

# **YSI 5000 & 5100 Dissolved Oxygen Meter**

**Setup and Operation...**

# Outline of Presentation

- ① Introduction to the 5000 & 5100 Systems
- ② Unpacking and Setting up the 5100 system
- ③ User-interface...Key Functions
- ④ Powering the Meter
- ⑤ Membraning the Probe
- ⑥ The Menu Structure
- ⑦ Calibrating the System
- ⑧ Making Measurements
- ⑨ Care and Maintenance
- ⑩ Advanced Features (optional)

1

# Introduction

# Introduction to the 5000 & 5100

YSI is pleased to present you with basic operating guidelines to unpack, set up, calibrate and measure dissolved oxygen using a YSI 5100 DO Meter configured with a 5010 BOD probe.

If you are using a YSI 5000, rather than 5100, no problem. The instruments are virtually identical for the basic instructions presented here. The 5100 has features that will be described in a moment.

Remember, these are basic “getting started” instructions. Don’t forget that the user manuals are included in the shipping carton and contain additional information that should be very useful in understanding and using this DO measuring system.

# About the Presentation

- ❖ The presentation will proceed from unpacking the meter, probe and accessories to...
- ❖ Installing batteries (back-up only), connecting AC power and connecting the BOD probe.
- ❖ Once set up, the meter will be turned on and the user-interface (keypad) will be described. Once a reading appears, we will stop to briefly show how to install a membrane on the probe
- ❖ Following this short “how to install a membrane” procedure, we will return to the meter and describe calibration.
- ❖ In addition to calibration, a couple of basic setup functions will be described as we study the menu structure of the meter.
- ❖ Some basic tips on taking a measurement will be described, followed by some basic care and maintenance.
- ❖ Finally, for those interested in the 5100 applications software, a step-by-step SOUR test will be shown.

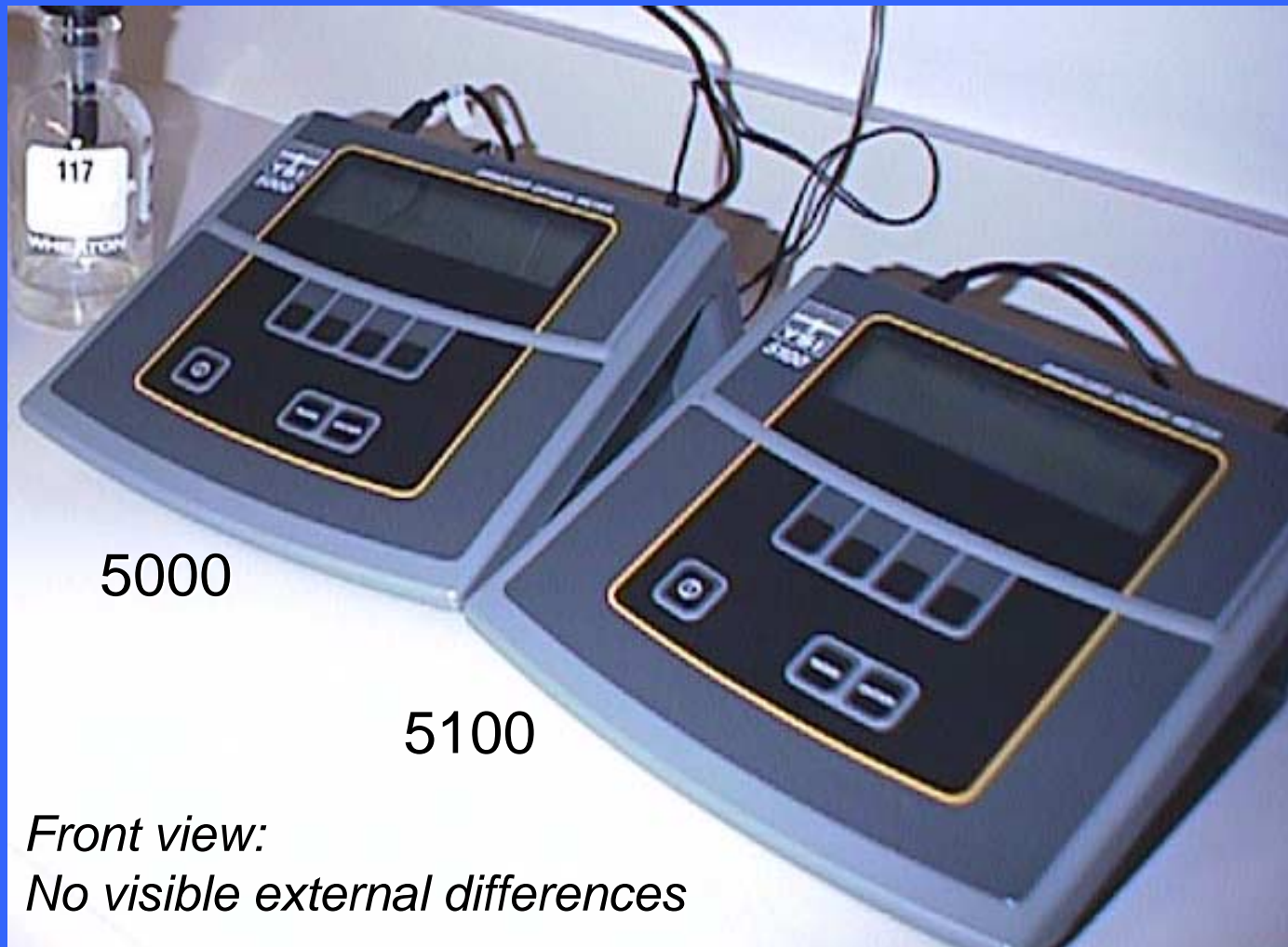
**In a few minutes your system  
will look like this...**



# Comparing Model 5000 vs. 5100

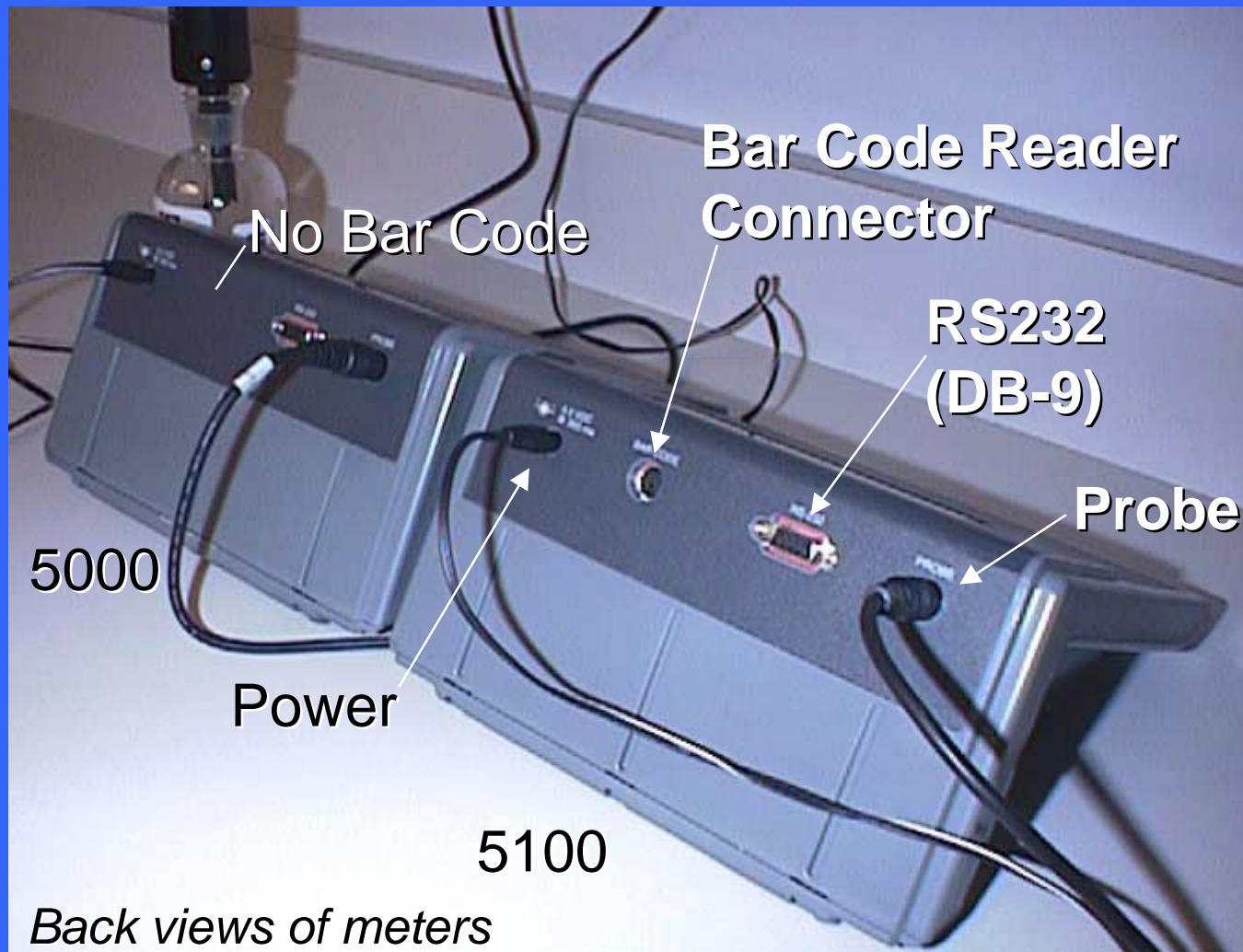
- ❖ Both 5000 & 5100 have many shared features
  - Same case, display and keypad arrangement
- ❖ 5100 has 3 distinct features...
  - Internal barometer and it can be calibrated
  - Special applications software for oxygen uptake rate testing
  - Bar code reader capability for use with BOD software
- ❖ This presentation focuses on the common features of the 5000 and 5100.

# Comparing Model 5000 vs. 5100





# Comparing Model 5000 vs. 5100



2

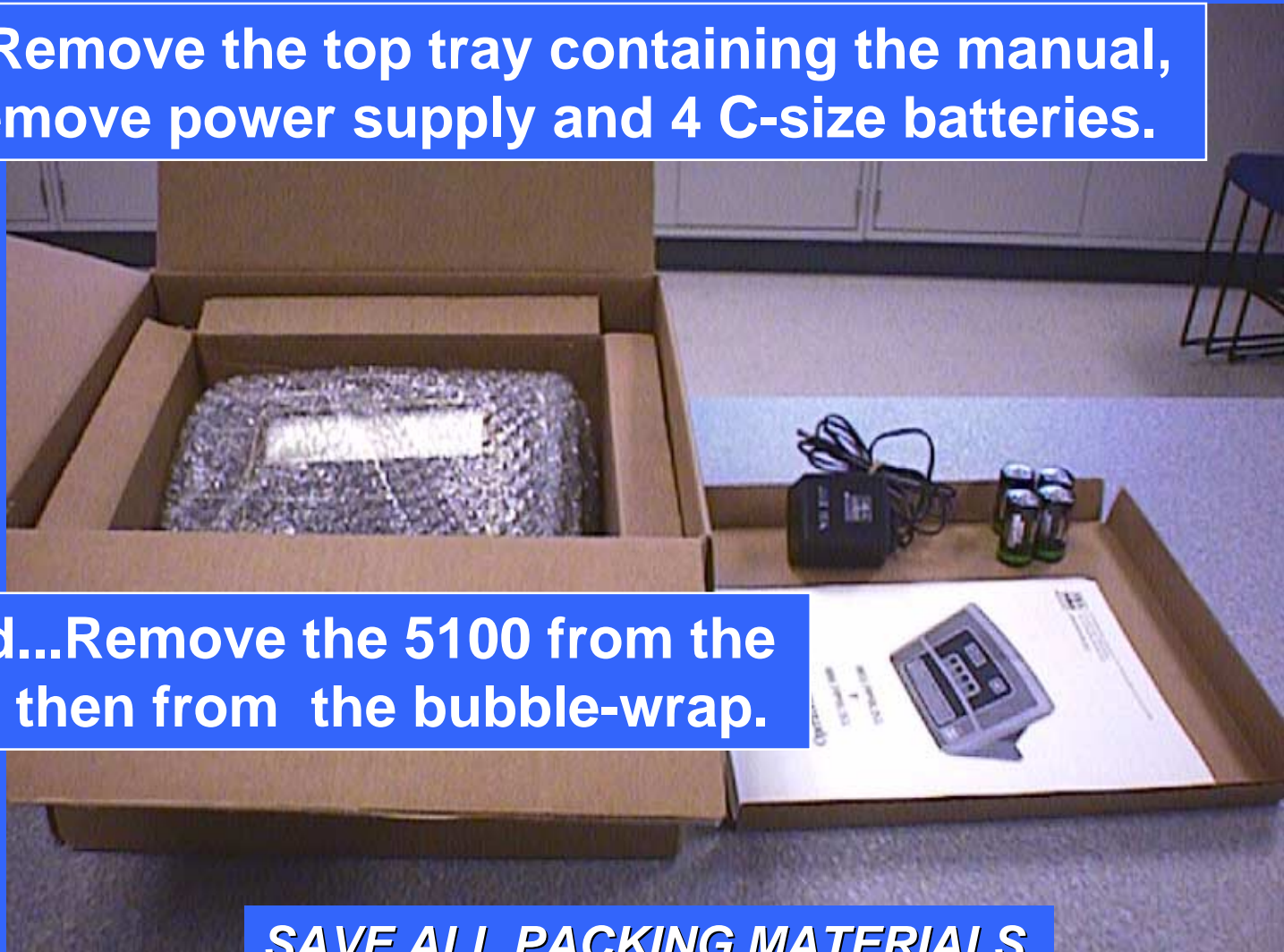
# Unpacking & Setting Up

# Unpacking the Meter

First...Remove the top tray containing the manual, then remove power supply and 4 C-size batteries.

Second...Remove the 5100 from the carton, then from the bubble-wrap.

***SAVE ALL PACKING MATERIALS.***



# Unpacking the Probe

5010  
BOD Probe

5906  
Cap Membrane Kit

Instruction  
Manual

***SAVE ALL PACKING MATERIALS.***





# Installing the Batteries



First...Position the 5100 face down, then slide off the battery compartment cover as shown.

*No tools required.*

# Installing the Batteries continued...

Second...Insert the batteries, paying special attention to polarity labels.



Third...Slide the cover back into place as shown above.

# Connecting the Power Supply

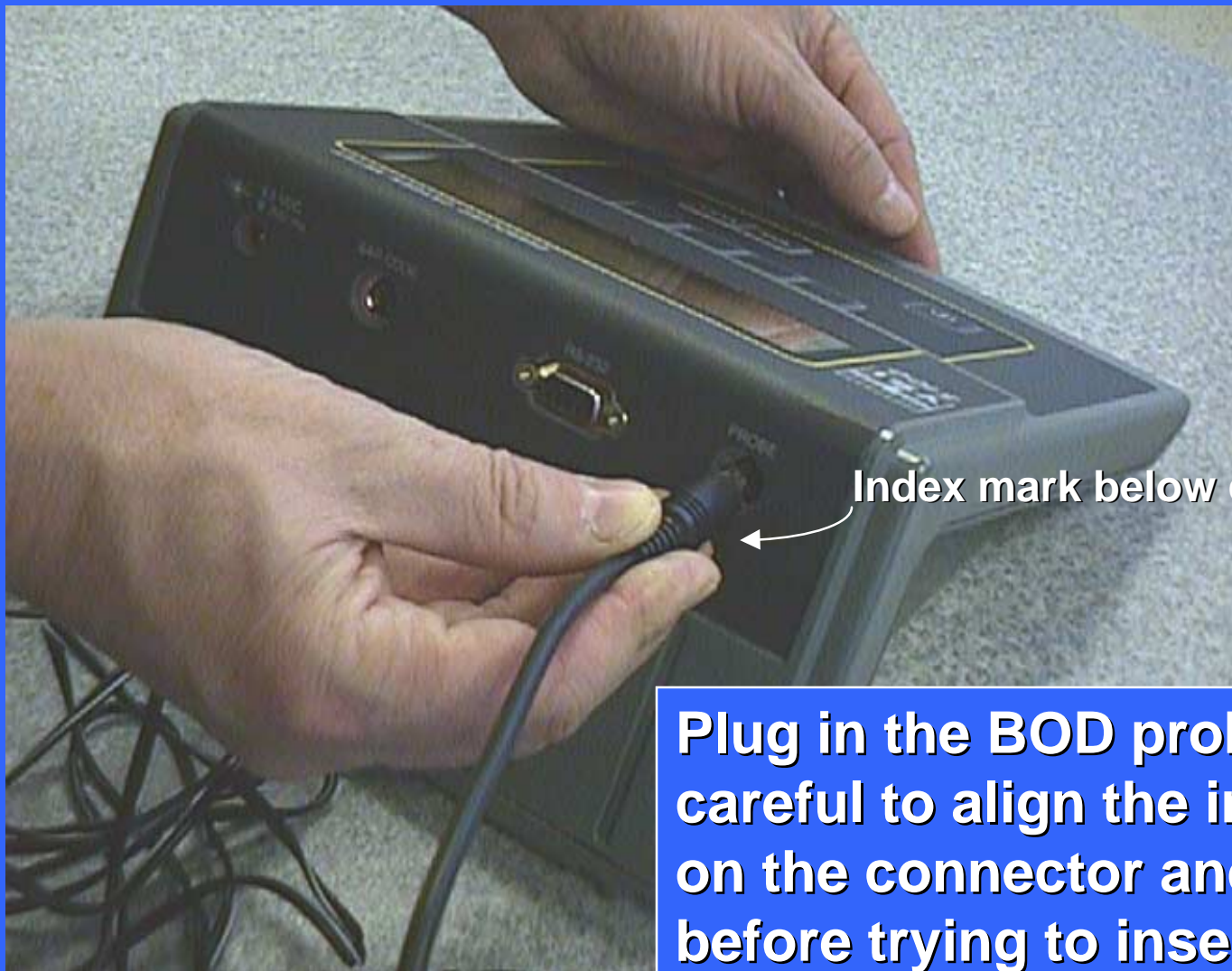


5117  
power module

Simply place the connector from the 5117 Power Supply into the meter, then the power module into an AC receptacle.



# Connecting the Probe





# Connecting the Probe continued...



Red toggle switch

Check for motion of  
stirring paddle here

If the BOD probe stirrer is turned on when you power up, switch the red toggle switch to off position.



# **User-Interface Keypad Functions**

# User-Interface...Key Functions



**\* Soft Key function is linked to the menu structure.**

# User-Interface...Descriptions

- ❖ Power key turns main power on & off.
- ❖ LCD (alpha-numeric) displays readings and also displays menu information needed to set up the instrument.
- ❖ Soft Keys provide a way to proceed through the software sub-menus and to change parameters and values.
- ❖ Soft Key Status messages are linked to particular menu levels and therefore change as you move through the menu items.
- ❖ Enter key allows confirmation of choices in the menu.
- ❖ Mode key provides a way to toggle from Main to Application mode and functions as a “back-up” key in menu navigation.
- ❖ Probe Stirrer Switch controls power to the stirring paddle at the BOD probe face. Motion at the probe face is essential to accurate DO readings.



# Powering the Meter

# Before You Power the Meter...

- ❖ Obtain a standard 300 ml BOD bottle
- ❖ Place about 1/2 inch of water into the bottle
- ❖ Place the BOD probe into the bottle
- ❖ Your system should now resemble the photo in the next slide...
  - Probe connector plugged into meter
  - Power connector plugged into meter
  - Power module plugged into AC receptacle
  - Probe inserted into BOD bottle

# Before You Power the Meter...

- ❖ Obtain a standard 300 ml BOD bottle
- ❖ Place about 1/2 inch of water into the bottle
- ❖ Place the BOD probe into the bottle
- ❖ Your system should now resemble the photo in the next slide...

# The Basic Setup for Powering

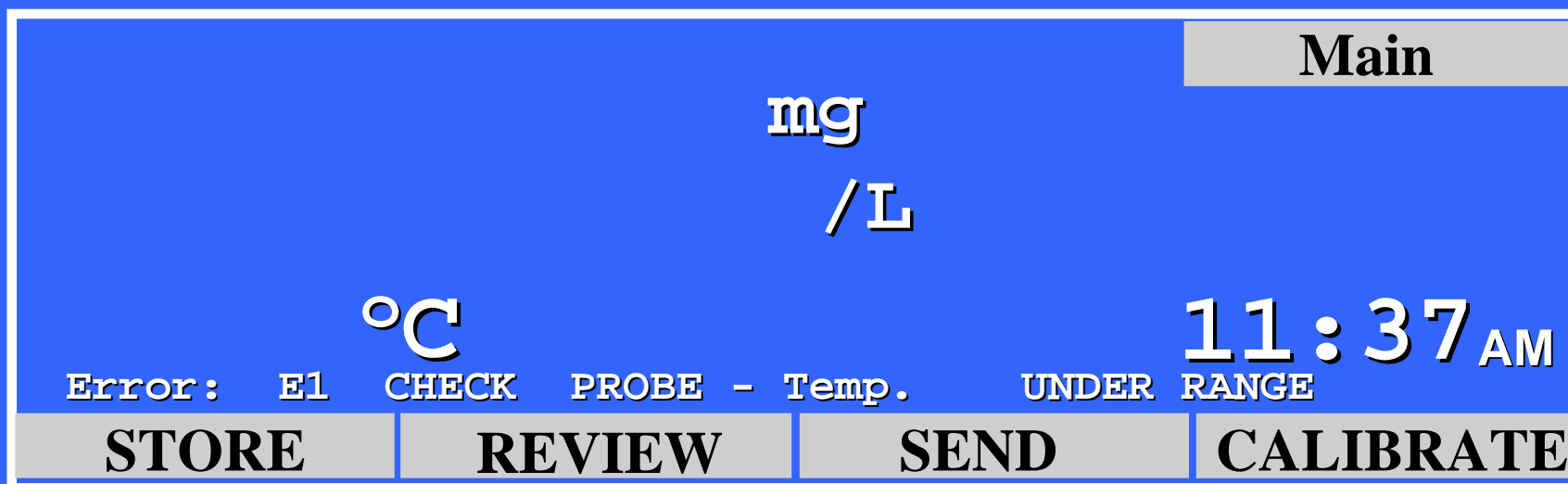




# You're ready to power the meter...

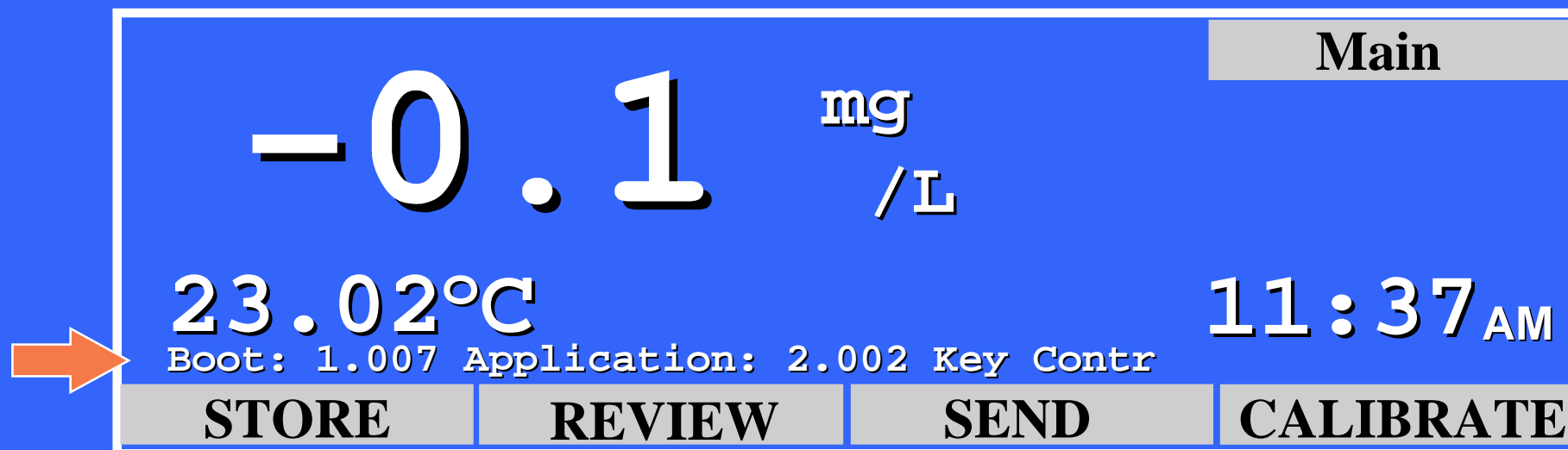
- ❖ Press the Power key.
- ❖ The YSI logo appears, followed by a scrolled message with software version information.
- ❖ If the probe stir motor is on, turn it off for now.
- ❖ Refer to the next few slides, which show typical display screens during normal power-up...

When you first power on you should see this...



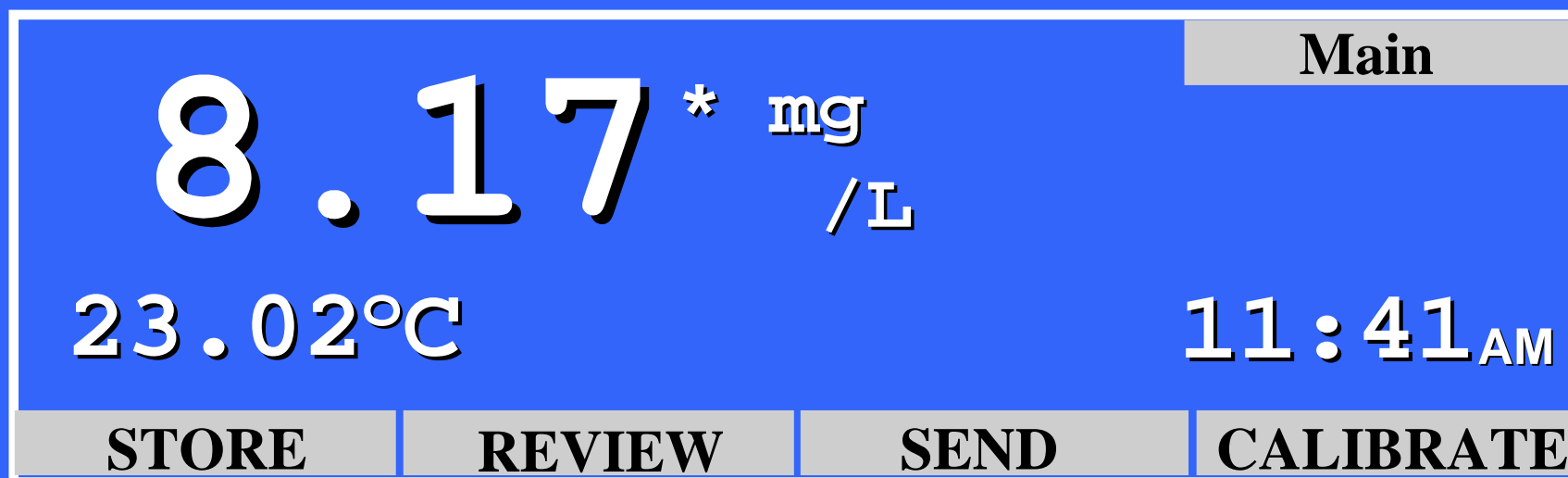
If no change occurs within a couple of seconds, check to insure proper probe connection to meter

This is normal on power up...for a few seconds.



Software version information scrolls by (see arrow).

This is normal on power up...after a few minutes.



This assumes that you have a functional membrane and fresh probe solution. In most cases you will need to install a new membrane before proceeding. Refer to Section 5, *Membraning the Probe*.

5

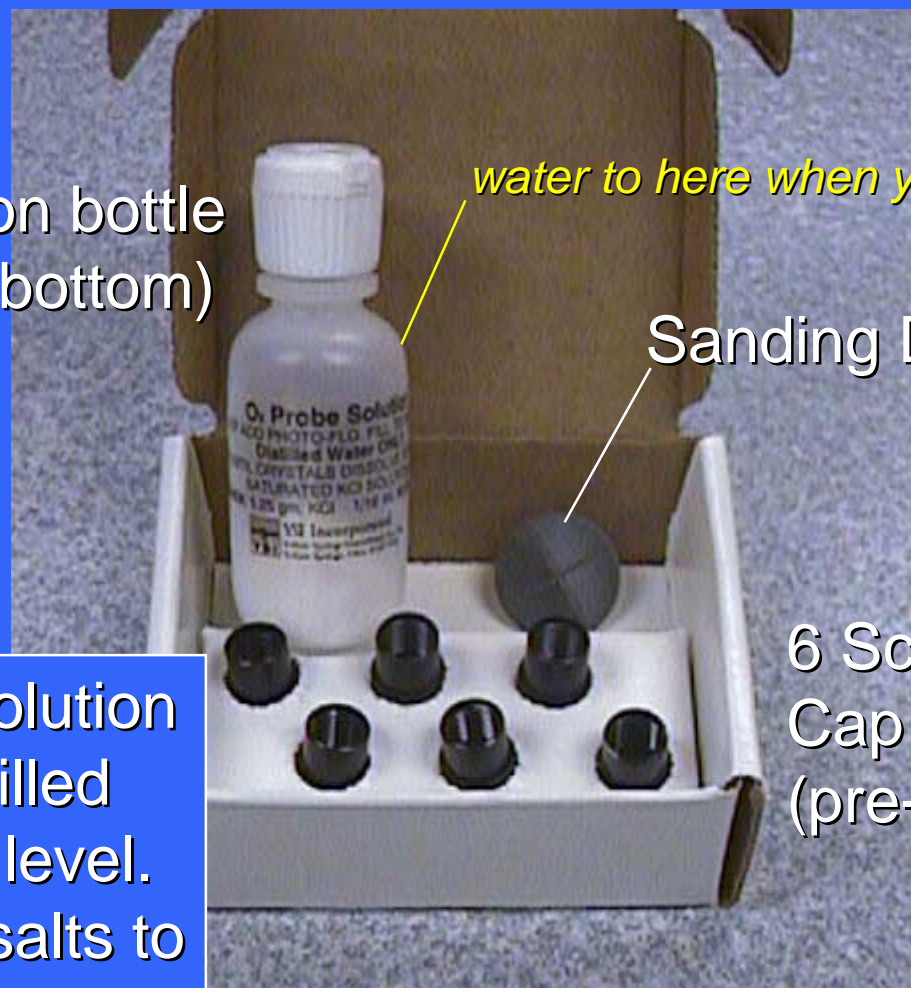
# Membraning the Probe

# The 5906 Membrane Kit

Probe solution bottle  
(dry salts in bottom)

*water to here when you reconstitute*

Sanding Disk



6 Screw-on  
Cap Membranes  
(pre-stretched)

Unscrew cap of probe solution bottle and add DI or distilled water to about shoulder level. Swirl contents allowing salts to become completely dissolved.

# Steps to Change a Cap Membrane

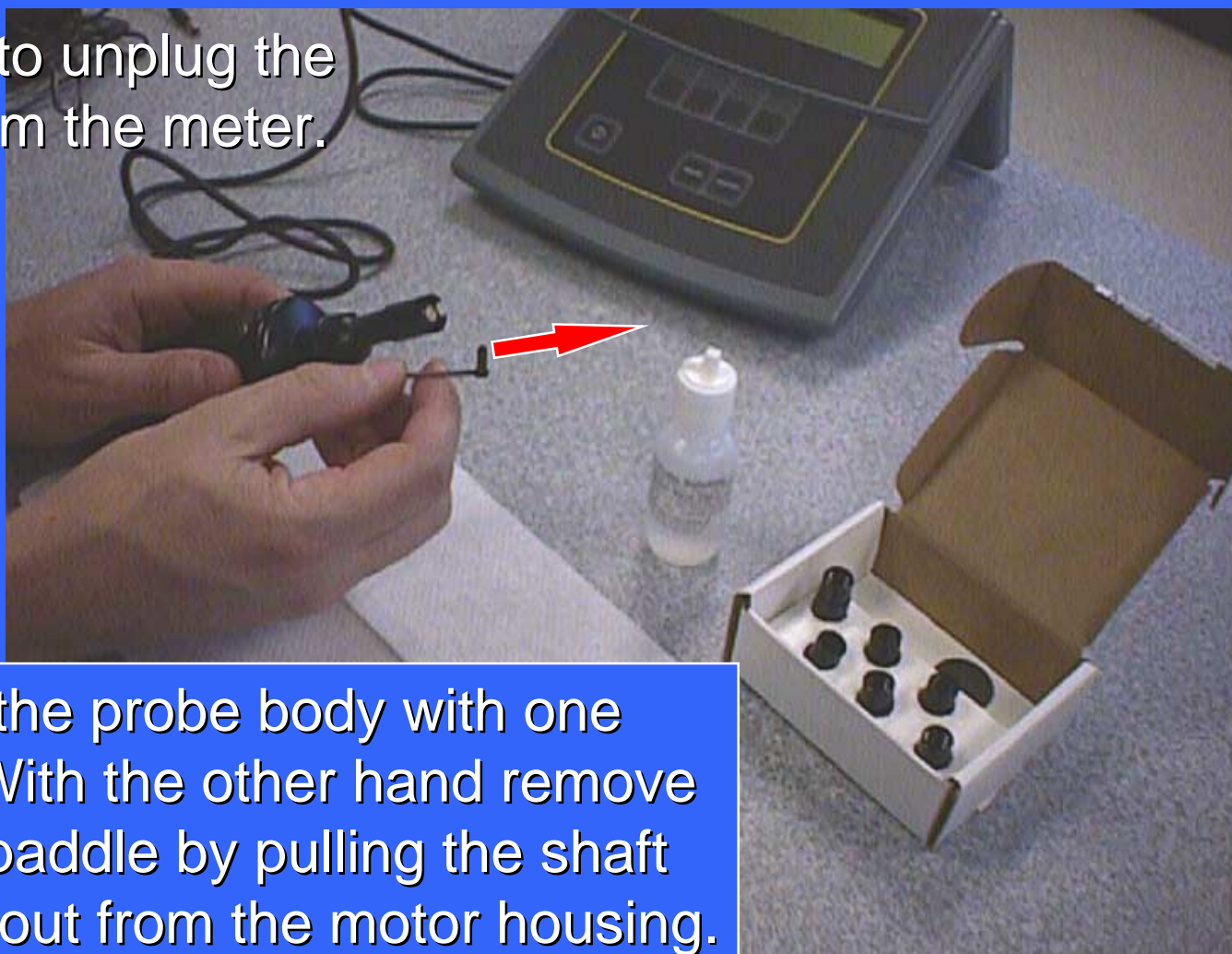
To change membrane do the following...see next slides.

- Remove stir paddle and shaft assembly (pull straight out).
- Grasp cap and rotate counterclockwise to remove.
- Rinse probe and visually inspect for debris and salt deposits.
- Place cap membrane down and 1/2 fill with probe solution.
- Slip membrane up and over electrode and tighten snugly.
- Replace stir paddle.
- Rinse off excess saline and shake off excess water.
- Return probe to BOD bottle with 1/2" water in bottom.

It is good practice to wait at least 15 minutes before attempting a calibration. This allows probe and temperature equilibration.

# Remove the Stir Paddle

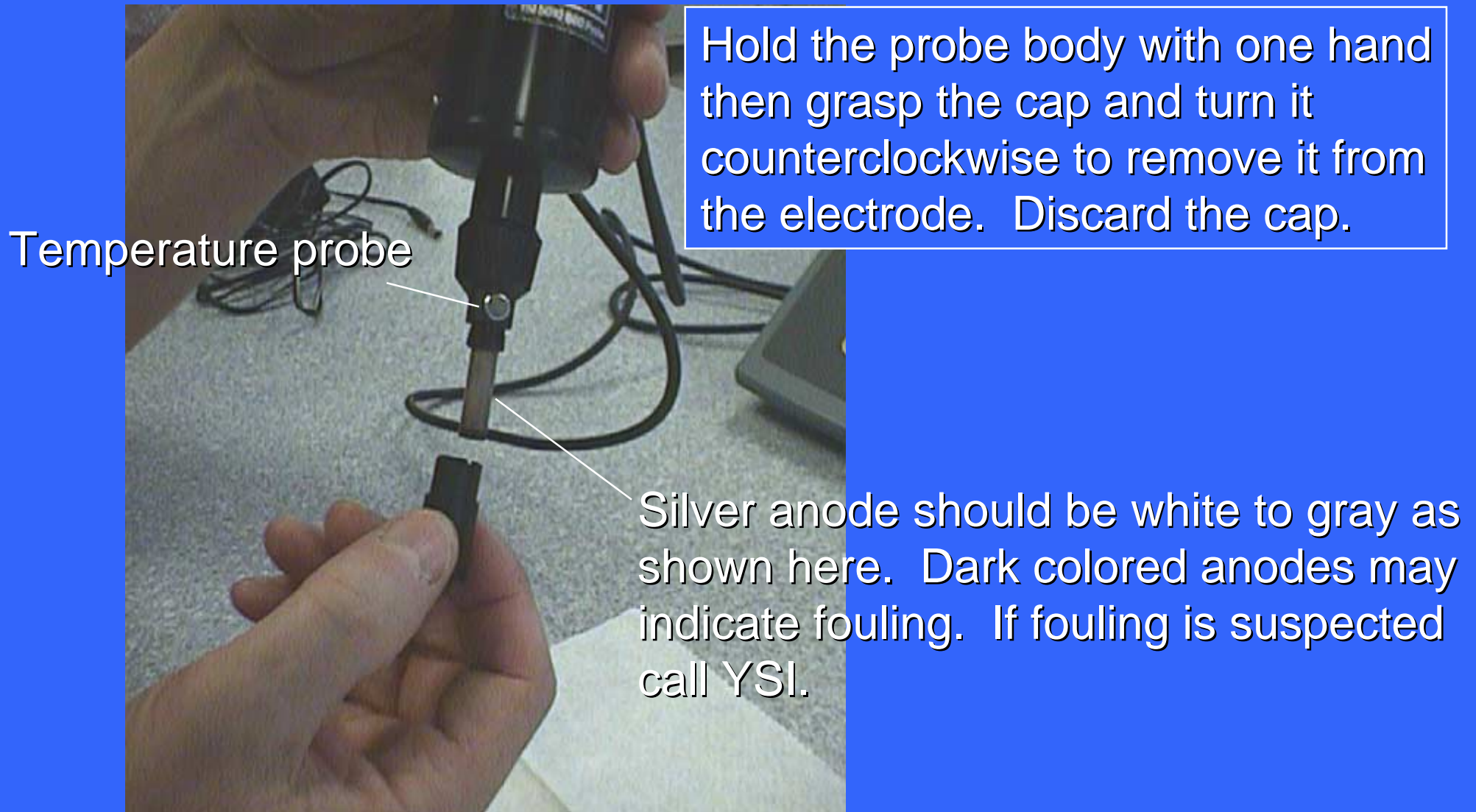
No need to unplug the probe from the meter.



Secure the probe body with one hand. With the other hand remove the stir paddle by pulling the shaft straight out from the motor housing.



# Remove the Cap Membrane



# Add Probe Solution to the Cap

Remove a new cap membrane from the box. Add Probe Solution to half fill the new cap membrane.

New Cap Membrane

Probe solution

Stir Paddle



# Install the New Cap Membrane

Holding the probe body vertical, raise the new cap up and over the electrode. Probe solution should overflow some as you turn the cap clockwise to secure the new membrane. Do not over-tighten!



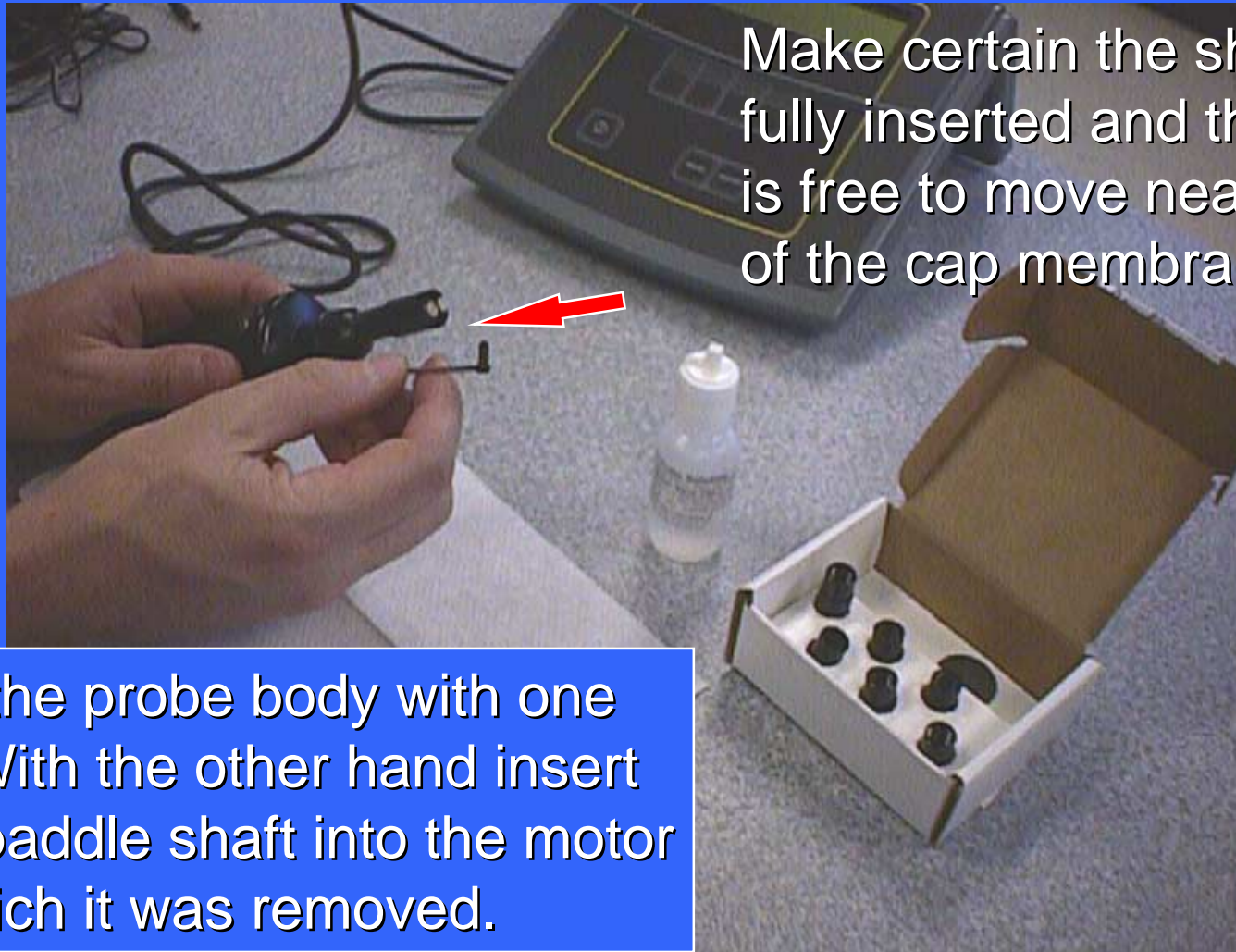
New cap membrane

Your fingers may become a little wet as some probe solution overflows. This is normal.



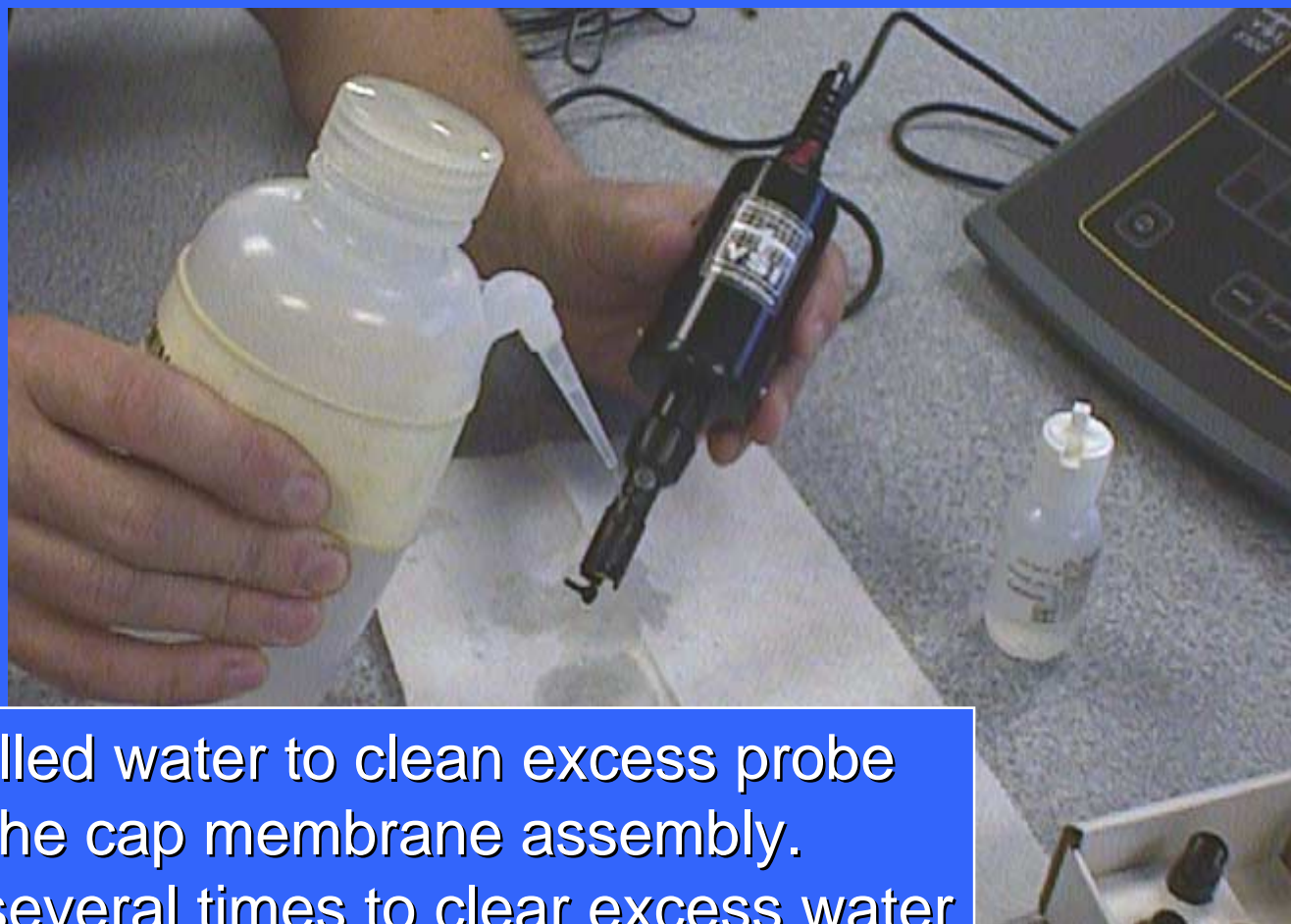
# Re-install the Stir Paddle

Make certain the shaft is fully inserted and the paddle is free to move near the face of the cap membrane.



Secure the probe body with one hand. With the other hand insert the stir paddle shaft into the motor from which it was removed.

# Rinse Off Excess Probe Solution

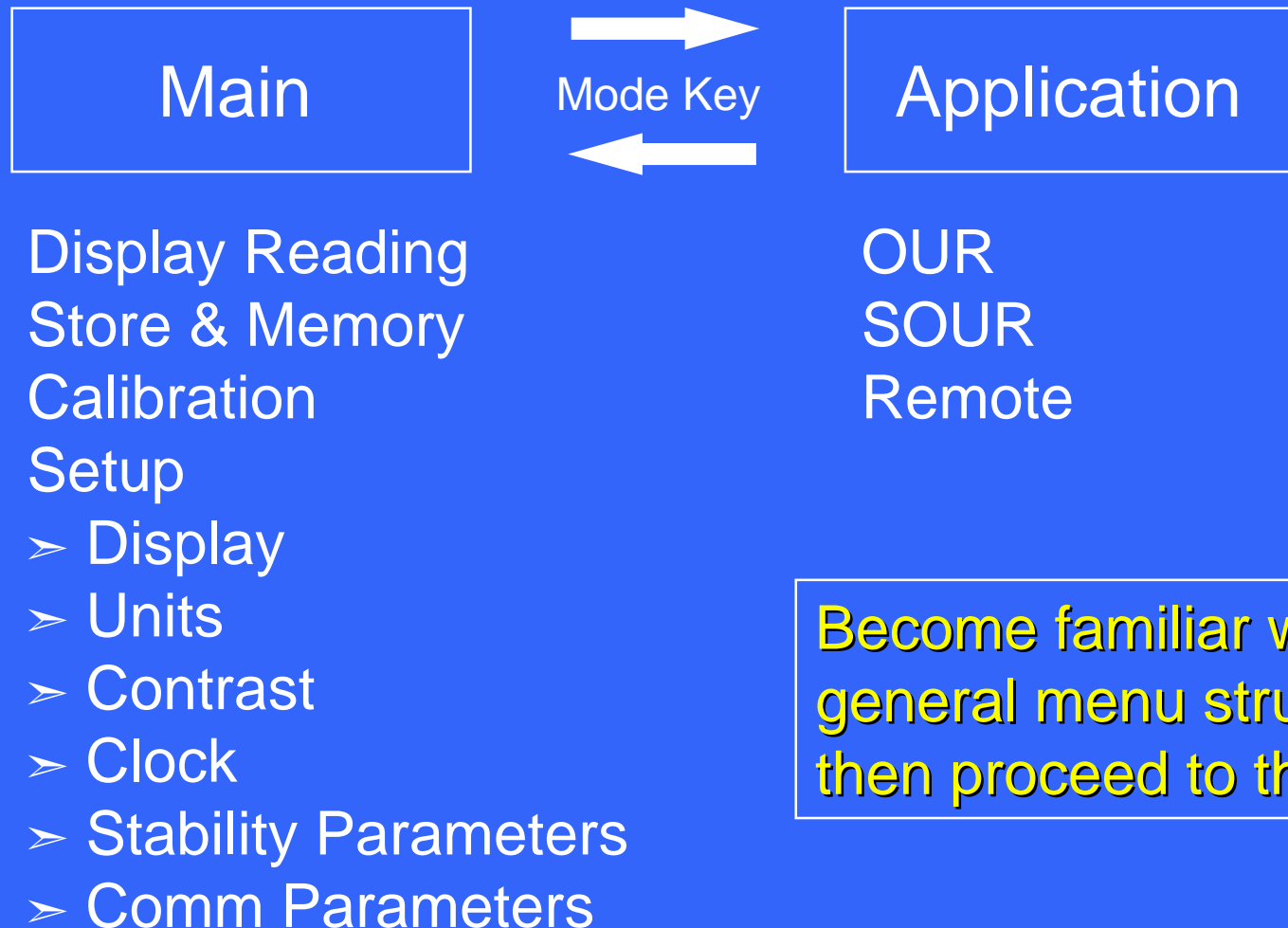


Use DI or distilled water to clean excess probe solution from the cap membrane assembly. Shake probe several times to clear excess water from probe body and membrane surface.



# The Menu Structure

# Basic Menu Structure



Become familiar with the general menu structure, then proceed to the examples.

# Learning to Navigate the Menu

Let's take a few minutes to describe two examples related to moving through the menu structure. We will set the date and time and we will change display reading units. The display figures that follow take you step-by-step through the menus.

From Main menu...

- Press CALIBRATE soft key (note changes to soft key status bar).
- Press SETUP from Calibrate soft keys.
- Press SYSTEM from Setup soft keys.
- Press TIME/DATE from System soft keys.
- Change date and time by using the NEXT soft key to progress through the numbers, while using the UP & DOWN keys to change numbers to the appropriate values. Press ENTER key to confirm changes.
- Press MODE key to back out of submenus to return to Main display.

**See slides...**



# Learning to Navigate the Menu

Let's take a few minutes to describe two examples related to moving through the menu structure.

- We will set the date and time.
- We will change display reading units.

The display figures that follow take you step-by-step through the menus.

**See slides...**

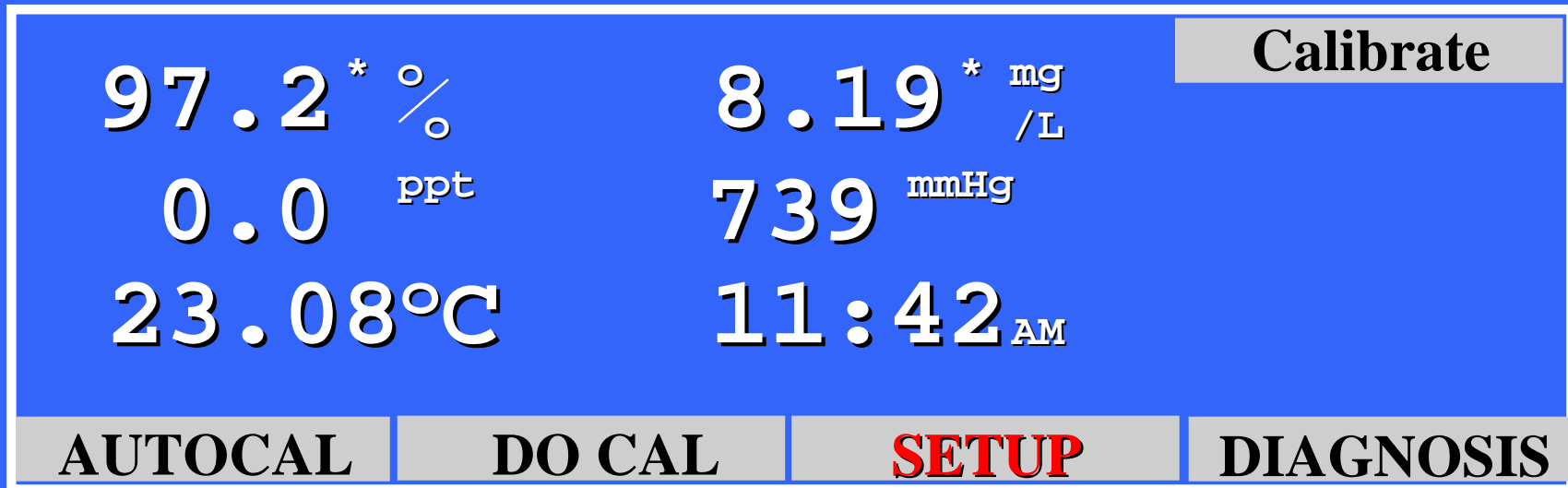
# Setting Date and Time

8.22 <sup>*</sup> mg/L			Main
23.05°C		11:41 AM	
STORE	REVIEW	SEND	<b>CALIBRATE</b>



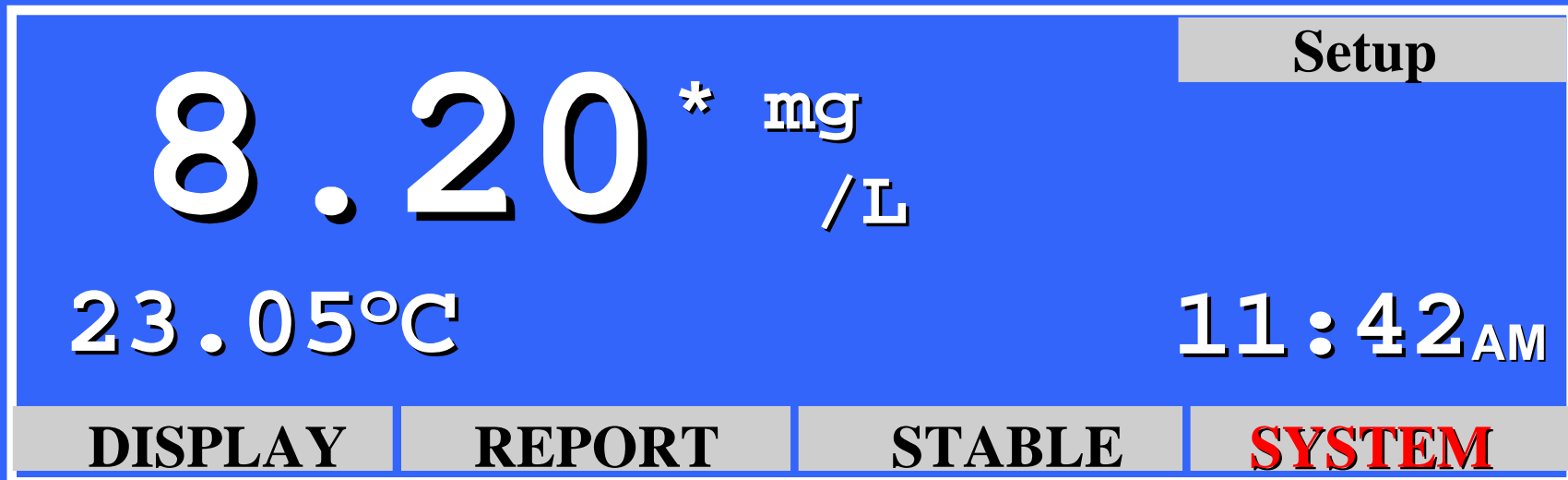
Press CALIBRATE soft key to access setup menus.

## Setting Date and Time continued...



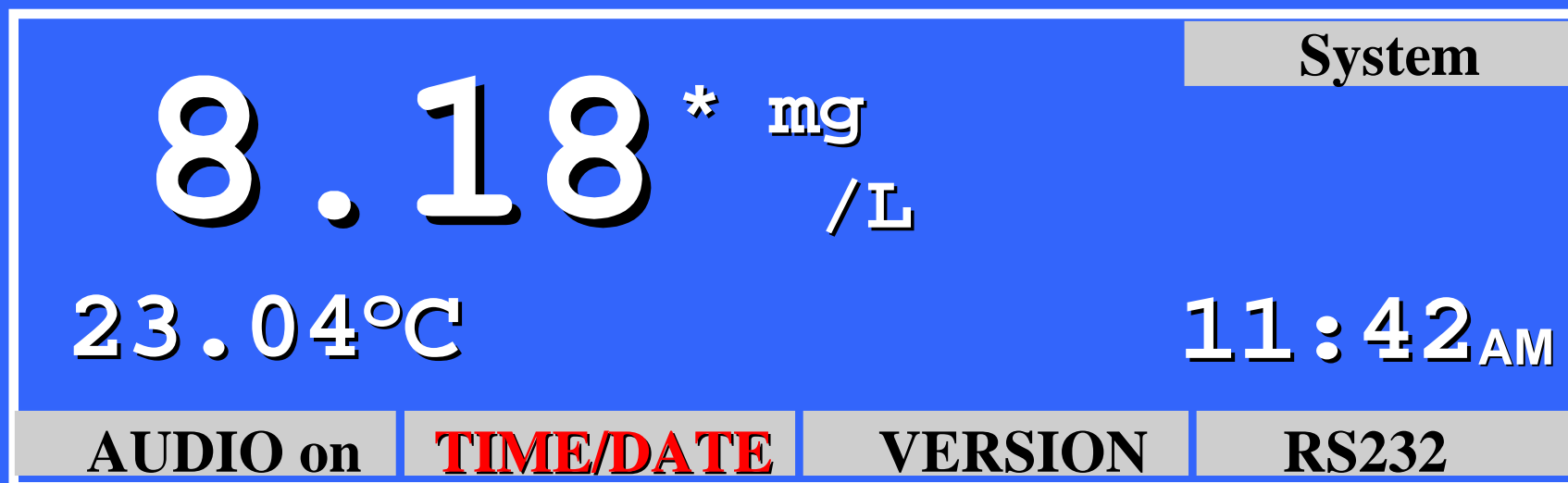
Press SETUP soft key to view SYSTEM.

## Setting Date and Time continued...



Press SYSTEM soft key to view options.

## Setting Date and Time continued...



Press TIME/DATE soft key to view current date and time.

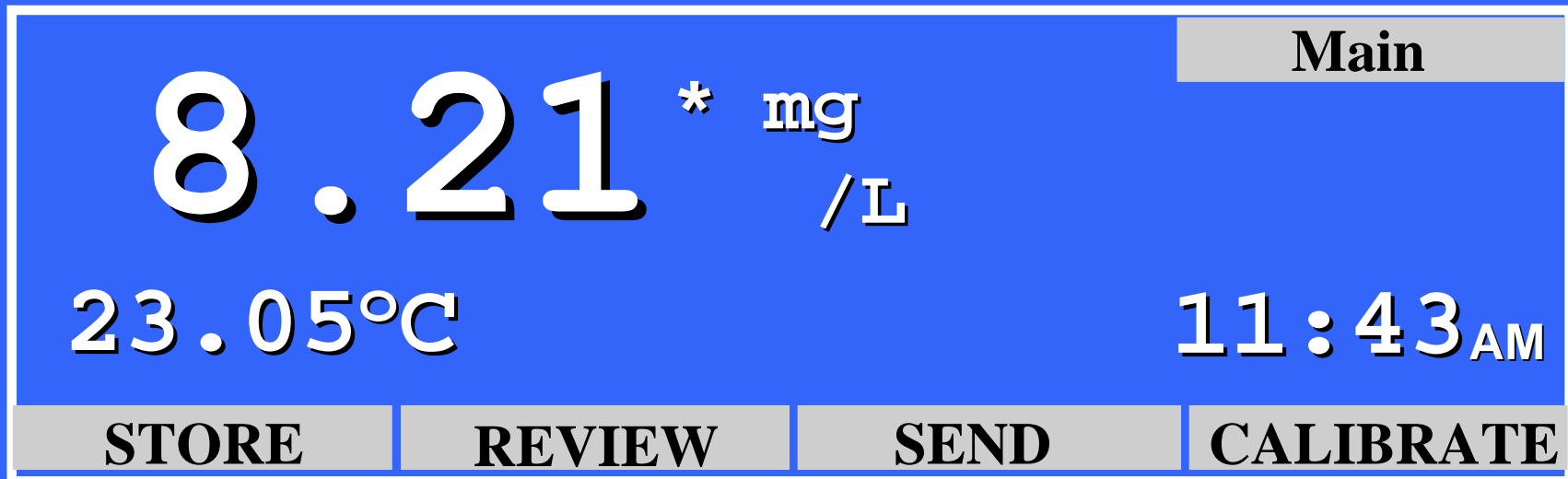
Flashing number shows digit that can be changed with UP/DOWN keys.

			<b>Time/Date</b>
<b>11:42:25</b>			
<b>10/29/1998</b>			
<b>UP</b>	<b>DOWN</b>	<b>DIGIT</b>	<b>NEXT</b>

Use NEXT to move to minutes, seconds, and so on. Always use 24-hour clock setting.



## Returning to Main Mode



Press MODE key to return to Main menu display.

# Changing Display Parameter Units

From Main menu...

- Press CALIBRATE soft key again to access Setup menu.
- Press SETUP from Calibrate soft keys.
- Press DISPLAY from Setup soft keys.
- Press UNITS from Display soft keys to view parameter unit choices.
- Change units by using the NEXT soft key to proceed through the list to the parameter of choice. Use the UP or DOWN soft keys to scroll through menu choices for each parameter.
- Press ENTER key to confirm changes and press MODE key to return to the Main menu. Press MODE key to back out of submenus to return to Main display.

**See slides...**

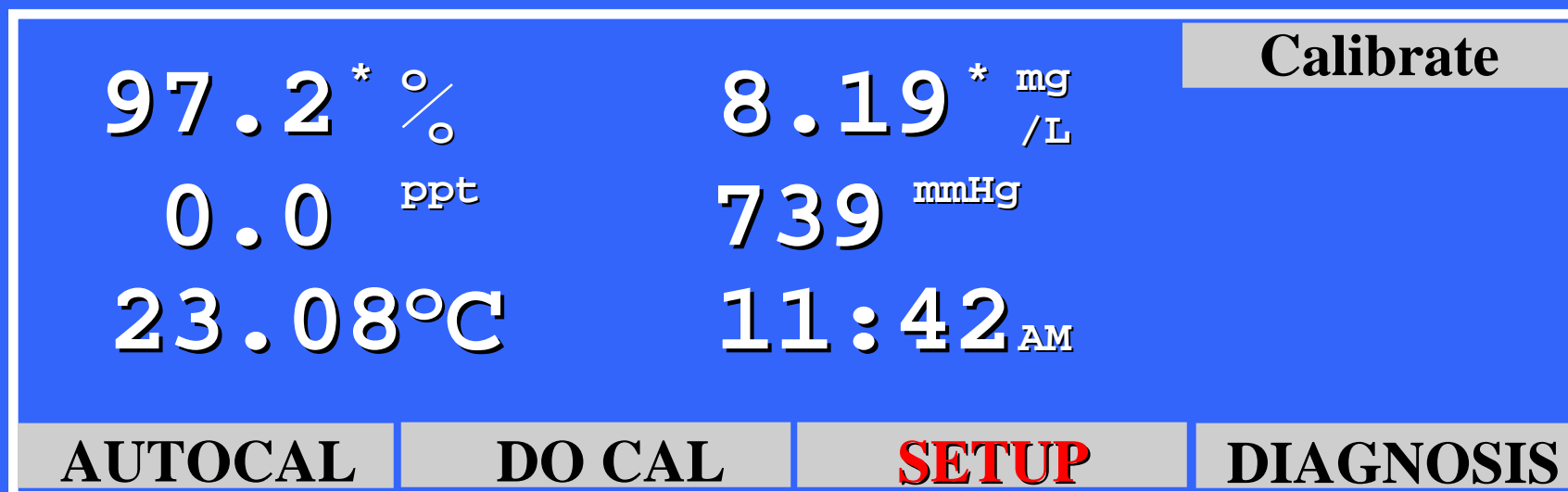
# Changing Parameter Units

8.22 <sup>*</sup> mg/L			Main
23.05°C		11:41 AM	
STORE	REVIEW	SEND	<b>CALIBRATE</b>



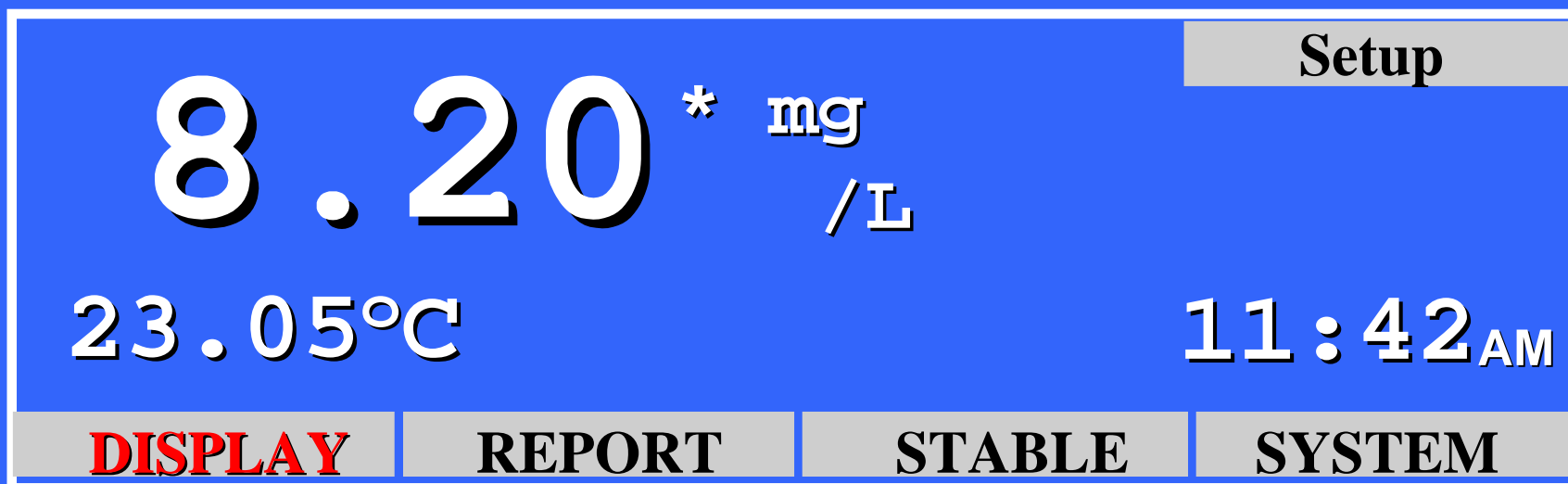
Press CALIBRATE soft key to access setup menus.

## Changing Parameter Units continued...



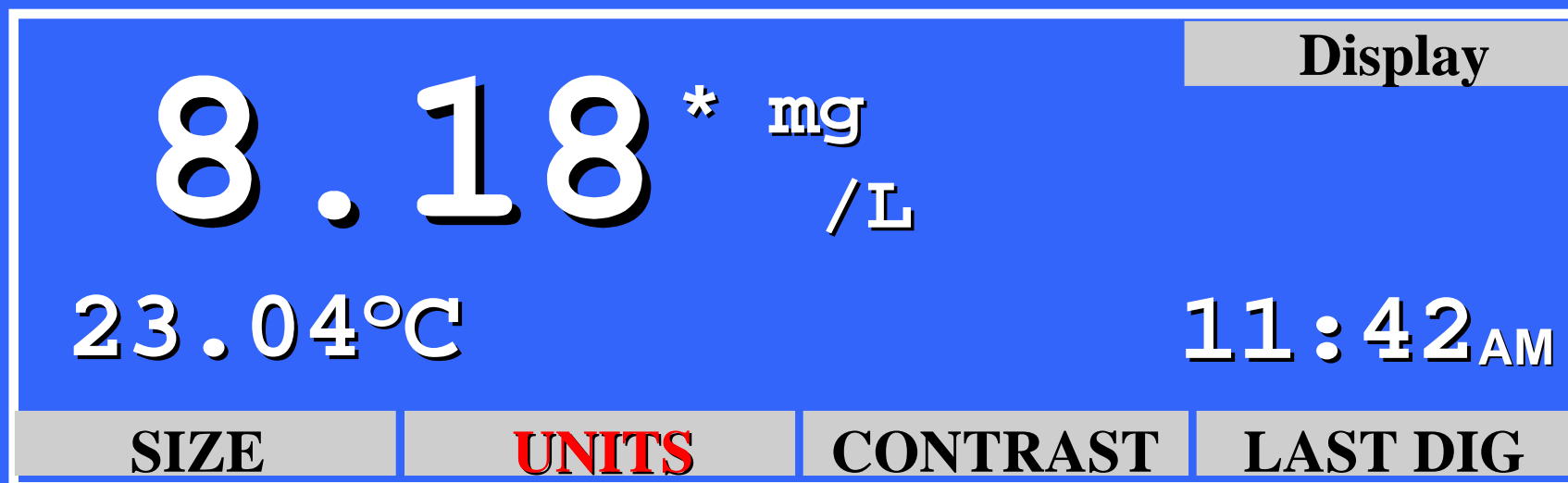
Press SETUP soft key to view setup options.

## Changing Parameter Units continued...



Press DISPLAY soft key to view options.

## Changing Parameter Units continued...



Press UNITS soft key to view parameters and current unit expressions.



## Changing Parameter Units continued...

DISPLAY UNIT SETUP			Units
D.O.	[	mg/L	]
Barometer	[	mmHg	]
Salinity	[	ppt	]
Temperature	[	C	]
Date Format	[	YYYY/MM/DD	]
		Hour	[ 12H ]
UP	DOWN		NEXT

Proceed through parameter choices with NEXT key. Use UP/DOWN key to change unit expressions.

## Other choices in the Display Unit list.

DISPLAY UNIT SETUP			Units
D.O.	[	%]	
Barometer	[	mbar]	
Salinity	[	ppt]	
Temperature	[	F]	
Date Format	[	MM/DD/YY]	Hour [ 24H ]
UP	DOWN		NEXT

Press MODE key to back out of submenus.

## Returning to Main Mode

8.21 <sup>*</sup> mg /L			Main
23.05°C		11:43 <sub>AM</sub>	
STORE	REVIEW	SEND	CALIBRATE

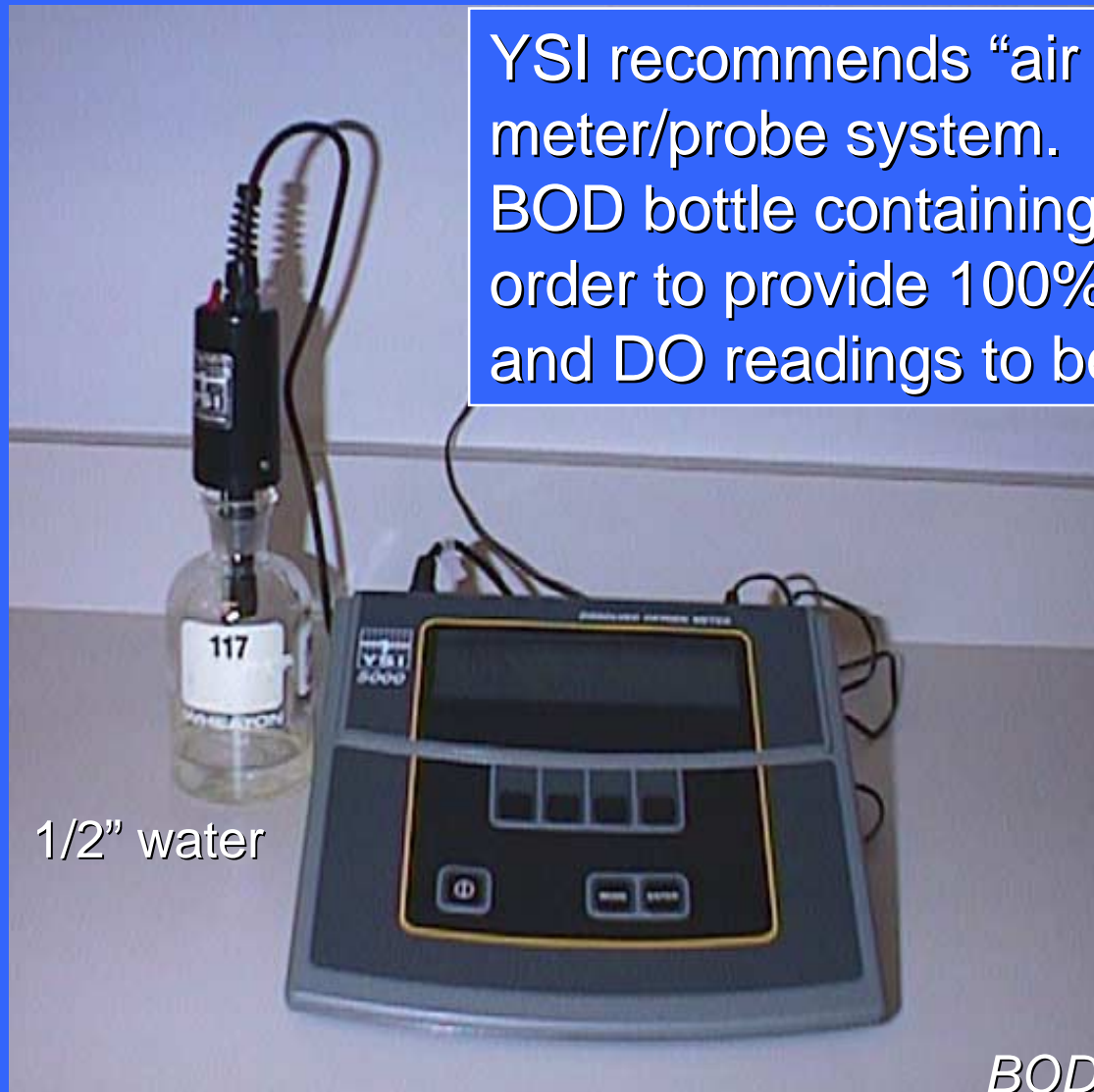
You will now proceed to calibration.



# Calibrating the System

# “Air Calibration” of System

YSI recommends “air calibration” of the DO meter/probe system. Place BOD probe into a BOD bottle containing about 1/2” of water in order to provide 100% RH. Allow temperature and DO readings to be stable before calibrating.



*BOD stir motor should be turned off.*

# Calibrating the System

After allowing the meter/probe system to equilibrate at room temperature for at least 15 minutes (probe in BOD bottle), turn your attention to the meter.

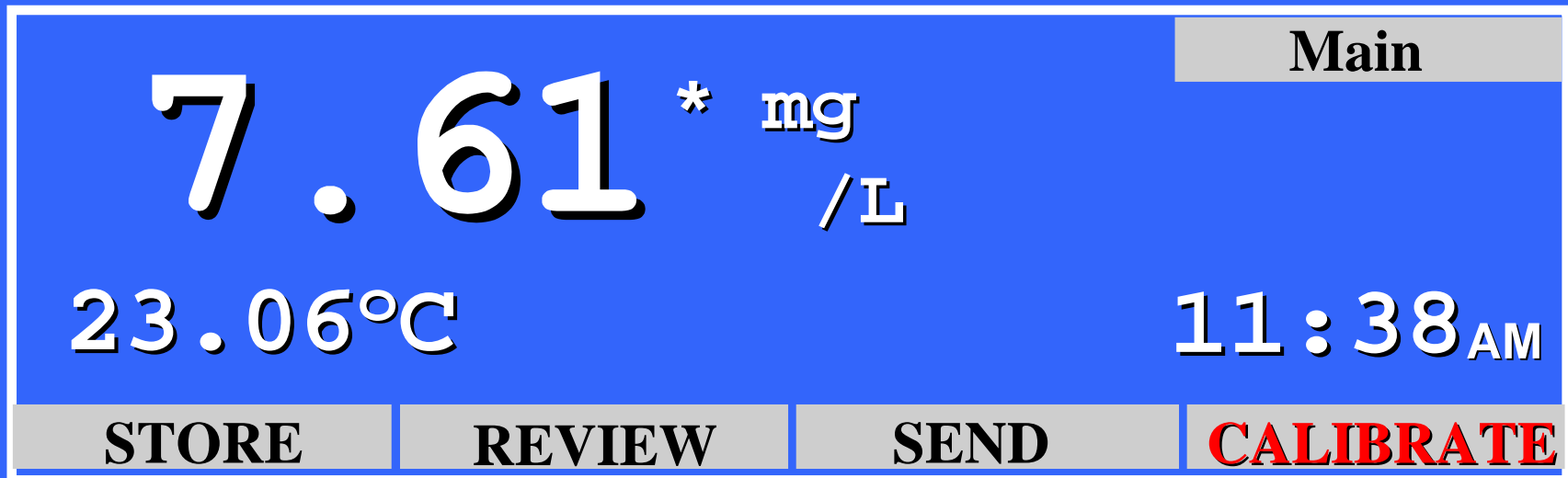
From Main menu...

- Press CALIBRATE soft key (note changes to soft key status bar).
- Check the expanded info screen for correct salinity and pressure.
- If 5100, you have a live barometer. No change should be required.
- If 5000, check barometric reading and change if needed. Press MODE to backup, then enter DO CAL, then NEXT until barometer reading is flashing. Change reading to appropriate true barometric pressure using digit and up/down keys.
- Press AUTOCAL. Watch for DO SAVED message. Calibration complete.
- Press MODE key to return to the Main display.

**See slides...**



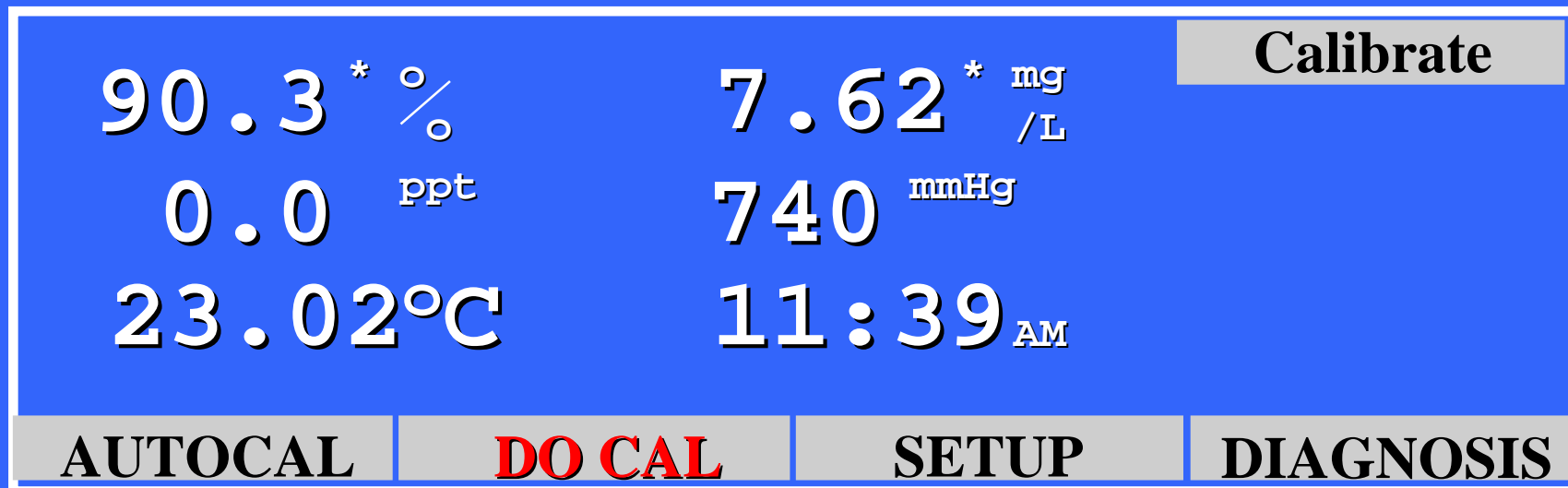
# Checking/Setting Barometric Pressure



Press CALIBRATE soft key to enter cal mode.

For 5000 model confirm/change barometric pressure.

*Not necessary in 5100, which has built-in barometer.*



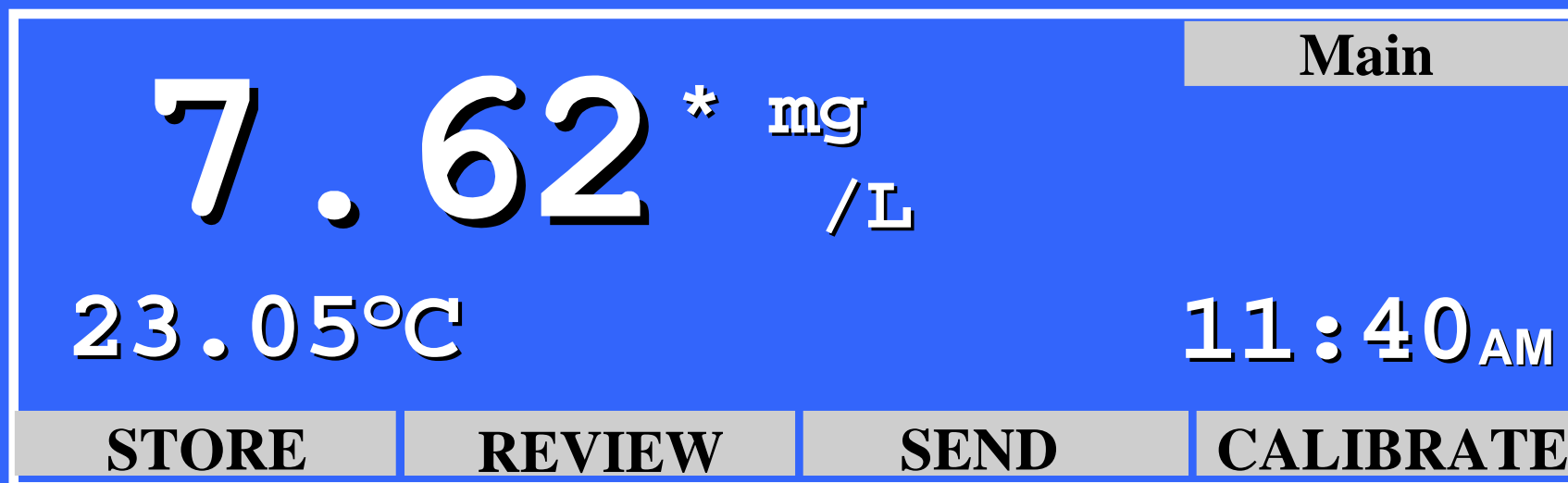
Press DO CAL to enter the menu to set DO concentration, salinity and/or barometric pressure.

## Barometric Reading Entry continued...

90.3 <sup>*</sup> %	7.61 <sup>*</sup> mg/L	DO Cal	
0.0 ppt	740 mmHg		
23.00°C	11:39 AM		
BAROMETER CALIBRATION SAVED			
UP	DOWN	DIGIT	NEXT

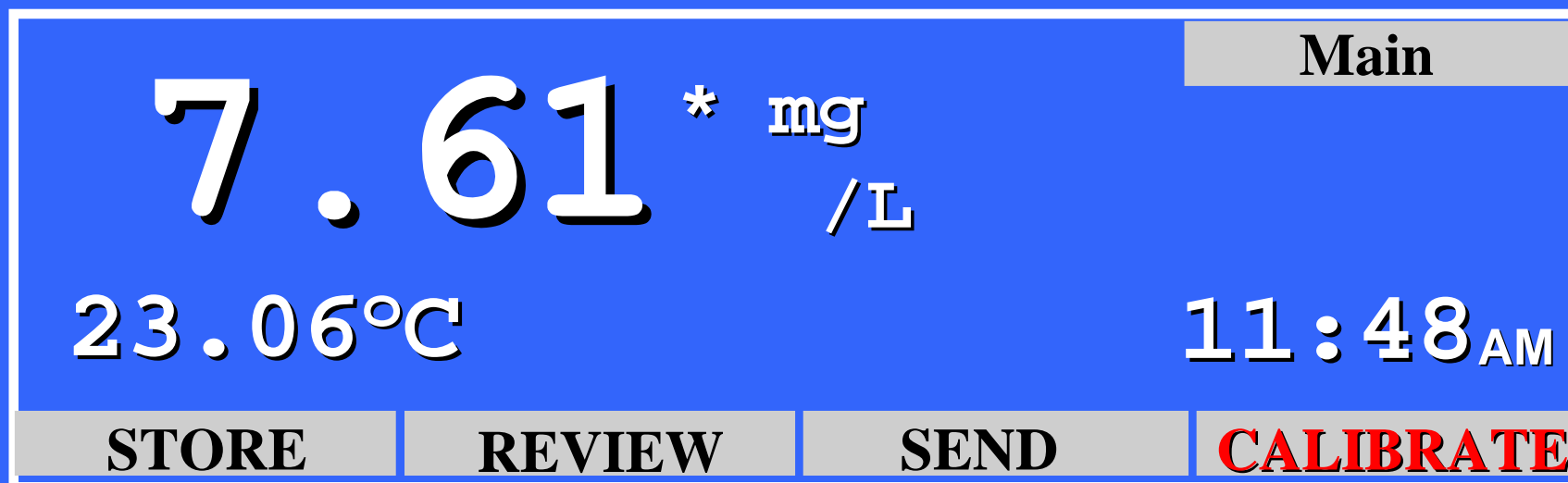
Use NEXT key to change parameters, then use DIGIT key to change digit, then use UP & DOWN keys to change values. Press ENTER to confirm.

Press MODE key to return to Main menu



You are now ready to calibrate.

When DO and temperature readings are stable...



Press CALIBRATE soft key to enter cal mode.

## Air Calibration continued...

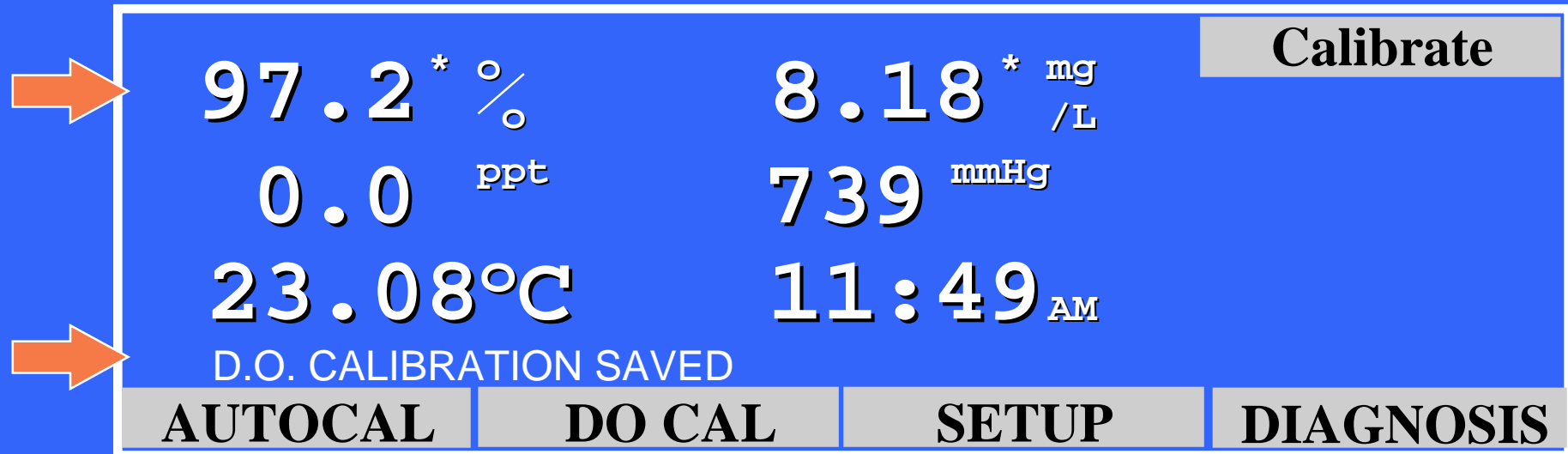
90.2 <sup>*</sup> %	7.62 <sup>*</sup> mg/L	Calibrate	
0.0 ppt	739 mmHg		
23.08°C	11:48 <sub>AM</sub>		
<b>AUTO CAL</b>	DO CAL	SETUP	DIAGNOSIS



Now press AUTO CAL to calibrate. See next screen.



Note changes in DO readings.

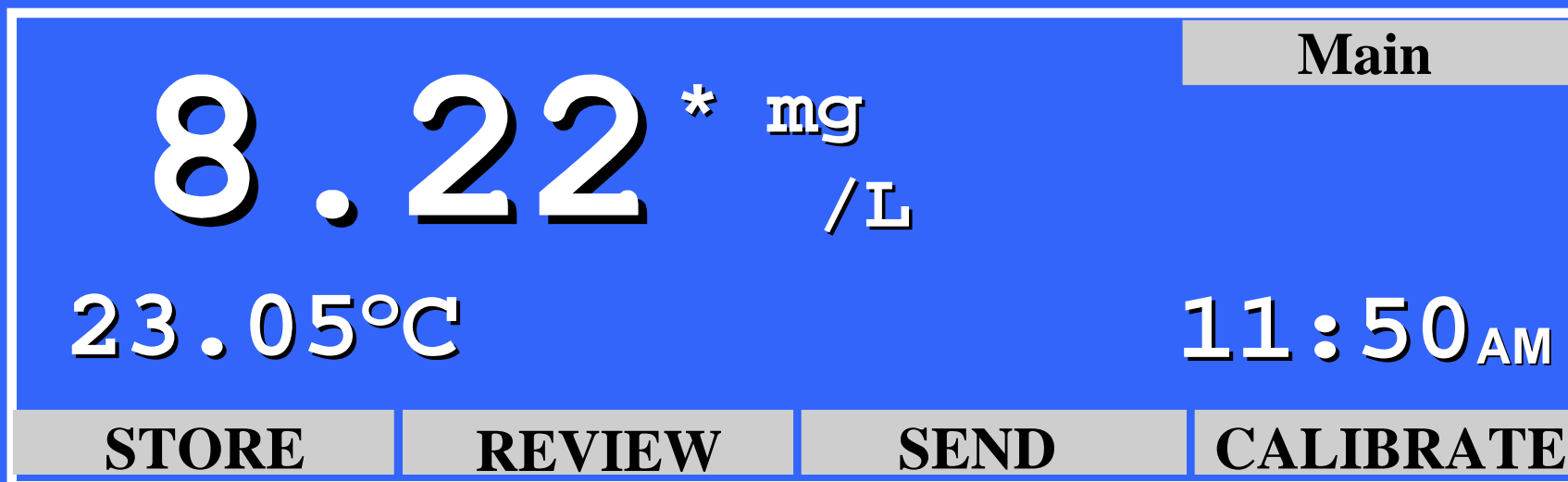


The screenshot shows a device display with a blue background. On the left, two orange arrows point to the DO readings and the confirmation message. The display shows the following data:

97.2* %	8.18* mg/L	Calibrate	
0.0 ppt	739 mmHg		
23.08°C	11:49 AM		
D.O. CALIBRATION SAVED			
AUTOCAL	DO CAL	SETUP	DIAGNOSIS

The new reading is the saved “air calibration” value. Confirmation message also appears lower left.

Press MODE key to return to Main menu display.



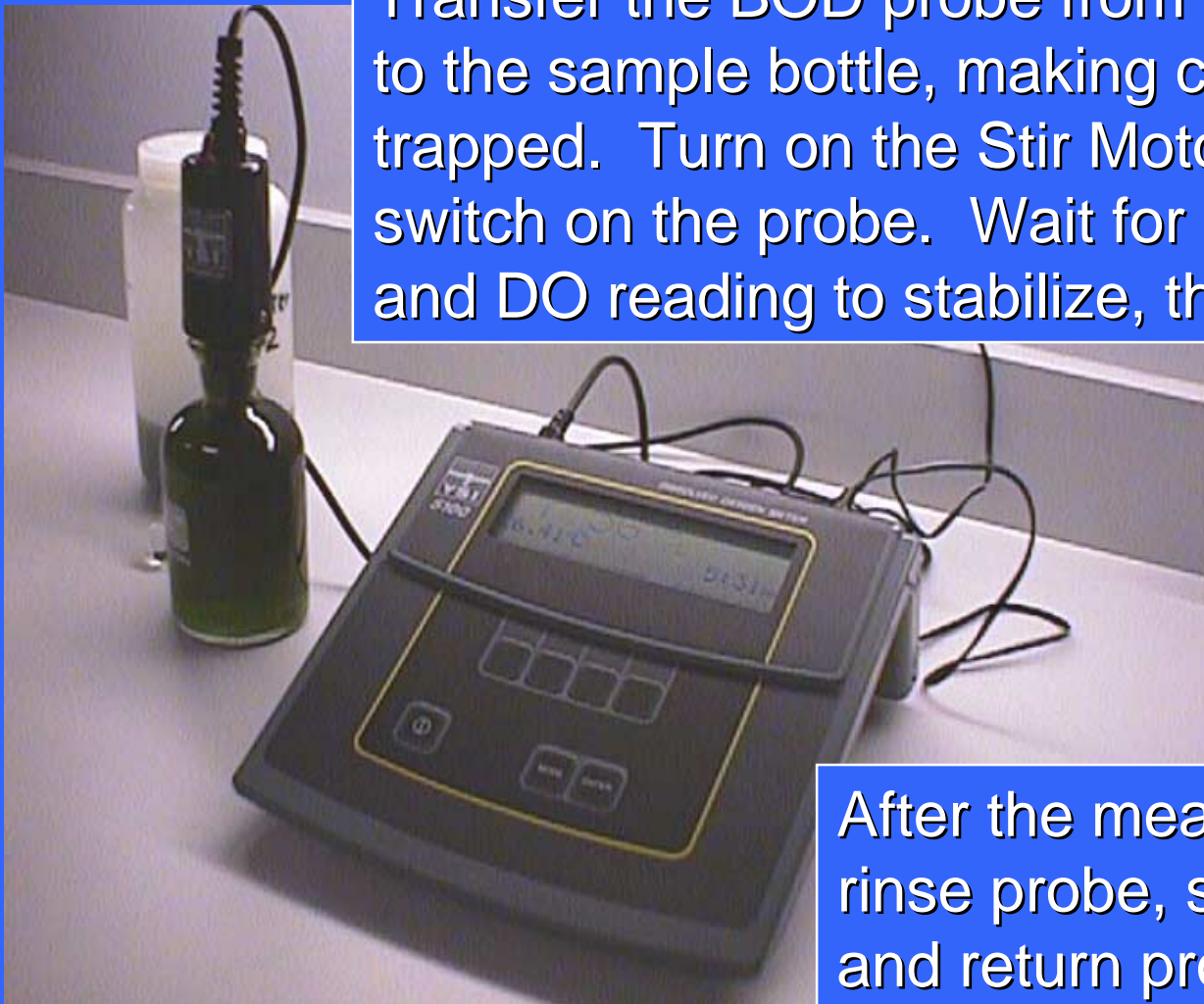
You are now ready to measure a sample.



# Making a Measurement

# Measuring DO in a Sample

Transfer the BOD probe from the calibration bottle to the sample bottle, making certain that air is not trapped. Turn on the Stir Motor using the red toggle switch on the probe. Wait for both the temperature and DO reading to stabilize, then record the reading.



After the measurement is completed, rinse probe, shake off excess water, and return probe to calibration bottle.

# Some Tips when Measuring DO

- ❖ Place the BOD probe back into the calibration bottle until the next measurement.
- ❖ Normally you need not recalibrate the probe between each sample. However, if you do, be certain that...
  - temperature is stable
  - DO reading is stable
- ❖ Do not forget to turn stirring *on* during the measurement and *off* when transferring the probe
- ❖ If you know that solutions contain significant salinity (like seawater), go back to DO CAL menu and enter an appropriate salinity correction factor.



# Care & Maintenance

# Care and Maintenance

- ❖ Turn power to the instrument off at end of work day to maximize the life of the probe. Silver (anode) is consumed when oxygen is present and probe powered.
- ❖ When not in use store probe in a BOD bottle with a little water in the bottom. Do not store probe submerged in DI or distilled water for extended periods of time.
- ❖ Change probe membrane every 2-4 weeks with typical usage. If sample is quite greasy or contains potential fouling agents, change more often.
- ❖ To clean electrode surfaces (silver anode or gold cathode) refer to the user's manual or call YSI.



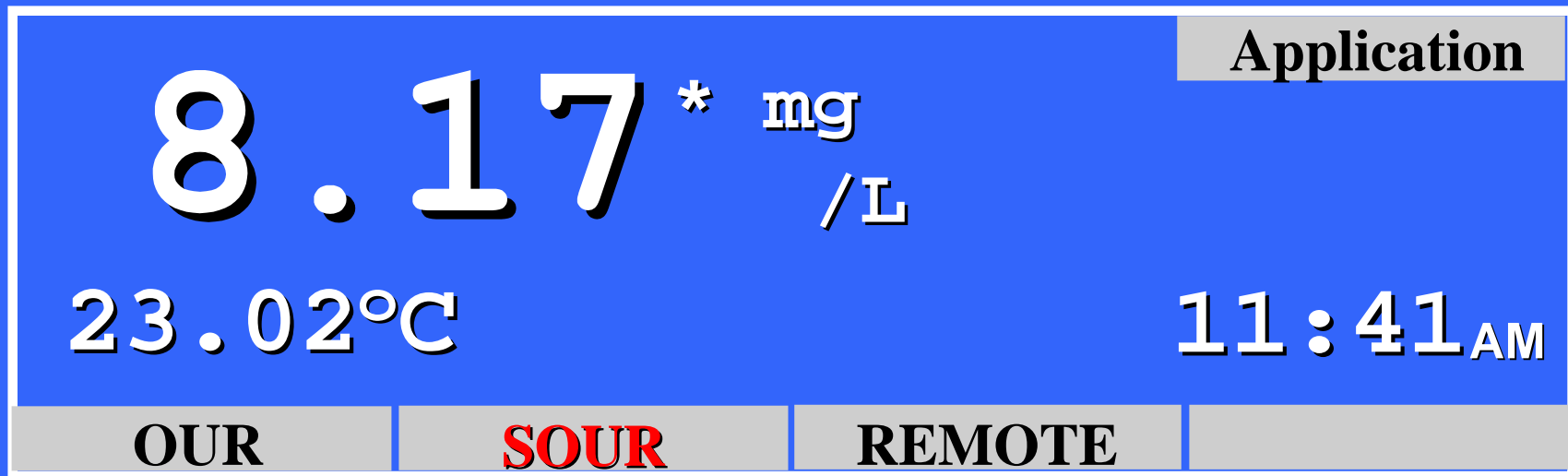
**10**

# **Advanced Feature**

# SOUR Software

- ❖ SOUR (Specific Oxygen Uptake Rate) software is resident in the 5100 meter. SOUR measurements can be quite useful in testing biosolids for stability (USEPA 503 regs) and for various process control testing.
- ❖ Both SOUR and OUR software are available in the Applications Mode of the 5100. From Main menu press the MODE key to access these menus.
- ❖ Various time and dilution parameters are preset as default values in the software. Refer to the manual.
- ❖ To run a SOUR test, use biosolids, mixed liquor or other appropriate sample in a BOD bottle and follow the instructions in the next slides.

# Running a SOUR Test



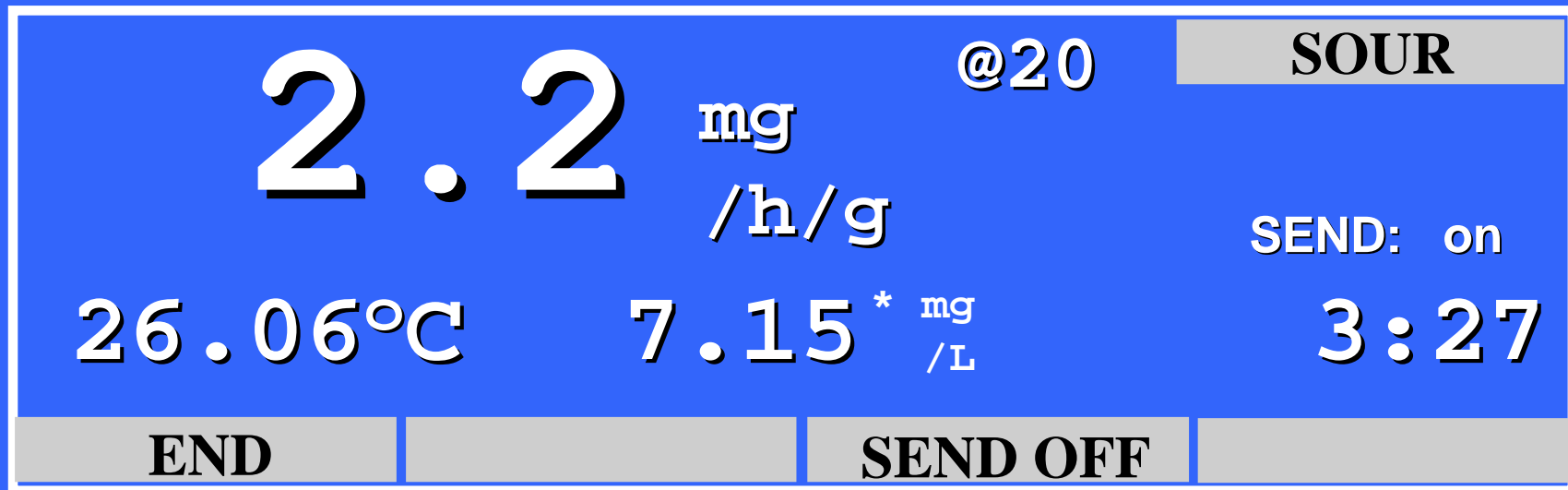
Press MODE key to shift to Application Mode, then press SOUR soft key to enter SOUR menu.

## Running a SOUR Test continued...

<b>-1.7</b>		<b>mg</b>	<b>@20</b>	<b>SOUR</b>
		<b>/h/g</b>		
<b>26.08°C</b>	<b>8.05</b>	<b>* mg</b>	<b>SEND: on</b>	
		<b>/L</b>	<b>0:00</b>	
<b>START</b>	<b>SETUP</b>	<b>REVIEW</b>	<b>SEND</b>	

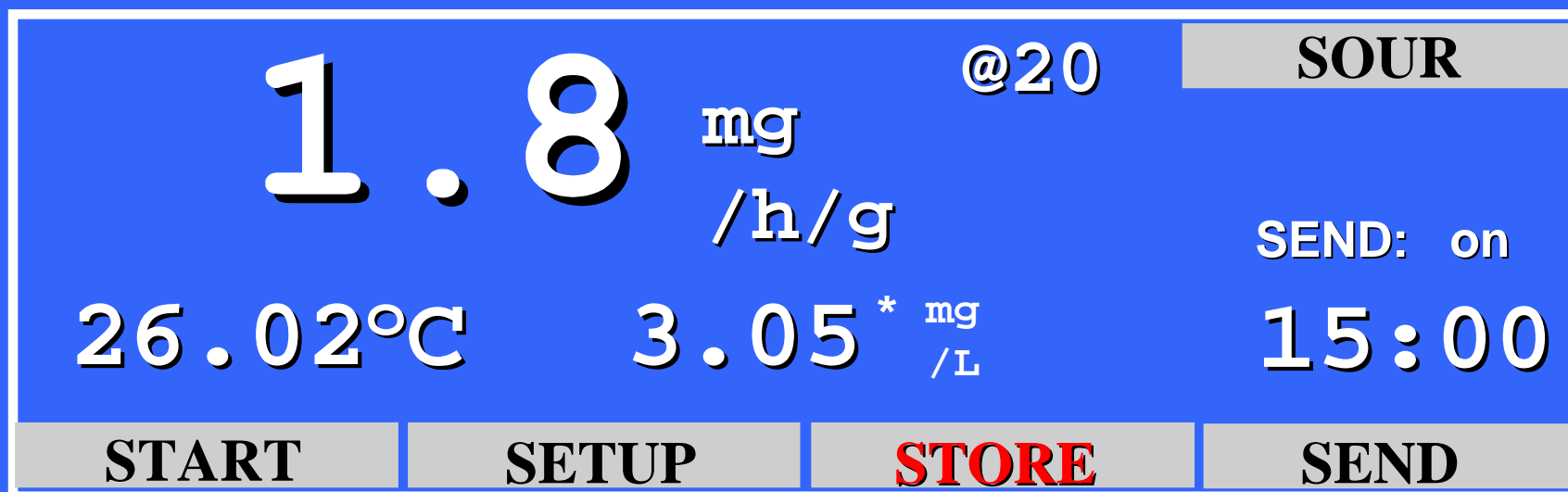
Before the DO drops below 5 mg/L and while the temperature is stable, press the START soft key to begin the SOUR Test.

## Running a SOUR Test continued...



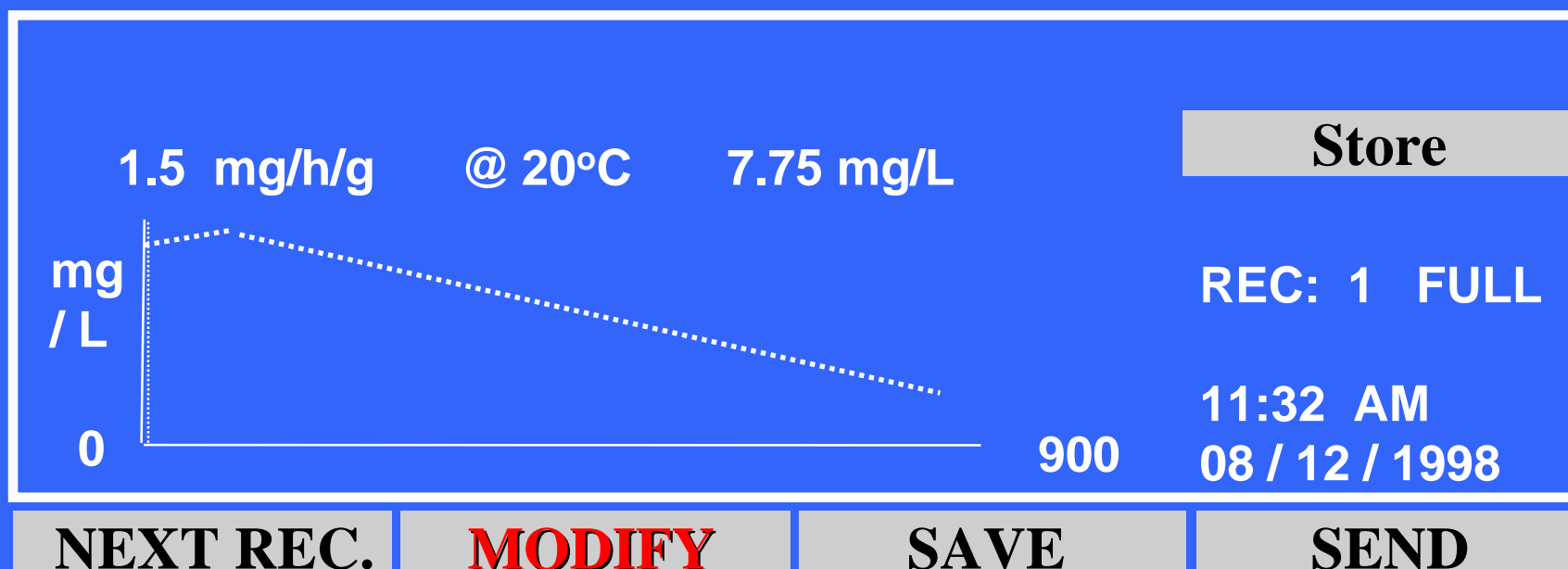
By default settings the SOUR will run 15 minutes or until the DO reading drops below 1 mg/L. This test has run 3+ minutes. You may stop the test anytime by pressing END.

## Running a SOUR Test continued...



When the test terminates, the rate becomes frozen on the screen (1.8 mg/h/g at 15 min.). Press STORE to view a graph and readings.

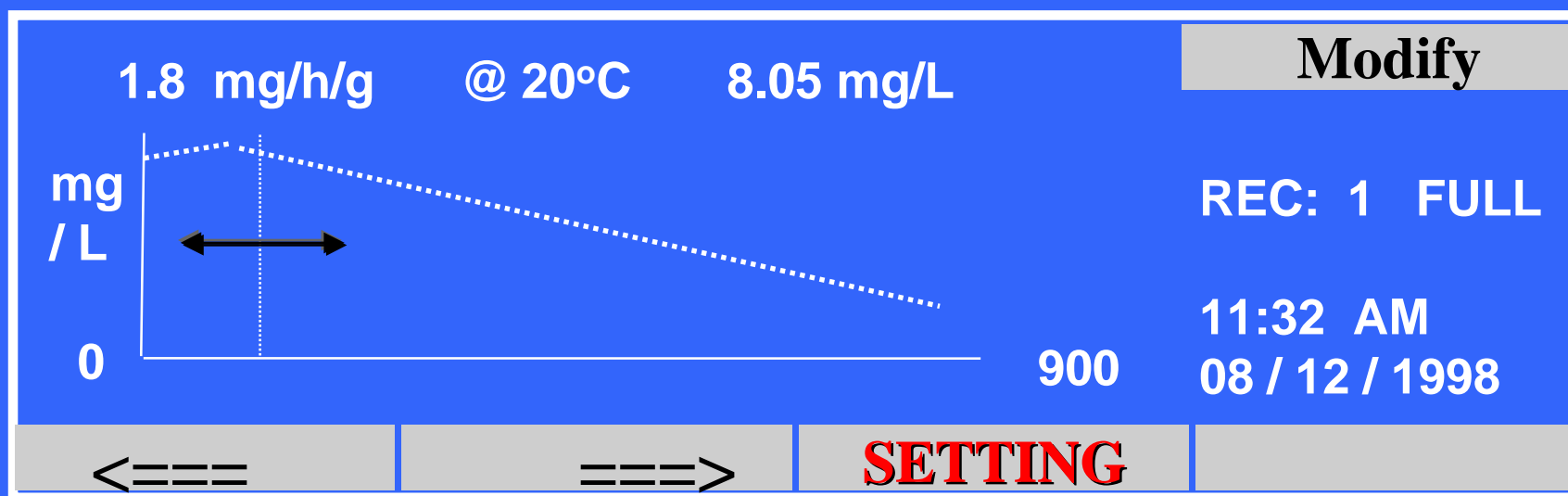
## Running a SOUR Test continued...



Press MODIFY to do any of the following:  
re-enter start point, re-enter dilution factor,  
re-enter solids weight. Press SAVE to add this  
this data set to one of the 5 memory records.



## Running a SOUR Test continued...



Set Start Point using cursor and arrow keys.  
Press **SETTING** to do any of the following...  
re-enter dilution factor, re-enter solids weight.

## Running a SOUR Test continued...

<b>PARAMETERS</b>		<b>Modify</b>
Sample / Total	1 / [ <b>01</b> ]	
Solids Weight	[ 1.000 ] g / L	
<b>UP</b>	<b>DOWN</b>	<b>DIGIT</b>
		<b>NEXT</b>

Re-enter the dilution factor or solids weight. Re-entering solids weight is especially useful since it may take several minutes to hours to determine an accurate solids value.

# END OF PRESENTATION

For more information refer to the user's manual that accompanies this instrument or contact...

YSI Environmental Products

Technical Support Group

800 897 4151 or 937 767 7241

Fax 937 767 9353

E-mail [support@ysi.com](mailto:support@ysi.com)

On the Web [www.ysi.com](http://www.ysi.com)

