as customer property and can only be returned with prior approval from Rottler Corporation Management.

The issuance of a **RGR DOES NOT** guarantee credit - it is only authorization for the return of the goods. Credit for return merchandise is at the sole discretion of Rottler. Credit will be issued only after inspection of returned goods.

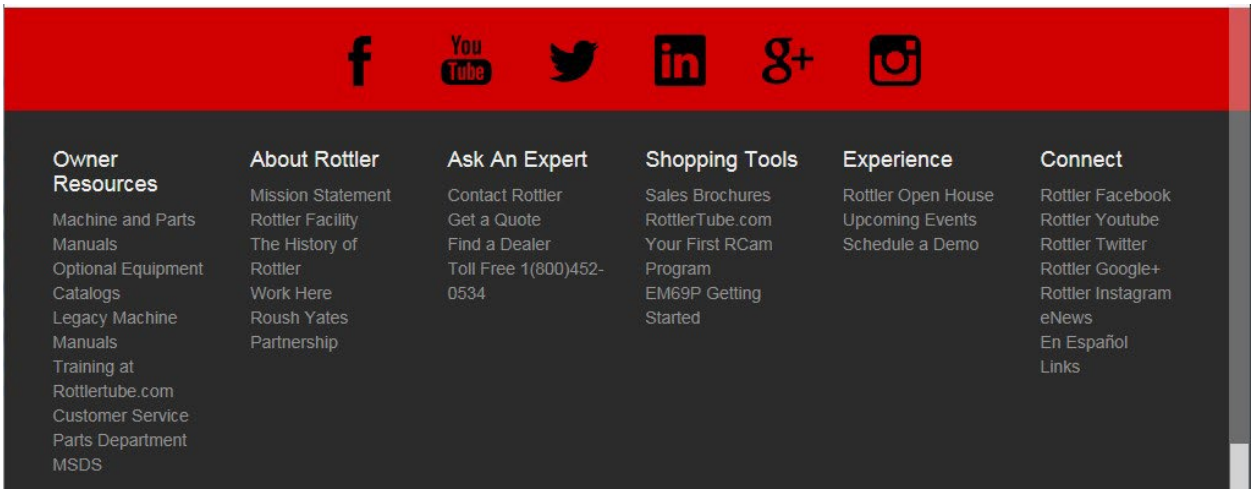
Tools proven to be defective within the warranty period will be repaired or replaced at the factory’s option.

We accept no responsibility for defects caused by external damage, wear, abuse, or misuse, nor do we accept any obligation to provide compensation for direct or indirect costs in connection with cases covered by the warranty.

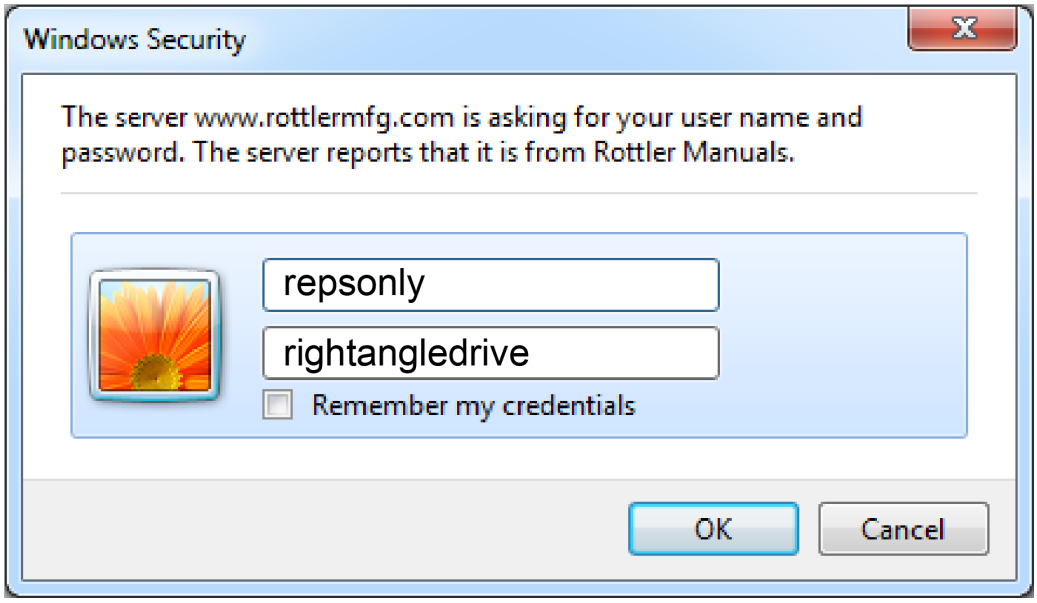
Online Documentation Access

Online documentation for machines and optional equipment can be accessed at the Rottler website. To access documentation open your browser and navigate to https://www.rottlermfg.com.

Scroll to the bottom of the page and under the Owner Resources title click the type of documentation you want to access.



If a log in window pops up asking for user name and password fill in the blanks as shown.



MAINTENANCE

Contents

Maintenance

Quick Reference Lubrication Chart

Refer to the maintenance section in the manual for lubrication location points and instruction.

Assembly	Frequency	Lube Operation	Recommended Lubricant	Date Serviced
Outer Spindle	8 Hours	Clean and Wipe with oil	ISO VG 68 Way Oil	
Brass guide shoes/slide	500 Hours	Clean and wipe with oil	ISO VG 68 Way Oil	
Grease spindle Rack and pinion	500 Hours	Clean and grease	NLGI #2 White Lithium Grease	
Grease spindle worm wheel and worm shaft	500 Hours	Clean and grease	NLGI #2 White Lithium Grease	
Grease spindle drive shaft	500 Hours	Clean and grease	NLGI #2 White Lithium Grease	
Grease rollover clamp fixture bearings	200 Hours	Clean and grease	NLGI #2 White Lithium Grease	
Grease clamp fixture Pins and Acme screw	200 Hours	Clean and grease	NLGI #2 White Lithium Grease	

Preventative Maintenance Quick Reference Chart

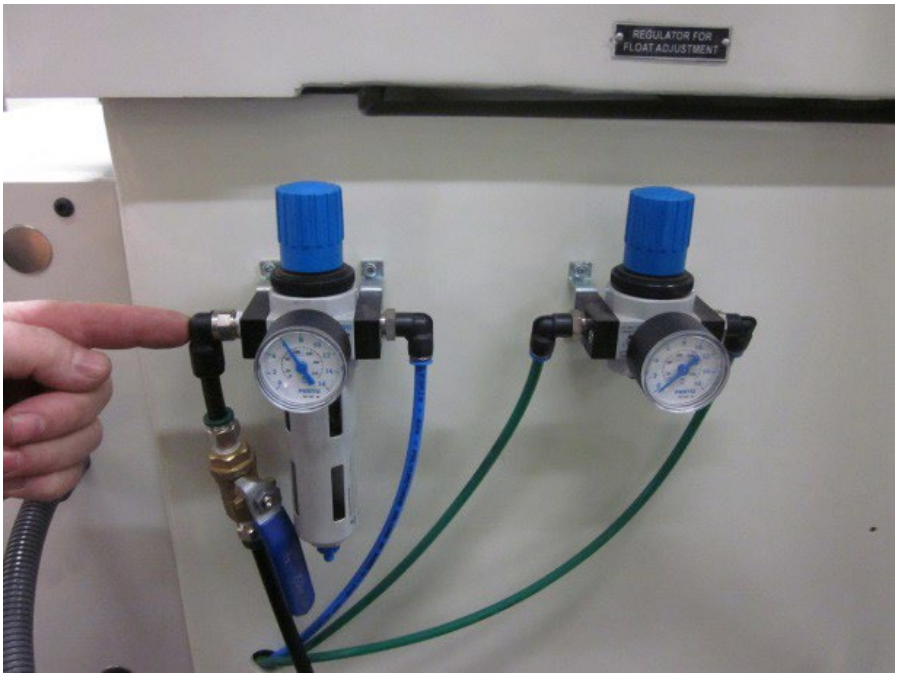
Refer to the procedures in the maintenance section of the manual to make or check these adjustments. Not all of the items listed in the table below have adjustment. The information should be recorded and the amount of wear tracked so the part can be replaced before down time on the machine occurs.

Procedure	Frequency	Date Serviced/Comments
Clean top and bottom float tables	8 Hours	
Outer Spindle Bushing Adjustment	500 Hours	
Brass Shoe Adjustment	500 Hours	
Angle sensor calibration	500 Hours	
Spindle Drive Belt Adjustment	1000 Hours	
Adjust workhead clamp plate bearings	1000 Hours	
Rack and pinion adjustment.	1000 Hours	

Machine Level Adjustment	1000 Hours	

CAUTION All floating surfaces should be dry and clean do not oil the surfaces, oil will cause the work heat not to float properly.

Air Adjustments



Float

The float regulator is located at the right rear of the main base on the bottom.
If the machine is not floating properly, it could be from too much or too little air from the regulator. Turn the regulator all the way off (full counter clockwise). Start turning the regulator slowly clockwise while continually checking the spindle base for proper floatation. Once the correct float is established, lock the regulator into place by pushing in on the black adjusting knob.

CAUTION Use as little air as possible to achieve correct floatation. Using too much air will could cause the spindle base to vibrate and not center properly on the on the pilot.

Float surfaces

CAUTION Wipe clean daily
All floating surfaces should be dry and clean do not oil the surfaces, oil will cause the work heat not to float properly.

Calibrating the Digital Level

NOTE: Even though the level has been carefully calibrated at the factory, it is a good idea to recheck calibration before putting the machine into service. In the event that the level is dropped or handled roughly then the following recalibration methods should be implemented.

The level assembly is referenced to the spindle via the level pin. It is there for important to check alignment of pin in reference to the spindle. This is accomplished by mounting a magnetic base dial indicator to the machine spindle and sweeping the pin vertically by raising or lowering spindle to check alignment. Pin alignment should be checked in two positions at 90 degrees to each other. If the pin alignment needs correcting, do so with the set screws located at base of pin block.

Install level on pin. Orient level to read left to right. Tilt head left or right until level reads 0.00. Now rotate level 180 degrees. The reading should be 0.00, if not then it will be necessary to calibrate the inclinometer to the level body. This is accomplished by loosening the inclinometers two retaining screws and pivoting the inclinometer until it repeats when level is rotated 180 degrees.

Example: level reads 0.05 to the left, when rotated 180 degrees to the right it should read minus 0.05.

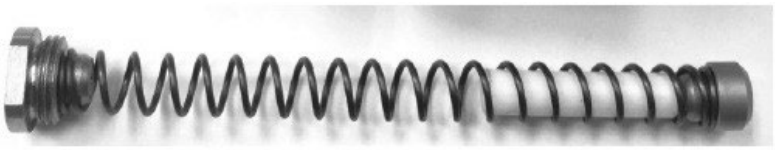
Check the level reading with the pickup oriented front to back. It should read 0.00 if the machine has been properly leveled with a machinist level.

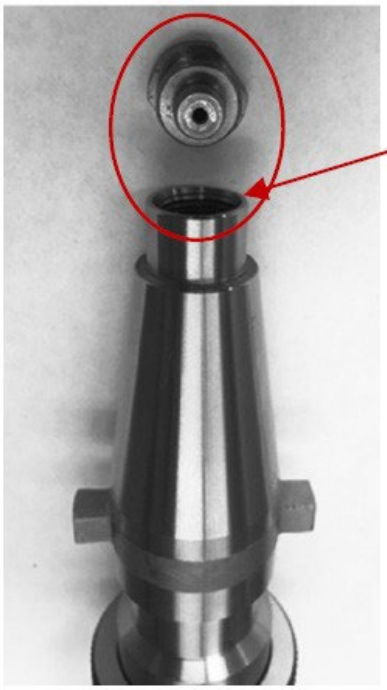
If the LED does not read 0.00 then chances are the machine's leveling procedures have not been properly followed or there are internal problems with the levels electronics.

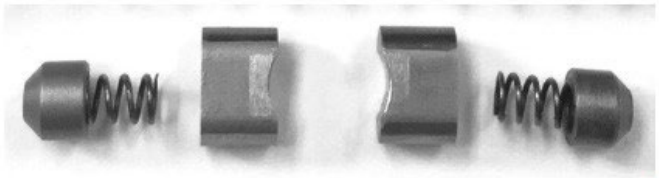
The sensitivity of the level is so great that it may not zero totally, even while the machine is not being touched. The alignment tolerance for installing guides is plus or minus .05 degrees, and for forming three angle seats is plus or minus .05 degrees.

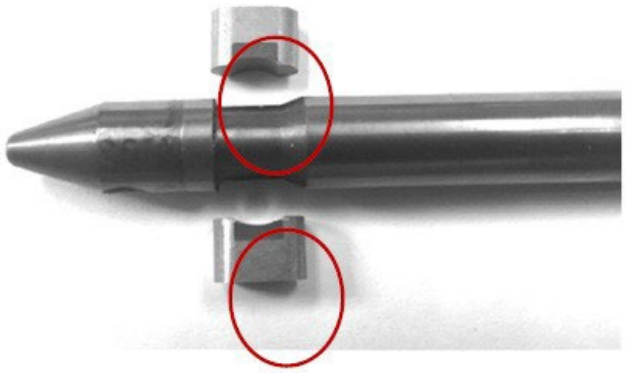
Rebuilding the UPT5200 Unipilot Holder

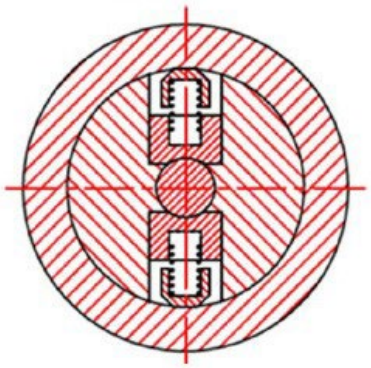
Align the pin and push through until To remove the cap unscrew the cap, this cap has left-hand you able get the sleeve up and threads; remove the long spring with the spacing Rod and the remove the components to replace. Trust Pad (See pictures below)

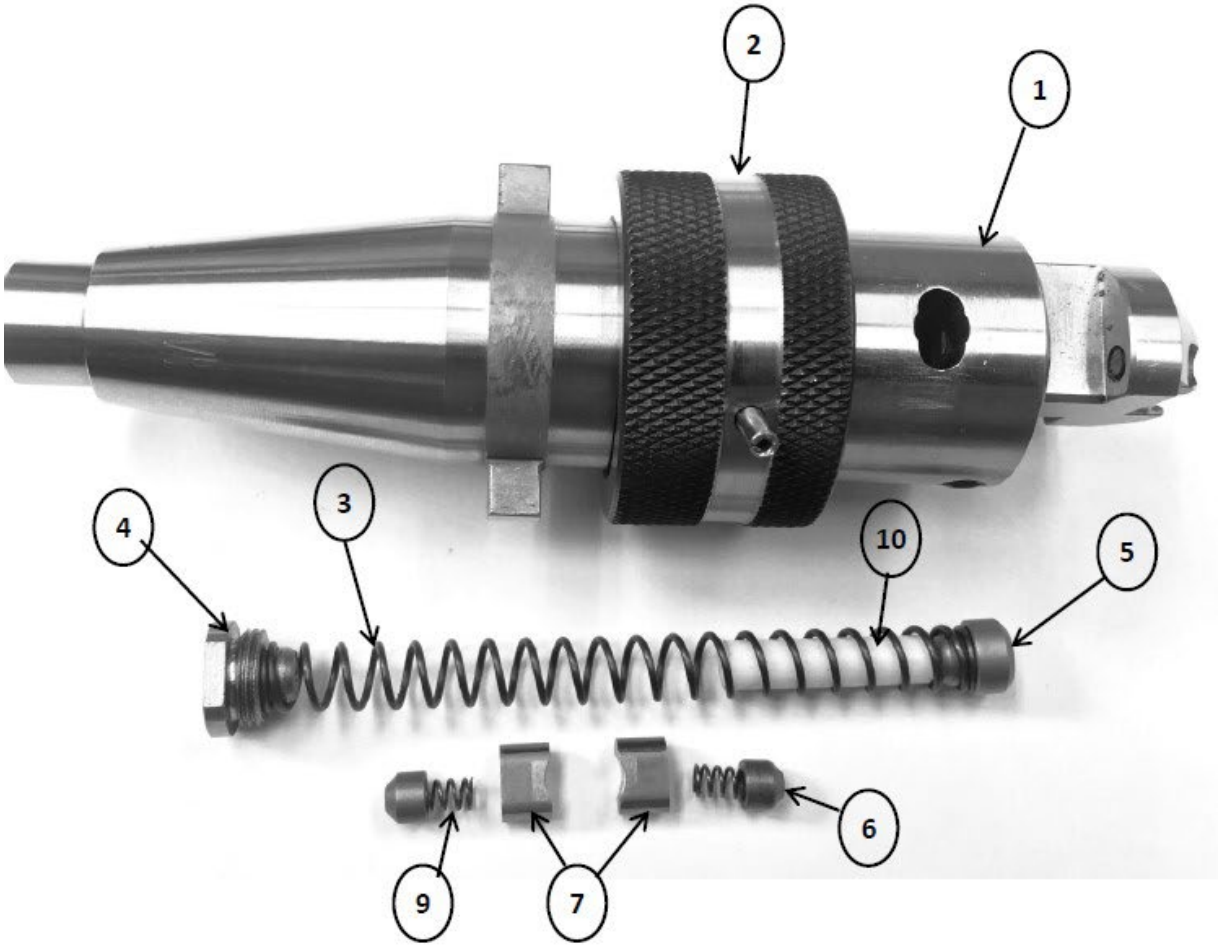












UPT5200 Rebuilding Kit Parts Details

Sr. No.	Part No.	Description	Qty.
1	5201	Toolholder Body Only (UPT5200)	1
2	5207	Toolholder Adapter Collar	1
3	555-19-10	5203-1 – Spring Long	1
4	555-19-9	5202 - Holding Screw	1
5	555-19-12	5104 - Trust Pad.	1
6	555-19-2	5205-1 - Plunger Pin Outer	2
7	555-19-3	5205-2 - Plunger Pin Inner	2
8	UCPXXX	UNIPILOT.375" (9.52mm) Shank	1
9	555-19-4	5203-3 - Compression Spring	2
10	555-19-11	5209 - Spacing Rod	1

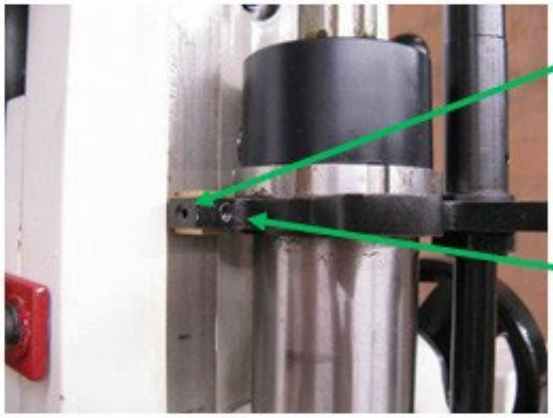
Adjusting And Aligning The Outer Spindle On SG Models

There are 2 brass guide shoes located on the guide plate on top of the spindle that align the rack gear on the back of the spindle with the pinion gear that moves the spindle up and down.

Lower the spindle to the center position of travel.

Check the guide plate at the top of the spindle, tighten if necessary.¶

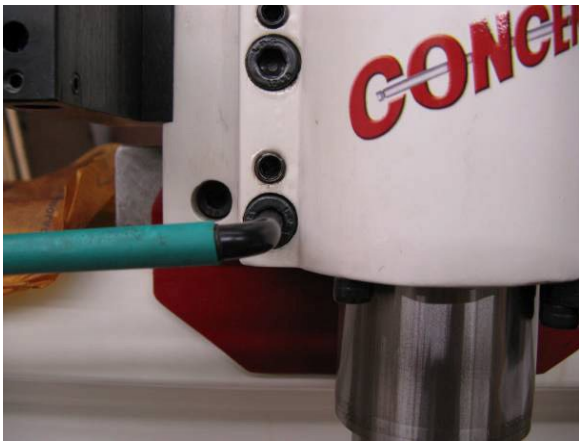
Clean and lightly lubricate sliding guide surfaces with grease. Adjust brass guide shoes on guide plate so that there is no twisting movement. Run the spindle through its full travel to confirm that there is no binding.



Loosen locking screw to adjust brass guide shoe. Tighten after adjusting.¶

Use adjusting screw to adjust brass guide shoe.

Adjusting outer spindle clearance.



Loosen the 4 lock bolts.

Loosen the 4 adjusting set screws.

Clean outer spindle and lubricate – add a few drops of oil to a clean cloth and wipe outer spindle.

Starting with the bottom set of lock bolt and adjusting set screws, tighten the lock bolt until there is drag on the spindle when it is move through its range of travel.

Then tighten the adjusting set screw until the amount of drag on the spindle is reduced to the point that there is a slight drag on the spindle through its range of travel.

You may have to make further adjustment to the lock bolt and set screw the get the spindle adjusted properly.

Repeat the above procedure the other 3 sets of lock bolts and set screws.

Spindle Assembly Service Procedure

SPINDLE ASSEMBLY - SG 9MTS (AFTER JAN-2015)
ADJUSTMENT OF SPHERE FLOAT & VERTICAL CENTERING

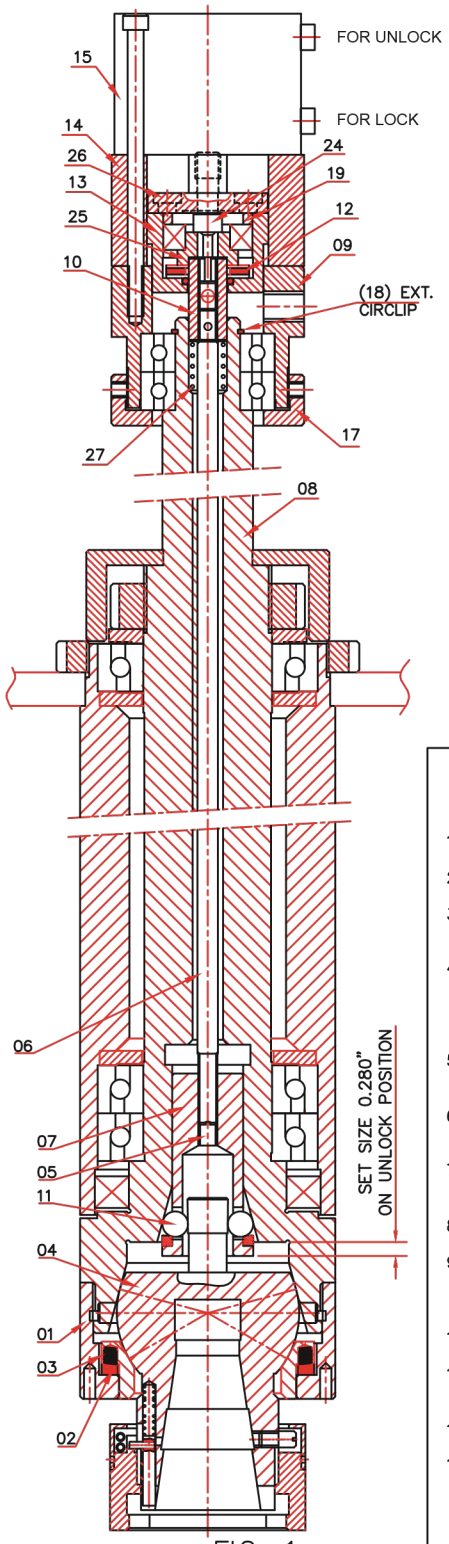
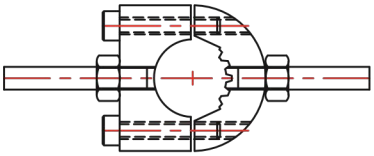
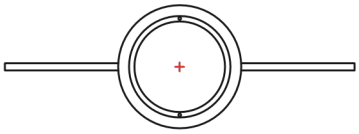


FIG. 1

TOOLING REQUIRED
FOR ASSEMBLY & DIS-ASSEMBLY



HOLDING TOOL (20)



PIN WRENCH (21)

SETTING FIXTURE (22)

PIN (16)

ADJUSTMENT PROCEDURE

1. REMOVE TOP SQUARE COVER SO THAT PNEUMATIC CYLINDER ASSY. IS ACCESSIBLE
2. MOVE QUILL DOWN BY ABOUT 4" BELOW SPINDLE HOUSING BOTTOM FACE.
3. PUT PNEUMATIC CYLINDER IN UNLOCK POSITION OR (AIR IN ABOVE PORT) AS SHOWN IN FIG.1.
4. BY HOLDING SPINDLE SPLINE (08), USING HOLDING TOOL (20) REMOVE SPHERE CAP (01) BY UNSCREWING. USING A SPECIAL PIN WRENCH (21) AS SHOWN, TWO HOLES ARE PROVIDED AT BOTTOM OF SPHERE CAP. HOLD SPHERE (04) TO PREVENT IT FROM FALLING DOWN.
5. TAKE OUT SPHERE(04) ALONG WITH LOWER CONE (03), SPACER (02) & FOUR BALLS (11).
6. CHECK DISTANCE $0.280^{+0.010}$" MAX. OF PLUNGER (07) AS SHOWN IN FIG.1 IF DISTANCE IS NOT OK THAN ADJUST AS PER PROCEDURE.
7. INSERT A PIN (16) IN HOLE OF PART NO. (10) THROUGH A HOLE PROVIDED IN BEARING HOUSING (09).
8. TAKE OUT ALLEN SET SCREW (05) USING 3MM ALLEN KEY.
9. WITH PIN (16) AT SR. NO. (6) STILL IN POSITION, TURN PLUNGER (07) & MAINTAIN DISTANCE $0.280^{+0.010}$" MAX. AS SHOWN IN FIG.1 TWO SLOTS ARE PROVIDED IN PLUNGER (07) FOR ROTATION USE SPECIAL SETTING FIXTURE (22).
10. INSERT ALLEN SET SCREW (05) BACK IN POSITION & FULLY TIGHTEN IT.
11. ASSEMBLE BACK SPHERE (04) BY FULL TIGHTENING SPHERE CAP (01), TAKING CARE THAT LOWER CONE (03), SPACER (02) & 4 BALLS (11) ARE IN POSITION.
12. TAKE OUT PIN (16) INSERTED AT SERIAL NO. (6).
13. CHECK CENTRING AND FLOAT OF SPHERE BY OPERATING PNEUMATIC CYLINDER.

DOC. NO. : NCL–002–03
DATE 21.03.2015

Spindle Lock Nut Service Procedure

SEAT & GUIDE MACHINE MODELS : SG-8MTS, SG-9MTS, SG-10X & SG-80MTS
SPINDLE LOCK NUT ASSEMBLY & DISMENTLING INSTRUCTIONS.

FIG. 1

LOCK NUT SUB ASSEMBLY

FIG. 2

SPINDLE LOCK NUT ASSEMBLY

FIG. 3A

FIG. 3B

LOCK NUT (TOP VIEW)

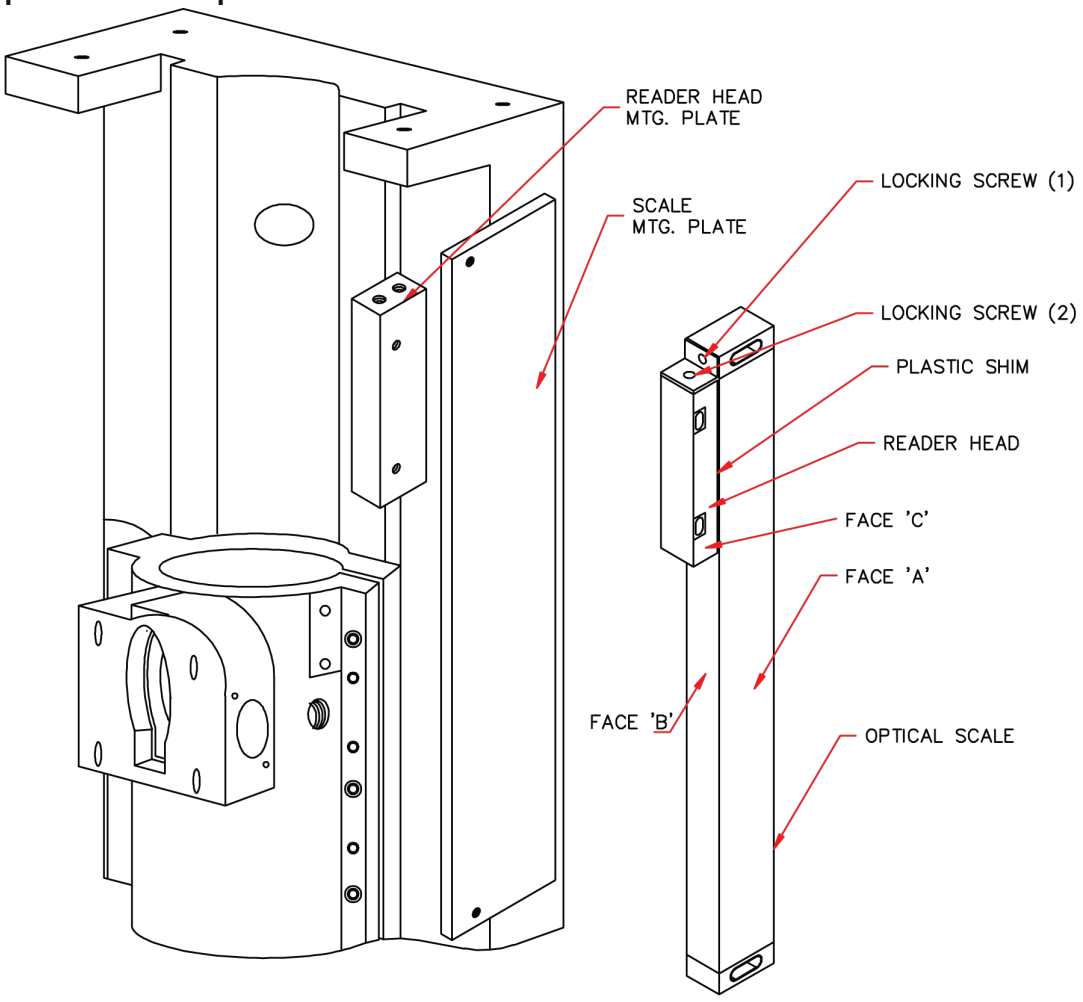
ASSEMBLY OF LOCK NUT (REF. FIG. 2)

1. INSERT SPRING '4' IN THE SPINDLE HOLE FOLLOWED BY PLUNGER PIN '2', KEEPING HOLE ON THE TOP SIDE.
2. ASSEMBLE STOP PIN '3' BY PRESSING UP PLUNGER PIN '2' TILL THE PIN HOLE IN PLUNGER PIN '1' COMES OPPOSITE TO HOLE IN THE SPINDLE. THE PIN SHOULD PROJECT BY 0.100" (2.5MM) FROM SPINDLE SURFACE.
3. START TIGHTENING LOCK NUT '1' ON THE SPINDLE. WHEN IT STOPS, PRESS THE PLUNGER PIN '2' AND CONTINUE TIGHTENING TILL THE LOCK NUT TOUCHES THE SPINDLE.
4. UNSCREW LOCK NUT '1' SLIGHTLY TILL LARGE HOLE IN THE LOCK NUT COMES OPPOSITE THE TAPPED HOLE IN THE SPINDLE.
5. WITH A SMALL SCREW DRIVER PRESS SPRING PAD '6' THROUGH LARGE HOLE SO THAT IT CLEARS THE SMALL HOLE. INSERT A STEEL ROD IN THE SMALL HOLE TO HOLD THE SPRING PAD '6' IN THAT POSITION. TAKE OUT SCREW DRIVER, REF. FIG. 3A & 3B.
6. TIGHTEN STOP SCREW '5' IN THE SPINDLE THROUGH LARGE HOLE.
7. RELEASE SPRING PAD '6' BY PULLING OUT THE STEEL ROD. THE LOCK NUT ASSEMBLY IS NOW COMPLETED. CHECK ITS FUNCTIONING MANUALLY BEFORE MACHINING.

DISMENTLING OF LOCK NUT (REF. FIG. 2)

1. ROTATE THE SPINDLE TO SEE IF LARGE HOLE IS OPPOSITE TO STOP SCREW '5'. IN CASE IT IS NOT SO, PRESS THE PLUNGER PIN '2' UPWARDS, THIS WILL BRING THE LARGE HOLE OPPOSITE TO STOP SCREW '5'.
2. TAKEOUT STOP SCREW '5' BY UNSCREWING THE SAME.
3. PRESS PLUNGER PIN '2' & START UNSCREWING THE LOCK NUT '1' TILL IT COMES OUT.
4. PUSH STOP PIN '3' TO COME OUT OF PLUNGER PIN '2'.
5. TAKE OUT PLUNGER PIN '2' AND SPRING '4'.
6. DO NOT TEMPER WITH LOCK NUT SUB-ASSEMBLY. ASK FOR A NEW PIECE IF DAMAGED. SPINDLE LOCK NUT IS ALWAYS SUPPLIED IN SUB-ASSEMBLED CONDUCTION WITH TWO COM. SPRINGS, SPRING PAD, ROLL PIN & COVER AS SHOWN IN FIG. 1

Replacement of Optical Scale



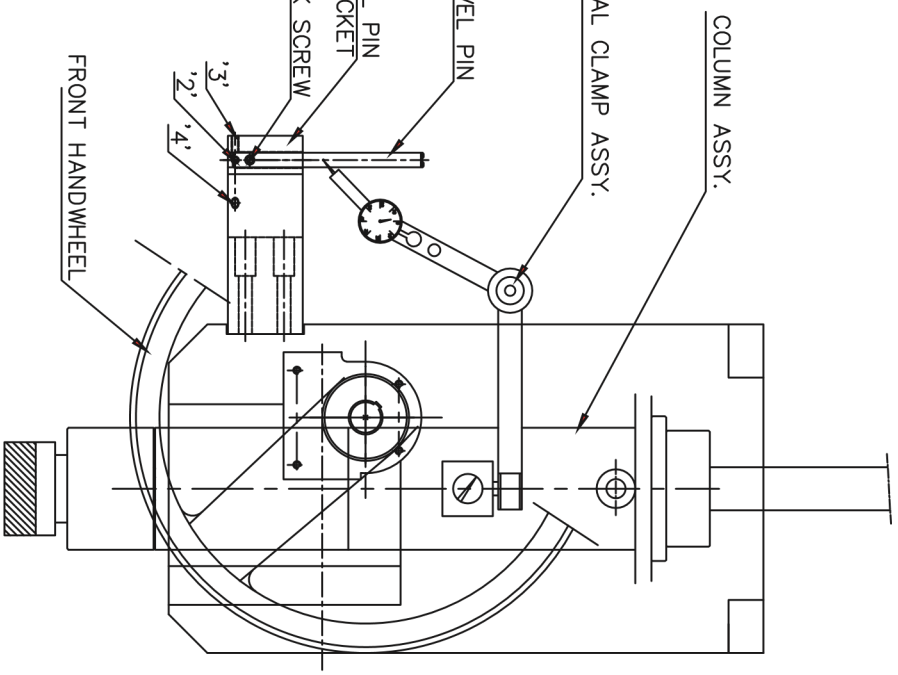
PROCEDURE FOR OPTICAL SCALE REPLACEMENT .

1. REMOVE EXISTING OPTICAL SCALE, TAKING CARE OF ELECTRICAL WIRING & REMOVING NECESSARY COVERS.
2. THE OPTICAL SCALE UNIT SUPPLIED COMES WITH TWO LOCKING SCREWS & PLASTIC SHIM FOR PROTECTION OF READER HEAD DURING TRANSPORTATION.
3. MOUNT OPTICAL SCALE ON THE MOUNTING PLATE.
4. MOUNT DIAL INDICATOR ON QUILL & ALIGN FACES 'A' & 'B' OF SCALE WITH VERTICAL MOVEMENT OF QUILL WITHIN 0.002". TIGHTEN SCALE IN THIS POSITION.
5. REMOVE LOCKING SCREW (1). WITH THIS READER HEAD MOVES FREELY UP & DOWN.
6. LOOSEN SLIGHTLY TWO MOUNTING SCREWS OF READER HEAD MOUNTING PLATE.
7. MOUNT READER HEAD UNIT WITH READER HEAD MOUNTING PLATE. NOW TIGHTEN TWO SCREWS OF READER HEAD MOUNTING PLATE.
8. REMOVE LOCKING SCREW (2) & REMOVE THE PLASTIC SHIM.
9. A STEEL SHIM IS SUPPLIED LOOSE ALONG WITH THE OPTICAL SCALE UNIT. USE THIS SHIM TO ENSURE THAT FACE 'A' OF SCALE & FACE 'C' OF READER HEAD OR IN THE SAME PLANE.
10. RE–ASSEMBLE THE WIRING & COVERS BACK IN POSITION.

Level Pin Setting

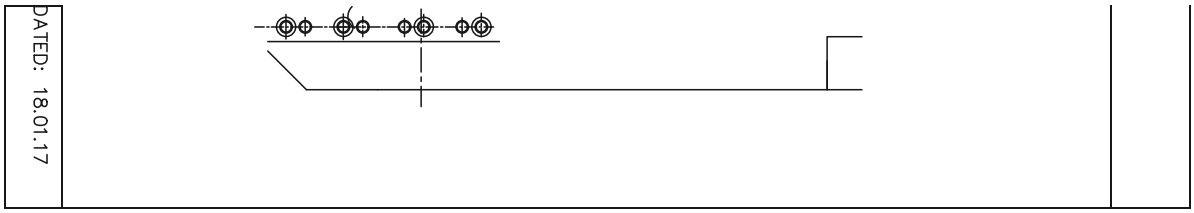
INSTRUCTIONS TO SET LEVEL PIN
MODEL : SG-7MTS, SG-8MTS & SG-9MTS

1. REMOVE FRONT COVER
2. HOLD DIAL CLAMP ASSY. ON COLUMN ASSY. AS SHOWN IN FIG. & SET DIAL ON LEVEL PIN.
3. MOVE COLUMN ASSY UP & DOWN BY FRONT HANDWHEEL & SET DIAL TO '0' BY ADJUSTING JACK SCREW '1' & SCREW '2' FOR FRONT & BACK POSITION OF LEVEL PIN
4. HOLD DIAL ON LEVEL PIN SIDEWISE & SET DIAL TO '0' BY ADJUSTING SCREW '3 & '4' BY USING 2.5MM ALLEN KEY.
5. REMOVE DIAL ASSY. & RE-PLACE THE FRONT COVER.

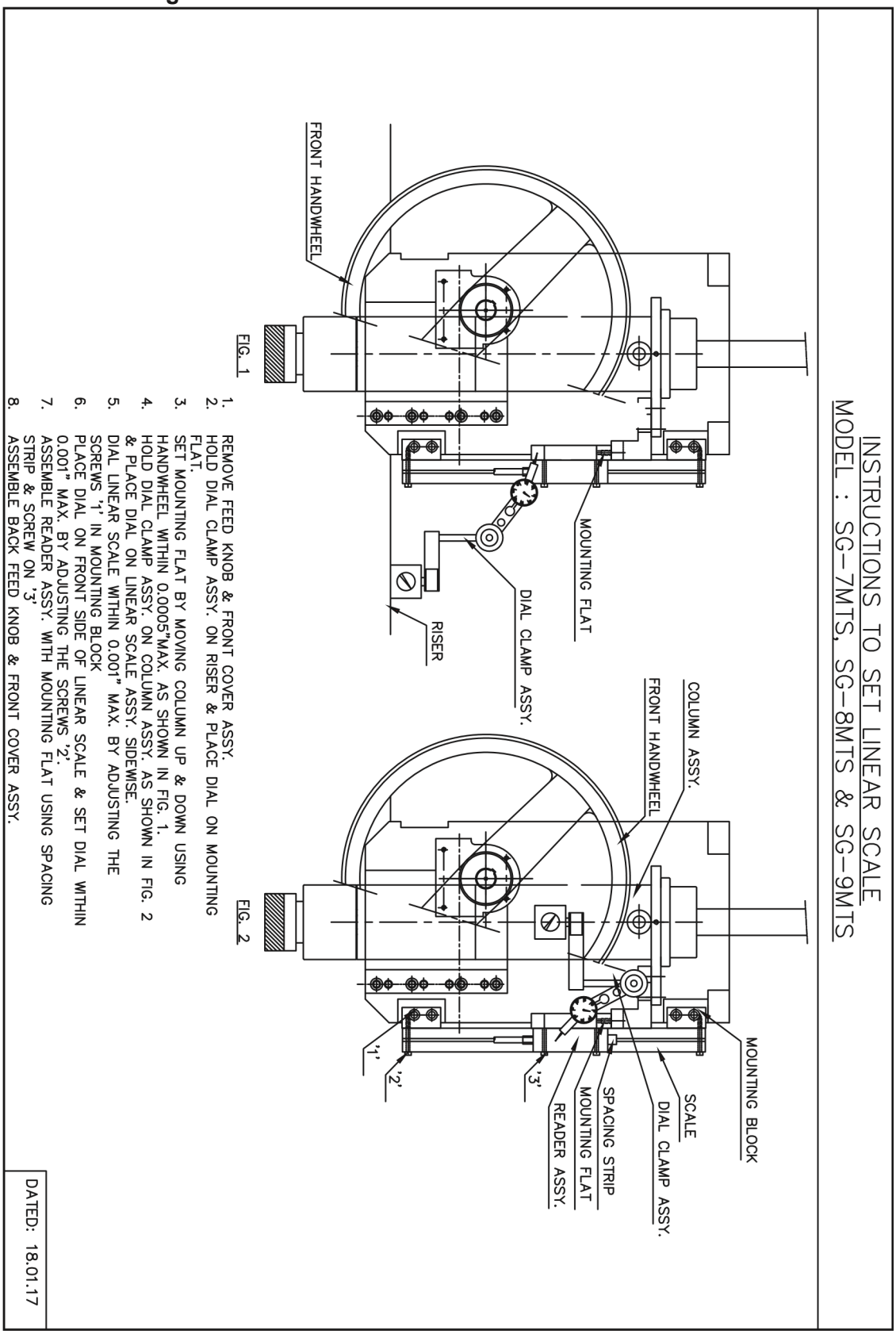


INSTRUCTIONS TO SET LEVEL PIN
MODEL : SG-7MTS, SG-8MTS & SG-9MTS

DATED: 18.01.17


DATED: 18.01.17

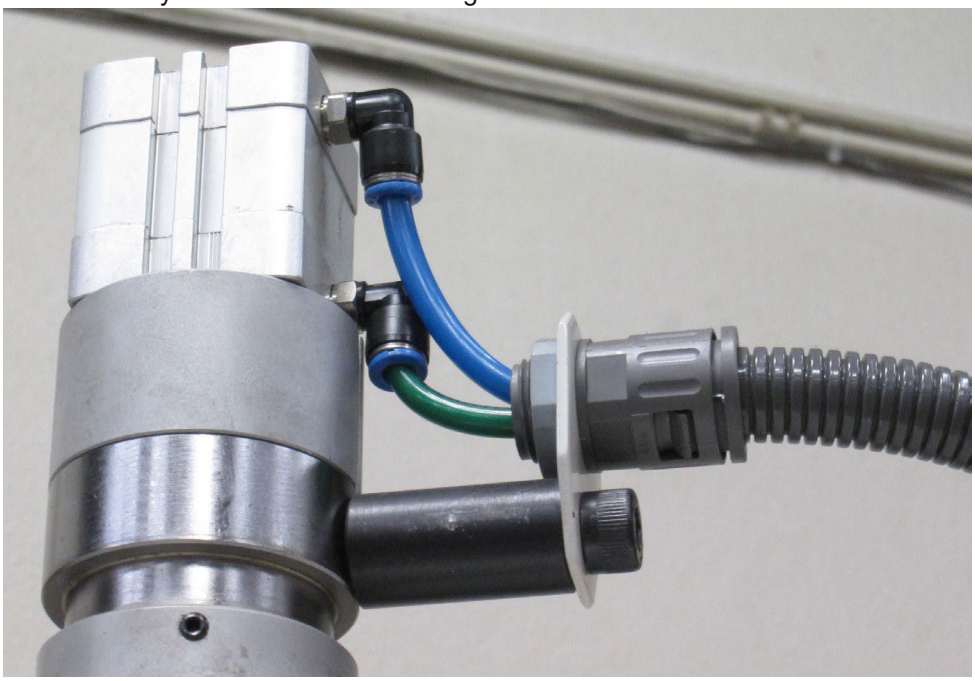
Linear Scale Setting



Removing Spindle

Remove upper cover from machine.

Remove air lines from cylinder and bracket holding air line conduit.



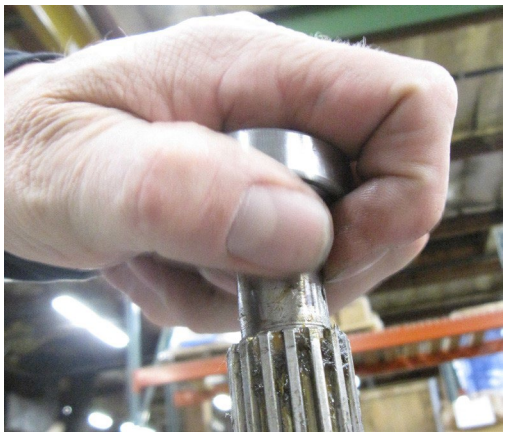
Remove 4 bolts holding air cylinder onto spacer block.

Remove 2 spacers from bearing housing.

Remove snap ring from bearing housing.

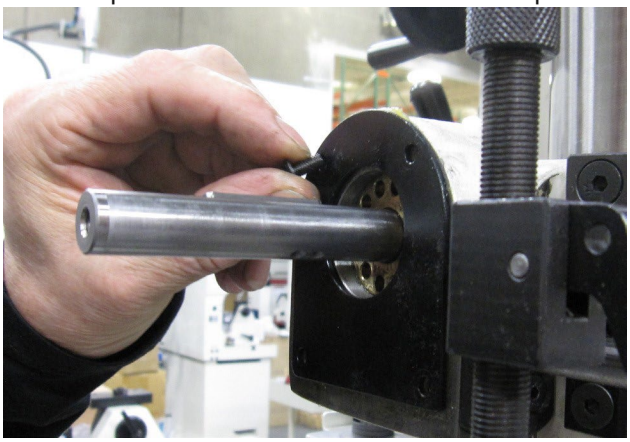
Lift off bearing housing.

Remove bearing retainer snap ring and slide bearings off shaft.



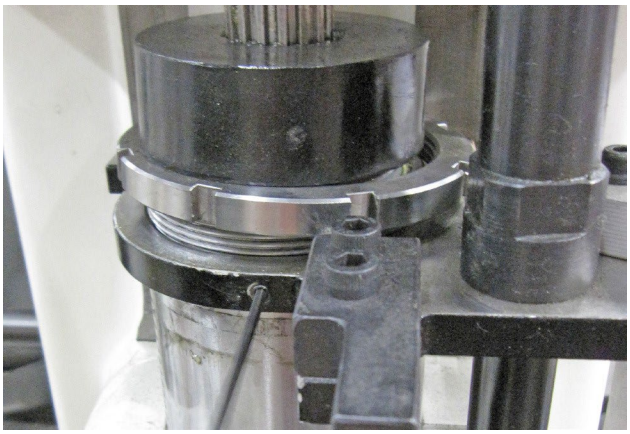
Lower spindle down onto a block of wood to prevent spindle from falling.
Remove hand wheel from pinion shaft.

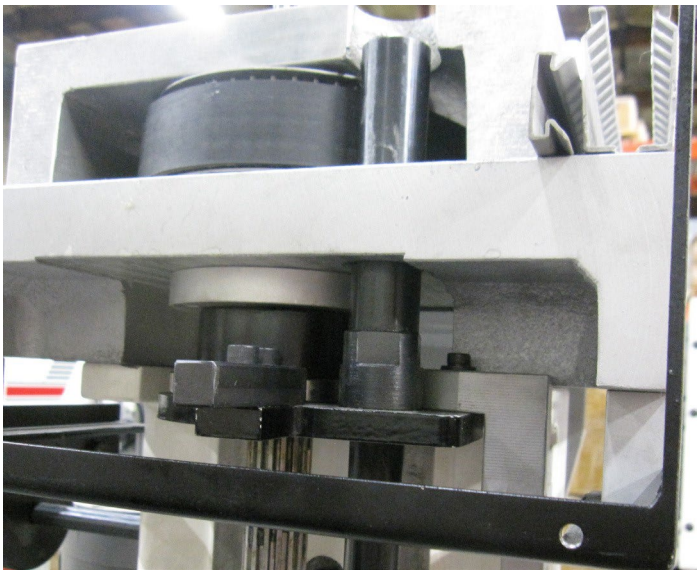
Remove pinion shaft retention bracket from spindle housing.



Loosen and unscrew stop plate lock nut from spindle.

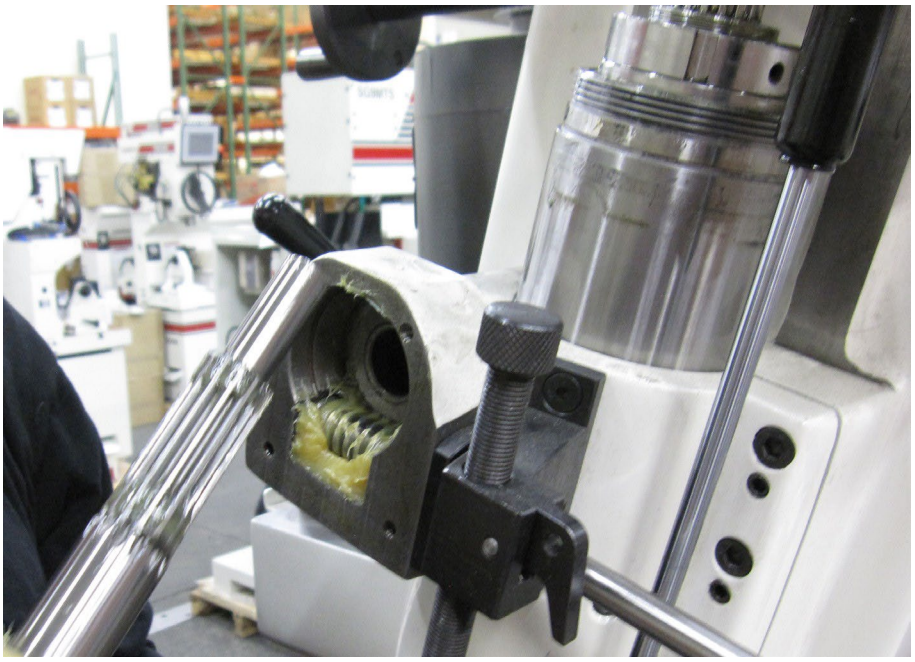
Loosen set screw from stop plate and using a brass punch, remove stop plate from spindle.





Lift stop plate as high as it will go.

Place the hand wheel back on the pinion shaft and lift the spindle off the piece of wood. While holding the spindle in place with the hand wheel tilt the head as far as possible to the right.
Hold the spindle in place to prevent it from falling and remove the pinion shaft.



Slide spindle down and out of spindle housing.

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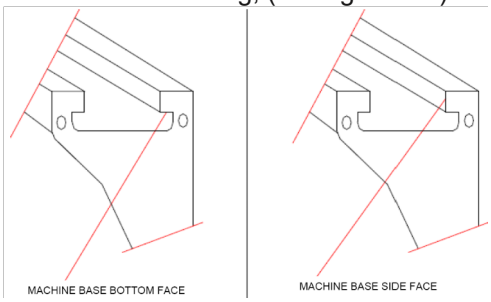
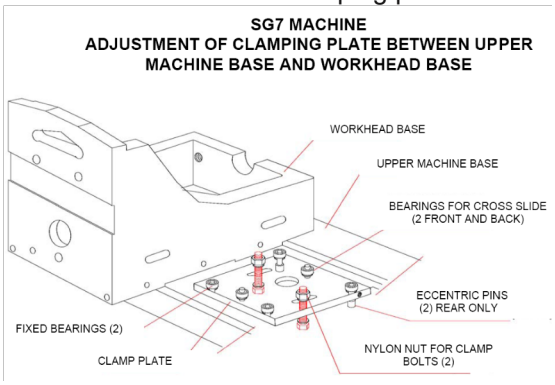
TROUBLESHOOTING

Problem	Possible Cause	Solution
Workhead base does not float	Insufficient air pressure	Set air pressure of supplied line should be minimum 85 PSI (6 Bars)
	Clamping plate does not drop when unclamped due to less clearance between upper floating base and ball bearings mounted on clamping plate	Take the workhead to one end of the of the upper floating surfaces (Left or Right side) float the workhead and pull it against the front on the T Slatted guide surfaces, then loose the set screws of the eccentric pin to increase clearance by using a feeler gage of 0.008” to 0.010” (0.20mm to 0.25mm) in between the T slotted guide surfaces of the upper base and the eccentric ball bearing; (see fig. below)  Lock the setscrews, remove the feeler gage and inspect if is with the tolerance across the all surfaces. Repeat if it is necessary.
	Clamping plate does not drop when unclamped due to the improper adjustment of the four clamping bolts	Adjust nylock nuts to set he correct clearance between the bottom side face of the locking T-Slot of the floating base (Riser) and the top part of the clamping plate. They are two on the SG7. The dropping clearance when is on the floating mode should be 0.015” (0.38mm)on all the four corners of the workhead clamping plate 

Problem	Possible Cause	Solution
Eccentricity Problems when Cutting Three Angle Seats	Machine is not level	Level machine per instructions in Installation section of this manual
	Workhead is not floating smoothly	Be sure that the work head and main base are clean and floating smoothly side by side and front to back
	Spindle floated to improper center location	Reposition workhead to ensure proper alignment
	Improper setup procedure	The centering switch that is located on the left side of the front panel needs to be on the centering position at the time of centering and machining the vale seat. The Spherical pneumatic switch needs to be on the OFF position and the pilot into the valve guide until reach the proper height or the cutting insert is a few thousands from the valve seat face. Let Workhead flow for few seconds to achieve maximum alignment over the pilot. Be sure there's no contact with the Workhead to allow spindle to stabilize and Cutter to center itself on the valve guide. Release Foot Pedal. Note: Spherical Pneumatic switch should be on the OFF position all the time that you are machining the valve seat; this will give you a positive live centering.
	Toolholder cone dirty	The toolholder cone must be clean before is attached to the spindle and also be sure that the inner spindle cone is clean
	Excessive pressure when cutting seat	Use less pressure when cutting the seat
	Incorrect spindle speed	Adjust spindle speed
	Worn or improperly selected pilot	Check pilot for wear and straightness
	Dull or damaged cutter insert	Replace insert
	Incorrect pilot selection	Follow directions in manual for selecting pilots
	Worn tool holder	Check tool holder with bore gauge to determine if there wear
	Worn valve guide	Service valve guides before attempting to cut valve seats

MACHINE PARTS

Contents

Machine Parts

Consumable Parts

REFERENCE	DESCRIPTION
SLEEVE R1	Spindle adapter replacement sleeve
BSW002	Diamond Wheel Cutting Bit Sharpener replacement Wheel (3.000" Diameter OD by .375" ID)
PRW600PIN	Replaceable Pins for PRW600 Pilot Removable wrench tool
PRW375PIN	Replaceable Pins for PRW375 Pilot Removable wrench tool
PRW20PIN	Replaceable Pins for PRW375 Pilot Removable wrench tool
VT-FP1562	Replacement Foam Pad for Round Vacuum Pad 1.562" diameter
VT-FP1875	Replacement Foam Pad for Round Vacuum Pad 1.875" diameter
VT-FP2125	Replacement Foam Pad for Round Vacuum Pad 2.125" diameter
VT-FP3125	Replacement Foam Pad for Round Vacuum Pad 3.125" diameter
VT-FP25X22	Replacement Foam Pad for Square Vacuum Pad 2.500" x 2.250" square
VT-FP31X20	Replacement Foam Pad for Square Vacuum Pad 3.125" x 2.000" square
VT-FP33X27	Replacement Foam Pad for Square Vacuum Pad 3.375"x 2.750" square
511-29-12F	T7 Torx driver for 1/4" insert (straight angle insert holders only)
511-29-12E	TORX SCREW M2.5 X 0.45 X (straight angle insert holders only)
T8S	T8 Torx Tip Holding Screws
T15S	T15 Torx Tip Holding Screws
MHS-375	Fixed Double Replaceable Insert Milling Head Screws for Large diameter milling Head (3/8” insert)
MHS-250	Fixed Double Replaceable Insert Milling Head Screws for Small diameter milling Head (1/4” insert)
S1032-250	BH375R1 and BH600R1 Tip Holder Looking Screw (10/32" X 1/4") **Req. 2**
S250-28-250	BH375WR1 Tip Holder Looking Screw 1/4"-28" X 1/4" **Req. 2**
S1032-437	TH1999 Adjusting Screw (10/32" X 7/16")
S1032-375	TH2000 Adjusting Screw (10/32" X 3/8")
S1032-500	TH2001 Adjusting Screw (10/32" X 1/2")
S1032-625	TH2002 Adjusting Screw (10/32" X 5/8")
S600-1570	TH2003 Adjusting Screw (6.00mm X 15.70mm)
S600-2015	TH2004 Adjusting Screw (6.00mm X 20.15mm)
M10X15X35	SG7 Rollover Fixture Hold down swivel Handle Zinc Handle 35mm (1.375") Long stud (KHF-725)
500-13X2	SG9MTS Rollover Fixture Hold down swivel Handle Zinc Handle 2.000" Long stud (KHF-162)
500-13X1375	SG7- SG9MTS Rollover Fixture Lock swivel Handle Zinc Handle 1.375" Long stud (KHF-158)

ICC003	Insert, Indexable carbide, for Fixed milling heads - large size - for 1.562" and larger cutters
ICC002	Insert, Indexable, carbide, for Fixed milling heads - small size - for 1.250" to 1.500" cutters

Carbide Inserts

See Carbide Insert Catalog for a complete list of Insert Profiles available from Rottler Manufacturing.

Special Profiles

Special Profile Cutter Inserts can be manufactured to your exact specifications and can include a combination of angles and radius blends.

There is three different style insert blanks.

A - Style Blank insert, RCA is a small insert for all standard applications.

B - Style Blank insert, RCB in design for long profiles like High Performances profiles with multi angles o Radius or other special applications

C - Style Blank insert, RCC is a much thicker insert for Heavy Duty tooling and can be use for hard seat materials (will work only on the Large Inserts holders series 3000 style insert holders, for the 20.00mm tooling)

Special Order - Special Profile Carbide Cutter Bits are generally considered to be “Customer Proprietary”. These are uniquely numbered, exclusively for the ordering customer; prices will vary depending on quantities and additional charge for initial run.

Call us for a quote.

RT312 Insert, triangular positive rake, 3/8 1/32” (.787mm) radius, for the TH3000 series insert holder and RT212 Insert, triangular positive rake, 1/4” (6.35mm) 1/32 “ radius for the TH2000 series, for hard seat materials applications (Counterboring and straight angles only)

Carbide Pilots

See Carbide Pilot catalog for a complete list of Pilots available.

Rottler Solid Fixed Carbide Pilots are manufactured from fine grain sintered tungsten carbide and are ground to a very high degree of accuracy, straightness and surface finish - designed for a life time of precision machining!

The part number of the pilot represents the actual diameter in metric of the straight/parallel part of the pilot where the pilot fits into the valve guide.

For example:

UCP0700 means that the diameter of the part of the pilot that goes into the valve guide is 7.00mm (0.2756”)

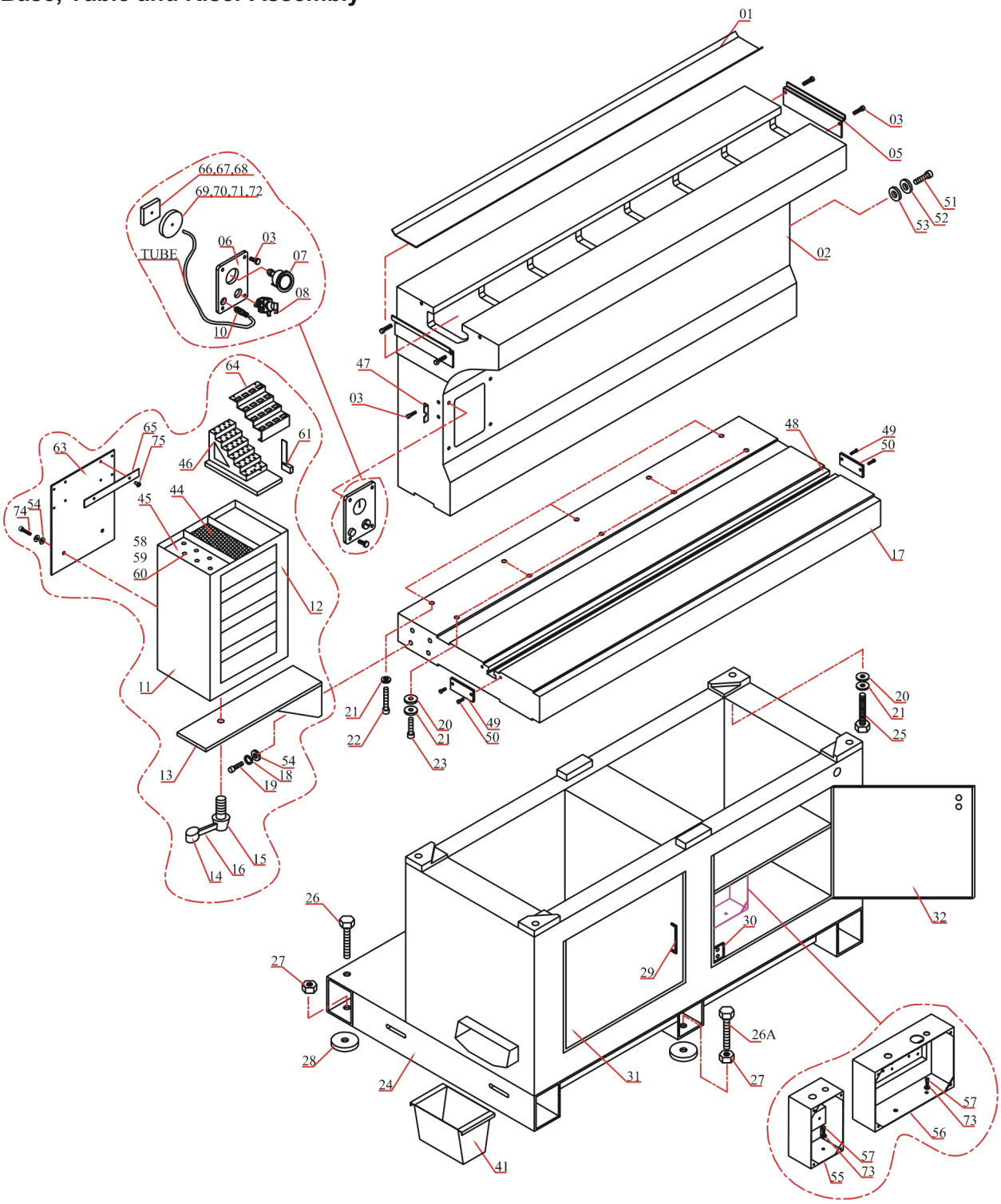
UCP1270 means that the diameter of the part of the pilot that goes into the valve guide is 12.70mm (0.5000”)

Pilots are available in increments of .01mm (0.0004”). Normally, a small amount of clearance approx .01mm (0.0004”) is required between the pilot and the valve guide.

Most new valve guides are manufactured to a nominal size and the valve stem diameters are manufactured to be smaller than the nominal size to allow clearance for heat expansion of the valve stem when the engine is operating. For example: a 7mm valve guide has an internal diameter of exactly 7.00mm (.2756”) The valve stem diameter of the intake valve is 6.98mm (.2748”) and the exhaust is 6.96mm (.2740”). In order for the pilot to fit most all valve guides, the first choice could be UCP0699 to give .01mm (0.0004”) clearance. If the valve guide is used and has some wear, then the second choice of pilot could be UCP0700(0.2756”).

Rottler makes 3 sizes of shanks of pilots:
6.00mm (0.2362”) for small valves guides 6mm (0.236”) and below. The part number for these pilots is UCPM.
0.375” (9.52mm) for common size valve guides, 6-14mm (.236-.625”). The part number for these pilots is UCP.
20mm (0.7874mm) for large valve guides for SG8M0A machine. These pilots are made to order specifications.

Base, Table and Riser Assembly



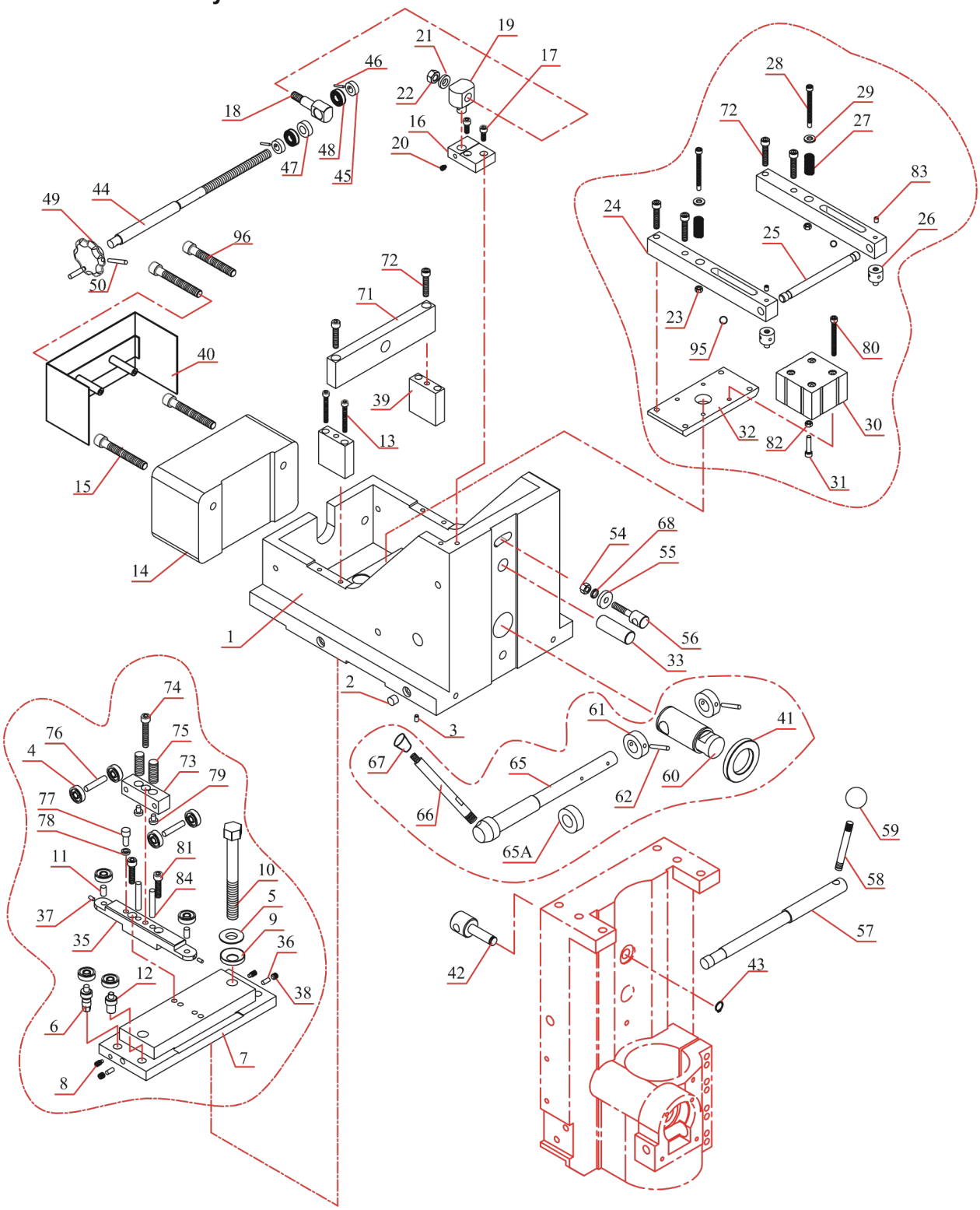
S. NO.	DRAWING PART NO.	NEW DRG. NO. SG-9MTS	DESCRIPTION	QTY/M/C
1.	430-820-1	9MTS-101	COVER PAN	1
2.	NCL -99-2	9MTS-102	RISER	1

3.	430-822	9MTS-103	BUTTON HEAD SCREW (M6x12)	10
4.	----------	----------	----------	
5.	430-821-1	9MTS-105	STOP PLATE	2
6.	033-071		PLATE	1
7.	430-830	9MTS-107	VACCUM GAUGE 2.5" STD-B X ¼ NPT	1
8.	430-831	9MTS-108	N-22-SW (9301)	1
9.	430-832	9MTS-109	SV-3-M5 (6817)	1
10.	430-837	9MTS-110	QSS-6 (153158)	1
11.	430-807	9MTS-111	TOOL CABINET	1
12.	430-816	9MTS-112	TOOL TRAY	4
13.	430-806	9MTS-113	MOUNTING BRACKET	1
14.	430-802	9MTS-114	KNOB (M8x25MM O.D.)	1
15.	430-817-1	9MTS-115	CLAMP PIN	1
16.	430-823	9MTS-116	CLAMP LEVER	1
17.	NC - 41	9MTS-117	TABLE	1
18.	VGS-804	9MTS-118	SPRING WASHER (M8)	4
19.	VGS-803	9MTS-119	ALLEN HEAD SCREW (M8x30)	4
20.	430-811	9MTS-120	PLAIN WASHER (Ø12MM)	11
21.	430-810	9MTS-121	LOCK WASHER (Ø12MM)	14
22.	430-809	9MTS-122	ALLEN HEAD SCREW (M12x70)	3
23.	430-812	9MTS-123	ALLEN HEAD SCREW (M12x50)	7
24.	430-801-1	9MTS-124	CABINET ASSY	1
25.	430-813	9MTS-125	HEX SCREW (M12x50)	4
26.	430-818	9MTS-126	LEVELING BOLT (M16x75)	5
26A.	430-818-1	9MTS-126A	HEX. HEAD SCREW (M16x180)	1
27.	430-818A	9MTS-127	HEX NUT (M16)	6
28.	430-819	9MTS-128	PAD	6
29.	430-825	9MTS-129	HANDLE	2
30.	430-827	9MTS-130	MEGNET BLOCK	2
31.	430-846	9MTS-131	DOOR L.H.	1
32.	430-847	9MTS-132	DOOR R.H.	1
33.	----------	----------	----------	
34.	----------	----------	----------	
35.	----------	----------	----------	
36.	----------	----------	----------	
37.	----------	----------	----------	
38.	----------	----------	----------	
39.	----------	----------	----------	
40.	----------	----------	----------	
41.	430-824	9MTS-141	CHIP TRAY	1
42.	----------	----------	----------	
43.	----------	----------	----------	
44.	430-826-1	9MTS-144	RUBBER SHEET	1
45.	430-829-1	9MTS-145	TOOL BOARD (L.H)	1
46.	430-839-1	9MTS-146	PILOT STAND	1
47.	033-069		SUPPORT BRACKET	1
48.	**NC-124-1 & 1M**	**9MTS-148**	**SCALE(TAPE)- INCH & MM**	**1 EACH**

49. *	NC-42	9MTS-149	STOPPER PLATE	2
50. *		9MTS-150	ALLEN HEAD SCREW (M6x16)	4
51.		9MTS-151	ALLEN HEAD SCREW (M10x25)	4
52.		9MTS-152	SPRING WASHER (10MM)	4
53.		9MTS-153	PLAIN WASHER (10MM)	4

S. NO.	DRAWING PART NO.	NEW DRG. NO. SG-9MTS	DESCRIPTION	QTY/M/C
54.		**9MTS-154**	**PLAIN WASHER (8MM)**	**8**
55.	**NCL-98-2**	**9MTS-155**	**AIR FITTING BOX (SMALL)**	**1**
56.	**NCL-98**	**9MTS-156**	**AIR FITTING BOX**	**1**
57.		9MTS-157	ALLEN HEAD SCREW M6X12	4
58.	430-841	9MTS-158	PIN (NOT SHOWN)	4
59.	430-842	9MTS-159	PIN (NOT SHOWN)	3
60.	430-843	9MTS-160	PIN (NOT SHOWN)	4
61.	UPT-5210	9MTS-161	CHECKING GAUGE	1
62.	----------	----------	----------	
63.	430-839-2	9MTS-163	SUPPORT PLATE	1
64.	430-839-3	9MTS-164	RACK (INSERT HOLDER)	1
65.	430-839-4	9MTS-165	NAME PLATE	2
66.	101A-109	9MTS-166	VACUUM PAD	1
67.	101A-110	9MTS-167	VACUUM PAD	1
68.	101A-111	9MTS-168	VACUUM PAD	1
69.	101A-112	9MTS-169	VACUUM PAD	1
70.	101A-113	9MTS-170	VACUUM PAD	1
71.	101A-114	9MTS-171	VACUUM PAD	1
72.	101A-115	9MTS-172	VACUUM PAD	1
73.		**9MTS-173**	**PLAIN WASHER (Ø6MM)**	**4**
74.		**9MTS-174**	**ALLEN HEAD SCREW (M8x16)**	**2**
75.		**9MTS-175**	**BUTTON HEAD SCREW (M5x6)**	**4**

Workhead Assembly Parts



S. NO.	DRAWING PART NO.	NEW DRG. NO. SG-9MTS	NEW DRG. NO. 044-LOCAL	DESCRIPTION	QTY/M/C

1	**NC-25-3A**	**9MTS-201**		**BASE**	**1**
2	VGS-512	9MTS-202		PLUG G 1/8” (3568)	4
3	VGS-513	9MTS-203		PLUG (BRASS)	12
4	VGS-505	9MTS-204		BALL BRG. (626) 6x19x6	10
5	NC-112-I	9MTS-205		SPHERICALWASHER	2
6	430-506	9MTS-206		ECCENTRIC PIN	2
7	430-501-1	9MTS-207		CLAMP PLATE	1
8	VGS-507	9MTS-208		GRUB SCREW (M5x10)	2
9	NC-112-II	9MTS-209		SPHERICAL WASHER	2
10	430-509-1	9MTS-210		HEX. BOLT(M12x110)	2
11	430-504-1	9MTS-211		PIN	2
12	430-502	9MTS-212		PIN	2
13		9MTS-213		ALLEN HEAD SCREW (M6x50)	4
14	430-518-1	9MTS-214		WEIGHT	1
15	430-519	9MTS-215		ALLEN HD. SCREW (M12x90)	2
16	430-521	9MTS-216		SWIVALING BLOCK	1
17		9MTS-217		ALLEN HD. SCREW (M6x16)	2
18	430-525	9MTS-218		SWIVALING PIN	1
19	430-522	9MTS-219		PIN HOLDER	1
20		9MTS-220		GRUB SCREW (M6x8)	3
21	430-527	9MTS-221		WASHER	1
22	430-528	9MTS-222		NYLOCK NUT (M10)	1
23		9MTS-223		NUT M6	2
24	NC-109	9MTS-224		CLAMP ARM	2
25	NC-110	9MTS-225		CLAMP ARM TIE ROD	1
26	NC-111	9MTS-226		SETTING BOLT	2
27	**282580**	**9MTS-227**		**SPRING (1.25x12x9x41)**	**2**
28		9MTS-228		ALLEN HEAD BOLT(M6x70)	2
29		9MTS-229		PLAIN WASHER DIA. 6	2
30	536363	9MTS-230		PNUMATIC CYL. (ADN-80-10-I-P-A)	1
31	NC-114-1	9MTS-231		CYL. PAD	1
32	NC-108-1	9MTS-232		CYL. MOUNTING PLATE	1
33	430-629-2	9MTS-233		PIVOT PIN	1
34	----------	----------		----------	
35	NC-122	9MTS-235		CROSS-STOP FLAT	1
36	NC-138	9MTS-236		NYLON PLUG (Ø0.170”x0.370”)	2
37	NC-139	9MTS-237		NYLON STOPPER (Ø0.130”x0.250”)	2
38		9MTS-238		GRUB SCREW (M6x6)	2
39	NC-136	9MTS-239		SUPPORT BLOCK	2
40	**SG9-1501**	**9MTS-240**		**CONDUIT CLIP COVER ASSY.**	**1**
41	**430-520**		**044-L-241**	**SPACER**	**1**

42	430-523	9MTS-242		ADJUSTING NUT	1
43	430-524	9MTS-243		EXT. CIRCLIP (1/2")	1
44	430-526	9MTS-244		INCLINATION ROD	1
45	430-548	9MTS-245		RETAINING RING	3
46	430-549	9MTS-246		SPRING PIN 1/8"x 3/4"	2
47	430-551	9MTS-247		NEEDLE BEARING (HK 1210)	1
48	430-550	9MTS-248		THRUST BEARING(12x26x4)	2
49	555-301			HAND WHEEL	1
50	430-530	9MTS-250		GRUB SCREW FLAT PT. (M5x6)	1
51	---------	----------		---------	----
52	---------	----------		---------	----
53	---------	----------		---------	----
54			**044-L-254**	**NUT (M10)**	**2**

S. NO.	DRAWING PART NO.	NEW DRG. NO. SG-9MTS	NEW DRG. NO. 044-LOCAL	DESCRIPTION	QTY/M/C
55	**VGS-640-1**		**044-L-255**	**WASHER**	**1**
56	**430-670**		**044-L-256**	**EYE BOLT**	**1**
57	**NC-35**	**9MTS-257**		**ECCENTRIC CLAMP**	**1**
58	**NC-39**		**044-L-258**	**LEVER PIN**	**1**
59	**430-802**	**9MTS-114**		**KNOB (M8x25)**	**1**
60	**430-629-1**		**044-L-260**	**CLAMP PIN**	**1**
61	**430-510**		**044-L-261**	**ECC. COLLAR**	**2**
62	**430-552**		**044-L-262**	**TAPER PIN**	**2**
63	---------	----------		---------	----
64	---------	----------		---------	----
65	**NC-34**	**9MTS-265**		**CLAMP**	**1**
65A					
66	**430-516**	----------	**044-L-266**	**LEVER**	**1**
67	**430-517**	----------	**044-L-267**	**KNOB (M8x50)**	**1**
68			**044-L-268**	**SPRING WASHER (Ø10MM)**	**1**
69	----------	----------		----------	
70	----------	----------		----------	
71	NC-115-1	9MTS-271		PIVOT SUPPORT	1
72		9MTS-272		ALLEN HEAD SCREW (M8x40)	6
73	NC-119	9MTS-273		BEARING BLOCK	1
74		9MTS-274		ALLEN HEAD SCREW (M6x35)	1
75	NC-121	9MTS-275		JACK SCREW	2
76	NC-120	9MTS-276		ROD	2
77	NC-122-1	9MTS-277		ALLEN HEAD SCREW (SPL.)	1
78	NC-122-2	9MTS-278		SPACER	1

79	NC-121-1	9MTS-279		THRUST PAD	2
80		9MTS-280		ALLEN HEAD SCREW (M8x75)	4
81		9MTS-281		ALLEN HEAD SCREW (M6x25)	2
82		9MTS-282		NUT M10	1
83		9MTS-283		GRUB SCREW M6x8	2
84		9MTS-284		DOWEL PIN Ø6x35	2
85					
86					
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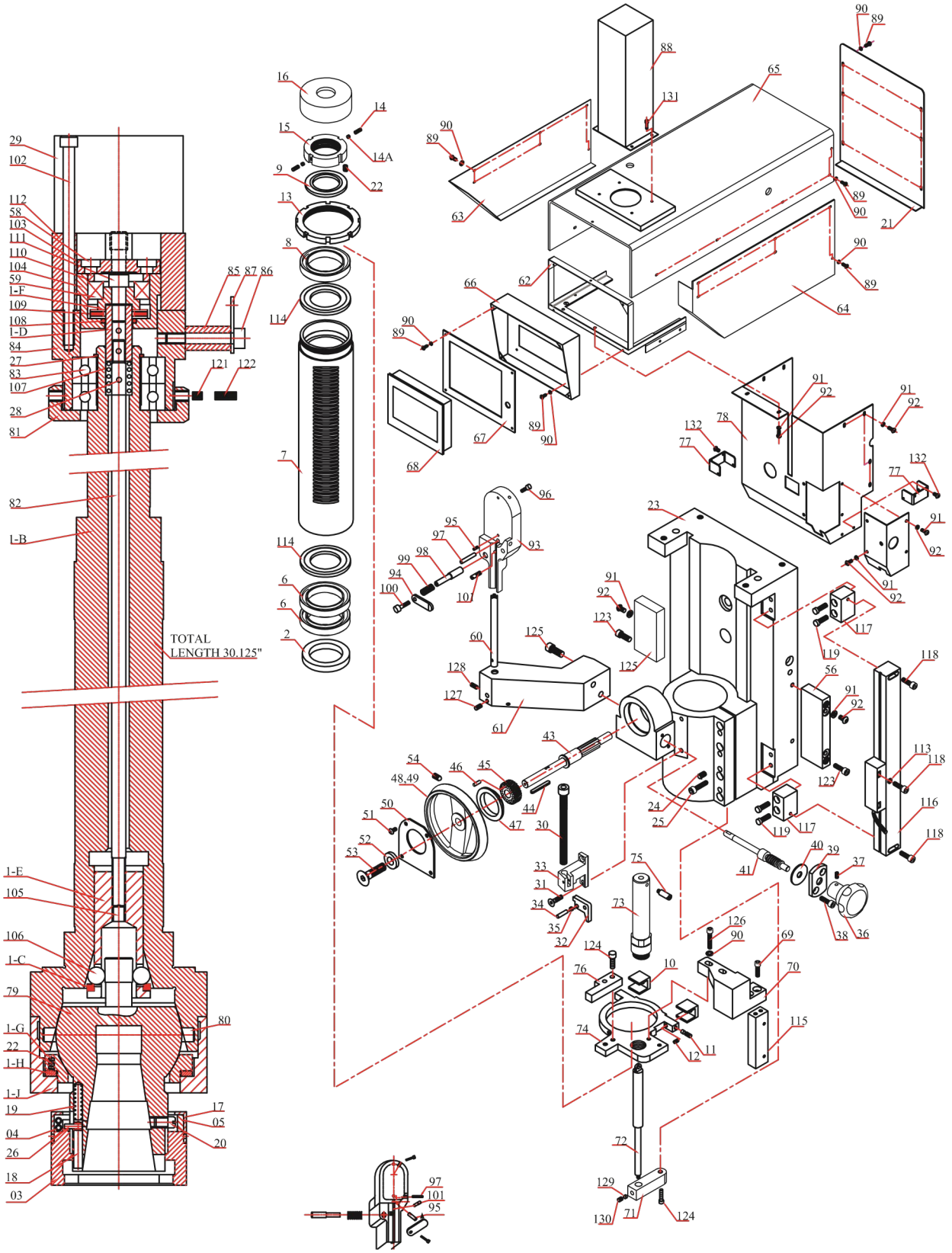
93					
94					
95			9MTS-295	STEEL BALL (3/8”)	2
96			**9MTS-296**	**ALLEN HEAD SCREW (M6x80)**	**2**

Spindle Assembly



S. NO.	DRAWING PART NO.	NEW DRG. NO. SG-9MTS	DESCRIPTION	QTY/M/C
1-A*	NCL-69-00	9MTS-301-A	DRIVE SHAFT COMPLETE ENCLUDED	1
1-B*	NCL-69-C	9MTS-301-B	DRIVE SHAFT ASSY.	1
1-C*	NCL-71-S	9MTS-301-C	SPACER	1
1-D*	NCL-72-1	9MTS-301-D	ROTATING PIN	1
1-E*	NCL-74-1	9MTS-301-E	PLUNGER	1
1-F*	NCL-72-2	9MTS-301-F	BEARING HOLDER	1
1-G*	NCL-77	9MTS-301-G	LOWER CONE	1
1-H*	NCL-78	9MTS-301-H	SPACER	1
1-J*	FH-079-S	9MTS-301-J	SPHERE CAP	1
2	430-671	9MTS-302	RUBBER SEAL (50x70x10)	1
3	KS-08-07	9MTS-303	QUICK NUT	1
4	KS-08-03	9MTS-304	SPRING	2
5	KS-08-02	9MTS-305	PAD	2
6*	430-659-1	9MTS-306	ANG. CONT. (PAIR) BEARING (40x68x30) (7008A5TRDULP3)	1
7*	NC-148	9MTS-307	COLUMN (TOTAL LENGTH 13.185")	1
8	430-648-1	9MTS-308	ANG. CONT. BEARING (40x68x15)	1
9	430-605-1	9MTS-309	SPACER	1
10	NC-32	9MTS-310	BRASS PAD	2
11	430-623A	9MTS-311	C.PT. GRUB SCREW (M5x16)	2
12	430-623B	9MTS-312	F.PT GRUB SCR.(M5x6)	2
13	NC-33	9MTS-313	STOP PLATE LOCK NUT	1
14	430-603A	9MTS-314	GRUB SCREW (M6x8)	2
14A	430-603B	9MTS-314A	PLUG	2
15	430-603	9MTS-315	LOCK NUT	1
16	430-601	9MTS-316	END STOPPER	1
17	KS-08-06	9MTS-317	COVER	1
18	KS-08-05	9MTS-318	PIN	1
19	KS-08-04	9MTS-319	SPRING	1
20	KS-08-01	9MTS-320	STOP PIN	1
21	430-715-1	9MTS-321	BACK COVER	1
22		9MTS-322	SPRING (5203-3)	7
23	**430-614-A**	**9MTS-323**	**SPINDLE HOUSING**	**1**
24	430-627	9MTS-324	GRUB SCR. D.PT. (M8x25)	4
25	430-609	9MTS-325	ALLEN HEAD SCREW(M8x30)	5
26		9MTS-326	ROLL PIN DIA. 0.093"X0.312"	1
27*		9MTS-327	EXT. CIRCLIP (DIA.20MM)	1
28*		9MTS-328	PIN (DIA. 0.093”)	1
29*	536279-B008	9MTS-329	AIR CYLINDER	1
30	430-615 (A&B)	9MTS-330	CONTROL STOP SCREW ASSY.	1 EACH
31	430-607	9MTS-331	C’SINK SCREW (M6x15)	2
32	430-620	9MTS-332	CONTROL STOP LATCH	1
33	430-606-1	9MTS-333	STOP ROD BLOCK	1
34	430-617	9MTS-334	PIN (3/16”x3/4”)	1
35	430-618	9MTS-335	SPRING	1
36	430-664-1	9MTS-336	FEED KNOB	1
37	430-665	9MTS-337	SET SCR. F. PT. (M6x6)	2
38		9MTS-338	C’ SINK SCREW (M5x12)	2

39	430-663-I	9MTS-339	END COVER	1
40	430-662	9MTS-340	WASHER	1
41	430-660-I	9MTS-341	WORM SHAFT	1
42	-----	----------	--------	----
43	430-631-I	9MTS-343	PINION	1
44	430-632-1	9MTS-344	KEY	1
45	430-661-I	9MTS-345	WORM WHEEL	1

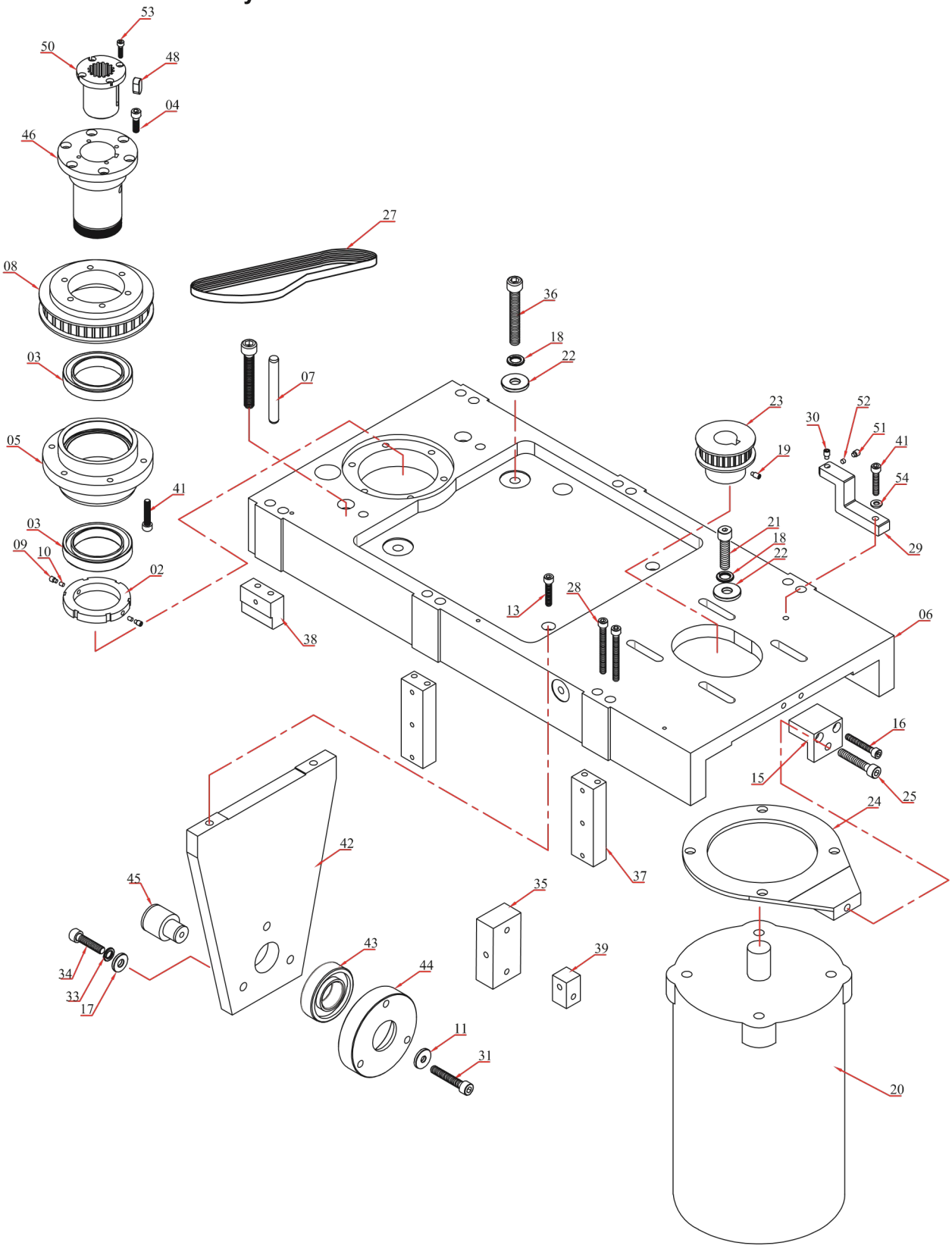
S. NO.	DRAWING PART NO.	NEW DRG. NO. SG-9MTS	DESCRIPTION	QTY/M/C
46	430-667	9MTS-346	PIN (Ø5x0.450”L)	2
47	430-634	9MTS-347	SPACER	1
48	430-635-I	9MTS-348	HAND WHEEL	1
49	430-635-2	9MTS-349	HAND WHEEL EXTENSION	1
50	430-668	9MTS-350	COVER PLATE	1
51	430-666	9MTS-351	BUTTON HEAD SCREW (M5x10)	4
52	430-636	9MTS-352	WASHER	1
53	430-636A	9MTS-353	C’SINK SCREW (M6x15)	1
54	430-639	9MTS-354	M6-BALL PLUNGER SCREW	1
55	430-682	9MTS-355	SPACING FLAT	1
56	430-681	9MTS-356	SPACING FLAT	1
57				
58*	----------	9MTS-358	AL. HD. SCREW M5x12	4
59*	----------	9MTS-359	BALL BEARING (6001-2RS 1)	1
60	430-616	9MTS-360	LEVELING PIN	1
61	NC-37	9MTS-361	PLATE (LEVELING PIN)	1
62	430-650-1	9MTS-362	SHROUD	1
63	NC-48-1	9MTS-363	RIGHT SIDE COVER	1
64	NC-47-1	9MTS-364	LEFT SIDE COVER	1
65	NC-49-1A	9MTS-365	TOP COVER	1
66	NC-166-1	9MTS-366	PANEL BOX	1
67	NC-165-1	9MTS-367	PANEL PLATE	1
68	NC-158-10	9MTS-368	TOUCH SCREEN 10”	1
69		9MTS-369	ALLEN HEAD SCREW M5x16	2
70	NC-163	9MTS-370	SLIDE MTG. BKT.	1
71	430-712-1	9MTS-371	HOLDER	1
72	430-714-R	9MTS-372	GAS SPRING (150N)	1
73	NC-147	9MTS-373	TUBE	1
74	430-625R-1	9MTS-374	PLATE	1
75	NC-173	9MTS-375	PIVOT PIN	1
76	430-625R-IV	9MTS-376	STOPPER PLATE	1
77	NC-40-2-A	9MTS-377	BKT. LIGHT MTG.	2
78	NC-40-1	9MTS-378	FRONT COVER	1
79*	NCL-76-1	9MTS-379	DRIVE ADAPTOR	1
80*		9MTS-380	PIN (DIA. 0.250” X 0.750 LONG)	2
81*	NCL-70-2	9MTS-381	CLAMP NUT	1
82*	NCL-73-S	9MTS-382	TIE ROD	1
83*		9MTS-383	BEARING (20x42x12) 6004-2Z	2
84*	NCL-70-1	9MTS-384	BEARING HOUSING	1
85*	NC-93	9MTS-385	STOPPER	1

86*		9MTS-386	ALLEN HEAD SCREW(M10x55)	1
87*	NCL-97	9MTS-387	CABLE BRACKET	1
88*	NCL-81-2	9MTS-388	CYLINDER COVER	1
89		**9MTS-389**	**BUTTON HEAD SCREW (M5x12)**	**36**
90		**9MTS-390**	**WASHER DIA. 5(BLACK)**	**37**
91		**9MTS-391**	**WASHER DIA. 6**	**14**
92		**9MTS-392**	**BUTTON HEAD SCREW (M6x12)**	**14**
93	430-1049 B	9MTS-393	LEVEL BLOCK	1
94	430-1025	9MTS-394	CLAMP	1
95		9MTS-395	GRUB SCREW (M5 x 16)	1
96		9MTS-396	ALLEN HEAD SCREW (M3 x 12)	2
97		9MTS-397	DOWEL PIN (Ø3/16 x 3/4 LONG)	1
98	430-1026	9MTS-398	CLAMP PIN	1

S. NO.	DRAWING PART NO.	NEW DRG. NO. SG-9MTS	DESCRIPTION	QTY/M/C
99	430-1026-1	9MTS-399	SPRING	1
100		9MTS-3-100	BUTTON HEAD (SCREW M5 x 10)	1
101	430-1049C	9MTS-3-101	SLIDE PIN	1
102*		9MTS-3-102	SCREW (M5x95)	4
103*	NC-141	9MTS-3-103	SUPPORT PLATE	1
104*	NC-140	9MTS-3-104	BEARING HOUSING	1
105*		9MTS-3-105	GRUB SCREW (M6x8)	1
106*		9MTS-3-106	BALL 5/16	4
107*		9MTS-3-107	SPRING (033-KIT)	1
108*	NC-145	9MTS-3-108	O-RING	1
109*	NC-144	9MTS-3-109	THRUST BEARING (12x26x4)	1
110*	NC-142	9MTS-3-110	SPACER	1
111*		9MTS-3-111	ALLEN HEAD SCREW M6x16	1
112*	NC-143	9MTS-3-112	SPACING BLOCK	1
113	NC-172	9MTS-3-113	WASHER	2
114	NC-150	9MTS-3-114	SPACER	2
115	NC-164	9MTS-3-115	MOUNTING FLAT	1
116	NC-159	9MTS-3-116	GLASS SCALE (220)	1
117	**NC-161-1**	**9MTS-3-117**	**GLASS SCALE MOUNTING BLOCK (UPPER & LOWER)**	**1EACH**
118		9MTS-3-118	ALLEN HEAD SCREW M4x20	4
119		**9MTS-3-119**	**ALLEN HEAD SCREW M6x35**	**4**
120	------	------	----------	---
121*		9MTS-3-121	NYLON PLUG Ø0.140”x0.080”L	2
122*		9MTS-3-122	F.PT. GRUB SCREW M5x6	2
123		9MTS-3-123	ALLEN HEAD SCREW (M6x30)	4
124		**9MTS-3-124**	**ALLEN HEAD SCREW (M6x20)**	**3**
125		9MTS-3-125	ALLEN HEAD SCREW (M8x45)	2
126		9MTS-3-126	ALLEN HEAD SCREW (M5x25)	2

127		9MTS-3-127	GRUB SCREW (M5x10)	1
128		9MTS-3-128	GRUB SCREW (M5x12)	3
129		**9MTS-3-129**	**NYLON PLUG M5**	**1**
130		**9MTS-3-130**	**GRUB SCREW (M5x5)**	**1**
131		**9MTS-3-131**	**ALLEN HEAD SCREW (M5x10)**	**4**
132.		**9MTS-3-131**	**BUTTON HEAD SCREW (M5x6)**	**4**

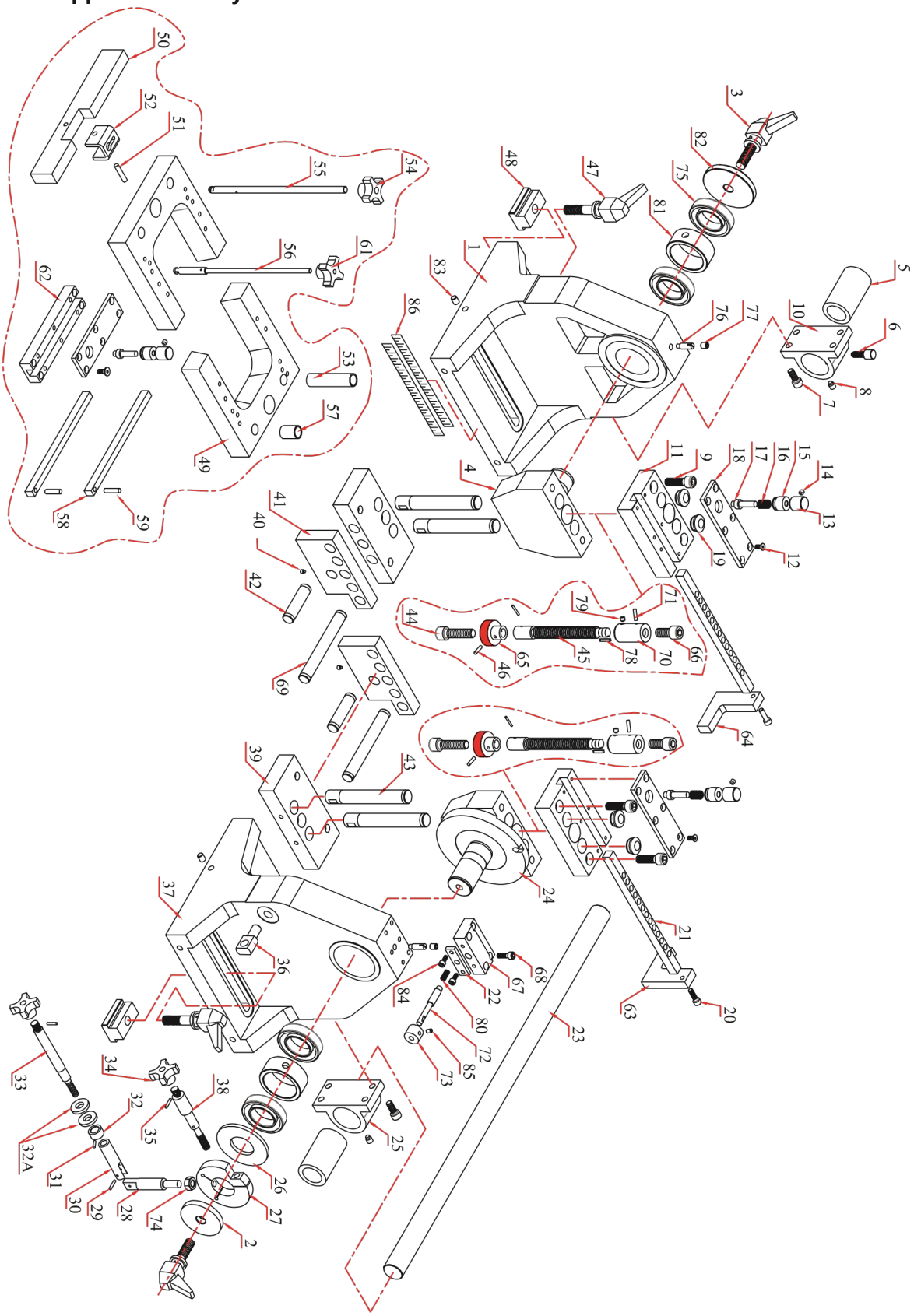
Transmission Assembly



S. NO.	DRAWING PART NO.	NEW DRG. NO. SG-9MTS	DESCRIPTION	QTY/M/C
1	------	----------	-------	
2	NC-155-1	9MTS-402	LOCK NUT	1
3		9MTS-403	BALL BEARING (6910)	2
4	430-705A	9MTS-404	ALLEN HEAD SCREW (M6x20)	6
5	NC-117-2	9MTS-405	BEARING HOUSING	1
6	430-735-3	9MTS-406	TOP PLATE	1
7		9MTS-407	DOWEL PIN (10x80)	2
8	445-702	9MTS-408	SPINDLE PULLEY	1
9	----------	9MTS-409	F.PT GRUB SCREW M5x6	2
10	----------	9MTS-410	NYLON PLUG DIA. 0.140” x 0.180” LONG	2
11	VGS-740	9MTS-411	WASHER	1
12	------	----------	-------	
13		9MTS-413	ALLEN HEAD SCREW (M8x55)	2
14	------	----------	-------	-----
15	NC-134	9MTS-415	BACK PLATE	1
16		9MTS-416	ALLEN HEAD SCREW (M6x40)	2
17	430-735W	9MTS-417	SPACER	3
18		9MTS-418	SPRING WASHER (M10)	6
19	VGS-753	9MTS-419	GRUB SCREW F. PT. (M5x10)	2
20	430-726	9MTS-420	MOTOR (VM3558)	1
21	VGS-731	9MTS-421	ALLEN HEAD SCREW (3/8x1 -1/2”)	4
22	VGS-732	9MTS-422	PLAIN WASHER(10MM)	6
23	445-738	9MTS-423	MOTOR PULLEY	1
24	NC-133	9MTS-424	MOTOR FLANGE	1
25		9MTS-425	ALLEN HEAD SCREW (M8x45)	1
26	---------	----------	---------	----
27		9MTS-427	POLYCHAIN BELT (1200-8M-12)	1
28		9MTS-428	ALLEN HEAD SCREW (M6x55)	12
29	445-738-1	9MTS-429	HIGHT GAUGE	1
30		9MTS-430	F.PT GRUB SCREW M6 x 10	1
31	----------	9MTS-431	ALLEN HEAD SCREW M6x20	1
32	----------	----------	----------	
33	----------	9MTS-433	SPRING WASHER(Ø8)	3
34		9MTS-434	ALLEN HEAD SCREW (M8x35)	3
35	430-720-1	9MTS-435	SUPPORT BLOCK	2
36		9MTS-436	ALLEN HEAD SCREW (M10x75)	4
37	430-718-1	9MTS-437	COVER SUPPORT	4
38	430-719-1	9MTS-438	COVER SUPPORT	2
39	430-720	9MTS-439	COVER SUPPORT	4
40	----------	----------	----------	
41		9MTS-441	ALLEN HEAD SCREW (M6x30)	7
42	NC-29-A	9MTS-442	SUPPORT FLAT	1
43		9MTS-443	BALL BEARING (6206-2RS1)	1
44	430-534-B	9MTS-444	BRG. SUPPORT	1
45	430-534-A	9MTS-445	PIVOT PIN	1

46	NC-153	9MTS-446	FLANGE	1
47	----------	----------	----------	
48	NC-156	9MTS-448	KEY (6MMx30)	1
49	----------	----------	----------	
50	430-701-1	9MTS-450	SPLINE BUSH	1
51		9MTS-451	GRUB SCREW FLAT POINT M5x6	1
52		9MTS-452	NYLON PLUG DIA. 0.140” x0.080”	1
53		9MTS-453	ALLEN HEAD SCREW M4x16	4
54			PLAIN WASHER (ØH6MM)	1

Head Support Assembly

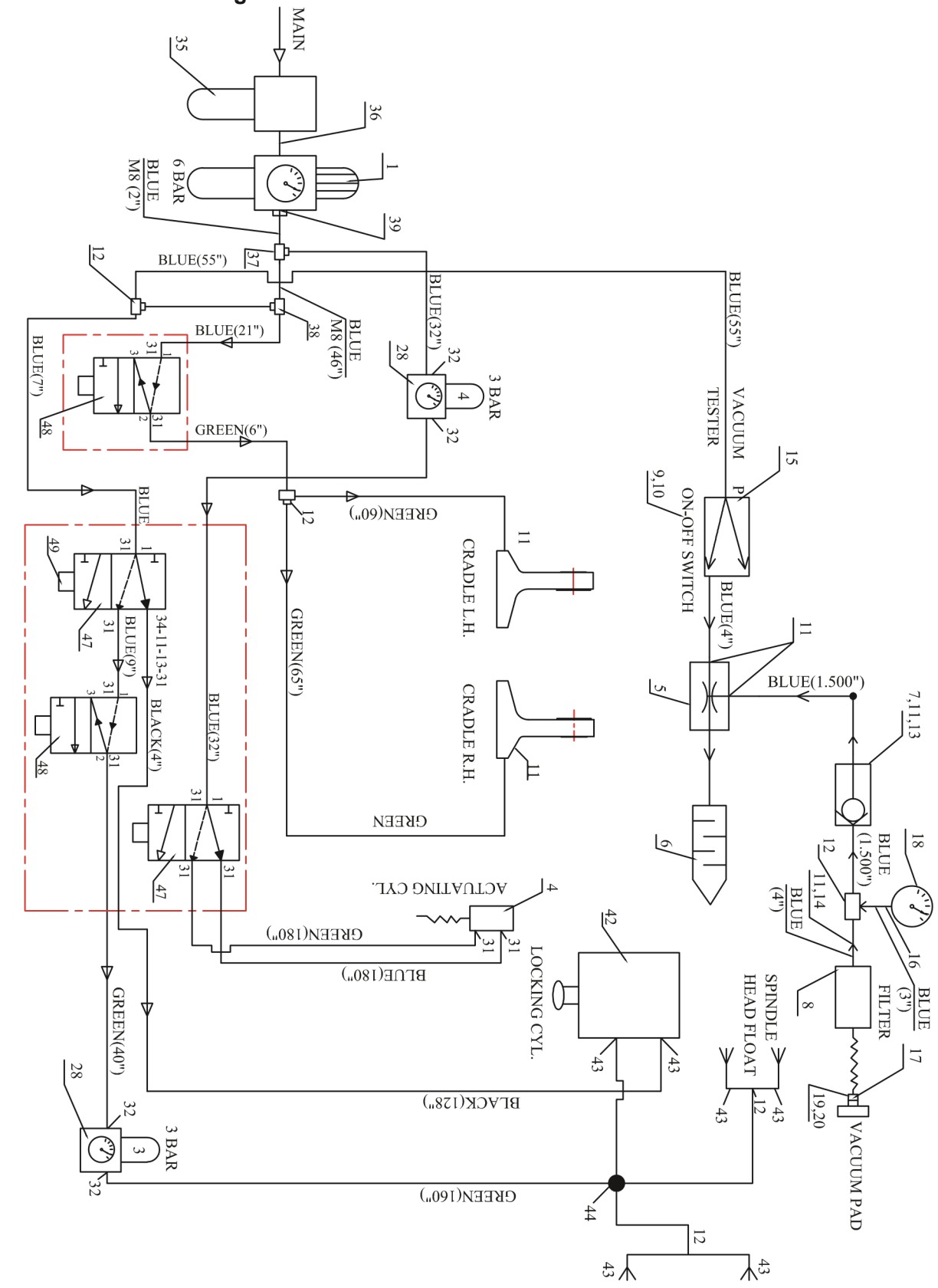


S. NO.	DRAWING PART NO.	NEW DRG. NO. SG-9MTS	DESCRIPTION	QTY/M/C
1*	430-913-B	9MTS-501	HEAD SUPPORT LEFT	1
2	430-912	9MTS-502	WASHER	1
3-1	**430-938 A**	**9MTS-503-1**	**CLAMP BOLT L.H**	**2**
3-2	**430-938 C**	**9MTS-503-2**	**CLAMP BOLT R.H.**	**2**
3A	430-938 B	9MTS-503A	WASHER	4
3B	430-938 D	9MTS-503B	PIN	4
4	SF-113	9MTS-504	HOLDER LEFT	1
5	430-901	9MTS-505	BUSH	2
6	430-911	9MTS-506	KNOB	1
7	430-906	9MTS-507	ALLEN HEAD BOLT (M8x20)	8
8		9MTS-508	GRUB SCREW (M8x10)	2
9	VGS-959	9MTS-509	ALLEN HEAD BOLT (M10x35 LONG)	4
10	430-902	9MTS-510	BEARING BUSH LEFT	1
11	SF-101	9MTS-511	PLATE	2
12	430-925	9MTS-512	C'SINK SCREW (M5x12)	24
13	430-918	9MTS-513	KNURLING COLLAR	4
14	430-917	9MTS-514	GRUB SCREW (M6x6)	4
15	430-916	9MTS-515	PIN HOLDER	4
16	430-921	9MTS-516	SPRING (SAME AS #100-057)	4
17	430-919	9MTS-517	PLUNGER	4
18	430-915	9MTS-518	PLATE	2
19	VGS-960	9MTS-519	CAP (BLACK)	4
20	430-936	9MTS-520	ALLEN HEAD SCREW (M6x20)	2
21	SF-108	9MTS-521	FLAT	2
22	SF-164	9MTS-522	HOLDING PLATE	1
23	430-914	9MTS-523	GUIDE ROD	1
24	SF-112	9MTS-524	HOLDER RIGHT	1
25	430-907	9MTS-525	BEARING BUSH RIGHT	1
26	430-934	9MTS-526	SPACER	1
27	430-933	9MTS-527	COLLAR	1
28	430-929	9MTS-528	ARM	1
29	VGS-928	9MTS-529	PIN (1/8"x5/8")	1
30	430-927	9MTS-530	CLAMP	1
31	430-904	9MTS-531	ROLL PIN (1/8"x3/4")	1
32	430-548	9MTS-532	RETAINING RING	1
32A	430-550	9MTS-248	THRUST BEARING (12x26x4)	2
33	430-926	9MTS-533	ADJUSTING SCREW	1
34	430-923	9MTS-534	KNOB	2
35	430-924	9MTS-535	PIN (1/8" x1 1/16")	2
36	430-922	9MTS-536	PIVOT BLOCK	1
37*	430-920-B-SPL	9MTS-537	HEAD SUPPORT RIGHT	1
38	430-931	9MTS-538	LOCK COLLAR SCREW	1
39	SF-104	9MTS-539	CLAMP PLATE	2
40		9MTS-540	GRUB SCREW (M5x6)	2
41	430-964-1	9MTS-541	CLAMP	2
42	430-949	9MTS-542	PIVOT PIN	2
43	430-961	9MTS-543	GUIDE PIN	4

44	430-967	9MTS-544	ALLEN HD. SCREW (M12x45)	2
45	SF-103	9MTS-545	SCREW	2
46	VGS-963	9MTS-546	PIN (5/32”x5/8” LONG)	4
47	430-941	9MTS-547	HANDLE	2
48	430-939	9MTS-548	T-NUT	2
49	SF-110	9MTS-549	HEAD SUPPORT	2
50	430-945	9MTS-550	BAR	2
51	430-946	9MTS-551	ROLL PIN (1/4”x1 ¼”)	2
52	430-947	9MTS-552	SWIVEL CLAMP	2

S. NO.	DRAWING PART NO.	NEW DRG.. NO. SG-9MTS	DESCRIPTION	QTY/M/C
53	430-943	9MTS-553	TUBE	2
54	430-942	9MTS-554	KNOB	2
55	430-948	9MTS-555	TAKE UP ROD	2
56	430-948A	9MTS-556	TAKE UP ROD (1/4”)	2
57	430-943S	9MTS-557	TUBE (SMALL)	2
58	430-944S	9MTS-558	PARALLEL FLAT	2
59		9MTS-559	DOWEL PIN (1/4” X 1”) (PURCHASED)	2
60	430-965-1	9MTS-560	CLAMPING PIN (NOT SHOWN)	4
61	430-942-A	9MTS-561	KNOB (1/4”)	2
62	430-944-II	9MTS-562	LOCATING BLOCK	2
63	430-935-I	9MTS-563	STOP PLATE R. H.	1
64	430-937-I	9MTS-564	STOP PLATE L. H.	1
65	430-962-2	9MTS-565	KNOB	2
66		9MTS-566	ALLEN HEAD SCREW (M12x25)	2
67	SF-162	9MTS-567	GUIDE BLOCK	1
68		9MTS-568	ALLEN HEAD SCREW (M6x20)	4
69*	NC-59B	9MTS-569	ALIGNMENT BAR	2
70	SF-107	9MTS-570	TOMMY NUT	2
71	SF-130	9MTS-571	PIN Ø0.156”x0.970” LONG	2
72	SF-163	9MTS-572	STOPPER PIN	1
73	SF-165	9MTS-573	KNOB	1
74		9MTS-574	NUT M10	1
75	430-950	9MTS-575	BALL BEARING (6007-2RS-1)	4
76	430-951	9MTS-576	SETTING SCREW	2
77	430-952	9MTS-577	GRUB SCREW M8x10	2
78	430-953	9MTS-578	KEY	2
79	430-954	9MTS-579	GRUB SCREW M6x6	2
80	SF-164-1	9MTS-580	SPRING	1
81	430-973	9MTS-581	SPACER	2
82	430-972	9MTS-582	WASHER	1
83		9MTS-583	PLUG 1/8 NPT	10
84		9MTS-584	ALLEN HEAD SCREW (M5x12)	2
85		9MTS-585	GRUB SCREW M5x8	1
86	**430-913-B-S**	**9MTS-586**	**SCALE (TAPE)**	**1 EACH**

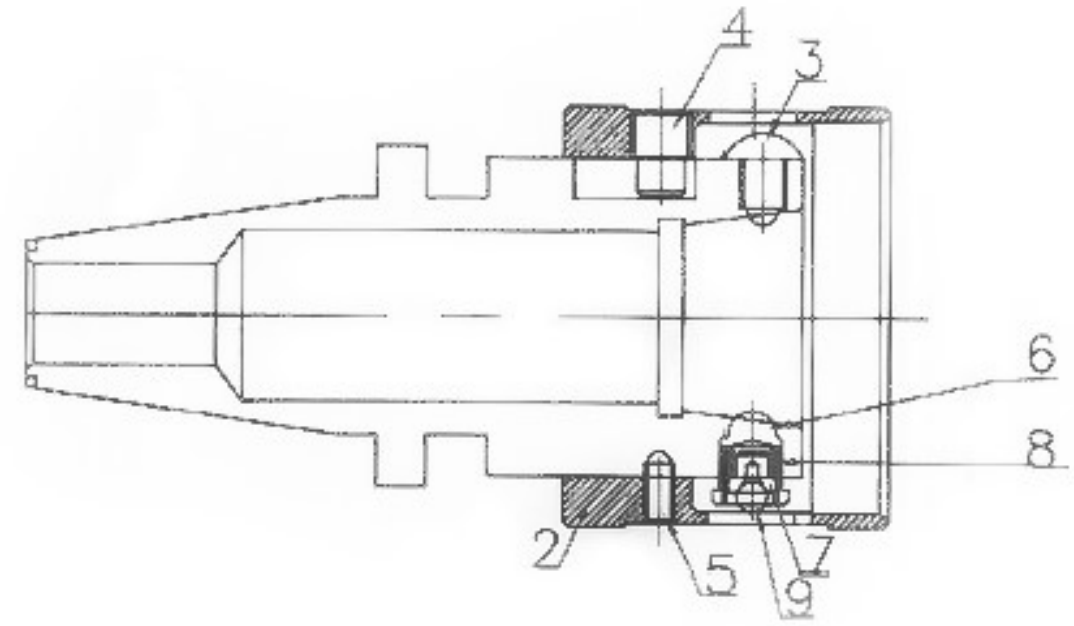
Pneumatic Circuit Diagram and Parts



PART LIST				
MACHINE TYPE: PNEUMATIC PARTS				
MODEL : S G-9MTS				
S. NO.	PART NO.	DESCRIPTION	QTY	REMARKS
1	162721	FILTER REGULATOR	1	LFR-3/8-D-5M-MIDI
2				
3				
4	536279	AIR CYLINDER B 008	1	ADN 32-10-1-P-A
5	14015	VACUUM GENERATOR	1	VAD 1/8
6	2307	SILENCER	1	U-1/8
7	3324	NON RETURN VALVE	1	H-1/8 A/I
8	160239	VACUUM FILTER	1	V-AF-PK-6
9	9301	SELECTOR ACTUATER	1	N-22-S
10	6817	BASIC VALVE	1	SV-3-M5
11	153002	PUSH-IN/ THREADED FITTING	7	QS-1/8-6
12	153129	PUSH IN T CONNECTOR	5	QST-6
13	153023	PUSH-IN/THREADED FITTING	2	QSF-1/8-6-B
14	153165	PUSH-IN/THREADED BULK HEAD FITTING	1	QSSF-18/-8-B
15	153306	PUSH IN/THREADED FITTING	2	QSM-M5-6
16	153024	PUSH IN/THREADED FITTING	1	QSF-1/4-6-B
17	153004	PUSH IN/THREADED FITTING	1	QS-1/8-8
18		VACUUM GAUGE	1	
19	92142110	FEMALE BODY	1	
20	90872110	MALE THREAD	7	
21		RE COIL TUBE OF 8MM OD & 3METERL ONG	1	
		BLUE COLOUR WITHOUT END FITTINGS		
22	02851100	INT . HEX. HEAD PLUG 1/8 NTP	10	
23		TUBE 6x4 MM BLACK	8M	
24		TUBE 6x4 MM BLUE	8M	
25		TUBE 8x55 MM BLUE	2M	
26		TUBE 6x4 MM GREEN	10M	
27	------	------	---	
28	159625	PRESSURE REGULATER	2	LR-1/4-D-MINI
29	------	------	---	
30	------	------	---	
31	153046	PUSH IN/THREADED-L- FITTING	12	QSL-1/8-6
32	153047	PUSH IN/THREADED-L- FITTING	4	QSL-1/4-6
33	------	-------	---	
34	151165	FLOW CONTROL VALVE	1	GRLA-1/8-B
35	159576	FILTER	1	LF-3/8-D-MIDI
36	15625	DOUBLE NIPPLE	1	E-3/8-3/8-MS
37	153135	PUSH IN T CONNECTOR	1	QST 8-6
38	153154	PUSH IN Y CONNECTOR	1	QSY-8-6
39	153006	PUSH IN/THREADED FITTING	1	QS-3/8-8
40	------	-------	---	
41	3568	PLUG	4	G 1/8

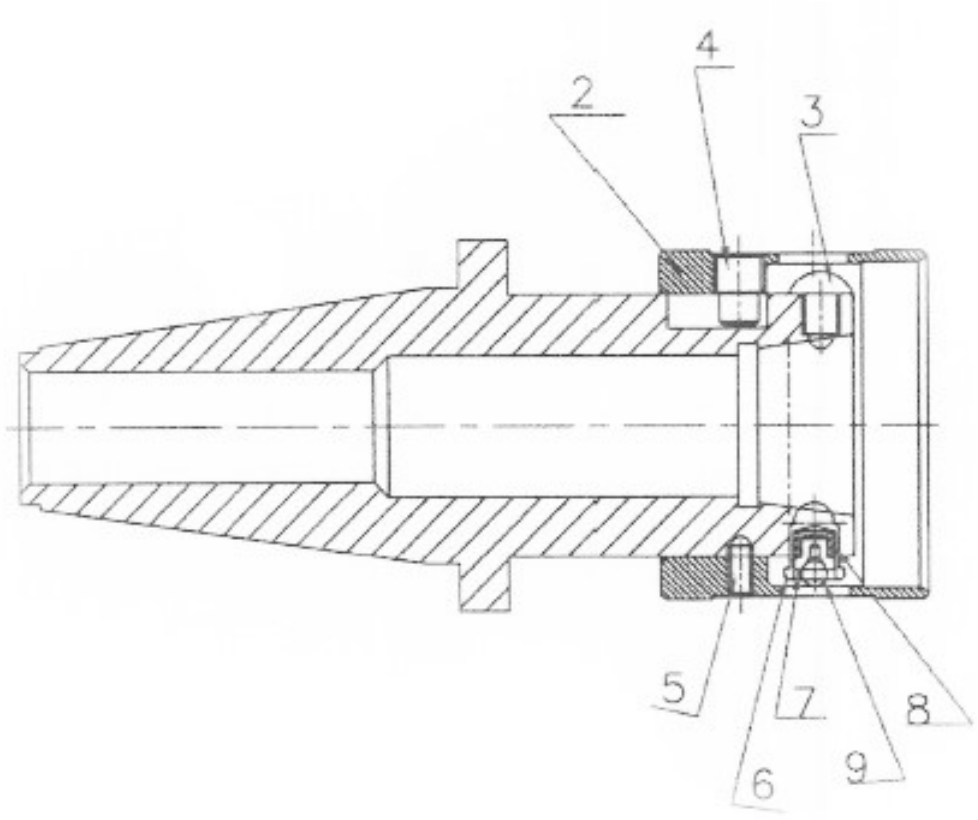
42	536363	AIR CYLINDER	1	ADN-80-10-I-P-A
43	153336	PUSH IN THREADED L-FITTING	6	SMALL
44	153380	PUSH IN X CONNECTOR	1	
45	------	-------	---	
46	------	-------	---	
47	9982	SOLENOID VALVE	2	MFH-5-1/8
48	7802	SOLENOID VALVE	2	MFH-3-1/8
49	4540	SOLENOID COIL	4	MSFW-230 AC
50	------	-------	---	

RBHAR1KIT Repair Kit for RBHAR1



Item	Part #	Description	Quantity
2	RBHAR1COL	Collar	1
3	555-19-19	Stop Screw	2
4	555-19-20	Dog Point Screw	2
5	555-19-21	Ball Point	2
6	555-19-22	Detent	4
7	555-19-23	Ball Seat	4
8	555-19-24	Spring	4
9	555-19-25	Ball (4mm)	4

RBHAR40UPCKIT Repair Kit for RBHAR40UPT



Item	Part #	Description	Quantity
2	RBHAR40UPCCOL	Collar	1
3	555-19-19	Stop Screw	2
4	555-19-20	Dog Point Screw	2
5	555-19-21	Ball Point	2
6	555-19-22	Detent	4
7	555-19-23	Ball Seat	4
8	555-19-24	Spring	4
9	555-19-25	Ball (4mm)	4

SDS

The Safety Data Sheets list shown in this section are the substances and materials that an operator is most likely to come in contact with while using this machine.

Other substances and materials are used in the manufacture, testing, and shipping of this machine. A complete list of the Safety Data Sheets of substances and materials used by Rottler Manufacturing during manufacturing, testing, and shipping is located on the Manual flash drive shipped with the machine. Safety Data Sheets are also located on the company web site: http://www.rottlermfg.com/documentation.php

1) Way Oil

2) Multi-Purpose EP Grease

Safety Data Sheet

According to OSHA HCS 2012 (29 CFR 1910,1200)
Health Canada HPR (SOR/2015-17), and
Mexico NOM-018-STPS-2015

SECTION 1: Identification

Product Identifier:	**Multi-Way Oil HD**
Other means of identification:	Phillips 66 Multi-Way Oil HD 22 Phillips 66 Multi-Way Oil HD 32
Code:	LBPH81776
Relevant identified uses:	Way Oil
Uses advised against:	All others
24 Hour Emergency Phone Number:	CHEMTREC: 1-800-424-9300 CHEMTREC Mexico: 01-800-681-9531

Manufacturer/Supplier	SDS Information	Customer Service
Phillips 66 Lubricants	URL: www.phillips66.com/SDS	U.S.: 800-368-7128
P.O. Box 4428	Phone: 800-762-0942	International: 1-832-765-2500
Houston, TX 77210	Email: SDS@P66.com	Technical Information
		1-877-445-9198

SECTION 2: Hazard Identification

Classified Hazards	Hazards Not Otherwise Classified (HNOC)
No classified hazards	PHNOC: None known
	HHNOC: None known
Label Elements	
No classified hazards	

SECTION 3: Composition/Information on Ingredients

Chemical Name	CASRN	Concentration
Distillates, petroleum, hydrotreated heavy paraffinic	64742-54-7	>40%
Distillates, petroleum, solvent-dewaxed heavy paraffinic	64742-65-0	>40%
Residual oils, petroleum, solvent-dewaxed	64742-62-7	>10%

All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

SECTION 4: First Aid Measures

Eye Contact: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing and cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops and persists, seek medical attention.

Inhalation: First aid is not normally required. If breathing difficulties develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. Seek immediate medical attention.

Ingestion: First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention

Most important symptoms and effects, both acute and delayed: Inhalation of oil mists or vapors generated at elevated temperatures may cause respiratory irritation. Accidental ingestion can result in minor irritation of the digestive tract, nausea, and diarrhea. Prolonged or repeated contact may dry skin and cause irritation.

Notes to Physician: Acute aspirations of large amounts of oil-laden material may produce a serious aspiration pneumonia. Patients who aspirate these oils should be followed for the development of long-term sequelae. Inhalation exposure to oil mists below current workplace exposure limits is unlikely to cause pulmonary abnormalities.

SECTION 5: Firefighting Measures

NFPA 704: National Fire Protection Association		
Health: 0 Flammability: 1 Instability: 00=minimal hazard		1=Slight Hazard
		2=Moderate Hazard
		3=Severe Hazard
		4=Extreme Hazard

Extinguishing Media: Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F/100°C. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

Specific Hazards arising from the chemical:

Unusual Fire & Explosion Hazards: This material may burn but will not ignite readily. If container is not properly cooled, it can rupture in the heat of a fire.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of sulfur, nitrogen, or phosphorus may also be formed.

Special protective actions for firefighters: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self-contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8). Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

See Section 9 for Flammability Properties including flash point and flammable (explosive) limits.

SECTION 6: Accidental Release Measures

Personal precautions, protective equipment, and emergency procedures: This material may burn but will not ignite readily. Keep all sources of ignition away from spill/release. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons downwind of the spill/release, isolate immediate hazard area, and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Stop and contain spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water, notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water may require notification of the National Response Center (Phone number: 800-424-8802).

Methods and material for containment and cleaning up: Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite and place in suitable container for disposal. If spilled on water, remove with appropriate methods (e.g. skimming, booms, or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios for this material; however, local conditions and regulations may influence or limit the choice of appropriate actions to be taken. See Section 13 for information on appropriate disposal.

SECTION 7: Handling and Storage

Precautions for Safe Handling: Keep away from flames and hot surfaces. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see Section 8). Spills will produce very slippery surfaces. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29 CFR 1910.146. Do not wear contaminated clothing or shoes.

Conditions for Safe Storage: Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated areas away from heat and all sources of ignition. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

SECTION 8: Exposure Controls/Personal Protection

Occupational exposure limits
The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time the other constituents have no known exposure limits.

Chemical Name	ACGIH	OSHA	Mexico	Phillips 66
Distillates, petroleum, hydrotreated heavy paraffinic	TWA: 5mg/m^3 STEL: 10 mg/m^3 as Oil Mist, if Generated	---	---	---
Distillates, petroleum, solvent-dewaxed heavy paraffinic	TWA: 5mg/m^3 STEL: 10 mg/m^3 as Oil Mist, if Generated	---	---	---
Residual oils, petroleum, solvent-dewaxed	TWA: 5mg/m^3 STEL: 10 mg/m^3 as Oil Mist, if Generated	---	---	---

Note: State, Local, or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or you local agencies, for further information.

Biological Occupational Exposure Limits
Note: This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region-specific regulatory bodies

Engineering Controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

Eye/Face Protection: The use of eye/face protection is not normally required; however, good industrial hygiene practice suggests the use of eye protection that meets or exceeds ANSI Z.87.1 whenever working with chemicals.

Skin/Hand Protection: The use of skin protection is not normally required; however, good industrial hygiene practice suggests the use of gloves or other appropriate skin protection whenever working with chemicals. Suggested protective materials: Nitrile rubber.

Respiratory Protection: Where there is potential for airborne exposure above the exposure limit, a NIOSH certified air purifying respirator equipped with R or P95 filters may be used.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. Air purifying respirators provide limited protection and cannot be used in atmospheres that exceed the maximum use concentration (as directed by regulation or the manufacturer's instructions), in oxygen deficient (less than 19.5% oxygen) situations, or under conditions that are immediately dangerous to life and health (IDLH).

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

SECTION 9: Physical and Chemical Properties

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mmHg (1atm). Data represent typical values and are not intended to be specifications.

Appearance:	Amber, Transparent	Flash Point:	> 320°F (160°C)
Physical Form:	Liquid	Test Method:	Pensky-Martens Closed Cup (PMCC), ASTM D93, EPA 1010
Odor:	Petroleum	Initial Boiling Point/Range:	No Data
Odor Threshold:	No Data	Vapor Pressure:	< 1mmHg
pH:	Not applicable	Partition Coefficient (n-octanol/water)(Kow):	No Data
Vapor Density (1=air):	>1	Melting/Freezing Point:	< -5°F (-15°C)
Upper Explosive Limits (vol % in air):	No Data	Auto-ignition Temperature:	No Data
Lower Explosive Limits (vol % in air):	No Data	Decomposition Temperature:	No Data
Evaporation Rate (nBuAc=1):	No Data	Specific Gravity (water=1):	0.86-0.89 @ 60°F (15.6°C)
Particle Size:	Not applicable	Bulk Density:	7.2-7.4 lbs/gal
Percent Volatile:	No Data	Viscosity:	5-20 cSt @ 100°C; 29-235 cSt @ 40°C
Flammability (solid, gas):	Not applicable	Pour Point:	< -5°F (-15°C)
Solubility in Water:	Insoluble		

SECTION 10: Stability and Reactivity

Reactivity: Not chemically reactive.

Chemical Stability: Stable under normal ambient and anticipated conditions of use.

Possibility of Hazardous Reactions: Hazardous reactions not anticipated.

Conditions to Avoid: Extended exposure to high temperatures can cause decomposition. Avoid all possible sources of ignition.

Incompatible Materials: Avoid contact with strong oxidizing agents and strong reducing agents.

Hazardous Decomposition Products: Not anticipated under normal conditions of use.

SECTION 11: Toxicological Information

Information on Toxicological Effects

Acute Toxicity	Hazard	Additional Information	LC50/LD50 Data
Inhalation	Unlikely to be harmful		>5 mg/L (mist, estimated)
Dermal	Unlikely to be harmful		>2 g/kg (estimated)
Oral	Unlikely to be harmful		>5 g/kg (estimated)

Likely Routes of Exposure: Inhalation, eye contact, skin contact

Aspiration Hazard: Not expected to be an aspiration hazard

Skin Corrosion/Irritation: Not expected to be irritating. Repeated exposure may cause skin dryness or cracking

Serious Eye Damage/Irritation: Not expected to be irritating

Skin Sensitization: No information available on the mixture, however none of the components have been classified for skin sensitization (or are below the concentration threshold for classification)

Respiratory Sensitization: No information available

Specific Target Organ Toxicity (Single Exposure): Not expected to cause organ effects from single exposure

Specific Target Organ Toxicity (Repeated Exposure): Not expected to cause organ effects from repeated exposure

Carcinogenicity: No information available on the mixture, however none of the components have been classified for carcinogenicity (or are below the concentration threshold for classification)

Germ Cell Mutagenicity: No information available on the mixture, however none of the components have been classified for germ cell mutagenicity (or are below the concentration threshold for classification)

Reproductive Toxicity: No information available on the mixture, however none of the components have been classified for reproductive toxicity (or are below the concentration threshold for classification)

Information on Toxicological Effects of Components

Distillates, petroleum, hydrotreated heavy paraffinic
Carcinogenicity: This oil has been highly refined by a variety of process to reduce aromatics and improve performance characteristics. It meets the IP-346 criteria of less than 3 percent PAH's and is not considered a carcinogen by the International Agency for Research on Cancer.

SECTION 12: Ecological Information

GHS Classification: No classified hazards

Toxicity: All acute aquatic toxicity studies on samples of lubricant base oils show acute toxicity values greater than 100 mg/L for invertebrates, algae, and fish. These tests were carried out on water accommodated fractions and the results are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon compositions.

Persistence and Degradability: The hydrocarbons in this material are not readily biodegradable, but since they can be degraded by microorganisms, they are regarded as inherently biodegradable.

Bioaccumulative Potential: Log Kow values measured for the hydrocarbon components of this material are greater than 5.3, and therefore regarded as having the potential to bioaccumulate. In practice, metabolic processes may reduce bioconcentration.

Mobility in Soil: Volatilization to air is not expected to be a significant fate process due to the low vapor pressure of this material. In water, base oils will float and spread over the surface at a rate dependent on viscosity. There will be significant removal of hydrocarbons from the water by sediment absorption. In soil and sediment, hydrocarbon components will show low mobility with absorption to sediments being the predominant physical process. The main process is expected to be slow biodegradation of the hydrocarbon constituents in soil and sediment.

Other Adverse Effects: None anticipated.

SECTION 13: Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations. This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste and is not believed to exhibit characteristics of hazardous waste. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the SDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste. This material under most intended uses would become "Used Oil" due to contamination by physical or chemical impurities. Whenever possible, Recycle used oil in accordance with applicable federal and state or local regulations. Container contents should be completely used, and containers should be emptied prior to discard.

SECTION 14: Transport Information

U.S. Department of Transportation (DOT)

UN Number:	Not regulated
UN Proper Shipping Name:	None
Transport Hazard Class(es):	None
Packing Group:	None
Environmental Hazards:	This product does not meet the DOT/UN/IMDG/IMO criteria of a marine pollutant
Special Precautions for User:	If shipped by land in a packaging having capacity of 3,500 gallons or more, the provisions of 49 CFR, Part 130 apply (contains oil).

Transport in Bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable

SECTION 15: Regulatory Information

CERCLA/SARA – Section 302: Extremely Hazardous Substances and TPQs (in pounds)
This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

CERCLA/SARA – Section 311/312 (Title III Hazard Categories)
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CERCLA/SARA – Section 313 and 40 CFR 372
This material does not contain any chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372.

EPA (CERCLA) Reportable Quantity (in pounds)
This material does not contain any chemicals with CERCLA Reportable Quantities.

California Proposition 65
This material does not contain any chemicals which are know to the State of California to cause cancer, birth defects, or other reproductive harm at concentrations that trigger the warning requirements of California Proposition 65.

International Inventories
All components are either listed on the US TSCA inventory or are not regulated under TSCA.
All components are either on the DSL or are exempt from DSL listing requirements.

SECTION 16: Other Information

Issue Date:	Previous Issue Date:	SDS Number	Status:
16-Apr-2018	23-Jun-2016	LBPH81776	FINAL

Revised Sections or Basis for Revision:
Exposure limits (Section 8); Regulatory information (Section 15)

Legend (pursuant to NOM-018-STPS-2015):
The information within is considered correct but is not exhaustive and will be used for guidance only, which is based on the current knowledge of the substance or mixture and is applicable to the appropriate safety precautions for the product.

Guide to Abbreviations:
ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; GHS = Globally Harmonized System; HPR = Hazardous Products Regulations; IARC = International Agency for Research on Cancer; INSHT = National Institute for Health and Safety at Work; IOPC = International Oil Pollution Compensation; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

Disclaimer of Expressed and implied Warranties:
The information presented in this Safety Data Sheet is based on data believed to be accurate as of the date this Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

Safety Data Sheet

According to OSHA HCS 2012 (29 CFR 1910,1200)
Health Canada HPR (SOR/2015-17), and
Mexico NOM-018-STPS-2015

SECTION 1: Identification

Product Identifier:	Alco Super-Lube Multi-Purpose EP-0 Grease
Other means of identification:	
Code:	829364
Relevant identified uses:	Lubricating Grease
Uses advised against:	All others
24 Hour Emergency Phone Number:	CHEMTREC: 1-800-424-9300 CHEMTREC Mexico: 01-800-681-9531

Manufacturer/Supplier	SDS Information	Customer Service
Phillips 66 Spectrum Corporation	URL: www.phillips66.com/SDS	U.S.: 800-368-7128
500 Industrial Park Drive	Phone: 800-762-0942	International: 1-832-765-2500
Selmer, TN 38375-3276	Email: SDS@P66.com	Technical Information
		1-800-264-6457 or +1-731-645-7972

SECTION 2: Hazard Identification

Classified Hazards	Hazards Not Otherwise Classified (HNOC)
No classified hazards	PHNOC: None known
	HHNOC: None known
Label Elements	
No classified hazards	

SECTION 3: Composition/Information on Ingredients

Chemical Name	CASRN	Concentration
Distillates, petroleum, hydrotreated heavy naphthenic	64742-52-5	40-70%
Distillates, petroleum, hydrotreated heavy paraffinic	64742-54-7	20-40%
Boron lithium oxide	12007-60-2	< 4%

All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

SECTION 4: First Aid Measures

Eye Contact: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing and cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops and persists, seek medical attention. If product is injected into or under the skin, or into any part of the body, regardless of appearance of the wound or its size, the individual should be evaluated immediately by a physician. (see Note to Physician)

Inhalation: First aid is not normally required. If breathing difficulties develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. Seek immediate medical attention.

Ingestion: First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention

Most important symptoms and effects, both acute and delayed: Inhalation of oil mists or vapors generated at elevated temperatures may cause respiratory irritation. Accidental ingestion can result in minor irritation of the digestive tract, nausea, and diarrhea. Prolonged or repeated contact may dry skin and cause irritation.

Notes to Physician: When using high-pressure equipment, injection of product under the skin can occur. In this case, the casualty should be sent immediately to the hospital. Do not wait for symptoms to develop. High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. These injuries often require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury. Early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury

SECTION 5: Firefighting Measures

NFPA 704: National Fire Protection Association		
Health: 0 Flammability: 1 Instability: 00=minimal hazard		1=Slight Hazard
		2=Moderate Hazard
		3=Severe Hazard
		4=Extreme Hazard

Extinguishing Media: Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F/100°C. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

Specific Hazards arising from the chemical:

Unusual Fire & Explosion Hazards: This material may burn but will not ignite readily. If container is not properly cooled, it can rupture in the heat of a fire.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of sulfur, nitrogen, or phosphorus may also be formed.

Special protective actions for firefighters: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self-contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8). Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

See Section 9 for Flammability Properties including flash point and flammable (explosive) limits.

SECTION 6: Accidental Release Measures

Personal precautions, protective equipment, and emergency procedures: This material may burn but will not ignite readily. Keep all sources of ignition away from spill/release. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons downwind of the spill/release, isolate immediate hazard area, and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Stop and contain spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water, notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water may require notification of the National Response Center (Phone number: 800-424-8802).

Methods and material for containment and cleaning up: Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite and place in suitable container for disposal. If spilled on water, remove with appropriate methods (e.g. skimming, booms, or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios for this material; however, local conditions and regulations may influence or limit the choice of appropriate actions to be taken. See Section 13 for information on appropriate disposal.

SECTION 7: Handling and Storage

Precautions for Safe Handling: Keep away from flames and hot surfaces. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see Section 8). High pressure injection of hydrocarbon fuels, hydraulic oils, or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus, or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29 CFR 1910.146. Do not wear contaminated clothing or shoes.

Conditions for Safe Storage: Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated areas away from heat and all sources of ignition. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

SECTION 8: Exposure Controls/Personal Protection

Occupational exposure limits
The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time the other constituents have no known exposure limits.

Chemical Name	ACGIH	OSHA	Mexico	Phillips 66
Distillates, petroleum, hydrotreated heavy naphthenic	TWA: 5mg/m^3 STEL: 10 mg/m^3 as Oil Mist, if Generated	---	---	---
Distillates, petroleum, hydrotreated heavy paraffinic	TWA: 5mg/m^3 STEL: 10 mg/m^3 as Oil Mist, if Generated	---	---	---

Note: State, Local, or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or you local agencies, for further information.

Engineering Controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

Eye/Face Protection: The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

Skin/Hand Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products.

Respiratory Protection: Respiratory protection is not normally required under intended conditions of use. Emergencies or conditions that could result in significant airborne exposures may require the use of NIOSH approved respiratory protection. An industrial hygienist or other appropriate health and safety professional should be consulted for specific guidance under these situations.

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

SECTION 9: Physical and Chemical Properties

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mmHg (1atm). Data represent typical values and are not intended to be specifications.

Appearance:	Green	Flash Point:	257°F / 125°C
Physical Form:	Semi-Solid	Test Method:	Cleveland Open Cup (COC), ASTM D92
Odor:	Slight hydrocarbon	Initial Boiling Point/Range:	No Data
Odor Threshold:	No Data	Vapor Pressure:	< 1mmHg
pH:	Not applicable	Partition Coefficient (n-octanol/water)(Kow):	No Data
Vapor Density (1=air):	<1	Melting/Freezing Point:	No Data
Upper Explosive Limits (vol % in air):	No Data	Auto-ignition Temperature:	No Data
Lower Explosive Limits (vol % in air):	No Data	Decomposition Temperature:	No Data
Evaporation Rate (nBuAc=1):	No Data	Specific Gravity (water=1):	0.87 @ 60°F (15.6°C)
Particle Size:	Not applicable	Bulk Density:	7.5lbs/gal
Percent Volatile:	No Data	Viscosity:	No Data
Flammability (solid, gas):	Not applicable	Solubility in Water:	Negligible

SECTION 10: Stability and Reactivity

Reactivity: Not chemically reactive.

Chemical Stability: Stable under normal ambient and anticipated conditions of use.

Possibility of Hazardous Reactions: Hazardous reactions not anticipated.

Conditions to Avoid: Extended exposure to high temperatures can cause decomposition. Avoid all possible sources of ignition.

Incompatible Materials: Avoid contact with strong oxidizing agents and strong reducing agents.

Hazardous Decomposition Products: Not anticipated under normal conditions of use.

SECTION 11: Toxicological Information

Information on Toxicological Effects

Acute Toxicity	Hazard	Additional Information	LC50/LD50 Data
Inhalation	Unlikely to be harmful		>5 mg/L (mist, estimated)
Dermal	Unlikely to be harmful		>2 g/kg (estimated)
Oral	Unlikely to be harmful		>5 g/kg (estimated)

Aspiration Hazard: Not expected to be an aspiration hazard

Skin Corrosion/Irritation: Causes mild skin irritation. Repeated exposure may cause skin dryness or cracking

Serious Eye Damage/Irritation: Causes mild eye irritation.

Skin Sensitization: No information available on the mixture, however none of the components have been classified for skin sensitization (or are below the concentration threshold for classification)

Respiratory Sensitization: No information available

Specific Target Organ Toxicity (Single Exposure): Not expected to cause organ effects from single exposure

Specific Target Organ Toxicity (Repeated Exposure): Not expected to cause organ effects from repeated exposure

Carcinogenicity: No information available on the mixture, however none of the components have been classified for carcinogenicity (or are below the concentration threshold for classification)

Germ Cell Mutagenicity: No information available on the mixture, however none of the components have been classified for germ cell mutagenicity (or are below the concentration threshold for classification)

Reproductive Toxicity: No information available on the mixture, however none of the components have been classified for reproductive toxicity (or are below the concentration threshold for classification)

Information on Toxicological Effects of Components

Lubricant Base Oil (Petroleum)
Carcinogenicity: The petroleum base oils contained in this product have been highly refined by a variety of processes, including severe hydrocracking/hydroprocessing to reduce the aromatics and improve performance characteristics. All of the oils met the IP-346 criteria of less than 3 percent PAH's and are not considered carcinogens by NTP, IARC, or OSHA.

SECTION 12: Ecological Information

GHS Classification: No classified hazards

Toxicity: All acute aquatic toxicity studies on samples of lubricant base oils show acute toxicity values greater than 100 mg/L for invertebrates, algae, and fish. These tests were carried out on water accommodated fractions and the results are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon compositions.

Persistence and Degradability: The hydrocarbons in this material are not readily biodegradable, but since they can be degraded by microorganisms, they are regarded as inherently biodegradable.

Bioaccumulative Potential: Log Kow values measured for the hydrocarbon components of this material are greater than 5.3, and therefore regarded as having the potential to bioaccumulate. In practice, metabolic processes may reduce bioconcentration.

Mobility in Soil: Volatilization to air is not expected to be a significant fate process due to the low vapor pressure of this material. In water, base oils will float and spread over the surface at a rate dependent on viscosity. There will be significant removal of hydrocarbons from the water by sediment absorption. In soil and sediment, hydrocarbon components will show low mobility with absorption to sediments being the predominant physical process. The main process is expected to be slow biodegradation of the hydrocarbon constituents in soil and sediment.

Other Adverse Effects: None anticipated.

SECTION 13: Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations. This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste and is not believed to exhibit characteristics of hazardous waste. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the SDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste. This material under most intended uses would become "Used Oil" due to contamination by physical or chemical impurities. Whenever possible, Recycle used oil in accordance with applicable federal and state or local regulations. Container contents should be completely used, and containers should be emptied prior to discard.

SECTION 14: Transport Information

U.S. Department of Transportation (DOT)
UN Number: Not regulated
UN Proper Shipping Name: None
Transport Hazard Class(es): None
Packing Group: None
Environmental Hazards: This product does not meet the DOT/UN/IMDG/IMO criteria of a marine pollutant
Special Precautions for User: None
Transport in Bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable

SECTION 15: Regulatory Information

CERCLA/SARA – Section 302: Extremely Hazardous Substances and TPQs (in pounds)
This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

CERCLA/SARA – Section 311/312 (Title III Hazard Categories)
US EPA has published a final rule aligning hazardous chemical reporting under sections 311 and 312 of the Emergency Planning and Community Right-to-Know Act (EPCRA) with OSHA HCS. See Section 2 for hazard classifications under EPCRA.

CERCLA/SARA – Section 313 and 40 CFR 372
This material does not contain any chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372.

Chemical Name	Concentration	De minimis
Zinc Compound(s)	<2%	1.0%

EPA (CERCLA) Reportable Quantity (in pounds)
This material does not contain any chemicals with CERCLA Reportable Quantities.

California Proposition 65
This material does not contain any chemicals which are know to the State of California to cause cancer, birth defects, or other reproductive harm at concentrations that trigger the warning requirements of California Proposition 65.

International Inventories
All components are either listed on the US TSCA inventory or are not regulated under TSCA.
All components are either on the DSL or are exempt from DSL listing requirements.

SECTION 16: Other Information

Issue Date:	Previous Issue Date:	SDS Number	Status:
02-May-2017	31-Jul-2015	829364	FINAL

Revised Sections or Basis for Revision:
Identified Hazards (Section 2); Composition (Section 3); Format change

Legend (pursuant to NOM-018-STPS-2015):
The information within is considered correct but is not exhaustive and will be used for guidance only, which is based on the current knowledge of the substance or mixture and is applicable to the appropriate safety precautions for the product.

Guide to Abbreviations:
ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; GHS = Globally Harmonized System; HPR = Hazardous Products Regulations; IARC = International Agency for Research on Cancer; INSHT = National Institute for Health and Safety at Work; IOPC = International Oil Pollution Compensation; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

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