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Environmental Information and Monitoring Programme (EIMP) Air Quality Monitoring Component

Mission 16 Report

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EIMP Environmental Information and Monitoring Programme

NILU Norwegian Institute for Air Research

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1 Introduction

The 16th mission to Egypt covered the period october 24th to november 11th 1999. The mission was undertaken by senior scientist Ove Hermansen in cooperation with Bjarne Sivertsen. Of the work programme activities A-I, the following tasks were covered:

C: Procurement

Specifications for additional equipment needs and consumables.

E: Training

Introduce new techniques for sampling and analysis of volatile organic compounds (VOC) and on the job training of the staff at Centre for Environmental Hazards Mitigation (CEHM) at the Cairo University, Giza.

F: QA/QC

Introduce new SOPs for VOC sampling and analysis to be used in the EIMP Air Quality Manual.

2 E Training

2.1 General

The main purpose of this mission was to introduce a new technique for analysis of volatile organic compounds (VOC) in air samples, and to do on the job training of the staff at Centre for Environmental Hazards Mitigation (CEHM) at the Cairo University, Giza. Due to major changes in staff at the laboratory during the visit, it was not possible to complete the training program according to the original plan.

The analysis method for VOCs is relatively complicated and full attention from personnel with broad experience from gas chromatography is essential to complete the training within the period of three weeks.

The gas chromatograph expert left the laboratory to start in a new job in the second week of the mission. The training was started again with another chemist, who left the laboratory after the second week. A new chemist with some experience in gas chromatography was engaged by the laboratory management during the third week. The three remaining days of the training visit was not sufficient to complete the training. The new chemist will also need some training on the gas chromatograph before being introduced to the new analysis techniques.

2.2 Training for instrument operation and maintenance, VOC-sampling

Principle and operation of the VOC-samplers were performed with people from the chemical laboratory as well as people from the air quality laboratory at CEHM. SOPs for sampling and an instruction list can be found in appendix B and D.

Descriptions of the sampling equipment can be found in appendixes F, G and H.

2.3 Training for instrument operation and maintenance, VOC-analysis

Training on the analysis techniques was delayed because of a malfunction of the gas delivery system for the gas chromatography. Principles and necessary preparations was performed with the chemists responsible for the operation of the instrument. Unfortunately, both chemists left the laboratory during the visit. Theory and principles were presented for the new chemist at the end of the visit. The laboratory will arrange an instrument course for this chemist to be prepared for participating in a new training visit later.
Preliminary SOP for VOC analysis can be found in appendix C.

2.4 On-the-job training

On-the-job training was performed on the VOC samplers. One sampler was used for sampling in Cairo, and the sample was brought back to the laboratory. It was not possible to complete the on-the-job training in the chemical laboratory due to the changes in staff during this visit (as explained in chapter 2.1).

2.5 Chemical analysis

During the second week of the visit, it became apparent that the laboratory did not have the standard mixtures needed to perform the VOC-analysis. The purge and trap unit for the gas chromatograph is constructed for water and soil analysis and need some technical modifications before it can be used for air samples. Some extra equipment are needed for these modifications (appendix I and J).
Because of this, chemical analysis of VOCs in air samples could not be started during the visit.

2.6 Work description

25. October

Visit at the CEHM laboratory, Cairo University.

Meeting with Dr. Ahmed Soliman Abd Ellah and Bjarne Sivertsen.

Discussing NO_2-data, VOC-samplers´ connection to sample tubes, constant temperature/pressure chamber for conditioning of filters.

Dr. Ahmed Soliman Abd Ellah gave a presentation of the laboratory, equipment, activities and personnel.

Introduced to Hany Nabil, responsible for operating the gas chromatograph and the one to undergo training of the VOC-method.

VOC-sampler:

Making an overview of principles and operation of the sampler together with Hany Nabil. Sampler could not be charged without an adapter for the power cable (american plug). Hany went out and bought an adapter at the market.

Prepared the sampler for programming, tested valves and canister vacuum.

VOC-gas chromatograph:

The purge & trap unit connected to the GC has been used for semi-volatiles in soil and water samples. It is not built for air samples.

Tested the capacity of the compressor delivering air to the N_2-generator. N_2 used as carrier gas, should be He.

26. October

Cairo University:

N_2-generator defect. Serviceman will be contacted.

Meeting with Dr. Ahmed Soliman Abd Ellah and Ahmed Sayd.

Programmed and prepared the sampler together with Ahmed Sayd. Went with him to Ghemoryia Street station to locate the sampler for sampling. Sampler might have a leakage problem, have to check the solenoid valve. All samplers will be checked for leakage.

Back to the laboratory, discussed the working principles for the purge & trap unit with Hany Nabil. Have to check min. temperature of the cold trap and what kind of desorbent in use.

Shows out that there are probably no reference standards in the laboratory. This must be checked out with Dr. Ahmed Soliman.

Went back to the office at EEAA.
Met Ulla Lund, discussed some interlaboratory-results from the CEHM lab.
Will do some checking on method, blind values and calculation of samples of biological origin.
Sent a message to Rolf Dreiem, asking him to bring a copy of the EMEP-report.

27 October
Cairo University:
Nobody present at arrival. Hany arrived after 1½ hour. N_2-generator still defect.
Part to be changed by the supplier during the day.
Since Soliman was not present and nobody present at the air lab, I was not able to check out the standard gases.
Went back to the EEAA-office to work with the SOP for VOC-sampling.
Short talk at the office with Dr. Tarek El Araby.

28 October
Cairo University:
N_2-generator still defect. Soliman has arranged to get a N_2-cylinder instead.
Unpacked and prepared the remaining VOC-samplers. Programmed all timers. All samplers set up for leakage testing after the weekend. Solenoid valves will be checked after charging batteries. Cables and adapters needed for charging will be obtained on saturday (30. October).
Disassembled the Purge & Trap unit together with Hany Nabil. Examinated function and principles, studied the couplings. The unit is not prepared for light hydrocarbons. Some technical modifications are needed, involving the use of an external coolant. CO_2-cylinder and couplings must be purchased. No manuals for the unit present in the laboratory. Dr. Ahmed Soliman Abd Ellah will contact the supplier to get the manuals. Installed the PC-software for computer-control of the unit.
Dr. Ahmed Soliman Abd Ellah sent a fax to check cost of He-cylinders.
Ref. standards are available at the Air lab. according to Dr. Ahmed Soliman Abd Ellah. When I asked Ahmed Sayd, I was told that there were no such standards at the air lab. Must be checked again with to Dr. Ahmed Soliman Abd Ellah next day, since he had left the laboratory.

31. October
Vacuum pump arrived at EEAA. Some paperwork has to be done before it vcan be sent to the laboratory.
Cairo university:
No cables or adapters present yet. Still not possible to charge the batteries and check the solenoid valves.
Not able to check the reference standards with Dr. Ahmed Soliman Abd Ellah since he was not present. The staff at the air lab. did not know any such standards, but some single gases for qualitative analysis and semi quantitative analysis should be possible to get.
Went back to the office at EEAA to work on SOPs, since no work could be done with the samplers.

1. November
Cairo University:
Brought the vacuum pump to CEHM.

Was going to continue training with Hany Nabil on the VOC-method, but he was not present.
Unpacked the vacuum pump and checked all parts. Vacuum-couplings not compatible with the connections. Dr. Ahmed Soliman Abd Ellah contacted a man from the workshop, explained and made drawings to him so he could make a connection in the workshop.
Connectors/adapters and cables for all samplers present in the lab. Samplers connected for charging.
Worked with the purge & trap unit again, this time with Dr. Ahmed Soliman Abd Ellah. Discussed the needs for couplings and tubing to make the necessary modifications. Dr. Ahmed Soliman Abd Ellah will ask Hany Nabil to get all the parts.

2. November
Cairo University:
Delivered 20 passive samplers and filters that Rolf Dreiem brought from NILU, to CEHM.
Hany Nabil still not present. Later in the day it turned out that Mr. Nabil had got a new job at EEAA and had already left CEHM. It was decided that the training would have to start over again, now with Dr. Ahmed Soliman Abd Ellah who again will train the person to fill mr. Nabils position in the future. This is far from an ideal solution since Dr. Ahmed Soliman Abd Ellah is a busy man being in charge of the chemistry laboratory as well as having his lectures at the university.
VOC-samplers still not charged. Checked all couplings visually and with a volt-meter. Extension cable defect. Repaired the cable and reconnected all samplers for charging until next day.
Connected the vacuum pump and the vacuum meter. Set up the tubing to check the vacuum system. The man from the workshop arrived with the connection he had made from the day before. Excellent work! Canisters can now be vacuumised in the laboratory.
Discussed the needs for couplings and tubing necessary for the flushing and cleaning of the canisters.
Performed more training on the purge & trap unit with Dr. Ahmed Soliman Abd Ellah. Discussing principles for technical modifications and use of external coolant.
Back at the office at EEAA:
Made a complete list of tubing and couplings needed for the VOC-method, with illustrations. Found two local representatives in Cairo.

3. November
Got some tube connections from Rolf Dreiem that was brought to the university.
Cairo University:
Small talk with Estelle Bjoernestad about the QA/QC work while waiting for the lab staff to arrive.
Dr. Ahmed Soliman Abd Ellah busy for the rest of the day with audit of the laboratory.
Finished the connections on the vacuum pump. Run a leakage test. Looked promising. The new connection from the workshop seems to need some time under vacuum for degassing.
Did some tests on the samplers. Charging voltage seems to be OK, but batteries will not charge.

Went back to the office to write a memo on status on the VOC-training.

4. November
Cairo University:
Started the vacuum pump again to perform some degassing while waiting for the laboratory staff to arrive.
Still no tube connectors ordered. Dr. Ahmed Soliman Abd Ellah would have this finished by Saturday.
Dr. Gehad Genidy would look after the samplers so that they will be charged during the weekend.
Went back to the office. Flemmings last day of work on the project.

7. november
Cairo University:
Nobody present at the laboratory to work on the VOC-method. Unable to check status on procurements.
Did some more testing on the vacuum pump and the VOC samplers. Two of the batteries now partially charged.
Wrote a note for Dr. Ahmed Soliman Abd Ellah, stressing that we had to show some more progress very soon.
Went back to the office after waiting for three hours.
Started to write on the Mission report.

8. november
Cairo University:
Met Dr. Gehad Genidy in the laboratory. He ensured that he would be available the whole day and that training could start immediately. Since Dr. Genidy had not been taking part in the training earlier, this ment that training would have to start from the beginning again. I was told that Mohammed Abd El Maugood also would take part in the training. Mr. Maugood later denied this. Director Dr. Jehia Abdel Hady entered the laboratory, presenting Dr. Hanaa Salem that also would be available during the rest of my visit. Dir. Dr. Hady kindly asked me to address him directly if any needs or problems.
Held a meeting with Dr. Gehad Genidy and Dr. Hanaa Salem to discuss further progress of the VOC-activities. Emphasized the problems of manning and missing parts for the instrument. It was suggested that training could start again next day. Explained that the three remaining days were not enough to undergo three weeks of training, especially since there were no one left in the laboratory who could operate the gas chromatograph.
Dr. Hanaa Salem will inform Dir. Dr. Hady about the need to inform EIMP that actions will be taken to solve the problems of manning for the training. It was decided that next day would be spent going through the basic principles for VOC-sampling and analysis.
Went back to the office.
A letter at my desk from Dr. Ahmed Soliman Abd Ellah informed me that he had not been in charge of the laboratory at CEHM since 4. November.
Had some discussions about the new situation with colleges in the office, and later with Mohammed Fathy.
Did some writing on the Mission report.

9. November

Cairo university:

Met Dr. Gehad Genidy who introduced me to Mr. Sayed Badawy who will be responsible for gas chromatographic analysis from now on. Mr. Badawy have some experience from GC/MS analysis, but will need training to operate the gas chromatograph in the CEHM laboratory. Went through principles, function and operation of the VOC-sampler again, this time with Dr. Genidy and Mr. Badawy.

Asked Yassin Fathi about a more powerful battery charger. He contacted a person at the geo-lab who had one. He did not want to use the charger due to danger of explotion. Yassin Fathi told that all VOC-sampling stations have 220 V power connection. Agreed that the samplers should be connected to the powerline while operated.

Discussed the cleaning procedure for canisters using the vacuum pump, with Dr. Genidy and Mr. Badawy.

Sayed Badawy showed me the laboratory for the GC/MS and X-ray diffraction. The MS is normally operated without using the gas chromatograph.

Met Dr. Ahmed Soliman Abd Ellah who informed me about his new position as a consultant to CEHM and others. He will take part in training of new staff in the laboratory.

Explained principle and function of the Purge & Trap unit to Dr Genidy and Mr. Badawy. Discussed differences of Purge & Trap techniques contra techniques for canister samples. Explained the technical modifications needed for using the P&T with air samples.

Showed the GC-software and the P&T control-software to Sayed. Emphasised the importance of training and practicing on the gas chromatograph before next training visit. Laboratory staff made a search for manuals for the GC-software as well for the P&T unit. It was agreed that these manuals must be delivered by the supplier.

Back to EEAA to write on the report.

Made a list of actions to be carried out and items to be purchased before next training visit.

10. November

Cairo University:

Gave the list of necessary items and actions to Dr. Tarek El Araby and Dr. Gehad Genidy

Checked the VOC samplers again, two more batteries were OK. Discussed charging problems with Rolf Dreiem.

Discussed the SOPs with Sayed Badawy. Emphasized the importance of training on the GC as part of the preparations before next visit. Mr. Badawy discussed this with Dr. Amany G Taher who suggested that it could be arranged with mr. Hany Nabil to do the training.

Dr Amany introduced me to Dr. Mohamed I El Anbaawy, at present responsible for the Chemistry laboratory. He gave a brief orientation about the changes in the laboratory. Discussed some necessary preparations before next visit. Dr. Anbaawy told that Mr. Hany would be contacted to arrange the training on the gas chromatograph.

Had a talk with Shereen Aly Mohamed, responsible for the laboratory's database. She is performing the sample registration and the reporting of final data from the lab.

Went back to EEAA to do some more preparations on the SOP's.

11. November

Went with Rolf Dreiem to have a look at the storage room.
Cairo University:
Brought a SOP for the VOC analysis method to Sayed Badawy.
Checked the version no.s of the software for the gas chromatograph and the Purge & Trap unit.
Disconnected all VOC-samplers and put them aside for storing.
Agreed with Sayed Badawy to get a dust cover for the pump and vacuum gauge.
Got three out of four CVs for new lab. personell to bring back to the laboratory.
Went back to the office to finish the mission report.

3 F QA/QC

SOPs were made for cleaning the sampling canisters and for handling the VOC samplers. SOPs for the analysis methods should be developed as part of the training programme. Since the training programme could not be completed, the SOPs for analysis should be considered as preliminary procedures.

3.1 QC and calibration routines

Calibration routines are described in appendix C, Preliminary SOP for determination of light hydrocarbons in air, analysis.

3.2 Sampling programme

The VOC sampling programme is described in Mission 15 report, appendix B.

Appendix A

People and colleagues

People and colleagues

List of names of people and colleagues met at the CEHM

Name	Position	Location
Dr. Jehia Abdel Hady	Director of CEHM	CEHM
Dr. Tarek Mohamed El-Araby	Manager of Air Quality lab.	CEHM
Prof. Dr. Ahmed Soliman Abd Ellah	Laboratory manager until November 4th 1999	Has left CEHM
Prof. Dr. Mohamed I. El-Anbaawy	Temporary laboratory manager	CEHM
Dr. Gehad Genidy	Ass. laboratory manager	CEHM
Hany Nabil	Former GC-expert	Has left CEHM
Sayed Badawy	New GC-expert	CEHM
Moustafa Morad		Has left CEHM
Mohammed Abd El Maugood	IC-expert	CEHM
Shereen Aly Mohamed	Resp. sample registration and reporting	CEHM
Dr. Hesham Mohamed El Araby	Resp. QA/QC	CEHM
Dr. Amany G, Taher		CEHM
Dr. Hanaa Salem		CEHM

Appendix B

Preliminary SOP for determination of light hydrocarbons in air, sampling

Determination of light hydrocarbons in air, sampling

Principle

A cleaned steel canister is filled with an air sampler by the use of a programmable air sampler. The canister is brought to a laboratory and analysed.

Sampling equipment

The sample cylinders are 6 litre "Summa" polished stainless steel canisters.

Sampling procedure

1. Can is evacuated
2. Remove swagelock-end-cap
3. Connect purge-tee and tighten
4. Programme the timer
5. Pressurize purge-tee
   Vent by opening valve B
   (minimum 10 times)
6. Open valve A - pressurize can to 15 psig
7. Pressurize can to max. pressure
8. Close valve A and switch off pump
9. Remove purge-tee and replace swagelock

Please use a pencil to fill in the label.

Please do not use force to tighten the green handle of the shut-off valve. Normal use of thumb and forefinger is sufficient!!

Cleaning of canisters before the first use

(1)evacuate to a pressure of 10^{-7} mbar 24 hours, ambient temperature.
(2)fill with 10 µl water and purified helium 24 hours, 1 bar
(3)evacuate to 1 mbar and fill with helium 5 times
(4)humidify with 10 µl water, evacuate to 1 mbar

Can is evacuated
Remove swagelock-end-cap
Connect purge-tee and tighten
Switch on pump
Pressurize purge-tee
    Vent by opening valve B
    (minimum 10 times)
Open valve A - pressurize can to 15 psig
    Vent by opening valve B
    (minimum 5 times)
Pressurize can to max. pressure (about 40 psig)

Close valve A and switch off pump
Remove purge-tee and replace swagelock

Please use a pencil to fill in the label.

Please do not use force to tighten the green handle of the shut-off valve.
Normal use of thumb and forefinger is sufficient!!

After step (1) a one-hour leak-test is performed. The canister shut-off valve is closed and no detectable increase of pressure should occur on the 10^{-7} mbar scale.

Blank runs of canisters should not show a single signal of more than 2000 µVs (30 ppt ethane or 10 ppt benzene).

From the 200 canisters we bought for the EMEP-program, 7 had a significant high level of C_6 hydrocarbons and chlorinated solvents. Those bottles were cleaned with methanol, acetone and water and cleaned as shown above. The evaporation in step (1) is performed with 70 °C instead of ambient temperature. The cleaning of a used bottle is done by 6 to 24 hours evacuation at 10^{-7} mbar and 50 °C. (Turbomolecular pump from Pfeiffer Balzers modified at NILU to allow simultaneous cleaning of 6 bottles).

Commercial supply

Steel canisters:
Prof. R. Rasmussen, Oregon Graduate Center, Biospheric Research Cooperation.

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Appendix C

Preliminary SOP for determination of light hydrocarbons in air, analysis

Determination of light hydrocarbons, analysis

The analytical method described below is by gas chromatography and FID.

A brief description of the set-up and procedures are given below. The analysis is complicated and should preferably be learned by training.

Instrumentation

VOC air analyser

A drying-tube with backflush and heating option has been added between valve V3 and V4. (10 cm teflon-tube 1/4" with 20 micron steel-sinters on both ends, filled with 3 cm of K_2CO_3 on both ends and 4 cm NaOH on support in the middle.)

The first trap is a 1/4" glass-tube packed with Carbosieve, Carbotrap and Carbotrap C - the refocussing trap a 10 cm piece of coate fused silica (Poraplot U).

Gas chromatography

Al_2O_3/KCl PLOT column, 50 m, 0.32 i.d. (Chrompack).

Hewlett Packard PC based chromatographic data handling system.

Gases and materials

All gases are grade 4 or better. They are further cleaned by passage through two different 200 ml cylinders filled with activated charcoal and molecular sieve. This is sufficient for the FID gases, but not for the helium as carrier gas. Helium is further cleaned in a 1/4" steel trap filled with molecular sieve at liquid nitrogen temperature. All tubes which are in contact with the sample are premium grade stainless steel or teflon (drying tube).

Analytical Procedure

Table 1:Settings of temperatures, gases, flow-directions and gas-flows in the different steps of an analytical cycle of the thermodesorption unit.

Step	Trap 1	Gas	Direction	Flow	Trap 2	Gas	Time
I	270 °C	He	Back	20 ml	120 °C	He	26 min
II	Ambient	He	Back	20 ml	Ambient	He	60 min
III	-30	He	Back	20 ml	Ambient	He	6 min
IV	-30	Sample	Front	25 ml	Ambient	He	14 min
V	-30	Sample	Front	25 ml	-180	He	6 min
VI	-30	He	Front	5 ml	-180	He	1 min
VII	250	He + HC	Back	8 ml	-180	He + HC	8 min

The consume of liquid CO_2 is about 2 liters per sample.

A chromatogram is given in Figure 1.

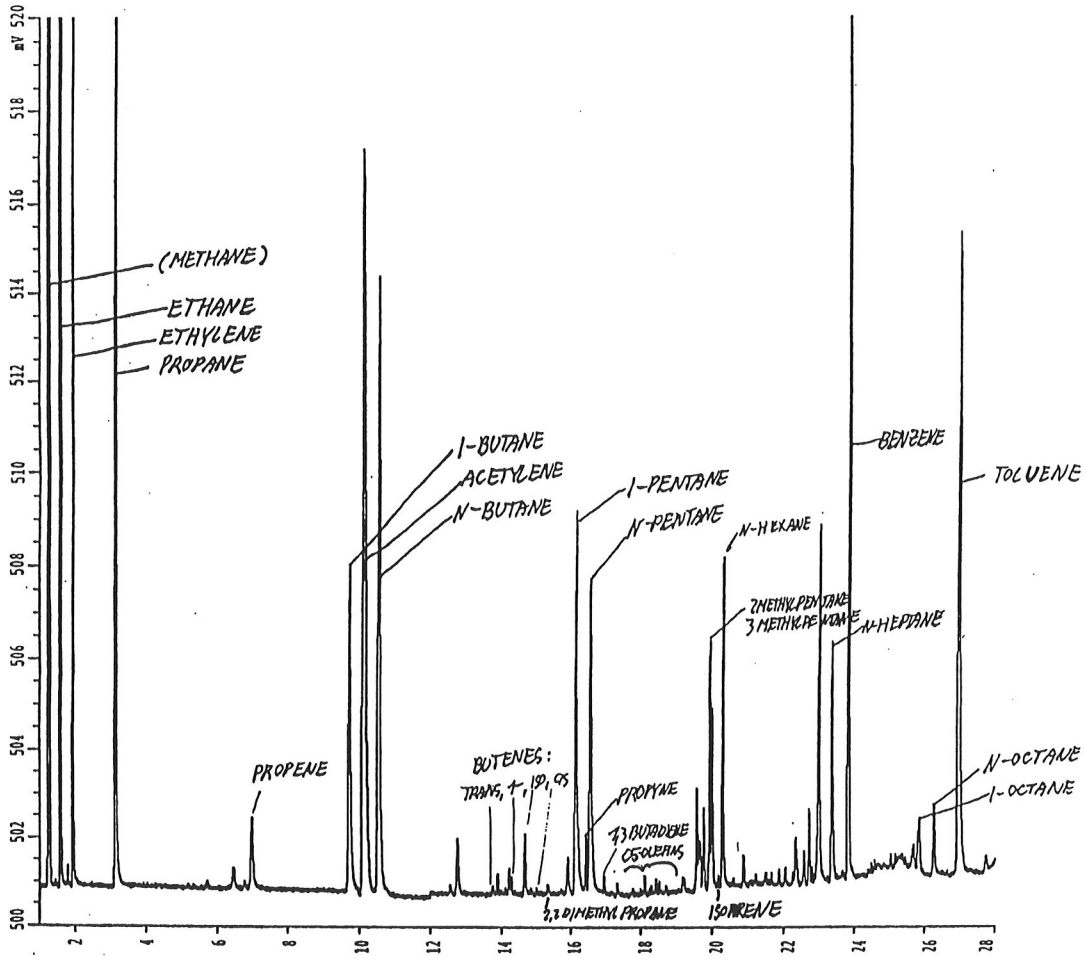

Figure 1: Chromatogram

Quality assurance

Calibration

Calibration-gas-mixtures from NIST (USA) should be used to determine the carbon-number-response for the FID.

The standard-gas-mixture is analysed with the same conditions as a sample (same pressure, flowrate, volume and time period) connected to one of the ten ports of the stream-selector. The absolute precision of the read-out of the massflow-controller is therefore not a critical point in calculating concentrations.

The standard gas is connected to port 1 of the multistream-selector and therefore always the first and thereafter every tenth injected sample.

All hydrocarbon peaks in the chromatograms are identified and integrated by hand.

For identification purposes ppm standard-gas-mixtures from Scotty or self-made standards are injected via a home-made injection system.

Maintenance
The blank values of the carrier gas are checked by direct connection to one of the ports of the multiposition-valve. A good performance of carrier-gas cleaning is of fundamental importance for a reliable analysis of the very volatile hydrocarbons.

The blank values of the instrument especially of the traps have to be controlled quite often. High boiling compounds on the traps may decompose and give higher background noise of several compounds.

A need for change of the drying-agents is indicated by bad chromatographic performance. On a routine basis the tube is renewed every week.

A record of the raw-area of the standard-runs is very useful to judge the instruments behaviour over longer time.

All gas-flows need to be checked quite often.

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Appendix D

Instructions for VOC sampling

VOC sampling

Sample no:_____
Filled in at the laboratory

Station	Sampler	Sampling	
Station no.: St. name:	Installed t.o.d.: _____:_____ date:	Start ① t.o.d.: _____:_____ date:	Canister pressure at start: ③
Sampler no.: Canister no.:	Collected t.o.d.: _____:_____ date:	End ② t.o.d.: _____:_____ date:	Canister pressure at end: ④

1. Before going to the station:

- Ensure that battery has been charged and that the
- Check that the time and day of the digital timer are correct
- Check that program is OK
- Fill in date and time for start and end of sampling ①&②
- Check that all valves #1, #2 and #3 are closed
- Check that the solenoid valve works properly

1.Select the **MANUAL** position on the timer
2.Push the **ON/OFF** button three-four times to see if the solenoid valve reacts.
IMPORTANT: When finished, ensure that the valve is in the **OFF** position
3.Select the **AUTO** position on the timer

2. At the station, before sampling:

- Check the vacuum pressure

1.Open the canister valve (#1) completely (counterclockwise)
2.Open the pressure gauge valve (#2)
3.Read the pressure and fill in the value ③
4.Close the pressure gauge valve (#2) (clockwise)

- Install the sampler in the correct place
- Mount the sample tube to the sample inlet (front inlet on the left side)

3. Collecting the VOC sampler at the station after sampling

- Check the vacuum pressure

1.Open the canister valve (#1) completely (counterclockwise)
2.Open the pressure gauge valve (#2)
3.Read the pressure and fill in the value ④
4.Close the pressure gauge valve (#2) (clockwise)

- Close the canister valve (#1) completely (clockwise)
- Bring the VOC-sampler to the laboratory

Appendix E

List of equipment used

List of equipment used for the VOC method

VOC sampler:

Thermo Environmental Instruments Volatile Organic Canister Sampler model 640

Gas chromatograph

Hewlett Packard 5890 series II with FID
Software: HP Chemstation Rev. A.04.01

Purge & Trap unit:

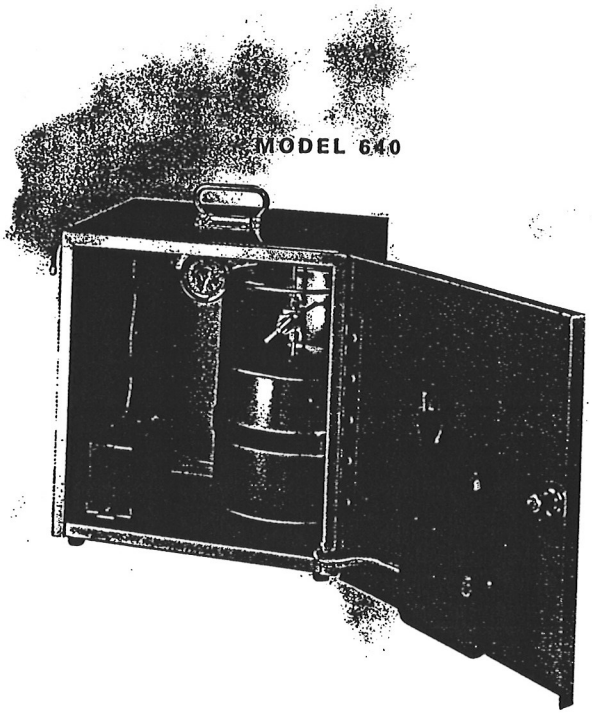
Hewlett Packard 7695 P&T
Software: Purge & Trap Control ver. A.01.01

Appendix F

Thermo Environmental Instruments VOC sampler

Thermo Environmental Instruments Inc.

VOLATILE ORGANIC CANISTER SAMPLER



- Twenty-four hour sample; approximately three liters under negative pressure
- Sampling is initiated and terminated at programmed time(s)
- Evacuated canister fills as pressure equalizes
- Completely D/C powered and portable
- Optional critical orifices for sample periods of 1, 3 or 8 hours

The Thermo Environmental Instruments Inc. Volatile Organic Canister Sampler (VOCS) is a portable, automatic sampler. It offers a quick and accurate method for sampling trace-level volatile organic compounds in ambient air. The sampler uses an evacuated canister, programmable timer and a latching solenoid valve. The VOCS is convenient for sampling at hazardous waste sites, leaking underground tanks or for high-rise structures, among other uses.

The VOCS is lightweight and easily transported from one site to another. The user only has to set the timer and the unit operates automatically. The valve automatically latches open at the programmed time and air is pushed through the unit by the atmospheric pressure. The critical flow orifice sized to provide an appropriate samp flow. At the end of the sample cycl the valve latches closed and the samp is ready for laboratory analysis.

The SUMMA® passivated six-lit stainless-steel canister is fabricated t the highest standards of cleanline with specially prepared interior surfac treated by the SUMMA® polishin process. Only Nupro® stainless-ste valves are used in the T.E.I. VOC ensuring an organic-free sample train

The components of the sampler ar available separately for purposes manual grab sampling or to me unique customer needs.

Intermediate Flow Sampler Specifications

SYSTEM SPECIFICATIONS

Flow Rate:	Volumetric standard 2.1 cm^3/min (3l /24 hr).
Shelter:	Clear anodized aluminum, 2 mm (0.080 in) thick.
Flow Controller:	Critical orifice.
Canister:	Six liter, stainless steel, SUMMA® polished.
Sample Train:	Stainless steel.
Vacuum Gauge:	0-30 in Hg.
Charging Circuit:	120 VAC/60 Hz or 220 VAC/50 Hz.
Power:	No A/C power required for sampling, completely D/C powered.
Digital Programmable Timer:	Seven-day solid-state digital programmable timer with 20 set points to permit custom scheduling sampling periods
Assembled Dimensions:	41 cm (16 in - Height) x 38.8 cm (15 1/4 in Width) x 30.5 cm (12 in Depth) - 0.0443 m^3 (1.56 ft^3).
Shipping Dimensions:	51 cm (20 in Height) x 51 cm (20 in Width) x 63.8 cm (25 in Depth) - 0.16 m^3 (5.79 ft^3).
Net Weight/Shipping Weight:	13 kg (28.5 lb) / 17.5 kg (38.5 lb).

OPTIONS

Critical Orifice:	Fixed flow rate orifices available: 2.1 cm^3/min (24-hour sample period); 6.3 cm^3/min (8-hour sample period); 16.7 cm^3/min (3-hour sample period); 50.0 cm^3/min (1-hour sample period)

Thermo Environmental Instruments Inc.

8 West Forge Parkway, Franklin, MA 02038 USA
Telephone: 508-520-0430 • Fax: 508-520-1460

Appendix G

VOC sampler model 640 instruction manual

Thermo Environmental Instruments Inc.
8 West Forge Parkway
Franklin, Ma. 02038

MODEL 640
INSTRUCTION MANUAL

Thermo Environmental Instruments Inc.

Model 640

Volatile Organic Canister Sampler (VOCS)

Instruction Manual

Thermo Environmental Instruments Inc.

TABLE OF CONTENTS

II. System Description and Operating Procedures:

A detailed drawing of the Wedding and Associates' VOCS system is shown in Figure 1. The system is completely portable and must remain in this configuration during both sampling and analysis. The sampler, with a pre-evacuated canister, is taken to the field site. During all sample collection, and transportation to and from the site, valve #3 must remain closed (fully clockwise). The digital timer programming procedure is given in the section titled "Programming Instructions: Digital Timer".

The VOCS is placed at the desired sampling site, and the protective cap of the sample tube inlet is removed. First, the operator should verify that the canister is under adequate vacuum. The latching solenoid valve must be in the closed position. To verify that the latching solenoid valve is closed, place the **MODE SELECTOR** switch of the Digital Programmable Timer in the Manual position. Press the "ON/OFF" button of the keypad and verify that "ON" is displayed. Allow approximately 5 s to elapse, then press the "ON/OFF" button and verify that "OFF" is displayed.

NOTE: The vacuum audit is achieved by opening valves #1 and #2 (fully counter-clockwise). The vacuum gauge should read approximately 0.9 of the local barometric pressure. (For example, if the barometric pressure is 30 in Hg, the vacuum gauge should read roughly 27 in Hg to ensure that a full 2.5 L of sample will be collected, and that the flow remains at a constant value during the entire 24-h sampling period.) When the vacuum audit is completed, fully close valves #1 and #2 (fully clockwise).

The sampler is set up for subsequent operation by opening valve #1 (fully counter-clockwise). At the programmed time on the digital timer, sampling is initiated by activation of the latching solenoid to the "ON" position. Flow then proceeds through the sample tube, the sampling module, the latching solenoid, the orifice, and finally into the canister through valve #1. The sampler will operate at a preset flow rate that will remain constant for up to a 24-hr. period (the user may elect to operate for less than 24 hr.). When the sampler is retrieved, re-audit the canister vacuum by opening valve #2 (counter-clockwise).

IV. System Description and Operating Procedures:

The vacuum reading should be approximately 0.5 of the local barometric pressure. (If the barometric pressure is 30 in Hg, the gauge should now read about 15 in Hg.) This value will ensure that the flow rate has been constant throughout the sampling period. The entire VOCS is then returned to the laboratory for two purposes: first, to allow analysis of the collected sample; and second, to recharge the battery, which will only power the timer and control system for approximately 3 days without recharging. To recharge, connect the male plug to a source of AC power, and allow 14 hours for full recharge.

Analysis is initiated via valve #3 and the evacuation/analysis port (Figure 1). Remove the protective cap and connect this port to the analysis system (e. g., a gas chromatograph), or to a pressurized vessel containing humidified zero-grade air, using suitable tubing. Note that the canister is still under roughly 0.5 atmosphere of vacuum. To increase canister pressure, use the zero-grade air, and open valves #1 and #3 (counter-clockwise) until the canister is charged to atmospheric pressure, or to some other pressure suitable for the analysis system. Then re- close valves #1 and #3 (clockwise).

To proceed with the analysis, connect the evacuation/analysis port to the analysis system, if this has not already been done, re-open valves #1 and #3 (counter-clockwise), and set the flow rate to that required by the analysis system. Once the analysis is complete, close valve #3 (clockwise) and open valve #2 (counter-clockwise) for a final check of the residual pressure in the canister. Then close valves #1 and #2 (clockwise).

To prepare the system for the next sampling period, the battery should be recharged as noted above, and the system purged and evacuated. Connect the evacuation/analysis port to a source of humidified zero-grade air under pressure. Admit this air into the canister by opening valves #1 and #3 (counter-clockwise) until a suitable pressure is reached, then allow the pressure to drop to atmospheric (a three-way valve is convenient for this purpose). Re-pressurize the canister and again allow it to return to atmospheric pressure.

System Description and Operating Procedures Continued:

After a suitable number of repetitions of this cycle, reconnect the sampler to the analysis system and verify that the canister is free of the expected analyzes. Close valves #1 and #3 (clockwise).

Connect the evacuation/sampling port to a suitable vacuum pump, and re-open valves #1 and #3 (counter-clockwise). Then open valve #2 (counter-clockwise). Continue evacuation until the vacuum gauge reads at least 0.9 of atmospheric pressure (i. e., a residual pressure of 0.1 atmosphere). Once this level of vacuum is reached, close valve #3, then #1, then #2 (fully clockwise). Then turn off the vacuum pump and disconnect the tubing from the evacuation/analysis port, and replace the protective cap. The system is now ready for the next sampling cycle.

V. Programming Instructions: Digital Timer

A. Definitions:

1. Mode Selector Switch has Three Settings:

•"MANUAL" - The automatic operation is bypassed while the switch is in this position. Load can be manually switched by the "ON" or "OFF" button.

•"AUTO" - Normal position for automatic operation. Load can be manually switched "ON" or "OFF". The timer will resume automatic operation beginning with the next set point.

•"PROGRAM" - To set or modify the clock or the program.

2. Reset Button:

•Resets the microprocessor before programming, or erases the entire program.

3. Clock/Output Switch:

•Used in setting day and time or to view the output condition.

VI. Programming Instructions:

4. On/Off Button:

•Manually turns load on and off, and enters programming steps for "ON" or "OFF" set points.

5. Prepare for Programming:

•The total program may include up to 28 events over a seven (7) day period. No two events can occur simultaneously. The program will repeat any previously programmed day of the same number.

•List all desired ON and OFF set points.

6. Reset Time Switch:

•Press recessed RESET switch to reset microprocessor and remove all previous set points.

7. To Set Time and Day of Week:

•Place three position selector in PROGRAM.

•Place two position selector in CLK.

•Press HOUR, MINUTE and DAY button to select current time and day (day 1 is Sunday, day 2 Monday, etc.). Note clock is 12 hour AM/PM repeating.

8. To Program Set Points:

•Place three position selector in PROGRAM.

•Place two position selector in OUTPUT.

•Press HOUR and MINUTE buttons to select set point time.

•Press DAY button to select day which ON or OFF set point is to occur.

•Press ON/OFF button to select ON or OFF set points.

•Press ENTER to enter selected set point time for the day selected.

•To repeat the same set point for other day(s), use DAY button to select the next day the set point is to occur, then press ENTER.

Programming Instructions Continued:

•Repeat for as many days as required.

•Repeat above procedure for all remaining set points required.

9. **To Review Program Set Points:**

•Place three position selector in PROGRAM.

•Place two position selector in OUTPUT.

•Display will show all zeros if there are no set points programmed. OFF and the day the ON/OFF switching operation is to occur. The display shows the first set point in chronological order beginning with Sunday (day 1).

•Press ENTER to review all remaining set points in chronological sequence.

•The display shows "End" after last set point is displayed.

10. **To Add or Delete Set Points:**

•To add set point time, press HOUR and/or MINUTE to change time displayed. Then press ENTER. Set point is now added.

•To delete a set point, press ON/OFF two times (display will show all dashes).

*FOR AUTOMATIC OPERATION, THREE POSITION SWITCH MUST BE IN "AUTO."

VII.

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3. Kestin, J., and Glass, J.S., "The Rapid Discharge of Gases from Vessels" Aircraft Engineering, Vol. 23, 1951, pp. 300-304.

4. Progelhof, R.C., and Owczarek, J.A., "The Rapid Discharge of a Gas from a Cylindrical Vessel through and Orifice" ASME Paper No. 63-WA-10, 1963.

5. Progelhof, R.C., and Owczarek, J.A., "The Rapid Discharge of a Gas from a Cylindrical Vessel through a Nozzle" AIAA Journal, Vol. 1, No. 9, 1963, pp. 2182-2184.

6. Progelhof, R.C., "Determination of the Mass of Gas in a Rapidly Discharging Vessel" AIAA Journal, Vol. 2, No. 1, 1964, pp. 137-139.

7. Addy, A., Walker, B.J., "Rapid Discharging of a Vessel through a Nozzle or an Orifice" ASME Publication, December 29, 1971.

Appendix H

VOC timer instruction manual

INTERMATIC®

ET170 SERIES

INCLUDING MODELS:

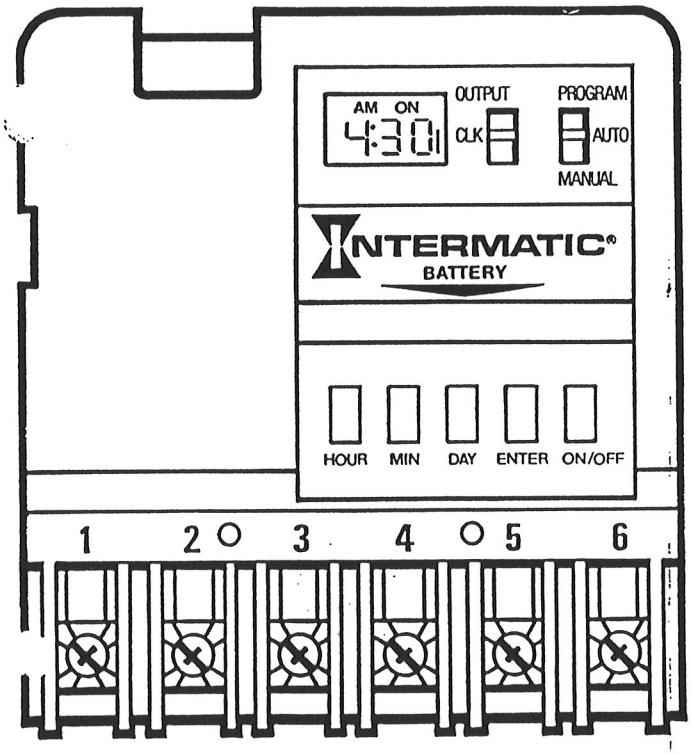
ET171C (SPST) 120V Suppl
ET173C (DPST) 120V Suppl
ET174C (DPST) 240V Suppl

Electronic 7 - Day Time Switches

With Battery powered Clock Operation

OWNER/INSTALLER INSTRUCTION MANUAL

ATTENTION: READ CAREFULLY BEFORE ATTEMPTING TO INSTALL YOUR INTERMATIC TIME SWITCH. FAILURE TO COMPLY WITH INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE! RETAIN FOR FUTURE REFERENCE.



Description

The Intermatic Electronic 7-Day Time Switch automatically switches loads according to a preset weekly schedule with to-the-minute accuracy. This time switch is designed to directly switch inductive or resistive loads up to 30 amps at 24, 120 or 240 volts and to switch tungsten or ballast loads up to the time switch rating. For use as a control timer in applications requiring 7-day load control such as lighting, heating, air conditioning systems, pumps, etcetera. Up to 20 (10 ON/10 OFF or any combination) set points (EVENTS) can be preset. These set points can be programmed for any or all 7 days to provide for up to 140 set points each week. Independent 7 day programming provides complete flexibility for applications where load switching differs each day of the week. The program can be overridden by selecting the MANUAL position.

Specifications

CLOCK VOLTAGE: 120 V.A.C., 60 Hz. (ET171C & ET173C)
240 V.A.C., 60 Hz. (ET174C)
POWER CONSUMPTION: 3.0 Watts Max. (ET171C)
5.0 Watts Max. (ET173C & ET174C)
CONTACT CONFIGURATION: SPST model ET171C DPST model ET173C.
SWITCH RATING: (Per Pole for ET173C & ET174C)

- 30 Amps Inductive/Resistive, 24/120/240 V.A.C., 60 Hz.
- 20 Amps Resistive - 28 V.D.C.,
- 1 H.P. 120 V. A.C., 60 Hz.
- 2 H.P. 240 V.A.C., 60 Hz.
- 5 Amps. Tungsten, 120/240 V.A.C., 60 Hz.
- 5 Amps Ballast 277 V.A.C., 60 Hz.

SET POINTS (EVENTS): 20 total (10 ON/10 OFF or any combination) daily
Up to 140 (70 ON/70 OFF or any combination) weekly.
BATTERY POWERED CLOCK OPERATION: 3 Years minimum (AA industrial grade alkaline supplied with time switch)
MIN. "ON" or "OFF" TIME: 1 minute.
MAX. "ON" or "OFF" TIME: days 23 hours 59 minutes.
SHIPPING WEIGHT: 2.5 Lbs. (1.1 Kg)
CASE: Drawn steel; 7-3/4" (19.7 cm) high, 5" (12.7 cm) wide, 3" (7.6 cm) deep; gray finish w/lockable spring hasp.
KNOCKOUTS: Combination 1/2 - 3/4" (one on back and each side, two on bottom).
WIRE SIZE: AWG #10 through #18.

General Safety Information

WARNING: DISCONNECT THE POWER TO THE TIME SWITCH AND THE LOADS BEFORE INSTALLING THIS TIME SWITCH.

1. Mount the time switch in the desired location using the three mounting holes which are provided. Mount the time switch at eye level, if possible, providing sufficient

Installation

room to the left of the enclosure for the cover to swing open fully. (See Figure #1 and Figure #2). The time switch mechanism does not need to be removed from the enclosure to mount the time switch since the top mounting hole is a slotted type mounting hole. Secure a screw or other fastener at eye level. The head of the screw or fastener should be slightly larger than the narrow portion of the slotted hole to ensure that the time switch is securely held in place. The remaining two mounting holes are accessible without removing the time switch mechanism and will provide secure and permanent mounting of the time switch.

2. If you do remove the mechanism, refer to Figure #1 and remove the mechanism from the case by depressing the catch at the top of the case and pulling out. CAUTION: DO NOT TOUCH THE CIRCUIT BOARD COMPONENTS SINCE STATIC DISCHARGE COULD DAMAGE THE MICROPROCESSOR.
3. Replace the mechanism in the case if it has been removed.
4. Lift the left side of the insulator off of the retaining post and pivot it up and away to expose the terminal strip.
5. Strip the supply and load wires by removing 1/2 inch of insulation. DO NOT USE ALUMINUM WIRE. (See igure #3). Insert the wire ends under the proper erminal plates and tighten the screws firmly. Use AWG #10 through #18. Connect ground wire to grounding terminal at bottom of case.
6. Replace the plastic insulator.
7. Be sure that the battery is functioning properly. This can be checked by making sure the display is visible. If the display has scrambled information, press the RESET switch and hold for three to five seconds. Note that the battery is factory installed and can easily be replaced without removing the time switch mechanism or field wiring. Simply press in and downward (in the direction of the arrow) on the battery cover which is identified with the word "Battery". It is recommended that the battery be replaced with a "AA" industrial grade alkaline cell at two to three year intervals as part of the normal time switch maintenance observing battery polarity markings when installing. No other maintenance is required.
8. Place the selector switches in the AUTO and CLK position.
9. Reapply power to the time switch.
10. Press the reset switch for three to five seconds. The display will now show 12:00 A.M. and day #1. Note that the days of the week are numbered 1 through 7 for Sunday through Saturday. The timer is now ready for programming. Refer to the chart which follows and enter the scheduled events (set points) required. Assign each of the 20 set points (EVENTS) entered to whichever day or days of the week you wish an ON or OFF operation to occur. Simply put a check in the box that applies. Note that programming two off times in sequence, allows the user to manually turn a load on, after normal working hours for example, and allows the time switch to automatically turn the load back off. This is an energy saving feature which allows loads to be manually switched on after normal occupancy times, but provides for automatic off switching of these loads. Note that several off times in a row can be programmed to provide several "auto off" times.

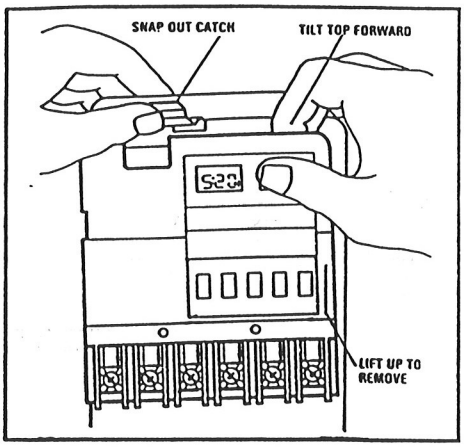


Fig. #1

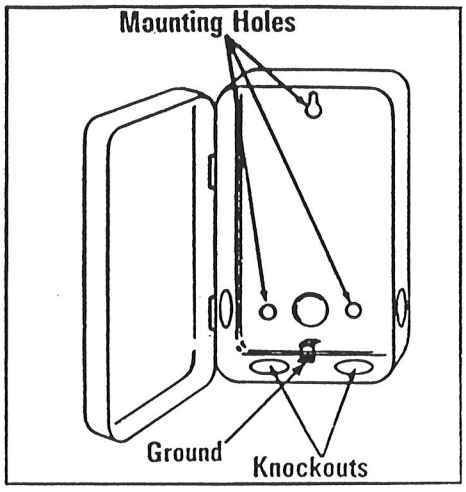


Fig. #2

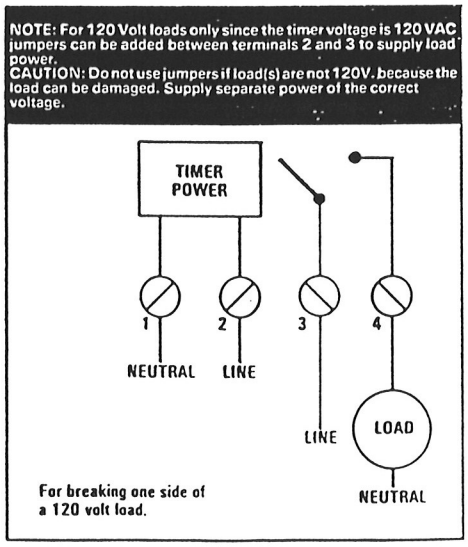


Fig. #3a
ET171C

		DAY							
EVENT#	SWITCHING TIMES	"ON" OR "OFF" OPERATION	SUN. 1	MON. 2	TUES. 3	WED. 4	THUR. 5	FRI. 6	SAT. 7
1									
2									
3									
4									
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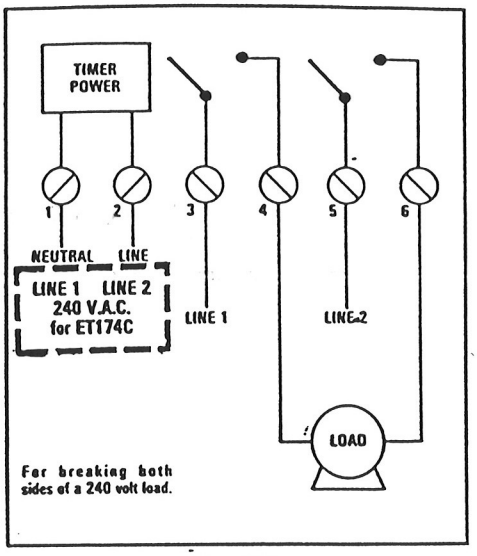

Fig. #3b
ET173C
ET174C

Programming Steps

Refer to programming instructions in this manual or the abbreviated instructions on time switch door label and note the following:

- The three position slide switch is used to select automatic operation (AUTO), manual operation (MANUAL) or to select programming (PROGRAM). The MANUAL position can be used to temporarily override the program. Under normal operation, the selector should be in the AUTO mode. The MANUAL mode maintains the program but prevents the loads from automatically switching. **FOR A PROGRAM TO SWITCH LOADS AT THE CORRECT TIMES, THE SELECTOR SWITCH MUST BE IN THE AUTO POSITION.**
- The two position selector switch is used to select programming for the time of day and day of week (CLK) or select programming for the switching times (OUTPUT).
- The RESET switch is used only prior to programming to reset the microprocessor or to ease all programmed set points.
- By holding the hour and/or minute buttons depressed, you can achieve a fast roll of the displayed time. This is useful when setting the time of day or programming set points (EVENTS).
- UP to 10 ON and 10 OFF set points or any combination up to 20 set points (EVENTS) can be programmed and can be assigned to any or all 7 days for up to a maximum of 140 set points each week.
- The load can be manually switched ON or OFF at any time if the selector switch is in either the MANUAL or AUTO mode by pressing the ON/OFF button. The two position selector MUST BE IN OUTPUT MODE.
- Pressing the ON/OFF button two times in the PROGRAM mode causes the event time displayed to be removed from the program. (only if the set point event has already been entered). The display will show "-:---".

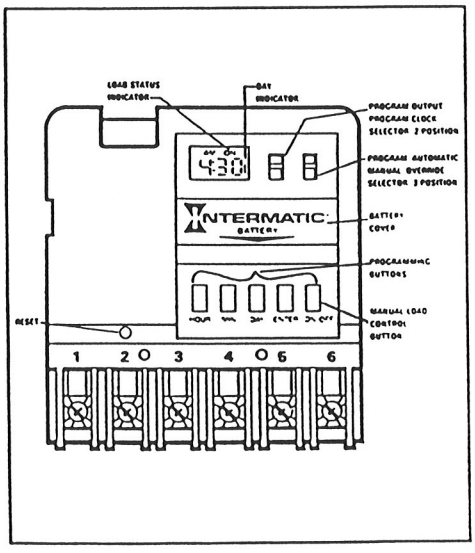

Fig. #4

Programming

RESET TIME SWITCH: Press the recessed RESET switch to reset the microprocessor and delete any set point information which has been programmed. NOTE: DO NOT press RESET after programming has begun or you will loose all of your program information.

TO SET TIME AND DAY OF WEEK: Place the three position selector in PROGRAM and the two position selector in CLK mode. Press the HOUR, MINUTE and DAY buttons individually to select the current time of day (12 hour AM/PM repeating) and the day of the week. Day 1 is Sunday, day 2 is Monday, etc.

TO PROGRAM SET POINTS: Select PROGRAM mode with the three position selector and OUTPUT mode with the two position selector. Press the HOUR and MINUTE buttons separately to program the first set point time desired. Press the DAY button to select the day the event is to

occur. Press the ON/OFF button to select an ON or OFF set point. Press the ENTER button to enter that set point for the selected day. Note that the ON or OFF indicator stops flashing only after pressing ENTER. If this set point is to occur for other days of the week, simply press the DAY button to select the next day then ENTER. Repeat for any addi ıal days. Note that this allows you to utilize one set poir. ⁄ any or all days of the week. A total of 20 set points are provided allowing up to 140 operations each week (20 set points X 7 days =140 operations). Repeat this procedure for as many of the 20 set points as required. Attempts to enter additional set points (beyond 20) will cause "F: UL" to appear in the display.

TO OVERRIDE PROGRAM: Program can be overridden at any time by selecting the MANUAL position. Program set points will be maintained but will not operate the controlled load(s) automatically.

TO REVIEW PROGRAM SET POINTS: Place the three position selector in the PROGRAM mode. Place the two position selector in OUTPUT mode. The display will show all zeros if there are no set points programmed or will show the first programmed set point and a programmed time with an ON or OFF depending on whether the time which appears is an ON set point or an OFF set point. Pressing the ENTER button will advance the display to the next set point in chronological order. In other words, the next set point on Sunday or the set point on Monday (day 2) will appear. Pressing the ENTER first button after the last set point has been displayed will cause "E:nd" to appear in the display. Further operation of the ENTER button will repeat the review cycle.

TO ADD OR DELETE SET POINTS: Press the HOUR and/or MINUTE buttons to change the time displayed to show the new time you wish to add, then press the ENTER pushbutton. To remove a programmed time, press the ON/OFF button two times. When this is done, the set point displayed will be removed and the display will show all dashes.

Trouble Shooting

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Time switch has no display.	Battery not properly installed or defective.	Check battery and replace if necessary.
Display shows scrambled or erratic times.	Time switch has not been reset. Electrical noise is interfering with the operation of the microprocessor.	Press the recessed reset switch and hold for approximately 5 seconds. Electrical noise interference is highly unlikely since the electronic circuitry and the power supply are completely isolated. The installation of surge suppressors (metal oxide varistors-MOVS) across terminals 3/4 (model ET173C and ET174C across terminals 3/4 & 5/6) will help to reduce electrical noise generated at the switching contacts.
Load does not switch at-programmed time.	PROGRAM/MANUAL/AUTO selector not in AUTO position. Time switch is programmed incorrectly. Power has not been supplied to the load. Note that the Neutral and Line terminals #1 & 2 (Line 1 and Line 2 are terminals for model ET174C) are isolated from the output terminals. NOTE: For 120 volt loads only since the timer voltage is 120 VA jumpers can be added between terminals 2 and 3 to supply load power. CAUTION: Do not use jumpers if load(s) are not 120V. because the load can be damaged. Supply separate power of the correct voltage.	Be sure PROGRAM/MANUAL/AUTO is in the AUTO position. Check program - place the Program Selector in the PROGRAM mode and press the Event button to review all twenty possible Events. Be sure power is applied to the line terminals #3 (#3 and #5 for ET173C and ET174C) in order to power the load. Note that the output contacts isolated from the timer power (terminals 1 and 2). This allows the timer to switch various loads from 24 volts through 277 volts.

FULL ONE YEAR WARRANTY

If within one (1) year from the date of purchase, this product fails due to a defect in material or workmanship, Intermatic Incorporated will repair or replace it free of charge.

The warranty does not apply to: (a) damage caused by accident, abuse, mishandling, dropping; (b) units which have been subject to unauthorized repair, opened, taken apart; (c) units not used in accordance with directions; (d) damages exceeding the cost of the product. Some states do not allow a limitation of damages, so the foregoing limitation may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

This warranty service is available by either (a) returning the product to the dealer from whom the unit was purchased, or (b) mailing postage prepaid to the nearest authorized service station listed. Please be sure to wrap the product securely when mailing to avoid damage. This warranty is made by: Intermatic Incorporated, Intermatic Plaza, Spring Grove, Illinois 60081- 9698.

AUTHORIZED SERVICE STATION
INTERMATIC INCORPORATED, 4720 West Montrose Avenue, Chicago, Illinois 60041.

INTERMATIC INCORPORATED
SPRING GROVE, ILLINOIS 60081 - 9698

158ET8245

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Appendix I

Price quote from Etico Gas

الشركة الشرقية للغازات
THE EASTERN GASES CO.,
(د٠م٠ ماجد المجريسي وشركاه)

ايتيكو جاس
ETICO GAS

صادر ٣١٤٢/أج/م٠م
القاهرة في ١٩٩٩/١٠/٢٨

السادة / جامعة القاهرة
مركز الحد من المخاطر البيئية
عناية السيد الدكتور / أحمد سليمان عبد اللاه
فاكس رقم ٥٧١٩٦٨٧

تحيه طيبه وبعد ،

نتشرف بأن نرفق طيه عرضنا بتوريد عدد (٢) اسطوانة غاز هيليوم عالى النقاوه .

مرفق طيه الـ SAFETY DATA SHEET الخاصة بالغاز.

برجاء أن يحوز عرضنا قبولكم وأن توافونا بأمر التوريد حتى يتسنى لنا عمل اللازم .

وتفضلوا بقبول فائق الاحترام ،،،،

مدير عام الشركة
د٠م٠ ماجد المجريسى

المقر المؤقت: ٤٨ حسين واصف - دقى - جيزة
ص٠ب: ٢٠٣ أورمان - جيزة
فاكس: ٣٣٥١٣٤١

العنوان: مدينة العاشر من رمضان
المنطقة الصناعية A1

الشركة الشرقية للغازات — **ايتيكو جاس**

THE EASTERN GASES CO., — **ETICO GAS**

(د٠م٠ ماجد المجريسى وشركاه)

عرض أسعار

القاهرة فى : ٢٨ / ١٠ / ١٩٩٩ — الموضوع : أسطوانات غاز هيليوم عالى النقاوة

رقم : 356/APL/SGD/NPC

السادة : جامعة القاهرة - مركز الحد من المخاطر البيئية

البند	الكمية	البيان	سعر الوحدة		السعر الإجمالى	
			جنيه	قرش	جنيه	قرش
١	٢	أسطوانة مملوءة بغاز الهيليوم عالى النقاوة ، نقاوة ٩٩,٩٩٦ %، حجم الغاز فى الأسطوانة ٦,٥ متر مكعب، وتحت ضغط ١٥٠ بار السعة المائية للأسطوانة ٤٧ لتر.				
		سعر الغاز	١١٠٠	--	٢٢٠٠	-
		سعر الأسطوانة	٤٥٠	--	٩٠٠	-
					-------	----
		الإجمالى			٣١٠٠	-
		ضريبة المبيعات بواقع ١٠٪ Tax			٣١٠	-

		اجمالى سعر الغاز : " فقط ثلاثة آلاف وأربعمائة وعشرة جنيها مصريا لا غير.			٣٤١٠	

		ملحوظة :				
		الغاز من إنتاج شركة AIR PRODUCTS.				

بطاقة ضريبية رقم ٩٢٦- ملف ضريبى ٥/٤٢٦/٢٥٤/٤/٣٥ - مأمورية ضرائب العاشر من رمضان .

الشركة معفاة من ضريبة الأرباح التجارية والصناعية .

مدة التوريد : فورا بضاعة حاضرة بمخازننا.

شروط الدفع : نقدا او بشيك مرفق به شهادة مختومة بقيمة الخصومات والاستقطاعات ان وجدت مقابل التسليم .

شروط التسليم : بمخازن الشركة .

مدة سريان العرض : عرضنا ساري لمدة ١٠ يوما من تاريخة .

ونحن نأمل ان يحوز عرضنا قبولكم ،،،،

وتفضلوا بقبول فائق الاحترام ،،،،

مدير عام الشركة

د ماجد المجريسى

المقر المؤقت: ١٤ حسين واصف - دقى - جيزة

ص.ب: ٣٠٣ أورمان - جيزة

فاكس : ٣٣٥١٣٤١

العنوان: مدينة العاشر من رمضان

المنطقة الصناعية A1

AIR PRODUCTS

Gas data and safety sheet
Helium He

Substance Identification No (UN No)	1046
Hazard Identification No	
Hazchem Code	2T

The following information is for the guidance of customers using gaseous or liquid helium. All users must know and understand the properties of helium before handling it.

Helium is available commercially, either as a gas or a cryogenic liquid, at high purity levels. As gas it is supplied either in standard steel cylinders at pressures up to 200 bar or in bulk quantities by mobile tube trailers. In liquid form it is transported and stored in special vacuum insulated tanks.

Specification

	Gaseous helium (Industrial grade)	Gaseous helium (High purity grade)	Gaseous helium (Special purity grades)
Helium % by volume	>99.993	>99.996	Highest 99.9998
Oxygen ppm by volume	<10	< 5	Lowest 0.2
Nitrogen ppm by volume	<20	<10	Lowest 0.4
Water ppm by volume	<3	<1	Lowest 0.4
Typical analyses (ppm by volume)			
Oxygen	5	2	Contact your local sales office for details on above and other impurities
Water	<1	<1	
Nitrogen	<20	<10	
Hydrogen	3	3	
Neon	5	5	
Carbon dioxide	<0.5*	<0.5*	
Carbon monoxide	<1*	<1*	
Nitrous oxide	<0.1*	<0.1*	
Methane	<0.5*	<0.5*	
Total Hydrocarbons	<1*	<1*	

*Limits of detection by standard analytical techniques used.

Physical properties

Molecular weight		4.003
Boiling point	@1 atm	—268.96°C
Melting point	@29.64 atm (lambda point)	—271.24°C
Vapour density	@b.pt., 1 atm	14.5 g/litre
Density of gas	@20°C, 1 atm	0.166 g/litre
Density of liquid	@b.pt., 1 atm	124.9 g/litre
Specific gravity of gas	(Air = 1)@20°C	0.138
Critical temperature		—267.9°C
Critical pressure		1.27 bar (g)
Solubility in water	@10°C, 1 atm	0.000161 wt%
Latent heat of vaporisation	@1 atm	20.91 kJ/kg

الشركة الشرقية للغازات — **ايتيكو جاس**

THE EASTERN GASES CO., — **ETICO GAS**

(د٠م٠ ماجد المجريسى وشركاه)

عرض أسعار

القاهرة فى : ٣٠ / ١٠ / ١٩٩٩ — الموضوع : منظم أسطوانات غاز هيليوم عالى النقاوة

رقم : 358/AIR PRODUCTS/II

السادة : جامعة القاهرة – مركز الحد من المخاطر البيئية

عناية : السيد الدكتور / أحمد سليمان عبد اللاه

البند	الكمية	البيان	سعر الوحدة		السعر الإجمالى	
			جنيه	قرش	جنيه	قرش
	١	**PRESSURE REGULATOR R - 253** **Two stage - high purity suitable for use with Helium cylinder .** **Max inlet pressure : 210 Bar G** **Max outlet preassure : 10.8 Bar G**	٢٢٠٠	–	٢٢٠٠	–
		ضريبة المبيعات بواقع ١٠٪			٢٢٠	–
		اجمالى السعر " فقط وقدره ألفان وأربعمائة وعشرون جنيها مصريا لاغير"			٢٤٢٠	–
		ملحوظة: المنظم من إنتاج شركة AIR PRODUCTS				

بطاقة ضريبية رقم ٩٢٦–ملف ضريبى ٥/٤٢٦/٢٥٤/٤/٣٥ – مأمورية ضرائب العاشر من رمضان ،

الشركة معفاة من ضريبة الأرباح التجارية والصناعية ،

مدة التوريد : ٣–٦ أسبوع من استلام امر التوريد

شروط الدفع : نقدا او بشيك مرفق به شهادة مختومة بقيمة الخصومات والاستقطاعات ان وجدت مقابل التسليم .

شروط التسليم : بمخازن الشركة .

مدة سريان العرض : عرضنا ساري لمدة ١٥ يوما من تاريخة .

ونحن نأمل ان يحوز عرضنا قبولكم ،،،،

وتفضلوا بقبول فائق الاحترام ،،،،

مدير عام الشركة

د.م ماجد المجريسى

المقر المؤقت: ١٤ حسين واصف – دقى – جيزة

ص.ب: ٢٠٣ أورمان – جيزة

فاكس: ٣٣٥١٣٤١

العنوان: مدينة العاشر من رمضان

المنطقة الصناعية A1

Appendix J

Memos

Environmental Information
and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: **EIMP EEAA**
Joergen Simonsen
Mohamed Fathy
Ahmed A. El Seoud
From: Ove Hermansen, NILU
Date: 25 October 1999

Use of helium for VOC-analysis

The gas chromatograph installed at CEHM to be used for the analysis of VOC-samples uses nitrogen as carrier gas. Using helium instead of nitrogen will greatly improve the data quality by enhancing the chromatographic resolution of the different VOC compounds.

Before changing from nitrogen to helium, two special gas-cylinders must be acquired at a price of about 1-2000 LE (will be checked). The consumption of He-gas will be very low, maximum two cylinders a year. Cylinders can be refilled when empty at a much lower price.

EIMP

Environmental Information
and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: **EIMP EEAA**
Joergen Simonsen
Mohamed Fathy
Ahmed A. El Seoud
From: **Ove Hermansen**
Date: **3 November 1999**

Status VOC-method

Staff:
Most of the time at CEHM has been spent for training of the person responsible for the gas chromatograph, Mr. Hany Nabil. He left CEHM yesterday for a new job at EEAA. There are no other people in the laboratory with similar experience in the field of gas chromatography. The training will be repeated with Dr. Ahmed Soliman Abd Ellah, who will be in charge of the training of new personnel.

VOC-analysis:
The purge & trap unit in the laboratory is constructed for analysis of soil and water samples, not for air samples. It should be possible however to use it for canister samples after doing some technical modifications to the instrument. This involves the use of an external coolant (CO_2-cylinder) and some extra couplings and tubing must be procured. The staff at CEHM is looking for suppliers and prices.

Calibration:
The laboratory does not have any of the standard gases needed for calibration. Certified standards must be procured. This will take some time. Until then, pure gases must be obtained for qualitative detection and semi-quantitative determination.

VOC-samplers:
After finally getting all cables and adapters needed to charge the samplers batteries, it turned out that four out of five samplers needs new batteries. Testing and control of the samplers can be done but they can not be used for sampling until the old batteries are replaced. Suppliers and prices are being looked for by the staff at CEHM.

EIMP
Environmental Information
and Monitoring Programme
EEAA - Danida - COWI
30 Misr-Helwan Str. Maadi, Cairo, Egypt
Tel: 202 525 6442, Fax: 202 525 6467

Memo

To: **Joergen Simonsen**
Haytham Ahmed
Dr. Tarek El Araby CEHM
Dr. Gehad Genidy CEHM
From: Ove Hermansen
Date: 10 November 1999

VOC-method, necessary preparations before training:

At least two persons with the experience needed to operate the gas chromatograph must be available all time during next visit. They must have a good understanding of the operation of the gas chromatograph since all the time for training activities have to focus on the VOC-method.

Necessary items:

Calibration gases:
ppm hydrocarbon mixtures (C_2-C_6) can be ordered from Scotty gases

Tubing and connectors:
Provided by Swagelok or Hoke (Gyrolok) (attachment: Tube connectors and adapters)

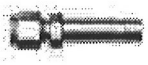
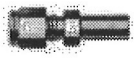
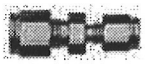
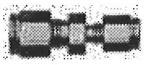
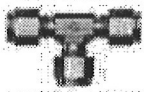
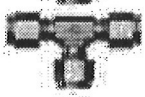
Purge & Trap unit:
External coolant, CO_2-cylinder with regulator
Manuals for the P&T (may be somewhere in the laboratory, if not; should be provided by the local supplier)

Gas chromatograph:
Helium cylinders & regulator (attachment: offer from ETICO GAS)
Chromatographic column (Al_2O_3/KCl PLOT coloumn, 50 m, 0.32 mm ID) provided by Chrompack. (Local distributor: Group Engineering & Scientific Systems., PO Box 1024, Al Maadi – Cairo)
Manuals for the GC-software (may be somewhere in the laboratory, if not; should be provided by the local supplier)

VOC-samplers:
Extension cables for all samplers
All batteries not working must be replaced

Tube connectors and adapters

quantity:

6		Reducer $^1/_{16}$" - $^1/_4$" inch
6		Reducer $^1/_{16}$" - $^1/_8$" inch
4		Reducer $^1/_8$" - $^1/_4$" inch
4		Reducing union $^1/_4$" - $^1/_{16}$" inch
4		Reducing union $^1/_4$" - $^1/_8$" inch
4		Reducing union $^1/_8$" - $^1/_{16}$" inch
4		Union $^1/_4$"
3		Tee $^1/_4$"
3		Tee $^1/_8$"

10		Nuts & Ferrules $^1/_{16}$"
10		Nuts & Ferrules $^1/_8$"
10		Nuts & Ferrules $^1/_4$"

5 m	Stainless steel tubing $^1/_{16}$"
5 m	Stainless steel tubing $^1/_8$"
5 m	Stainless steel tubing $^1/_4$"

1	Valve, type Nupro SS 4H (same as valves in the VOC-samplers).
1	Pressure gauge, ÷1 - 3 atm

Swagelok fittings:
Cairo Valve & Fitting Ltd.
78 Amar Ebn Yasser St.
Heliopolis, Cairo
Egypt
(20) (2) 249-1701 Phone
(20) (2) 249-1701 Fax

Hoke, Gyrolok fittings:
Target Engineering
14 Street 286, New Maadi beside El Garayer Square
Cairo
Egypt
Telephone #: +202-516-7711
Fax # : +202-516-4044
Contact: Abdelmomen Helmy, Executive Director
E-Mail:
targeng@ie-eg.com

Norwegian Institute for Air Research (NILU)
P.O. Box 100, N-2027 Kjeller – Norway

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Environmental Information and Monitoring Programme (EIMP). Air Quality Monitoring Component Mission 16 Report	Bjarne Sivertsen
	NILU PROJECT NO. O-96013
AUTHOR(S) Ove Hermansen and Bjarne Sivertsen	CLASSIFICATION * A
	CONTRACT REF.

REPORT PREPARED FOR:
COWI/EIMP
EEAA Building, 30 Misr Helwan Street
Maadi, Cairo, Egypt

ABSTRACT
The main purpose of mission 16 was to introduce a new technique for analysis of volatile organic compounds (VOC) in air samples, and to do on the job training of the staff at Centre for Environmental Hazards Mitigation (CEHM) at the Cairo University, Giza. Due to major changes in staff at the laboratory during the visit, it was not possible to complete the training program according to the original plan. The equipment for sampling and analysis has been checqued and tested and further needs of equipment has been evaluated.

NORWEGIAN TITLE
Overvåkingsprogram for luftkvalitet i Egypt

KEYWORDS		
Air Quality	VOC	Chemical analysis

ABSTRACT (in Norwegian)

* *Classification*
- *A Unclassified (can be ordered from NILU)*
- *B Restricted distribution*
- *C Classified (not to be distributed)*