

FoodTech_{Source™}

PORTABLE FOOD ANALYZER
with AutoBIAS™

USER'S MANUAL
Version 2.1

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This manual provides you with all the information needed to operate the
Cole-Parmer *FOODTECH*™

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A NOTE ON THE TEXT

Throughout this manual, keystrokes are represented in **bold type**; references to messages on the computer screen or the *FOODTECH*[™] display screen are in “quotations.”

WARNING:
THE FOODTECH™ PORTABLE NEAR-IR
ANALYZERS ARE NOT EXPLOSION
PROOF: REASONABLE CARE MUST BE
USED IN HANDLING THESE
INSTRUMENTS.

THE FOODTECH™ IS SUPPLIED WITH A
SPECIAL STATIC-FREE CLEANING
BRUSH. FAILURE TO USE THIS BRUSH
BETWEEN SAMPLES MAY CAUSE
BAD READINGS.

ABOUT THE FOODTECH™

FEATURES OF THE FOODTECH™

- Easy sampling: no grinding, no preparation
- Analyzes whole grain products such as wheat (spring and winter), barley, soybean and corn
- Analysis in 60 seconds or less
- Stores calibrations for 3 constituents each of up to 10 products
- Accurate up to 95% of moisture, protein, oil, etc.
- Able to analyze samples at temperatures from -20°C to +50°C.
- Direct readout in percentage form for both AS-IS and CM
- Totally solid state optics (no moving parts)
- Automatic Bias Initialization and Standardization

UNPACKING THE FOODTECH™

Check that all items 1 through 6 are in the box. If any items are missing, please contact Cole-Parmer immediately.

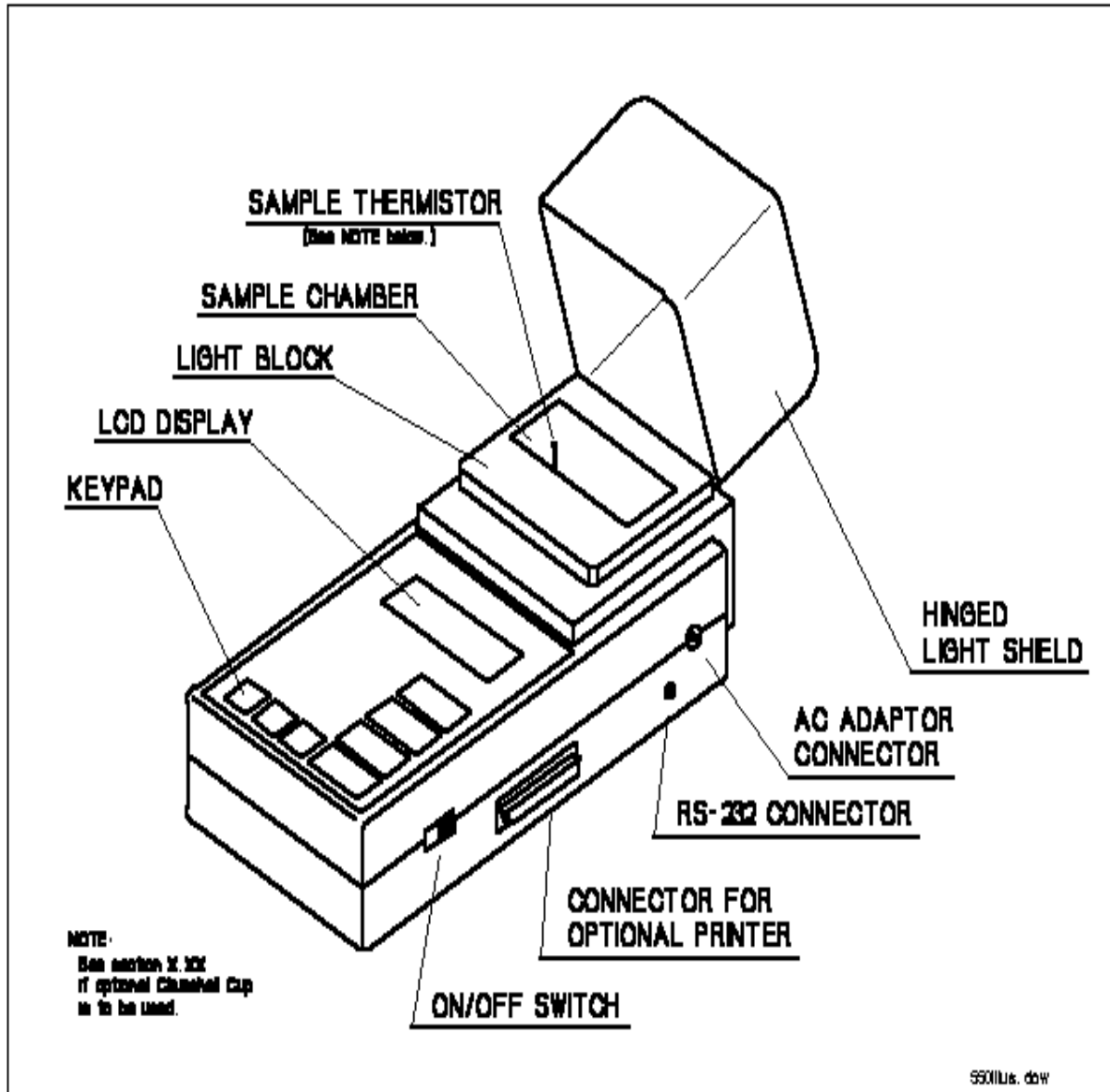
1. FOODTECH™ Portable Food Analyzer (PFA)
2. User's Manual
3. Quick Start Manual
4. AA Batteries
5. 16 mm Sample Cups
6. Static Brush

Optional:

1. Carrying Case
2. Software Disk and Calibration Manual
3. A/C Adapter
4. RS232 Cable
5. Printer
6. Printer Paper
7. 25 mm Sample Cup (corn, soybean)
8. Variable Pathlength Sample Cup 5 mm-16 mm (small grains)
9. AutoBIAS perma-sample

The optional carrying case has the combination set at the factory to open at 000. You may leave it at this setting or you can set your own combination. (See Appendix 1 in this manual for instructions on how to set your own combination.)

APPEARANCE AND PART NAMES



PREPARATION

ELECTRICAL REQUIREMENTS

After you have opened the carton, take a moment to consider where to place the FOODTECH™. The instrument has been designed to work flawlessly in the manufacturing environment, but please take into account the following requirements before setting up the instrument.

The FOODTECH™ operates from six AA cells or 9v DC from an A/C adapter. For the best operation and the most reliable analysis, the FOODTECH™ should have a clean, independent electrical line with the A/C adapter. Depending on the A/C voltage at the customer's site, the appropriate adapter (nominal 115 or 230 VAC) is shipped with the instrument. Connect the A/C adapter cable to the jack closest to the top on the right-hand side of the instrument. Also, insert six 1.5v AA size **alkaline** batteries into the battery compartment located on the rear of the main body. Be sure the batteries are oriented as indicated in the compartment.

OPTIONAL PRINTER

The optional printer can be attached directly to the FOODTECH™.

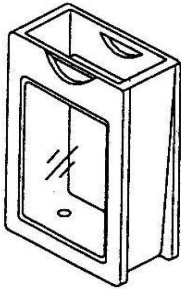
PRINTER PAPER INSTALLATION FOR OPTIONAL PRINTER

1. Remove the clear plastic cover from the printer.
2. Cut the end of the roll at an angle to form a point in the center.
3. Feed the paper into the slit inside the Paper Roll Compartment and press the **PAPER FEED** key.

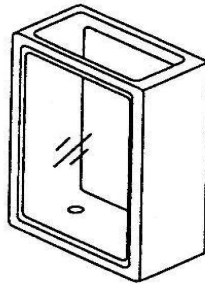
SAMPLE CUP

The FOODTECH™ is shipped with 2 standard 16mm (approx. 3/4") sample cups to be used with wheat and barley. A 24mm (approx. 1") cup and a variable pathlength cup are also available.

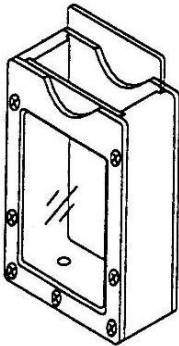
Do not place objects on the sample cup. It should not be placed in direct heat or cleaned with harsh chemicals such as scouring powder.



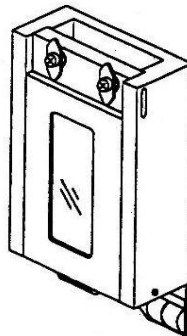
Molded 16mm Cup
Stock #2670



24mm Cup
Stock #A-572



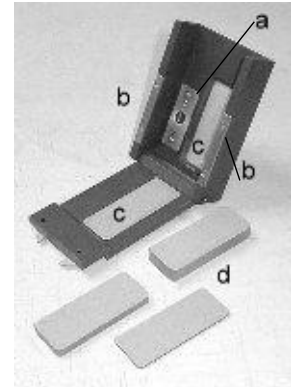
Variable Path-Length Cup
Stock #2672



Clam-Shell Cup
Stock #A0636

CLAM-SHELL CUP

The A0636 Clam-shell Cup allows the analysis of pastes and slurries in clear “whirl-pak”-type bags. The Clam-shell Cup includes an internal A0633 Thermistor Module (a), contact strips (b), windows in the body and door (c), and an assortment of different thickness windows (d).



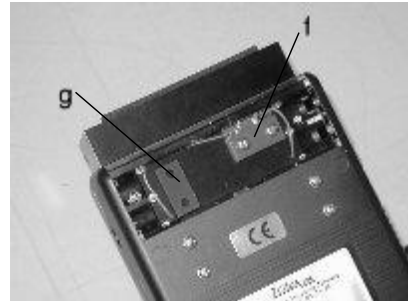
Because the Clam-shell cup has its own thermistor, the thermistor probe in the instrument must be removed. First, locate the thermistor cover (e). It is the smaller of the two covers on the bottom of the instrument.



Remove the thermistor cover by pressing down with the thumbs, and sliding the cover upward.



Inside the thermistor recess, you'll note the Thermistor Probe assembly (f) (held in with two 6-32 screws), and the Black Spacer (g).



Remove the Black Spacer (held in with tape), and the Thermistor Probe, exposing the Contact Board (h). Note the red and green wires which are connected to the Contact board.



This is a close-up of the A0516 Thermistor Probe. Note that one end of the probe is painted green. If the Thermistor Probe is re-installed later, the green end should be closest to the green wire on the contact board.



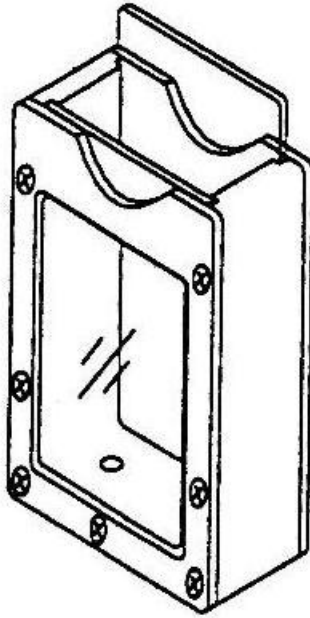
To plug the holes in the sample chamber, make a Spacer Assembly from the Gray Stop Plate, the Black Spacer, and two 6-32 screws.



Install the Spacer Assembly as shown. Storing the Thermistor Probe as shown will keep it from getting lost. Re-install the Thermistor Cover, and you're done. To convert back, reverse the procedure.



VARIABLE PATHLENGTH SAMPLE CUP



The Variable Pathlength Sample Cups uses windows of different thicknesses slide in and out of slots

KEYPAD DESCRIPTION

The Cole-Parmer keypad is designed to be easy to use.

ENTER This key is used after a selection has been made on the menu.

PRODUCT This key is used to make a product selection.

SELECT This key is used before entering any adjustable programming
ESC within the instrument. It can also be used to cancel a current entry in the instrument.

MEASURE This key is used to make measurements.

CM * This key toggles the displayed result between Protein on a
AS-IS Constant Moisture basis or on an AS-IS basis.

▲ ▼ These arrow keys cycle through menu selections.

TURNING THE FOODTECH™ ON FOR THE FIRST TIME

- 1) If you are using batteries, simply turn on the FOODTECH™ by the switch on the right side and go to step 3).

If you are running the FOODTECH™ on batteries, please make sure the instrument is shut off when not in use. The batteries will last much longer if the instrument is off when sitting idle.

- 2) Plug the adapter into the right side of the FOODTECH™ Turn on the power switch. The FOODTECH™ begins a test sequence: “TEST EPROM, TEST RAM, TEST IREDS, TEST ADC, TEST THERM.” When “Measure Standard” is displayed, the test sequence has been completed.
- 3) Run the AutoBIAS sample (if option is installed), following the directions on page 15.
- 4) Measure ten samples of the product that the instrument has been calibrated for. (These samples must have already been analyzed by your lab.) Write the analysis in the chart provided on page 17 and fax the form or call Cole-Parmer at:

FAX: 1-847-247-2983
PHONE in the USA: 1-888-409-3663
outside the USA: 1- 847-549-7600

Cole-Parmer will give you any necessary adjustments.

AUTOMATIC BIAS INITIALIZATION AND STANDARDIZATION

(Optional)

When you turn the instrument on each day, it will require you to run an AutoBIAS sample in each product you use.* The AutoBIAS feature uses the latest NIR technology to prevent the FOODTECH™ from drifting out of calibration.

The instrument will prompt, “BIAS ADJUST [product].” Press **ENTER**. The instrument will read the empty chamber, then prompt, “Insert Sample.” Do so; then press **MEASURE**. The screen will prompt, “Remove & Turn.” DO NOT TURN THE CUP: the perma-sample can only be inserted one way. Just press **MEASURE**. Remove and replace the sample when prompted; press **MEASURE**. Remove the sample when prompted and press **MEASURE**. The instrument will read the empty chamber again.

The instrument will decide how many times it needs to read the sample. At this point, it may prompt, “READ AGAIN.” If it does so, DO NOT INSERT THE SAMPLE. Press **MEASURE**. After it reads the empty chamber again, it will tell you to “Insert Sample.” Repeat the process. It may ask you to read the sample several times. Do not be alarmed. Simply follow the directions until the screen gives the constituent name and a value. This value is the amount of the bias adjustment for that constituent: Write it on the attached *Daily AutoBIAS Adjustment Record*. Press **ENTER**. The instrument will automatically adjust the bias by the amount shown. The second constituent bias amount will appear. Record it and press **ENTER** again. Continue until all the constituents have been adjusted.

You are now ready to begin reading samples in the adjusted product!

You can elect to run an AutoBIAS at any time, in addition to the daily AutoBIAS prompt. Make sure you are in the product whose bias you want to adjust. Press **SELECT ESC**. Use the arrow keys (▲▼) to scroll through the menu until “Auto Bias” appears on the screen. Press **ENTER**.

* If you are unable to run the AutoBIAS sample for some reason, you can escape the daily AutoBIAS prompt by pressing the arrow keys in the following order: up, down, up (▲▼▲). Do not make a habit of ignoring the AutoBIAS prompt. If you have lost the AutoBIAS sample, contact Cole-Parmer for a replacement.

DAILY AutoBIAS™ ADJUSTMENT RECORD

Keep a blank copy of this sheet.

PRODUCT # and NAME	DATE	AutoBIAS AMOUNT FOR			
		CON 1	CON 2	CON 3	CON 4
	___/___/___				
	___/___/___				
	___/___/___				
	___/___/___				
	___/___/___				
	___/___/___				
	___/___/___				
	___/___/___				
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	___/___/___				

ANALYZED SAMPLE FORM

SEND TO: Cole-Parmer Instrument Co., USA, FAX NO.: 1-847-247-2983

FROM: Company name, Country _____

CONTACT PERSON: (please print) _____

PHONE: Country code _____ Number _____

FAX: _____

Enter in the Analyzed Sample columns ten (10) samples that have been analyzed by your lab. In the corresponding columns, enter the **FOODTECH™** readings for the same samples. Fax to Cole-Parmer for advice concerning any needed adjustments.

Sample Number	Analyzed Sample Lab Protein AS-IS	FOODTECH™ Protein AS-IS	Analyzed Sample Lab Moisture	FOODTECH™ Moisture	Analyzed Sample Lab _____	FOODTECH™ _____
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

SELECT PRODUCT

1. Press **Product**.

Press the arrow keys (**▲ ▼**) to cycle through the products. The different products will be listed. (The Portable Food Analyzer is able to store ten products, numbered as 0-9.)

2. Press **ENTER** when the product to be tested is on the display. Only one product can be selected at a time.

MENU SELECTIONS

1. Turn on analyzer.
2. After test sequence is complete, press **Select Esc**. “Enter Bias” will appear on the **FOODTECH™** screen.
3. Press the arrow keys to cycle through the selections:
 - **Enter Bias** - adjust the calibration
 - **Data Link** - to communicate with the computer
 - **Store Sample** - saves samples in internal memory to be downloaded to the computer
 - **Paper Feed** - for the optional printer
 - **Reset ID #** - resets the sample ID number to 1
 - **Auto Bias** - maintains calibration accuracy
 - **Set Date**
 - **Set Time**
 - **Printing** - for the optional printer
 - **Set Readings** - number of times that each sample is read—Cole-Parmer recommends 4
4. Press **ENTER** to select the option on the screen.

MEASURING A SAMPLE

1. Turn power switch **ON**. “**FOODTECH™ PFA**” will be displayed. The display will show a version number and then will begin a test sequence. “Measure Standard” will be displayed when the test sequence has been completed.
2. Select the product according to the sample type to be measured. (See “Select A Product”)
3. Fill the sample cup with sample and tap the cup twice on a hard surface.
4. Make sure there is nothing in the sample chamber and close the lid over the sample chamber.
5. Press **MEASURE**. The display will show “Reading . . .,” then “Insert Sample.” This indicates that the instrument has been standardized. The PFA must be standardized prior to making any measurement.
6. Lift the lid from the sample chamber and place the cup containing the sample in the chamber.
7. Replace the lid over the sample in the chamber. This shield must always be used when measuring a sample or a standard; otherwise, the results will be incorrect.
8. Press **MEASURE**. The display will show “Reading . . .,” then “Remove & Turn.” Remove the sample, rotate the sample cup 180 degrees and replace it in the **FOODTECH™ PFA**. Close the lid.
9. Press **MEASURE**. The display will show “Reading . . .,” then “Remove & Reload.” Remove the sample cup, pour out the sample, and refill the cup with the same sample.
10. Tap the sample cup twice on a hard surface, replace it in the sample chamber, and close the lid.
11. Press **MEASURE**. The display will show “Reading . . .,” then “Remove & Turn.” Remove the sample cup, rotate the cup 180 degrees, and replace it in the **FOODTECH™ PFA**. Close the lid.
12. Press **MEASURE**. The display will show “Reading . . .,” then “Remove & Press M.” Remove the sample.

13. Close the lid over the empty chamber and press **MEASURE**.
14. The results will be displayed. Use the down arrow key to list the results of each constituent.
15. To measure another sample of the same product, press **SELECT ESC** to clear the results. The instrument will return to “Measure Standard.” Repeat steps 3-14.

Remember:

At any prompt where you have to either enter a sample or remove a sample and press **MEASURE**, the instrument will allow you only 50 seconds to do so. If after the elapse of 50 seconds you have not completed the task required, the **FOODTECH™** will flash “Time Out!” and automatically return to “Measure Standard.” This feature is designed to prevent readings from becoming “stale.”

ADJUSTING THE CALIBRATION

The *FOODTECH*[™] has been carefully calibrated at the factory or at your location; however, sometimes it is necessary to adjust the calibration for a bias. A bias adjustment fine tunes the *FOODTECH*[™] by shifting all readings up or down by the same amount.

- A. Obtain ten laboratory-analyzed samples.
- B. Measure the samples in the *FOODTECH*[™]
- C. Compare the instrument readings with the laboratory analysis or fax the data to Cole-Parmer at 847-247-2983 and Cole-Parmer will provide any necessary adjustments. See the following example of data requiring a bias adjustment.

Example: Determine the average *FOODTECH*[™] value and the average laboratory value. The difference between the two will be the bias adjustment.

Sample Number	<i>FOODTECH</i> [™] Protein As-Is	Lab Protein As-Is
1	10.0	10.2
2	11.1	11.3
3	12.3	12.6
4	10.4	10.5
5	9.1	9.3
6	10.8	11.0
7	12.0	12.1
8	11.2	11.4
9	8.8	9.0
10	9.6	9.8
Column Average =	10.5	10.7

In the above example, the *FOODTECH*[™] is reading Protein As-Is 0.2% too low (determined by the difference between the averages of the two columns). The bias adjustment will be +0.2 for Protein As-Is.

ADJUSTING THE BIAS

1. Turn on the instrument.
2. Make sure you are in the product that requires the bias adjustment. (See “Select a Product”)
3. When “Measure Standard” is displayed, press **SELECT ESC**.
4. “Enter Bias” will appear on the display. Press **ENTER**.
5. The product and constituent appear:

Example: PØ WHT C1 PRO

6. Use the arrow keys to cycle through the constituents. Press **ENTER** after the constituent for which you are adjusting the bias appears.
7. “Bias: Ø.Ø” will appear. Use the arrow keys to cycle through the numbers. Press **ENTER** when the correct bias is displayed. **Make sure the decimal point is in the right place.** “Complete” will appear.
8. If for any reason you must abort, press **SELECT ESC** to abort the bias adjustment.

AUTOBIAS

1. To run the optional AutoBIAS, select “Auto Bias” on the **FOODTECH™** menu and press **ENTER**. (See also the AutoBIAS instructions on page 15.)
2. Follow the instructions on the screen, using the AutoBIAS perma-sample provided by Cole-Parmer or your own sealed AutoBIAS sample. (See the **FOODTECH™ Calibration Manual** for instructions on creating an AutoBIAS sample and setting the instrument to read a different AutoBIAS sample.)
3. Run the sample as many times as the instrument requests.
4. Record the date and the amount of the bias adjustment on a copy of the AutoBIAS Adjustment Record on page 16.

ADJUSTING THE TIME

1. Turn PFA on.
2. At the “Measure Standard” prompt, press **SELECT ESC**.
3. When “Enter Bias” is displayed, use the arrow keys ((▲ ▼) to cycle through the menu until “Set Time” appears.
4. Press **ENTER**.
 - The up arrow key (▲) cycles through the hours.
 - The down arrow key (▼) cycles through the minutes.
 - The **CM* AS-IS** key zeroes the seconds.
5. Press **ENTER** after the time has been adjusted.

ADJUSTING THE DATE

1. Turn on the PFA.
2. After the test sequence is completed, “Measure Standard” is displayed.
3. Press **SELECT ESC**. “Enter Bias” will appear.
4. Use the arrow keys to cycle through the menu to find “Set Date.” Press **ENTER**.
 - The up arrow key (▲) cycles through the months.
 - The down arrow key (▼) cycles through the days.
 - The **CM*/AS-IS** key cycles through the years.
5. Press **ENTER** after the date has been adjusted.

ADJUSTING THE NUMBER OF READ CYCLES

The **FOODTECH™** is designed to allow you to use between 1 and 9 repetitions to get the maximum accuracy needed for your samples in a minimum of time.

Cole-Parmer recommends using four (4) repetitions.

1. Turn on PFA.

2. At the “Measure Standard” prompt, press **SELECT ESC**.
3. When “Enter Bias” is displayed, use the arrow keys (**▲ ▼**) to cycle through the menu to find “Set Readings.” Press **ENTER**.
4. “# Reads: 4” is displayed. Use the arrow keys to cycle through the numbers. Press **ENTER** at the number of your choice.

STORE SAMPLES

(Optional)

The PFA is able to store the OD's and sample ID's for up to 25 samples in battery-backed RAM. The samples are stored in the same memory as the K values. This means that the sample readings are preserved even when the FOODTECH™ is turned off. The samples that are saved in the FOODTECH™s memory can be downloaded to a PC.

To save the last sample that was read:

1. Press **SELECT ESC**. “Enter Bias” will be displayed.
2. Use the arrow keys (**▲ ▼**) to cycle through the menu until “Store Samples” appears. Press **ENTER**.
3. “Saved #_____” indicates the number (1-25) of the saved sample in the FOODTECH™s memory.

After saving 25 samples, the instrument will wrap around and begin to save again in position 1. This will overwrite the previous sample(s).

The samples can be downloaded to the PC using the optional software by connecting the FOODTECH™ to the computer with an RS232 cable and selecting “Download Saved Samples” from the Utility Menu of the calibration program. See “Download Saved Samples” in the Calibration Manual.

DATA LINK

The FOODTECH™ must be in Data Link mode for it to communicate with the PC. The FOODTECH™ is connected to the PC with an RS232 cable.

1. Turn on PFA.

2. At the “Measure Standard” prompt, press **SELECT ESC**.
3. When “Enter Bias” is displayed, use the arrow keys ((▲ ▼) to cycle through the selections to find “Data Link.”
4. Press **ENTER**. “DATA LINK” will be displayed in capital letters.

PRINTING

This selection is used with the optional printer.

To enable the printer:

1. Turn on the PFA.
2. At the “Measure Standard” prompt, press **SELECT ESC**.
3. “Enter Bias” will appear. Use the arrow keys (▲ ▼) to cycle through the menu to find “Printing.” Press **ENTER**.
4. “PRN ENABLED” will be displayed. Press **ENTER**.

NOTE: Each time the FOODTECH™ is turned on, the printer must be enabled.

To disable the printer:

1. Turn on the PFA.
2. At the “Measure Standard” prompt, press **SELECT ESC**.
3. “Enter Bias” will appear. Use the arrow keys (▲ ▼) to cycle through the menu to find “Printing.” Press **ENTER**.
4. “PRN DISABLED” will be displayed. Press **ENTER**.

PAPER FEED

This selection is used with the optional printer. The printer must be enabled (See above). To advance the paper on the optional printer:

1. Press **SELECT ESC**. “Enter Bias” will appear.
2. Use the arrow keys to cycle through the menu until “Paper Feed” is displayed.
3. Press **ENTER**. The paper will advance one line each time **ENTER** is pressed.
4. Press **SELECT ESC** to return to “Measure Standard.”

RESET ID #

This selection is used to reset the automatic sampling number to #1.

1. Turn on the PFA. Wait for “Measure Standard” to be displayed.
2. Press **SELECT ESC**. “Enter Bias” will appear on the display.
3. Use the arrow keys to cycle through the menu until “Reset ID #” appears. Press **ENTER**.
4. “ID # Reset” will be displayed. The next sample run will be labeled sample #1.

WARNINGS AND ERROR CODES

The *FOODTECH*[™] has a number of warnings and error codes built into it. Some are overridden automatically on the analyzer; others require you to start the reading again.

The range for the warnings can be set by using the Instrument Edit Utility program on the Calibration Software.

Error: TOO DARK

- 1) This error occurs if the energy reaching the detector is less than the acceptable level.

Error: TOO LITE

- 2) This will be displayed if the detector is in saturation. This normally is caused by not placing the light shield on correctly while the instrument is reading a sample or measuring the standard.

******* WARNING *******
Error
AMB. TEMP TOO LOW

- 3) The *FOODTECH*[™] was set up with a temperature check for itself. If the instrument temperature is too cold, a warning, “AMB. TEMP TOO LOW” will appear on the display. This can be overridden by pressing **ENTER**.

******* WARNING *******
Error
AMB. TEMP TOO HIGH

- 4) This indicates that the instrument is above the recommended temperature range.

******* WARNING *******
Error
SMP. TEMP TOO LOW

- 5) The *FOODTECH*[™] was also set up with a temperature check for the sample. If the sample temperature is too cold, a warning, “SMP. TEMP LOW,” will appear on the screen. This can be overridden by pressing **ENTER**.

******* WARNING *******
Error
SMP. TEMP TOO HIGH

- 6) This indicates that the sample temperature is above the recommended temperature range.

******* WARNING *******
*** BAD CURVE ***

- 7) This will be displayed *only* if A, B, and C have been activated using the Instrument Edit Utility program in the Calibration Software.

Note: When entering Curve Checking on the Constituent Menu you should always look at the curve on a typical sample on the computer. On the bottom of the computer screen the filter numbers are displayed. You should choose A as the highest peak of the sample, B as the second highest peak on the sample, and C as the low point of the sample. This allows you to verify that the curve is a reasonable shape for the curve you calibrated for.

******* WARNING *******
Error
HIGH VAR

8) This is displayed if the variance among the four readings is more than normal variance in the sample. This tells you that the repeatability within the sample is not as reasonable as we would expect. This could be caused by light leaks, an improperly aligned sample, or just variations in the samples.

******* ERROR *******
VALUE TOO LOW

9) This occurs when the reading for a particular constituent is outside the range that was set up on the range of data on the Instrument Edit Utility program.

10) At any prompt where you have to either enter a sample or remove a sample and press MEASURE, the instrument will allow you only 50 seconds to do so. If after the elapse of 50 seconds you have not completed the task required, the FOODTECH™ will flash “Time Out!” and return to “Measure Standard.” This feature is designed to not allow readings to become “stale.”

NO CONS NAME

- 11) This is displayed after a sample reading to warn the user that the product selected to run the sample does not have constituents named for that product.

LOW BATTERIES

- 12) This is displayed when the batteries need to be replaced.

GENERAL SPECIFICATIONS

1. MEASUREMENT

Measuring Principle: Near-Infrared Transmittance based on technology from the United States Department of Agriculture

2. PRINTER OUTPUT (optional)

Product and Constituent name and analysis with time, date, and identification number (manual or automatic)

3. DISPLAY

Product and Constituent name and analysis

4. POWER SOURCE

Six AA 1.5V alkaline batteries
9V A/C adapter (included)

5. DIMENSIONS

Main Body - 4.7 x 13.5 x 2.2 inches

6. WEIGHT

3 lbs

7. ACCESSORIES

	<u>Part Number</u>
2 sample cups	
1 Static Brush	
6 AA alkaline batteries	ZXP 103
1 User's Manual	ZXP 111
1 Quick Start Manual	

8. OPTICAL MEASUREMENT TECHNIQUE TRANSMITTANCE OF NEAR-INFRARED

USING: 14 wavelengths covering the range from 893 nanometers to 1045 nanometers

9. OPTIONS:

Carrying case	AutoBIAS perma-sample
Calibration software	Calibration manual
RS232 cable	AC adapter
Variable pathlength sample cup	24mm sample cup
Printer	Printer paper

GLOSSARY

application - the type of product the user is analyzing for a certain constituent(s)

AutoBIAS - Automatic Bias Initialization and Standardization. Maintains the accuracy of the calibration by daily adjustment.

bias - the average overall shift of the regression curve from the ideal laboratory regression curve

constants - numbers that relate to the influence of each wavelength use in the statistical calibration of the customers product

constituent - organic compound that is found in the sample being tested

diffuse transmittance - light energy is transmitted and distributed evenly through the sample being tested

diodes - near-infrared red light sources

IR - abbreviation of infrared

K's or K values - same as **constants**

lab analysis - the chemical or physical analysis of constituent(s) in a product

light absorption - the amount of light energy absorbed by various constituents in the product being measured

linear regression - a graphical representation of a statistical analysis of the relationship between two or more measured variables

nanometer or nm - one billionth of a meter

near-infrared - the range of light energy near the visible spectrum

near-IR - See **near-infrared**

OD - optical data expressed in terms of voltage values for each wavelength used in a Cole-Parmer analyzer

regression - the statistical liner, quadrant, or cubic means of comparing two or more variables (ex: OD versus percentage of moisture)

sample - a measured amount of product to be tested

sensor - a device used in Cole-Parmer analyzers that converts light energy to electrical signals for processing optical data

spectrum - the range of OD energy measured in wavelength increments

transmittance - the ease with which light or other forms of energy can pass through a sample being tested

wavelengths - specific band widths of light energy, usually expressed in nanometers in near-infrared instrumentation

HRS - Hard Red Spring Wheat

HRW - Hard Red Winter Wheat

SWW - Soft White Wheat

SRW - Soft Red Winter Wheat

BLY - Barley

CRN - Corn

SOY - Soybean

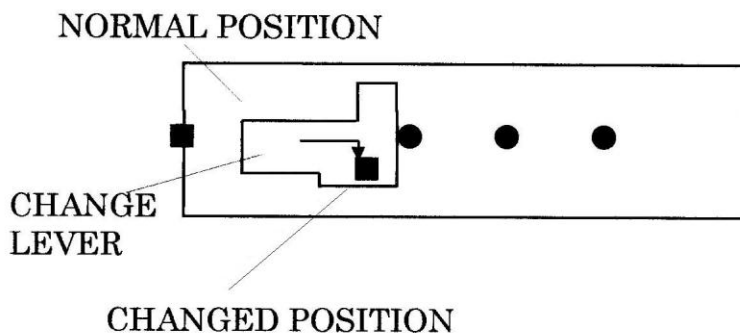
SML - Soymeal

APPENDIX I

COMBINATION LOCK

Your combination lock is set at the factory to open at 000. You may leave it at this setting or you can set your own secret combination in the following manner:

1. Open the case. At the back of the lock you will see the change lever extending from the body of the lock.



2. Move the change lever toward the dials of the combination lock and down.
3. Now turn the dials to your own secret number and write it down in a safe place.
4. Without disturbing the setting of the dials, move the change lever back to its original (normal) position. Make sure you have done this before closing the case and using the lock.

Your case will now open only at your secret combination. If you want to change the combination again, simply repeat these steps.

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Addendum

CM DISPLAY

When displaying measurement results, the instrument displays the AS-IS calculation first by default. Pressing the CM/AS-IS Button will toggle back and forth between CM and AS-IS.

If you should wish to display the CM results first, simply press the CM/AS-IS button while the display says "Measure Standard". When pressed, the display will say "CM DEFAULT". Any readings taken afterwards will show the CM results first. To view the AS-IS results first, press the CM/AS-IS button again while the display says "Measure Standard" and the display will say "AS-IS DEFAULT".