

ROTTLER

SG90MTS HEAVY DUTY CYLINDER HEAD SEAT & GUIDE MACHINE MACHINE MAINTENANCE AND PARTS MANUAL



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MANUAL SECTIONS

INTRODUCTION

MAINTENANCE

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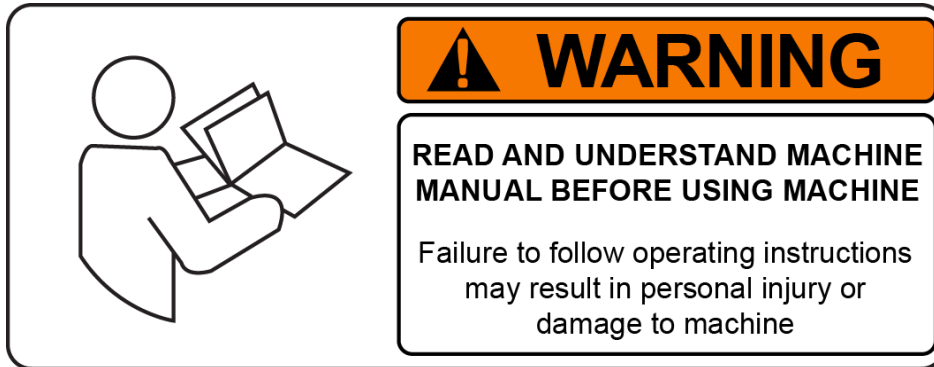
SDS

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 SG90MTS 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 SG90MTS series machines gain experience using the different functions of the machine, the operator will become an expert in utilizing the machine tool.

Beyond the Operating Instructions this manual contains information and part number references on fixtures, cutting tools, and machine maintenance. The operator should read and become familiar with these areas as well.

Description

The Rottler SG90MTS series were created specifically for heavy-duty cylinder head applications. Although the machine is primarily geared towards large diesel or natural gas cylinder heads, the SG90MTS also can handle small engines with performance applications as well. This makes the SG90MTS the most versatile machine in the Rottler Seat and Guide machine lineup.

The Rottler SG90MTS represents a pinnacle of innovation in modern seat cutting technology. New to this type of machine is the Rottler patented Uni-Pilot tooling technology which allows the operator to move hole-to-hole while cutting seats without the need of re-positioning the pilot or using multiple pilots to process a cylinder head. Furthermore the SG90MTS is outfitted with the Rottler patented Active Spindle technology which automates the locking and unlocking process between centering and cutting operations on previous generations of seat-cutting machines.

The Rottler SG90MTS can be used in either the manual or manual-matic software modes. These modes can be selected from the main screen and are further defined in the sections below. Beyond these two modes, operators will find that the SG90MTS also has features to allow automated tapping, reaming, and drilling cycles for other work such as guide work or work on the manifold sides of cylinder heads.

Software Modes:

MANUAL – This mode allows the operator to control the base functions of the machine individually. These functions include; floating the workhead and cradle, locking/un-locking the sphere, and turning the spindle on and off. Within this mode the operator can also set the zero for the spindle position DRO, as well as set the spindle RPM for cutting and finishing. This mode is very useful when cutting only one seat or testing parameters to setup a MANUALMATIC program.

MANUALMATIC – This mode automates the seat cutting process by storing spindle positions, which when the spindle DRO matches these stored values will cause the machines functions as mentioned above to activate automatically. Values can be stored by moving the spindle to the desired height, and then pressing the "set" button next to the labeled values. Manualmatic programs can be created for both intake and exhaust seats on specific cylinder heads to allow the operator to process heads by simply selecting the program and then moving the spindle through the stored values to cut a seat. This is explained further in the operating instructions section.

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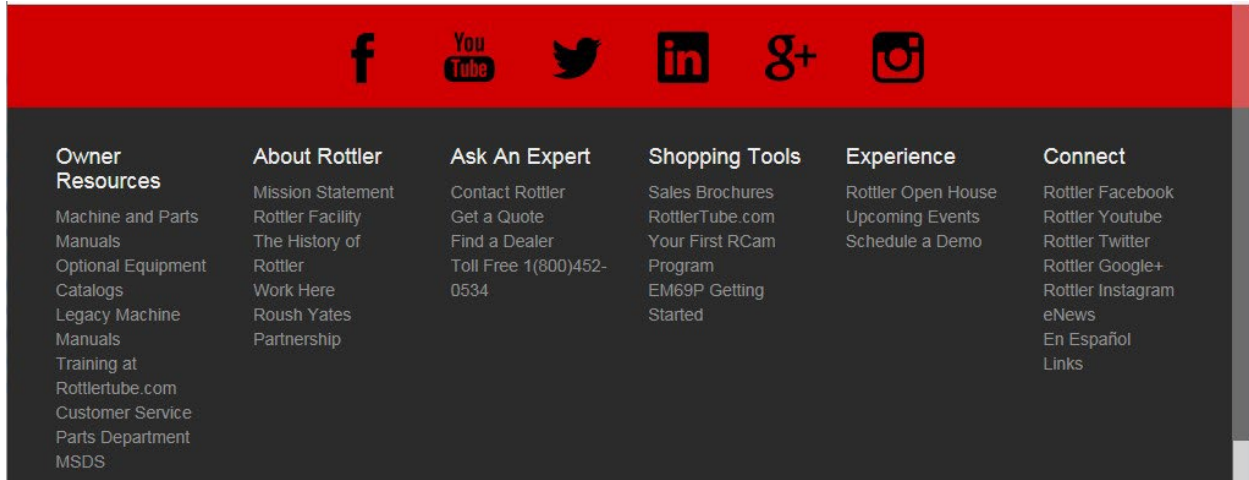
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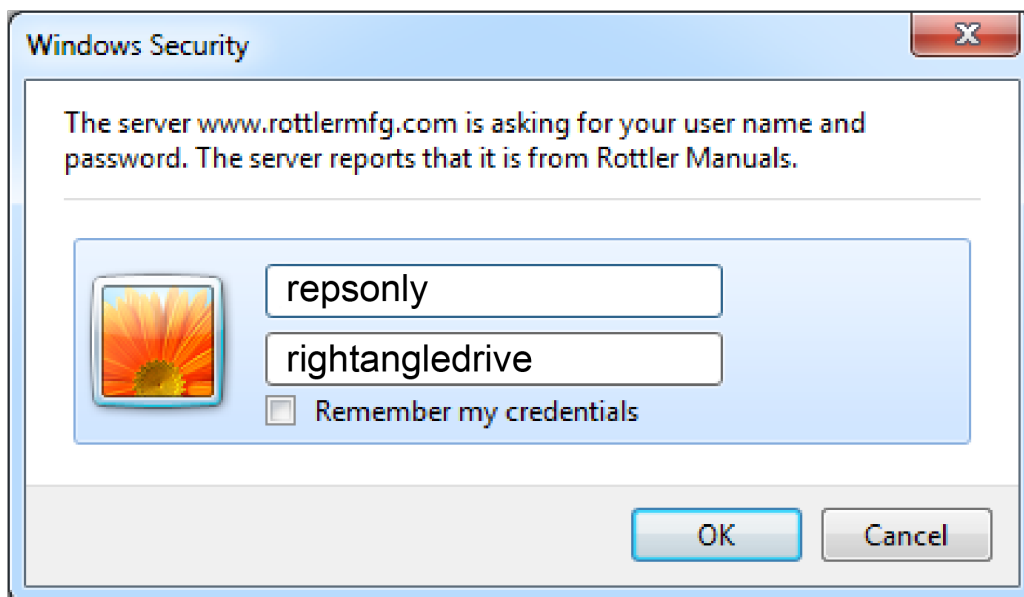
Online Documentation Access

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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

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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 regulators are located on the left side of machine base. Marked “Work Head Air Float Adjustment” If the work head is not floating properly it could be from too much or too little air from the regulator. Starting with all regulators set at 1 bar with “workhead float” button activated, slowly turn all up .5 bar at a time until workhead start to float. Pushing work head front to rear checking for stiff spots. If workhead is dragging in the forward position, (workhead pulled closest to operator) raise the 2 front regulators 1 mark until it floats without dragging. Same for rear. You may have to go back and forth a few times to get this correct. If workhead is not dragging lower the PSI until it does and then raise 1 notch at a time until it is free. Typically the front two regulators will be slightly higher than the rear two. Once the correct float is established lock the regulators in place by pushing in on the blue adjusting knob

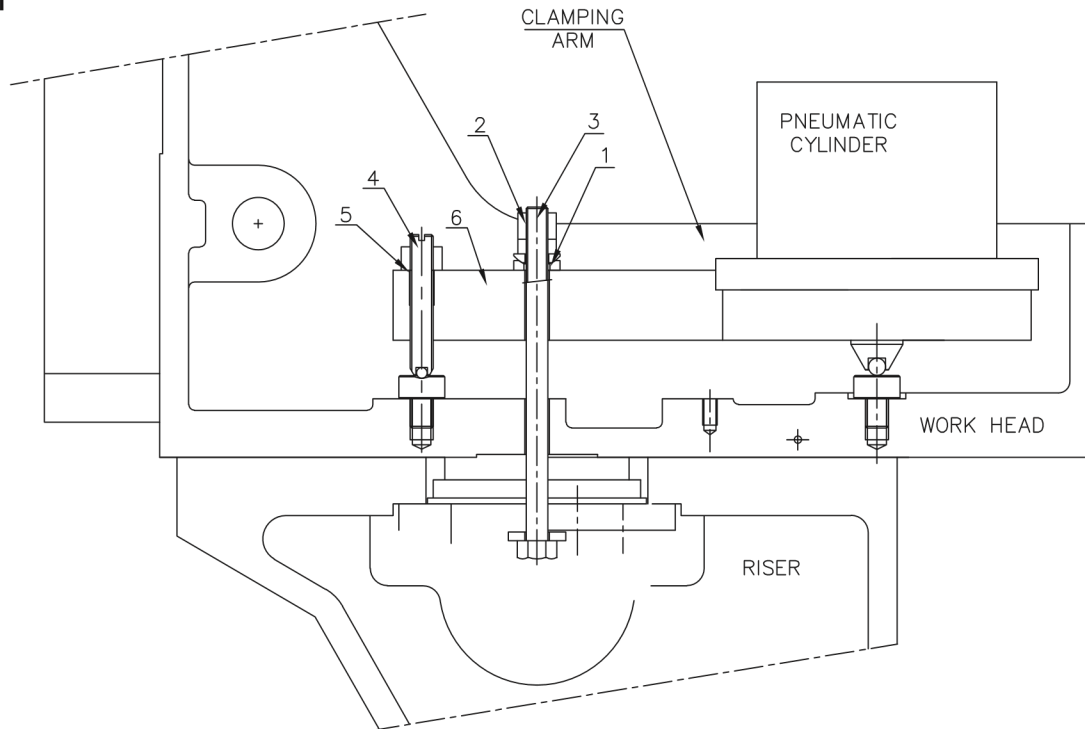
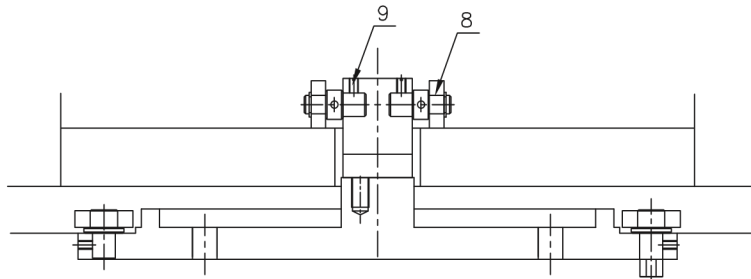
CAUTION

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.

Work Head Air Float Adjustment**ADJUSTMENT OF WORK HEAD AIR FLOAT****FIG.1****FIG.2****ADJUSTMENT PROCEDURE:**

1. LEVELLING OF RISER TOP SURFACE PLAYS A CRUCIAL PART IN STABILITY OF WORK HEAD THEREFORE LEVEL THE RISER TOP SURFACE PROPERLY.
2. IT IS DIFFICULT TO PIN POINT THE REASON FOR WORK HEAD JUMPING TO THE REAR. BEST ACTION WILL BE TO ADJUST THE CLAMPING ARMS.
3. LOSSEN FOUR GRUB SCREWS (9). AIR FLOAT WORK HEAD & ADJUST FOUR BEARINGS (9) IN SUCH A WAY THAT THE CLAMPING PLATE IN RISER SLOT DOES NOT TOUCH THE RISER CLAMPING SURFACE. BEARINGS CAN BE ADJUSTED BY ROTATING THE BEARING PINS WHICH ARE ECCENTRIC (FIG 2).
4. CHECK SPHERICAL WASHERS FOR ANY DAMAGE. IF NECESSARY, REPLACE THE SAME.
5. CLAMPING ARM SHOULD BE FAIRLY LEVEL. THIS CAN BE DONE BY LOOSENING CHECK NUTS (5) & ADJUSTING GRUB SCREWS WITH BALL (4). FOR DOING THIS LOOSEN NYLOCK NUTS (2).
6. TIGHTEN NYLOCK NUT ON CLAMPING BOLT (3) WITH AIR FLOAT ON. THEN TURN OFF 1 OR $\frac{1}{2}$ TURNS BACK.
7. CHECK LOCKING & FLOAT OF WORK HEAD. RE ADJUST IF REQUIRED.
8. ADJUST PRESURE RAGULATOR FOR WORK HEAD TO HAVE UNIFORM LIFT OF WORK HEAD, WHEN AIR FLOATING .
9. TO ENSURE THAT AIR FLOAT HOLES IN THE WORK HEAD ARE NOT CLOGED, MOVE WORK HEAD IN FRONT AS WELL AS THE REAR OF THE RISER. GIVE AIR PRESURE TO SEE THAT AIR FLOWS FREELY IN BOTH POSITION.

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 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 inclinometer's two retaining screws and pivoting the inclinometer until it repeats when level is rotated 180 degrees.

Example: level reads 0.04 to the left, when rotated 180 degrees to the right it should read minus 0.04.

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.

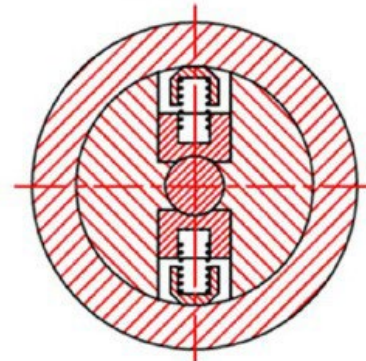
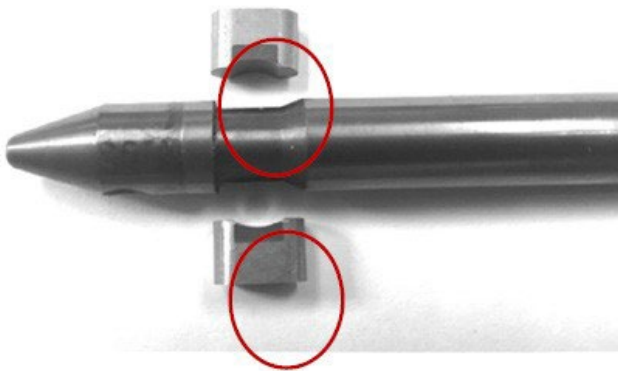
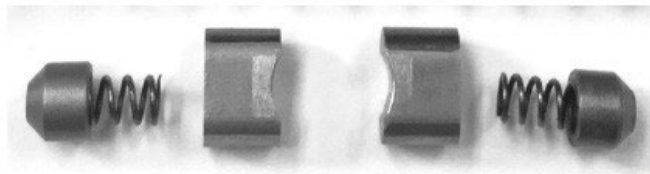
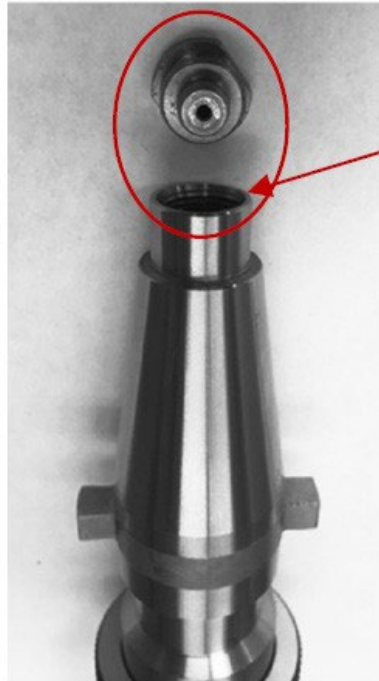
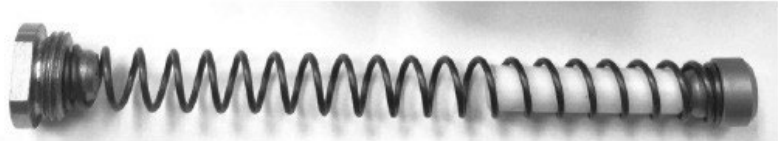
If the readout does not read 0.00 then chances are the machine's leveling procedures have not been properly followed or there are internal problems with the levels electronics.

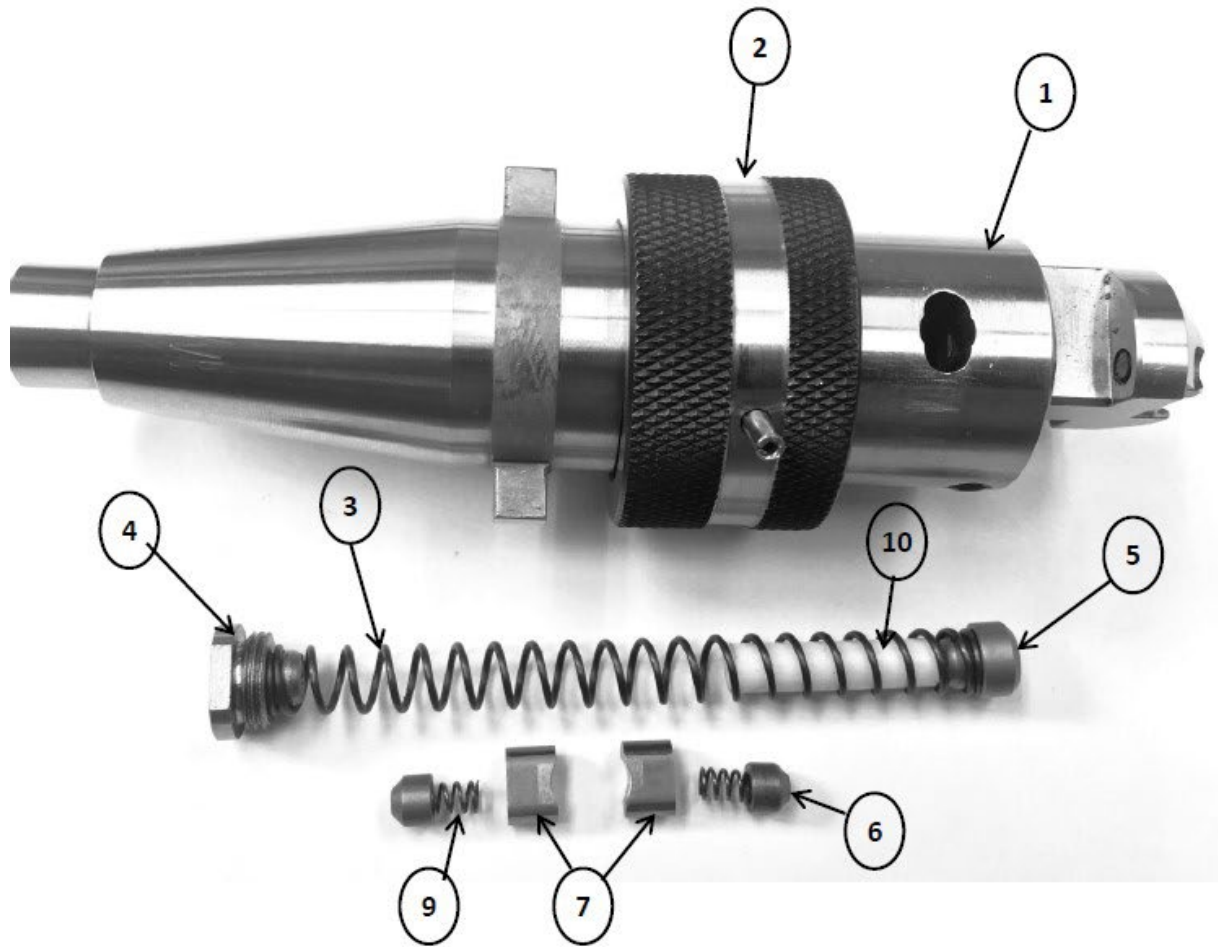
The sensitivity of the level is so great that it may not zero totally, even while the machine is not being touched. The alignment tolerance for installing guides is plus or minus .05 degrees, and for forming three angle seats is plus or minus .1 degrees.

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

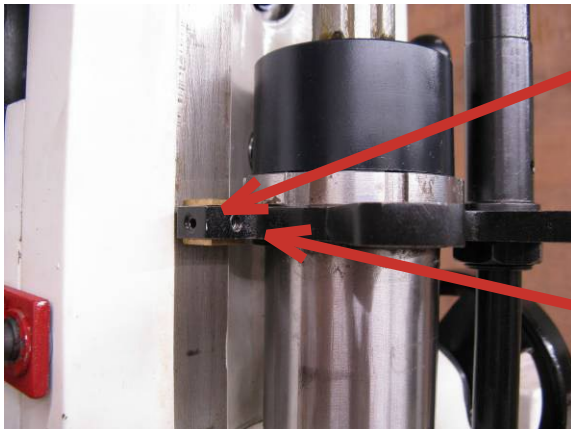
There are 2 brass guide shoes located on the guide plate on top of the spindle that align the rack gear on the back of the spindle with the pinion gear that moves the spindle up and down.

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.

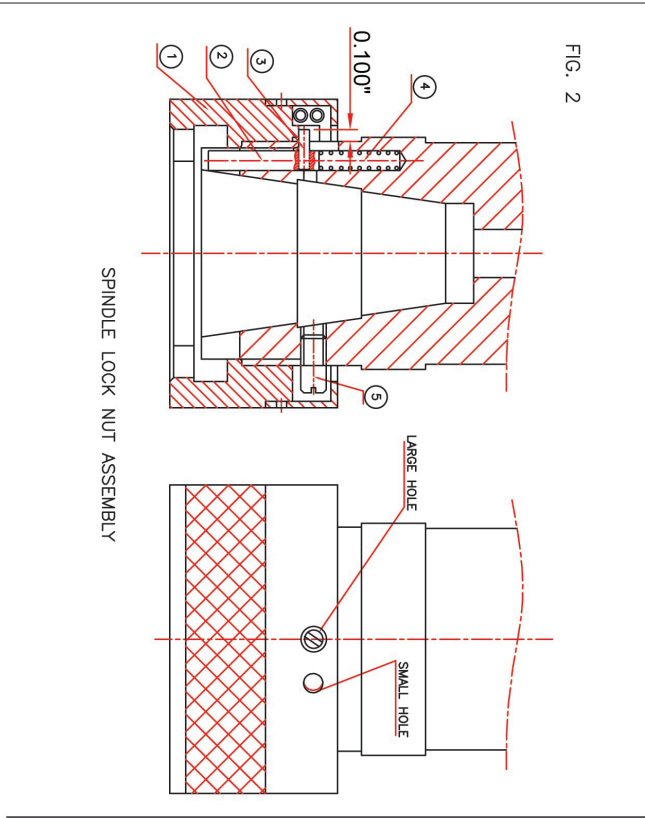
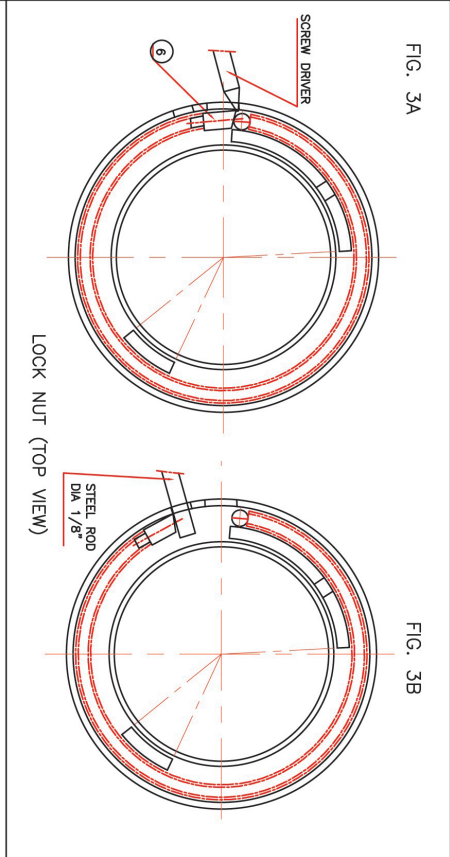
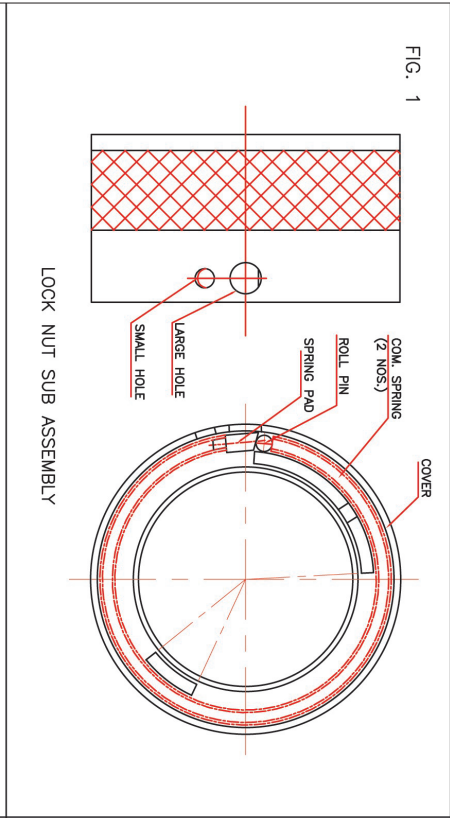
Then tighten the adjusting set screw until the amount of drag on the spindle is reduced to the point that there is a slight drag on the spindle through its range of travel.

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.

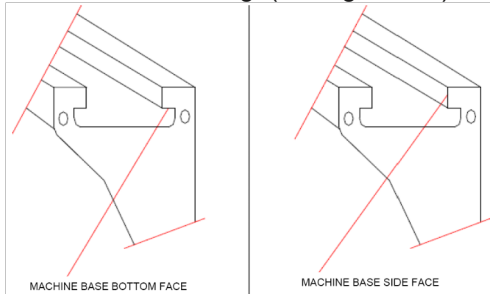
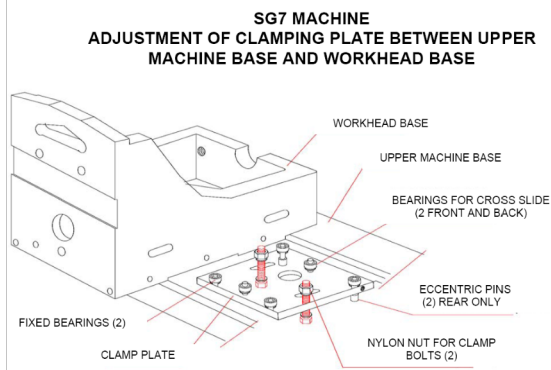
Spindle Lock Nut Service Procedure

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



- 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.
- DISMANTLING 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

TROUBLESHOOTING

Problem	Possible Cause	Solution
<p>Workhead base does not float</p>	<p>Insufficient air pressure</p>	<p>Set air pressure of supplied line should be minimum 85 PSI (6 Bars)</p>
	<p>Clamping plate does not drop when unclamped due to less clearance between upper floating base and ball bearings mounted on clamping plate</p>	<p>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)</p>  <p>MACHINE BASE BOTTOM FACE MACHINE BASE SIDE FACE</p> <p>Lock the setscrews, remove the feeler gage and inspect if is with the tolerance across the all surfaces.</p> <p>Repeat if it is necessary.</p>
	<p>Clamping plate does not drop when unclamped due to the improper adjustment of the four clamping bolts</p>	<p>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</p>  <p>SG7 MACHINE ADJUSTMENT OF CLAMPING PLATE BETWEEN UPPER MACHINE BASE AND WORKHEAD BASE</p> <p>WORKHEAD BASE UPPER MACHINE BASE BEARINGS FOR CROSS SLIDE (2 FRONT AND BACK) ECCENTRIC PINS (2) REAR ONLY NYLON NUT FOR CLAMP BOLTS (2) CLAMP PLATE FIXED BEARINGS (2)</p>

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	<p>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 valve 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.</p> <p>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.</p>
	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

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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	SG8 Rollover Fixture Hold down swivel Handle Zinc Handle 2.000" Long stud (KHF162)
500-13X1375	SG7- SG8 Rollover Fixture Lock swivel Handle Zinc Handle 1.375" Long stud (KHF158)
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
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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").

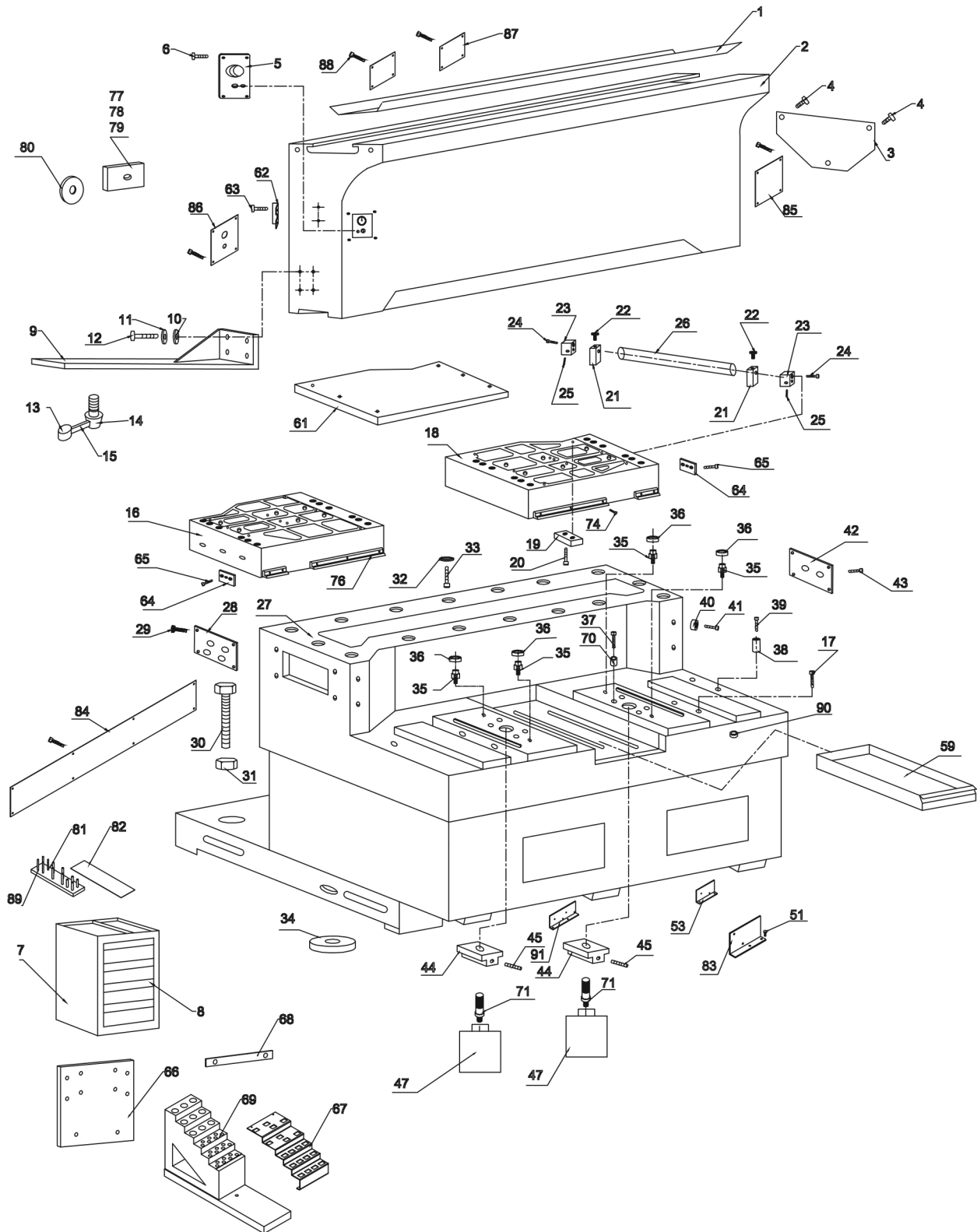
Rottler makes 3 sizes of shanks of pilots:

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 SG80A machine. These pilots are made to order specifications.

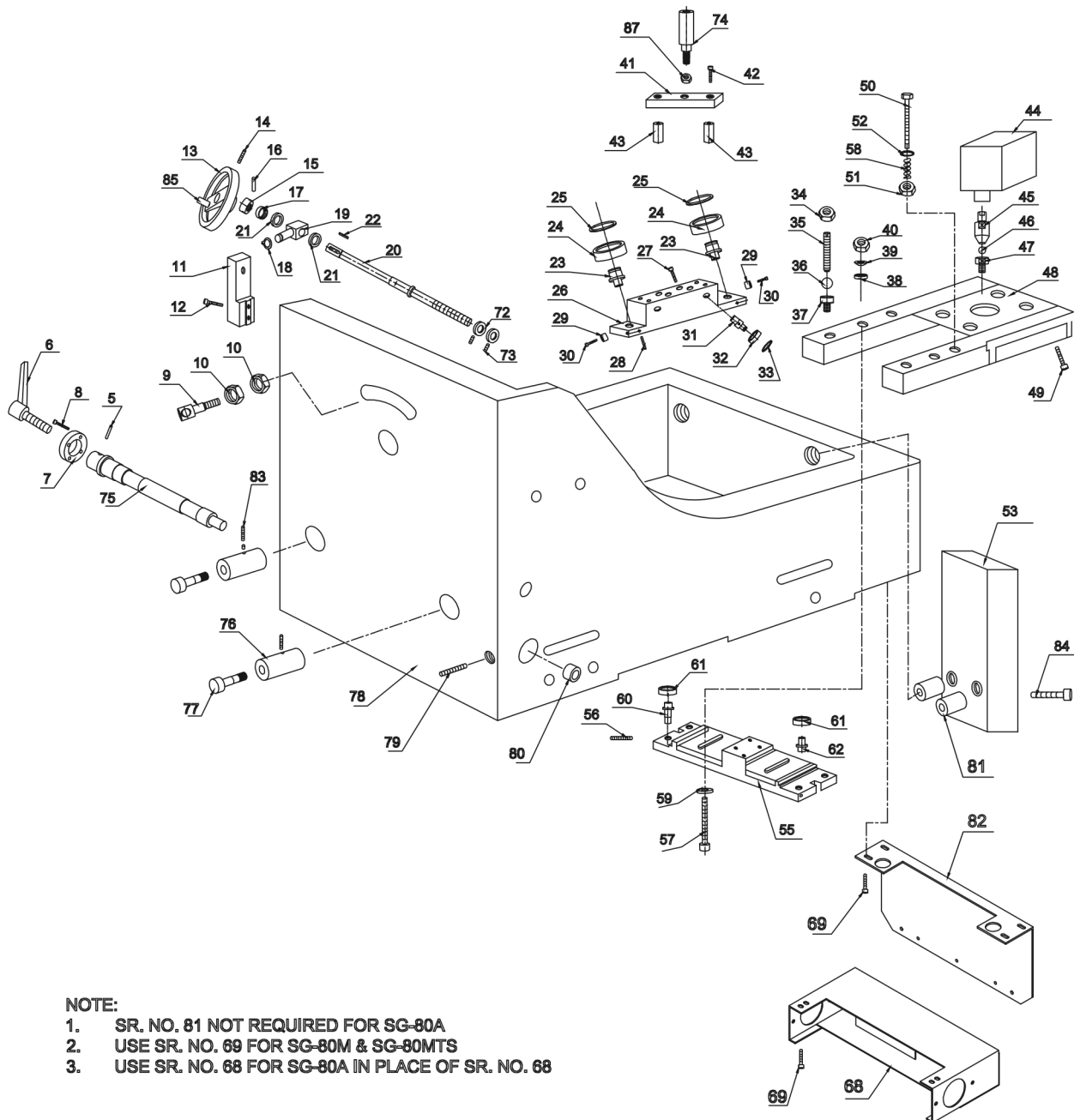
Bed, Table, and Riser Assembly



S. NO.	PART NO.	DESCRIPTION	QTY.
			SG-80MTS
1	055A-550	PAN COVER	1
2	055A-500	RISER	1
3	055A-719	END COVER	2
4		ALLEN BUTTON HEAD SCREW M6X12	4
5	055A-546	NAME PLATE	1
6		ALLEN BUTTON HEAD SCREW M6X12	4
7	055A-760	TOOL CABINET	1
8		TOOL TRAY	4
9	430-806	MOUNTING BRACKET	1
10		PLAIN WASHERM8	5
11		LOCK WASHER M8	5
12		HEX. SCREW M8 X 30	4
13	430-802	BALL (M8x25MM O.D.)	1
14	430-817	CLAMP PN	1
15	430-823	CLAMP LEVER	1
16	055A-608	LEFT CROSSTABLE	1
17		ALLEN SCREW M10X20	2
18	055A-607	RIGHT CROSSTABLE	1
19	055A-612	STOPPER	2
20		ALLEN SCREW M6X16	4
21	055A-528	STOP DOG	2
22	055A-551	THUMB SCREW	2
23	055A-529	SUPPORT	2
24		ALLEN SCREW M6X30	2
25		ALLEN GRUB SCREW M5X6	2
26	055A-615	STOPPER ROD	1
27	055A-611	CABINET	1
28	055A-617	NAME PLATE	1
29		ALLEN BUTTON HEAD SCREW M6X12	4
30	430-818	HEX HEAD SCREW M16X70	5
	430-818A	HEX HEAD SCREW M16X180	1
31		HEX NUT M16	6
32		MACHINED WASHER M12	16
33		ALLEN SCREW M12X35	16
34	430-819	PAD	6
35	055A-516	BEARING PIN	4
36		BALL BEARING (60022RS-1)	4
37		ALLEN SCREW M10X55	8
38	055A-613	STOPPER	1
39		ALLEN SCREW M8X35	1
40	055A-602	NYLON STOPPER	2
41		ALLEN SCREW M8X16	2
42	055A-708	NAME PLATE	1
43		ALLEN BUTTON HEAD SCREW M6X12	4
44	055A-515	T-NUT	2
45		ALLEN GRUB SCREW M5X8	2
46	-----	-----	-----
47		PNEUMATIC CYLINDER	2
48	-----	-----	-----
49	-----	-----	-----
50	055A-652	BULKHEAD BRACKET	-----
51		ALLEN HEAD SCREW M6X 2	6
52		ALLEN HEAD SCREW M8X 16	-----
53	055A-762	BRACKET	1

S. NO.	PART NO.	DESCRIPTION	QTY.
			SG-80MTS
54		FOOT SWITCH	----
55	055A-650	FOOT SWITCH HOUSING	-----
56	-----	-----	-----
57	-----	-----	-----
58	-----	-----	-----
59	055A-709-3	CHIPS TRAY	1
60	-----	-----	-----
61	055A-709-7	CROSSTABLE COVER	2
62	033-069	BRACKET	1
63		ALLEN SCREW M6X12	2
64	055A-664	PLATE	2
65		ALLEN CSK HEAD SCREW M6 X 12	4
66	055A-757	SUPPORTPLATE	1
67	055A-756	STAND	1
68	430-8394	NAME PLATE	1
69	055A-758	PILOT STAND	1
70	055A-641	CYL. SPACER	8
71	055A-642	CYL. STUD	2
72.	-----	-----	-----
73.	-----	-----	-----
74.		ALLEN HEAD SCREW M5X15	20
75.	055A-712	CONTROL BOX SPACER	-----
76.	055A-697	WIPERS	1 SET
77	101A-109	VACUUM PAD	1
78	101A-110	VACUUM PAD	1
79	101A-111	VACUUM PAD	1
80	101A-112	VACUUM PAD	1
81	055A-759	TOOL BOARD (L.H.) WITH PINS	1
82	055A-755	RUBBER SHEET	1
83	055A-770	BRACKET	1
84	055A-709-2	CABINET COVER	1
85	055A-709-5	RISERCOVER	1
86	055A-709-6	RISERCOVER	1
87	055A-709-1	RISERCOVER	2
88		BUTTON HEAD SCREW M6x10	24
89	055A-766	PIN	4
90	055A-698	STOPPER	2
91	055A-762-1	BRACKET	1

Base Assembly

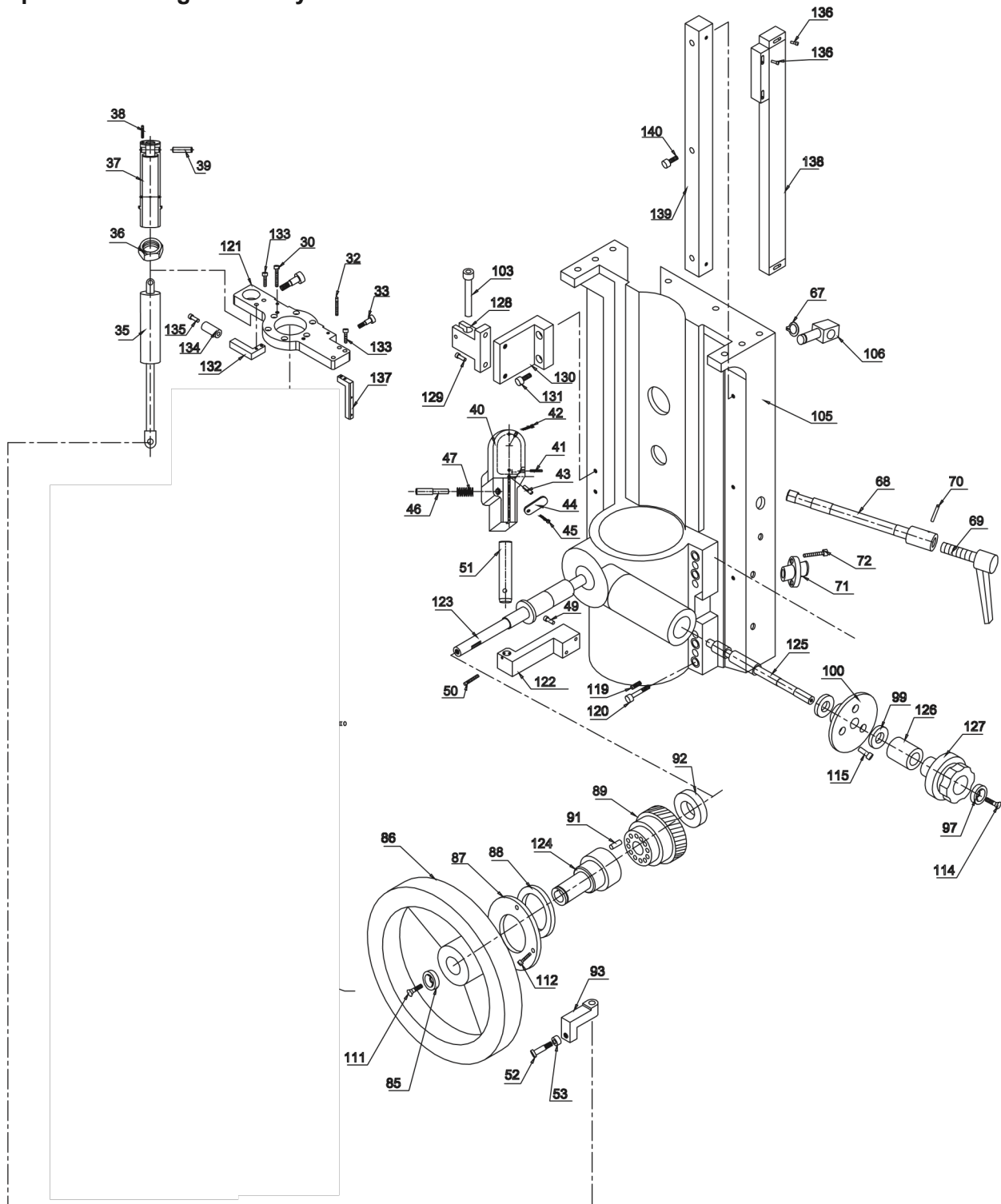


- NOTE:**
1. SR. NO. 81 NOT REQUIRED FOR SG-80A
 2. USE SR. NO. 69 FOR SG-80M & SG-80MTS
 3. USE SR. NO. 68 FOR SG-80A IN PLACE OF SR. NO. 68

S. NO.	PART NO.	DESCRIPTION	QTY.
			SG-80MTS
1			
2			
3			
4			
5		CYLINDRICAL PIN DIA. 1/8"X1-1/8" LONG	1
6		ADJUSTABLE HANDLE	1
7	055A-321	SPACER HOUSING	1
8		ALLEN SCREW M6X16	4
9	055A-264	LOCATING BOLT	1
10	055A-320	NUT	2
11	055A-327	SCREW BLOCK	1
12		ALLEN SCREW M8X40	2
13	055A-311	HAND WHEEL	1
14		ALLEN GRUB SCREW M6X10	1
15	055A-309	SPACER	1
16		SPRING DOWEL DIA. 1/8"X1-1/8" LONG	1
17		NEEDLE ROLLER BEARING	1
18		EXT. CIRCLIP A16	1
19	055A-304	GUIDE PIN	1
20	055A-310	INCNCILATION ROD	1
21		NEEDLE THRUST BEARING	2
22		PARALLEL KEY 3/16"X3/16"X7/8"	1
23	055A-502	BEARING PIN	2
24		BALL BEARING (60052RS-1)	2
25		EXT. CIRCLIP A25	2
26	055A-344	CROSS BEARING SUPPORT	1
27		ALLEN SCREW M6X55	4
28		ALLEN GRUB SCREW M5X8	6
29	055A-305	STOPPER	2
30		ALLEN SCREW M5X12	2
31	055A-501	BEARING PIN	4
32		BALL BEARING (6000LLU 12A 01)	4
33		EXT. CIRCLIP A10	4
34		HEX NUT M12	2
35	055A-308	SET SCREW	2
36		STEEL BALL DIA 1/4"	2
37	055A-301	PIVOT	2
38	055A-324	SPHERICAL WASHER	6
39	055A-323	SPHERICAL WASHER	6
40		NYLOCK HEX NUT M12	2
41	055A-316	SWIVEL BRACKET	1
42		ALLEN SCREW M6X55	2
43	055A-315	SPACER	2
44		PNEUMATIC CYLINDER	1
45	055A-306	PIVOT PIN	1
46		STEEL BALL DIA 3/8"	1
47	055A-303	BALL SUPPORT	1
48	055A-322	CLAMPING BRACKET	1
49		ALLEN SCREW M12X30	4
50		HEX HEAD SCREW M8X90	2
51		HEX NUT M8	2
52		WASHER M8	2
53	055A-627	WEIGHT	1
54		ALLEN SCREW M12X75	---

S. NO.	PART NO.	DESCRIPTION	QTY.
			SG-80MTS
55	055A-343	CLAMPING PLATE	1
56		ALLEN GRUB SCREW M5X8	4
57		HEX HEAD SCREW M 12X170	2
58	282580	COMP. SPRING	2
59	055A-325	SPACER	2
60	055A-312	BEARING PIN	2
61		BALL BEARING (60022RS-1)	4
62	055A-313	BEARING PIN	2
63			
64			
65			
66			
67			
68	055A-710	CABLE TRAY WITH COVER	---
69		ALLEN SCREW M6X12	---
70	-----	-----	---
71	-----	-----	---
72	055A-342	STOP COLLAR	2
73		ALLEN SET SCREW M6X2	2
74	055A-341	TIE ROD SUPPORT	1
75	055A-334	ECCENTRIC SHAFT	1
76	055A-336	CLAMPING BLOCK	2
77	055A-339	CLAMPING BOLT	2
78	055A-333	BASE	1
79		GRUB SCREW (M 6x16)	2
80	055A-345	ECCENTRIC BUSH	1
81	055A-629	WEIGHT SPACER (M)	2
82	055A-346	CONDUIT PLATE (M)	1
83		ALLEN HEAD GRUB SCREW M6x10	2
84		ALLEN HEAD CAP SCREW M12x100	2
85	430-637R	KNOB	1
86	430-638-R	PLUG (LEVER)	1
87		HEX. NUT M12	1

Spindle Housing Assembly



S. NO.	PART NO.	DESCRIPTION	QTY.
			SG-80MTS
1		ALLEN SCREW M5X12	2
2	055A-103	BRASS STOPPER	1
3	055A-105	NUT	1
4		ALLEN GRUB SCREW M5X8	1
5	055A-404	SPLINE BUSH	1
6		PARALLEL KEY 1/4"X1/4"X1-1/2"	1
7		EXT. CIRCLIP A48	2
8		NEEDLE ROLLER BEARING	1
9	055A-122	BEARING SUPPORT	1
10		EXT. CIRCLIP A55	1
11			
12	KS-09-06	COVER	1
13	KS-08-01	STOP PIN	1
14	KS-09-03	COMP. SPRING	2
15	KS-08-04	COMP. SPRING	1
16	KS-08-02	PAD	1
17	KS-08-05	PIN	1
18	KS-09-07	NUT	1
19	055A-102	QUILL NUT	1
20		ANGULAR CONTACT BALL BEARING	3
21	055A-124	SPACER	1
22	055A-123	SPACER	1
23	055A-107	SPINDLE SPACER	1
24	055A-106	SPINDLE NUT	1
25		ALLEN GRUB SCREW M5X8	2
26	055A-189	QUILL	---
27		ALLEN GRUB SCREW M5X8	2
28	055A-190	STOP PLATE	---
29		ALLEN SCREW M6X16	---
30		ALLEN SCREW M6X25	6
31		ALLEN SCREW M8X20	---
32		ALLEN GRUB SCREW M5X6	2
33	055A-121	ADJUSTING SCREW	2
34	055A-126	STOP DOG	---
35		COMP. GAS SPRING	1
36	055A-104	NUT	1
37	055A-111	GAS SPRING SUPPORT	1
38		ALLEN GRUB SCREW M4X6	1
39	055A-113	CYL. PIN	1
40	055A-236	LEVEL BLOCK	1
41		ALLEN GRUB SCREW M6X6	1
42		ALLEN SCREW 6-32X5/8" LONG	2
43		CYL. PIN DIA 3/16"X1-1/8" LONG	1
44	055A-237	CLAMP	1
45		ALLEN SCREW M5X12	1
46	055A-238	CLAMP PIN	1
47	055A-240	SPRING	1
48	----	-----	-----
49		ALLEN SCREW M8X65	2
50		ALLEN GRUB SCREW M6X2	3
51	055A-239	CLAMP	1
52	055A-247	GAS SPRING SCREW	1
53	055A-248	GAS SPRING SPACER	1
54	055A-295	GAS SPRING HOLDER	---

S. NO.	PART NO.	DESCRIPTION	QTY.
			SG-80MTS
55			
56			
57			
58			
59			
60			
61			
62		ALLEN CAP SCREW M6x30	---
63			
64			
65	055A-297	SPINDLE HOUSNG	---
66			---
67		EXT. CIRCLIP A16	1
68	055A-268	ECCENTRIC CLAMP	1
69		ADJUSTABLE HANDLE	1
70		CYL. PIN DIA 1/8"X1-1/8" LONG	1
71	055A-219	PIVOT PIN	1
72		ALLEN SCREW M6X12	4
73		PIN DIA 0.093"X0.350" LONG	1
74			
75			
76			
77	055A-337	LUB. FEEDER	---
78		ALLEN HEAD SCREW M6x30	---
79		OILER	---
80	055A-127	STOP PLATE (M)	---
81	055A-877	DIAL BK T. (M)	---
82	055A-100	QUILL (M)	1
83	055A-171	SPINDLE	1
84	055A-776	PINION SHAFT(M)	---
85	055A-781	END SPACER(M)	1
86	055A-780	HAND WHEEL (M)	1
87	055A-783	GEAR END SPACER(M)	1
88	055A-782	GEAR SPACER(M)	1
89	055A-778	HELICAL GEAR(M)	1
90	055A-779	BUSH(M)	---
91	055A-785	CYL. PIN(M)	2
92	055A-761	SPACER (M)	1
93	055A-284	GAS SPRING HOLDER (M)	1
94	055A-289	INDICATED MTG. BKT. (M)	---
95	055A-287	INDICATED MTG. ROD (M)	---
96	055A-290	CLAMP (M)	---
97	055A-210	SPACER	1
98	055A-226	FEED DIAL (M)	---
99		THRUST BEARING (51102)	2
100	055A-291	BRG. HOUSING(M)	1
101	055A-784	WORM(M)	---
102	430-606-S	STOP ROD BLOCK	---
103	055A-288	CONTROL STOP SCREW (M) WTH KNOB	1
104	-----	-----	---
105	055A-263	SPINDLE HOUSNG (M)	1
106	055A-270	NUT(M)	1
107	055A-722	PANEL BOX(M)	---
108	055A-723	MTG. BKT.(M)	---

S. NO.	PART NO.	DESCRIPTION	QTY.
			SG-80MTS
109		ALLEN GRUB SCREW M6x15	---
110		ALLEN GRUB SCREW M6x20	---
111		ALLEN HEAD CSK SCREW M8x \varnothing	1
112		ALLEN HEAD CAP SCREW M5x12	3
113		ALLEN HEAD CAP SCREW M6x15	---
114		ALLEN HEAD CSK SCREW M6x5	1
115		ALLEN HEAD CAP SCREW M6x12	3
116		ALLEN HEAD CSK SCREW M6x5	---
117		ALLEN HEAD CAP SCREW M8x12	---
118		ALLEN HEAD CAP SCREW M8x20	---
119		ALLEN GRUB SCREW M10x25	4
120		ALLEN HEAD CAP SCREW M10x35	4
121	055A-131	STOP PLATE	1
122	055A-282	LEVEL SUPPORT	1
123	055A-280	PINION SHAFT	1
124	055A-281	BUSH	1
125	055A-277	WORM	1
126	055A-278	WORM SHAFT	1
127	055A-279	FEED DIAL	1
128	055A-274	LATCH STOP	1
129		ALLEN HEAD CAP SCREW M6x16	2
130	055A-273	LATCH SUPPORT	1
131		ALLEN HEAD CAP SCREW M6x20	2
132	055A-275	STOPPER	1
133		ALLEN HEAD CAP SCREW M6x30	4
134	055A-276	STOPPER EXTN.	1
135		ALLEN HEAD CAP SCREW M8x45	1
136		ALLEN HEAD CAP SCREW M4x20	1
137	055A-272	HEAD SUPPORT	1
138		OPTICAL SCALE	1
139	055A-271	SCALE SUPPORT	1
140		ALLEN HEAD CAP SCREW M6x30	3

Spindle Assembly

MACHINE MODEL:SG-100XY SPINDLE HOUSING ASSEMBLY

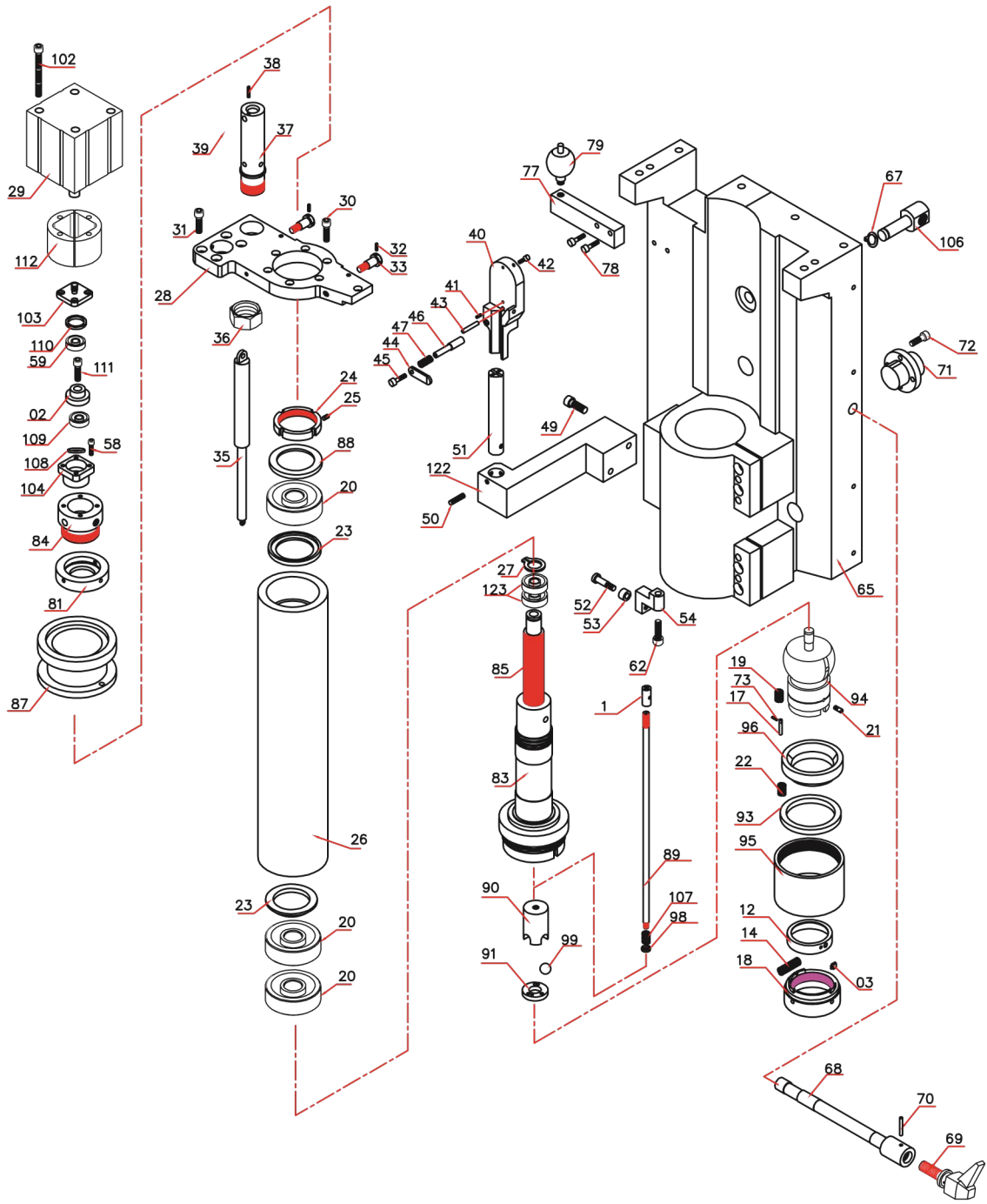


PLATE NO. 3

DOC. NO. 055A-990
SHEET 9 OF 20

S. NO.	PART NO.	BIN NO. (SG-100XY & MTS)	BIN NO. (SG-80MTS)	BIN NO. (SG-80A)	BIN NO. (SG-9MTS)	DESCRIPTION	QTY.
1	NCL-72-1				9MTS-301-D	ROTATING PIN	1
2	NCL-72-2				9MTS-301-F	BEARING HOLDER	1
3	KS-08-02				9MTS-305	PAD	1
4							
5							
6							
7							
8							
9							
10							
11							
12	KS-09-06		80MTS-312			COVER	1
13							
14	KS-09-03		80MTS-314			COMP. SPRING	2
15							
16							
17	KS-08-05				9MTS-318	PIN	1
18	KS-09-07		80MTS-318			NUT	1
19	KS-08-01				9MTS-319	COMP. SPRING	1
20			80MTS-320			ANG. CONT. BALL BRG.(50x72x12)	3
21	KS-08-01				9MTS-320	STOP PIN	1
22	5203-3				9MTS-322	SPRING	3
23	055A-181	100MTS-323				BRG. SPACER	2
24	055A-106		80MTS-324			SPINDLE NUT	1
25			80MTS-325			ALLEN GRUB SCREW (M5x8)	2
26	055A-170	100XY-326				QUILL	1
27					9MTS-327	EXT. CIRCLIP(DIA 20MM)	1
28	055A-190			80A-328		STOP PLATE	1
29	536279-B008				9MTS-329	ACTUATING CYL.(ADN-32-10-I-P)	1
30			80MTS-330			ALLEN SCREW (M6x25)	6
31				80A-331		ALLEN SCREW (M8x20)	4
32			80MTS-332			ALLEN GRUB SCREW (M5x6)	2
33	055A-121		80MTS-333			ADJUSTING SCREW	2
34							
35			80MTS-335			COMP. GAS SPRING	1
36	055A-104		80MTS-336			NUT	1
37	055A-111		80MTS-337			GAS SPRING SUPPORT	1
38			80MTS-338			ALLEN GRUB SCREW (M4x6)	1

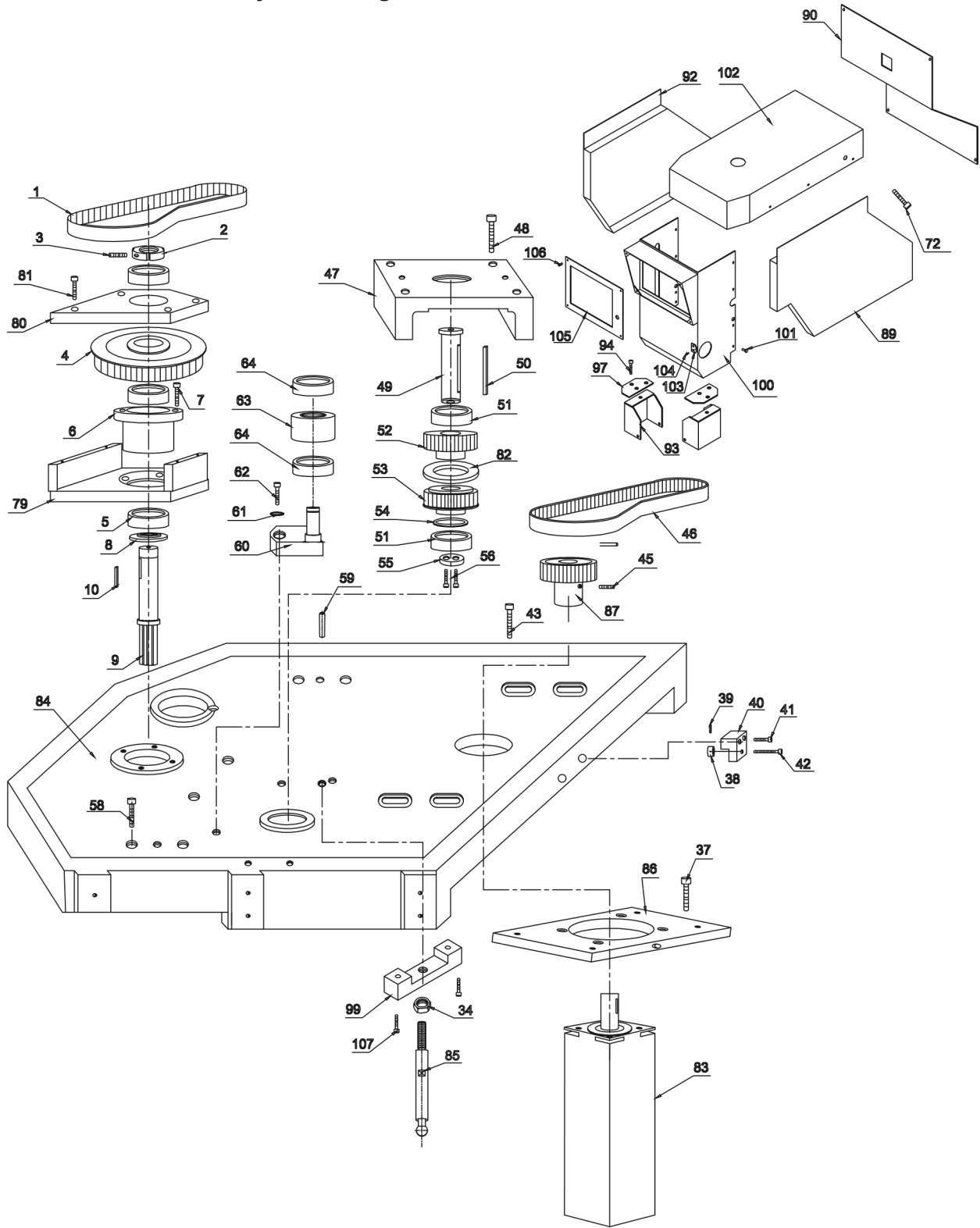
39	055A-113		80MTS-339			CYL. PIN	1
40	055A-236		80MTS-340			LEVEL BLOCK	1
41			80MTS-341			ALLEN GRUB SCREW (M6x16)	1
42			80MTS-342			ALLEN SCREW (6-325/8" LONG)	2
43			80MTS-343			CYL. PIN (Ø 3/16"x1-1/8" LONG)	1
44	055A-237		80MTS-344			CLAMP	1
45			80MTS-345			ALLEN SCREW (M5x12)	1
46	055A-238		80MTS-346			CLAMP PIN	1
47	055A-240		80MTS-347			SPRING	1
48							
49			80MTS-349			ALLEN SCREW(M8x50)	2
50			80MTS-350			ALLEN GRUB SCREW (M6x12)	3
51	055A-239		80MTS-351			CLAMP	1
52	055A-247		80MTS-352			GAS SPRING SCREW	1

S. NO.	PART NO.	BIN NO. (SG-100XY & MTS)	BIN NO. (SG-80MTS)	BIN NO. (SG-80A)	BIN NO. (SG-9MTS)	DESCRIPTION	QTY.
53	055A-248		80MTS-353			GAS SPRING SPACER	1
54	055A-295			80A-354		GAS SPRING HOLDER	1
55							
56							
57							
58					9MTS-358	ALLEN CAP SCREW (M5x12)	4
59	6001-2RS-1				9MTS-359	BALL BRG. (12x28x8)	1
60							
61							
62				80A-362		ALLEN CAP SCREW (M6x30)	1
63							
64							
65	055A-297			80A-365		SPINDLE HOUSING	1
66							
67			80MTS-367			EXT. CIRCLIP (A16)	1
68	055A-268		80MTS-368			ECCENTRIC CLAMP	1
69			80MTS-369			ADJUSTABLE HANDLE	1
70			80MTS-370			CYL. PIN (Ø1/8"x1-1/8" LONG)	1
71	055A-219		80MTS-371			PIVOT PIN	1
72			80MTS-372			ALLEN SCREW (M6x12)	4
73			80MTS-373			PIN (Ø 0.093"x0.350" LONG)	1
74							
75							
76							

77	055A-337			80A-377		LUB. FEEDER	1
78				80A-378		ALLEN HEAD SCREW (M6x30)	2
79				80A-379		OILER	1
80							
81	NCL-70-2				9MTS-381	CLAMP NUT	1
82							
83	055A-176-1	100MTS-383				SPINDLE	1
84	NCL-70-1				9MTS-384	BEARING HOUSING	1
85	055A-176-2	100MTS-385				SPLINE SHAFT	1
86							
87	055A-187	100MTS-387				TOP STOPPER	1
88	055A-182	100MTS-388				BRG. SPACER	1
89	055A-138	100MTS-389				THREAD ROD	1
90	055A-177	100MTS-390				BALL CAGE	1
91	055A-178	100MTS-391				BALL SPACER	1
92							
93	055A-175	100MTS-393				SPRING SPACER	1
94	055A-172	100MTS-394				DRIVE ADAPTOR	1
95	055A-173	100MTS-395				SPHERE CAP	1
96	055A-174	100MTS-396				LOWER CONE	1
97	055A-154	100XY-397				SPACING RING	1
98	055A-149	100MTS-398				SPACER	1
99		100MTS-399				STEEL BALL (DIA 0.500")	3
100							
101							
102					9MTS-3102	ALLEN HEAD SCREW (M5x95)	4
103	NC-141				9MTS-3103	SUPPORT PLATE	1

S. NO.	PART NO.	BIN NO. (SG-100XY & MTS)	BIN NO. (SG-80MTS)	BIN NO. (SG-80A)	BIN NO. (SG-9MTS)	DESCRIPTION	QTY.
104	NC-140				9MTS-3104	BEARING HOUSING	1
105							
106	055A-270		80MTS-3106			NUT(M)	1
107	AS-1021-1				9MTS-3107	SPRING (033-KIT)	1
108	NC-145				9MTS-3108	O-RING	1
109	NC-144				9MTS-3109	THRUST BEARING(12x26x4)	1
110	NC-142				9MTS-3110	SPACER	1
111					9MTS-3111	ALLEN HEAD SCREW (M6x16)	4
112	NC-143				9MTS-3112	SPACING BLOCK	1
113							
114							

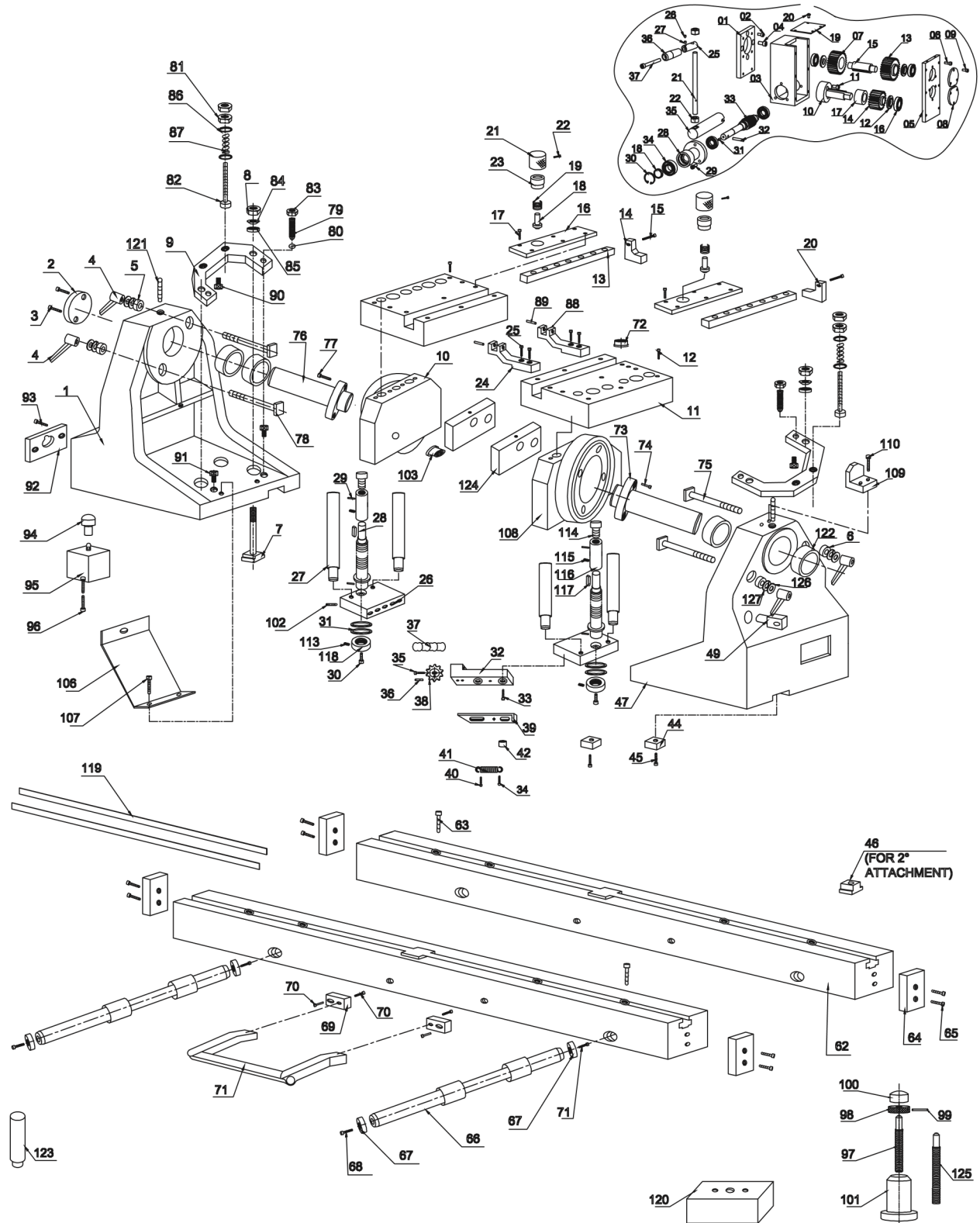
Transmission Assembly New Design



S. NO.	PART NO.	DESCRIPTION	QTY.
			SG-80MTS
1		SPINDLE POLYCHAIN BELT	
2	055A-406	SHAFT NUT	1
3		ALLEN GRUB SCREW M5X8	1
4	055A-447	SPINDLE PULLEY	1
5		BALL BEARING 30x62x162RS	3
6	055A-449	BEARING HOUSING	1
7		ALLEN SCREW M8X25	4
8	055A-429	BEARING SPACER	1
9	055A-472	DRIVE SHAFT	1
10		PARALLEL KEY 5/16"X5/16"X1-1/4"	1
11	055A-255	TOP PLATE	---
12	055A-422	RING NUT	---
13		ALLEN GRUB SCREW M5X6	1
14	055A-430	BEARING SPACER	---
15	055A-442	BEARING COVER	---
16		ALLEN SCREW M6X12	---
17	055A-441	BEARING HOUSING	---
18		ALLEN SCREW M6X16	---
19		ANGULAR CONTACT BALL BRG. (7204)	---
20	055A-443	BEARING SPACER	---
21		ALLEN GRUB SCREW M5x8	---
22	055A-427	PULLEY	---
23	055A-480	BALL SCREW	---
24		PARALLEL KEY 1/4"X1/4"X1-5/16"	---
25		EXT. CIRCLIP A12	---
26	055A-479	BEARING HOUSING	---
27		ALLEN SCREW M5X12	---
28		Z-AXIS MOTOR	---
29	055A-405	MOTOR SUPPORT	---
30		ALLEN SCREW M6X20	---
31	055A-409	MOTOR PULLEY	---
32		ALLEN GRUB SCREW M5X8	---
33	-----	-----	---
34		HEX NUT M12	1
35		SPINDLE MOTOR	---
36	055A-407	MOTOR PLATE	---
37		ALLEN SCREW M10X27	4
38	055A-254	SPACER	1
39		CYLINDRICAL PIN DIA 1/8"X5/8" LONG	1
40	055A-253	ADJUSTING BLOCK	1
41		ALLEN SCREW M6X30	1
42		ALLEN SCREW M8X50	1
43		ALLEN SCREW M10X30	4
44	055A-438	MOTOR PULLEY	---
45		ALLEN GRUB SCREW M6X10	1
46		MOTOR POLY CHAIN BELT	1
47	055A-256	BEARING SUPPORT	1
48		ALLEN SCREW M10X75	4
49	055A-440	INT. SHAFT	1
50		PARALLEL KEY 5/16"X5/16"X3"	1
51		BALL BEARING(6206)	2
52	055A-448	UPPER INT. PULLEY	1
53	055A-439	LOWER INT. PULLEY	1
54		INT. CIRCLIP B 62	1

S. NO.	PART NO.	DESCRIPTION	QTY.
			SG-80MTS
55	055A-435	BEARING SPACER	1
56		ALLEN SCREW M6X15	2
57		ALLEN SCREW M6X20	---
58		ALLEN SCREW M10X30	4
59		CYL. PIN	2
60	055A-478	IDLER SUPPORT	1
61		EXT. CIRCLIP A20	1
62		ALLEN SCREW M12X35	1
63	055A-436	IDLER PULLEY	1
64		BALL BEARING (6004 LLU/2AS)	2
65		BALL BEARING (6904-2RS) 20 x 37 x 9	---
66		TIMING BELT	---
67	055A-700	TOP COVER	---
68	055A-789	RIGHT COVER	---
69	055A-790	LEFT COVER	---
70	055A-703	BACK COVER	---
71	055A-791	FRONT COVER	---
72		ALLEN BUTTON SCREW M5X6	26
73	055A-283	BLOCK	---
74		ALLEN SCREW M8X25	---
75		ALLEN SCREW M8X35	---
76	055A-446	BALL SCREW BRACKET	---
77		ALLEN SCREW M5X16	---
78	-----	-----	---
79	055A-474	BEARING SUPPORT	1
80	055A-475	BEARING COVER	1
81		ALLEN HEAD CAP SCREW M8x20	4
82	055A-335	PULLEY SPACER	1
83	-----	SPINDLE MOTOR	1
84	055A-227	TOP PLATE (M)	1
85	055A-340	PLATE SUPPORT	1
86	055A-476	MOTOR PLATE(M)	1
87	055A-477	MOTOR PULLEY(M)	1
88	055A-720	FRONT COVER(M)	---
89	055A-751	RIGHT COVER(M)	1
90	055A-753	BACK COVER(M)	1
91	055A-725	TOP COVER(M)	1
92	055A-752	LEFT COVER(M)	1
93	055A-713	LIGHT BRACKET	2
94		ALLEN HEAD SCREW M6x10	4
95	055A-714	DUST COVER	---
96		ALLEN HEAD SCREW M6x10	---
97	055A-749	LIGHT BRACKET	2
98	055A-220	SUPPORTPLATE	---
99	055A-221	SUPPORTPLATE (M)	1
100	055A-763	FRONT COVER	1
101		ALLEN BUTTON HEAD SCREW M6x10	16
102	055A-765	TOP COVER	1
103	055A-768	ZERO MARK	1
104		ALLEN BUTTON HEAD SCREW M4x6	2
105	055A-764	PANEL PLATE	1
106		ALLEN BUTTON HEAD SCREW M6x10	4
107		ALLEN HEAD SCREW M 6x30	2

Head Support and Cradle Assembly



S. NO.	PART NO.	DESCRIPTION	QTY. SG-80MTS
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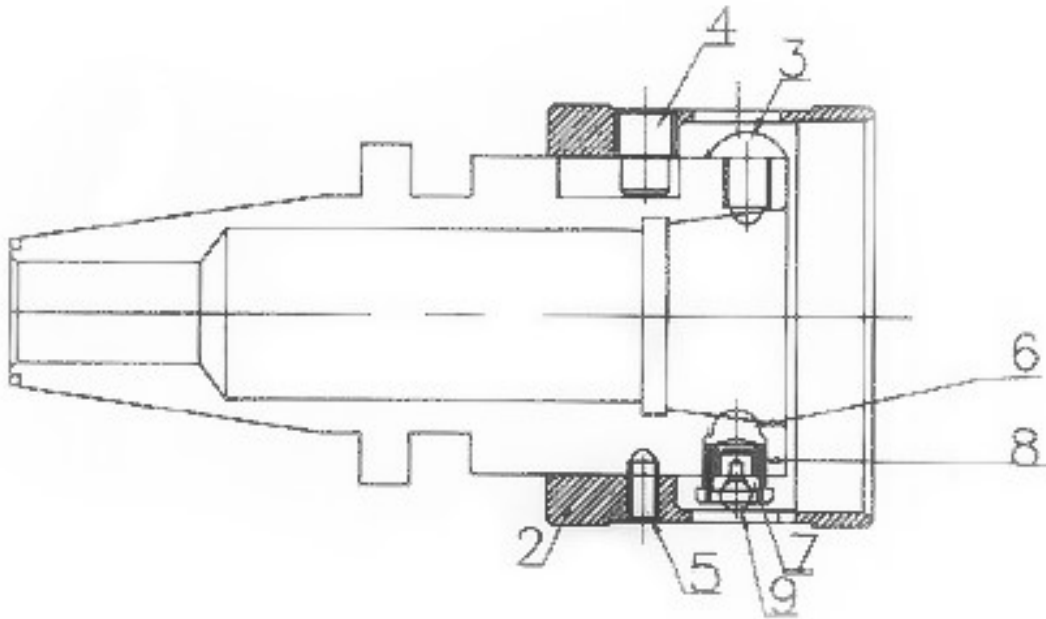
1	055A-678	CRADLE LEFT	1
2	055A-662	SPACER	1
3		ALLEN HEAD SCR EW M6X12	2
4		ADJUSTABLE HANDLE	4
5	055A-663	SPACER	2
6	055A-660	SPACER	2
7	055A-676	T-BOLT	4
8		NYLOCK HEX NUT M12	4
9	055A-671	CLAMPING BRACKET	2
10	055A-657	CRADLE HOLDER (LEFT)	1
11	055A-573	SUPPORT PLATE	2
12		ALLEN SCREW M10X35	8
13	430-940	FLAT	2
14	430-937	STOP PLATE (L. H)	1
15		ALLEN SCREW M6 X 20	2
16	055A-527	COVER PLATE	2
17		ALLEN CSK SCREW M5X12	12
18	430-919	PLUNGER	2
19	430-921	SPRING (NO. 10-0057)	2
20	430-935	STOP PLATE (R.H)	1
21	430-918	KNURLING COLLAR	2
22		ALLEN SCREW M6 X 6	2
23	430-916	PIN HOLDER	2
24	055A-569	CHAIN BLOCK-A	2
25		ALLEN SCREW M10X25	8
26	055A-579	CLAMP PLATE	2
27	055A-588	GUIDE ROD	4
28	055A-638	SCREW ROD	2
29		CYLINDRICAL PIN DIA. 4 x 20 LONG	2
30		ALLEN HEAD SCREW M12 x 25	2
31		NEEDLE THRUST BEARING 20 x 34 x 4	4
32	055A-576	SPROCKET SUPPORT	4
33		ALLEN HEAD SCREW M10X20	8
34		ALLEN BUTTON HEAD SCREW M5X10	12
35		ALLEN SCREW M8X20	4
36		DOWEL PIN DIA 1/8"X58" LONG	4
37		ROLLER CHAIN	1
38	055A-556	SPROCKET	4
39	055A-564	TOP PLATE	4
40		ALLEN BUTTON HEAD SCREW M5X6	4
41	055A-557	TENSION SPRING	4
42	055A-565	BUSH	12
43			
44	055A-623	TENON	4
45		ALLEN SCREW M5X12	4
46	055A-619	T-NUT	4
47	055A-679	CRADLE RIGHT	1

48			
49			
50			
51			
52			
53			

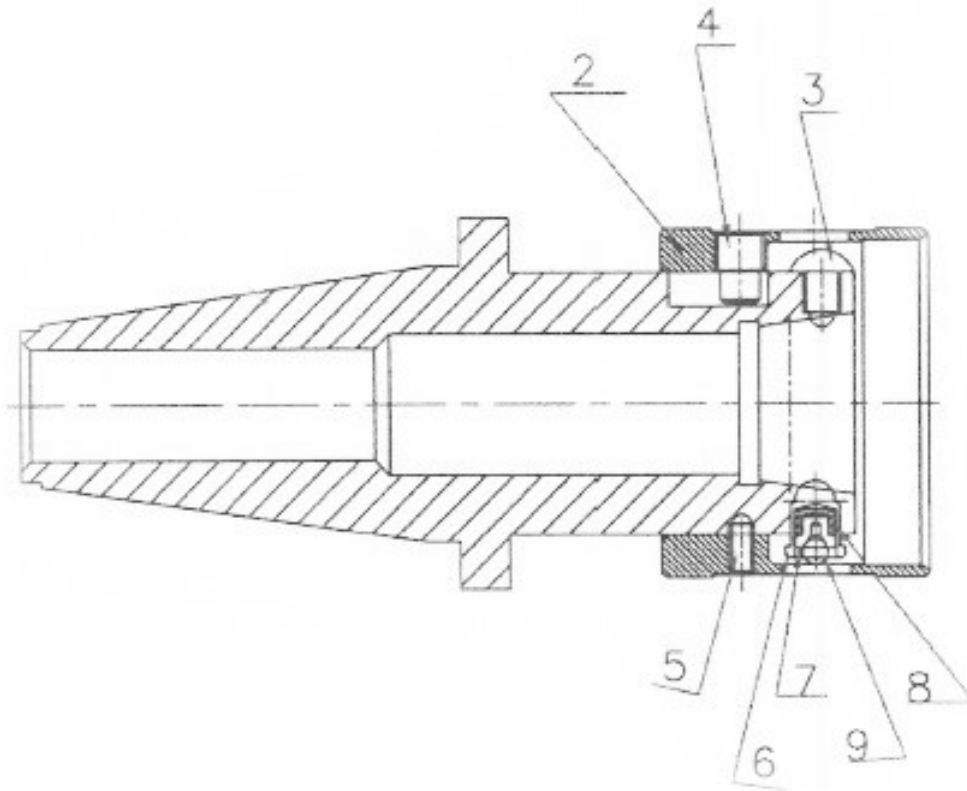
S. NO.	PART NO.	DESCRIPTION	QTY. SG-80MTS
54			
55			
56			
57			
58			
59			
60			
61			
62	055A-654	PARALLEL BAR	2
63		ALLEN SCREW M12X55	8
64	055A-590	END STOPPER	4
65		ALLEN SCREW M6X12	8
66	055A-675	GUIDE ROD	2
67	055A-560	END COVER	4
68		ALLEN SCREW M8X20	2
69	055A-595	HANDLE BLOCK	2
70		ALLEN SCREW M8X16	4
71		ALLEN SCREW M8X25	2
72	055A-626	PLUG	4
73	055A-658	HOLDER SHAFT RIGHT	1
74		ALLEN SCREW M10X20	4
75	055A-670	T-BOLT	2
76	055A-659	HOLDER SHAFT LEFT	1
77		ALLEN SCREW M10X20	4
78	055A-669	T-BOLT	2
79	055A-674	SET-SCREW	4
80		STEEL BALL DIA 6MM	4
81		NYLOCK NU T M8	4
82		ALLEN HEAD SCREW M8X90	4
83		HEX NUT M12	2
84	055A-323	SPHERICAL WASHER	4
85	055A-324	SPHERICAL WASHER	4
86		WASHER M8	8
87	282580	COMP. SPRING	4
88	055A-625	CHAIN BLOCK-B	2
89	055A-567	PIN	12
90	055A-635	PIVOT	2

91	055A-672	PIVOT	4
92	055A-645	VALVE PLATE	2
93		ALLEN CSK SCREW M6X12	4
94	055A-673	CYLINDER EXTENSION	2
95		PNEUMATIC CYLINDER	2
96		ALLEN HEAD SCR EW M6X70	8
97	055A-682	JACK SCREW	1
98	055A-683	JACK COLLAR	2
99		CYLINDRICAL PIN DIA 1/8"X1.1/2" LONG	1
100	055A-681	JACK TOP	1
101	055A-680	JACK BASE	1
102		ALLEN GRUB SCREW M6X6	4
103	055A-661	PLUG	2
104			
105			
106	055A-718	CRADLE COVER	2
107		ALLEN BUTTON HEAD SCREW M5X10	6

S. NO.	PART NO.	DESCRIPTION	QTY. SG-80MTS
108	055A-694	CRADLE HOLDER (RIGHT)	1
109	055A-695	ZERO MARK	1
110		ALLEN HEAD CAP SCREW M6X16	2
111			
112			
113		ALLEN GRUB SCREW M5x6	2
114		ALLEN HEAD SCREW M12x16	2
115		ALLEN GRUB SCREW M6x6	2
116	055A-639	SHAFT EXTENSION	2
117		PARALLEL KEY 3/16"x3/16"x1/2	2
118	055A-640	RING NUT	2
119	055A-654-S	PARALLEL BAR SCALE	1 SET
120	055A-606	HEIGHT BLOCK	2
121	055A-668	SET SCREW	2
122		NEEDLE BEARING NK 40/20	4
123	055A-646	CLAMPING PIN	4
124	055A-648	CLAMP PLATE	2
125	055A-684	JACK SCREW LARGE	1
126		WASHER M12	4
127		SPRING WASHER M12	4

RBHAR1KIT Repair Kit for RBHAR1

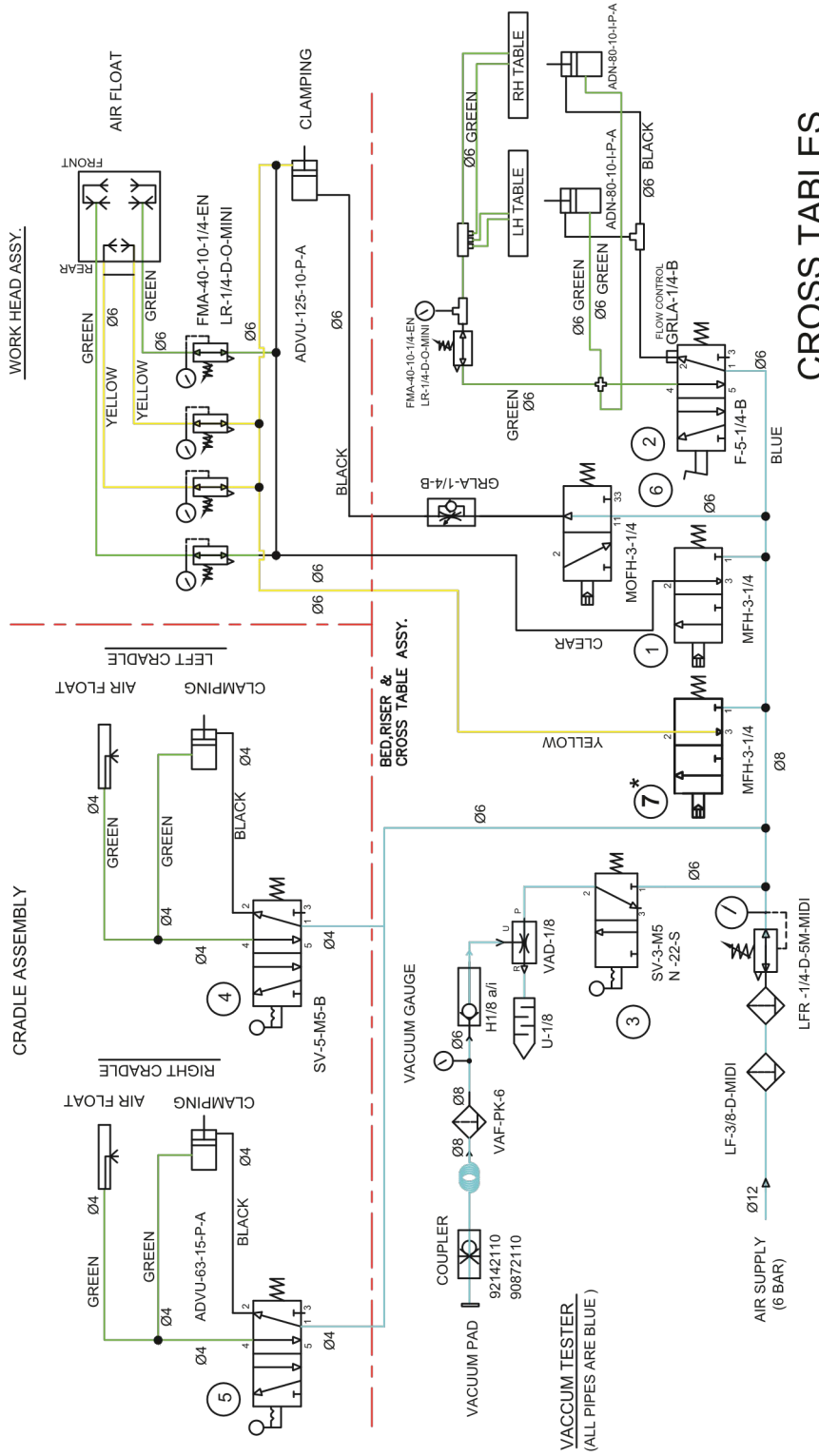
Item	Part #	Description	Quantity
2	RBHAR1COL	Collar	1
3	555-19-19	Stop Screw	2
4	555-19-20	Dog Point Screw	2
5	555-19-21	Ball Point	2
6	555-19-22	Detent	4
7	555-19-23	Ball Seat	4
8	555-19-24	Spring	4
9	555-19-25	Ball (4mm)	4

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

SG90MTS Pneumatic Drawing

**SG-80A & SG-80MTS
PNEUMATIC CIRCUIT DIAGRAM**



CROSS TABLES

- NOTE:
- ① SOLENOID VALVE FOR WORK HEAD AIR FLOAT "ON" & "OFF" (SG-80A & SG-80MTS) FRONT PORT.
 - ② SOLENOID VALVE FOR CROSS TABLE AIR FLOAT & CLAMP
 - ③ SELECTOR SWITCH FOR VACUUM TESTER
 - ④ SELECTOR SWITCH FOR LEFT CRADLE AIR FLOAT & CLAMP
 - ⑤ SELECTOR SWITCH FOR RIGHT CRADLE AIR FLOAT & CLAMP
 - ⑥ SOLENOID VALVE FOR WORK HEAD CLAMP & DECLAMP (SG-80A)
 - ⑦ SOLENOID VALVE FOR WORK HEAD AIR FLOAT "ON" & "OFF" REAR PORT.
- * SOLENOID VALVE FOR WORK HEAD AIR FLOAT "ON" & "OFF" REAR PORT.

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 known 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 known 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)

Disclaimer of Expressed and Implied Warranties:

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