X1215/16 (ABOVE SERIAL NUMBER 2000)

Cartridge Disk Drive Unit

Vol. VII: Maintenance

Data
Systems

1.1 GENERAL

The performance of the Cartridge Disk Drive depends on a carefully planned and properly executed program of preventive and corrective maintenance.
The program, if fillowed, will ensure optimal performance and maximim 'device up' time.
The scheduled maintenance of the device is based on hours, indicated by the elapsed-time meter which can only be viewed from the rear, and on normal office environment on a one shift base an abnormally dirty environment may dictate increased preventive maintenance.
Three levels of scheduled maintenance exist:

a) 1000-Hour or six month scheduled maintenance
b) 2000-Hour or 12 month scheduled maintenance
c) 4000-Hout or 24 month scheduled maintenance.

However, it is advisable to perform a maintenance check the first 500 hours of three months.

1.2 SPECIAL TOOLS

Drive belt adjustment tool.
Disc Exerciser XMX1418
Extender board
Jumper wires
C.E. cartridge XMX1419
Head removal and replacement tool
Head alignment and adjustment tool
Torque wrench 7 kg/cm (M3 socket screw)
Berg handtool HT-80
C.E. write protect plug
Index unit adjustment tool
Optical zero adjustment tool
Tool case
Fault indicator 3L54 (if not installed)
Sector pick up adjustment tool
Meander block adjustment tool
P.C.B.A 2L28 (SMS1418)
P.C.B.A 2L29 (XMX1418)
Bit 2.5 mm HEX.

1.3. MATERIALS

Isopropyl alcohol	1322 505 69201
Wad tip-Q-sticks	5122 010 20921
Lint-free dry clotch (Scotch wiper)	5122 010 20911
CAB foil 0.08 mm	
Wooden spatulas	2822 060 15456
Drive belt	
Earth contact lubrication	

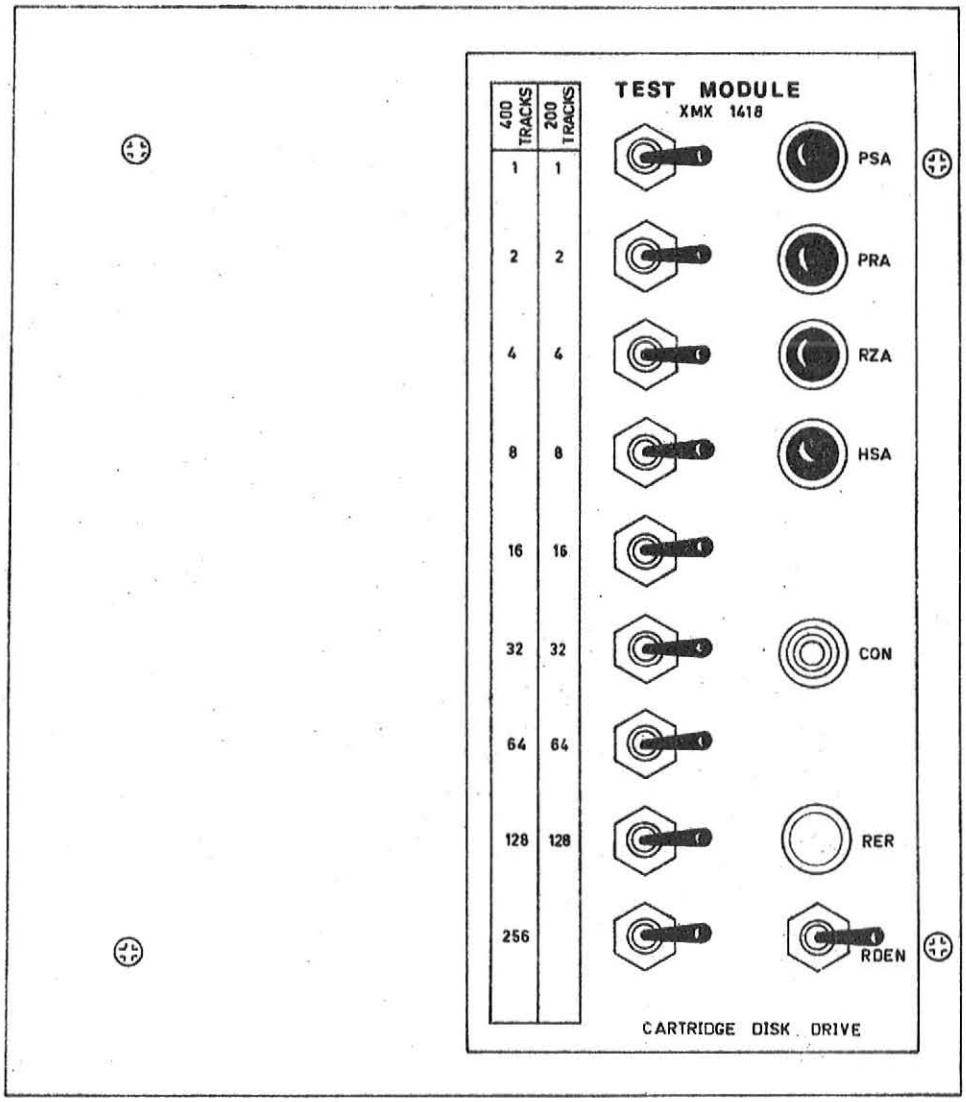

TEST MODULE
XMX 1418
400 TRACKS
200 TRACKS
1
1
2
2
4
4
8
8
16
16
32
32
64
64
128
128
256
PSA
PRA
RZA
HSA
CON
RER
RDEN
CARTRIDGE DISK DRIVE

Figure 7-1

1.4. EXERCISER fig. 7-1

The Exerciser is provided for use a service engineer to enable him to instruct the CDD, in moving the heads to a selected cylinder address, or between two selected cylinder adddresses,to select one of the four heads, to make a read enable.

Switches and Indicators

The left row consists of nine toggle switches known as track-switches which are identified 1,2, 4, 8, 16, 32, 64, 128 for 200 tracks and 1, 2, 4, 8, 16, 32, 64, 128, 256 for 400 tracks.
The right row consists of 4 push buttons, two indicators, and one toggle switch.
The four push buttons are identified by.
PSA : Position Single activated

PRA : Position Repeat activated

RZA : Return to zero activated

HSA : Head Select activated

The two indicators are identified by CON : ON cylinder

RER : Recoverable seek Error

And the toggle switch is called
RDEN : Read enable

Use of the Exerciser

1.Connect the plug of the test module to interface socket of the CDD.

2.Switch on the power at the rear of the disk unit, the cartridge exchange lamp and power on are lit, and insert the cartridge into the correct position.

3.Press the Start/Stop button.

4.Wait until the Unit Ready indicator is lit.

5.The unit is ready to accept signals from the test module.

1.5 EXERCISER operation

a. Direct seek.

1. Set cylinder address in switches
2. Press the button PSA, the positioner moves to the selected address.

b. Return to zero seek.

1. Press the button RZA, the positioner moves to cylinder zero.

c. Repeat.

1. Set first cylinder address on switches.
2. Press button PSA, the positioner moves to the desired address.
3. Set second cylinder address on switches.
4. Press button PRA, the positioner moves now repeatedly between the selected cylinder address.
5. To stop the positioner, press PRA and the positioner will stop on the first cylinder address or on cylinder zero.

d. Head selection.

Set in the two left switches (1 and 2) the number of the selected head. (sec. below)

Switch 1	Switch 2	Head
left	left	0 UHC
right	left	1 LHC
left	right	2 UHC
right	right	3 LHF

Press button HSA, the selected head will now read, the information, of the track on which the poniotioner was send, before.the head selection.
When the toggle switch RDEN is active it is possible to test the whole read channel up till the interface.

2.1 SCHEDULED MAINTENANCE (1000 hours and FIRST 500 hours)

Engineer : Installation :

Data : Unit serial number:

Work time : Running time meter:

Use Maintenance book no. 5122 992 01061	Page	Tech. tip	Result
1. Inspect the heads. Use a dental mirror and a bright light. If a head has been repeadtedly contacting a surface, it must be replaced. Do not touch the heads with the mirror.			
2. CLEAN THE HEADS WITH A SPATULE WRAPPED IN A SCOTCH WIPER DAMPENED WITH ISOPROPYL ALCOHOL (1322 505 69201). USE A DRY WIPER TO DRY THE HEADS.			
3. Clean the cartridge holder. A lint free dust cloth must be used. The cartridge should fit easily in position. Ensure that no loose particles are left behind when the cleaning has been completed.			
4. Check the cleaning brushes. If there are less than 10 bristles per bruch, change the brush assembly. Was it necessary to change it?			yes/no
5. Inspect the spindle motor drive belt. Was the drive belt worn? Was the drive belt slack? (If necessary adjust it.)			yes/no yes/no
6. Inspect and clean the positioner. Are the rollers and guides clean? If not, clean with a dry Scotch wiper.			yes/no
7. Clean the magnetic chuck and spindle cone with a Scotch wiper and alcohol. Use adhesive tape to pick up any loose particles.			
8. REPLACE THE FINE AND COARSE FILTER (ONLY FOR 1000 HOURS SCHEDULED MAINTENANCE). Caution: When fitting the fine filter, make sure that the air flow is in the correct direction (watch the arrow) and do not remove the packing earlier than necessary.			
9. Check the steel wire with which the clamps retracts the brushes.			
10. Run the test program. Program executed.			yes/no
Note: It is recommended to clean the cone locating hole of the cartridges with a Q-stick.			

2.2. SCHEDULED MAINTENANCE (2000 hours and 4000 hours)

Engineer :

Data :

Work time:

Installation :

Unit serial number:

Running time meter:

Use Maintenance book no. 5122 992 01061	Pag.	Tech tip	Result
1. Inspect the heads. Use a dental mirror and a bright light. If a head has been repeatedly contacting a surface, it must be replaced. Do not **touch the heads** with the mirror.			
2. CLEAN THE HEADS WITH A SPATULE WRAPPED IN A SCOTCH WIPER DAMPENED WITH ISOPROPYL ALCOHOL (1322 505 69201). USE A DRY WIPER TO DRY THE HEADS. Do not touch or breathe on the heads. Do not soak the heads with excess Isopropyl alcohol.			
3. Clean the cartridge holder. A lintfree dust clotch must be used. The cartridge should fit easily in position. Ensure that no loose particles are left behind when the cleaning has been completed.			
4. Check the cleaning brushes. If there are less than 10 bristles per brush, change the brush assembly. Was it necessary to change it?			yes/no
5. Replace the spindle motor drive belt (only for the 4000 or two years maintenance).			
6. Replace the spindle earthing contact.			
7. Inspect and clean the positioner. Are the rollers and guides clean? If not, clean with a dry Scotch wiper.			yes/no
8. Clean the magnetic chuck and spindle cone with a Scotch wiper and alcohol. Use adhesive tape to pick up any loose particles.			
9. Replace the fine and coarse filters. Caution: When fitting the fine filter make sure that the airflow is in the correct direction (watch the arrow). Do not remove the packing earlier than necessary.			
10. Check the steel wire with which the clamps retracts the brushes.			
11. Check R/WR head alignment on CYL 73 (146). Was the adjustment O.K.? Use the write protect card. Record it in the Interchangeability list.			yes/no yes/no
12. Check index to burst adjustment on CYL 5. Record it in the Interchangeability list. Was the adjustment within the limits 18.8 sec $\pm$ 2 usec?			yes/no
13. Run the test program. Program executed.			yes/no

General.

The adjustment neccessary to ensure the satisfactory functioning of the Cartridge Disk Drive (CDD) are described in this section. When an item has been replaced, an adjustment is nearly always neccessary so section 4 of this volume should be used in conjunction with this section.
It should be noted that no supply voltage adjustments can be performed.
A multimeter (type PM 2411/04), an oscilloscope (type PM 3250 or 3330), and a Servo Test Card are required.

3.1 MICRO-SWITCHES

The following micro-switch do not require adjustment:

a) The two clamp switches.

3.1.1 Cleaning Cycle Micro-switch Adjustment.

The adjustment of the rest position of the cleaning brushes can be performed by turning the cam situated on the brush arm. The cam must be turned so that the micro-switch contacts open at the moment the brushes move outside the cartridge holder ring.
The arm, with its associated brushes, can be turned by hand.
A multimeter must be connected across the normally closed contacts to check the micro-swith action.

3.1.2 Retracted switch adjustment (Figure 7-2)

CAUTION : DO NOT MOVE POSITIONER TO MUCH FORWARD SO THAT THE HEADS BECOME LOADED

1) Remove the fuses F5 and F6 from the + 35V and -35V on the driver print.

2) Connect the multimeter to pin 57 of card SS (signal RETA) and earth.

3) Switch Power On.

4) Move the positioner by hand slowly towards track 000 until signal RETA is logic "1".

5) Check at this point whether the zero indication of the vernier is 1mm ± 1/2 mm at the left of the "R"-indication on the ruler.
If necessary re-position the retracted switch.

6) Check if the positioner can be moved between the RETA-setting and the mechanical stop for at least 5mm.

7) Switch power off and replace the fuses F5 and F6.

8) Switch power on and check that there is no current through the positioning coil by moving the positioner between the retracted position and track 000.

9) Switch power off.

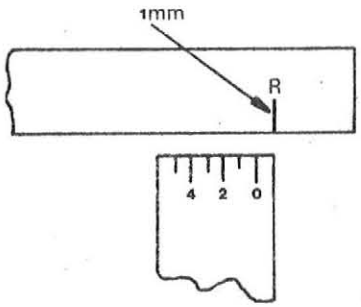


Figure 7-2

3.2 Y-DIRECTION MEANDER BLOCK (Figure 7-3, 7-4).

N.B. When possible this adjustment should be carried out with the heads removed.

3.2.1 Adjustment in Y-direction.

1) Take away the fuses F5 and F6 on the driver card. (Now the voicecoil is disconnected from the +35V and -35V).
2) Loosen the two socket screws G and K.

   A PROTECTIVE SHEET OF 80 /UM APPROXIMATELY CAN BE PLACED BETWEEN THE MEANDERS, THUS PREVENTING THE MEANDERS ARE DAMAGED.
3) Switch the power on.
4) Put a cartridge in the disk unit (only when the heads are not removed).
5) Press the start/stop button and wait until the disks are in nominal speed.
6) Move the positioner inwards by hand so that the primary meander is in front of the secundary meander.
7) Monitor the signal SINX on card SE pin 58 and COSX pin 57. The top to top value of these signals must between 3.8V and 4.2V, when removing the positioner between track 000 and track 200 (400). A second examination is, that the largest top to top value should not be more than 10% of the smallest top to top of the SINX signal.
   When the SINX signal is too large, the distance between primary and secundary meander has to be enlarged, by moving the secundary meander block using the special tool which can be placed in the holes S or E.
   If the signal is too small the distance has to be reduced.
8) Fasten the two screws G and K and repeat point 7.
9) In "retracted" position the off-set of the SINX and COSX signal had to be 0 m V $\pm$ 25.
   Adjust with the potmeters R.6 and R.28 on the meander card.

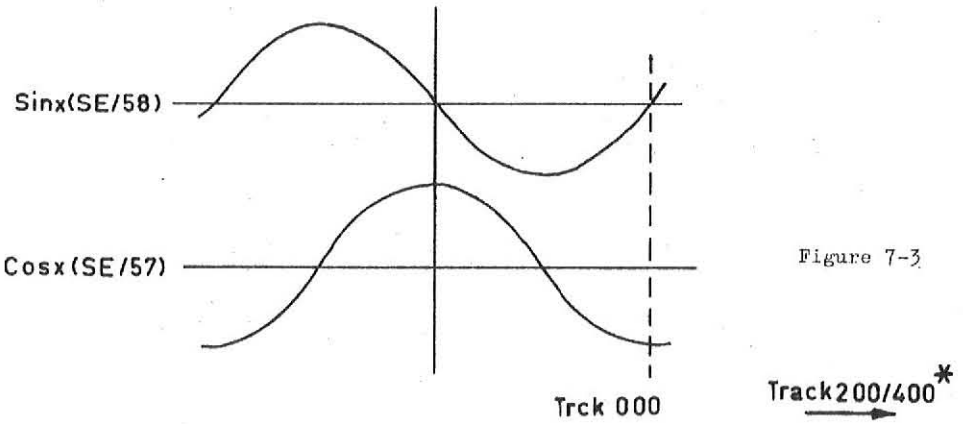
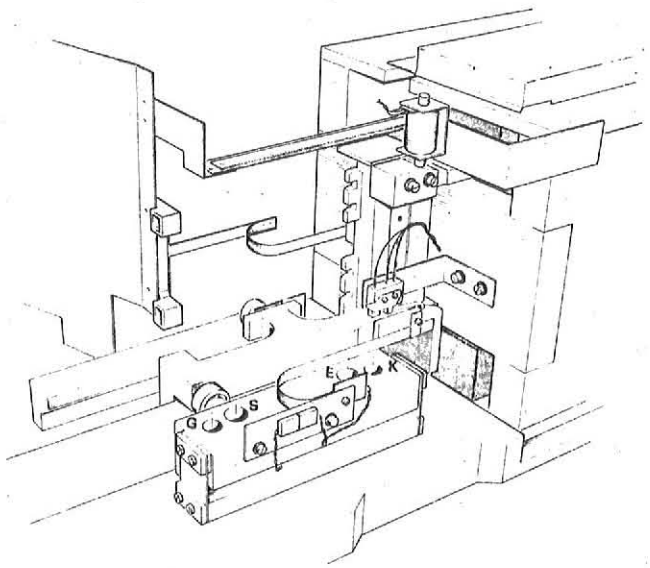


Figure 7-3



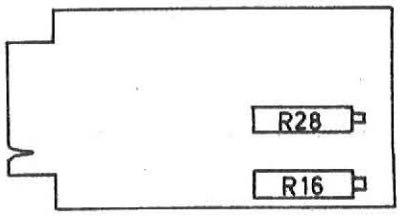


Figure 7-4

3.3 ADJUSTMENT OF THE MEANDER CARD POTENTIOMETERS

a) Switch the power on.
b) Make sure the positioner is in the retracted position.
c) Measure between pin 58 of card SE (signal SINX) and earth. The voltage difference has to be less than 50 mV. If it is not, turn the potentiometer R16 until it is less than 50 mV.
d) Do the same for COSX signal, pin 57 of card SE (potmeter R28)
Potentiometers R16 and R28 are situated at the meander card.

3.4 OPTICAL ZERO ADJUSTMENT (Figure 7-5)

a) Execute point a, b, c, d, e of 3.2.
b) Monitor the signals OPZ (card CUP pin 24) and A0 (card SE pin 35).
c) Move the positioner from track 200 to track 000. In the vicinity of track 000 the signal OPZ becomes a "1", when the front side of the vane reaches the optical zero tranducer. By moving the optical zero unit the figure below has to be completed.

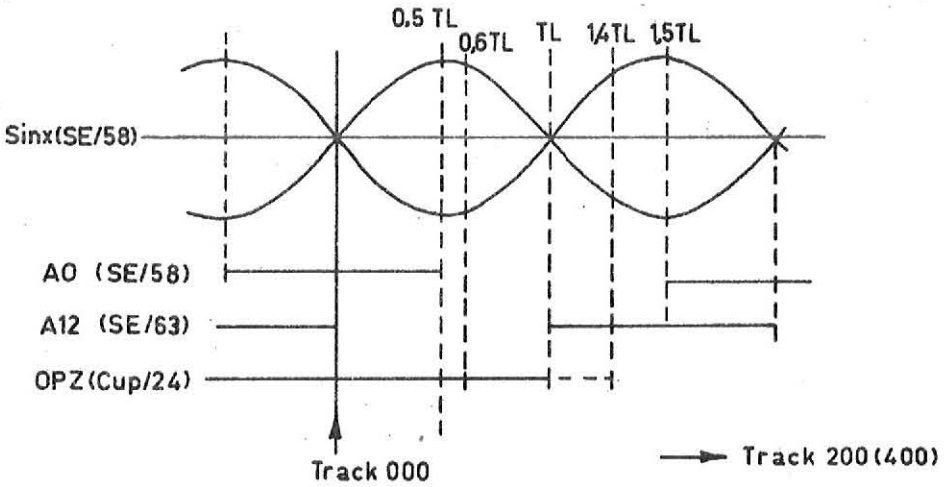


Figure 7-5

3.5 POSITIONING SPEED ADJUSTMENT

Starting with this adjustment, the meander signals, 'optical zero', index pulses of the cartridge and the fixed disk must be correct.
All cards must be installed. For location of the potentiometers, see fig. 7-6.

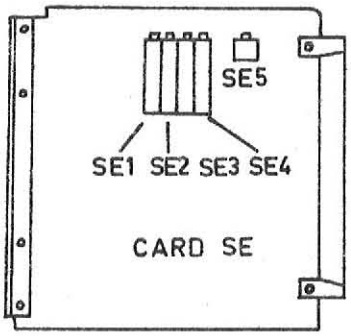


Figure 7-6

1) Turn the potmeters SE1 and SE2 fully CW and then 5 turns CCW.
2) Turn potmeter SE4 (tS) fully CCW then ca. 4 turn CW.
3) Turn potmeter SE3 (max. speed) fully CCW. The speed is now minimal.
4) Connect one probe of an oscilloscope to pin 29 of card SE the ("off set" of the speed signal) the positioner is in the retracted position. The "off set" must be $\leqslant$ 20 mV. If not adjust with potmeter SE5.
5) Connect pin 11/CUP (signal $\overline{\text{BPDA}}$) to pin 04/CUP (ground).
6) Place a cartridge in the machine and start.
7) After 60 sec. the positioner starts with the first seek.
When the positioner is unsteady during the first week (whistle) turn SE4 another half a turn CW.
8) By means of the exerciser, do a repeat seek between track 64 and 128. (128-256).
Connect a trigger probe of the oscilloscope on signal $\overline{\text{EC}}$ pin 13 of card DC. Trigger the scope extern neg.
Connect probe A on pin 31 of card PA (positioner current).
Connect probe B on pin 29 of card SE (speed signal).
9) Turn potmeter SE3 CW (speed is increased) till the current is correct, see fig. 7-7 with due regard to on point 11.
When the speed becomes higher turn SE 4 CW till it is correct, see fig. 7-9.

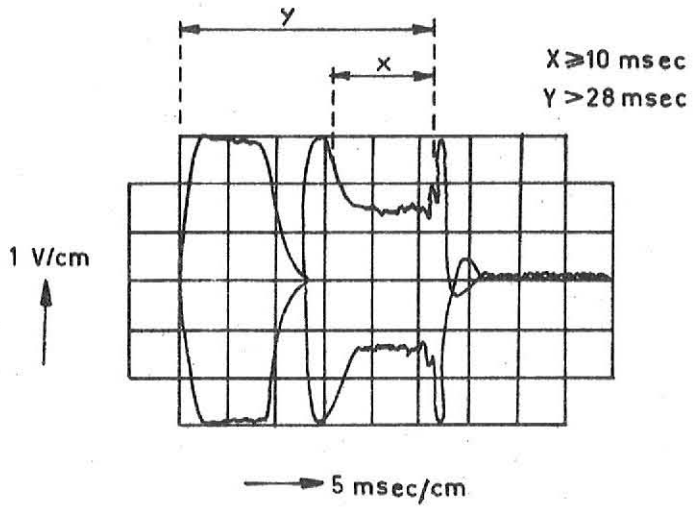


Figure 7-7

The current should not be limited, in the regulated area.
If it is limited turn the potmeter SE3, CCW. Figure 7-8

10. Repeat point 9 but now between track 0 and 64 (128) and between track 128 (256) and 192 (384) with due regard to point 11.

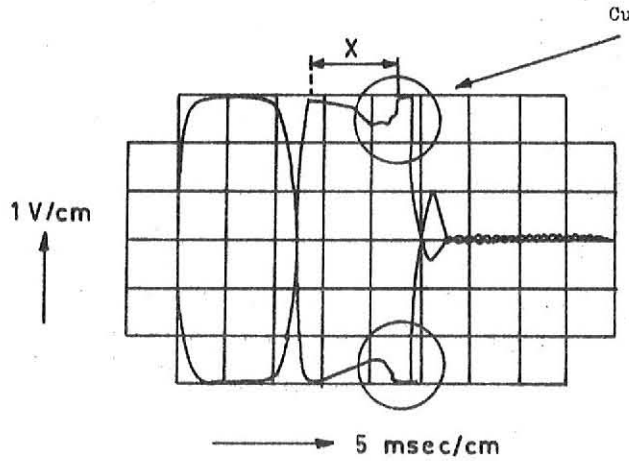


Figure 7-8

11. Now trigger the scope pos on sign. $\overline{EC}$, pin 13 of card DC.
Connect channel B on pin 29 of card SE (speed signal).
Measure the speed of incidence.
This must be between 10 and 13 cm/sec. This agrees with a voltage of 400-450 mV.
The fig. 7-9 gives the correct pattern, A1 and A2 must be 400-450 mV.
If it is not correct turn potmeter SE4.
(CC W bigger and C.W smaller).

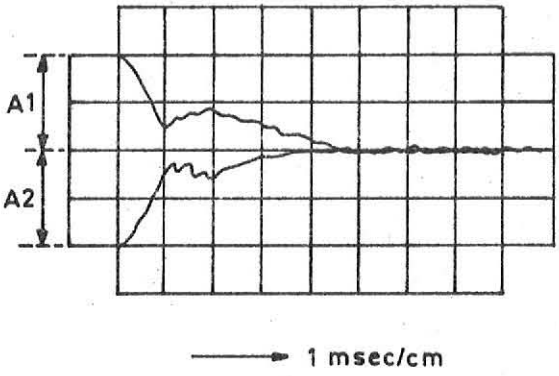


Figure 7-9

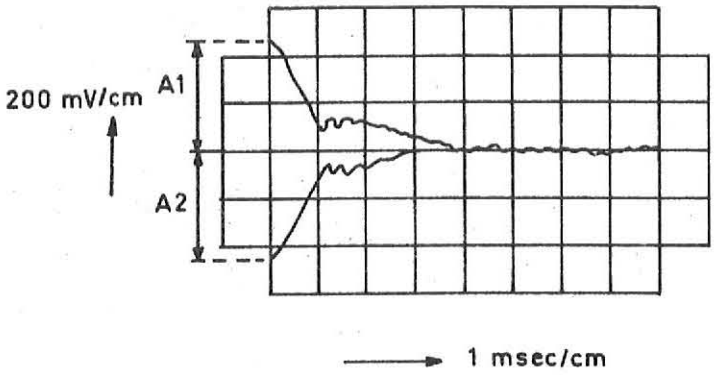
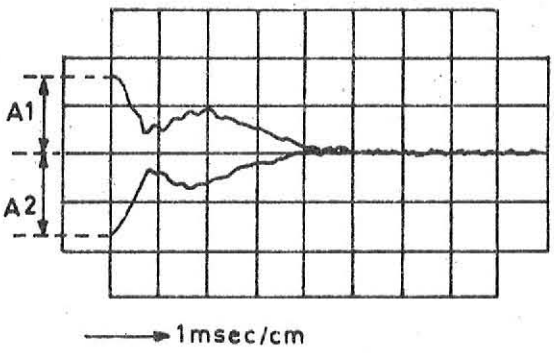
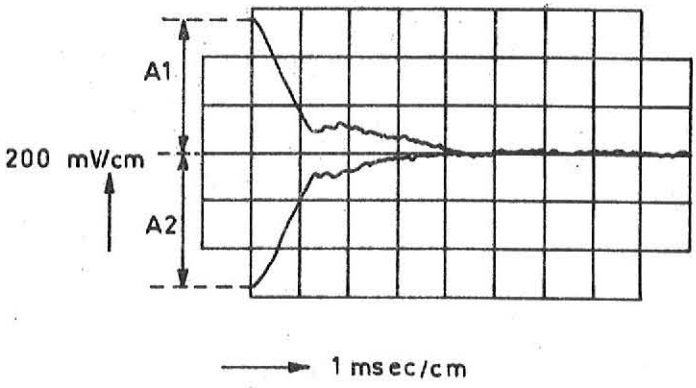


Figure 7-10



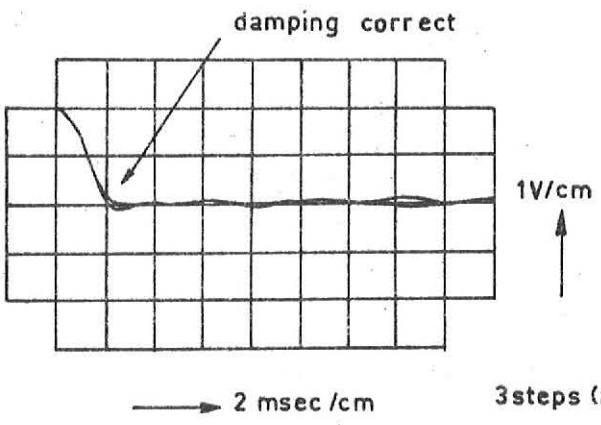
Speed to low

Figure 7-11



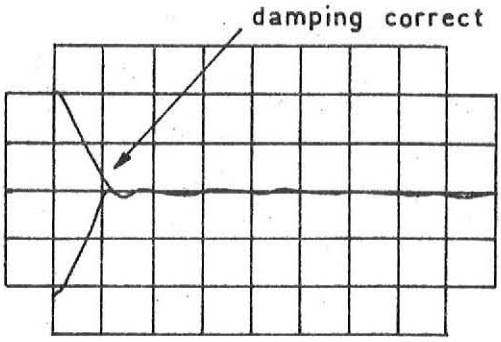
Speed to high

Figure 7-12



3steps (repeat)

Figure 7-13



4steps(repeat)

Figure 7-14

When the potmeter SE4 makes the slope too steep, the place position loop can become unstable, fig. 7-15
turn potmeter SE2 CW

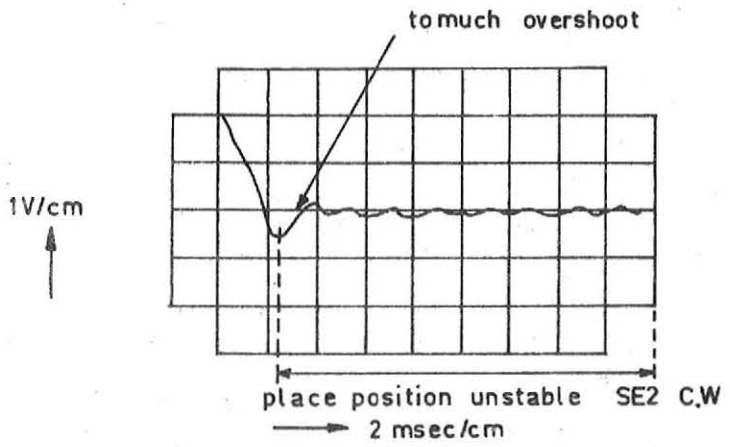


Figure 7-15

The polarity of the signal is dependent on the direction in which, and the polarity from where will be positioned.

The fig. 7-16, 7-17, 7-18, 7-19 show examples of an incorrect adjusted position loop.

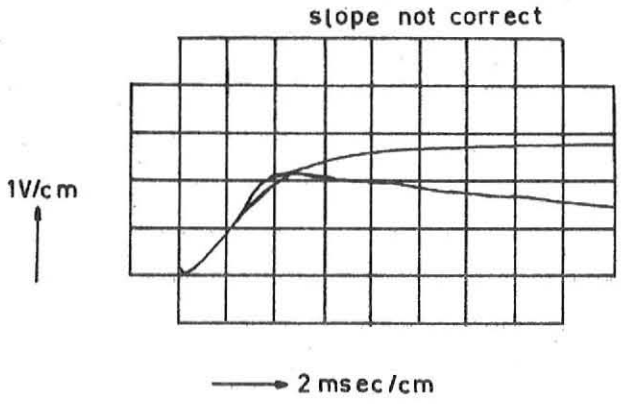


Figure 7-16

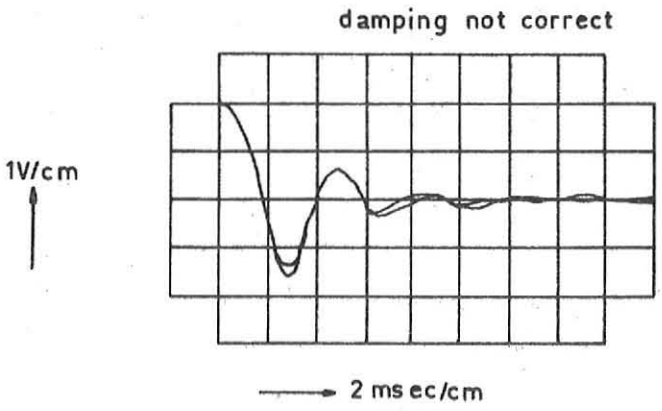


Figure 7-17

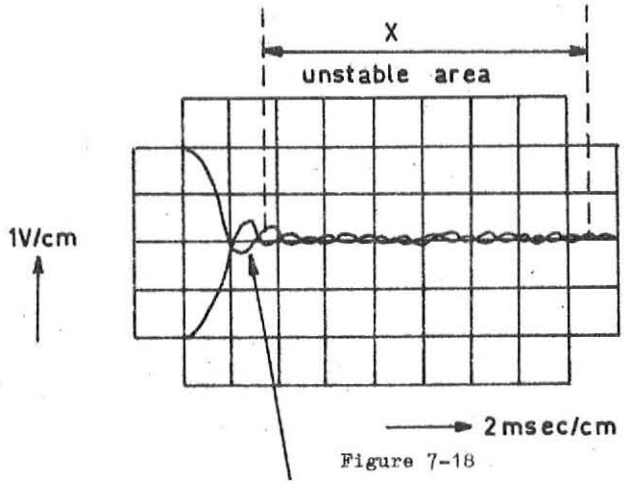


Figure 7-18

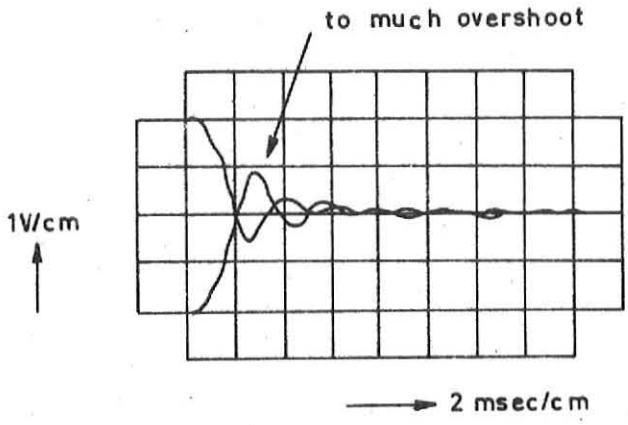


Figure 7-19

In figures 7-18 and 7-19 positioning is over one step. The slope is too steep(SE2) so the area x becomes unstable.
Also SE1 is not adjusted correctly, turn SE2 C.W., then adjust the correct damping with SE1.

12) Check again on channel A of the scope the positioner current see point 8,9, 0. When it is necessary adjust with SE3, and do point 11 again.

13) Trigger scope pos on signal $\overline{EC}$ DC/13.
Correct channel A on signal SCX pin 54 card SE.
By turning the potmeters SE1 and SE2 the place of the adjusting.
Position over 3 and 4 steps forward/reverse in the neighbourhood of track 3-64-128 and 192.(6-128-256-384)

14) By adjusting SE1 and SE2 in turn, a correct place position loop will be obtained. The slope wil be adjusted by turning SE2 (TX).
CCW means steeper an CW means shallower.
By SE1 (Kspf) the overshoot is adjusted CCW means more damping (less overshoot), CW means less damping.
The figures 7-13 and 7-14 shows the correct adjustment for respectively three and four steps, from the areas mentioned in point 13.

15) Start positioning over the next distance, and check the incidence shown in fig. 7-13 & 7-14 for scope adjustment see point 13.
Positioning from cylinder X to cylinder Y forward/reverse (repeat)

X1215 Cylinder X	X1216		X1215 Cylinder Y	X1216
0			1	2
0			2	4
0			8	16
0			32	64
0			64	128
32	64		33	66
32	64		34	68
32	64		40	80
32	64		64	128
32	64		96	192
64	128		65	130
64	128		66	132
64	128		72	144
64	128		96	192
64	128		128	256
128	256		129	257
128	256		130	260
128	256		136	272
128	256		160	380
128	256		192	384
192	384		193	385
192	384		194	386
192	384		200	400

16. Do point 15 again, with the following scope connections.
Trigger the scope positive, extern to signal $\overline{EC}$ pin 13 of card DC.
Connect channel A to signal WTC pin 22 of card CUP, and channel B to signal $\overline{PONC}$ pin 06 of card CUP.
In all the areas, the signal WTC must stay a '1' after signal $\overline{PONC}$ goes to a '0', (seek error).
The relationship between WTC and $\overline{PONC}$ is shown in fig. 7-20.
The time T must be at least 1 msec.

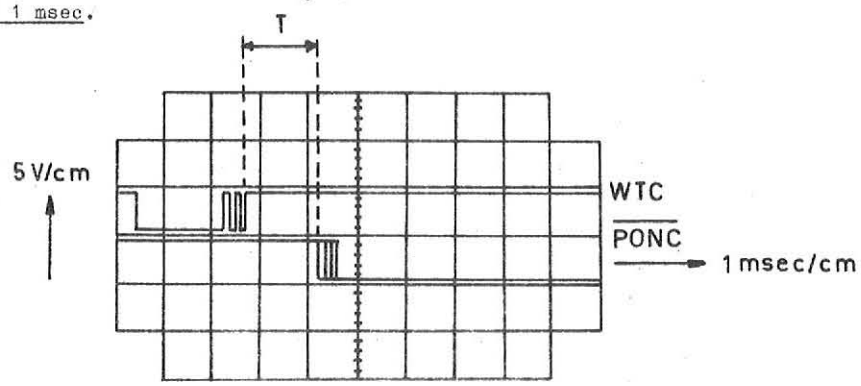


Figure 7-20

Fig. 7-21 shows an incorrect situation, the place position loop must be adjusted again, starting with point 12.

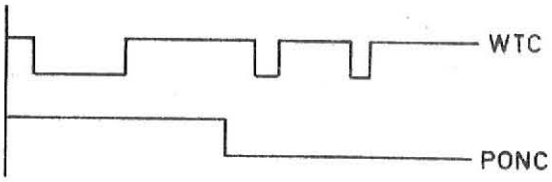


Figure 7-21

17. AFTER THE CORRECT ADJUSTMENTS? TURN POTMETER SE 3 ¼ REVOLUTION CCW.

3.6 ADJUSTMENT OF HEADS 0 AND 1 AND THE INDEX UNIT. (Figure 7-22)

The adjustment of the heads and the index unit must be done with the aid of a CE cartridge, which should stabilize at the disk drive ambient temperature for at least 2 hours.
Also the torque tool, the adjustment tools and the CE-plug must be used.

1. Remove plug P8 on the backpanel, insert the CE-plug, and replace plug P8.
2. Turn the spindle by hand in the position, that the red point on the spindle is in front with the index unit protection cap of the bottom plate Rotate the CE- disk in the cartridge in such amanner, that the index slot is in front with the cap.
3. Insert the CE- cartridge.
4. Push power on and then start.
   Wait 30 minutes.
5. Connect the signal $\overline{BPDA}$ pin 11/CUP to the ground.
6. Connect channel A of the scope to test pin on the R/w card.
7. Connect channel B of the scope to pin 21/SS and trigger intern, positive at the same signal (index pulse fixed disk) time base 2.5 msec/cm.
8. Position the heads to track 073 (146) by means of the test case.
9. Select head 0.
10. Adjust head 0 as shown in fig. 7-18.
    The centre zero must be ± 0,4 cm.

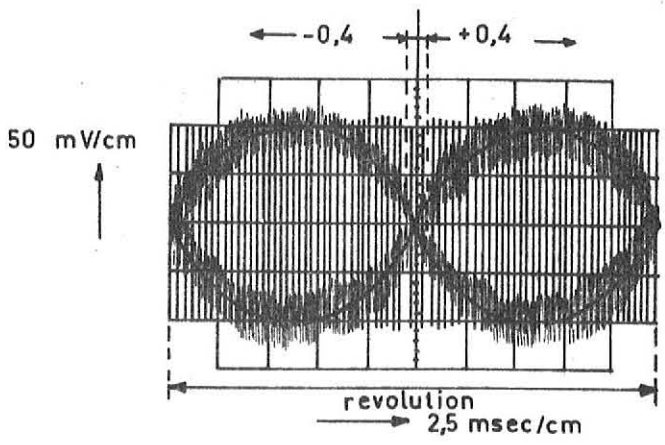


Figure 7-22

11. Repeat step 9 for the head 1.
12. Switch the time base calibration again to normal, and set base to 5 µ sec/cm, using pos triggering like step 5.
13. Positioning to track 005. (010)
14. Select head 0.
15. Adjust the index.
16. Select head 1.
17. Repeat step 14.
18. When steps 14 and 16 have a different value, take the average deviation, in such a way that T = 20 msec ± 3 µ sec, see fig. 7-23 as well head 0 as head 1.

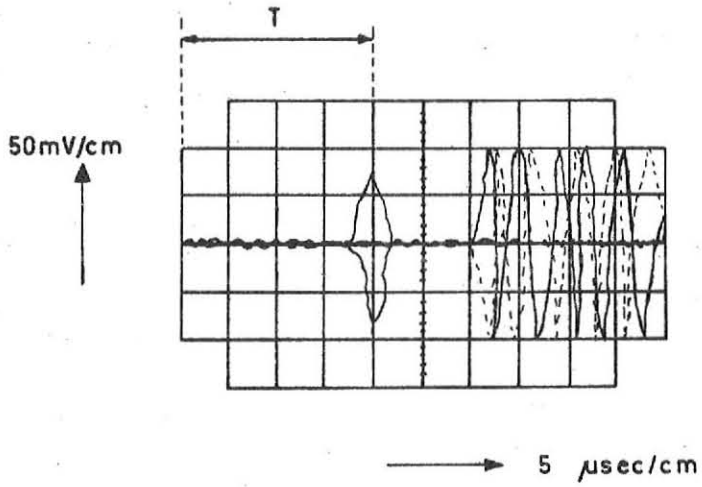


Figure 7-23

3.7. ADJUSTMENT OF THE INDEX UNIT (CARTRIDGE)

1. Insert a cartridge with small slots in the sectorring.
2. Connect channel A of the oscilloscope with pin 12 of card DBC (IC2) and trigger intern neg.
3. Start the unit
4. Check if the signal in the oscilloscope is the same as fig. 7-24

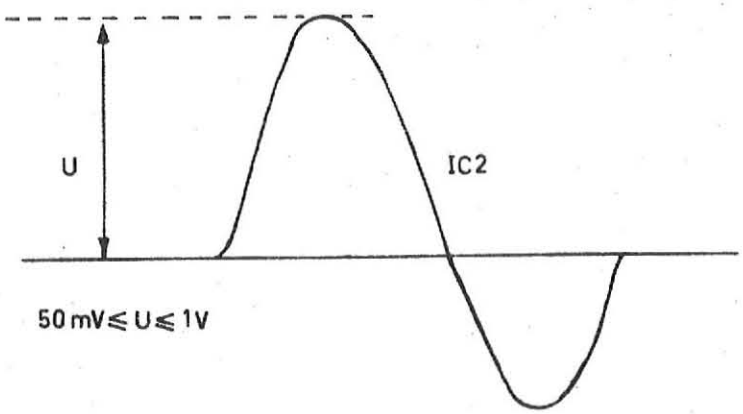


Figure 7-24

5. Stop the unit
6. Insert a cartridge with wide slots.
7. Do the same check again.

3.8 ADJUSTMENT OF THE INDEX UNIT (FIXED DISK)

1. Connect channel A of the oscilloscope with pin 17 of card PA (IF1) trigger intern neg.
2. Start the unit.
3. Check if the signal on the oscilloscope is the same as fig. 7-25

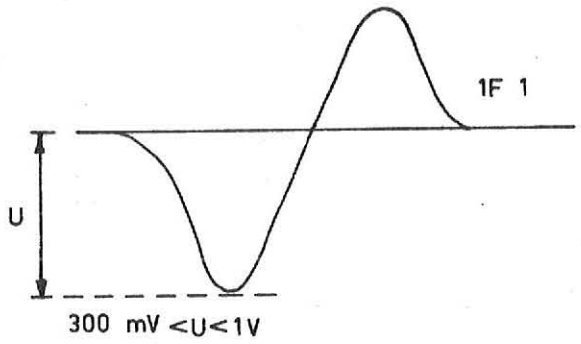


Figure 7-25

3.9 ADJUSTMENT TEMP. COMPENSATION (ONLY FOR X1216)

The Unit is in operation but the temp. compensation is swtiched off by grounding LAT/43.

1. Remove connection on card LAT/43 to ground.
2. Measure on LAT/44 resp. 39 ground potential.
3. Measure on LAT/34 resp. 36 about - 3,5 V.
4. Measure on T.P. 1 on LAT an offset voltage, adjust this voltage with the potentiometer LAT 1 course on 0 mV
5. Heat the cartridge diodes by hand, the offset-voltage goes "negative".
6. Install a cartridge.
7. Position by means of the test case from track 000 to track 064.
8. Measure by means of an oscilloscope signal RCON on card LAT/10 and signal SCX on card SE/54. Trigger on DC/13, and check the slope.
9. Turn the potmeter LAT 1 in such a way that signal SCX is a positive respective a negative pulse. The signal RCON became now 4 m sec. longer.
10. Keep e.g. the pos pulse.
11. Select head 2 resp. head 3. The extra pulse on SCX disappears.
12. Select now head 0 resp. head 1. Pulse on SCX appears.
13. Turn the potmeter on card LAT till the pulse on SCX is disappeared.
14. Install the CE cartridge and the CE plug P8.
15. Take out TP1 on card LAT by means of a wire outside the case to measure the off-set voltage.
16. Operate for one hour with covered cabinet.
17. Adjust the off-set voltage on TP1 on 0 mV $\pm$ 20 mV.
18. Remove the cover.
19. Adjust as soon as possible (within ten minutes) the heads 0 and 1 on track 146 of the CE cartridge. Take care of the offset, these had to be within $\pm$ 50 m V during this adjustment.
20. Install after this adjustment a "Cold" cartridge and position on track 000, with a difference of zero; on card SE/54 signal SCX you can check the working of the temp. compensation (see point 8).

4.1 INDEX UNIT CARTRIDGE

1. Remove the bottomplate which is above the fixed disk (4 screws).
2. Adjust the height of the index unit see fig. 7-26.

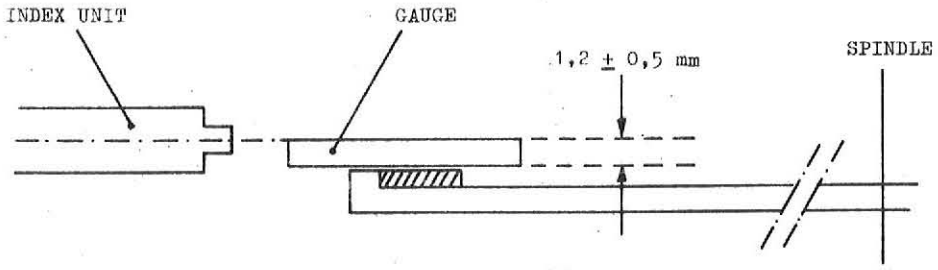


Figure 7-26

3. Loosen the two fixing screws of the index unit.
4. Adjust the index unit with the gauge, so that it is just free.
   See figure 7-27

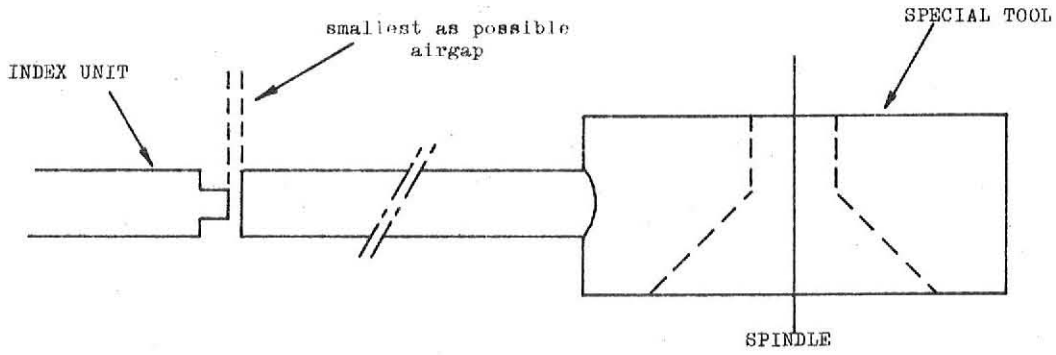


Figure 7-27

5. Tighten the two fixing screws of the index unit.

4.2 INDEX UNIT FIXED DISK

1. Loosen the locknut of the index unit.
2. Adjust the index unit with respect of the sector ring by means of a feeler gauge 0.35 mm.
   See figure 7-28.

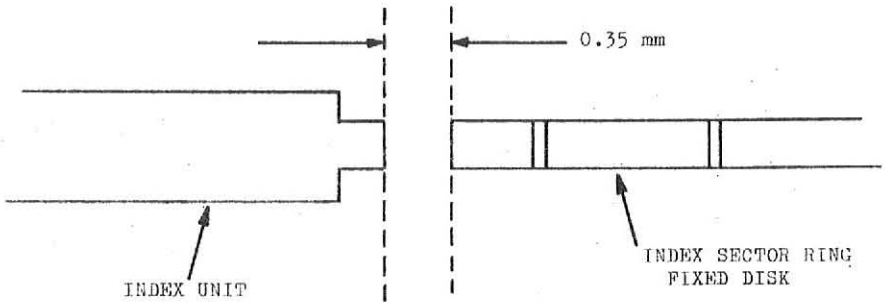


Fig. 7-28

3. Check that the sector ring doesn't touch the index unit.

4.3 RETRACTED SWITCH

1. Loosen the screws of the micro switch and shift it so, that is is activated ± 1 mm before retracted position.
2. Tighten the screws.

4.4 CLEANING THE HEADS

1. Remove rear top cover
2. Clean the heads. Use a spatule wrapped in a scotch wiper dampened with isopropyl alcohol (1322 505 69201) use a dry wiper to dry the heads.
3. Replace the rear top cover.

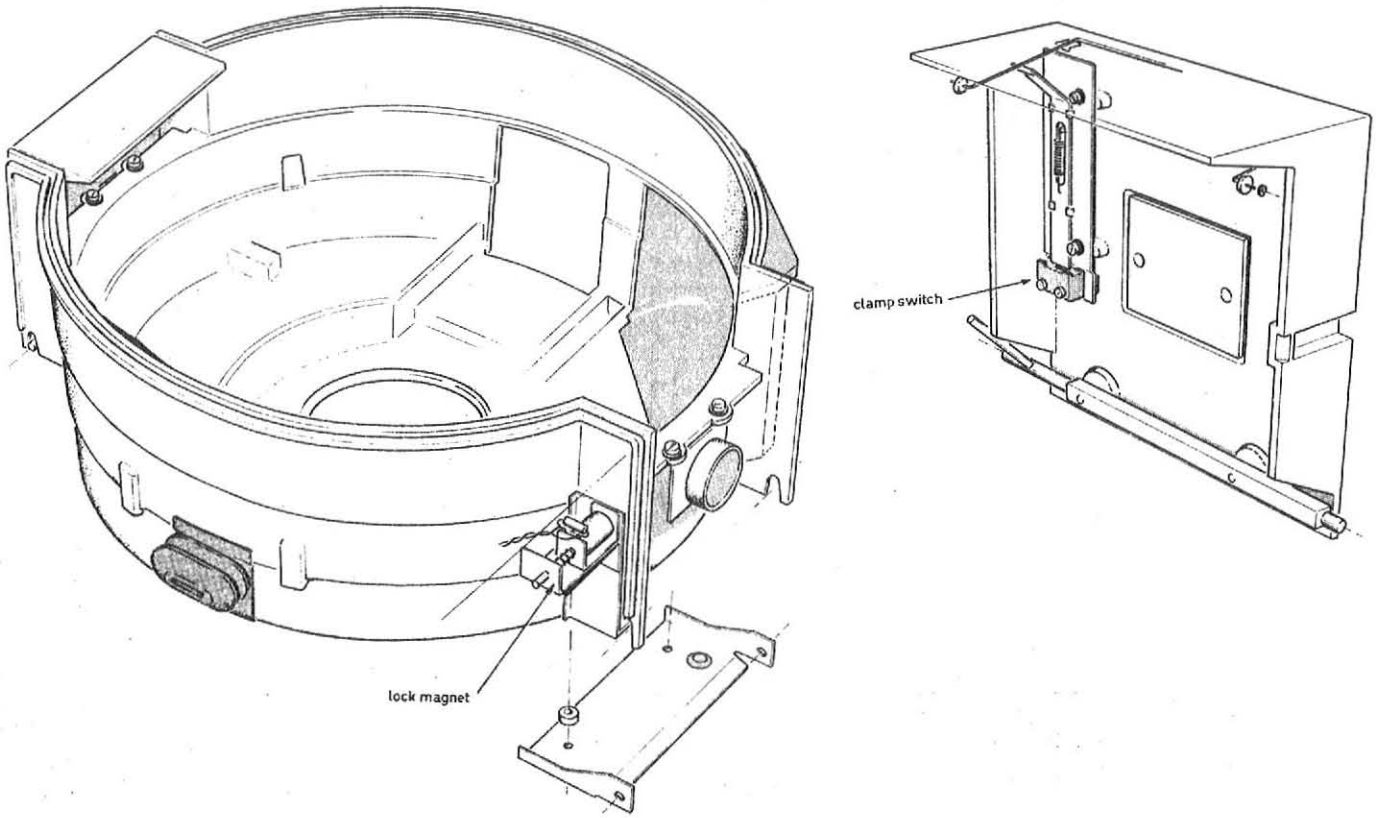


Figure 7-30

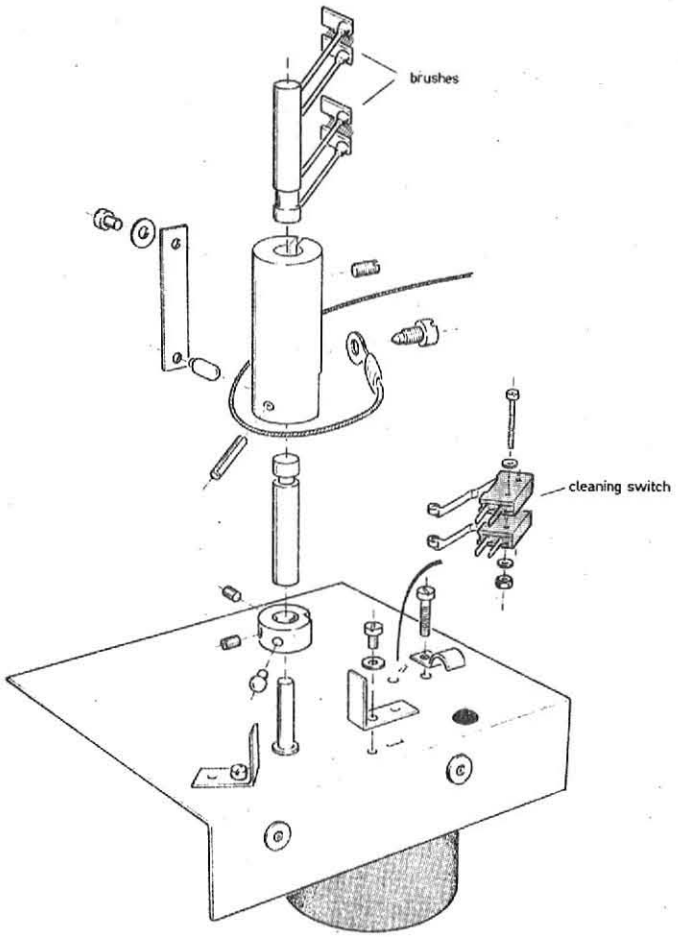


Figure 7-31

5.1 GENERAL

Before replacing any part, switch off the power on the rear.
Be aware of the strong magnetic field of the positioner magnet (watches, tools, measuring equipment).

5.2 AIRFILTERS

5.2.1 Fine filter (figure 7-29)

1. Disconnect connector of front panel (JF-PF)
2. Remove four dixing screws of the frontpanel, remove frontpanel.
3. Take out the fine filter and replace new one; BE SURE OF THE CORRECT AIR FLOW (RED ARROW).
4. Replace frontpanel.
5. Connect JF-PF

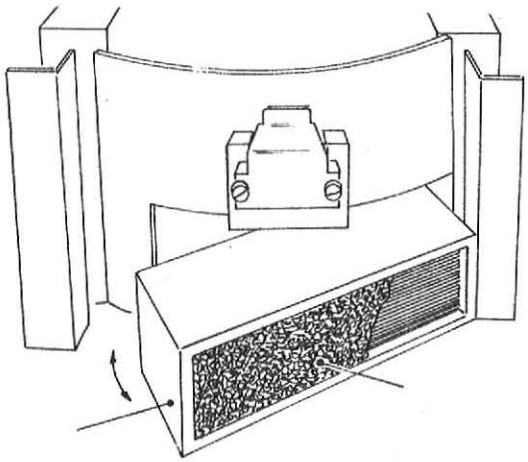


Figure 7-29 FILTERS

5.2.2. Coarse filter

1. The coarse filter can be taken out by hand, out of the fine filter.

5.3 LOCK MAGNET (figure 7-30)

1. Remove front top cover.
2. Remove unit from cartridge holder.
3. Insert new one.
4. Remove wires from the old one and connect to the new one.

5.4 CLAMP SWITCHES (figure 7-30)

When opening or closing right hand clamp switch, pull out the lock magnet pin.

1. Remove top front cover.
2. Remove the clamp on which the switch is situated (2 screws).
3. Take out the micro-switch by loosening the screws.
4. Insert a new one.
5. Connect wires from the old one to the new one in the right order.
6. Insert the clamp.
7. Check working.
8. Replace top front cover.

5.5 CLEANING SWITCH (figure 7-31)

1. Remove rear top cover.
2. Replace micro-switch
3. Remove wires from the defect one and connect in correct order to the new one.
4. Check working.
5. Replace rear top cover.

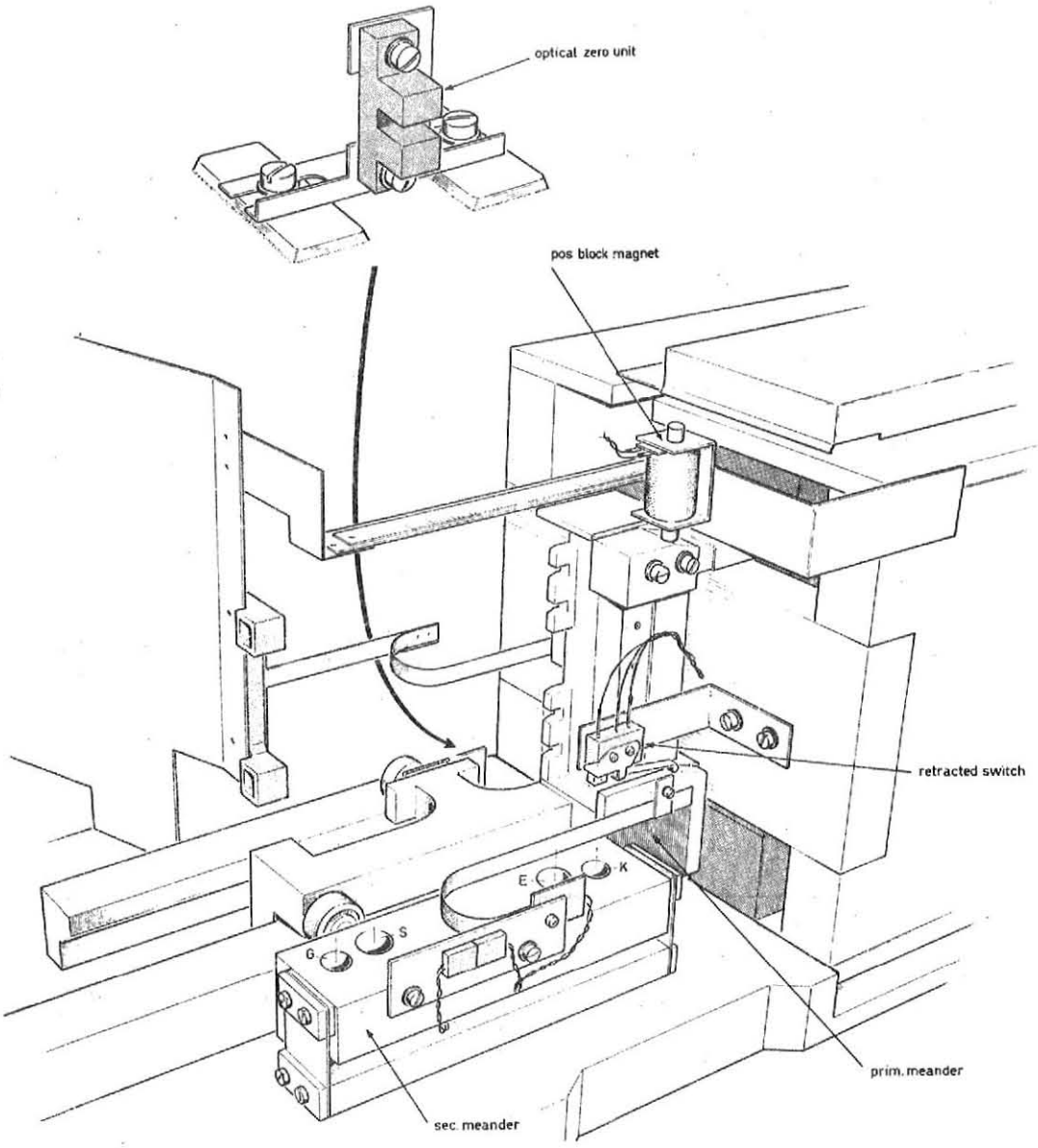


Figure 7-32

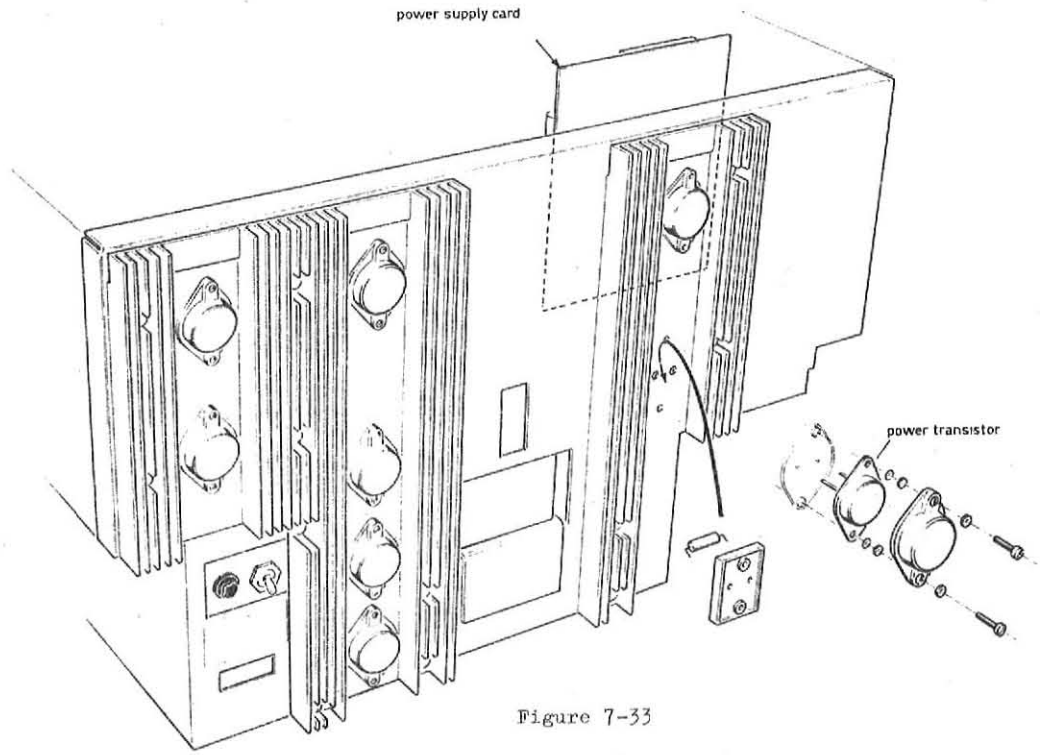


Figure 7-33

5.6 RETRACTED SWITCH (figure 7-32)

1. Remove rear top cover.
2. Pull the positioner to the fully retracted position.
3. Remove the switch and replace a new one.
4. Connect wires to the corresponding pins.
5. Check working and adjust see 4.3.
   CAUTION: DO NOT MOVE POSITIONER TOO MUCH FORWARD SO THAT THE HEADS BECOME LOADED.

5.7 POSITIONER BLOCK MAGNET (figure 7-32)

1. Remove rear top cover.
2. Push the positioner to the fully retracted position.
3. Remove the magnet and replace new one.
   CAUTION: DO NOT MOVE POSITIONER TOO MUCH FORWARD SO THAT THE HEADS BECOME LOADED.
4. Connect wires to the corresponding pins.
5. Check working.
6. Replace rear top cover.

5.8 OPTICAL ZERO UNIT (figure 7-32)

1. Remove rear top cover
2. Disconnect connector JZ-PZ
3. Loose the two screws and remove unit.
4. Remove switch (2 screws)
5. Insert new one.
6. Replace the unit.
7. Connect plug.
8. Adjust OPZ (see 3.4)

5.9 CLEANING BRUSHES (OPTIONAL) (figure 7-31)

1. Remove rear top cover.
2. Remove top of the reversing case.
3. Remove stop in reversing case.
4. Remove brush arm assembly by means of a socket head screw wrench.
5. Disconnect brush retracting cable
6. Install new brushes.
7. Install unit.
8. Adjust position of the cleaning unit (special tool).
9. Check that the brush arms never touch the disk.

5.10 POWER SUPPLY CARD (figure 7-33)

1. Remove rear top cover.
2. Remove connector PV on power card.
3. Remove wires from connecting block.
4. Remove four screws on the rear, holding the power supply card.
5. Replace card.
6. Fit wires in connecting block.
7. Connect plug PV.
8. Check voltage without all cards.
9. Replace rear top cover.

5.11 POWER TRANSISTORS (figure 7-33)

1. Loosen the two screws of the defected transistor.
2. Replace the new transistor. USE A NEW MICA PLATE.

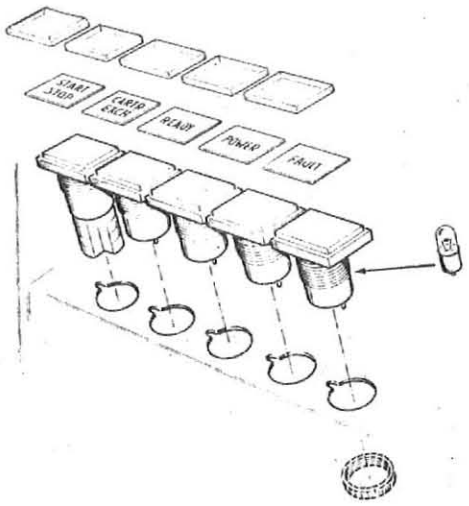


Figure 7-34

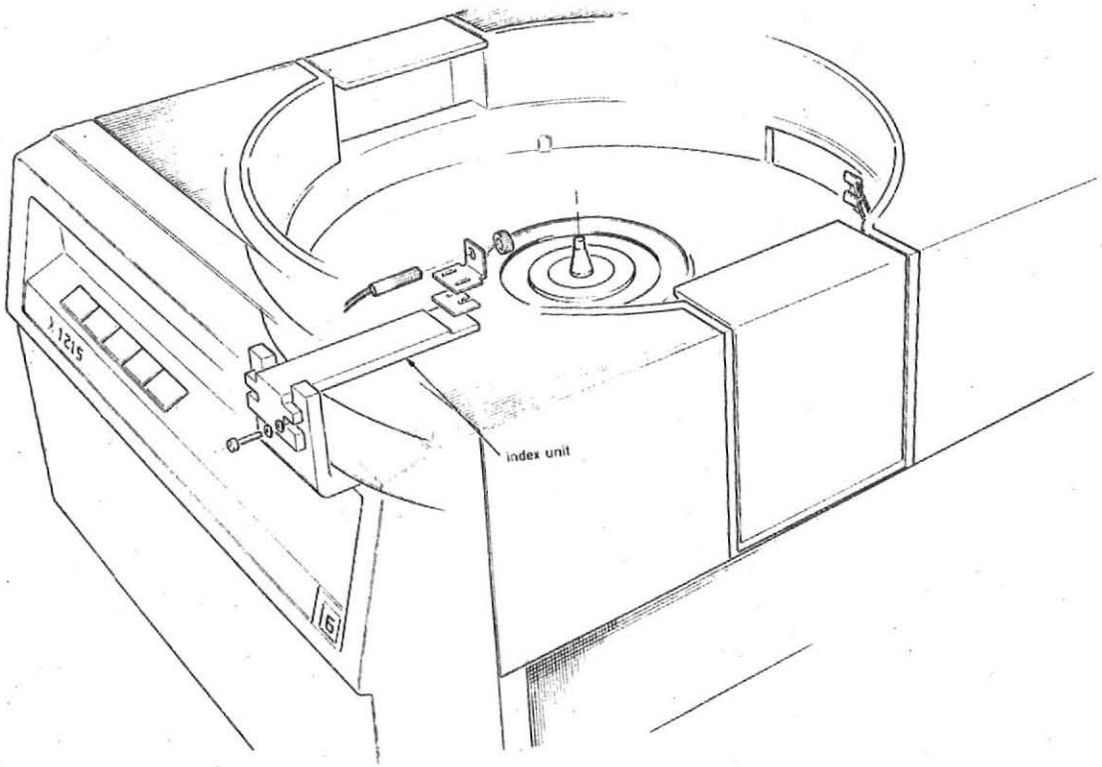


Figure 7-35

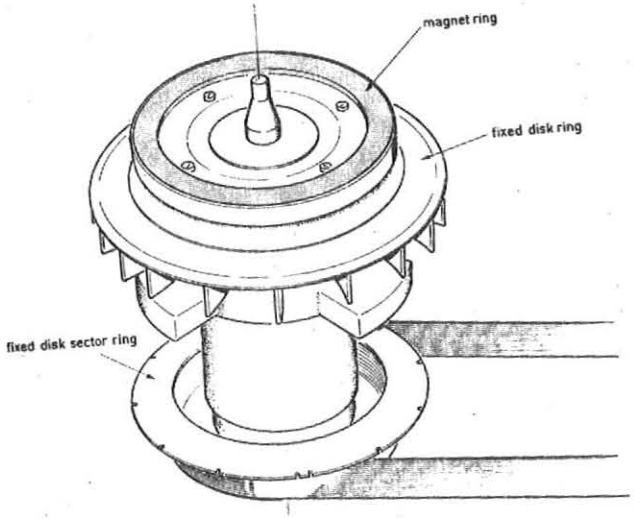


Figure 7-36

7612

X1215/1216

5.12 PUSH BUTTON AND INDICATORS (figure 7-34)

1. Remove front top cover.
2. Disconnect connector of front panel (JF-PF).
3. Remove front panel.
4. Unsolder wires of faulty button/indicator.
5. Take out the button/indicator.
6. Fix new one in position.
7. Solder wires to button/indicator.
8. Fasten front panel.
9. Connect connector (JF-PF).

5.13 LAMP PUSH BUTTON AND INDICATORS (figure 7-34)

1. Disconnect the lenscap.
2. Remove the defective lamp (by means of a tweezer) and replace a new one.
3. Replace lens cap.

5.14 INDEX UNIT CARTRIDGE (figure 7-35)

1. Remove front top cover.
2. Remove front panel.
3. Remove first bottom plate (four screws).
4. Loosen plug PB.
5. Remove index unit.
   CAUTION: Be careful with the fixed disk.
6. Replace the unit by a new one.
7. Connect plug PB.
8. Adjust the unit mechanical (4.1).
9. Replace base plate.
10. Adjust the unit electrical (3.7).

5.15 FIXED DISK (figure 7-35 and 7-36)

1. Remove front top cover, rear top cover and the front panel.
2. Remove first bottom plate (four screws).
3. Loosen index unit support and take it out as far as possible of the cartridge holder.
4. Remove the fixing ring. Be careful with fixed disk.
5. Take out the fixed disk.
6. Replace new one (use gloves).
7. Replace the fixing ring.
8. Place index unit report.
9. Adjust mechanical (4.1).
10. Install first bottom plate.
11. Adjust index unit electrical (3.7).
12. Fix front panel and covers.

5.16 SPINDLE (figure 7-36)

1. Remove upper and bottom covers.
2. Remove index unit with support (see 5.14)
3. Remove fixed disk (see 5.15).
4. Remove spindle earth contact by loosen the socket screw.
5. Remove drive belt.
6. Loosen the nut, holding the pulley in position (special-tool).
7. Take of the pulley.
8. Loosen the three screws holding the spindle.
9. Take out the spindle (upwards). Take care of the shims between spindle and frame.
10. Replace new spindle, DON'T FORGET THE SHIMS.
11. Replace pulley.

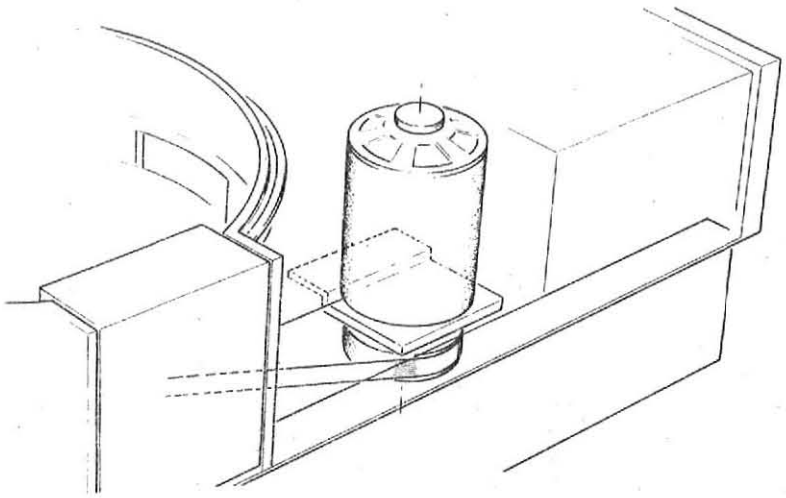


Figure 7-37

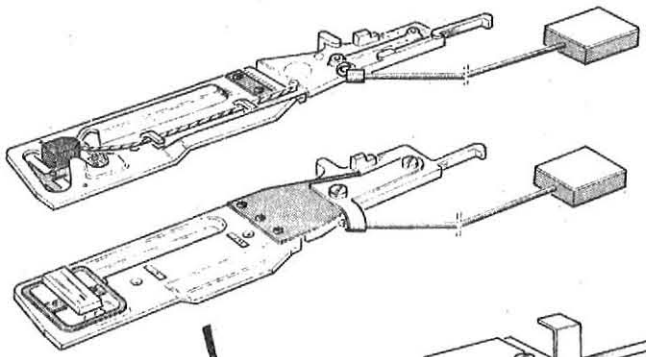
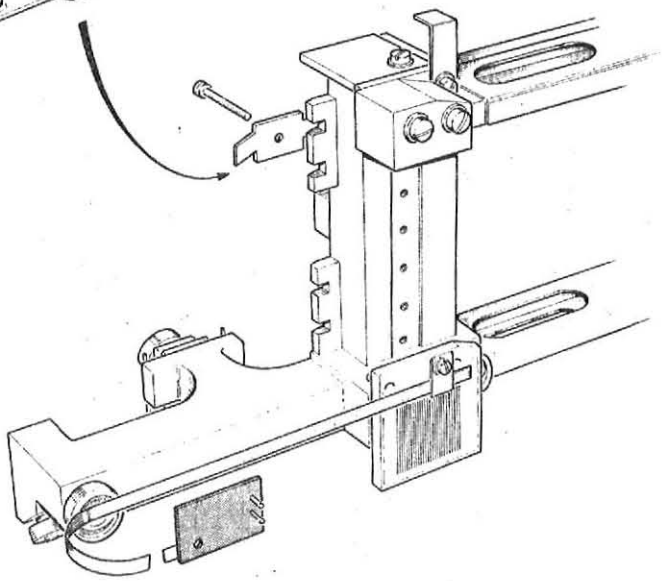


Figure 7-38



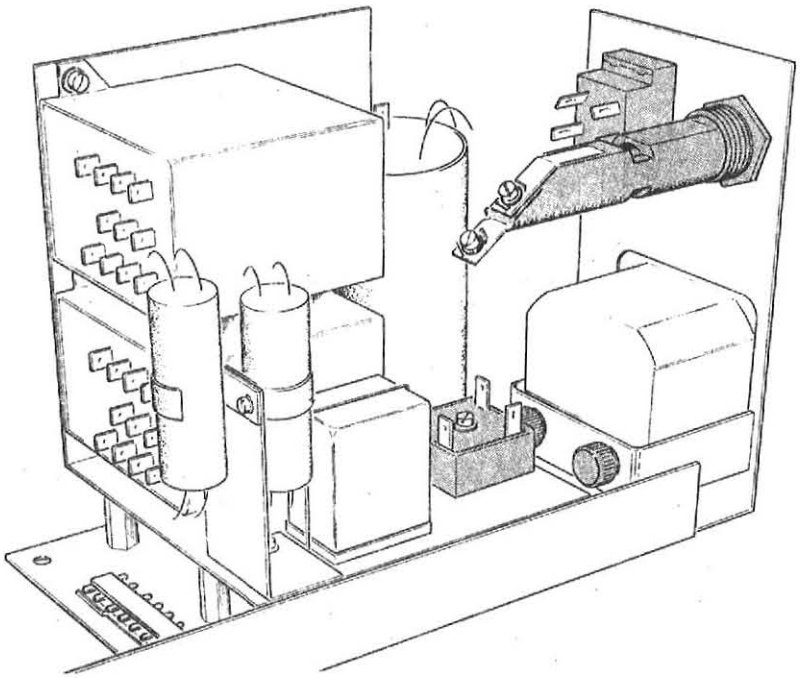


Figure 7-39

12. Replace drive belt.
13. Replace earth contact.
14. Check belt tension (5.19).
15. Replace bottom cover.
16. Replace fixed disk.
17. Replace index unit.
18. Replace covers.

5.17 PACK MOTOR (figure 7-37)

1. Remove upper and bottom covers.
2. Remove drive belt.
3. Remove the protection sheet on the connecting block.
4. Disconnect wires from connecting block.
5. Remove pulley from the motorshaft.
6. Remove the mounting plate with the motor.
7. Remove the motor.
8. Replace new motor.
9. Replace pulley
10. Replace drive belt.
11. Adjust tension of drive belt
12. Connect the wires on the connecting block.
13. Replace protection sheet.
14. Replace covers.

5.18 HEADS (figure 7-38) See 5.21 for headcrash procedure

1. Remove rear top cover.
2. Disconnect head plugs from pre-amplifier card.
3. Insert head remover (special tool).
4. Unscrew the two head fixing screws.
5. Remove the head screws and clamp.
6. Remove carefully the head.
7. Insert new head in the head remover.
8. Replace new head.
9. Partially fasten the screws.
10. Take off the head remover.
11. Adjust the heads (3.6).
12. Fasten the screws with a torque wrench 7 kgf/cm.

5.19 SWITCHING UNIT (figure 7-39)

1. Remove rear top cover.
2. Remove bottom cover.
3. Remove protection sheet on the connecting block.
4. Remove earth wires and cables to pack motor and cleaning motor.
5. Loosen the two screws at the right side, and the two at the rear side.
6. Take out the unit as far as possible.
7. Loosen the other wires, noting their position.
8. Fasten the wires to the new unit.
9. Replace new unit.
10. Fasten the cables.
11. Replace protection sheet.
12. Replace bottom-and rear top cover.

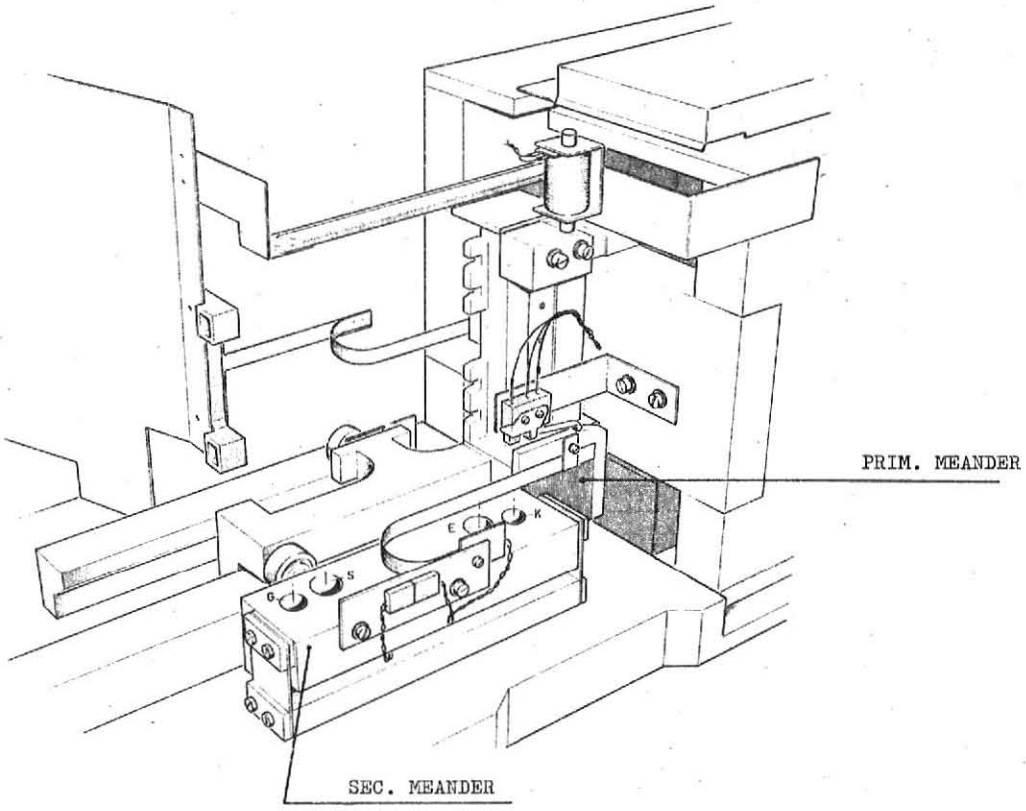


Figure 7-40

5.20 MEANDER (figure 7-40)

1. Remove index unit with support, see 5-14.*
2. Remove cartridge holder.*
3. Remove fixed disk, see 5-15.*
4. Loosen the screw clamping the stabilizer rod.
5. Loosen stabilizer rod from meander block.*
6. Loosen prim. meander supply wires.
7. Loosen two screws holding secondary meander block.
8. Carefully take out the meander block.
   Insert new one: KEEP IT AS FAR AS POSSIBLE FROM THE PRIM MEANDER
10. Fasten the supply wires.
11. Fasten stabilizer rod to meander and clamping block.*
12. Replace fixed disk.*
13. Replace the cartridge holder, DON'T FORGET THE SHIMS.*
14. Replace index unit.*
15. Adjust secondary meander (see 3.2).
16. Adjust index unit (see 4.2).

* Only if stabilizer rod is installed.

5.21 AFTER HEADCRASH PROCEDURE

In order to minimize the number of headcrashes an "after headcrash" procedure and an "after repair" procedure must be done.

1. Remove cartridge and fixed disc and clean the whole disc compartment using a brush and vacuum cleaner: brushing to be done in the direction of the vacuum cleaner.
2. Clean the disc compartment with isopropyl and cotton wool.
   If the headcrash is occurred on the cartridge, clean the fixed disc with isopropyl and cotton wool.
3. Replace the fixed disc. Do not tough the disc with your hands, use clean gloves which are only used for this purpose.
4. Check all the customer cartridges on physical damages.
   If the headcrash occurred on the fixed disc clean all cartridges which have been on the unit concerned with isopropyl and cotton wool in a dustfree area of the workshop.
   A disc on which the headcrash occurred must be replaced. This also applies to discs which show physical damage after cleaning.
5. Clean all heads with isopropyl and scott wiper, after a headcrash.
   Heads having a surface contamination of more than 20 0/0 are to be replaced. Just as well as heads which show physical damage after cleaning.
6. Remove the fused f5 and f6, switch on the machine and leave the machine turing for at least one hour to blow away all remaining dust.
7. Replace fuses againg.

AFTER REPAIR PROCEDURE

1. Clean cartridge compartment with bursh and vacuum cleaner a vacuum clean the inside of cabinet.
2. Make 5 full switch on procedures to get rid of possible dust by means of the cleaning cycle.
   We like to point once more to the fact, THAT THE DISTANCE BETWEEN HEADS AND DISC IS ONLY 2,5 UM.
   This means that even a finger print or a smake particle on the disc causes a headcrash. That is why it is forbidden to smore or to eat during the time that the covers are taken off.

6.1 GENERAL

If there is a fault in the C.D.D. the following fault-finding procedure is recommended.
a) Check that the cards are in the right location in the Electronics Cage.
b) Check that the cards are pushed fully home.
c) Check that all plugs are connected.