3. CUTTERHEAD SUSPENSION AND NEUMANN STEREO CUTTERHEAD INSTALLATION

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3.1. SA 78 cutterhead suspension installation

An adjustable face plate is located at the left end of the carriage arm. It may be adjusted vertically by means of the large knurled knob at its top. The face plate has a dovetail slot milled into it. At the right side of the SA 78 cutterhead suspension unit is a guide rail and a flat headed mounting bolt. Fig.3.1.1. This bolt may be loosened using either a screw driver or a 12 mm open end wrench backing off the hex nut on the opposite or left wall of the suspension. The flat headed bolt is inserted into the dovetail slot and the hex nut is pulled up finger-tight. The SA 78 cutterhead suspension may now be slid forward and back, making the cutterhead adjustment according to chapt. 3.6. possible.

3.2. The cutterhead suspension dash pot

The dash pot attached to the frontside of the cutterhead suspension must be filled with the silicone oil (50 cs/s) which comes with the machine, fig. 3.2.1. Remove the suspension cover with the lowering lever in its upright position, obtained by pressing the release button. Lower this lever until it locks in its down position. Fill the dash pot with the silicone fluid supplied to within 3 mm (1/8") of the top edge. Make sure that no air is trapped beneath the piston by moving the dropping lever up and down several times, releasing air bubbles from below the piston. Add silicone as required.

The amount of damping which the dash pot contributes may be regulated by opening and closing holes in its piston, using the knurled collar around the piston rod. An approximately correct setting is achieved by turning this collar fully counter-clockwise (fully loose) and then two full turns clockwise.

A more accurate adjustment for actual cutting is described in chapt. 5.

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3.3. Chip tube connection

The SA 78 cutterhead suspension intended for the VMS 80 is equipped with a special chip tube assembly for this machine. It has an orifice tube which may be turned and/or slid in and out a V-shaped clamping vise, fig. 3.3.1., a connecting tube and a chip hose. The open end of this hose must be put into the corresponding hole in the chip jar cover top.

3.4. Stylus replacement in Neumann SX cutterheads

The Neumann SX cutterhead is delivered with a new cutting stylus installed. To exchange it, use the ZA 12 inspection scope which is optionally available.

The ZA 12 inspection scope permits the precise installation of styli in the stereo cutterhead; a pre-requisite for a perfect cut. The scope also permits inspection of the stylus condition while in the cutterhead by allowing the cutterhead to be swivelled trhough an arc of mor than 180° while maintaining perfect focus on the stylus itself. When replacing a stylus be sure to observe the following points:

1.) Rest the cutterhead on a level surface with its stylus pointing up and the mounting brackets towards you.

2.) Slide the stylus tool, which is supplied with every cutterhead, under the square shank collar with its milled slot facing up.

3.) DO NOT use the stylus tool as a lever, but rotate it from side to side while exerting slight upward pressure to remove the stylus from its conical receptacle. Remove the heating wires by depressing the buttons atop the heating wire terminals.

4.) Handle the new stylus either with tweezers or your fingers solely by its heating wires and inspect the conical shank and its receptacle in the cutterhead to make sure

...3.4. there is no dirt. Such dirt may be removed using a fine paint brush dry or dipped in a minimal amount of acetone. Make certain that no acetone is permitted to run into the cutterhead itself!

5.) Insert the new stylus into its receptacle making sure its front face is towards you.

6.) Mount the cutterhead in the movable arm as shown and rotate the cutterhead until the front face of the stylus appears in the field of vision. Use the two knurled screws at the base of the microscope to align the stylus face along the reticule line in the scope and use the broad grooved ring on the scope's body to bring the stylus tip into proper focus. Check the stylus face alignment to the reticule line (see figure), and use the stylus tool, this time with its milled slot facing downward, to rotate the stylus until the face is perfectly paralles with it. At the same time apply gentle downward pressure to properly seat the stylus in the torsion tube. Maximum pressure should not exceed 150 g (5 oz).

7.) Clamp the heating wires to their terminal leaving sufficient slack to allow the wires to leave the stylus horizontally and parallel to each other until they curve downward towards the terminals. Use a wooden stick or toothpick to orient the wires to prevent their dragging on the lacquer surface while cutting.

3.5. SX Neumann stereo cutterhead installation

The carriage of the lathe is to be moved to the right-hand end. Press cutter lift button, remove the suspension cover and loosen the cutterhead clamping screw. Insert the cutterhead mounting plug into the hole at the front of the cutterhead mount until the cutterhead touches the front face of the suspension. Tighten the cutterhead clamping screw slightly and plug in the cutterhead connecting cable. Caution: Before moving the cutterhead over the turntable for further adjustment make sure that the cutterhead does not touch the turntable platter. If this is the case, adjust the suspension height accordingly.

Place the leveling block supplied on the turntable and lower the cutterhead down to it. If this is not possible, presumably the hold back spring tension is too strong. Loosen the knurled adjustment screw at the back of the cutterhead suspension to a point where the cutterhead will drop to the leveling block. Loosen the cutterhead clamping screw and adjust the cutterhead until the corners of both of its magnets touch the alignment block. Fig.3.5.1. Fasten the cutterhead clamping screw and raise the cutter.

3.6. Carriage radial motion adjustment

During the cutting procedure the stylus has to move exactly along the turntable radius. To fulfil this requirement, the cutterhead suspension may be slid forward and back as described in chapt. 3.1.

For the normal routine adjustment lower the cutterhead to the right of the turntable and adjust the hold back spring (as described in chapt. 3.5.) in such a way that the cutterhead is floating and that the front plate to which it is fastened, is flush with the front of the cutterhad suspension itself.

Watch the stylus through the horizontal chip microscope in this floating position. The adjustment is correct when the stylus front edge is in line with the vertical reticule of the microscope. Fig. 3.6.1. To obtain this position shift the entire cutterhead suspension forward or back after loosening the hex nut at the left-hand side.

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3.7. Counterbalance spring adjustment for the cutterhead suspension

Attach the connecting cable AM-SA between cutterhead suspension and machine and position it according to fig. 3.7.1. Lower the cutterhead to the right of the turntable. The push button at the operating terminal CUTTER DOWN will light.

Turn the potentiometer BASIC DEPTH fully counterclockwise (to zero). Bring both thumb knobs ADJUST▽ and ADJUST▼ to their mid position (i.e. their white indicator line is vertical, pointing upward). Adjust the hold back spring by turning its knurled screw in such a way that the front plate, in which the cutterhead is fastened, is again vertical and in line with the front of the cutterhead suspension itself.

Tighten the knurled counter nut of the hold back spring screw. Fig. 3.7.2.

Important: Contraty to older Neumann lathes the VMS 80 cutting depth (groove width) is adjusted electronically only. The spring in the cutterhead suspension is only used to balance the cutterhead.

3.8. Chip tube adjustment

Lower the cutterhead to the right of the turntable into its floating position as described in chapt. 3.7. Adjust the chip tube by means of the two knurled nuts at the V-shaped chip tube suspender such that the end of the tube is positioned exactly behind the stylus and that the lower edge of the tube is 0.5 mm above the stylus tip. Carefully draw the chip tube orifice out towards the stylus until its front edge is 1 mm behind the stylus. Fig. 3.8.1.

Caution: Make sure that the chip tube is clear of the stylus when doing this.

The dimensions indicated above are approximate. They have to be optimized under actual cutting conditions while watching the chip in the microscope.

3.9. Basic electrical cutterhead suspension adjustment (cutting depth adjustment)

Raise the cutterhead suspension by means of its adjustable face plate, fig. 3.9.1., so far that the stylus does not touch the lacquer even in the cutter down position. Let the carriage run to the test groove diameter of the lacquer (push button TEST DIA). Set a heating current of about 500 mA (potentiometer BASIC HEAT) and a land of 10 µm (0.4 mil) (potentiometer LAND). Adjust the BASIC DEPTH meter (potentiometer BASIC DEPTH) to a value of 40 µm (1.6 mil) (marker ▽). The stylus may now slightly touch the chip tube. Start the turntable. Now carefully lower the entire cutterhead suspension, using the knurled knob, and observe the cutting process in the horizontal stylus microscope. Lower the suspension until the stylus front edge is in line with the microscope reticule.

Caution: There is a certain risk that the very thin chip now cut will not be picked up by the chip tube. If it is not, release the cutterhead and lower it again.

Measure the groove width in the microscope and adjust thumb potentiometer ▽ until groove measures exactly 40 µm (1.6 mil).

The second depth adjustment must be performed at the ▼ marker of the depth meter. Set the

...3.9. potentiometer BASIC DEPTH to a reading of 150 µm (6 mil) on the meter ▼ marker. Measure the groove width in the microscope and adjust actual width by means of the ▼ thumb potentiometer to exactly 150 µm (6 mil). Repeat the adjustment at the ▽ marker (40 µm).

Important: Under no circumstances use the hold back spring in the cutterhead suspension for this as was the practice with older Neumann lathes.

The adjustment: ▽ marker - ▼ marker - repetition ▽ marker is always to be done in this sequence and is to be repeated whenever a new lacquer carton is opened or the stylus is changed.

It is in essence a calibration of the electronics to the lacquer and stylus in use. If critical cutting is to be done it is advisable to repeat this electronics calibration for each disk.

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EASY TO UNDERSTAND INSTRUCTIONS!

FOR STEPS 3.6, 3.7 & 3.9

CALIBRATION OF CUTTERHEAD SUSPENSION (NEUMANN VMS-80)

A--DISCONNECT CABLE BETWEEN CUTTERHEAD SUSPENSION AND LATHE ELECTRONICS. HOLDBACK SPRING ADJUSTMENT FOR FLOATING HEAD POSITION: WITH HEAD LOWERED, ADJUST SPRING USING KNURLED KNOB AT BACK UNTIL FACEPLATE IS FLUSH WITH FRONT OF CUTTERHEAD SUSPENSION. (This adjusment allows you to adjust the radial carriage correctly without letting the faceplate prejuduce the verticle reticule reading of 'scope)

B--CARRIAGE RADIAL ADJUSTMENT: WITH HEAD LOWERED ADJUST ENTIRE CUTTERHEAD SUSPENSION BACKWARDS OR FORWARDS BY LOOSENING HEX NUT ON SIDE UNTIL STYLUS FRONT IS IN LINE WITH VERTICLE RETICULE OF CHIP 'SCOPE. (this adjustment ensures you are cutting in a straight line directly across to the center of the disk)

**MAKE SURE NO DEPTH IS DIALED IN

C--HOLDBACK SPRING TENSION WITH ELECTRICAL LOAD CONNECTED: RECONNECT CABLE BETWEEN CUTTERHEAD SUSPENSION AND LATHE ELECTRONICS. (FACEPLATE WILL NOW MOVE FORWARD). NOW READJUST HOLDBACK SPRING FOR CORRECT ADJUST--FACEPLATE SHOULD AGAIN BE FLUSH WITH FRONT OF SUSPENSION. (This adjustment compensates for the electrical load. NOTE: The VMS-80 lathe uses electrical control of depth only-not spring controlled as with earlier lathes)

D--CUTTERHEAD SUSPENSION HEIGHT: WHILE CUTTING WITH LACQUER ON-DIAL IN 1.6 mils DEPTH AND 0.4 mils LAND (THUMBWHEELS @ 0) ADJUST HEIGHT BY TURNING KNURLED KNOB AT TOP UNTIL STYLUS FRONT AGAIN IS IN LINE WITH VERTICLE RETICULE.

E--ELECTRICAL DEPTH FINE TUNE: OBSERVE CUT UNDER 'SCOPE AND USE THUMBWHEELS TO ACHIEVE CORRECT DEPTH FOR ▽ 1.6 mils AND 6.0 mils ▼ .

3.10 ZA 4 cooling system (optional) installation

For the cutting of high level disks additional cooling makes it possible to increase the life of Neumann stereo cutterheads.

Helium gas is used to conduct the heat generated in the driving coils to the neighboring metal parts.

The ZA 4 cooling system consists of two plastic connecting hoses, a connecting piece, and a flow indicator with a needle valve.

The flow indicator is mounted on the support arm of the disk cutting lathe in such a way that the knurled knov of the needle valve is easily accessible. The short plastic hose connects the front gas inlet pipe on the cutterhead with the outlet of the flow indicator (upper connecting piece). A pressure reducing valve for helium capable of accurately establishing an operating pressure of 1 PA (14 lbs/sq.inch) is to be mounted onto the thread (21.8 mm, 14 TPI right-hand thread) of the helium tank. The connecting piece which is supplied with the ZA 4 cooling system is then attached to the outlet of the pressure reducing valve and connected to the inlet of the needle valve on the flow indicator by means of the long plastic hose.

About 1 to 2 liters (0.35 to 0.7 cubic feet) of

...3.10 Helium should be fed into the cutterhead per hour. This condition will be satisfied if the float in the flow indicator stands between .03 and .04 at an operating pressure of 1 Pa (14lbs/sq.inch). A slight dancing of the ball will not affect the cooling.

When operating Neumann cutterheads with the VG 66, VG 74 amplifier rack or the SAL 74 cutter drive logic the adjustment of the control for the circuit breakers need not be altered. These circuit breakers are not affected by drive current, but switch off on critical temperature in the cutterhead so that the Helium cooling effect is fully considered.