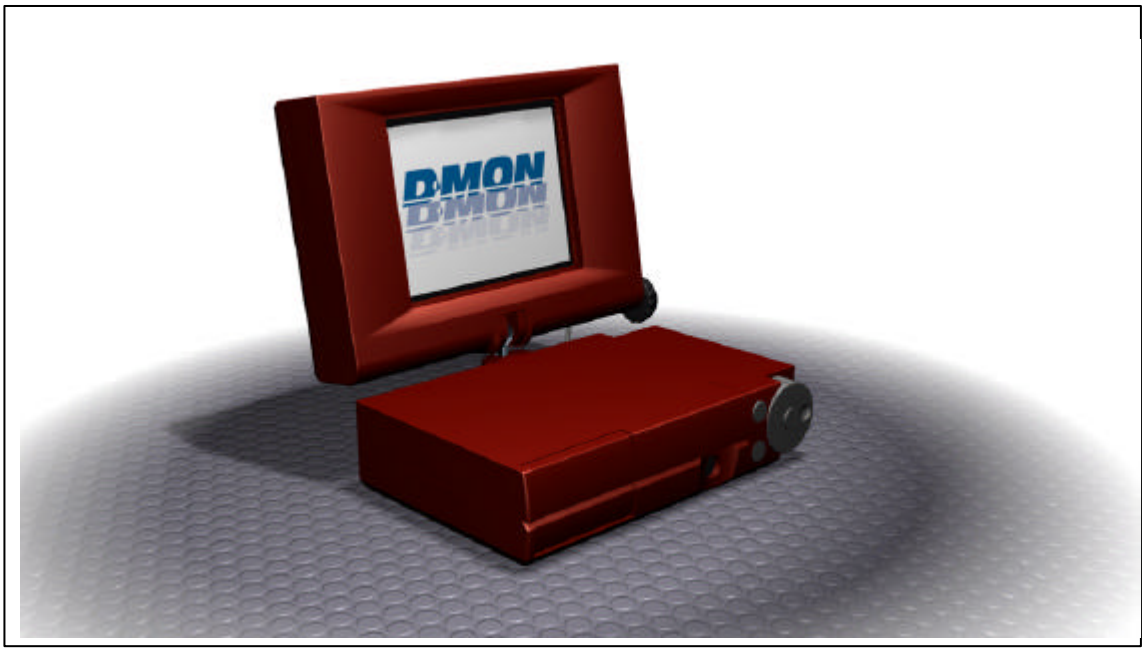
C-Mon®



C/D-MON™
Data logger for
CPTU
Memocone type II and III

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General Description.

The latest generation of data loggers for registration of drilling parameters and CPT.

C-Mon.

The C-Mon (Cone Monitor) and D-Mon (Drill Monitor) are developed with the latest technology within electronics for the industry.

We have used modern design for the hardware and a completely new way for the ergonomics and the logic for the operator.

The Operative System, owned by us, is build on a kernel from Accelerated Technology Inc. The operative system from AT Inc. is a very intelligent and powerful tool. It is used by the Industry and Scientific world, where too quick changes of the soft wares are impossible. New soft ware for modifications and new methods are done on the AT Inc. Kernel on a very quick and cost effective way. There no license cost for upgrading of new versions. The original soft ware will not be out of date and unusable. The D-Mon will also never be used for Word Processing or playing games. It is a tool for the rig owner.

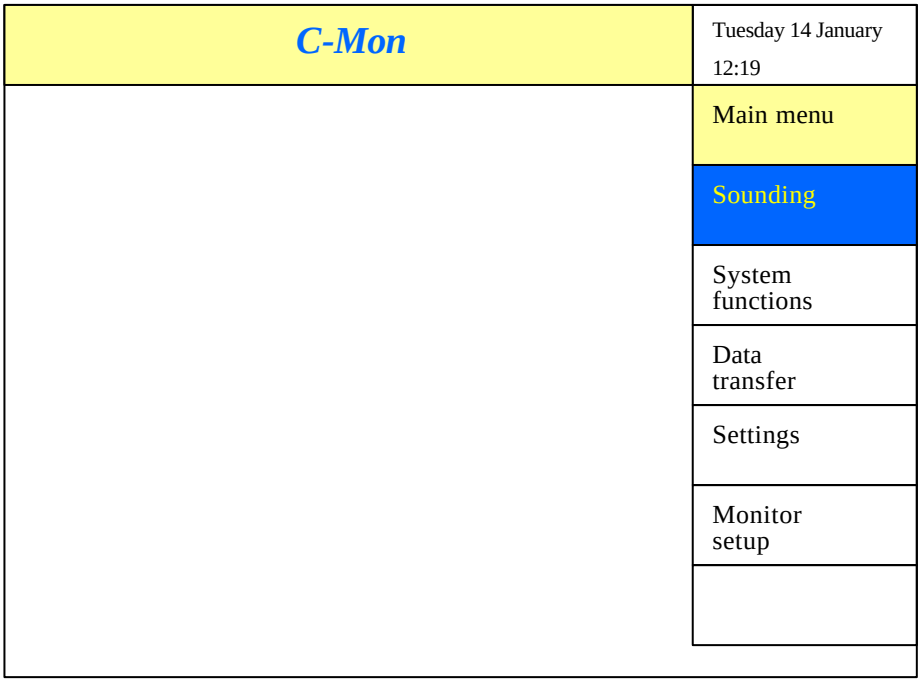
The handling of the C/D-Mon is totally menu operated. All possibilities at upstart, operation, registration of data and collection of data is clearly described on the screen. All input is done by the wheel and three buttons.

The screen is of new type, giving 700 Candela intensity of light. It guarantees that the screen gives full brightness in full daylight and even when the sun is in zenith. During the dark winter the backlight of the screen gives a perfect picture even when it is 30 degrees centigrade below freezing.

The D-Mon can be mounted on the rig as one unit, with the bottom part, the operative wheel and the screen on it's attachment. It can also be mounted as three separate units. The bottom part with the pressure transducers can be fixed somewhere protected on the rig. The wheel for communication with the logger will be mounted easy accessible near the levers and the screen with most of the electronics, all software and all the memory functions, will be put on the "smart ball". The ball makes it easy turnable in almost all angles. At the end of the day, the screen is easily detachable by one big fastening nut and one cable connection. The light aluminium screen is stored in the elegant case, which will also be the transport case protecting the screen from damage.

General.

The D-Mon is fully menu oriented. All information is presented on the screen. Go through the different options with the rotating wheel and make the choice by pressing the button in the centre of the wheel. The **PLUS BUTTON** starts the logging and the **MINUS BUTTON** stops the logging. The **PLUS** and **MINUS** buttons are used for i.e. **ROD CHANGE**.



Connect the Main Cable and the C-Mon will automatically start. The first picture on the screen is the Main menu. Apart from product name and Logo, you find five pop up menus.

Sounding Here you change between the different sounding methods programmed in your C-Mon.

System functions Here you have all directories and the manoeuvring of the floppy hatch.

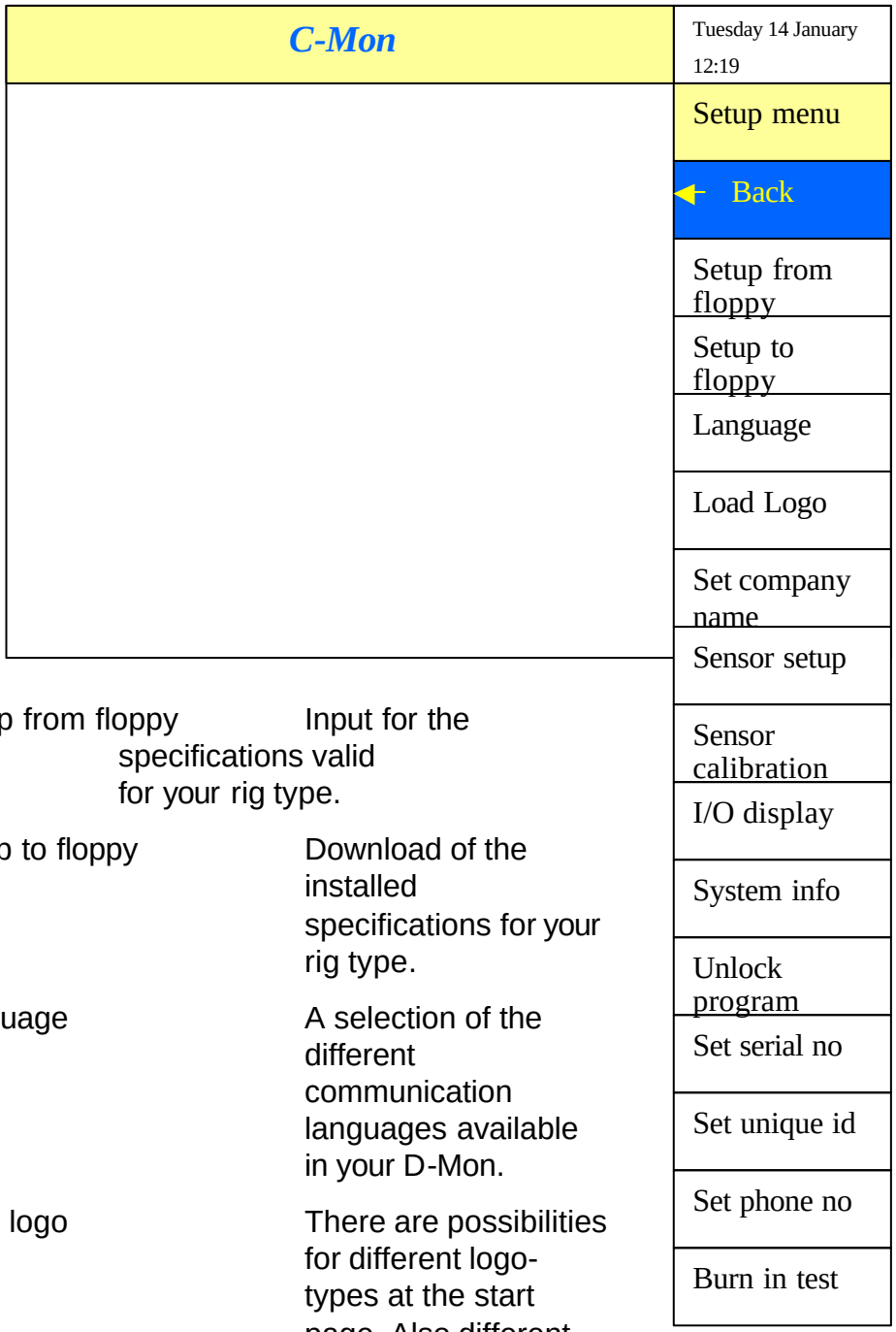
Data transfer Here you have the functions for downloading of data in several ways.

Settings Here you have the different settings for your C-Mon

Monitor setup Here you have the different setups for the C-Mon and the sensors.

Monitor setup

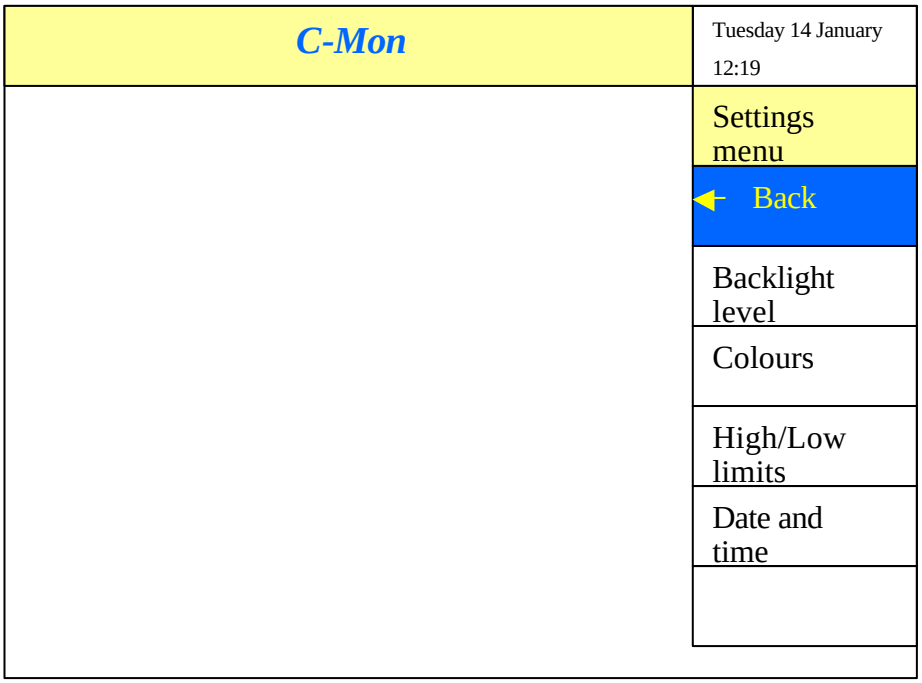
This chapter is for the producer and different set ups.



Setup from floppy	Input for the specifications valid for your rig type.
Setup to floppy	Download of the installed specifications for your rig type.
Language	A selection of the different communication languages available in your D-Mon.
Load logo	There are possibilities for different logo-types at the start page. Also different screensavers can be installed.
Set company name	Type our own company name. This will be presented in the head of every data file.

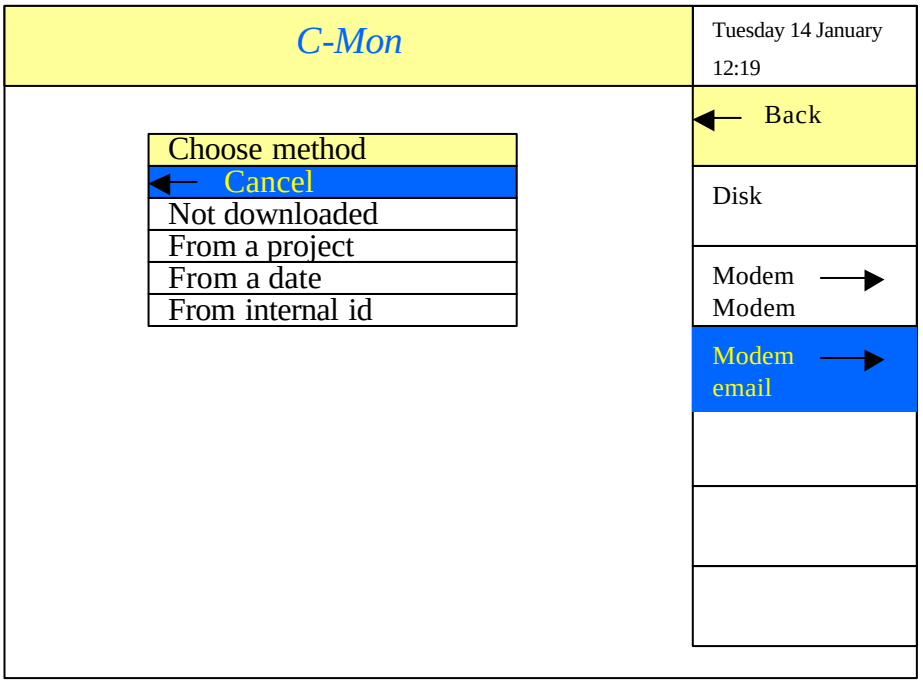
Sensor setup	Setup for the different transducers and sensors used on the specific rig.
Sensor calibration	Calibration of the different transducers and sensors used on the specific rig.
I/O display	Shows all un calibrated data from the transducers and sensors installed on the specific rig.
System info	This gives you the Serial number and soft ware version installed.
Unlock program	Opens the C-Mon for the first time, for downloading of all necessary soft ware. Also when programs for new methods will be down-loaded.
Set serial No	This option is protected by a password and only accessible by the producer.
Set unique id	Puts an internal number on every file.
Set phone no	Print the number to the e-mail server.
Burn in test	This is used for the final long term test of all functions of the data logger.

Settings



Back	This choice takes you back to the previous picture.
Backlight level	Here you adjust the intensity of light on the screen. When the symbol comes up, adjust with the wheel and confirm with the centre button.
Colours	There are two ways of having the screen set up. The default with dark letters and markings on the light screen or a dark background with lighter letters. The choice is individual . In different light conditions you can achieve better visibility by changing between these two options.
High/Low limits	For individual programming of maximum and minimum values presented as different colours on the screen.
Date and time	set year by turning the wheel select month set date by turning the wheel select day set hour by turning the wheel set minutes by turning the wheel

Data transfer

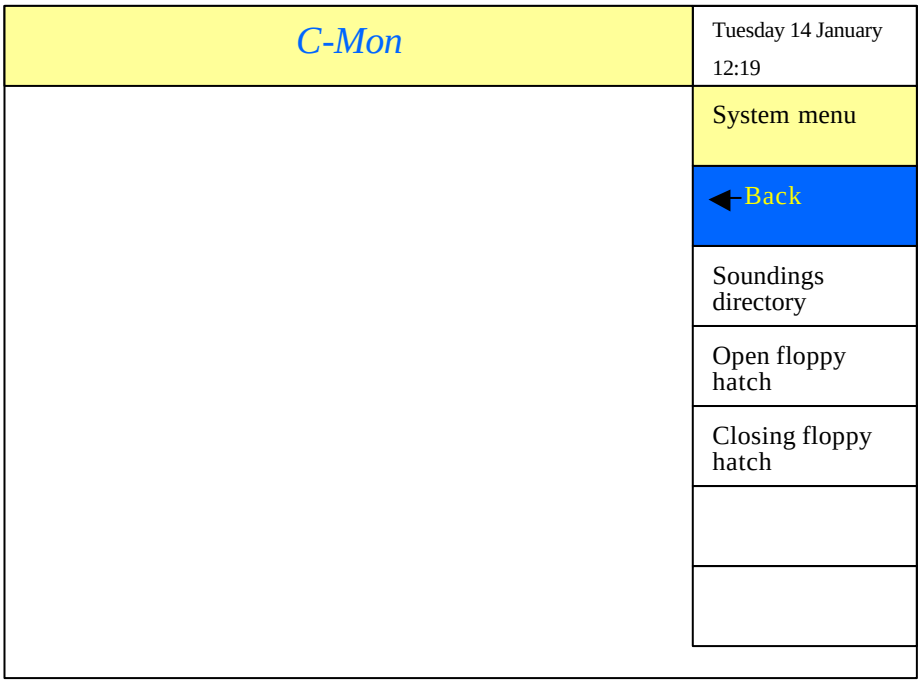


Back	Takes you back to the main menu.
Disk	Down load the data to a floppy disk or an USB memory. The installed media is decided at the ”Monitor setup”.
Modem to Modem	Down load the data to a connected modem. This is plugged in to the RS 232 in the MemoCone plug.
Modem to email	If the cell phone module (GSM module) is connected and the pre-chosen server-number is programmed.

Cancel	Takes you back to the main menu
Not downloaded	When a sounding has been downloaded once, it gets a mark on the file. This choice will download all files that has not been downloaded before.
From a project	When starting a new sounding up the D-Mon asks for a Project name. This choice search the entire hard disk drive for all soundings made under the same project name.
From a date	When starting a new sounding the date will always be included in the file. This choice search the entire hard disk drive for all soundings performed on a specific date.
From internal id	Every sounding gets an internal number, starting from 0001. If the operator knows this internal number, this sounding can be downloaded again.

The internal memory saves always the last 3 000 meters of soundings in the revolving hard disk drive.

System function



Soundings directory — From this option you download soundings stored in the hard disk drive.

The choices are: — Latest, where you get the last 20 soundings listed.

From a project, where you write in the project name using the wheel on the key board on the screen.

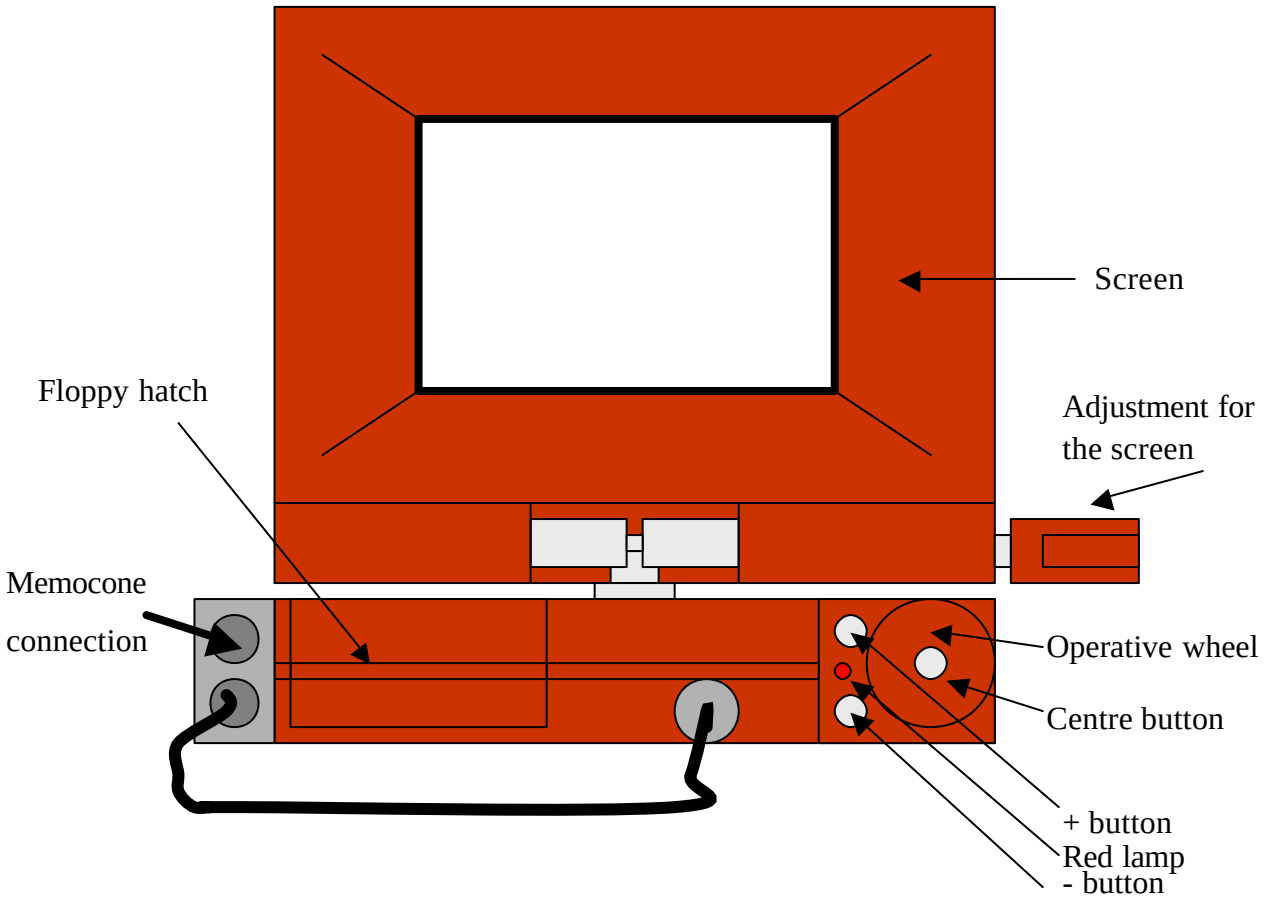
From a date, where you write in the date following the instructions coming up on the screen.

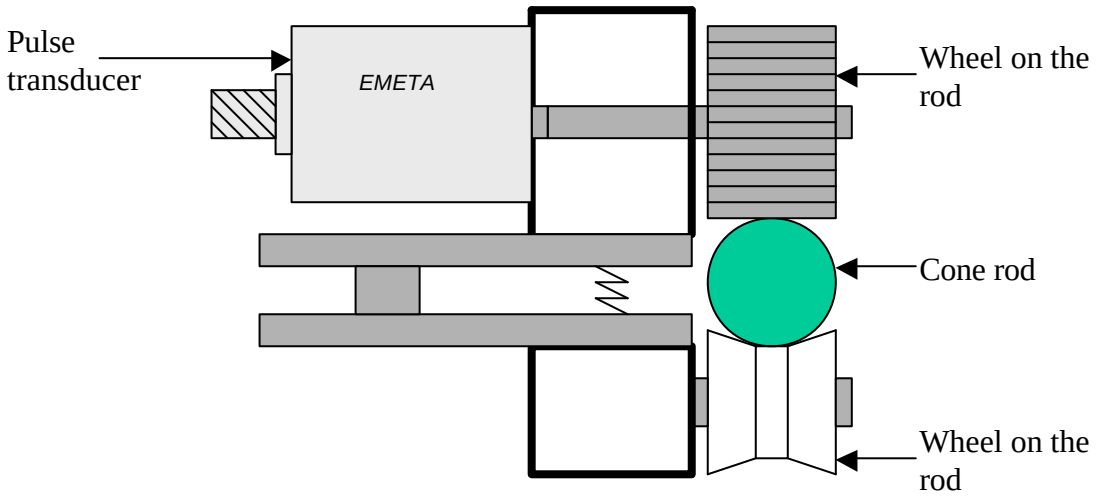
Open floppy hatch — With this choice, the hatch covering the floppy disk, is opened for access to the floppy disk station.

Close floppy hatch — The water and weatherproof hatch will automatically close.

Setup for CPT with the ENVI MemoCone III.

Data logger C-Mon.





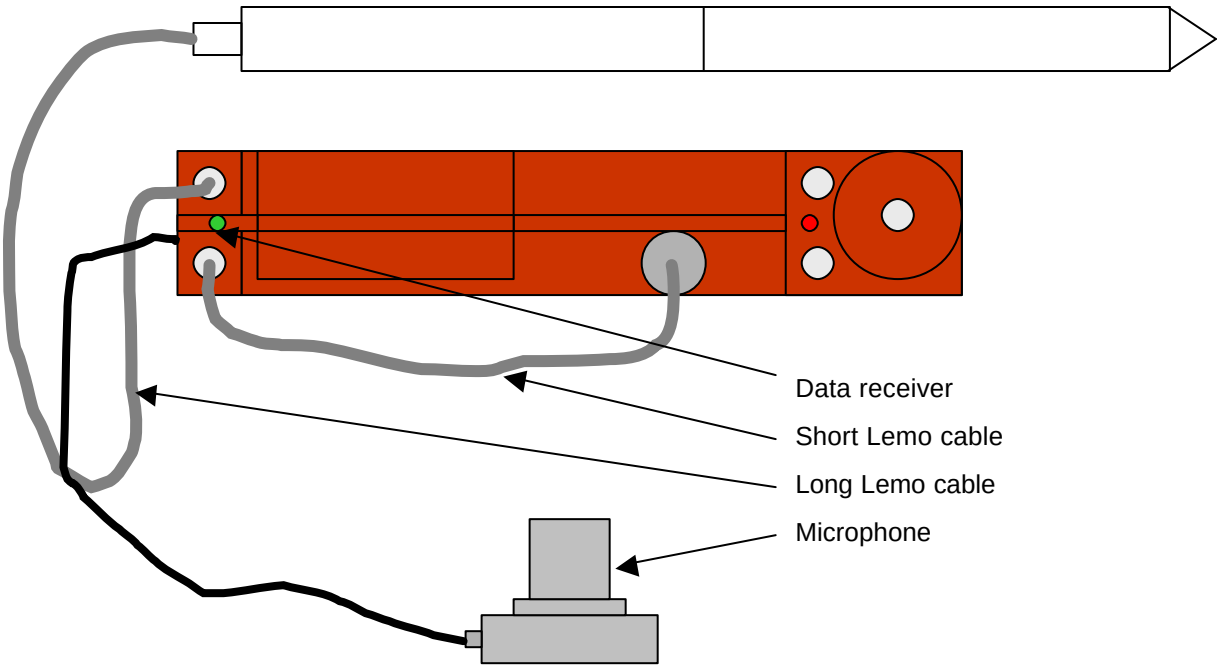
Depth registration ”wheel on the rod”.

CPT with acoustic data transmission.

MemoCone III

For real time acquisition you can use the acoustic option.

It consists of a sound transmitter, instead of the battery tube, a sound receiver and a microphone.

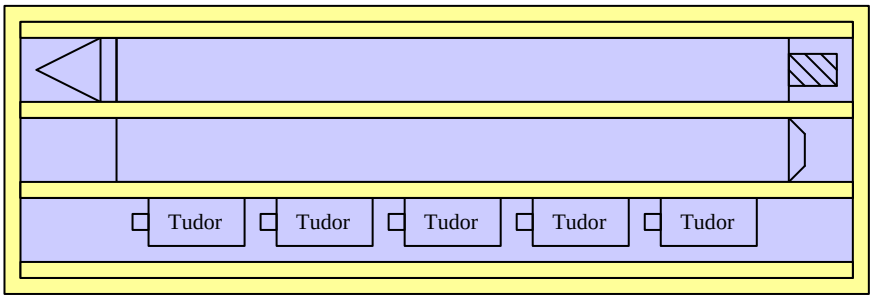


Install the acoustic data receiver on the C/D Mon and connect the short Lemo-Lemo cable as shown above.

Connect the microphone cable between the microphone and the back of the receiver.

Connect the MemoCone III between the upper receiver plug and the MemoCone III using the longer Lemo-Lemo cable.

Install the microphone on the pushing head and push on top of the rods with the microphone.



The ENVI MemoCone III Piezocone.

A complete setup for performance of CPT using the ENVI MemoCone II Piezocone consists of:

Datalogger C-Mon with software for CPT, in it's case.

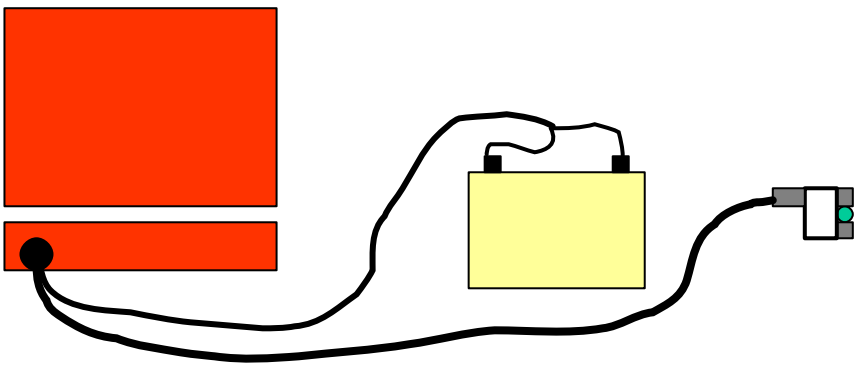
Depth registration DRR.

Prepared points, O-rings, Grease and oil

5 pcs of ALKALINE batteries size C (LR14).

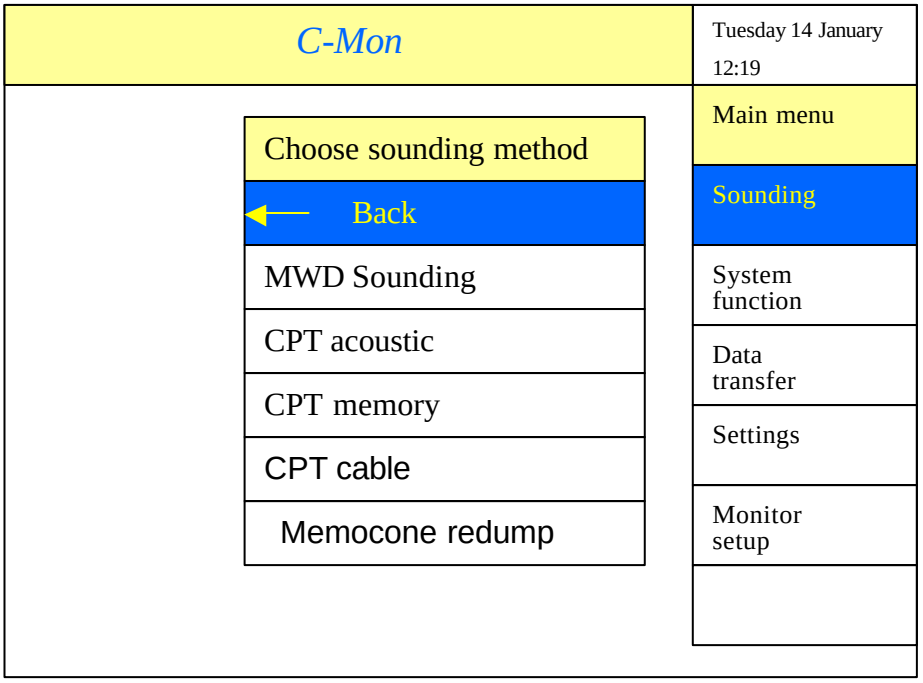
Users manual for CPT in acoustic -memory mode.

Connect the main cable with the big plug at the back of the C-Mon , the cable with two loose ends at 12V / 24V DC and the cable with the Cannon plug to the depth transducer.



The C-Mon starts automatically when the power is connected.

Go to Sounding and press the centre button.

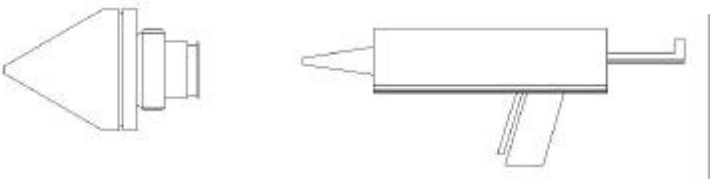


Variations depending of the set up of methods in your C-Mon.

Preparation of the ENVI MemoCone III.

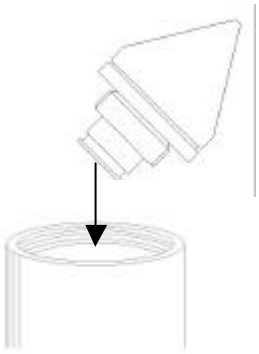
MemoCone
Conical filter point
Universal spanner
Grease
Hydraulic oil
Cable

Start by filling the conical filter point with grease. Make sure the filter point is entirely filled with grease and that there are no air bubbles in the point. Press grease into the filter point until you can see it coming out from the slot. Wipe away excessive grease.

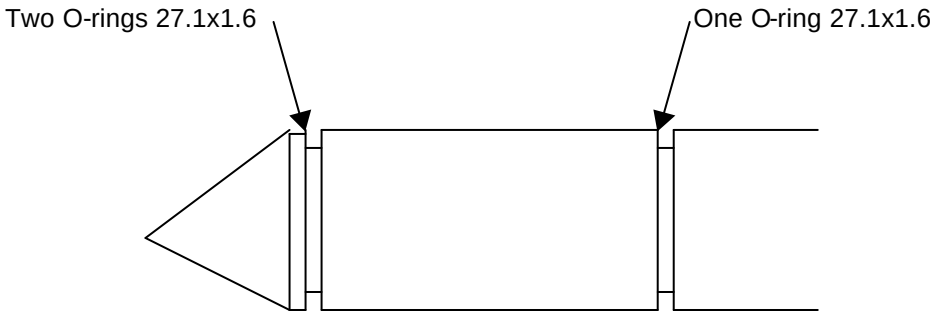


Fill the cavity in the lower part of the MemoCone with hydraulic oil and remove the air bubbles which are formed in the oil.

Then place the filter point into the MemoCone. Lean the point slightly to avoid air bubbles.

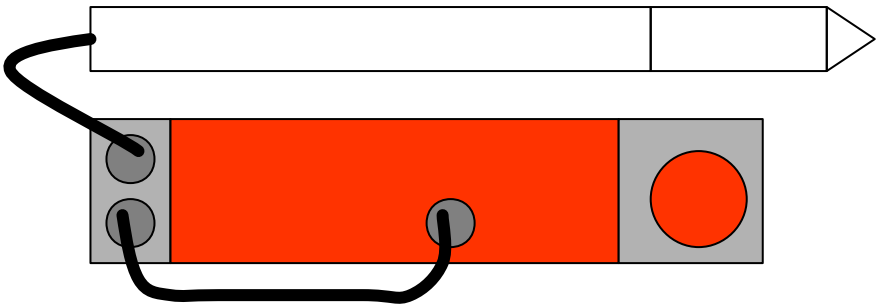


Place two O-rings behind the conical filter and one O-ring on the other end of the friction sleeve. Tighten the conical filter slightly using a universal spanner.



The MemoCone is now ready for sounding and can be stored

”prepared” for several hours without affecting the measurement.



Connect the MemoCone III to the upper left plug

Go to CPT acoustic by rotating the wheel on the C-Mon and press centre button.

Connecting to probe
Initializing probe
Reading zero values

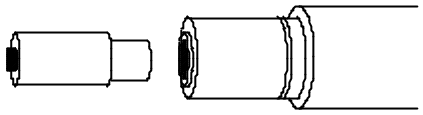
Serial no: 30299
MemoCone 5 ton high accuracy
Press Enter to continue

If readings of zero values are presented on the screen, it indicates that the values are outside the accepted.

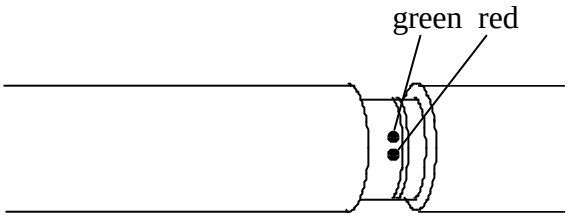
DISCONNECT:

When this picture is shown on the screen, disconnect the cable from the MemoCone and put the **BATTERY PLUG** in the MemoCone instead of the cable.

Put five ALKALINE batteries, model Size C, 1,5V, in the battery tube, with the plus pole pointing DOWNWARDS when the cone is mounted and positioned to start the test. Don't use rechargeable batteries.



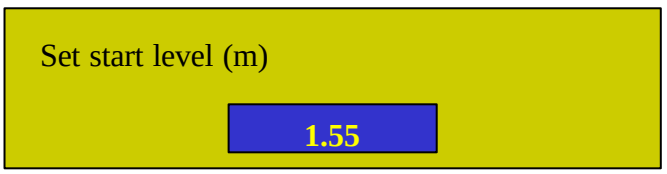
Screw the MemoCone and the battery tube together, but not completely. You should be able to watch the two lamps just inside the thread. A steady twinkling of the ***green*** lamp ensures that the MemoCone has started to take readings, If the ***red*** lamp is on, it means that the battery is poor and not good for a test. If the ***green*** light is twinkling **1 sec. ON – 1 sec. OFF**, screw together tight. A "ticking" sound should be heard. The MemoCone is now ready for pushing.

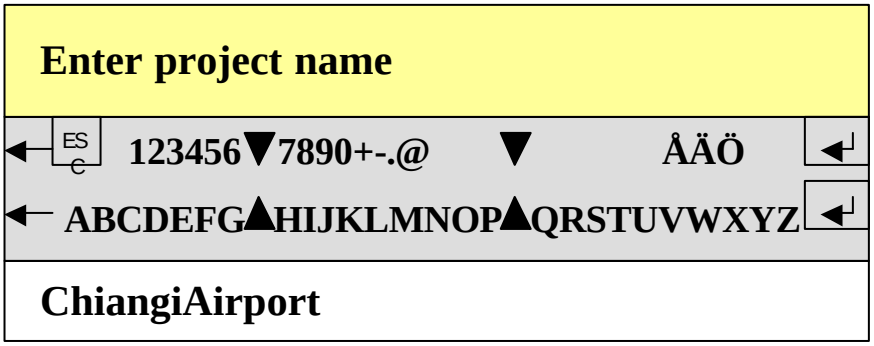


Press the centre button on the C-Mon.

If you start the test from the surface, just press the button.

If the hole is pre drilled through dry crust or fill, put in the pre drilled depth, by rotating the wheel and push the button.





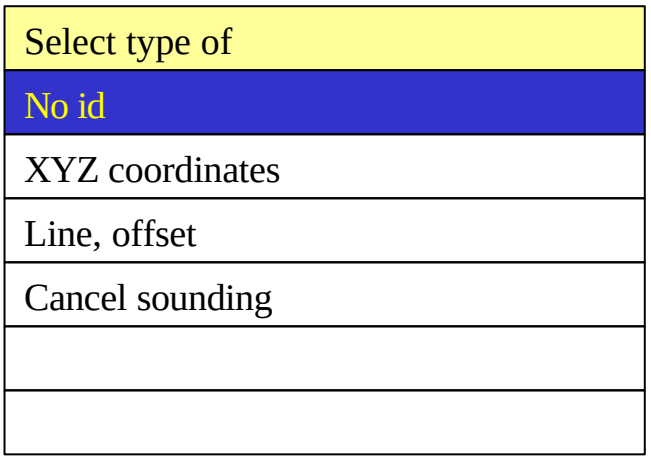
Use the wheel as a joy stick and go between the letters, symbols and numbers. Confirm the letter with the centre ENTER button.

When the project name is written go to ↵ and press the centre button. The selected project name will now be registered in the head of the data file.

For the next sounding this project name will be suggested as default.

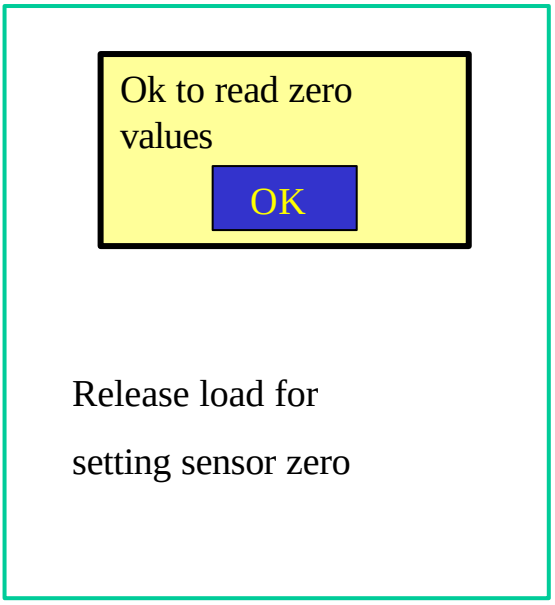
If the project name shall be changed go to ← and erase the chosen name and type the new project name as described above.

Positioning of the sounding.



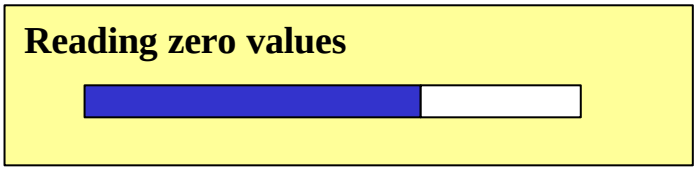
If choosing:

No id:	The C-mon jumps direct to reading zero values
Free id:	Use the key board to print your bore hole number
XYZ coordinates:	Use the key board to register first the X coordinate, than the Y coordinate and last the Z coordinate. For the changes use the ↵
Centre line, offset:	Use the key board to register centre line
	Use the key board to register offset and Z coordinate

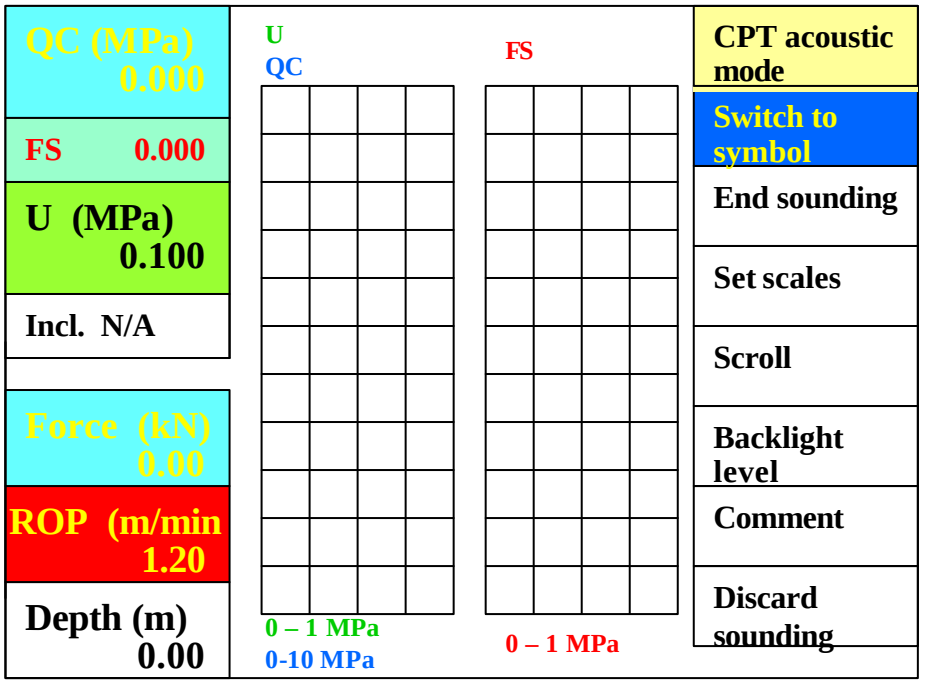


Push the centre button for OK.

The C-Mon puts the zero values in the data file as zero values before sounding.



The screen on the C-Mon changes to this picture while sounding.



Place the MemoCone in the machine and start pushing.

OBSERVE: when the cone is starting to move**, PUSH** the **PLUS BUTTON**. The red light goes out and the registration starts. If you have the depth transducer that moves up and down with the machine, the **PLUS BUTTON** must be pushed at every rod shift, to make the registration collected in the C-Mon. If you have a depth transducer of the "wheel on the rods" type this will not be necessary.

In order to protect the MemoCone from being overloaded, please do not use total load higher than indicated in the table below:		
Depth	10 ton cone	5 ton cone
0-10m	10 tons	5 tons
10-20m	13 tons	8 tons
20-30m	18 tons	11 tons
>30m	20 tons	16 tons

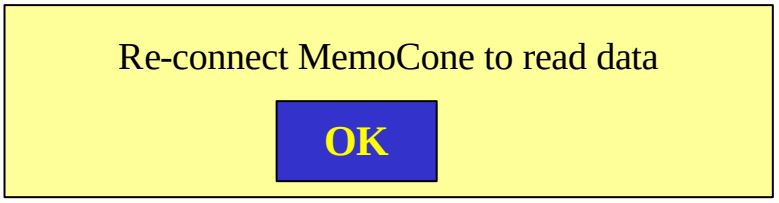
Downloading the data from ENVI MemoCone III

When using the acoustic transmission, you will get real time data that is also saved in the memory. This data can however sometimes be disturbed and affected in such a way that it may be inclompete.

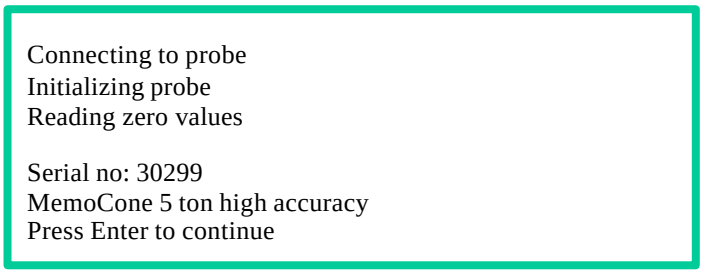
In order to get perfect undisturbed data from the memocone, connect the cone once again to the C-mon and download the data from the memory as follows:

After retraction of the cone, take the cone from the machine and unscrew the battery tube. Connect the cone as described on page 14.

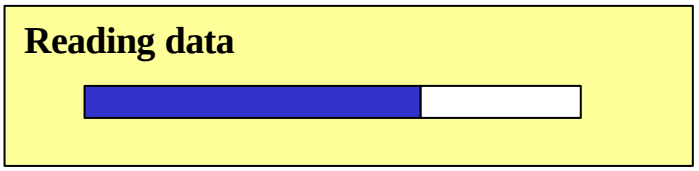
Select ”End sounding” on the screen by rotating the wheel and press the centre button.



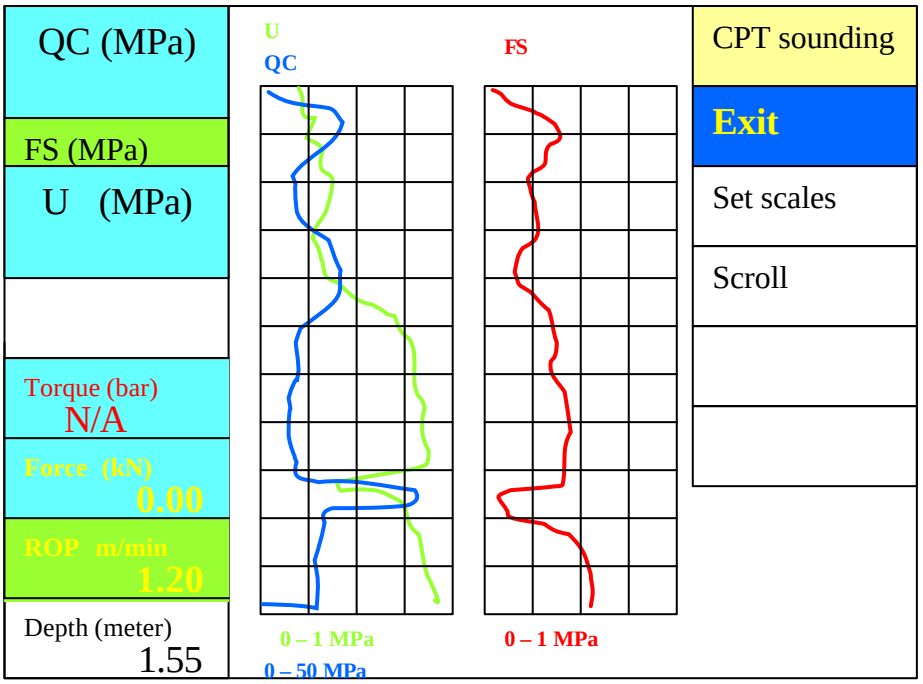
Choose OK by pressing the centre button.



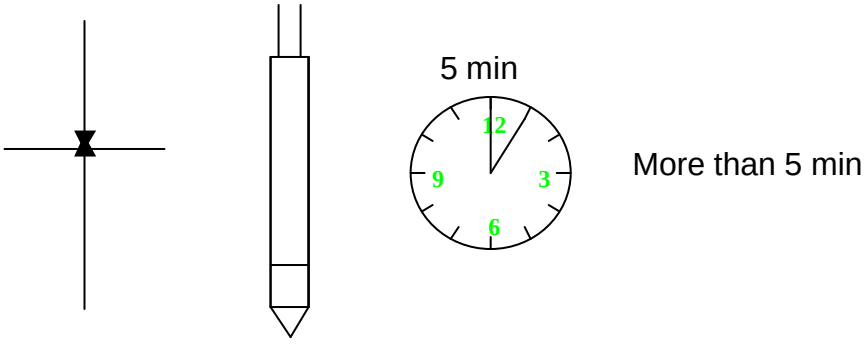
If readings of zero values are presented on the screen, it indicates that the values are outside the accepted.



All the stored data is now transferred from the MemoCone to the C-Mon and is presented on the screen.



DISSIPATION TEST
(Memory operation)



STOP PENETRATION	WAIT > 5 MINUTES

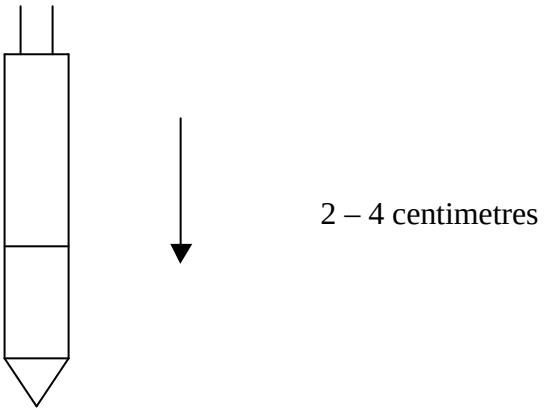
OBSERVE The maximum operation time for the Memocone III is 8 hours.

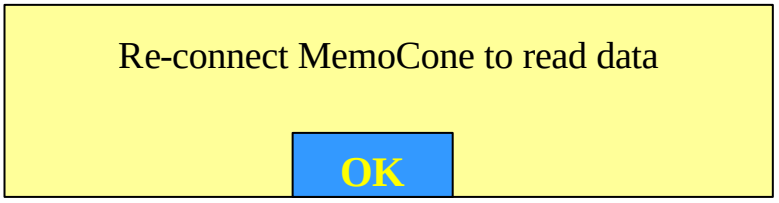
You can follow the decay of the pore pressure on the screen.

To stop the dissipation test, just continue the penetration.

Of course you can make more dissipation tests further down. If you want to terminate the penetration and make a dissipation test, you must stop the dissipation test before pulling up.

This is done by **continuing the penetration a few centimetres.**



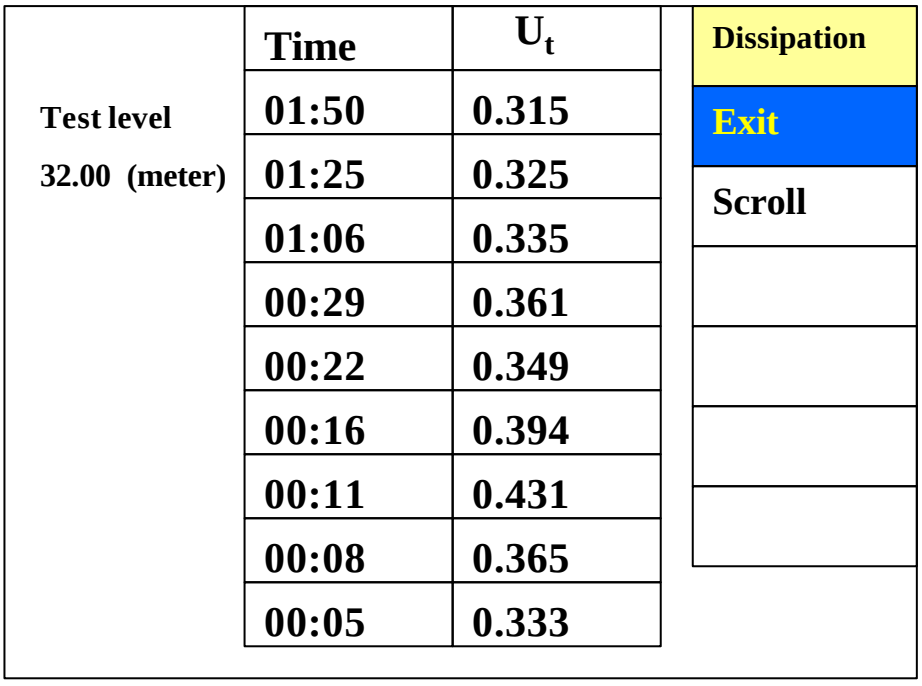


The MemoCone downloads the zero values, all the CPT data, presents it as graphs.

After this the dissipation test (s) is downloaded.

Put in the project name and type of id.

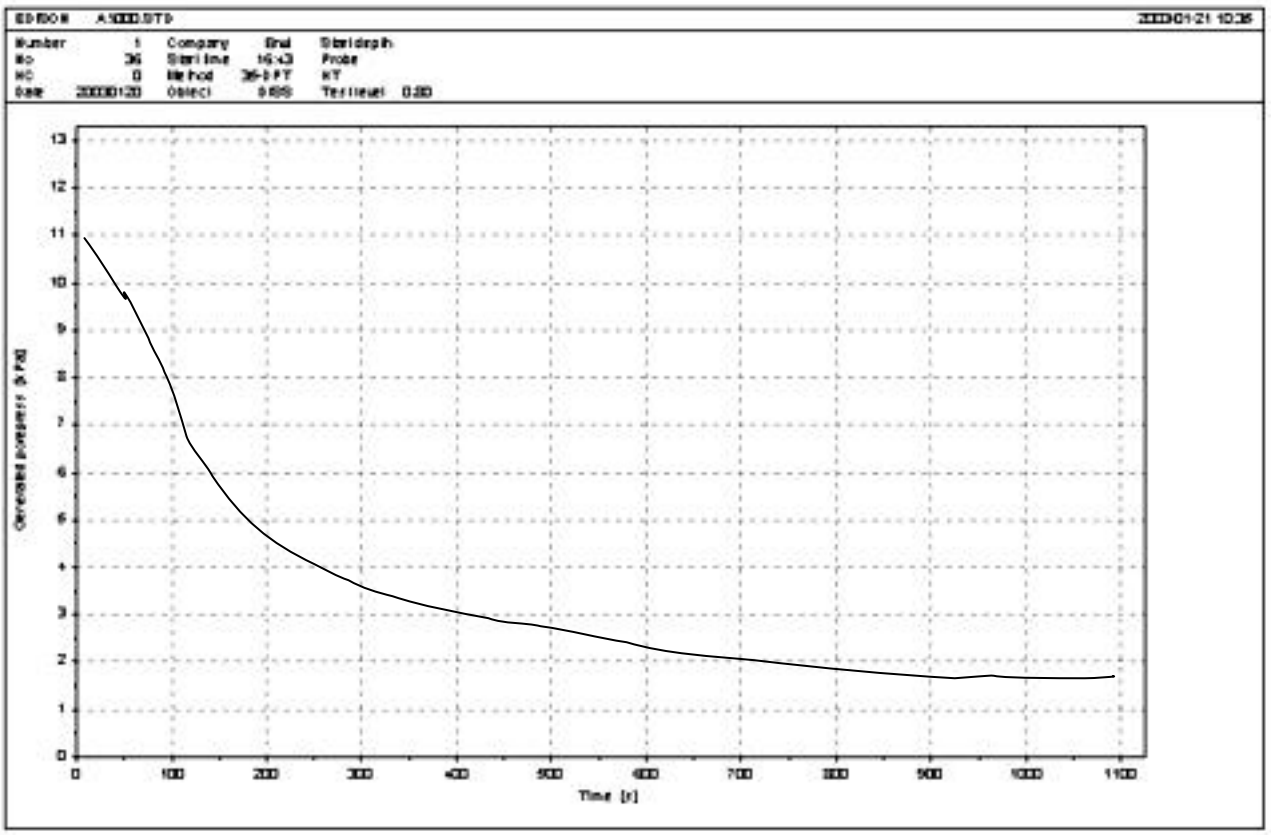
The test level/s is/are written on the screen.



Download the data in the normal way to a floppy disk. See next page.

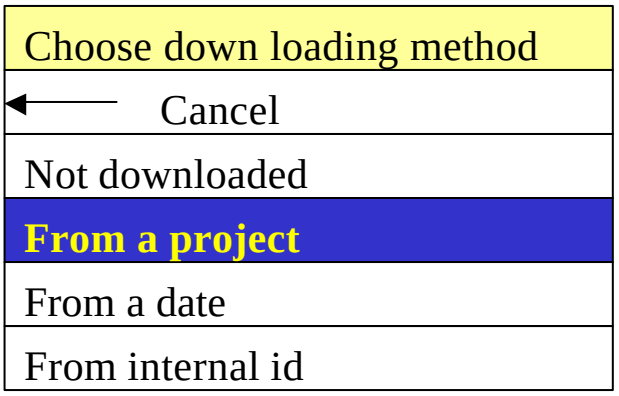
Take the floppy and download the data to your presentation soft ware in the office computer and make the graph for the dissipation test.

As an example below from SGI, EDISON.



Downloading data from the C-Mon to floppy.

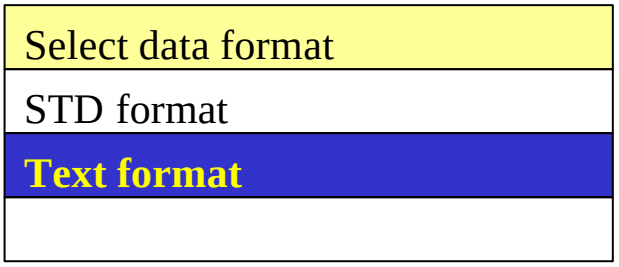
Choose Data transfer from the main menu



Choose the method for downloading and press the centre button.

The hatch is opening automatically. Put in a floppy disk.

From Not downloaded select the required data format:



STD format is a standardised format used within the geotechnical and geological branches in Scandinavia.

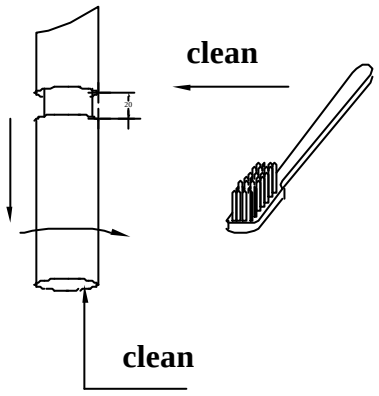
Text format is the international ASCII format for i.e. EXCEL.

MAINTENANCE of the MEMOCONE

After every test:

- •Displace the friction sleeve about 20 mm downwards by gentle rotating and pulling.
- •Use a toothbrush and clean up the upper and lower joints.
- •Smear with grease.
- •Push and rotate the Friction sleeve gently back into position.
- •Put the O – ring back into position

Friction Sleeve



After the completed project:

•Remove the friction sleeve completely, clean and grease. Remove the ring from the conical filters and clean them with compressed air.

Smear the complete probe and battery tube (steel tubes) with oil before storage. Grease all O-rings.

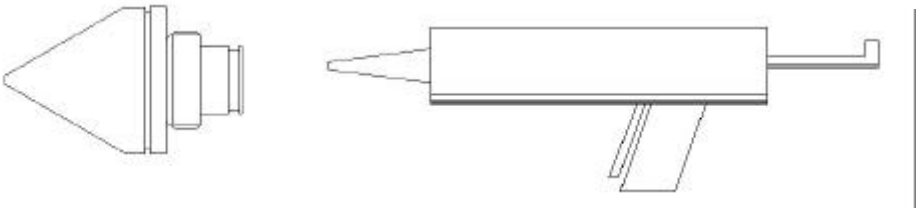
Users manual for CPT in cable mode.

PREPARATIONS:

MemoCone
Conical filter point
Universal spanner
Grease
Hydraulic oil
Cable

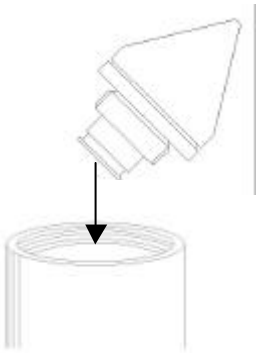
Start by filling the conical filter point with grease. Make sure the filter point is entirely filled with grease and that there are no air bubbles in the point.

Press grease into the filter point until you can see it coming out from the slot on the filter point. Wipe away excessive grease.

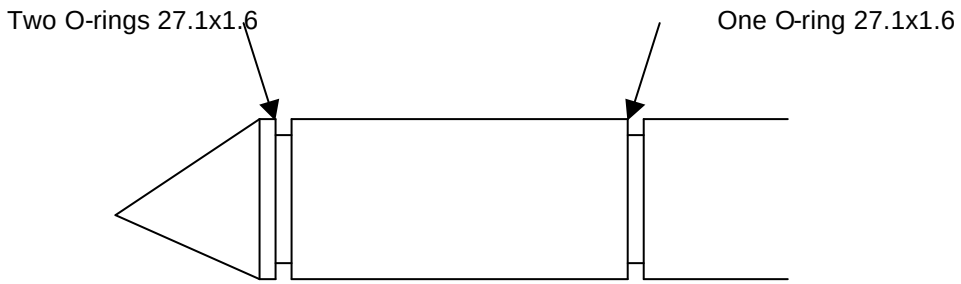


Fill the cavity in the lower part of the MemoCone with hydraulic oil and remove the air bubbles which are formed in the oil.

Then place the filter point into the MemoCone. Lean the point slightly to avoid air bubbles.



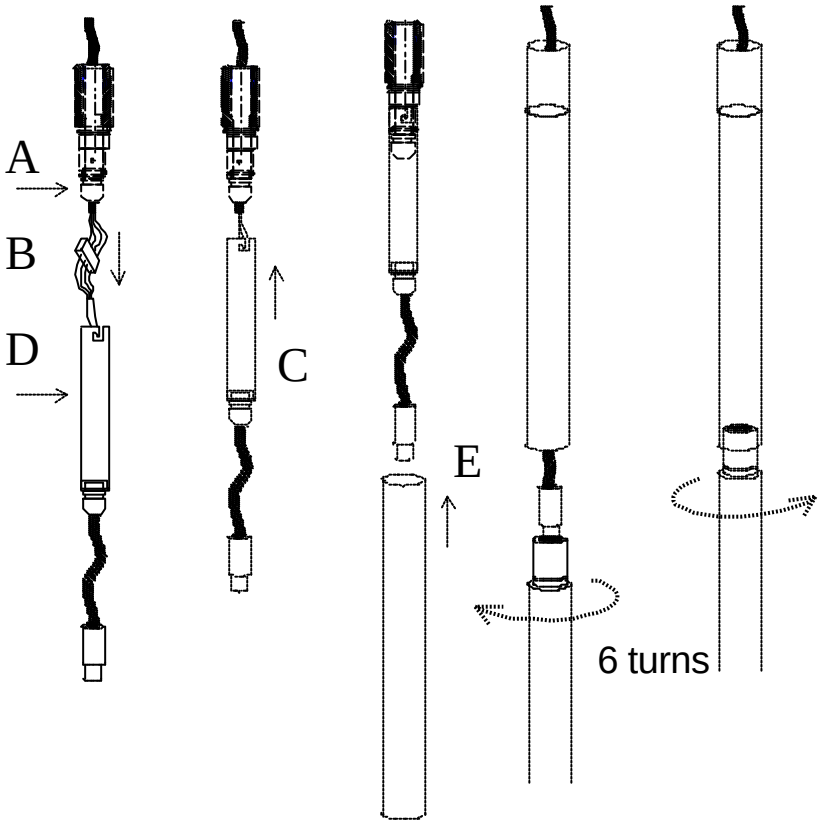
Place two O-rings behind the conical filter and one O-ring on the other end of the friction sleeve. Tighten the conical filter slightly using a universal spanner.



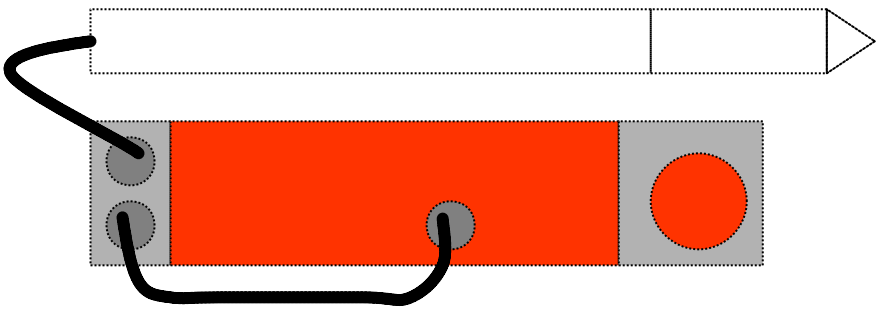
The MemoCone is now ready for sounding and can be stored ”prepared” for several hours without affecting the measurement.

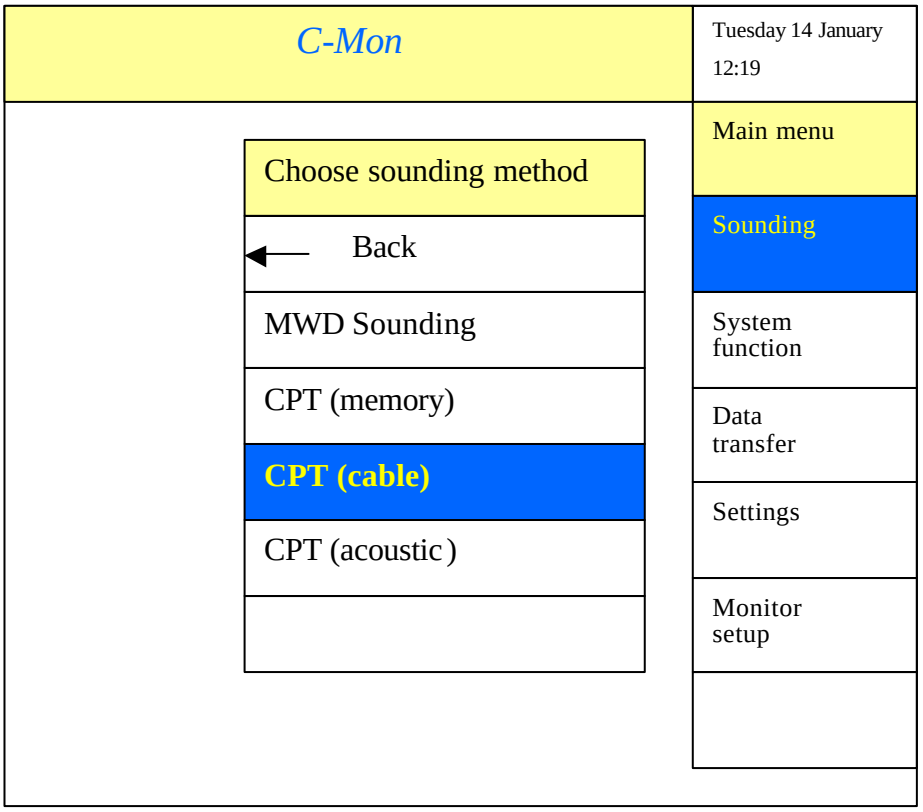
CABLE CONNECTIONS:

1. Connect **the CABLE** to the terminal B
2. Tighten the **GLAND A**
3. Fill with **OIL** in the **BRASS TUBE C** up to level **D**
4. Put on the brass tube and lock the bayonet
5. Screw on the **STEEL TUBE E**
6. Connect the MemoCone and rotate 6 turns counter clockwise
7. Screw together



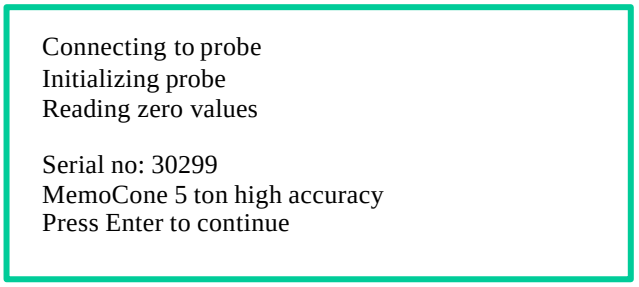
Connect the cable to the plug in the front of the C-Mon.





Variations depending of the set up of methods in your D-Mon.

Go to CPT (cable) and push the centre button.

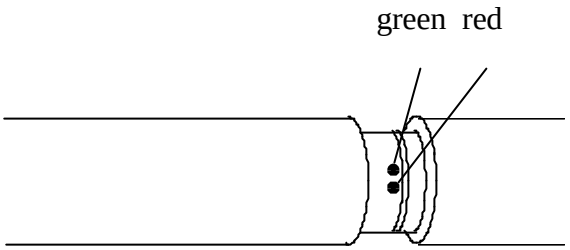


If readings of zero values are presented on the screen, it indicates that the values are outside the accepted.

Screw the MemoCone and the cable tube together, but not completely. You should be able to watch the two lamps just inside the thread.

A steady twinkling of the ***green*** lamp ensures that the MemoCone has started to take readings.

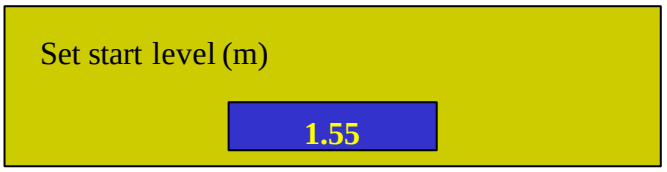
When the ***green*** light is twinkling **1 sec. ON – 1 sec. OFF**, screw together tight, The MemoCone is now ready for pushing.

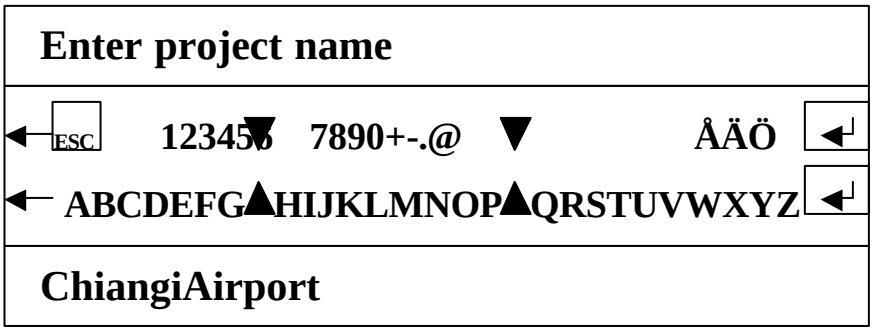


Press the centre button on the D-Mon.

If you start the test from the surface just press the button.

If the hole is pre drilled through dry crust or fill put in the pre drilled depth by rotating the wheel and push the button.





Use the wheel as a joy stick and go between the letters, symbols and numbers. Confirm the letter with the centre button.

When the project name is written go to ↵ and press the centre button. The selected project name will now be registered in the head of the data file.

For the next sounding this project name will be suggested as default.

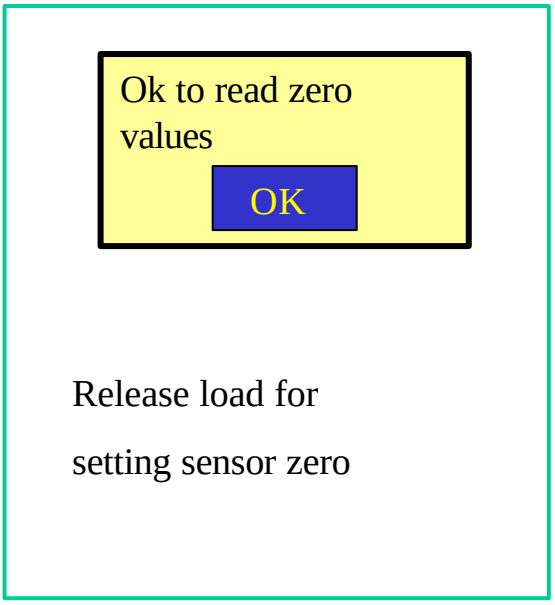
If the project name shall be changed go to ← and erase the pre chosen name and type the new project name as described above.

Positioning of the sounding.

Select type of
No id
Free id
XYZ coordinates
Line, offset
Cancel sounding

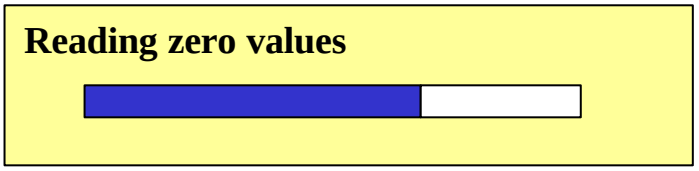
If choosing:

No id:	The jumps directly to reading zero values
Free id:	Use the key board to print your bore hole number
XYZ coordinates:	Use the key board to register first the X coordinate, than the Y coordinate and last the Z coordinate. For the changes use the ↵
Centre line, offset:	Use the key board to register centre line
	Use the key board to register offset and Z coordinate



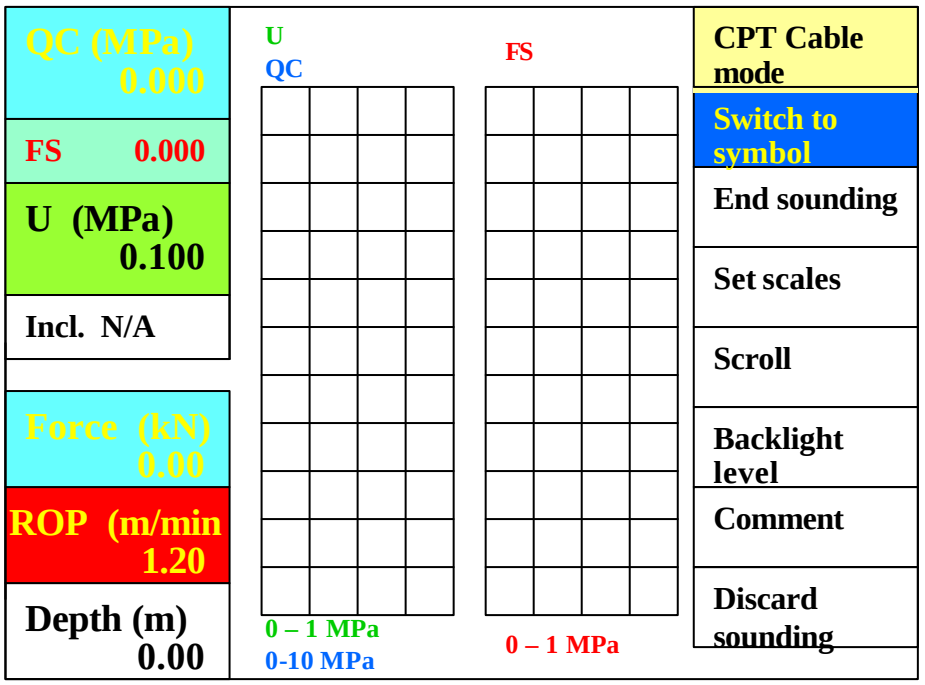
Push the centre button for OK.

The C-Mon puts the zero values in the data file as zero values before sounding.



The screen on the C-Mon changes to this picture while sounding.

If the screen is presented with the Drilling symbol, you can change to graphs by choosing Switch to diagram.



For CPT, as in this case, no inclinator is mounted, marked N/A, not available.

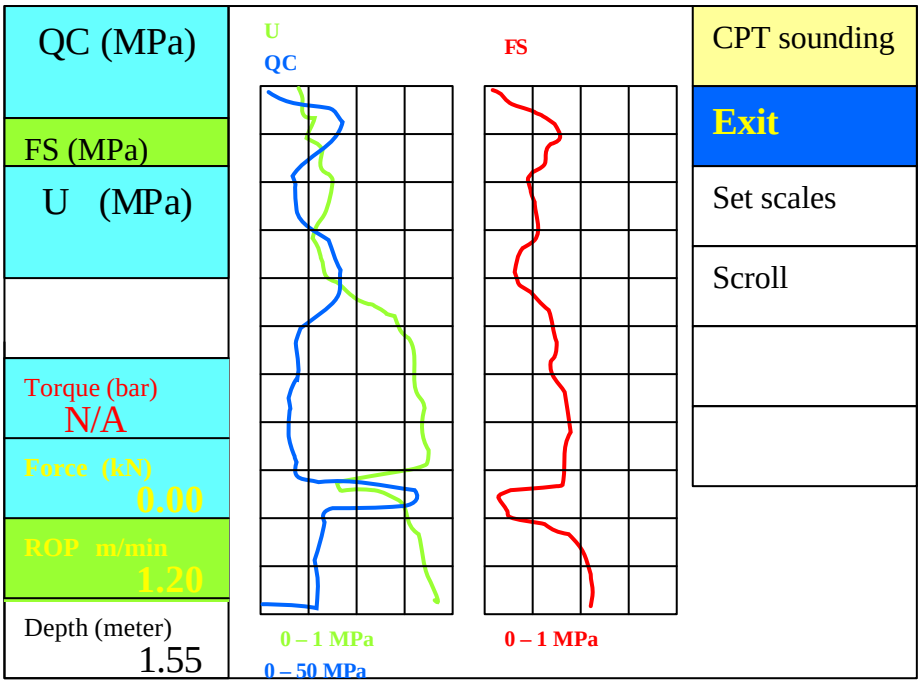
While pushing the MemoCone II or III, in cable mode, the graphs for depth, point resistance, local friction and generated pore pressure are shown in real time.

In order to protect the MemoCone from being overloaded, please do not use total load higher than indicated in the table below:		
Depth	10 ton cone	5 ton cone
0-10m	10 tons	5 tons
10-20m	13 tons	8 tons
20-30m	18 tons	11 tons
>30m	20 tons	16 tons

Starting the penetration.

Place the MemoCone in the machine and start pushing.

OBSERVE: when the cone is starting to move**, PUSH** the **PLUS BUTTON**. The red light goes out and the registration starts. The **PLUS BUTTON** must be pushed at every rod shift, to make the registration collected in the C-Mon if you have the depth transducer on the machine. If you have the depth transducer with a wheel on the rod, it will not be necessary to push the plus button more than once.



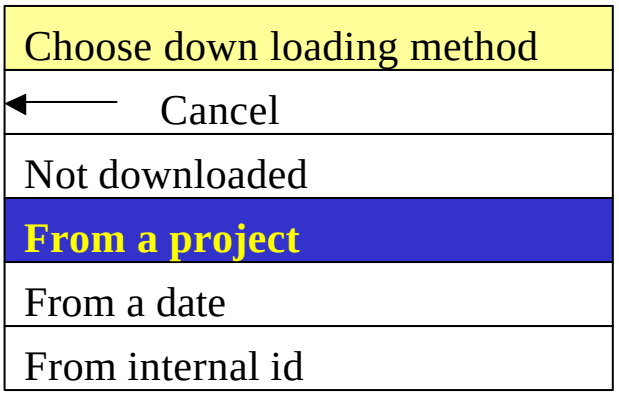
Stop the CPT test.

Rotate the wheel to End sounding and push the button.

The C-Mon reads the zero values after the test and store all the data in the hard disk drive.

Downloading data from the C-Mon to floppy.

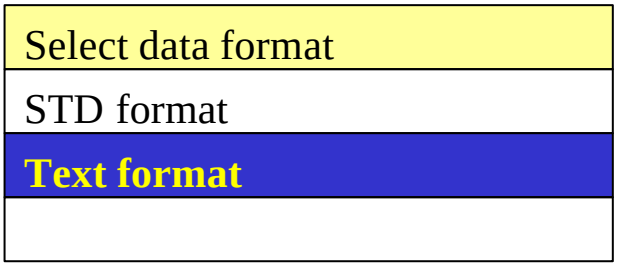
Choose Data transfer from the main menu



Choose the method for downloading and press the centre button.

The hatch is opening automatically. Put in a floppy disk.

From Not downloaded select the required data format:



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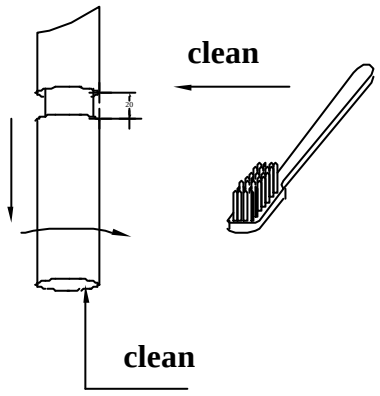
Friction Sleeve



After the completed project:

•Remove the friction sleeve completely, clean and grease. Remove the ring from the conical filters and clean them with compressed air.

Smear the complete probe and battery tube (steel tubes) with oil before storage. Grease all O-rings.

The **DATA** file.

There are two major formats for the drilling parameter data file:

1. STD type file for evaluation programs: EDISON and CPT PRO

```
$
HA=1,HB=80,HC=ENVI-0,HO=0.03,HD=19930902,HM=60,HJ=peabs4,HF=PEAB
#
D=0.03,A=0,B=245.5I=0,G=0,R=67,P=0.3438
D=0.04,A=0,B=255.83,I=0,J=0.73242,G=0,R=67,P=0
D=0.07,A=0,B=240.67,I=0,J=0.48828,G=0,R=67,P=1.5625
D=0.08,A=0,B=219.17,I=0,J=0.24414,G=0,R=67,P=1.5625
D=0.1,A=0,B=144.33,I=0,J=0,G=0,R=67,P=1.5625
D=0.12,A=0,B=39.5,I=0,J=0.73242,G=0,R=67,P=O.78125
D=0.14,A=6.748,B=0.5,I=0.84529,J=2.4414,G=45.41,R=67,P=6.9531
D=0.16,A=7.8455,B=72.5,I=0.85027,J=2.4414,G=52.49,R=0,P=8.0273
D=0.18,A=5.6504,B=95.833,I=0.84529,J=2.1973,G=59.326,R=0,P=7.6758
D=0.2,A=6.8293,B=133.33,I=0.83038,J=2.4414,G=66.162,R=70,P=6.9531
```

2 TXT type of file (for ECXEL etc.):

```
§
HA=1,HB=1,HC=ENVI-79,HO=19970429,HI=10:20,HM=60
#
DEPTH   BITLOAD   ROP     F PRESS    FLOW    RPM   TORQUE   CODE   TEXT
  0.02    20.081    36.5    0.0198    0.0011    0    7.7615
  0.04    20.081    28.5    0.0198    0.0011    0    7.7615
  0.06    20.122    32.4    0.0198    0.0011    0    7.7615
  0.08    20.122    29.0    2.0336    0.0011    0    7.7615
  0.10    20.081    29.7    4.8624    7.1782   13.3  7.7615
  0.12    20.122   172.83   7.4465    13.772   44.8  7.7615
  0.14    18.855   170.5    5.9786    15.99    67.8  7.7615
  0.16    18.033   167.88   6.1009    17.371   85.5  8.2111
  0.18    16.432    169.0   6.1009    19       88.3  11.691
  0.20    16.011   171.446.1009       19.856   88.9  13.685
```

LEGEND:

Heading

HA = No of heading
HB = Serial No of registration
HC = Serial No of data collector
HD = Date
HI = Start time for registration
HM = Method code
HF = Company name
HJ = Name of object
HL = Section
HH = Deflection to the right of section centre
HV = Deflection to the left of section centre
HK = No of registration given in the field
HT = Text
HN = Number of probe

Data:

D = depth in metres
K = 2 digit codes
T = Text string
A = Bit load in kN
B = Rate of penetration (ROP) in mm/s
F = Local friction (CPT)
Q = Point resistance (CPT)
U = Generated pore pressure (CPT)
J = Flow in to the borehole of flushing medium in l/min
G = Flow out of the borehole of flushing medium in l/min
I = Pressure of flushing medium in MPa
P = Rotation motor pressure (torque)
R = Rotation speed (rpm)
S = Number of blows per 0.2 meter
AZ = Hydraulic pressure on drifter/hammer

Appendix A: Microphone pushing head.

The microphone pushing head will detect the small sound waves in the CPT rods coming from the Memocone III CPTU probe. Inside the microphone, there is a crystal unit that will convert the sound signal into an electric voltage signal which is connected to the receiver unit in the C-mon. When a usable signal is detected, the LED in the receiver unit will light up for every reading received. Since the full force of the CPT pusher (200kN) is transfered through the aluminum body of the microphone unit, it is important that it is installed in a correct way.

Installation of the microphone in the CPT pusher:

The picture below shows a recommended installation.

The microphone will fit into a circular piece of steel with an inner hole of 70mm diam. and a height of at least 55 mm.

The unit will automatically hatch into the steel piece with the help of small magnets.