6. ELECTRICAL AND MECHANICAL ALIGNMENT INSTRUCTIONS

The followeing is a description of the machine alignment carried out at the factory prior to delivery of the machine. Usually, it is not necessary to repeat these procedures. Knowledge, however, is essential if the parameters are different to the in-house standards, and to be able to adjust and service the lathe system.

We recommend a test and, if necessary, readjustment of all points which are marked with an asterisk.+
The following test equipment is required:

digital voltmeter
stop watch
extender boards
multimeter
Extender boards are a constituent of the VMS 80 delivery.

The VMS 80 electronics PCs have the following abbreviations:
PMA 80 Turntable drive
RAS 80 Land control
STS 80 Depth control
VMA 80 Pitch control drive
VME 80 Pitch control power amplifier
BGE 80 Disk parameter setting
SPS 80 Carriage positioning control
VAS 80 Pitch control
TAS 80 Depth processing control
VSA 80 Preview signal processing

...6. The PCs are all mounted in the lower part of the VMS console. See fig. 6.0.1.Virtually all trimmer potentiometers for the adjustment and alignment of the machine are mounted at the front of the PCs. Only the cover plate need to be removed, not the PCs.

There are, however, a few basic adjustments which may only be done using the extender boards supplied. Fig. 6.0.2.

Three different extender boards are provided with the VMS 80:

a) Extender PC 01 for the NSR 80 power supply
b) Extender PC 02 for PMA 80 and VME 80 motor drive
c) Extender PC 03 for all other PCs.

Important: The VMS 80 control logic uses CMOS technology. CMOS elements are endangered by high potential resulting from static discharge. The following steps should be taken to ensure the safety of the CMOS logic:
Before removing or placing a PC-board into the machine discharge yourself on a grounded part of the machine.

6. ELECTRICAL AND MECHANICAL ALIGNMENT INSTRUCTIONS

6.1. Adjustment of varigroove (pitch drive

The following adjustments should only be performed after the machine has warmed up for a minimum of 30 minutes

+6.1.1. Adjustment of standstill of the pitch drive

The VMA PC is removed and extended using the PC 03 extender card. The land and depth on the control unit are turned fully anticlosckwise(CCW). The instruments for land and depth read zero. In the control unit, start and 33 1/3RPM are pushed.

Connect a multimeter to test point 4 and to zero volts. Adjust the trim pot situated between IC4 and IC13 in such a manner that the least voltage ~~change~~ occurs. This adjustment requires care. The result of the adjustment may be checked by watching the right-hand lead-screw knob which should rotate no more than two scale marks per minute, and that in cutting pitch direction only.

VMA board

PK 03 board

+6.1.2. CAL PITCH adjustment

This adjustment is to be done only after the previously described zero potential stability is correct. Select 33 1/3. For VMS 80 with metric calibration: the depth control is adjusted to 80 µm. Open the land control till the pitch meter indicates 100 µm. Adjust PITCH CAL potentiometer till the leadcrew knob takes 18 seconds for one revolution. This timing test should be repeated to ensure the accuracy of the adjustment.

For VMS 80 with inch calibration: the depth control is adjusted to 3 mil. The land control is set for a pitch meter reading of 4 mil. The time for a full revolution of the leadscrew is then 17.72 seconds (18 seconds close enough).

This adjustment is only done at 33 1/3 RPM and is then valid for all turntable speeds.

set 33 1/3 rpm
set Depth 3 mil
set Land 4 mil
adj pitch 1 rev → 17.72 sec = 18 sec.

6.2.1. Mechanical adjustment of the linear potentiometer

TP5

SPS

For metric VMS 80 units: Place PC SPS onto extender board PC 03. Connect a digital voltmeter between test point 5 and to 0 volts. Move carriage to 300 mm diameter on indicator ruler. The locking Allen bolt should be approx. in the middle of the elongated slot. Fig.6.2.1. The digital voltmeter should now read 6.000 volts. If this is not the case, loosen bolt with Allen key and move support against carriage until voltage is achieved. Fig. 6.2.1.1.

After this is done, further adjustments of the ruler scale marker may only be made after loosening the Allen screw, fig. 6.2.1.1. This could become necessary when replacing the cutterhead.

For VMS 80 machines with inch scale: Set to 12 inches. The voltage on TP 5 should be 6.096 volt. Adjustments in the same manner as described above.

6.2.2. Electrical alignment of the linear potentiometer

The PC SPS remains on the extender board PC 03. The test points 2, 3 and 4 have a trim pot allocated to each test point.

The common 0-volt connection is next to test point 3. First connect the digital voltmeter between test point 4 and 0 volts. Adjust the pot next to test point 4 to 12.000 volts. Connect the digital voltmeter to TP 2 and adjust the pot next to TP 2 to 8.800 volts. Connect the digital voltmeter to TP 3 and adjust the pot next to TP 3 to 0.8000 volts.

Adjustments for TP 2 and 3 interact and should be repeated until no change is noticed between measurement.

SPS

PK 03

6.3 Diameter calibration

The VMS 80 has a linear potentiometer to generate the position reference of the carriage. The voltage at the wiper of this pot is directly proportional to the radius position of the carriage (20 mV/mm) (508 mV/inch). The conversion of these voltages to command signals is carried out in comparators.

viper 508 mV/inch

To avoid adjustment errors due to reversing of the carriage, the carriage should only be moved from right to left for these alignments. Each diameter in turn is set using the fixed diameter ruler and the carriage is accurately positioned with the help of the hand wheel at the right leadscrew end. Before adjusting the trim pots at the front of the SPS PC, check the relevant disk parameters: RPM, DISK DIA and END DIA. Turn the relevant control clockwise until the adjacent LED lights. No turn the control slowly anti-clockwise (CCW) until the LED just goes out.The adjustment for that diameter is now complete. Repeat this for all other diameters.

Calibration of the USED % indicator in the control unit. A trim pot on PC SDS requires adjustment. For calibration, the digital display is used as the indicator. The adjustment of the trim pot is done logically and in such a manner that the number jumps from 99% to 100% (Display 00). Select

...6.3. the disk diameter and position the carriage to the end modulation diameter.Adjust the trim pot until USED % reads less than 99%. Slowly turn the pot in the opposite direction until the digital indicator jumps from 99 to 100% (Display 00).

Calibration of the mechanical end positions of the carriage is done with trim pots CAR R and CAR L at the following diameters:

→ for CAR L: 92 mm

→ for CAR R: 425 mm

Important:For calibrating the right carriage end position CAR R, the inverse direction is recommended. Move the carriage from left to right to the recommended diameter of 425 mm. → Turn trim pot CAR R clockwise (CW) until the adjustment LED goes out. The turn same pot anticlockwise (CCW) until LED just lights. Repeat for 92 mm diameter and adjust CAR L.

yell — single
red - LP

6.4. Leadscrew FAST/LEAD-OUT RPM calibration

There is a separate calibration for each turntable speed. Select the turntable speed.The carriage is to be placed in its extreme right-hand position. The PITCH + DEPTH CONTROL switch is in the "Test" position. The red LED and DISK DIA lamp flash during this adjustment.

Operate the START and FAST buttons in sequence. The LED in the middle of the PITCH meter lights. The FAST/LEAD-OUT pitch may now be read on this scale of the meter. The indication is in "mm pitch" per turntable rotation. The adjustment is carried out by means of VMA PC trim pot FAST/LEAD-OUT.

6.5. Leadscrew MARKER (SPIRAL)/LEAD-IN RPM calibration

The preparations are the same as described in the FAST/LEAD-OUT alignment. Additionally, the MARKER (SPIRAL) switch is in CONT position.The START button and then the MARKER (SPIRAL) button are pressed. The LED on the appropriate scale lights and permits reading of the MARKER (SPIRAL)/ LEAD-IN speed which is indicated in mm per turntable revolution. The adjustment is made with the relevant potentiometer for the selected speed on the VMA PC.

+6.6. Adjustment of diameter compensation depth control

This alignment provides for constant groove width over the full modulation radius. Select 33 1/3 RPM, a disk diameter of 12" (30cm) and an end diameter single at the control unit.

The potentiometers ▽ and ▼ on the TAS PC COMP DEPTH are turned fully clockwise (CW). Cut a 14" lacquer at the test groove diameter for 12" (30 cm) (approx.325 mm). Lower the cutter. Cut an unmodulated groove and calibrate the DEPTH ADJUST at the control unit (as in paragraph 3.9.). Leave depth unchanged and the comp. depth calibration at 5" 12 cm diameter is repeated. Repeat calibration adjustment, but this time adjust with trimmer pot RAD COMP DEPTH on TAS PC

12" - 5"
12" TAS PC - comp depth
5" Rad comp depth

*

Sequence as prescribed in paragrph 3.9. ▽ ▼ ▽ must be observed, i. e. first calibration mark ▼ and the repeated ▽

*1.6 mil — 6 mil

Rad 12" — 5"

6.7. Preheat duration adjustment

On the VMS 80 lathe, the stylus is preheated before it begins cutting. This has been shown to significantly improve chip pick-up. This may be observed on the heater current indicator instrument. It is also visible by the time delayed flashing of the CUTTER DOWN button This preheat duration may be adjusted. It is set at the factory at one second. The absolute value is immaterial and may be adjusted to the users liking.

1 sec

6.8. Drop time adjustment

After stylus preheat duration, the cutterhead will cut a basic depth independent of its drop time. This speed relates to a 40 µm groove width. Immediately after the initial depth cut, the depth switches from basis depth to real depth. The drop time is influenced by the cutterhead dash pot damping. It is advisable to adjust the dash pot before adjusting the drop time. Electrical adjustment is by means of the DROP TIME pot on the TAS PC-board. Adjust for an immediate change to real depth upon reaching basic depth.

1.6 mil

1.6 mil

6.9. Carriage radial motion basic adjustment

The chip microscope is accurately set at the factory. Should it become misaligned, it will be necessary to adjust the radial motion by means of the engraved center line ruler which comes with the machine.

Place the ruler over the center pin as shown in fig. 6.9.1. Position the cutterhead over the end of the ruler and lower to the CUTTER READY position. If necessary, adjust suspension height by means of the carriage face plate to prevent the stylus from touching the ruler. Adjust the position of the ruler in such way that its line is directly under the cutting stylus. Lift the cutterhead, move it inward and bring it down again to observe whether the the stylus has followed exactly along the black line. If an error is observed, loosen the hex nut fig.3.1.1. and move the entire cutter suspension. Repeat the calibration procedure until the alignment between cutterhead stylus and ruler line is correct at outer and inner diameters.