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SECTION 0

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0.1 SAFETY INFORMATION

In accordance to Chrompack's commitment to customer service and safety, this instrument and its accompanying documentation complies with the CE (NEN 5509) specifications.

To prevent any injury to the user or any damage to the instrument it is essential that you read the information in this chapter.

If this manual is not in your mother language and if you have problems understanding the text, we advise you to contact your Chrompack office for assistance. Chrompack cannot accept responsibility for any damage or injury caused by misunderstanding of the information in this manual.

Indications in the manual

This manual contains warnings and precautionary statements that can prevent personal injury, instrument damage and loss of data if properly followed. Statements of this nature are called to your attention by the following symbols:

- NOTE: The NOTE calls attention to procedure, practice, or the like, which, if not correctly performed or adhered to, could result in inadequate functioning of the instrument.
- WARNING: The WARNING calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury or damage to the product.

Indications on the instrument

Specific symbols, drawing attention to safety hazards have been applied on appropriate places on the instrument. The following symbols can be encountered:



Instruction manual symbol. Indicates that the user should refer to the manual before operating the equipment.



Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 V must be so marked.)



Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal which must be connected to ground before operating equipment.



Radioactive hazard. Indicates that the instrument contains radioactive components which may cause personal injury when handled incorrectly.



Skin puncture. Indicates sharp or suddenly moving parts such as injection needles that may cause injury.



Hot surface. Indicates parts that may cause burns when touched.



Cryogenic frostbite. Contains extremely cold material (such as liquid nitrogen, carbon dioxide) that may cause injury when handled carelessly.



Static discharge warning. Item contains parts or information that can be damaged by electrostatic discharge. Take care for proper grounding before handling.



Do not touch. Touching this item may result in damage to the instrument or personal injury.

0.2 GENERAL SAFETY PRECAUTIONS

- 1. The installation of this instrument will normally be carried out by an experienced Chrompack service engineer. Any damage to the system that occurs during unpacking when it is not carried out in the presence of a Chrompack service engineer will result in the rejection of a warranty claim.
- This instrument should be placed in a suitable location with sufficient ventilation to remove gases and vapors. Space around the instrument must be sufficient to enable cooling of the instrument.
- 3. Before plugging the instrument in or turning the power on, always make sure that the voltage and fuses are set appropriately for your local power supply.
- 4. Do not turn on the instrument if there is a possibility of any kind of electrical damage. Instead, disconnect the power cord and contact your Chrompack office.
- 5. The supplied power cord must be inserted into a power outlet with a protective earth ground connection. When using an extension cord, make sure that the cord is also properly grounded.
- 6. Do not change the external or internal grounding connections as this could endanger you and/or damage the instrument.

- The instrument is properly grounded when shipped. You do not need to make any changes to the electrical connections or to the instruments chassis to ensure safe operation.
- 8. When working with this instrument, follow the regulations for GLP (Good Laboratory Practice). Take care to wear safety glasses and appropriate clothing.
- 9. Do not place containers with flammable liquids on this instrument. Spillage of the liquid over hot parts may cause fire.
- 10. This instrument may use flammable or explosive gases e.g. hydrogen under pressure. Be sure to be familiarized with and to follow accurately the operation procedures prescribed for those gases before operating the instrument. Note that using the Chrompack Hydrogen Safety System will reduce the safety risks when working with hydrogen as the carrier gas.
- 11. Note that considerable amounts of carrier gas and a great part of the sample are released through the split vent. If hydrogen is used as the carrier gas or if toxic compounds are analyzed the split vent must be connected via external tubing to a proper fume hood. The same applies for the exhaust of the detector.
- When measuring gas flow rates through an FID or NPD, never measure air and hydrogen together. They should be measured separately to minimize explosion hazard.
- Cold compounds (such as carbon dioxide, liquid nitrogen) may cause severe burns. Refer to Chrompack manual Cryogenic frostbite (Cat. no. 505079) for detailed information.
- 14. When handling sharp objects such as fused silica or stainless steel capillaries or capillary columns, traps, syringes etc. avoid puncture of the skin.
- 15. Never try to repair or replace any component that is not described in this manual without the assistance of a Chrompack service engineer. Unauthorized repairs or modifications will result in rejection of warranty claims.
- 16. Always disconnect the power cord before attempting any type of maintenance.
- 17. Note that capacitors inside the instrument may still be charged even if the instrument is turned off.
- 18. Use proper tools when working on the instrument to prevent danger for yourself and/or damage to the instrument.
- 19. Only use fuses of the type and current rating specified. Do not use repaired fuses and do not short-circuit the fuse holder.
- 20. Damage can result if the instrument is stored under unfavorable conditions for prolonged periods (e.g. subject to heat, water, etc.).

SECTION 1

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1.1 GENERAL

The CP-9050 Automatic Liquid Sampler can handle up to 105 liquid samples divided in up to 7 vial ranges coupled to as many GC methods. The sampler uses standard syringes while all kinds of injection techniques are possible.

1.2 HARDWARE

Figure 1.1 shows the main parts of the CP-9050 Automatic Liquid Sampler:



Figure 1.1 Main Parts CP-9050 Automatic Liquid Sampler.

1.2.1 INJECTION HEAD

- 1. PLUNGER HOLDER
- 2. SYRINGE
- 3. SYRINGE FIXING LEVER
- 4. NEEDLE GUIDE



Figure 1.2 Syringe Carrier.

See Figure 1.1 and 1.2 for details. The Injection Head's function is to transport liquids either from vial to vial or from vial to the injection port of the GC. The Injection Head carries the syringe and provides the two essential movements of the syringe:

- Lowering the syringe to let the needle pierce the septum of the vial until the needle tip is well submerged into the vial's liquid.
- Moving the plunger up and down for taking and dispelling liquids.

The syringe carrier holds the syringe, the syringe itself is locked by the syringe fixing lever while the head of the plunger is fixed by "a screw" loaded plunger holder.

The black needle guide - pushed down by springs - holds the needle of the syringe and centers the needle in the septum cap of the injection port; it also functions as sample vial detector. The Injection Head is fastened to the crossrail by two hex screws. These two screws can be reached by mounting holes in the back wall of the injection head.

There is one electrical flat cable connection between Injection Head and Crossrail and one electrical flat cable connection between Crossrail and Instrument Base Unit.

1.2.2 CROSSRAIL

The Crossrail provides the movement of the Injection Head from solvent and waste vial along the sample tray to the injection port(s).

For the adjustment of the injection point the crossrail has to be moved towarts the injector(s) till the Syringe Carrier can easily reach the used injection port(s).

This can easily be done by means of the allen hex screws which tighten the Crossrail on the Instrument Base Unit.

1.2.3 INSTRUMENT BASE UNIT

The Instrument Base Unit houses the electronics, the control terminal and the tray compartment which is partially open at the bottom.

At the left of the Instrument Base Unit vials for solvent(right) and waste (left) can be inserted. The Instrument Base Unit is mounted with three screws on top of the sampler cover of the CP-9001/2 GC.

1.2.4 CONTROL TERMINAL

The Control Terminal is used during setup for programming the CONFIGURATION PARAMETERS.

The normal programming of METHOD PARAMETERS is done via the CP-9001/2 keyboard and display.

The Control Terminal contains a two line liquid crystal display (LCD) and a keyboard with eight keys. On the first line of the display and sometimes at the beginning of the second line there is a description of the menu or the parameter. Values are displayed on the second line below the corresponding description. A selected parameter value - a value that can be changed - is displayed as blinking.

On the keyboard, the key set ($M \cup C \vee$) selects the different functions (Methods, Utilities, Clear and Validate).

The four arrow keys are used to input values. The parameter to be changed is selected by pressing the ' \rightarrow ' or ' \leftarrow ' key until it is displayed as blinking. The value is increased with the ' \dagger ' key and decreased with the ' \ddagger ' key. If a low or high limit is reached, the value wraps around to the other end of the valid range. If a value - having a valid range of 1 to 200 - is 10 and should be set to 180, it is faster and more convenient to use the ' \ddagger ' key so the value wraps around to 200. Holding the arrow key pushed down speeds up the changing of the value.

1.3 SOFTWARE

Five important software modifications have been implemented with the release of software revision 2 (or higher) for the CP-9001/2:

a) One can control a CP-9050 sampler or a CP-9010 sampler or a 94X 'One Shot Sampler'. In case of selecting the CP-9050 sampler in Page 1, Line 12 a new set of Pages 4 and 8 will become visible. In case of selecting a 94X sampler Page 4 and 8 are as with software revision 1.

NOTE: A CP-9001/2 meant to control a CP-9050 sampler must be equipped with software revision 2 (or higher). In case of 91X samplers, CP-9001/2 software revision 1 must be used (which can control a combination of 94X and 91X samplers).

- b) Baseline recording/subtraction is not possible anymore. Therefore Page 2 of the CP-9001/2 shows 'optional' for Line 3 and 4.
- c) Relevant Page 8 parameters (VIAL RANGES with coupled METHODS, PL.COUNT and SEPTUM counters) plus some extra parameters of Page 7 (AUTOSTART and RESTART TIME) will be saved in EEPROM at the sacrifice of GC method 12. As a consequence only eleven GC methods can be programmed in Page 5.

NOTE: Without sampler the five METHODS and the METHOD MODE in RUN CONTROL METHODS will be saved as well.

d) One can control a temperature programmable on column injector (TP OCI) which can be used with the CP-9050 liquid sampler.
 The way the TP OCI is used can be selected in Page 1, Line 13 (one or two TP OCI's with free programmable temperature or temperature coupled to the oven temperature).
 In case of free programmable TP OCI's the relevant parameters show up in Page 7, Line 16 and up.

- e) Programming VLV 1 or VLV 2 in a Tx-program will only disable the default START or STOP function of that relay. In software revision 1.0X both default START and STOP functions were disabled in case VLV 1 and/or VLV 2 had been programmed in a Tx-program.
- NOTE: In case of a TP OCI relay VLV 2 is used for switching the fan cooling of the TP OCI, VLV 3 is used for the opening of the seal of the front TP OCI and VLV 4 is used for the opening of the seal of the rear TP OCI.

1.4 GENERAL OPERATION

The CP-9001/2 with software release 2 (or higher) can store up to eleven GC methods.

NOTE: A GC method holds all GC parameters of Page 1, 2, 3, 4, most of the parameters of Page 7 and some parameters of Page 10. Thus the sampler parameters of Page 4 are included in a GC method!

When the CP-9050 sampler is activated (Page 1, Line 12. SAMPLER = 51) the CP-9001/2 gets information from the sampler about the syringe size and tray (these values must be programmed during setup of the sampler). The default values and data ranges for the sampler parameters in the CP-9001/2 are set according to the syringe and tray installed.

Page 8 the RUN CONTROL SAMPLER Page of the CP-9001/2 links GC methods to vial ranges of the sampler. Up to seven vial ranges can be defined while overlap between the vial ranges is possible. If no method is specified with the vial range, all vials of this range will be processed with the sampler parameters programmed in the active memory of the CP-9001/2.

The CP-9050 sampler itself can store up to nine sampler methods.

NOTE: A sampler method holds only the sampler parameters of Page 4 of the CP-9001/2, which are maintained even when the power to the CP-9050 sampler is switched off.

When the CP-9001/2 is started with the sampler active (Page 1, Line 12, SAMPLER = 51) all sampler parameters to be used are downloaded to the sampler:

- In case a GC method was specified with the vial range this GC method will be loaded in the active memory of the CP-9001/2 and the sampler parameters from the active memory (the parameters of Page 4 of the CP-9001/2) will be downloaded to the sampler.
- If no GC method was specified with the vial range the sampler parameters from the active memory (the parameters of Page 4 of the CP-9001/2) will be downloaded directly to the sampler.

The sampler method number used for storage (1 - 9) depends on the value of SPECIAL INJECTION METHODS (only normal injection is possible!) in Page 4 of the CP-9001/2. Default SPECIAL = 1 which means that all sampler parameters are stored in sampler method 1 (used for normal injection).

- NOTE: A <u>GC method</u> is a method of the CP-9001/2 containing GC and sampler parameters. GC methods are stored in the CP-9001/2.
 - A <u>sampler method</u> is a method of the CP-9050 sampler containing only sampler parameters. Sampler methods are stored in the sampler.

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2.1 GENERAL

The installation comprises:

- a) Assembling the CP-9050 sampler.
- b) Software update of the CP-9001/2 GC.
- c) Installing the RS232 board in the CP-9001/2 GC.
- d) Mounting/connecting an extra RS232 plug and cable in the CP-9001/2 GC.
- e) Replacing the standard covers of the CP-9001 GC by the sampler covers.
- f) Replacing standard septum cap(s) by sampler septum cap(s).
- g) Mounting the CP-9050 sampler.
- h) System setup and adjustment procedures.
- NOTE: If CP-9001/2 and CP-9050 sampler were ordered together steps b) to g) can be skipped, only the assembling of the sampler, the mounting of the sampler and the system setup and adjustment procedures have to be done.
 - If the sampler was ordered separately, one or more of the nine steps have to be taken.

2.2 ASSEMBLING THE CP-9050 SAMPLER

After unpacking position the main body of the instrument on a flat table.

Unpack the Crossrail and the Injection Head.

Place the Crossrail on the LEFT and RIGHT Arm Support of the Instrument Base Unit and tight it up with the 2 hexagonal screws.

Connect the flat cable of the Crossrail with the Instrument Base Unit.

Take the Injection Head and keep one of the screws on the long 2.5 mm Allen (hex) key and line up the hole in the black syringe carrier plate with the upper hole in the back panel of the injection head.

The two holes in turn need to be aligned with the upper hole in the cross-slide and the screw has to be pushed through and tightened to mount the injection head while the guidance pins in the cross-slide fit into the holes in the back panel of the injection head.

Now slide the syringe carrier downwards until the hole in the black syringe carrier plate lines up with the lower hole in the of the back panel of the injection head.

The second mounting screw can be inserted and tightened.

Connect the flat cable to the injection head.

Installation

2.3 CABLE CONNECTIONS

Check if the Instrument you received has the right voltage.

OPTIONS			
::]			
SERIAL	BCD OUTPUT		
	••••••	•••••	

Figure 2.1 Back panel CP-9050.

2.4 SOFTWARE UPDATE OF THE CP-9001 GC

A CP-9001 meant to control a CP-9050 sampler must be equipped with software revision 2 (or higher). The software revision number can be found in the upper line of page 10 of a CP-9001, e.g.: **REVISION: 2.01**.

NOTE: With software revision 1 only 94X and 91X type samplers can be controlled!

2.5 INSTALLING THE RS232 INTERFACE BOARD IN THE CP-9001/2 GC

A CP-9001/2 meant to control a CP-9050 sampler must be equipped with a revision 1.04 (or higher) RS232 interface board.

The revision number of the RS232 interface board can be found at the printed circuit board. This RS232 interface board has to be installed in one of the two slots at the basic control board of the CP-9001/2.

Figure 2.2 shows the required dip switch/jumper setting and interface cable to the sampler connector. If no TP OCI has been installed all positions of dipswitch S1 must be set to OFF. In that case the TP OCI cannot be programmed: Page 1, Line 13 shows 'optional'.

If one TP OCI has been installed only position 1 must be set to ON and in case of two TP OCI's position 2 must be set to ON. Page 1, Line 13 shows TP OCI, which means the TP OCI is programmable.



Figure 2.2 RS232 Board; Switch/Jumper Settings and Cable Connection.





For the RS232 communication with the sampler a 25 pin female RS232 connector with cable has to be mounted next to the 25 pin female connector for the data-acquisition, see Figure 2.3.

Installation

NOTE: In case of an old CP-9001 two 3 mm holes have to be drilled in the mounting plate for the 25 pin connector.

The cable from the connector must be routed through the electronic compartment of the CP-9001/2 to the RS232 board and connected with the 5 pin plug at CM3, see Figure 2.2. A cable with 25 pin male connectors at both sides must be connected between the 25 pin sampler connector at the back of the CP-9001/2 and the 9 pin connector at the back of the CP-9050 sampler marked ' Serial). Use the 25/9 pins converter delivered with the instrument.

In case one or two TP OCI's have been installed the cable with the 15 pin connector coming from the CP-9001/2 must be connected to the 15 pin connector at the CP-9050 sampler marked 'GC IN/OUT'.

2.7 REPLACING THE STANDARD COVERS OF THE CP-9001 GC BY SAMPLER COVERS

The left-hand cover over the flow controls (mounted with two screws), the middle cover over the detector and injector area (mounted with two screws), the hinges for the middle cover (mounted with two screws each) and the back cover over the electrical terminals (mounted with two screws) have to be removed.

The back cover will be replaced by an aluminum back cover (mounted with two screws). The left-hand, middle and old back cover will be replaced by one sampler cover over the injector, detector, flow control and back cover area (mounted with two plastic hinges with four M4 screws each).

NOTE: In case of an old CP-9001 holes have to be drilled in the back side of the CP-9001, see Figure 2.4. In that case the hinges must be mounted with M4 bolts and nuts.



Figure 2.4 Holes to be drilled in the CP 9001 for mounting the sampler cover.

2.8 REPLACING STANDARD SEPTUM CAP(S) BY SAMPLER SEPTUM CAP(S)



The standard septum caps used for hand injection and 91X/94X samplers need to be replaced by special septum caps which guide the black needle guide of the CP-9050 sampler.

For packed, splitter and/or splitless injection ports the one shown in Figure 2.5 will be used.

The temperature programmed on column injection port (TP OCI) with pneumatic head has its own guidance part, see Figure 2.6 in Section 2.9.2 ADJUSTING THE INJECTION DEPTHS.

Figure 2.5 Septum Cap for Packed, Splitter, Splitless Injectors.

2.9 MOUNTING THE CP-9050 SAMPLER

With the use of 3 screws (supplied) the CP-9050 sampler is mounted onto the GC top cover. 2 holes are located on the right side of the CP-9050 (one in front and one in the rear position). The thirt hole is located in the bottom plate of the Instrument Base Unit (under the Sample Tray).

The position of the sampler is hereby fixed.

Unpack the Sample Tray and place it into the Instrument Base Uniton.

Make sure that the Sample Tray is placed in the correct way which means the 2 pins in the Instrument Base Unit fit into the bottom of the Sample Tray and the vial numbering can be read.

The installation of the sampler can be divided in five steps:

- a) SETTING THE CONFIGURATION PARAMETERS (Section 2.9.1).
- b) ADJUSTING THE INJECTION DEPTHS (Section 2.9.2).
- c) INSTALLING A SYRINGE (Section 2.9.3).
- d) CLEANING VIALS (Section 2.9.4)
- e) ADJUSTING DEPTH FOR SAMPLE/SOLVENT PICKUP AND SAMPLE/SOLVENT WASHING (Section 2.9.5).

2.9.1 SETTING THE CONFIGURATION PARAMETERS

- a) Connect the power cord.
- b) Switch on the sampler while pressing the [M] key on the control terminal. The display shows 'CONFIGURATION' blinking.
- c) Press the [V] key to enter this option.
- d) Follow the procedure given in Section 2.10.1 2.10.20 CONFIGURATION.

2.9.2 ADJUSTING THE INJECTION DEPTHS FOR DIFFERENT INJECTION PORTS

For packed, splitless and on column injection it is best to inject as deep as possible into the injection port. For splitter injection (splitter injection port or splitter/splitless injection port in splitter mode) it as advisable to inject less deep, especially in case the insert has been filled with glass beads and/or glass wool. The syringes used do have a needle length of 51 mm. Figure 2.6 shows recommended injection depths for packed, splitless, splitter and on column injection. For adjusting the injection depth follow the procedure given in Section 2.10.11



Figure 2.6 Injection depth for packed, splitter, splitless and on column injection

INJECTION POINTS POSITION.

When adjusting the injection depth it is handy to know the depth of the guidance part in the septum cap used for packed, splitter or splitless injection port or in the guidance part of the temperature programmable on column injector (TP OCI) which in both cases is **5 mm**.

2.9.3 INSTALLING A SYRINGE



Figure 2.7 Syringe carrier with syringe installed.

IMPORTANT:

For safety reasons it's advised to shut off the power everytime a syringe have to be adjusted.

Install the syringe in the syringe carrier. Take care when inserting the syringe (with one hand) that the needle is threaded into the hole of the needle guide. Slide the rim on top of the barrel a little bit in the slot meant for it and while holding the upper part of the plunger holder with your index finger (of your other hand) push the srew loaded plunger clamp up so that the plunger head slips into the plunger holder. Push the syringe in position and push the plunger clamp down, then fix the screw again. Finally the syringe can be locked by turning the white syringe fixing lever 90°. Move the plunger holder down as far as possible to adjust dead volume to zero (fixed by a hexagonal nut)

- NOTE: 1) Standard Hamilton syringes can be used.(700 -series 5 & 10 µl)
 - 2) The maximum plunger fill and inject speed is for a 10 μ l syringe maximum 25 μ l/sec.
- 3) Proper working depends on the syringe state and the following points have to be assumed:
 - straight needle
 - plunger freely slipping
 - no plunger leakage
- 4) It's a good practice to execute some cleaning cycles (Utilities).

2.9.4 CLEANING VIALS

Use standard 10 ml vials.

Fill a vial with an appropriate solvent and put it into the right place of the vial holder. Place an other "empty" vial on the left side for waste solvent.

Remark:

To prevent "plopping off" of the snapcap it's advised to change the snapcap with septum on a regular base!

2.9.5 ADJUSTING DEPTH FOR SAMPLE/SOLVENT PICKUP AND WASHING

These adjustments are only required if one wants other settings than the default settings. For these adjustments insert a vial in position 1 of the tray and insert solvent (right) and waste (left) vials on the left hand side of the CP-9050. See Section 2.9.5 for adjusting solvent pickup and wash penetration depth.

See Section 2.10.11 for adjusting the sample penetration depth.

NOTE: The sample penetration depth depends on the vials used!

2.9.6 CONFIGURATION SETUP AND ADJUSTMENT PROCEDURES

The only way to change the configuration parameters is switching the power of the sampler on while pressing the [M] key on the control terminal. The display shows 'CONFIGURATION' blinking.

Press the 'V' key to enter this option. The display shows 'NB of Inj. Points'.

With the 't' and 't' keys you can step through the possible values, with the ' \rightarrow ' and ' \leftarrow ' keys you can step through the parameters.

Set all parameters to the values given in Section 2.10 CONFIGURATION PARAMETERS. Press the 'C' key to leave the CONFIGURATION PARAMETERS menu: 'CONFIGURATION' starts blinking again.

By pressing the 'C' key again the sampler returns to its STANDBY mode showing:

FST	LST	INJ	METH	[M] [U]
1	1	1	1	[V]

NOTE: - Always press the 'V' key to store the CONFIGURATION PARAMETERS! If the sampler is switched off before the 'V' key was pressed the entered parameters will not be stored!

The sampler is now ready for operation, see Section 3 OPERATION.

2.10 CONFIGURATION PARAMETERS

Parameter	Possible values	Set value	-
INJECTION POINTS	1/2/3/4	2	1)
WASH POSITION	LEFT/RIGHT	LEFT	,
START SIGNAL	GC_READY/REMOTE	REMOTE	
SYRINGE VOLUME	2/5/10 µl	5	
TRAY SELECTION	4x8/6x14/7x15/10x20	7 x 15	
BCD ACTIVE STATE	HIGH/LOW	HIGH	2)
START CYCLE BUZZ	ON/OFF	ON	
MANUAL INJ. BUZZ	ON/OFF	ON	
BAR CODE SCANNING	ON/OFF	OFF	
INJECTION POSITION	0,1,2,3		
REFERENCE ADJUST			
SAMPLE PENETRATION			
WASH PENETRATION			
- SOLVENT			
- WASTE			
MOTOR SPEED(1mm/sec)			
-SYRINGE MOVE-UP	50 - 125	80	
-SYRINGE WASH-DOWN	50 - 125	80	
-SYRINGE SAMPL-DOWN	50 - 125	80	
-SYRINGE INJECT	50 - 125	100	
-SOLVENT PULL-UP(0.1µl/s)	1 - 250	50	
-SOLVENT EJECT (0.1µl/s)	1 - 250	150	
-SAMPLE EJECT (0.1µl/s)	1 - 250	200	
-SYRINGE TEST (0.1 µl/s)	1 - 250	50	
-X & y axis SPEED (1mm/s)	50 - 125	100	
SYRINGE TEST (0.1 µl)			
-FILLING	0 - 50	1	
SERIAL BAUDRATE	600/1200/2400/4800/9600	9600	
SERIAL LINK TEST			
POS SENSOR TEST			
RESET TO DEFAULT		<u>-</u>	

NOTE: 1) The NO OF INJ POINTS must be set at 2 even if only one injection port is available! .

2) Only important when non standard connections (options) are made (used).

2.10.1 CONFIGURATION

To enter the Configuration menu, turn power off then, while still pressing the [M] key, turn power on. After the initialization cycle, the following message is displayed:

· · · · · ·	
CONFIGURATION	

Press [V] to enter this option. Select configuration parameter with $[\rightarrow]$ or $[\leftarrow]$. Press [V] to enter the selected parameter. MODIFY the value of the selected parameter with $[\dagger]$ or $[\ddagger]$ Update and Quit with [V] Discard and Quit with [C]

2.10.2 NUMBER OF INJECTION POINTS

Set the number of injection points.

NB OF INJ	POINTS		
(1-4)	2	[V] [C]

Set this value at 2, even if only one injection port is available.

2.10.3 WASHING POSITION



Set to LEFT with [†] or [+].

2.10.4 START SIGNAL



Set to REMOTE with [†] or [↓].

2.10.5 SYRINGE VOLUME

SYRINGE VOLUME 5 [V] [C]

Set to volume of syringe used with [†] or [4].

2.10.6 TRAY SELECTION

SELECT ROW X COL TRAY 7 X 15 [V] [C]

Set the 7 x 15 tray with $[\dagger]$ or $[\downarrow]$.

2.10.7 BCD ACTIVE STATE

Sets the active logical level



Select HIGH or LOW with [†] or [↓]. Only important if this option is available and used.

2.10.8 START CYCLE BUZZER



Select ON or OFF with [†] or [+].

2.10.9 MANUAL INJECTION BUZZER

MANUAL INJ BUZZZ ON [V] [C]

Select ON or OFF with [†] or [4].

2.10.10 BARCODE SCANNING



This option is not available although on and off can be selected.

2.10.11 INJECTION POSITION

INJECT. POSITION No.0 [V] [C]

Injection position 0 = rear injection port.

Injection position 1 = front injection port.

One or two injection points can be programmed depending on hardware present.

NOTE: In case only one injection port is available the second injection point can be programmed identical to the first one. In this way programming front or rear does not matter: the injection is always done in the same injection port.

Select the injection position to program (0 or 1) with $[\dagger]$ or $[\downarrow]$ and press [V] to enter programming: the following display appears:

"X" AXIS No.0	x 0.1	mm 0410	[V]	[C]	
1		L, p	osition	in 0.1	

- Injection Point being adjusted

Modify the axis position with [†] [↓] keys in a step by step (brief action on the key) or continuous way (key pressed).

Select the other axis (Y) with [<-] [->] and adjust in the same way.

"Y" AXIS x 0.1 mm No.0 0006 [V] [C]

- Position in 0.1 mm

- Injection Point being adjusted

Finally select the PENETRATION with [--] [->] and adjust in the same way.

"Z" AXIS	x 0.1 mm	
No.0	0030	[V] [C]

- Position in 0.1 mm

- Injection Point being adjusted

For programming the penetration depth proceed as follows:

- Move downwards with the [†] key until the bottom of the needle guide lies flat with the upper part of the septum cap (for ease of adjustment place a piece of paper on top of the septum cap).
- 2) Note down the display value (typical value ± 800)
- 3) Calculate the display value required for a certain penetration depth by adding the depth of the guidance part of the septum cap (5mm = 50 units) and the required injection depth (see section 2.9.2, figure 2.6) to the in step 2) displayed value and store with [V].

Typical value for splitter (±1339) splitless (±1259) and TP OCI (±1306).

- NOTE: 1) Before starting to grogram the positions of the injection points make sure the Injection Head is in it's HOME position and also that you do not move the Injection Head during the programming. Otherwise you have to restart programming because the programmed value does not match the actual value.
 - 2) The best is to program all three values rougly and when the injection position is neary reached then adjust exactly.
 - 3) The [M] key allows to check the already stored X and Y positions of the running injection point; the PENETRATION (Z) is reset to a safe value. WARNING: always use [C] to leave a parameter when no adjustments where made. [V] always overwrite your stored values (in this case with the safe penetration value!).
 - 4) In case of a TP OCI it's advised to do the programming <u>without</u> syringe to avoid damaging the silicone seal inside the TP OCI.

2.10.12 REFERENCE ADJUST



Press [V] to enter the programming.

"X" AXIS x 0.1 mm REFERENCE 2944 [V] [C]

Position in 0.1 mm

To adjust the Reference position, align the right edge of the Injection Head with the Right Arm Support of the Instrument Base Unit (see fig.2.8) with $[\dagger][\downarrow]$ keys in a step by step (brief action on the key) or continuous way (key pressed).

IMPORTANT:

- 1) This programming must be done every time the arm position has been modified (MECHANICAL !)
- 2) The Sample Tray and Cleaning Vials Holder positions are RELATED to the Reference adjustment.





2.10.13 SAMPLE VIAL PENETRATION

SMPL PENETRATION
[V] [C]

Allows to adjust the needle penetration in the sample vials. Press [V] to enter the programming.

PENETR. x 0.1 mm SAMPLE 1 0277 [V] [C]

- Penetration Depth in 0.1 mm

- Detected vial

Since it is not possible to see how far the needle penetrate into the vial, proceed as follows:

- 1) Measure the distance from septum to the desired penetration depth. (use a spare capped vial).
- 2) Put a capped vial in position 1 of the tray.
- 3) Move the syringe downwarts with [†] key until the needle just touches the septum of the vial.
- 4) Move the syringe further downwarts with the [1] key over the distance measured in step 1).

2.10.14 CLEANING VIALS PENETRATION

WASH PENETRATION
[V] [C]

 $7\,\rm ce$ penetration depth in solvent and waste vials can be individually adjusted. Press [V] to enter the programming.

PENETR. x 0.1 mm SOLVENT 0030 [V] [C]

- Penetration Depth in 0.1 mm

- Select the SOLVENT or WASTE vial with [+-] or [→] and adjust penetration with [†] [↓].

IMPORTANT:

Validate [V] ONLY when SOLVENT and WASTE penetration are programmed.

2.10.15 MOTOR SPEEDS

Motor speeds are in 1mm/sec unless mentioned different. The default values have proven good results and should be changed only if really necessary!

SYRINGE MOVE UP 80 [V] [C]

Syringe moving upwarts.

With [†] or [+] values can be changed.

Syringe moving down to cleaning vials. With [†] or [↓] values can be changed.

SYRINGE SAMPL DOWN 80 [V] [C]

Syringe moving down to sample vial. With [†] or [↓] values can be changed.

SYRINGE INJECT 100 [V] [C]

Syringe moving down to inject sample. With [†] or [4] values can be changed.

Plunger pulling up solvent. With [†] or [‡] values can be changed.

Plunger ejecting solvent. With [†] or [↓] values can be changed.

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SAMPLE EJECT 200 [V] [C]

Plunger ejecting sample during filling strokes. With [†] or [↓] values can be changed.

SYRINGE TEST	
(0.1 <i>µ</i> l/sec) 50	[V] [C]

With [†] or [+] values can be changed.

Plungerspeed when testing your syringe or checking your dead volume.

"X" & "Y" AXIS SPEED (1mm/sec) 100 [V] [C]

Speed with which the Injection Head moves to the injection port. With [†] or [↓] values can be changed.

2.10.16 SYRINGE TEST

SYRINGE TEST [V] [C]

This function allows to check if the syringe takes the programmed volume. This is done with the **plungerspeed** mentioned above. Press [V] to enter the programming. The following display appears:

FILLING VO	LUME	
(0.1 <i>u</i> i)	1	
(•	[1][-]

Adjust the volume with [†] [↓]

1) Press [V]: the plunger is moving up and down and then pulls up the programmed volume.

2) Press [V] again: the plunger goes to zero volume.

3) Press [V] same as step 1)

4) Press [C] Quit this parameter

At this point it may be necessary to align the zero volume position of the syringe (plunger is not going down to zero).

This can easily be done by unscrewing the little hexagonal nut; press down the black plunger holder as far as possible and re-tight the little hexagonal nut.

2.10.17 SERIAL BAUDRATE

Press [V] to enter the programming. The following display appears:

SERIAL BAUDRATE BAUDS 9600 [V] [C]

Set the Baudrate to 9600 with [†] [+]

2.10.18 SERIAL LINK TEST



This parameter can not be entered with [V].

With the Cp-9001/2 the communication from GC to SAMPLER can be checked by programming the sampler mode (CP-9001/2: Page 1, Line 12) to 50 or 51.

The CP-9001/2 sends the following messages:

Sampler mode 50: # 950000

Sampler mode 51: # 040000 # 090000 # 959991

The last part of these messages can be seen in the display of the CP-9050 sampler.

NOTE: See section 5.4.1 ADVANCED SERIAL LINK TEST for further testing.

2.10.19 POSITION SENSORS TEST

XL	XR	Y	s	PL	SMP	
1	0	1	0	0	0	

The sensor state is displayed as:

- 1 = active
- 0 = inactive
- XL : INJECTION UNIT on LEFT side
- XR : INJECTION UNIT on RIGHT side
- Y : INJECTION UNIT back
- S : SYRINGE up
- PL : PLUNGER pulled up
- SMP : VIAL detected

IMPORTANT: All the motors are powered off; Do not try to program any position after this test. If necessary, turn power off and re-enter the configuration program.

EXAMPLE CHECKING THE "SAMPLE VIAL DETECTION SENSOR"

The CP-9050 sampler can detect whether a vial is inserted in the selected sample number position. This is done by checking how deep the needle guide moves when the syringe carrier moves down for sampling. If no vial is inserted the guide moves down to the sample tray and the switch is not activated. The state of the switch is indicated at the display. The adjustment is checked as follows:

1) Activate CONFIGURATION by pressing the [V] key while turning on the power.

2) Activate Parameter POS SENSORS TEST (value SMP=0)

3) Insert vial in position 2 of the sample tray.

4) Move injection head by hand to the first sample position.

5) Shift the needle guide down by hand slowly while observing the vial switch indication at the display. It should be "O" at the beginning, turned to "1" when the needle guide is about 3 mm below the top of the vial and switch back to "0" when the needle guide is about 3 mm above the vial.

(the needle guide should "rest" on sample 2 while pressing downl).

2.10.20 RESET TO DEFAULT

With this function all changeable parameters are reset to default values. All user values are lost. BE CAREFUL WHEN USING THIS FUNCTION! Its only use is to reset all parameters to save values after making changes (e.g. sample penetration or injection depth too deep so the needle may be damaged). Use this function if the CP-9050 sampler is reinstalled on another CP-9001/2 GC before setting up new values.

RESET TO DEFAULT

[V] [C]

Resets to default: METHODS, POSITIONS, MOTOR, SPEEDS... Press [V], the following message is displayed:

ARE YOU SURE ??	
<v> CONFIRM</v>	[V] [C]

Press [V] to confirm or [C] to abort.

WARNING:

Be careful using this option because you will loose all your programmed parameters!.

2.11 TABLES OF CONFIGURATION, METHOD AND UTILITY PARAMETERS

In the next three tables - Table I, II and III - the default values are given for the CONFIGURATION, METHOD and UTILITIES Parameters. You can use these tables to note down your actual values.

CONFIGURATION PARAMETERS

Table |

CONFIGURATION PARAMETERS	RANGE	DEFAULT	PROGRAM
NB of Inj. Points	1 - 4	2	
Wash Position	Left/Right	Left	
Start signal	GC_Ready/Remote	Remote	
Syringe Volume	2/5/10	5	
Tray Selection	7 x 15 / 6 x 14	7 x 15	
BCD Active State	High/Low	High	
Start Cycle Buzz	On/Off	On	
Manual Inj. Buzz	On/Off	On	
Bar Code Scanning	On/Off	Off	
Injection Position X-as (0.1 x mm) Y-as (0.1 x mm) Penetration (0.1 x mm)	7 - 4482 6 - 960 30 - 1339	7 6 30	
Reference Adjust X -as (0.1 x mm)	7 - 4482	1522	
Sample Penetration Penetration Depth	30 - 547	30	
Wash Penetration Solvent Penetration (0.1 x mm) Waste Penetration (0.1 x mm)	30 - 547 30 - 547	30 30	
Motor Speed (x 1 mm/sec)			
 * Syringe MOVE-UP * WASH-DOWN * SAMPL-DOWN * INJECT * Solvent PULL-UP (01.µl/sec.) * EJECT * Sample EJECT * Syringe TEST (0.1 µl/sec) * X & Y axis SPEED (1mm/sec) 	50 - 125 50 - 125 50 - 125 50 - 125 1 - 250 1 - 250 1 - 250 1 - 250 50 - 125	80 80 100 50 150 200 50 100	
Syringe test Filling(0.1 <i>µ</i> I)	0 - 100	1	
Serial Baudrate (x 100)	6/12/24/48/96	96	
Serial Link Test	-	-	
Pos Sensors Test	-	-	
RESET TO DEFAULT	-	-	

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OP-9050 AUTOMATIC LIQUID SAMPLER

METHOD PARAMETERS

Sec.

Table II

METHOD PARAMETERS	RANGE	DEFAULT	METH.1	METH.2
Injection MODE (SPECIAL)	-	0		
Volume SOLVENT (µl) Volume AIR (µl)	0 - 5.0 0 - 5.0	0 0		
Volume SAMPLE (µl) Volume AIR (µl)	0.1 - 5.0 0 - 5.0	0.5 1		
Clean Syringe SOLVENT (PRE) Clean Syringe SAMPLE (PRE)	0 - 99 0 - 99	0 0		
Filling Vol. (<i>µ</i> l) Number Fillstrokes	0.1 - 5.0 0 - 9 9	2.5 7		
Viscosity (Sec)	0 - 9.9	0.5		
Plunger speed FILL (µl/s) Plunger speed INJ. (µl/s)	0.1 - 25 0.1 - 25	5 25		
Select inj. Port	Rear / Front	Rear		
Splitter PRE (sec) Splitter POST (sec)	0 - 99 0 - 99	0 0		
inj. Delay PRE (sec) Inj. Delay POST (sec)	0 - 99.9 0 - 99.9	0.3 0.3		
Clean Syringe SOLVENT (POST)	0 - 99	0		

UTILITY PARAMETERS

Table III

			Display
Inject.	Samp.	Meth.	v c
Single	1	1	
Washing Syringe	Cycles 1		v c
Inject	Pre	Pst	- -
Manual	0	0	V C
Select	Row x	Col	- -
Tray	7 x	15	V C
Start Cycle x 1 min	Delay 0		v c

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3.1 INJECTION TECHNIQUES

Operation

With the CP-9050 sampler 'plunger in barrel' syringes are used, which means the needle volume of the syringe used has to be taken in account: what stays in the syringe after injection depends upon injection technique used, sample, GC parameters and sampler parameters.

With the CP-9050 sampler different injection techniques can be used: 'normal', hot needle', 'sandwich'. Since many parameters are programmable - not only pre injection solvent and/or sample cleaning, post injection solvent cleaning etc., but also speed of injection and residence time before and after injection - all kinds of injection techniques can be optimized.

To show the possibilities of these samplers three examples of injection techniques will be discussed:

- a) A 'HOT NEEDLE' INJECTION.
- b) A SIMPLE 'SANDWICH' INJECTION.
- c) A MORE ELABORATE 'SANDWICH' INJECTION.

In these examples we assume:

- the needle volume is $1 \mu l$.
- 0.2 µl of sample or solvent evaporates from the needle during injection.
- a) A 'HOT NEEDLE' INJECTION.



Figure 3.1 'Hot needle' injection.

After sampling 1 μ I (1) the total amount of sample in barrel + needle is 2 μ I as can be seen after taking a 1 μ I air plug (2). By programming a pre injection delay of a few hundred milliseconds the needle can be heated before injection. During injection part of the sample in the needle evaporates, thus after injection (3) stays 0.8 μ I. In this way we have injected 2 - 0.8 = 1.2 μ I of sample (assuming no discrimination during the evaporation from the needle!).

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CP-9050 AUTOMATIC LIQUID SAMPLER

b)

A SIMPLE 'SANDWICH' INJECTION.



Figure 3.2 A simple 'sandwich' injection.

A possibility to inject the sampled amount more precisely will be when we start sampling with a needle filled with solvent (using pre-injection solvent clean flushes) see (1). Sampling must then be done with no fill strokes programmed, just filling the barrel once to the μ I mark (2). The syringe contains now 1 μ i solvent + 1 μ i sample (3). During injection the total amount of sample will be transferred to the injection port while part of the solvent evaporates from the needle (4). After injection stays 0.8 µl. So we have injected 1 μ l sample + 0.2 μ l solvent (assuming no mixing of solvent and sample).

c) A MORE ELABORATE 'SANDWICH' INJECTION.



Figure 3.3 A more elaborate 'sandwich' injection.

A further improvement can be made if we separate the sample and the solvent by an air plug. Also more solvent can be used as is illustrated here. After pre injection solvent clean flushes a solvent plug of 0.5 μ l is taken (1) whereafter an air volume of 0.2 μ l (2). Then 1 μ l of sample is taken (3) + an extra air volume of 0.8 μ l (4). During injection the total amount of sample will be transferred to the injection port + 0.7 μ l (0.5 + 0.2 μ l) of solvent. What remains in the needle is 0.8 μ l of solvent.
3.2 SYRINGES

The CP-9050 sampler uses standard Hamilton 700 series syringes (5 or 10 μ l) with a needle length of 51 mm, an OD of the needle of 0.47 mm (gauge 26S) and point style 1 which means the needle has a bevel of 17° and is slightly bent inward. Therefore, protecting it from blockages.

Special syringes with slightly thicker (0.52 mm = gauge 25S) needles can be used as well for packed, splitter and splitless injectors (all with septum cap).

For the on column injector the needle must have an OD of 0.47 mm to make it possible to get into a 0.53 mm column or retention gap.

Note:

The maximum plunger fill and inject speed for a <u>5 and 10 µl syringe</u> is 25 µl/sec.

3.3 PREPARING VIALS

Selecting sample/solvent/waste vials

Standard 2 ml vials, 2 ml vials with 0.1 ml inserts or 0.1 ml conical vials can be used in the 7 x 15 tray.

Dimensions: OD \leq 11.6 mm, height 30 - 38 mm. For the solvent and waste vials 10 ml vials are used.

Dimensions: OD = 22.5 mm, height = 48 mm.

Filling sample vials

For obtaining reliable, high performance results with the sampler and preventing contamination or injection volume problems do fill the vials half full or a little bit more.

If the vials are almost empty the contribution from previous sample injection or solvent washes may affect the sample (cross contamination, dilution effect).

If the vials are almost full a vacuum may interfere with the syringe measuring a precise volume.

Capping sample vials

Use a crimper to put on the airtight crimp caps.

- Be sure the cap is airtight; if you can turn the cap by hand easily the cap is too loose and sample evaporation may occur.
- Be sure the cap is centered otherwise the syringe needle could hit the cap.
- Be sure the cap is not tightened too much. If so the septum is not flat anymore and the syringe tends to core a curved vial septum and drop small pieces of the material into the sample.

Solvent and waste vials

To fill the solvent vial or empty the waste vial it is required to move the injection head by hand to a place where it does not interfere with pulling the vial out of the vial holder. Before the next injection cycle the position of the injection head will be automatically reset to the waste position.

NOTE: The septum on the solvent and waste vials is part of an effective syringe needle cleaning concept. Not using a septum or not replacing these septa on a regular basis may cause sample cross contamination or even "plopping off", of the snapcap.

CP-9050 AUTOMATIC LIQUID SAMPLER

3.4 ACTIVATING THE SAMPLER PROGRAM

Page 1:

1.COL.LIMIT 101.
2.DET.TEMP 0.
3.INJ.TEMP 0.
4.OVEN INIT 0.
actual 21.
5.0VEN FINAL 0.
6.OVEN RISE 0.
7.TIME INIT 99.
8 TIME FINAL 0.
9.STAB.TIME 1.
10.CYCLES 1.
11.TX-MODE off
12.SAMPLER 901X on
13.TP OCI 0.
51=901X on.11=94X on
SAMPLER 51

In Line 12 one can choose the sampler type and mode. The following codes are possible:

- 50 The CP-9010 or CP-9050 sampler page (Page 4) is programmable, the sampler is off, pressing START starts a GC cycle without starting the CP-9010 or CP-9050 sampler, Page 8: RUN CONTROL ME "HODS can be active.
- 51 The CP-9010 or CP-9050 sampler pages (Page 4 & 8) are programmable, the sampler is on, pressing START starts a GC cycle while starting the CP-9010 or CP-9050 sampler, Page 8: RUN CONTROL SAMPLER will be active.
- 10 The 94X sampler page (Page 4) is programmable, the sampler is off, pressing START starts a GC cycle without starting the 94X sampler, Page 8: RUN CONTROL METHODS can be active.
- 11 The 94X sampler page (Page 4) is programmable, the sampler is on, pressing START starts a GC cycle with starting the 94X sampler, Page 8: RUN CONTROL METHODS can be active.
- NOTE: Before programming the CP-9050 sampler page (Page 4) one has to activate the sampler at least once (after power up of the CP-9001/2) by entering 51 for SAMPLER. By doing this the CP-9001/2 gets information from the CP-9050 sampler about installed/programmed syringe size and vial tray. The default values and programmable data ranges will be set according to the installed/programmed syringe size and vial tray (See Section 2.10 CONFIGURATION PARAMETERS about programming the syringe size and vial tray).

In case the CP-9050 sampler has been activated the keyboard of the CP-9050 sampler will be locked; the function keys [M],[V],[U] and [C] disappear in the display. FST, LST, INJ and METH stay visible on the display of the sampler. The only key that stays active (only during sampling) will be the [C] key. With the [C] key it is possible to abort the started cycle in the sampling phase of the CP-9050 sampler: sampler and GC will be stopped. Pressing the red START/RESET button on top of the CP-9001/2 or pressing the STOP/RESET key at the CP-9001/2 keyboard twice has the same effect but these keys will be active all the time, not only in the sampling phase of the CP-9050 sampler.

In case of TP OCI('s) the dipswitches at position 1 or 2 must be set. Then Line 13 shows TP OCI. Otherwise (all dipswitches OFF) Line 13 shows 'optional'.

Operation

Operation

3.5 PROGRAMMING STANDARD SAMPLER PARAMETERS

If the sampler/sampler mode has been set to 50 or 51 the first part of Page 4 looks like:

901X SAMPLER	.
1.INJ.VOL.	0.5
2.INJ./VIAL	1.
3. <clean smp<="" td=""><td>0.</td></clean>	0.
4.FILLSTR.	7.
5.>CLEAN SLV	0.
6.INJ.PORT	rear
7.OPTIONS	0.
.1 - 5.0	μl
INJ.VOL.	0.5

- NOTE: Values and data ranges shown here assume a 5 μ i syringe installed (programmed during setup, see Section 2.10 CONFIGURATION PARAMETERS about programming the syringe size). Default values for the parameters and data ranges depend on the syringe size programmed.
 - Once activating the CP-9050 sampler (by setting Line 12 in Page 1 to-51) shows
 values and ranges for the syringe size programmed in the CP-9050 liquid sampler.

The first part of Page 4 contains parameters for daily use. The second part of Page 4, accessible by putting a '1' in Line 7 OPTIONS, contains parameters that will be changed less frequently.

Explanation of the parameters (data ranges and defaults given for 5 μ l syringes.

LINE 1.INJ.VOL.

INJECTION VOLUME in μ I (0-5 μ I in steps of 0.1 μ I; default 0.5 μ I) This parameter specifies the volume to be sampled and injected. Since 'plunger in barrel' syringes are used, needle volume has to be taken in account!

NOTE: By filling the needle with solvent (PRE INJECTION SOLVENT CLEAN FLUSHES > 0) one can compensate for needle dead volume. In that case PRE INJECTION SAMPLE CLEAN FLUSHES and FILL STROKES must be set to zero!

LINE 2.INJ./VIAL NUMBER OF INJECTIONS PER VIAL (1-99; default 1) This parameter specifies the number of times each sample will be injected.

LINE 3.<CLEAN SMP

NUMBER OF PRE INJECTION SAMPLE CLEAN FLUSHES (0-99; default 0) This parameter specifies the number of times the syringe is washed with sample. This option is used when the solvent used in a post injection clean cycle is not compatible with the analysis or when no pre injection solvent clean cycle is used.

NOTE: If you want a solvent plug on top of the sample to compensate for needle dead volume (PRE INJECTION SOLVENT CLEAN FLUSHES > 0) this parameter must be set to zero.

LINE 4.FILLSTR.

NUMBER OF FILL STROKES (0-99; default 7)

This parameter specifies the number of pull ups using the FILL VOLUME. This parameter serves to control the filling of the syringe. It may happen that air bubbles remain below the plunger after a pull up. By moving the plunger down fast after a pull up these air bubbles can be worked out.

NOTE: If zero is selected for FILL STROKES the plunger will be pulled up only once using the INJECTION VOLUME!

If you want a solvent plug - with the volume of the syringe needle - on top of the sample to compensate for needle dead volume (PRE INJECTION SOLVENT CLEAN FLUSHES > 0) this parameter must be set to zero.

LINE 5.>CLEAN SLV

NUMBER OF POST INJECTION SOLVENT CLEAN FLUSHES (0-99; default 0) This parameter specifies the number of times the syringe is washed with solvent after the injection.

NOTE: If the sampler is stopped in the sampling phase (before injection but after taking some sample) the syringe is cleaned with the programmed number of SOLVENT CLEAN FLUSHES.

LINE 6.INJ.PORT

INJECTION PORT (front/rear; default rear) Here one can select the injection port to be used in case a front and a rear injection port are available.

LINE 7. OPTIONS

Message 'ENTER 1 to program' (0-1; default 0)

By entering a '1' in this line a new page with additional parameters shows up. This page contains parameters that need to be changed less frequently. For further details see Section 3.6 PROGRAMMING SPECIAL SAMPLER PARAMETERS.

NOTE: Entering a '1' is the only way to get access to the additional parameters!

Operation

3.6 PROGRAMMING SPECIAL SAMPLER PARAMETERS

By entering a '1' in LINE 7.OPTIONS a new page with additional parameters shows up:

SAMPLER OPTIO	NS
1.AIR VOL.	1.
2.FILL VOL.	2.5
3. <clean slv<="" td=""><td>0.</td></clean>	0.
4.SOLV.PLUG	0.
5.AIR PLUG	Ο.
6.VISCOSITY	0.5
7.FILL SPEED	5.
8.INJ.SPEED	25.
9. <inj.delay< td=""><td>0.3</td></inj.delay<>	0.3
10.>INJ.DELAY	0.3
11. <inj.time< td=""><td>Ο.</td></inj.time<>	Ο.
12.>INJ.TIME	Ο.
13.SPECIAL	1
0 - 5.0 μl	
AIR VOL.	1.

LINE 1.AIR VOL.

AIR VOLUME (0-5 μ l in steps of 0.1 μ l; default 1 μ l) The air plug pulled up after taking the sample - after all programmed fill strokes - can reduce evaporation from the needle. The air plug can also be used for the 'hot needle' injection technique.

NOTE: Do not program a total volume (= INJ.VOL. + AIR VOL. + SOLV. PLUG + AIR PLUG) which is bigger than the total syringe volume!

LINE 2.FILL VOL.

FILL VOLUME (0-5 μ i in steps of 0.1 μ i; default 2.5 μ i) This parameter specifies the - minimum - volume used for the FILL STROKES. If the programmed INJECTION VOLUME is higher than the FILL VOLUME the INJECTION VOLUME will be used for all FILL STROKES.

NOTE: The FILL VOLUME is used for FiLL STROKES and PRE INJECTION SAMPLE CLEAN FLUSHES, the total syringe volume is used for PRE and POST INJECTION SOLVENT CLEAN FLUSHES.

LINE 3.<CLEAN SLV

NUMBER OF PRE INJECTION SOLVENT CLEAN FLUSHES (0-99; default 0) This parameter specifies the number of times the syringe is washed with solvent before sampling (PRE INJECTION SAMPLE CLEAN FLUSHES and/or FILL STROKES).

NOTE: By filling the needle with solvent before sampling one can compensate for needle dead volume (PRE INJECTION SOLVENT CLEAN FLUSHES > 0). In that case PRE INJECTION SAMPLE CLEAN FLUSHES and FILL STROKES must be set to zero!

LINE 4.SOLV.PLUG

SOLVENT PLUG (0-5 μ i in steps of 0.1 μ i; default 0 μ i)

SOLVENT PLUG and AIR PLUG will be used in the so-called sandwich injection technique, where solvent and sample will be separated by an air plug. With PRE INJECTION SOLVENT CLEAN FLUSHES one can get a solvent plug with the volume of the needle, while here the SOLVENT PLUG can be programmed (solvent volume = programmed value plus the needle volume).

NOTE: - When using a SOLVENT PLUG the conditions PRE INJECTION SAMPLE CLEAN FLUSHES = 0 and FILL STROKES = 0 must be fulfilled!

- If it is not possible to enter a value for this parameter (DATA RANGE blinking) check the above mentioned conditions.
- Do not program a total volume (= INJ.VOL. + AIR VOL. + SOLV. PLUG + AIR PLUG) which is bigger than the total syringe volume!

LINE 5.AIR PLUG

AIR PLUG (0-5 μ l in steps of 0.1 μ l; defauit 0 μ l)

AIR PLUG and SOLVENT PLUG will be used in the so-called sandwich injection technique, where solvent and sample will be separated by the programmed AIR PLUG.

- NOTE: When using a SOLVENT PLUG and AIR PLUG the conditions PRE INJECTION SAMPLE CLEAN FLUSHES = 0 and FILL STROKES = 0 must be fulfilled!
 - If it is not possible to enter a value for this parameter (DATA RANGE blinking) check the above mentioned conditions.
 - Do not program a total volume (= INJ.VOL. + AIR VOL. + SOLV. PLUG + AIR PLUG) which is bigger than the total syringe volume!

LINE 6.VISCOSITY

VISCOSITY DELAY (0-9.9 s in steps of 0.1 s; default 0.5 s) The parameter specifies the delay between sample pullup and sample ejection while sampling with FILL STROKES. The same delay time is used after the last fill stroke before the syringe will be taken out of the vial. This feature is especially useful for handling viscous samples.

LINE 7.FILL SPEED

PLUNGER SPEED while pulling up sample (0.1-25 μ /s in steps of 0.1 μ /s; default 5 μ /s) The speed of the upward plunger movement during sampling (PRE INJECTION SAMPLE CLEAN FLUSHES and FILL STROKES) can be set here. This feature is especially useful for handling viscous samples.

LINE 8.INJ.SPEED

PLUNGER SPEED while injecting (0.1-25 μ /s in steps of 0.1 μ /s; default 25 μ /s) The speed of the downward plunger movement during injection can be set here. So if a fast or slow injection has to be performed the plunger speed can be set here accordingly.

LINE 9.<INJ.DELAY

PRE INJECTION DELAY (0-99.9 s in steps of 0.1 s; default 0.3 s)

After the syringe moves down into the injection port a certain delay time can be programmed before the sample will be injected.

In case of a fast injection one can select a short delay time and in case of the so-called hot needle injection technique this delay time must be set long enough to warm up the needle.

NOTE: In case of temperature programmable on column injection ports (TP OCI's) this time sets the time the pneumatic seal is closed before injection, see Section 3.9 TEMPERATURE PROGRAMMABLE ON COLUMN INJECTOR.

LINE 10.>INJ.DELAY

POST INJECTION DELAY (0-99.9 s in steps of 0.1 s; default 0.3 s)

This parameter specifies the delay between injection and the moment the syringe will be pulled out of the injection port. This delay time can be useful for controlling the evaporation from the needle.

NOTE: In case of temperature programmable on column injection ports (TP OCI's) this time sets the time after the injection when the syringe will be withdrawn.

LINE 11.<INJ.TIME

PRE INJECTION TIME for valve switching (0-999 s in steps of 1 s; default 0 s) This parameter specifies the time between start of the sampler cycle and injection. In practice to be effective - the programmed time should be longer than the time between start of sampler cycle and injection (this time depends on the number of fill strokes and the number of pre injection sample/solvent clean flushes).

LINE 12.>INJ.TIME

POST INJECTION TIME for valve switching (0-999 s in steps of 1 s; default 0 s) This parameter specifies the time between injection and deactivation of a valve.

REMARK

Line 11 and 12 are not being used; Because the CP-9050 is a fully integrated Liquid Sampler, programming of a valve is done by using the TX table of the CP-9001/2!.

Example:

 One wants to activate a splitter/splitless valve connected to relay-3 (VLV 3) of the CP-9001/2 before injection.

- This valve must stay activated till 2 minutes after injection. The following parameters must be programmed:

TX-program (page 3):

1.Time 0 Valve/Ext 3 2.Time 2

Valve/Ext -3

- Note: If the TX-program of the CP-9001/2 relay 3 (VLV 3) is programmed at time zero it will be activated when the sampler cycle starts, so before the GC program!
 - The time between start of the sampler and start of the GC program is dependent on the activities of the sampler (number of clean strokes,fill strokes etc.).
 - Two minutes after injection relay 3 will be deactivated.

LINE 13.SPECIAL

Choice of sampler method. The default value is 1 which means all sampler parameters will be loaded from the CP-9001/2 to method 1 of the sampler.

3.7 PROGRAMMING THE RUN CONTROL SAMPLER PARAMETERS

If the sampler/sampler mode has been set to 51 the first part of Page 8 looks like:

```
RUN CONTROL SAMPLER
                  METH
   FRST
           LAST
       1. 105.
                   Ο.
 1.
 2.
       0.
             Ο.
                   0.
                   0.
 3.
       0.
             0.
                   Ο.
 4.
             0.
       0.
 5.
       0.
             Ο.
                   Ο.
 б.
       Ο.
             0.
                   Ο.
 7.
             0.
                   0.
       Ο.
 8. PRIORITY
                    Ο.
                    0.
 9.PL.COUNT
10.RESET
                    0
SELECT LINE
```

LINE 1 - 7.FRST LAST METH

In these 7 lines vial ranges (1 - 105) can be coupled with GC methods (1 - 11). Up to seven vial ranges can be defined while overlap between the vial ranges is possible. While entering values for FIRST and LAST vial a check is done for LAST vial \geq FIRST vial. Deactivating a vial range can be done by programming zero for FIRST and LAST vial. If FIRST vial = 0 while LAST vial > 0 a message UNDEFINED VIAL RANGE appears when the CP-9001/2 is started.

If all vial ranges (FIRST and LAST) are set to zero the sampler/GC cannot be started. If no method is specified with the vial range, all vials of this range will be processed with the sampler parameters programmed in the active memory of the CP-9001/2.

If a sampler/GC run is stopped - by pressing the STOP/RESET key at the keyboard twice or pressing the START/RESET button on top of the CP-9001/2 once - the sampler continues with the next programmed injection when the CP-9001/2 is restarted by pressing the START key at the keyboard or the START/RESET button on top of the GC (if the sampler run is stopped **before injection** the same injection is done at restart!).

If a programmed vial range is processed a '*' in front of the line number of that vial range will mark that condition. When resetting the CP-9001/2 (LINE 10. RESET = 0) these '*' marks disappear.

If all programmed injections were done - so all programmed vial ranges will be completed and have a '*' in front of all vial ranges - restarting the CP-9001/2 (by pressing the START key or the START/RESET button) starts the sampler all over again with the first injection of the first vie' of the first programmed vial range.

- NOTE: In case a sampler/GC run is stopped after one or more injections were done and one wants to start all over again the CP-9001/2 must be reset (LINE 10. RESET = 0) otherwise the sampler continues with the next injection!
 - In case a vial range is changed (or just pressing three times ENTER after selecting a vial range by selecting LINE X) the CP-9001/2 will be reset in the same way as with LINE 10.RESET = 0.
 - The programmed values for VIAL RANGES and coupled METHODS are stored in EEPROM. Switching the CP-9001/2 off and on again makes the last programmed values active again.

LINE 8.PRIORITY

PRIORITY SAMPLE

During a sampler/GC run a priority sample can be programmed. Enter the vial number for the priority sample followed by a decimal point and the method number to be used with that priority sample.

Example:

Vial position 91 will be used for a priority sample. This sample must be analyzed using GC method-2. Program Line 8 with 91.02 (note the zero in front of the method number!). When the running GC cycle comes to an end the priority sample will be analyzed according the parameters of GC method 2. When the priority sample has been analyzed, the sampler/GC continues where it stopped.

LINE 9.PL.COUNT

PLUNGER COUNT WARNING LIMIT

Dependent on the conditions used the syringe need to be cleaned or replaced after some time. In many cases the number of plunger strokes executed is an important factor. The number of plunger strokes is counted by the sampler itself while a warning limit (< 9800) can be programmed here. The value entered will be multiplied by 100: for a warning limit of 9800 one has to enter 98.

NOTE: In case values < 100 need to be programmed, enter the value after a decimal point: for a warning limit of 50 enter '.50' or '.5' (for 9 enter '.09'l).

LINE 10.RESET

RESET FUNCTION

0 Resets the sampler cycles which means when the CP-9001/2

- with sampler activated - is started again the sampler starts with the first injection of the first vial in the first vial range programmed.

- NOTE: It is wise to use RESET = 0 before starting a new series of injections to be sure the sampler starts with the first injection of the first vial in the first vial range programmed. In many cases the history of the sampler/GC combination is not known exactly!
 - 1 Resets the front injection septum counter to zero. After changing the septum of the front injection port the septum counter must be reset.
- NOTE: In case of a temperature programmed on column injection port (TP OCI) this counter can be used to see if cleaning of the TP OCI is needed or if the seal must be replaced.

- 2 Resets the rear injection septum counter to zero. After changing the septum of the rear injection port the septum counter must be reset.
- NOTE: In case of a TP OCI this counter can be used to see if cleaning of the TP OCI is needed or if the seal must be replaced.
 - 3 Resets the plunger stroke counter to zero. After cleaning/replacing a syringe the plunger stroke counter must be reset.
- NOTE: RESET only works in non run model This might also be a good time to change the "Snap cap with septum" on the Waste and Solvent viail

3.8 STATUS INFORMATION (PAGE 8 AND STATUS PAGE)

The second part of Page 8 shows up after pressing '4':

RUN CONTROL SAMPLER front rear SEPTUM 0. 0. SET PL.COUNT 0. Ο. ACT.PL.COUNT VIAL : Ο. Ο. INJ./VIAL : ACT. INJ. : ο. ACTIVE METHOD Ο.

This Page contains 'status' information. Most information is updated after an injection.

SEPTUM

INJECTION COUNTER as a reminder for exchanging a septum. Septum counters for front and rear injection port are given. After every injection the septum counter of the injection port used is increased by one. After changing the septum of that injection port the septum counter must be reset to zero.

SET PL.COUNT PROGRAMMED PLUNGER COUNT WARNING LIMIT The programmed value is displayed.

ACT.PL.COUNT

ACTUAL PLUNGER COUNT The number of plunger counts (after the last RESET = 3) is displayed.

VIAL ACTIVE VIAL The active vial is displayed.

INJ./VIAL PROGRAMMED INJECTIONS PER VIAL The programmed number of injections per vial is displayed.

ACT. INJ. ACTUAL INJECTION The actual injection from the active vial is displayed.

ACTIVE METHOD.

The active method used is displayed.

The STATUS page of the CP-9001/2 gives for the sampler information about the total number of injections to be made, the actual injection, the active vial and the active GC method:

	STATU	S		10:05	
	F	EADY			
	RUN TIM	1E		0.	
1	CYCLES	1 ;	20		<== actual injection : total number of injections
		set	ac	tual	
	OVEN	50.		50.	
	DET	300.	3	oo.	
	INJ	300.	3	00.	
	AUX1	ο.	-	0.	<== AUX1 or TP OCI1
	AUX2	0.	-	Ο.	<== AUX2 or TP OCI2
	VLV				
	VLV/EXT	Г			
	VIAL	1			<== active vial
	ACTIVE	METH	OD	1.1	<== active GC method (autoload)
	ĺ				
	1				ł.



Figure 3.4 Timing of TP OCI seal opening in relation to syringe movement.

The pneumatically controlled seal of the TP OCI must be opened before the syringe can enter the TP OCI. The timing can be seen in Figure 3.4. The seal will be opened as soon as the syringe (injection head) reaches its position above the TP OCI and will be closed when the syringe reaches the programmed injection depth. In this way the seal is open for the shortest time possible.

The signal for opening the seal comes from the CP-9050 sampler (a contact closure of a relay available via the 1st pin connector at the CP-9050 sampler marked 'GC IN/OUT'). This relay contact is wired in series with relay VLV 3 for a front TP OCI and in series with relay VLV 4 for a rear TP OCI. Relays VLV 3 and VLV 4 are switched based on:

- the dipswitch settings at the RS232 board (presence of one or two TP OCI's).
- sampler activation (Page 1, Line 12.SAMPLER = 51).
- front or rear injection port.

With PRE INJECTION DELAY (Second part of Page 4, Line 9, see Section 3.6) the time between reaching the injection depth and the injection can be programmed. With POST INJECTION DELAY (Second part of Page 4, Line 10, see Section 3.6) the time between the injection and the withdrawal of the syringe from the injection port can be programmed. Good starting values for injection delays: PRE INJECTION DELAY (<INJ.DELAY) = 2s. POST INJECTION DELAY (>INJ.DELAY) = 10s.

NOTE: - Relay VLV 2 is used for switching the fan cooling of the TP OCII

Relay VLV 3 is used for a single TP OCI; in case of dual TP OCI relays VLV 3 and VL' 4 are used.

3.10 OPERATING HINTS

Vial positions

The 7 x 15 tray can contains 105 vials in 7 rows of 15 columns. The first row is marked with column numbers 1, 2, 3,..., 14; some positions of the next rows are marked with vial numbers.



Figure 3.5 7 x 15 tray with vial positions.

Solvent Vial

Estimate the volume of solvent needed for the programmed number of INJECTIONS and programmed number of PRE and POST INJECTION SOLVENT CLEAN FLUSHES per injection. Be sure there will be enough solvent in the solvent vial.

Waste vial

Estimate the volume of waste collected by the programmed number of INJECTIONS and the programmed number of SAMPLE and SOLVENT CLEAN FLUSHES.

Wetting a syringe

Before starting a series of injections it is wise to wet the syringe by solvent/sample flush strokes. This can be done by starting a GC/sampler run. The sampler starts - if programmed - with PRE INJECTION SOLVENT CLEAN FLUSHES, PRE INJECTION SAMPLE CLEAN FLUSHES, FILL STROKES and so on. If the sampler cycle is interrupted before injection no internal counters are incremented and the GC/sampler can be started again without the need for resetting. You can also use the WASHING SYRINGE parameter in the UTILITIES page of the CP-9050 (see table III page 2-23).

In this case wetting your syringe will be done with solvent only.

CP-9050 sampler display

When the sampler mode (CP-9001/2, Page 1, Line 12) is set to 51, the keyboard of the CP-9050 sampler will be locked: no keys are active anymore (with the exception of the [C] key). When the GC/Sampler combination is started the CP-9050 display changes to:

INJECT SAMP METH SINGLE X Y

where X is the vial processed and Y the sampler method used.

Aborting an injection cycle

With the [C] key it is possible to abort the started cycle - even when the keyboard of the sampler is locked - in the **sampling phase** of the CP-9050 sampler only - the sampler stops (hold situation). Now there are two possibilities:

- 1) after pressing the [V] key the sampler continues where it was stopped.
- 2) after pressing the [C] key a second time the sampler and CP-9001/2 will be stopped.

NOTE: - If the syringe is already contaminated or filled the sample is automatically thrown away and the syringe is cleaned for the next sampling cycle (when programmed).

Pressing the red START/RESET button on top of the CP-9001/2 or pressing the STOP/RESET key at the CP-9001/2 keyboard twice stops the sampler and CP-9001/2 as well but these keys will be active all the time, not only in the sampling phase of the CP-9050 sampler.

1 minute time-out

If in METHOD programming mode of the sampler no key of the keyboard of the Control Terminal is pressed within one minute the sampler escapes from programming mode without changing the sampler parameters of that METHOD. The sampler returns to STANDBY mode showing:

FST	LS	T INJ I	ИЕТН	[M] [U]
1	1	1	1	[V]

Resetting to first injection of first vial of first vial range

In case a sampler/GC run is stopped after one or more injections were done and one wants to start all over again the CP-9001/2 must be reset (LINE 10. RESET = 0) otherwise the sampler continues with the next injection!

(Or just pressing three times ENTER after selecting the specific vial range by selecting "LINE X" the CP-9001/2 will be reset in the same way as with LINE 10.RESET = 0.

Cycle counter

In case of a sampler there is no need to program the cycle counter (Page 1, Line 10). From the defined vial range and the programmed injections per vial the cycles will be calculated and displayed in the STATUS Page. So if the vial range is 1 - 15 and the injections per vial have been programmed as 2, the cycle counter will be set at 30 (after starting, the STATUS Page will be updated).

Cycle counter overflow

Since it is possible (but not useful, think of septum life) to program many injections per vial the situation may arise where the number of injections per vial range exceeds 999. In that case the cycle counter will overflow.

Sampler mode

For starting the sampler it is required that the sampler mode (Page 1, Line 12) has been set to 51 in the active memory of the CP-9001/2. In the method coupled to a vial range the sampler mode must also be set to 51.

Solvent plug & Air plug

If values for SOLVENT PLUG and AIR PLUG are not accepted (blinking data range) be aware of the conditions required for entering values; in this case:

PRE INJECTION SAMPLE CLEAN FLUSHES = 0 FILL STROKES = 0

Changes of sampler parameters

At the start of a vial range the sampler parameters will be downloaded to the CP-9050 sampler.

- If no method was programmed with the vial range the sampler parameters of the active memory will be downloaded, but only at the start of that vial range. So changes made in the active memory will become active at the start of that vial range.
- In case a method was programmed with the vial range the sampler parameters of that method will be downloaded, but only at the start of that vial range! So changes must be made in the GC method itself (via EDIT METHOD, Page 5, Line 3) and these changes will become active at the start of that vial range.

NOTE: A RESET = 0 (Page 8, Line 10) resets the sampler to the first injection of the first vial range.

Default values for a programmed syringe

In case one wants to use a syringe with a different capacity - e.g. change from a 5 μ l to a 10 μ l syringe - this capacity has to be programmed in the CONFIGURATION PARAMETERS of the CP-9050 sampler (see Section 2.10 & 2.10.1). Activating the sampler by setting the sampler mode (Page 1, Line 12) to 51 the CP-9001/2 gets the syringe size from the sampler and adjusts the data ranges of the syringe related parameters accordingly. If no GC method was loaded during activation of the sampler, the sampler parameters will be set to default values; if a GC method was loaded the values of the sampler parameters do not change to default values!

3.11 SUMMARY OF PROGRAMMING

The programming of the CP-9050 sampler can be summarized in nine steps:

- Activate the sampler by entering 51 in Page 1, Line 12.SAMPLER. By doing this the CP-9001/2 gets information from the CP-9050 sampler about installed/programmed syringe size and vial tray. The default values and programmable data ranges will be set according to the installed/programmed syringe size and vial tray.
- 2) Program the six standard sampler parameters (INJ.VOL., INJ.VIAL, <CLEAN SMP, FILLSTR., >CLEAN SLV, INJ.PORT) of the sampler page (Page 4, Line 1 6).
- 3) If required get access to the special sampler parameters (AIR VOL., FILL VOL., <CLEAN SLV, SOLV.PLUG, AIR PLUG, VISCOSITY, FILL SPEED, INJ.SPEED, <INJ.DELAY, <INJ.DELAY, <INJ.TIME AND >INJ.TIME) by entering '1' in Page 4, Line-7.OPTIONS and program the special sampler parameters.
- 4) If required save the GC method (Page 5, Line 1).
- 5) If required repeat steps 2) to 6) or program methods via EDIT METHOD (Page 5, Line 3).
- 6) Program one or more vial ranges in Page 8, Line 1 7 and GC methods. If no method is specified (METH = 0) with the vial range, all vials of this range will be processed with the sampler parameters programmed in the active memory of the CP-9001.
- 7) If required program the PLUNGER COUNT WARNING LIMIT and RESET the ACTUAL PLUNGER COUNT and SEPTUM COUNTERS.
- If one wants to start all over again reset the sampler/GC by entering 0 in Page 8,Line 10.RESET.

NOTE: It is best to use RESET = 0 before starting a new series of injections to be sure the sampler starts with the first injection of the first vial in the first vial range programmed. In many cases the history of the sampler/GC combination is not known exactly!

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SECTION 4

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4.1 TIMETABLE FOR MAINTENANCE

<u>Daily</u>

- Check septum and liner of injection port. If required replace septum and clean the liner of the injection port.
- Check wash solvent, empty waste vial if required.
- Check the syringe: contamination, plunger movement and needle tip damage.
- Before a first run after several hours of interrupted operation perform 3 5 wash cycles to condition the syringe (use the option in UTILITIES page of the CP-9050 Automatic Liquid Sampler).

Weekly

- Check wash solvent and waste vial septa. These septa are part of an effective syringe cleaning concept, replace them regularly (at least every 1 - 2 weeks) to avoid sample cross contamination.

Because also the "Snap cap" might be getting soft under the influence of solvent it is advised to change the septum and "Snap cap" together.

- Check syringe. If required clean the syringe.
 - The syringe has to be replaced every 2 3 months depending on use.

4.2 SYRINGES

The CP-9050 sampler uses standard Hamilton 700 series syringes (5 or 10 μ l) with a needle length of 51 mm, an OD of the needle of 0.47 mm (gauge 26S) and point style 1 which means the needle has a bevel of 17° and is slightly bent inward. Therefore, protecting it from blockages.

Special syringes with slightly thicker (0.52 mm = gauge 25S) needles can be used as well for packed, splitter and splitless injectors (all with septum cap).

For the on column injector the needle must have an OD of 0.47 mm to make it possible to get into a 0.53 mm column or retention gap.

NOTE: the 5 and 10 μ i syringes have a maximum plunger fill and inject speed of 25 μ l/sec.

Cleaning

Clean the syringe as recommended by the syringe manufacturer.

Blocked needles can be cleaned with appropriate cleaning wires or with a little air pressure in the barrel in case of septum blockage.

Dirty glass barrels can be cleaned with suitable solvents as Hamilton Cleaning Solution. Dirty plungers can be wiped off with a fibre-free cloth. Do not touch the plunger with your hands.

4.3 SEPTA

'Low bleed' septa should always be used in packed, splitter, splitless and wide bore injection ports because these produce the lowest background noise.

Two types of high temperature, low bleed septa are recommended; one for temperatures up to 375°C (Chromsep Blue) and the other for temperatures up to 400°C (Chromsep Red). With the CP-9050 sampler and the point of the syringe in good shape septa need to be replaced after 150 - 200 injections. In case the needle tip of the syringe has been damaged septa can start leaking very soon.

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Maintenance

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SECTION 5

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5.1 SAMPLER ERROR MESSAGES - CP-9001/2 DISPLAY

The CP-9001/2 has five error messages related to sampler operation.

NOT INSTALLED	 No communication possible with sampler: RS232 interface board not present. Cables between RS232 interface board and sampler not connected. CP-9050 sampler switched off. 		
CHECK SAMPLER	 CP-9050 sampler not in STANDBY mode while receiving a START command. Starting the CP-9001/2 while the CP-9050 sampler is (still) busy. In [V], [M] or [U] mode (one or more are marked): In case the keyboard of the CP-9050 sampler was not locked (switching the sampler on while the CP-9050 sampler was activated in the CP-9001/2 (Page 1, Line 12.SAMPLER = 51) it is possible to press the [U], [V] or [M] key. In these states the sampler cannot be started. In CONFIGURATION SETUP mode (switching the sampler on with the [M] key pressed) while the CP-9050 sampler was activated in the CP-9001/2 (Page 1, Line 12.SAMPLER = 51). In CONFIGURATION SETUP mode the sampler cannot be started. 		
UNDEFINED VIAL RANGE	One or more vial ranges do have a zero for the first vial.		
PL.COUNT EXCEEDED	The actual plunger count is higher than the programmed warning limit. The syringe must be cleaned/replaced.		
SAMPLER ERROR	 in case of a SAMPLER ERROR Page 10, Line 4.SAMPL.ERR. of the CP-9001/2 gives information about the type of error. The information is given as AB.XY: AB = 10 Number of characters received ≠ 8. AB = 20 Sampler command not accepted. This can happen when a parameter is not within the data range of that parameter (e.g. the GC method was made for a 5µt syringe, later on a 10µl syringe was programmed in the CONFIGURATION PARAMETERS). AB = 40 Run time parameter error (SET < ACT time for DOUBLE or DUAL injection).NOT INSTALLED XY = 01 Receive buffer full. XY = 02 No communication with CP-9050 sampler. XY = 08 Line status error (baud rate not correct). 		

NOTE: - Errors AB = 10 and XY = 01 should normally not appear.

- Since the code of the last error stays visible till it is cleared, it is wise to clear the code (Page 10, Line 4 = 0) before further checking.

- If a sampler error code 20 occurs (see CP-9001/2 Page 10, Line 4) it means a sampler command was not accepted by the CP-9050 sampler: a parameter is not within the data range of that parameter (e.g. the GC method was made for a 5 μ i syringe, later on a 10 μ l syringe was programmed in the CONFIGURATION PARAMETERS).

NOTE:

in a few cases the data range given in the CP-9001/2 is greater than the CP-9050 sampler can accept

5.2 SAMPLER ERROR MESSAGES - CP-9050 SAMPLER DISPLAY

WARNING: SAMPLER SETUP LOST	 This message is displayed if the checksum calculated over all system values in non volatile memory is not correct. After RESET TO DEFAULT (see Section 2.13). Ignore this message and the subsequent message. After change of sampler software (EPROM). Ignore this message, press [V]. Weak backup battery on Control Board.
CHECK BATTERY ON CPU MODULE	See WARNING: SAMPLER SETUP LOST. If it was not caused by RESET TO DEFAULT (see Section 2.13) or sampler software exchange (EPROM), call for service to replace the batteries.
SWITCH NOT DETECTED	Every time a motor moves towards a switch, the distance moved is checked against the maximum possible travelling distance. If the switch is not activated after this distance either the switch is defective or the motor does not move due to a mechanical or electronic failure. Check cables/connections. See Section 2.10.19 POSITION SENSORS TEST.
SWITCH ALWAYS CLOSED	Similar case as above but the switch remains activated.
ERROR #N	This message indicates a software error and should normally not appear. If the message persists call for service.

5.3 SAMPLER ERRORS: SYMPTOMS, CHECKS AND SOLUTIONS

Symptom: Injection maid picks up vials

- Check if the sy: is needle is completely retracted into the needle guide when in its home position and under power. Touch with your finger the underside of the needle holder. If the needle tip can be detected, the needle is not fully retracted.
- If not fully retracted check the length of the syringe needle used nominal length is 51 mm (2"). If the needle length is OK adjust the needle guide position. Loosen the screws in the needle guide stops just below both springs of the needle guide with the 1.3 mm Allen (hex) key. Shift the needle guide in the right position needle point about 0.5 mm retracted and fasten the screws in the needle guide stops.

Symptom: Sampler seems to skip samples

If skipping samples is an intermittent problem, it is most likely that you are using vials that are too long or too short so that the vial detector does not function properly for every vial. Check the height of vials against the specified height (see Section 3.3 PREPARING VIALS).

Symptom: Injection head moves to wrong X-position when picking up sample or solvent

 Check if the right vial tray has been selected during CONFIGURATION SETUP (see Section 2.10 CONFIGURATION PARAMETERS).

Symptom: Wrong syringe needle penetration depth after adjustment (solvent, waste, sample, inject position)

A common error is that the adjusted penetration depth is not actually stored with the [V] key and the old depth is remained. See Sections 2.10.11 - 2.10.14 for adjusting the penetration depth at solvent, waste, sample and inject position.

Symptom: Sampler does not start a sample injection cycle

 First of all check for error messages in the displays of the CP-9001/2 and CP-9050 sampler (some error messages are delayed for about 6 seconds since retries are done if commands are not accepted). If no error messages were seen check Page 10, Line 4.SAMPL.ERR. A value other than 0 means the last occurred error!

Since this error will not be cleared automatically enter a zero for this line and retry. If the symptom persists check again Page 10, Line 4.SAMPL.ERR. Now a value other than 0 shows the real error code (see Section 5.1 SAMPLER ERROR MESSAGES - CP-9001/2 DISPLAY).

- Sampler not activated by entering 51 (Page 1, Line 12.SAMPLER 901X on).
- Undefined vial ranges.

Symptom: Excessive noise from syringe plunger or any other drive

- Turn the instrument off and check if syringe plunger, syringe carrier or injection head (X-slide), when being moved by hand, let you feel any resistance. If smooth and even movement results there is no indication that any of the motors are faulty or any excessive mechanical resistance exists.
- Since certain frequencies of the stepper motors can cause a resonance in the different instrument parts, change the speed of the motor, where the noise originates (see Section 2.10.15 MOTORS SPEED). A change up or down will most likely eliminate the noise problem. It should be noted that this problem will not hurt the instrument.

Symptom: Syringe does not fill properly (air bubbles below plunger)

- Try to increase number of filling strokes to work out air bubbles.
- Check the syringe needle tip. If it is bent (tip looks like a hook), change the syringe. Any restrictions, which can easily be caused by a burred or bent needle tip, will cause excessive pressure differences that cannot be equalized with normal parameter settings.
- When using high volatile solvents use PRE INJECTION SAMPLE CLEAN FLUSHES or PRE INJECTION SOLVENT CLEAN FLUSHES (if possible with a less volatile solvent) to wet and cool the syringe before sampling as much as possible.
- Check sample vial penetration depth (see Section 2.10.13) if needle tip is below the liquid level!.

Symptom: Results show no or very low detector signal (no peaks)

- A clogged syringe needle might be the reason for very low or even no detector signal.
 Coring of soft septa or picking up sediment on the bottom of the vial have often turned out to be the problem.
- Use enough POST INJECTION SOLVENT CLEAN FLUSHES to assure a clean syringe. This can be very important in case of samples containing high concentration of low volatile components. In the worst case the syringe can become blocked without cleaning after injection.
- If you are using very low sample volumes check the sample vial penetration depth (see Section 2.10.13). Use vials with conical inserts or adjust to a deeper level if necessary, but do not touch the bottom of the vial with the needle tip to avoid bending of the tip.
- Check the syringe needle tip. If it is bent (tip looks like a hook), change the syringe. Any restrictions, which can easily be caused by a burred or bent needle tip, will cause excessive pressure differences that cannot be equalized with normal parameter settings.

Symptom: Results show lower repeatability than normal

- Use enough POST INJECTION SOLVENT CLEAN FLUSHES to assure a clean syringe. This can be very important in case of samples containing high concentration of low volatile components. In the worst case the syringe can become blocked without cleaning after injection.
- Use cleaning cycles before injection if you are using a low volatile solvent.
- Check the syringe needle tip. If it is bent (tip looks like a hook), change the syringe. Any restrictions, which can easily be caused by a burred or bent needle tip, will cause excessive pressure differences that cannot be equalized with normal parameter settings.
- Check your method for viscosity delay times (see Section 3.6 PROGRAMMING SPECIAL SAMPLER PARAMETERS: VISCOSITY). Longer delays allow better pressure equilibrium.
- If the sample vial is filled more than 50%, a vacuum may be created inside the vial, depending on the number of cleaning cycles with sample and injections per sample, which leads to poor filling of the syringe.
- If you are using very low sample vial volumes check the sample penetration depth (see Section 2.10.13).
- Determine if the caps are being crimped property by attempting to rotate the cap by hand. Loose caps may cause selective loss of lighter components from a sample. Adjust crimping tool correctly.

Symptom: Results show cross contamination between samples

- Make sure you have septa on your wash solvent and waste vials. They are an important part of the cleaning mechanism. Change them at least every 1-2 weeks (including "Snap cap") !
- Push down the plunger holder before starting a run and check if the plunger tip touches the needle.
- Make sure the dead volume of your syringe needle is not excessive. Good syringes have a needle with dead volumes less than 1 μ l (typically 0.6 μ l).
- Use an appropriate wash solvent and program at least 5 POST INJECTION SOLVENT CLEAN FLUSHES. Increase the number of flushes and observe if the cross contamination diminishes.
- Use PRE INJECTION SAMPLE CLEAN FLUSHES and/or PRE INJECTION SOLVENT CLEAN FLUSHES to reduce cross contamination further.
- Check if the syringe fills completely when washing. If several cleaning cycles are
 programmed and many samples are processed vacuum in the solvent vial and overpressure
 in the waste vial may build up. Cut away a segment of the solvent and waste septa to
 assure equalization of pressure.

5.4 CHECKING PROCEDURES

For all these checking procedures the CP-9050 sampler must be in CONFIGURATION SETUP mode:

- Switch on CP-9050 sampler with (M) key pressed. The display shows CONFIGURATION blinking.
- Activate CONFIGURATION by pressing [V] key and step through the CONFIGURATION
 PARAMETERS with the '→' or '←' keys at the control terminal of the CP-9050 sampler till the
 display shows the right PARAMETER blinking.

(To escape from CONFIGURATION SETUP mode just press the [C] key).

5.4.1 ADVANCED SERIAL LINK TEST

In normal operation mode of the CP-9050 sampler an easy check can be done with the CP-9001/2 by setting the sampler mode (page 1, Line 12) to 50/51.

With sampler mode 50 the display of the CP-9050 sampler shows:

FST LST INJ METH [M] [U] 1 1 1 1 [V]

Which means the keyboard of the CP-9050 has been unlocked.

With sampler mode 51 the display of the CP-9050 sampler shows:

FST	LST	INJ	METH	nn l
4	4	4	4	1111
I	1	I	1	E1 I

Which means the keyboard of the CP-9050 has been locked.

NOTE:

By setting the sampler mode to 51 communication in both directions - from CP-9001/2 GC to CP-9050 sampler and vice versa- is checked.

What happens is: the GC asks the sampler for the programmed tray and syringe and after getting the right answers from the sampler, locks the keyboard of the sampler. A different test for the serial link was described in Section 2.10.8 SERIAL LINK TEST.

SECTION 6

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6.2	ACCESSORIES/CONSUMABLES	6-3
6.3	SPARE PARTS	6-3

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6.1 INCLUDED PARTS

2 x Solvent/waste vial with polythene snap cap and disc(10 ml)

1 x Allen (hex) key 4 mm

1 x Allen (hex) key 2.5 mm, long

1 x Allen (hex) key 1.5 mm

1 x Allen (hex) key 1.3 mm

1 x Syringe 5 µl

1 x Reference Manual

6.2 ACCESSORIES/CONSUMABLES

Part no. Description

Quantity

10201	Crimp top vial, 1 ml	100 pc
10375	Crimp top vial, 1 ml with 0.1 ml removable conical insert	100 pc
10210	Aluminum crimp cap with septum for 10201/10375	100 pc
10381	Removable conical insert, 0.1 ml	100 pc
10231	Hand crimper for 10200/10375/10210	1 pc
738200	Crimp top vial, 10 ml	125 pc
10223	Polyethylene snap cap with septum	100 pc
10227	Polyethylene snap cap	100 pc
10225	Replacement septum (red) for 10223	100 pc
11223	Hamilton 75N 5µl syringe	1 pc
11224	Hamilton 701N 10µl syringe	1 pc
11330	Sixpack of 701N 10µl syringes	1 pc
8670	Syringe cleaner 220 - 240V	1 pc
8672	Syringe cleaner 110V	1 pc
8665	Cleaning Kit with cleaning wires and cleaning solution	1 pc
8154	Cleaning solution (70 ml)	1 pc
10041	Septa, Chromsep Blue 9 mm	30 pc
10036	Septa, ChromSep Red 9 mm	30 pc
738668	Included part kit CP-9050 (without Reference manual)	1 pc
734918	Silicon seals for TP on column injector	10 pc
737903	Vertical air-duct	1 pc

6.4 SPARE PARTS

Part no.	Description	Quantity	
735649	Connection cable RS232 board - DB25 female connector	t pc	
735648	R\$232 board	1 pc	
177830	RS232 cable, 2 x 25 pin male connectors	1 pc	
737650	Septum cap for CP-9010 and CP-9050 samplers	1 pc	
163371	Adapter DSUB 25 Female - DSUB 9 Male	1 pc	

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CP-9050 AUTOMATIC LIQUID SAMPLER

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VERZONDEN

NL

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Total numbers of pages incl. front page: 1

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Country:

Fax nr.:

Beste Jan,

Al zoekende in het serv, manual van de CP9050 dacht ik mijn informatie op blz. 3-13 te kunnen vinden. (volgens de index blz. 3-1 laatste blz. is nr. 13) Edoch geen blz. 3-13 te vinden, wel nr. 3-14 met andere informatie als die ik nodig heb. Is dit een foutje of mis ik deze blz. gewoon?

Indien ja, kan ik een copie krijgen?

Bij voorbaat mijn dank.

Hans van Bergen CUSTOMER SUPPORT/service

02/12/96 09:51 331 118671331 PRD 23.1007.1996 14.11 31 118671331 31 118671331 31 118671331 --- CP Nederland _____ @ 001/003 **ACK** R Bergen op Zoom The Netherlands CHROMPACK NEDERLAND B.V. 4624 VT Boorbasveolain 7 4600 ÅG The Natharlands Positius 280 Bargen op Zooin Telefoon +(0)164-282834 Fax Telefax +{0}164-282828 E-mail: opinfo@zeolandnet.mi Jan Vos Hans van Bergen From: To: 11/20/98 CP-M'burg R&D Date: Company: 505300 CP9050 Subject Country: Ref.: INTJV009.DOC Fax nr.: Total numbers of pages incl. front page; 1 CC: Beste Jan. Al zoekende in het serv. manual van de CP9050 dacht ik mijn informatie op biz. 3-13 te kunnen vinden. (volgens de index biz. 3-1 laatste biz. is nr. 13) Edoch geen biz. 3-13 te vinden, wei nr. 3-14 met andere informatie als die ik nodig heb. is dit een foutie of mis ik deze biz. gewoon? Indien ja, kan ik een copie krijgen? Bij voorbaat mijn dank. Hans van Bergen CUSTOMER SUPPORT/service & R&D maakt geen foulijes, ended de zetduuel. Maan als je good "hight dan ozie je op page 3-12 de letreffende info staan, page 3-14 moet 3-13 wordon. Groelges p 021

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SECTION 3: REMOVAL, REPLACEMENT & ADJUSTMENT PROCEDURES

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- 3-2 General procedures for electronic modules.
- 3-3 Adjusting the needle guide.
- 3-4 Exchanging the injection head.
- 3-5 Exchaning the front panel with display and keyboard.
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NOTE: FOR THE SAMPLER CONFIGURATION PROGRAM SEE THE REFERENCE MANUAL SECTION 2.10.1.

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PENETRATION DEPTH RANGE FOR SAMPLERS

(CP9010, CP9020/25, CP9050)

Penetration depth	CP9010 min	(steps) max	CP9020/2 min	25(steps) max	CP9050 min	(x0.1mm)
Solvent	400	650❶	nvt	nvt	300	5470
Waste	250	450	nvt	nvt	260	370
Sample	260	550	1200	1350	310	510
Splitter		1782		3022		1.277
Slt/Spltless		1917		3022	 .	13390
TP-OCI		1830		nvt		1309

REMARKS:

- 400= measured at needlee penetrated 1/3 into vial. 650= measured when needle nearly touched the bottom of the vial.
 - 9 250= measured at needle just passing the "neck"of the vial. 450= measured at needle located halfway the vial.
 - Sole measured at needle just passing the "neck" of the vial. 550= measured when needle nearly touched the bottom of the vial.
 - This Value should have been 1367 but value 1339 is the maximum depth this sampler can be adjusted.

Recalculation from steps to mm : 0000 15 steps is 1mm 0000

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This manual belongs to:.....

. National States

SERVICE MANUAL

CP-9050 AUTOMATIC LIQUID SAMPLER (P/N 505300)

SECTION	CONTENTS
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l	Reference drawings.
2	Components legend & Spare parts.
3	Removal, Replacement & Adjustment
	Procedures.
4	Schematic diagrams.
5	Troubleshooting & Checks.
б	TSB's, Engineering Changes, Product Notes and Equipment Related Products.
7	Special Tools.
8	Preventive Maintenance, Liabilities/Schedules & Maintenance Procedures.
9	Principle(s) of operation.
10	Reference manual.

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SECTION 0: SAFETY INFORMATION

PAGE

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0-2	Safety information
0-4	General safety precautions

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CE

SAFETY INFORMATION

In accordance to Chrompack's commitment to customer service and safety, this instrument and its accompanying documentation complies with the CE (NEN 5509) specifications.

To prevent any injury to the user or any damage to the instrument it is essential that you read the information in this chapter.

If this manual is not in your mother language and if you have problems understanding the text, we advise you to contact your Chrompack office for assistance. Chrompack cannot accept responsibility for any damage or injury caused by misunderstanding of the information in this manual.

Indications in the manual

This manual contains warnings and precautionary statements that can prevent personal injury, instrument damage and loss of data if properly followed. Statements of this nature are called to your attention by the following symbols:

- NOTE: The NOTE calls attention to procedure, practice, or the like, which, if not correctly performed or adhered to, could result in inadequate functioning of the instrument.
- WARNING: The WARNING calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury or damage to the product.

Indications on the instrument

Specific symbols, drawing attention to safety hazards have been applied on appropriate places on the instrument. The following symbols can be encountered:

Instruction manual symbol. Indicates that the user should refer to the manual before operating the equipment.



Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 V must be so marked.)



Protective conductor terminal. For protection against electrical shock in case of a fault. Used with fieldwiring terminals to indicate the must be connected to ground before operating equipment.

0-3

SAFETY INFORMATION, continued



Radioactive hazard. Indicates that the instrument contains radioactive components which may cause personal injury when handled incorrectly.



Skin puncture. Indicates sharp or suddenly moving parts such as injection needles that may cause injury.



Hot surface. Indicates parts that may cause burns when touched.



Cryogenic frostbite. Contains extremely cold material (such as liquid nitrogen, carbon dioxide) that may cause injury when handled carelessly.



Static discharge warning. Item contains parts or informa tion that can be damaged by electrostatic discharge. Take care for proper grounding before handling.



Do not touch. Touching this item may result in damage to the instrument or personal injury.

GENERAL SAFETY PRECAUTIONS

- 1. The installation of this instrument will normally be carried out by an experienced Chrompack service engineer. Any damage to the system that occurs during unpacking when it is not carried out in the presence of a Chrompack service engineer will result in the rejection of a warranty claim.
- 2. This instrument should be placed in a suitable location with sufficient ventilation to remove gases and vapors. Space around the instrument must be sufficient to enable cooling of the instrument.
- 3. Before plugging the instrument in or turning the power on, always make sure that the voltage and fuses are set appropriately for your local power source.
- 4. Do not turn on the instrument if there is a possibility of any kind of electrical damage. Instead, disconnect the power cord and contact your Chrompack office.
 - 5. The supplied power cord must be inserted into a power outlet with a protective earth ground connection. When using an extension cord, make sure that the cord is also properly grounded.
 - 6. Do not change the external or internal grounding connections as this could endanger you and/or damage the instrument.
 - 7. The instrument is properly grounded when shipped. You do not need to make any changes to the electrical connections or to the instruments chassis to ensure safe operation.
 - 8. When working with this instrument, follow the regulations for GLP (Good Laboratory Practice). Take care to wear safety glasses and appropriate clothing.
 - 9. Do not place containers with flammable liquids on this instrument. Spillage of the liquid over hot parts may cause fire.
 - 10. This instrument may use flammable or explosive gases e.g. hydrogen under pressure. Be sure to be familiarized with and to follow accurately the operation procedures prescribed for those gases before operating the instrument. Note that using the Chrompack Hydrogen Safety System will reduce the safety risks when working with hydrogen as the carrier gas.
 - 11. Note that considerable amounts of carrier gas and a great part of the sample are released through the split vent. If hydrogen is used as the carrier gas or if toxic compounds are analyzed the split vent must be connected via external tubing to a proper fume hood. The same applies for the exhaust of the detector. 505300/REV 1.00

GENERAL SAFETY PRECAUTIONS, continued

- 12. When measuring gas flow rates through an FID or NPD, never measure air and hydrogen together. They should be measured separately to minimize explosion hazard.
- 13. Cold compounds (such as carbon dioxide, liquid nitrogen) may cause severe burns. Refer to Chrompack manual Cryogenic frostbite (Cat. no. 505079) for detailed information.
- 14. When handling sharp objects such as fused silica or stainless steel capillaries or capillary columns, traps, syringes etc. avoid puncture of the skin.
- 15. Never try to repair or replace any component that is not described in this manual without the assistance of a Chrompack service engineer. Unauthorized repairs or modifications will result in rejection of warranty claims.
- 16. Always disconnect the power cord before attempting any type of maintenance.
- 17. Note that capacitors inside the instrument may still be charged even if the instrument is turned off.
- 18. Use proper tools when working on the instrument to prevent danger for yourself and/or damage to the instrument.
- 19. Only use fuses of the type and current rating specified. Do not use repaired fuses and do not shortcircuit the fuse holder.
- 20. Damage can result if the instrument is stored under unfavorable conditions for prolonged periods (e.g. subject to heat, water, etc.).

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SECTION 1 : REFERENCE DRAWINGS

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NOTE: - The "DOC.NO" at the reference drawings refers to the header "DOC.NO." of the parts lists of section 2.

- The encircled numbers at the reference drawings refer to the numbers given in the column "ITEM NO." of section 2.

- There is no actual page numbering on the reference drawings, the numbering as given on this page in the column "PAGE", just indicates in which order the drawings must be inserted.















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Spritzenführt

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Y-Linearführ

001-8060

SEVERAL PARTS

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4				J
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	<u></u>			
BOARD OPTION 9000		DOC.NR.: 734905	REVISION:	DATE :
AM.PROJ. SCALE : 1 : 1	MATERIAL: TREATMENT:	·	GENERAL ROUGHNESS:	REV. BTW
FORM: NAME : M.HARTWIGSEN	TOLERAN DIMENSIONS		SE STATED	02
A4 DATE : 11-11-88		REMARKS:		04
CHROMPA	ACK®	HERCULESWEG 4338 PL MIDE THE NETHERL	8 TEL:0 DELBURG ANDS FAX:0	01180-71000 01180-33118





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SECTION 2: COMPONENTS LEGEND & SPARE PARTS.

CHAPTER CONTENTS

DOC.NO.

2-2 Front view (serial # 10301 -) 001-1202 1 of 2 Rear view (serial # 10301 -) 2-2 001-1202 2 of 2 Rear view (serial # 10129 - 10300) 2 - 2 001-1002A 2-3 Rear view (serial # 10070 - 10128) 001-1002 Front view (serial # 100001 - 10069) 2-3 001-1000F 2-3 ALS - CP AUTOSAMPLER (220V) 001-1202/2 GRUNDPLATTE, (BASE BODY, COMPLETE) 110V/220V 001-9202/1/2 2 - 4 2 - 5 ARM ASSEMBLY 001-9003 INJECTORKOPF (INJECTION HEAD) 2-6 001-9204 <u>~</u> 2-7 INJECTION HEAD (serial # 10031 -) 001-9204 2-7 INJECTION HEAD (serial # 10070 - 10128) 001-9004 2-7 INJECTION HEAD (serial # 10001 - 10069) 001-9004F 2-8 SEVERAL PARTS 2-9 COVER ASSY CP9050 ON CP9001/9002. 2-9 COMM. INTERFACE ASSY. 2-9 INCLUDED PARTS CP9050. UPGRADE KIT FOR THE CP9001/CP9002. 2-10 PARTS NEEDED FOR 9050 BUILD ON CP900X SERIES. CONTENTS OVERVIEW MAINBOARD KIT ASSY'S 2-11 2-12 CONTENTS OVERVIEW MAINBOARD KIT ASSY'S 2-13

NOTE: - The header "DOC.NO." at the parts lists refers to the box "DOC.NO." of the drawings of section 1.

- The numbers in the column "SUPPLIER NUMBER" refer to the numbers at the reference drawings of section 1.
- Parts with a dash in the column "ITEM NO." are not drawn in the reference drawings of section 1.
- Parts with "N.C." in the column "CP-PART.NO." are not codified as a available spare-part.
- For further parts breakdown of electronic units refer to section 4.

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DOC.001-1202 1 of 2

SUPPLIER NUMBER	DESCRIPTION	CP-PART NUMBER
001-9204	INJECTION HEAD	102753
001-9003	ARM ASSEMBLY	N.C.
001-9202	BASE BODY	N.C.

REAR VIEW (SERIAL # 10301 -)

DOC.001-1202 2 of 2

SUPPLIER NUMBER	DESCRIPTION	CP-PART NUMBER
001-9204	INJECTION HEAD	102753
001-9003	ARM ASSEMBLY01-9003	N.C.
001-9202	BASE BODY	N.C.
001-5073B	CABLE ARM ASSEMBLY/BASE BODY	N.C.
001-5286	CABLE INJ. HEAD/BASE BODY	102764

<u>REAR VIEW (SERIAL # 10129 - 10300)</u>

DOC.001-1002/A

SUPPLIER NUMBER	DESCRIPTION	CP-PART NUMBER
001-9004	INJECTION HEAD	102752
001-9003/A	ARM ASSEMBLY01-9003	N.C.
001-9202	BASE BODY	N.C.
001-5073/A	CABLE ARM ASSEMBLY/BASE BODY	N.C.
001-5286/10	CABLE INJ. HEAD/BASE BODY	N.C.

<u>REAR VIEW (SERIAL # 10070 - 10128)</u>

DOC.001-1002

SUPPLIER NUMBER	DESCRIPTION	CP-PART NUMBER
001-9004	INJECTION HEAD	102752
001-9003	ARM ASSEMBLY01-9003	N.C.
001-9002	BASE BODY	N.C.
001-5073B	CABLE ARM ASSEMBLY/BASE BODY	N.C.
001-5286/10	CABLE INJ. HEAD/BASE BODY	102763

FRONT VIEW (SERIAL # 10001 - 10069)

DOC.001-1000F

SUPPLIER NUMBER	DESCRIPTION	CP-PART NUMBER
001-9000F	INJECTION HEAD	103014
001-9003F	ARM ASSEMBLY01-9003	N.C.
001-9002F	BASE BODY	N.C.
001-5073	FLATCABLE	103002

ALS - CP AUTOSAMPLER (SERIAL # 10301 - UP) DOC.001-1202/2

	SUPPLIER	DESCRIPTION	CP-PART
ا ا ب د	NUMBER		NUMBER
1	9204	INJECTION HEAD	102753
	9003	ARM ASSEMBLY	N.C.
	9202/2	BASE BODY	N.C.
	008/CP		
	009	WASH/WASTE VIAL SPRING	102987

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SUPPLIER	DESCRIPTION	CP-PART
NUMBER		NUMBER
8080	GROUND CABLE	N.C.
5283	MAINBOARD SERIALNUMBERS:10301 AND UP	102988
5282 D	MAINBOARD SERIALNUMBERS:10001 - 10300	102765
5301	MAINBOARD ASSY 230V, SERIALN. 10001-10069 2	102757
5302	MAINBOARD ASSY 230V, SERIALN. 10070-10300 2	102758
5303	MAINBOARD ASSY 110V, SERIALN. 10001-10069 @	102759
5304	MAINBOARD ASSY 110V, SERIALN. 10070-10300 @	102760
5135	TRANSFORMER CONNECTORS 110V, SERIALN. 10301-UP	102762
5131	TRANSFORMER CONNECTORS 230V, SERIALN. 10301-UP	102989
5031	TRANSFORMER SOLDER-GROUP, SERIALN. 10001-10300	102761
SCH067	TRANSFORMER HOLDER	N.C.
SCH056	RIGHT COVER SUPPORT	N.C.
052	RIGHT COVER	102994
8224	Y AXIS MOTOR ASSY WITH MOLEX CON. SERIALN,	102754
	10301 - UP	
8024	Y AXIS MOTOR ASSY WITH AMP CON. SERIALN, 10001	102991
	- 10300	
SCH066	SHAFT	N.C.
SCH063	SENSOR INDEX	N.C.
8060	Y AXIS BEARING ASSY	N.C.
SCH061	BELT ATTACHMENT Y AXIS	N.C.
100	Y AXIS BELT MXL	102992
SCH062	BELT CLAMP	N.C.
8065	SHAFT HOLDER	N.C.
5121	DISPLAY, KEYBOARD ASSY	102993
053	FRONT COVER	102990
SCH68	TRAY HOLDERS	N.C.
059	RAIL	N.C.
058	REAR COVER (WITH SILKSCREEN)	102996
055	BODY BASE PLATE	N.C.
001-5132	LINE FILTER	102995

- $\ensuremath{\textcircled{}}$ Tou can use this mainboard only after first updating with the Mainboard assy's.
- ② For assy contents see page 2-12

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DOC.001-9003

SUPPLIER	DESCRIPTION	CP-PART
NUMBER		NUMBER
SCH014	15 TEETH LOOSE PULLEY	102755
SCH015	PULLEY SHAFT	N.C.
5073/B	ARM FLAT CABLE SERIALN. 10130- UP	102767
5073/A	ARM CABLE SERIALN. 10070- 10129	102766
5073	ARM FLAT CABLE SERIALN. 10001- 10069	103002
SCH024	BELLOWS CLAMP	N.C.
010	ARM BODY	N.C.
8032	X AXIS MOTOR ASSY	103003
8031	CARRIAGE ASSY	102998
SCH022	SHAFT	N.C.
SCH023	BELLOW	102997
SCH021	SHAFT HOLDER	N.C.
SCH026	BELLOW GUIDE	N.C.
SCH020	SIDE COVER	N.C.
5084	ARM RIGHT LIMIT SENSOR	102999
ACH012	DOVETAIL	N.C.
SCH016	FASTENING	N.C.
099	X AXIS BELT MXL	103000
SCH062	X AXIS BELT CLAMP	N.C.
5083	ARM LEFT LIMIT SENSOR	103001
SCH011	ARM SLIDE	N.C.

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SUPPLIER	DESCRIPTION	CP-PART
NUMBER		NUMBER
SCH047	SYRINGE SUPPORT	N.C.
8042	PLUNGER MOTOR ASSY	103004
SCH040	PLUNGER MOTOR HOLDER	N.C.
8033	CROSS BAR	N.C.
077	CLIP (RESORT)	103015
SCH062	BELT CLAMP	N.C.
101	Z AXIS BELT CLAMP MXL	103006
5286	CABLE WITH BOARD #1 SERIALN. 10300 - UP	102764
5086/1	INJECTION BOARD #1 SERIALN. 10001 - 10069	103008
5086/10	CABLE WITH BOARD #1 SERIALN. 10070 - 10300	102763
8043	Z AXIS MOTOR ASSY	103009
C1-034	MOTOR HOLDER	N.C.
043	LEVER	103010
044	LEVER SHAFT	103011
030	INJECTOR BODY HEAD	N.C.
SCH102	NEEDLE GUIDE SPRING	N.C.
SCH038	20 TEETH PINION	103007
SCH035	REFLECTOR	N.C.
5090	INJECTION BOARD #3	103005
032	UPPER COVER	N.C.
031	INJECTOR HEAD COVER	N.C.
SCH039	INJ.HEAD BASE PLATE	N.C.
SCH045	NEEDLE GUIDE	N.C.
SCH041	IS PART OF NEEDLE GUIDE	N.C.
5086/20	INJECTOR BOARD #2	103013
5086/30	FLEX CABLE, 11-POLE	103012

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INJECTION HEAD SERIALNUMBER 10301 - UP

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DOC.001-9204

SUPPLIER NUMBER	DESCRIPTION	CP-PART NUMBER
001-5086/20	INJECTION UNIT BOARD #2	 103013
001-5086/30	FLEX CABLE, 11-POLE	 103012
001-5286	CABLE WITH BOARD #1	102764
001-5090	INJECTION BOARD #3	103005

INJECTION HEAD SERIALNUMBER 10070 - 10300 DOC.001-9004

SUPPLIER NUMBER	DESCRIPTION	CP-PART NUMBER
001-5086/20	INJECTION UNIT BOARD #2	103013
001-5086/30	FLEX CABLE, 11-POLE	103012
001-5086/10	CABLE WITH BOARD #1	102763
001-5090	INJECTION BOARD #3	103005

INJECTION HEAD SERIALNUMBER 10001 - 10069

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SUI NUN	PPLIER MBER	DESCRIPTION	CP-PART NUMBER
001	-5086/20	INJECTION UNIT BOARD #2	103013
001	-5086/30	FLEX CABLE, 11-POLE	103012
001	-5086/1	INJECTION BOARD #1	103008
001	-5090	INJECTION BOARD #3	103005

SEVERAL PARTS

DOC. -------

	SUPPLIER NUMBER	DESCRIPTION	CP-PART NUMBER
	001-8032	X AXIS MOTOR ASSY	103003
	SCH096	X AXIS MOTOR	N.C.
	SCH013	MOTOR PULLEY	N.C.
	001-8043	Z AXIS MOTOR ASSY	103009
	SCH097	Z AXIS MOTOR	N.C.
	SCH036	MOTOR PULLEY	N.C.
	001-8224	Y AXIS MOTOR ASSY WITH MOLEX CONNECTOR	102754
		SERIALN. 10301 - UP	
	SCH095	Y AXIS MOTOR	N.C.
14-7- 4 -1	SCH036	MOTOR PULLEY	N.C.
	001-8024	Y AXIS MOTOR ASSY WITH AMP CONNECTOR	102991
		SERIALN. 10001 - 10300	
	SCH095	Y AXIS MOTOR	N.C.
	SCH036	MOTOR PULLEY	N.C.
	001-8042	PLUNGER MOTOR ASSY	103004
	SCH098	PLUNGER MOTOR	N.C.
	001-037	MOTOR PULLEY GLUEDE ON MOTOR AXIS	N.C.
	001-8046	NEEDLE GUIDE	N.C.
	SCH049	RACK	N.C.
	7046	HOUSING	N.C.
	SCH051	PLUNGER STOP	85921
	SCH050	PLUNGER GUIDE	85920
	001-8031	X CARRIAGE ASSY	102998
	SCH019	AXLE	N.C.
	SCH018	GUIDE	N.C.
	001-8060	Y AXIS BEARING ASSY	N.C.
ĺ	SCH060	GUIDE	N.C.

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COVER ASSY

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PART NUMBER	DESCRIPTION
737732	COVER ASSY CP9050 CP9001/9002/9003

COMM. INTERFACE ASSY 736589

	PART NUMBER	DESCRIPTION
اميرون	736589	COMM.INTERFACE ASSY
	735648	PCB ASSY DUAL RS232 BOARD

INCLUDED PARTS CP9050 738668

PART NUMBER	DESCRIPTION
738668	INCLUDED PARTS CP9050
11223	HAM SYRINGE 75, 5µl
699007	ALLEN KEY 4MM
699009	ALLEN KEY 2.5MM
699008	ALLEN KEY 1.5MM
84339	ALLEN KEY 1,27MM
738200	CRIMP TOP VIAL 10ML
10225	DISC FOR PE SNAPCAP 5-50ML
10227	SNAPCAP REPL. ONLY 5-50ML

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<u>CP9050 220/230V-50Hz</u> 738436

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PART NUMBER	DESCRIPTION
738436	CP9050 220/230V 50Hz
N.C.	LIQUID SAMPLER (STANG)220/240V
N.C.	PROTECTION COVER
N.C.	SCHR+PV M4X12D7987SV
N.C.	SCREW M4X12D7985SV
N.C.	WASHER 4.3D125 SV
847032	SCREW M3X6 ST. ZINC PLATED
735648	PCB ASSY DUAL RS232 BOARD
735649	CABLE ASSY RS232 INTERFACE
737650	SEPTUM CAP
505299	MANUAL REF CP-9050 LIQUID SAMPLER
734469	OPTIONBOARD BRACKET
731877	BORGCLIP
153005	PRINT GUIDE 3306
N.C.	SCREW 2.5X6 D84RVS
N.C.	NUT ZK M2.5 D934 SV
177830	CABLE, 2XDSUB-MALE 25P, 9 WIRES
N.C.	ADAPTER DSUB25FEMALE-DSUB9MAL
N.C.	CABLE ASSY CP9050 SPLS/TP-OCI
N.C.	STICKER CE 10X10MM
737732	COVER ASSY CP9002
847244	SCREW M4X10D7985RS
738668	INCLUDED PARTS CP9050

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PARTS NEEDED FOR 9050 BUILD ON CP-900X SERIES

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PARTS NEEDED	CP9000	CP9001	CP9002/3
COVER ASSY CP9050 CP9001 + CP9002 UPTO SERIAL- NUMBER XXXXXXX	737732	737732	737732
COMM. INTERFACE ASSY	IS NOT NEEDED	736589	736589
REMOTE CABLE (CP9050 TO GC)	177840	NO	NO
ADAPTER 25/9 (FEMALE/MALE)	NO	163371	163371
CABLE (CP9050 TO TP-OCI) CP supplied cable	TP-OCI NOT POSSIBLE	738434	738434
INCLUDED PARTS (CP9050)	738668	738668	738668
EPROM (ENG)	719949	738041	738245
EPROM (GERMAN)	719948	738042	738247

NOTE 1: CP9001 NEEDS -RS232 BOARD REV 1.04 OR HIGHER -SOFTWARE REV 2 OR HIGHER (ALSO 941 AND TO-OCI)

NOTE 2: For the CP9001 and CP9002 a kit is available to upgrade the GC to make it suitable for the CP9050 (P/N:738436).

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5282 MAINBOARD SERIALNUMBERS:10001 - 10300

NUMBER

257

SUPPLIER DESCRIPTION

LN. 10301-UP

MAINBOARD ASSY 230V, SERIALN. 10001-10069

SUPPLIER NUMBER	DESCRIPTION	CP-PAR' NUMBER
257/F	BACKPANEL ASSY	N.C.
5282	MAINBOARD SERIALNUMBERS:10001 - 10300	102765
4300	CABLE FOR Y-MOTOR	N.C.
SCH067	TRANSFORMER HOLDER	N.C.
5131	TRANSFORMER CONNECTORS 230V, SERIALN. 10301-UP	102989
5132	LINE FILTER	102995

MAINBOARD ASSY 110V, SERIALN. 10001-10069

SUPPLIER DESCRIPTION CP-PART NUMBER NUMBER 1.4 257/F BACKPANEL ASSY N.C. MAINBOARD SERIALNUMBERS:10001 - 10300 102765 5282 CABLE FOR Y-MOTOR N.C. 4300 TRANSFORMER HOLDER SCH067 N.C. TRANSFORMER CONNECTORS 110V, SERIALN. 10301-UP 102762 5135 LINE FILTER 5132 102995

MAINBOARD ASSY 230V, SERIALN, 10070-10300

BACKPANEL ASSY

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CP-PART

NUMBER

N.C.

N.C. N.C. N.C. 102989 102995 $\mathbb{N} \cdot \mathbb{C}$.

102765

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001-5303

CP-PART

MAINBOARD ASSY 110V, SERIALN. 10070-10300

001-5304

SUPPLIER NUMBER	DESCRIPTION	CP-PART NUMBER
257	BACKPANEL ASSY	N.C.
5282	MAINBOARD SERIALNUMBERS:10001 - 10300	102765
TP100	FLATCABLE	N.C.
4300	CABLE FOR Y-MOTOR	N.C.
SCH067	TRANSFORMER HOLDER	N.C.
5135	TRANSFORMER CONNECTORS 110V, SERIALN. 10301-UP	102762
5132	LINE FILTER	102995
C1-201	PIGGY BAG	N.C.

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SECTION 3: REMOVAL, REPLACEMENT & ADJUSTMENT PROCEDURES

CHAPTER CONTENTS

- 3-2 General procedures for electronic modules.
- 3-3 Adjusting the needle guide.
- 3-4 Exchanging the injection head.
- 3-5 Exchaning the front panel with display and keyboard.
- 3-6 Exchanging the processor board.
- 3-7 Exchanging the crossrail.
 - 3-8 Software changes.
 - 3-9 Standard connection In/out connector.
 - 3-10 In/out connector cable CP9001/9002 connections.
 - 3-11 BCB output connector.
 - 3-12 Serial connector (RS232).
 - 3-12 Options connector.
 - 3-13 Penetration depth range for samplers.

NOTE: FOR THE SAMPLER CONFIGURATION PROGRAM SEE THE REFERENCE MANUAL SECTION 2.10.1.

GENERAL PROCEDURE FOR ELECTRONIC MODULES

In general, always use the given sequence in the adjustments. The numbers between brackets, e.g.(15) refer to the **Reference drawings**, section 1 unless there is a figure shown on the same page. Installation of the replacement component is generally the reverse of the removal sequence.

WARNING

DISCONNECT POWER CORD PRIOR TO REMOVAL OF ANY COMPONENT

DURING REPAIR WORK IT'S MANDATORY TO USE ANTISTATIC PRECAUTIONS TO PREVENT DAMAGE

ADJUSTING THE NEEDLE GUIDE.

- Insert a clean syringe with the nominal needle length of 51mm.
- Loosen the set screws at the needle guide stops (3) with a 1.3 mm hex key.
- Now the needle guide is no longer under spring load and may be moved up or down until the needle tip is about 0.5mm inside the needle guide (6).
- Fasten the allen hex screws of both the needle guide stops.
- Double check the set position by cautiously pushing up the needle guide until the needle tip may be sensed with the finger. Check the gap below the needle guide stops to be 0.5mm.



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3-4

EXCHANGING THE COMPLETE INJECTION HEAD.

-Turn the instrument off and disconnect the power cord.

-Remove the syringe.

- Push the injection head to the lefthand side of the crossrail.
- -Gently unplug the flatcable that is connected to the injection head.
- -Use an allen hex key to loosen the two screws holding the injection head to the cross-side. The upper- and lower screw can be exposed by moving the syringe carrier by hand up or down so that the hole in the syringe carrier is lined up with one of the screws.
- To mount the replacement injection head proceed in the reverse order.



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EXCHANGING THE FRONT PANEL WITH DISPLAY AND KEYBOARD.

- -Disable the SAMPLER CONTROL PROGRAM on page 1 of the CP-900x GC by entering code 50 on line 12. The CP-9050 keyboard is not locked anymore now.
- -Turn the instrument off and disconnect the power cord.
- Remove the sample tray from the sampler housing.
- Remove the sample tray holders (4 pieces), See section 1 DOC.NO.CRP002 Body assembly item 21.
- Remove the top cover by loosening the 8 Phillips headscrews on both sides and on the top. Loosen also the 3 Allen head screws that fit into the bottom plate.
 - -Remove the injection head. Refer to page 3-4.
 - Disconnect the crossrail flatcable that is plugged into the processor board.
 - -Remove the crossrail (see drawing). Loosen the two Allen head screws of the crossrail leg at the right hand side only (C).
 - -Measure the distance between the left crossrail end and the left leg (D) and between the right crossrail leg and the right end (E).



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3-5-1

- Loosen the Allen head screws at position (A) and (B) in order to remove the legs.

3-5

- Remove the right hand cover by loosening the 3 screws and the 1 at the backcover.
- -Loosen the 3 Phillips screws at the rear of the display (A small screwdriver is required) and the 3 Phillips screws at the front.
- It's now possible to remove the keyboard/display and the flatcable connection.
- Proceed in the reverse order to build the sampler back to his original status.

IMPORTANT NOTE: After exchanging mechanical or electronically parts it's mandatory to set the configuration parameters, see usermanual page 2-8.

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3-5-2

3-6

EXCHANGING THE PROCESSOR BOARD.

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- -Disable the SAMPLER CONTROL PROGRAM on page 1 of the CP-900x GC by entering code 50 on line 12. The CP-9050 keyboard is not locked anymore.
- -Write down all method and system parameters in a table as shown on page 2-21/ 2-22 of the Reference manual (Section 10 of this binder).
- -Turn the instrument off and disconnect the power cord.

NOTE: It is impossible to exchange the processor board while the sampler is installed on the GC! You must take the sampler from the GC first!

-Remove the sample tray.

- -Pull the crossrail with injectionhead to the front of the sampler.
- -Remove the top cover by loosening the 8 phillips headscrews on both sides and on the top. Loosen also the 3 allen head screws that fit into the bottom plate.
- -Disconnect all the plug connections on the processor board. Please write down the colors of the wires coming from the transformer and their position in the green connector.
- -Remove the transformer by loosening the 2 screws in the bottom of the sampler that hold the transformer bracket.
- Push the crossrail back to it's rear position for easier access of the lower screws that fix the processor board. Use a long stem hex wrench to loosen the seven allen hexscrews that hold the board to the black instrument chassis.
- -Carefully lift the board vertically out of the housing.
- -Remove the EPROM by means of a chip puller. Read also the procedure "Exchanging an EPROM" on the next page.
- Insert the EPROM in the corresponding socket of the replacement processor board.

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3-6-1

- To install the replacement board proceed in reverse order through the above mentioned steps. Even though all plugs and sockets are keyed, and therefor prevent mix-up wires, its advisable to double check these connections before turning on the instrument.

IMPORTANT NOTE: After exchanging mechanical or electronically parts it's mandatory to set the configuration parameters, see usermanual page 2-8.

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3-6

3-6-2

Exchanging the crossrail.



- -Disable the SAMPLER CONTROL PROGRAM on page 1 of the CP-9001/2 GC by entering code 50 on line 12. The CP-9050 keyboard is not locked anymore.
- -Turn the instrument off and disconnect the power cord.
- -Remove the injection head. Refer to page 3-4 for more information about the injection head.
- -Disconnect the crossrail flatcable that is plugged into the processor board.
- Loosen the Allen head screws of the crossrail leg at the right hand side only (C).
 - -Carefully measure the distance between the left crossrail end and the left leg (D) and between the right crossrail leg and the right end (E).
 - -Mark those dimensions on the new to mount crossrail and then loosen the Allen head screws at position (A) and (B) in order to remove the legs.
 - To mount the replacement crossrail proceed in reverse order through the steps.

3-7-1

- -After replacing the crossrail special attention should be paid to the alignment of the sampler on the GC. Check the injection positions and the WASH/WASTE vial positions in the same way as done during the first installation.
- -For a better sliding of the injection head you can put some grease *) on both the square sliding bars inside the crossrail.
- *) I.e: DX MOLYKOTE grease, P/N: 084202

IMPORTANT NOTE: After exchanging mechanical or electronically parts it's mandatory to set the configuration parameters, see usermanual page 2-8.

3-7-2

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3-7

Chromatograph Software changes.

The Chrompack CP-9001 GC has two different software versions available:

1)	Revision	1.xx	:	a) b)	940/941 910/911	One shot samplers and Automatic Liquid samplers
2)	Revision	2 . xx	:	a)	940/941	One shot samplers and
				b)	CP-9010	Automatic Liquid sampler
				C)	CP-9050	Automatic Liquid sampler

NOTE :

The Chrompack CP-9002 GC is standard equipped with software to control 940/941 One shot samplers and the CP-9010/9050 Automatic Liquid Samplers. There is no special software required. The ALS-910/911 samplers are no longer supported by this software.

Comparison between Revision 1.xx and Revision 2.xx software.

Five important software modifications have been implemented with the release of software revision 2.xx for the CP-9001:

- a) In case of selecting the CP 9010/9050 sampler in Page 1, Line 12 a new set of Pages 4 and 8 will become visible. In case of selecting a 940/941 sampler Page 4 and 8 are the same as in software revision 1.xx .
- b) Baseline recording/subtraction is not possible anymore. Therefore Page 2, Line 3 and 4 show 'optional'.
- c) Relevant Page 8 parameters (VIAL RANGES/METHODS) plus some extra parameters of Page 7 (AUTOSTART and RESTART TIME) will be saved in EEPROM at the sacrifice of GC method 12. As a consequence only eleven GC methods can be programmed in Page 5.
- d) Revision 2.xx software enables control of the temperature programmable on-column injector (TP-OCI) which is often used in combination with the CP-9010 or the CP-9050 automatic liquid sampler.

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3-8-1

3-8

Name -

e) Programming VLV/EXT 1 or VLV/EXT 2 in a Tx-program will only disable the default START or STOP function of that relay. In software revision 1.xx both default START and STOP functions were disabled in case VLV/EXT 1 and/or VLV/EXT 2 had been programmed in a Tx-program.

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Cable P/N: 738434

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3-10

Standard connection





14-pins T&B flatcable connector

505300/REV 1.00

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3~11

Serial connector (RS232)

9-pins DSUB



Options connector

6-pins T&B flatcable connector

 This connector is reserved to STANG instruments options. Unauthorized use of this connector may result in serious damage of the instrument.

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3-12

PENETRATION DEPTH RANGE FOR SAMPLERS

(CP9010, CP9020/25, CP9050)

	Penetration depth	CP9010 min	(steps) max	CP9020/ min	25(steps) max	CP9050 min) (x0.1mm) max
	Solvent	400	650 0	nvt	nvt	300	547 ®
	Waste	250	450 0	nvt	nvt	260	370 9
~~'	Sample	260	550 ®	1200	1350 0	310	510 0
	Splitter		1782		3022		1277
	Slt/Spltless		1917		3022		1339 0
	TP-OCI		1830		nvt		1309

REMARKS:

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- 400= measured at needlee penetrated 1/3 into vial. 650= measured when needle nearly touched the bottom of the vial.
- 250= measured at needle just passing the "neck" of the vial. 450= measured at needle located halfway the vial.
 - 260= measured at needle just passing the "neck" of the vial.
 550= measured when needle nearly touched the bottom of the vial.
 - This Value should have been 1367 but value 1339 is the maximum depth this sampler can be adjusted.

Recalculation from steps to mm : 0000 15 steps is 1mm 0000

SECTION 4: SCHEMATIC DIAGRAMS.

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_	Page	Title	DOC.NO.	SHEET
-	4-2	MAINBOARD ALS/R	AFP 001-5283	1-3
	4-3	MAINBOARD ALS/R	AFP 001-5283	2-3
	4 - 4	MAINBOARD ALS/R	AFP 001-5283	3 - 3
	4-5	TRANSFORMER CONNECTIONS		
	4 - 6	TRANSFORMER WIRING		
~	4 - 7	CABLE OVERVIEW SAMPLER	ALS104-CP	1-1
	4 - 8	CARRIER ARM (TRAGARM KOMPLETT)	AFP 001-9003	1-1
	4 - 9	INJECTION ARM (INJEKTORKOPF)	AFP 001-9204	1-1
	4-10	DISPLAY AND KEYBOARD	AFP 001-5121	1-1
	4-11	RS232 CABLE	3564900	1-1
	4-12	RS232 CABLE	3564900	1-1
	4-13	DUAL RS232 BOARD V1.06	735647	1-1
	4-14	DUAL RS232 BOARD V1.06	735648	1-1

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NOTE: - There is no actual page numbering on the reference drawings, the nubering as given on this page in the column "PAGE", just indicates in which order the drawings must be inserted.

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	RS-232C CABLE 9000	P ≥	5 3 2 1			
X B.U. 여자. A4 M.M. S 121		Pin 1 2 3 4 5	Color Black Green Brown	Pin 1 2 3 7	COLOR BLACK GREEN BROWN	



	DUA	L RS232 BOARD						DOC NR		735647			
	FORM	AB	CODE	110	NAME	PS	SHEET 1	1 OF	1 OF 1	REV	DATE	BTW NR	PCB REV
								• •		04	14-05-93	5607	1.04
	$\overline{\mathbb{C}}$							05	05-05-94	6048	1.04		
1	CHROMPACK THE NETHERLANDS							nc	06	24-08-94	6180	1.05	
								07	13-01-95	6340	1.06		

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TROUBLE LIST

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Trouble	Reason	Correction			
poor reproducibility	zero volume adjustment is incorrect	picture A			
the syringe-needle breaks or dented	the septum of the vials or the injector is too hard	try another septum or an other syringe (recommendation:10µ1)			
the syringe-plunger dented or is fixed	zero volume adjustment is incorrect	picture A			
the syringe picks up the vials	the position of the needle guide isn't correct to the syringe or: the sleding rods are dirty	picture B			
the sampler skips vials	the high of the vials isn't analogue as the adjusting before	repeat in the config menu the point:vial penetration			
the inj.head position is sideways of the vial position	the inj.head was changed: (x, y-pos) or: the arm was shifted (x-pos) or: the mainboard was changed (y-pos)	x-position: config menu: reference-adjust. y-position: picture C Attention: repeate in the config.menu the inj. position			
the inj.head position is sideways of the wast- and cleanvials	the arm holder was shift	shift the left armholder :picture E			
the y-movement goes strong (check by power off)	check if the arm holder is scratching on the rail	shift the left armholder picture E			
the sampler does not go into the configurations menu when connecting the serial 9 pol. plug	the keyboard is dented or has a short-contact (after a change of the display-keyboard-ass'y)	loose the screws of the display-montage and try it again, if the result is positiv, than put a plastic-washer under the board before fixing of the screws: picture D			
the motor does not stop in the end-position	a sensor does 'nt work specific: the y-sensor:	check all connectors if they have a correct contact (the roundcable connectors on the backside of the unit is to fix very correct, check after a mainboard-change if the index goes into the koppler picture C			
after a repair the motor runs louder than before	the belt is to tight	y- direction: shift the y-motor x- direction: shift the loose pulley z- direction: shift the z- motor			
the display-letters have not enough contrast	the change of the mainboard or the display	turn the little screw on the potentiometer on the mainboard picture C			
The sampler loose the memory	the sampler was without power a long time and the battery is discharged.	the sampler has to stay one day with power on until the battery has more than 3,3 V $$			
¢ als inector-head, with syringe 5 PICTURE A 0 0 0 0 ۵ 00 o 。 00§ 001-9204 ŝ $(\bigcirc$ (\mathbf{O}) <u>B</u> A distance x 0 a b 1. step: distance x=0 (solve screw a and move the pant A upstains) 2. step: mount the syringe 3. step: check the position C (correction: picture B) 4. step: solve screw b and move the part 8 downstairs, fixing the syringe-plunger S. step: power on in config.menu: syringe test (blinking) push $\exists x V$ distance y 6. step: solve screw a and move the part A downstairs to distance y=0, fix screw a ATTENTION: these steps are to do after every syringe-change С









ADJUSTING PROBLEMS WITH THE SAMPLER (CONFIGURATION).

After installation and/of repair or removing the sampler it's necessary to do the sampler configuration, explicit the "INJECTION POSITION" and "REFERENCE ADJUST".

Even after doing those adjustments it can happen that the syringe needle is not in the middle of the sample vial and/or Wash/Waste vial.To solve this problem you must follow the flow-chart, describing the reference and wash/waste adjustment.



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5-3.1

5-3.2



505300/REV 1.01

5-3.2

CHROMPACK Manual Update

Distribution: Service manual CP-9050No.: 041Instrument: CP-9050 AUTOSAMPLERDate: 11 May, 1998Subject: Manual update REV 1.13 into REV 1.67Originator: ANALYTIK-FP JENAEnclosures: pagesAuthor: Jan VosFile: Service Manual CP-9050 (505300)No. of pages: 54

Dear Colleagues,

- -1- [Remove front page, add front page REV 1.67.
- -2- $\sqrt{}$ Remove the pages 1-1 until 1-5 (5 pages) in section 1 and discard, add the new pages.
- -3- Service section 2 completely and discard, add new section 2.
- -4- 💭 Remove page 3-1 in section 3, add page 3-1 REV 1.01
- -5- V Remove page 3-14 in section 3, add page 3-13
- -6- Remove the pages 4-1 until 4-14 (14 pages) in section 4 and discard, add the new pages.
- -7- Remove section 5 completely and discard, add new section 5.
- -8- Please insert this page in section 6

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THE PROFESSIONALS ' CHOICE

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SECTION6 : _____TSB`s ENGINEERING CHANGES, PRODUCT NOTES AND EQUIPMENT RELATED PRODUCTS.

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6-2 TSB'S AND ENGINEERING CHANGES.

6-3 PRODUCT NOTES AND EQUIPMENT RELATED PRODUCTS.

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TSB's and ENGINEERING CHANGES.

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CHROMPACK Manual Update

Distribution: Service manual CP-9050 sampler	No.: 031
Instrument: CP-9050	Date: 31 January 1997
Subject: Update manual from REV. 1.10 to REV. 1.13	Originator: Jan Vos
Enclosures: 3 pages	Author: Jan Vos
Eile: Service Manual CP-9050 (505300)	No_of pages: 4

Dear Colleagues,

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- 1. Remove front page, add front page REV 1.13.
- 2. Remove page 2-7, REV 1.01 in section 2, add REV 1.02.
- 2. Please insert this page in section 6.

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FROM CHROMATOGRAPHERS – FOR CHROMATOGRAPHERS

CHROMPACK Manual Update

Distribution: Service manual CP-9050: 505300	No.: 024
Instrument: CP-9050 autosampler	Date: 24 September 1996
Subject: Update manual from REV. 1.05 to REV. 1.10	Originator: Jan Vos
Enclosures: 5 pages	Author: Jan Vos
File: Service Manual CP-9050 (505300)	No. of pages: 6

Dear Colleagues,

- Remove front page, add front page REV 1.10. 1.
 - Remove the front page REV 1.00 in section 5, add page 1.01. 2.
 - 3. Add section 5-5.
 - 4. Please insert this page in section 6.

SM024-1

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Distribution: Salessup, Servrep	No.: 7924 BTW No.: xxxx
Instrument: CP-9050 autosampler	Date: 24 September 1996
Subject: Configuration	Originator: STANG
Enclosures: None	Author: Jan Vos
File: TSB binder	Total no. of pages: 3

92.74

Dear colleagues,

After installation and/of reparation or removal of the sampler, it is necessary to do the sampler configuration, particularly the "INJECTION POSITION" and "REFERENCE ADJUST". Even after doing these adjustments it may happen that the syringe needle is not in the middle of the sample vial and/or Wash/Waste vial.

To solve this problem you should follow the flow chart, in which the reference and wash/waste adjustments are described.

NOTE:

This information will be included in the service manual 505300 by means of a manual update, which will be issued later.

TSB7924-1





CHROMPACK Manual Update

Distribution: Service manual CP-9050: 505300	No.: 023
Instrument: CP-9050 autosampler	Date: 3 September 1996
Subject: Update manual from REV. 1.00 to REV. 1.05	Originator: Stang
Enclosures: drawing	Author: Jan Vos
File: Service Manual CP-9050 (505300)	No. of pages: 6

Dear Colleagues,

- 1. Remove front page, add front page REV 1.05.
 - 2. Remove DOC.NO. CRP004 in section 1, add the including drawing.
 - 3. Remove pages 2-7, 2-8 and 2-11 in section 2, add the pages with REV 1.01.
 - 4. Please insert this page in section 6.

SM023-1

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Distribution: SE/SM/SR/CP	No.: 7921 BTW No.: xxxx
Instrument: Sampler CP-9050	Date: 2 September 1996
Subject: Spare parts Injector head	Originator: Stang
Enclosures: CRP Injection head	Author: Jan Vos
File: TSB binder, Service manual	Total no. of pages: 2

Dear colleagues,

Inside the injector head you will find two printed circuit boards connected by a "soldered" flat cable. Due to the serviceability exchanging this connection can give problems. Therefore, the supplier has changed this connection in such a way that it is much easier to replace. If the problem is related to these boards you can order the following parts:

1. Injector head board # 2 2. Injector head board # 1 3. Cable P/N 103013 see drawing encircled number 11 P/N 103008 see drawing encircled number 18 P/N 103012 see drawing encircled number 31

Note:

This information and drawing will be included in the service manual 505300 by means of a manual update which will be issued later.



Distribution: SE/SM/SR/CP	No. : 7911 BTW No.: xxxx
Instrument: CP-9000 with CP-9050	Date: 4 June 1996
Subject: Retrofit kit for CP-9050 installation on a CP-9000	Originator: Jürgen Lips
Enclosures: None	Author: Jan Vos
File: TSB binder/Service manual CP-9050	Total no. of pages: 1

Dear colleagues,

The Retrofit kit for the CP-9000 to install a CP-9050 sampler is now available!!

Please order the parts separately:

738668 Included parts CP-9050 719948 Eprom CP-9000 VLV4RDY German 719949 Eprom CP-9000 VLV4RDY English 737732 Cover assy CP-9002 177840 Cable, GC connection to CP-9050

Best regards,

Jan Vos

TSB7911-1

Distribution: SE/SM/SR/CP	No. : 7913 BTW No.: xxxx
Instrument: CP-9050	Date: 4 June 1996
Subject: First release service manual CP-9050 sampler	Orlginator: STANG
Enclosures: None	Author: Jan Vos
File: TSB binder	Total no. of pages: 1

Dear colleagues,

I am pleased to announce that the SERVICE MANUAL for the CP-9050 autosampler is ready now.

This manual is an addition to the users manual and provides detailed and specific technical information about the sampler.

You will notice that the amount of information is given very clearly, and the table of contents will help you to find your specific needs.

It is strongly recommended to study the contents of the manual in detail since it will extend you knowledge of the CP-9050 sampler.

The CP-9050 service manual can be ordered as usual. Please use part number 505300.

I hope that this manual will make your life in the field easier and I wish you a lot of success with your service efforts.

Best regards

Jan Vos

TSB7913-1

6-3

PRODUCT NOTES AND EQUIPMENT RELATED PRODUCTS.

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CP-9050 SAMPLER

AUTOMATIC

LIQUID



	Feature	Specifications
Same -	General	Injection into 2 injection ports (front or rear). Stepper motor driven movements; speed of all movements programmable. Removable sample tray.
	Tray capacity	105 vials (7 rows of 15 vials).
	Sample capacity	2 ml or 0.1 ml (2 ml vial with 0.1 ml insert).
	Syringes	Standard Hamilton 700 series, 5 or 10 μ l.
	Minimum sample volume	\approx 10 µl (0.1 ml insert).
	Injection volume	Programmable in steps of 0.1 μ l up to 5/10 μ l.
	Injection on to	Packed, splitter, splitless, wide bore and temperature programmed or column injection ports.
	Reproducibility	$<$ 1.0% (1 μl n-C12, n-C13 in n-C7, packed column, FID).
	Control of the sampler	The sampler is controlled by a CP-9001/2 GC.
1	Programming (via sampler)	Syringe capacity (5/10 µl). Number of injection ports 2 (front or rear). Vial detection (on/off). Buzzer at start of cycle (on/off). Motor speeds. Sample penetration depth. Solvent penetration depth. Waste penetration depth. Injection depth (separately programmable for both injection ports).
	Programming (via CP-9001/2)	Injection volume $(0 - 5/0 - 10 \ \mu$ l). Number of injections per vial $(1 - 99)$. Number of pre injection solvent clean flushes $(0 - 99)$. Number of pre injection sample clean flushes $(0 - 99)$. Number of fill strokes $(0 - 99)$. Fill volume for fill strokes $(0 - 5/0 - 10 \ \mu$ l). Number of post injection solvent clean flushes $(0 - 99)$. Injection port (front/rear). Air plug after sample $(0 - 5/0 - 10 \ \mu$ l). Sandwich solvent and air plug before sample $(0 - 5/0 - 10 \ \mu$ l).
	505300/REV 1.00	6-3.1

6-3

CP-9050 SAMPLER AUTOMATIC

LIQUID



Feature	Specifications
	Visćosity delay (0 - 9.9 s).
	Plunger speed during filling $(0.1 - 25.5 \ \mu l/s)$.
	Plunger speed during injection (0.1 - 25.5 μ l/s).
	Pre injection delay (0 - 25.5 s).
	Post injection delay $(0 - 25.5 s)$.
	Free programmable vial ranges (1 \sim 7) can be coupled with GC methods (1 \rightarrow 11)
	Priority sample (position $1 - 105$) analyzed with programmer
	GC method $(1 - 11)$.
	Warning limit for plunger stroke counter (0 - 9800).
Status information	Septum counters (front and rear)
(CP-9001/2)	Programmed and actual plunger stroke count.
	Number of sampled vial.
	Actual injection (per vial).
	Active Gu method. Completed wiel range
	completed vial lange.
Method storage capacity	9 sets of sampler parameters (battery backup).
Output control signals	CP-9110 TP-OCI Control (relay).
Power	40 VA max.
Line voltage/Frequency	110 - 240 V, 50 or 60 Hz
Dimensions	
(w x h x d)/weight	60 x 40 x 25 cm/ 8 kg

Specifications are subjects to change. 501749

505300/REV 1.00

6-3.2

SECTION 7 : SPECIAL TOOLS.

7-2 ANTI STATIC MAT

P/N: 737947.

505300/REV 1.00

- A. Material is .016* thick, light blue, static dissipative vinyl. Surface Resistance is 1 x 10¹¹ ohms. Pockets and edges are heat sealed.
- B. Ground cord is permanently riveted to material with banana jack for wrist strap and an additional .395* (10 mm) snap stud for grounding second item if required.
- C. The permanently attached ground cord is a 5' long, 105 strand high flex copper wire with black PVC insulation. OD is .100'. It is terminated with a Mueller No. 95 grounding clip.
- D. & E. Velcro closure kit can be tolded and held in small package for tool box or briefcase. Folds to 8' x 10' package.
 - Hot stamped permanent warning "Always connect both ground cord and wrist strap and test for proper grounding before beginning work around static sensitive components.
 - G. Item 16430 includes one 14840 adjsutable elastic wristband and one 14010 six foot coiled wrist ground cord. (See Drawings 14840 and 14010). Also available as Item 16440 without wristband and wrist cord.
 - H. Two pockets 12.5' and 9.5' heat sealed to hold tools or components.

Item No.	Description
16430	Mat. Ponable, w/Wrist Strap, 20x22
16440	Mat. Portable, No Wrist Strap, 20x22

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8-2 INTRODUCTION.

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- 8-3 PREVENTIVE MAINTENANCE.
- 8-4 MAINTENANCE PROCEDURES.

INTRODUCTION

No.

When properly maintained the CP9050 will provide years of troublefree operation.

To keep the CP9050 operating at its best performance and reliability, it's very important that it receives preventive maintenance.

PREVENTIVE MAINTENANCE

Daily by end user.

- Check septum and liner of injection port. If required replace septum and clean the liner of the injection port.
- Check wash solvent, empty waste vial if required.
- Check the syringe: contamination, plunger movement and needle tip damage.
- Before a first run after several hours of interrupted operation perform 3 5 wash cycles to condition the syringe.

Weekly by end user.

- Check wash solvent and waste vial septa. These septa are part of an effective syringe cleaning concept, replace them regularly to avoid sample cross contamination.
- Check syringe. If required clean the syringe.
 The syringe might have to be replaced every 2 3 months depending on use.

Cleaning of the syringe by end user.

Clean the syringe as recommended by the syringe manufacturer. Blocked needles can be cleaned with appropriate cleaning wires. Dirty glass barrels can be cleaned with suitable solvents as Hamilton Cleaning Solution.

Dirty plungers can be wiped off with a fibre-free cloth. Do not touch the plunger with your hands.

When cleaning doesn't help replace the syringe.

Replacing septa by the end user.

'Low bleed' septa should always be used in packed, splitter, splitless and wide bore injection ports because these produce the lowest background noise.

Two types of high temperature, low bleed septa are recommend; one for temperatures up to 375°C (Chromsep Blue) and the other for temperatures up to 400°C (Chromsep Red).

With the CP 90XX sampler and the point of the syringe in good shape septa need to be <u>replaced after 150-200 injections</u>. In case the needle tip of the syringe has been damaged septa can start leaking very soon.

MAINTENANCE PROCEDURES

The next points of maintenance should carried out every year.

BODY ASSEMBLY:

Remove arm assembly, rear cover, right cover caution: take care of the Keyboard/display cable.

See section 1 DOC.NO. CRP002.

Y AXIS MOTOR	Fixing nuts.
Y AXIS BELT	Tightening of the belt attachment.
	Tightening of the clamp.
	Belt tension.
Y AXIS BEARING	Check rolling smoothness.
	Lubrication (grease).
LOOSE PULLEY	Lubrication (silicon oil)

ARM ASSEMBLY:

See section 1 DOC.NO. CRP003.

ARM HOLDERS Tightening of the fixing screws. BELLOWS Aspect.

Before checking the next parts please remove the injection head and the bellows.

CARRIAGE	ASSEMBLY C	leck bearing and slide.
	Γ	ubrication bearing and slide (grease).
BELT	B	elt tension.
	B	elt clamp tightening.
LOOSE PUI	LEY L	ubrication (silicon oil).

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8-4.1

INJECTION HEAD

See section 1 DOC.NO. CRP004.

GEARS AND RACK	Check bearing and slide. Lubrication (silicon oil).
NEEDLE GUIDE SPRINGS	Check for smoothness. Lubrication (silicon oil).
VIAL SENSOR REFLECTOR	Adjust if necessary. Fixing screws.
NEEDLE GUIDE STOPS	Adjust if necessary. Fixing screws.
Remove the Injector head cover for checking.	
BELT	Belt tension. Belt clamp fixing screw.
LOOSE PULLEY	Lubrication (silicon oil).
FLEXSTRIP CABLE	Visible inspection.
HEAD LOCKING	Visible inspection. Efficiency.

505300/REV 1.00 8-4.2

PRINCIPLE(S) OF OPERATION.

ere offer and a manual state of the