Ohaus Corporation
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ANALYTICAL *Plus*
Electronic Balances
Models
AP110, AP210, AP310, AP250D,
AP110E, AP210E, AP310E and
AP250E

Instruction Manual

NOTE: THIS EQUIPMENT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS A DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FCC RULES.

THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL INTERFERENCE WHEN THE EQUIPMENT IS OPERATED IN A COMMERCIAL ENVIRONMENT. THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND, IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS. OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE HARMFUL INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

THIS DIGITAL APPARATUS DOES NOT EXCEED THE CLASS A LIMITS FOR RADIO NOISE EMISSIONS FROM DIGITAL APPARATUS AS SET OUT IN THE INTERFERENCE-CAUSING EQUIPMENT STANDARD ENTITLED “DIGITAL APPARATUS”, ICES-003 OF THE DEPARTMENT OF COMMUNICATIONS.

CET APPAREIL NUMERIQUE RESPECTE LES LIMITES DE BRUITS RADIOELECTRIQUES APPLICABLES AUX APPAREILS NUMERIQUES DE CLASSE A PRESCRITES DANS LA NORME SUR LE MATERIEL BROUILLEUR : “APPAREILS NUMERIQUES”, NMB-003 EDICTEE PAR LE MINISTRE DES COMMUNICATIONS.

Unauthorized changes or modifications to this equipment are not permitted.

The exclamation point within the triangle is a warning sign alerting you of important instructions accompanying the product.

TABLE OF CONTENTS

INTRODUCTION

This manual covers Installation, Operation and Troubleshooting for the Ohaus ANALYTICAL Plus Series of Electronic balances, Models AP110, AP210, AP310, AP250D, AP110E, AP210E, AP310E and AP250E. Suffixes after the basic model number are: D = Dual Range and E= Type Approved with CE conformance and bear official markings (Max, Min, Class, etc.) on a serial number plate located on the side of the balance. To ensure proper operation of the balance, please read this manual completely.

DESCRIPTION

The Ohaus ANALYTICAL Plus Series balances are high precision weighing instruments, designed to be versatile, accurate, easy to operate and will provide years of service with virtually no maintenance. The Analytical Plus series is constructed using a die-cast aluminum base finished with a durable corrosion resistant epoxy powder paint. The weighing area is protected from air currents by a draft shield. It contains solid-state precision electronics PC boards, and a seven and a half, 0.5 inch digit, Vacuum Fluorescent display. Each balance operates through a series of menus which enhances operation. A built in lockswitch prevents preset settings from being changed.

FEATURES

Analytical Plus balances contain four main display menus which enable you to calibrate and configure the balance for specific operating requirements.

MENU When (ON TARE) switch is pressed and released with MENU displayed, allows access to the calibration, user, setup and print menus.

CALIBRATION Menu - Allows the balance to be calibrated by using either Auto, User or Test calibration methods. The test function is used to verify the last calibration.

USER Menu - Allows the balance to be set for environmental conditions. Reset, averaging level, stability range and auto-zero functions can be set.

SETUP Menu - Allows the balance to be customized for specific weighing functions.

PRINT Menu - Allows the selection of parameters under which the balance will interface to a computer or a printer.

Each of these menus contain selectable parameters which can be entered via the front panel switches. Storing of the parameters is accomplished by selecting ***End*** at the completion of all selections in a particular menu. For a detailed description of each feature, refer to the individual menus in this manual.

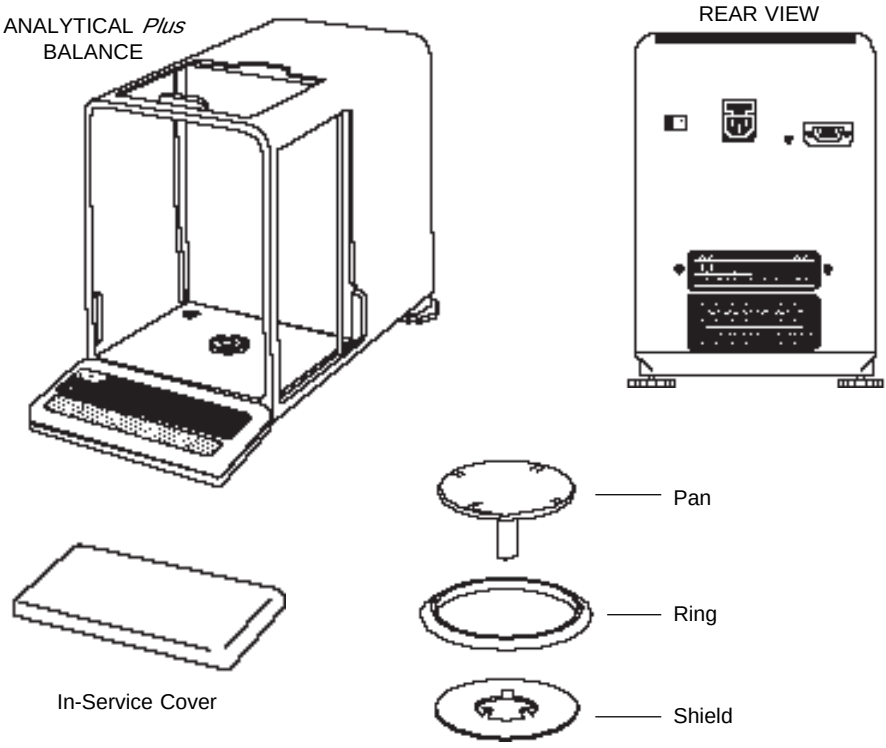
INSTALLATION

UNPACKING

Your ANALYTICAL Plus balance was shipped with the following items:

- Pan assembly (including pan, shield, ring and assembly instructions)
- In-service cover
- AC power cord
- Spare fuse
- Instruction manual
- Warranty card

Remove the contents from the carton and carefully remove all packing material. It is recommended to save the carton and packing material for storing and/or transporting the balance. Verify that all of the components have been included and there has been no damage during shipment.



INSTALLATION

Environment

The balance should always be used in an environment which is free from excessive air currents, corrosives, vibration, and temperature or humidity extremes. These factors will affect displayed weight readings.

DO NOT install the balance:

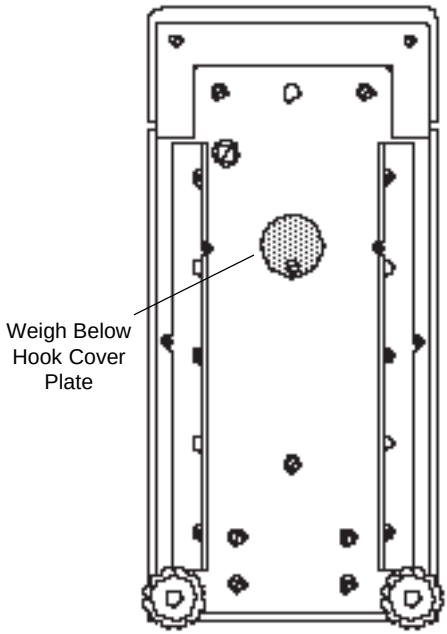
- next to open windows or doors causing drafts or rapid temperature changes.
- near air conditioning or heat vents.
- near vibrating, rotating or reciprocating equipment.
- near magnetic fields or devices that may generate magnetic fields (i.e. motors, alternators, etc.)
- on an unlevel work surface.

Install the balance in the location where it will be used before proceeding.

Weigh Below Hook

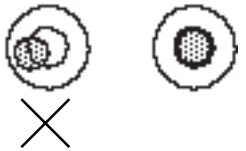
A weigh below hook is provided inside the bottom cover under the protective plate shown in the illustration.

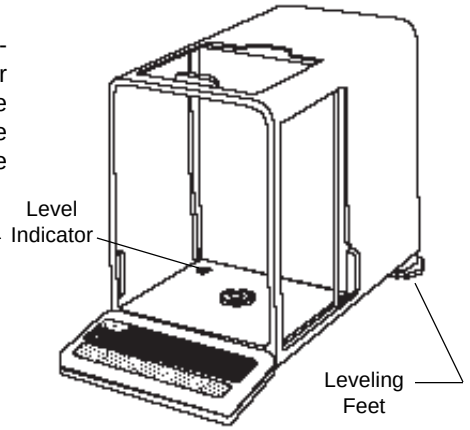
To access the weigh below hook, carefully turn the balance on it's side, loosen the screw which secures the cover plate, rotate the plate to clear the hole, then secure the plate in that position. Return the balance to an upright position. Mount the balance on a stable, level elevated platform and install a hook.



Leveling the Balance

The balance is equipped with a level indicator on the floor of the weighing chamber and two adjustable leveling feet at the rear. Adjust the leveling feet until the bubble appears in the center circle of the level indicator.



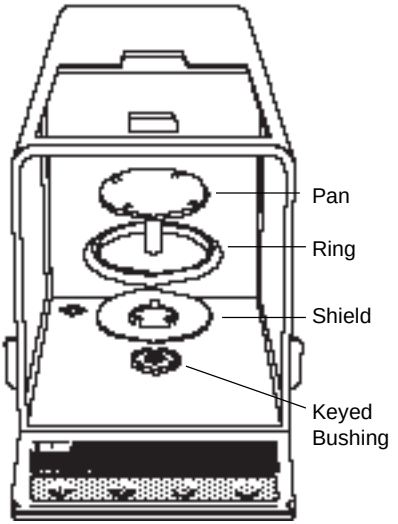


Installing the Pan Assembly

1. Place the shield onto the keyed bushing and press it down into place. The bent tabs must be facing upward and the shield should be flat against the chamber floor.

2. Place the ring over the shield. The lip on the bottom of the ring should fit against the shield to keep it from moving.

3. Insert the pan in the load receiver hole, matching the key on the pan shaft with the slot in the hole. Gently press the pan down into place.



In-Service Cover

Place the cover snugly over the display unit.

RS232 INTERFACE

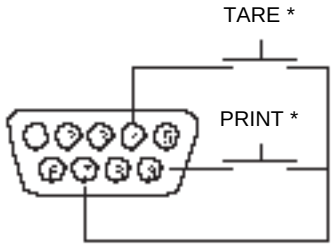
ANALYTICAL Plus balances are equipped with a bi-directional RS232 compatible interface for communication with printers and computers. When the balance is connected directly to a printer, displayed data can be output at any time by simply pressing PRINT, or by using the Auto Print feature.

Connecting the balance to a computer enables you to operate the balance from the computer, as well as receive data such as displayed weight, weighing mode, stability status, etc.

The following sections describe the hardware and software provided with the balance.

Hardware

On the rear of the balance, a 9-pin sub-miniature "D" connector is provided for interfacing to other devices. The pinout and pin connections are shown in the adjacent illustration.



1	5 V dc (5 mA max.)
2	Data Out (TXD)
3	Data In (RXD)
4*	Tare (External signal)
5	Clear To Send (CTS)
6	Data Terminal Ready (DTR)
7	Ground
8	Request To Send (RTS)
9*	Print (External signal)

* External PRINT and/or TARE switches may be installed as shown in the diagram. Momentary contact switches must be used.

The balance will not output any data unless pin 5 (CTS) is held in an ON state (+3 to +15 V dc). Interfaces not utilizing the CTS handshake may tie pin 5 to pin 6 to defeat it.

Output Formats

Data output can be initiated in one of three ways: 1) By pressing PRINT; 2) Using the Auto Print feature; 3) Sending a print command ("P") from a computer.

The output format is illustrated in the RS232 command table which follows.

RS232 Commands

All communication is accomplished using standard ASCII format. Only the characters shown in the following table are acknowledged by the balance. Any other commands, control characters or spaces are ignored. Commands sent to the balance must be terminated with a carriage return (CR) or carriage return-line line feed (CRLF). For example, a tare command should appear as shown in the adjacent diagram. Data output by the balance is always terminated with a carriage return - line feed (CRLF).

TARE COMMAND

Field:	T	CR	LF
Length:	1	1	1

RS232 COMMAND TABLE

Command Character	Description
?	Print current unit. GRAMS, DWT, CARAT, OZ AV, OZ T, GRAIN, TAEL 1, TAEL 2, TAEL 3, MOMME, CUSTOM UNIT Field: Mode (5) | Stab (1) | CR (1) | LF (1) Stab: blank if stable, " ? " if unstable
xl	Set averaging level to "x", where x = 0, 1, 2 0 = minimum level 1 = 2 = maximum level
xM	Places balance in mode "x", where x = 1 to 11 (see table). If unit is not already enabled, command will be ignored. 1 = grams 2 = pennyweight 3 = carats 4 = avoidupois ounces 5 = troy ounces 6 = grains 7 = taels 8 = mommes 11 = custom unit
P	Print display data When "numeric only" display data is selected for output in the RS232 menu, the Mode field is not output. Field: Weight (10) | (1) | Mode (5) | Stab (1) | CR (1) | LF (1) Mode: Same as ? command Weight: Displayed weight sent right justified w/lead zero blanking. Nine characters include: decimal point (1), weight (7 max)), polarity (1): blank if positive, " - " if negative
hhmmss TIME	Set current time to "hh: mm: ss", hh is between 0 - 23.
TIME	Print current time.
mmddyy DATE	Set current date 'mmddyy'.
DATE	Print current date.
%	Print current % ref.
#	Print current ref., any function.
AC	Abort calibration /Test.
C	Start an auto calibration.
E	Go to initial state of current function.
F	Print current function.
M	Same as mode button.
xD	Set 1 second print delay (set x = 0 for OFF, or x = 1 for ON).
ID	Print current ID string.
xxxxID	Enter ID string (xxxx limit to 8 characters).

Command Character	Description
xS	Set stable data only printing (set x = 0 for OFF, or x = 1 for ON.
T	Same effect as pressing on tare button.
V	Print EPROM version Field: Model # | 1 | EPROM # | CR | LF Length: 6 | | 16 | 1 | 1 Balance Model "98101-xx Sr#x.xx"
x#	Set current ref., any function, CW takes two reference separated by a space.
x%	Doanloads reference weight "x" for percent mode. "x" must be in grams. Command is ignored if percent mode is disabled. If percent mode is enabled, balance will automatically switch to percent mode display.
xF	Set current function to "x". x = 0 to 6. Setup menu must be unlocked. 0 = None 1 = Percent 2 = Parts Counting 3 = Check Weighing 4 = Animal Weighing 5 = Fill Guide 6 = High Point
xZ	Set Auto Zero to "x". x = 0 for OFF, x = 1 for ON
xSL	Set stability level. User menu must be unlocked. x = 0 to 3
Z	Zero request (Gross tare) if Net/Gross enabled.
nnnA	Set Auto Print feature to "nnn"(see table). nnn = 0 Turns feature OFF nnn = S Output on stability nnn = C Output is continuous nnn = 1-256 Sets Auto Print interval
Esc L	Prints listing of Setup and Print menu settings.
Esc R	Resets Setup and Print menus to factory defaults. CAUTION: This will reset RS232 configuration.
Esc S	Save current settings.

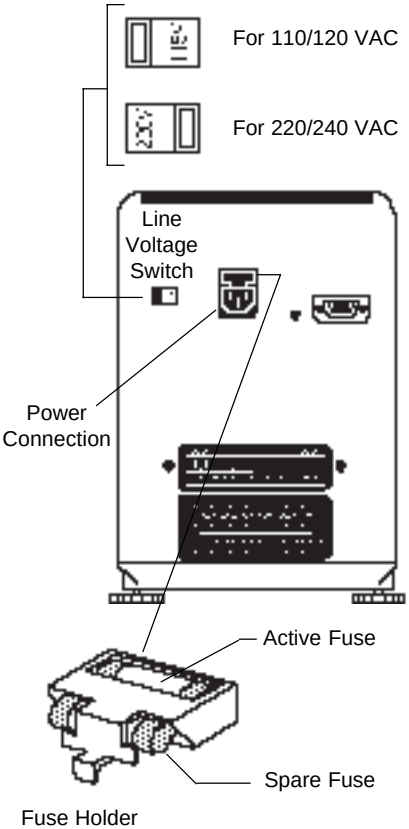
Connecting Power

1. Before connecting the power cord, check that the line voltage switch located at the rear of the balance is set correctly for your location. If not, use a small screwdriver to set the switch correctly.

2. Make sure the doors to the weighing chamber are closed.

2. Connect the power cord receptacle to the plug on the rear of the balance.

3. Plug the power cord into a convenient AC outlet. The balance signals one long beep to indicate power has been applied.



Spare Fuse

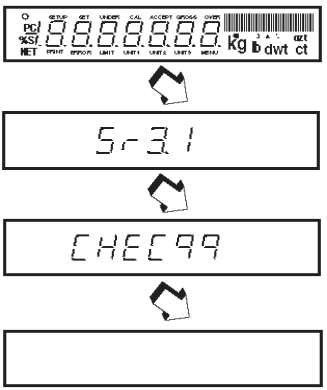
A spare fuse is provided in the fuse holder as shown in the diagram. All models use a 160 mA/250 V fuse.

Self Test

When power is applied to the balance, it begins a self test cycle. During this time, the display cycles as shown.

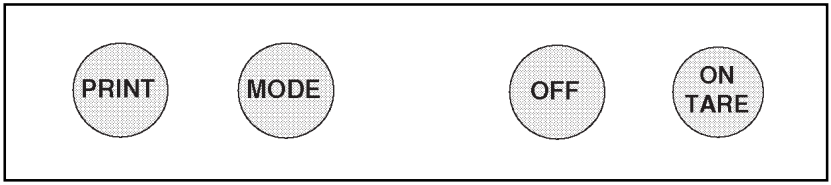
NOTE: Sr shown in the display is the software revision and may be different in your balance.

After the self test is completed, the display turns off. Allow the balance to stabilize for about 2 hours before using it.



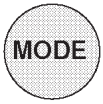
OPERATION

Switch Functions



Press and Release:
Turns on the balance if it is off, zeros the balance. In the menu system, this button is used to accept a choice or enter a submenu.

Press and Release:
Turns the balance off.



Press and Release:
Selects weighing units functions or options. In menus, changes to next step or value.

Press and Release:
Sends weight data, statistical data, GLP data to computer/printer. In menus, allows returning to a previous menu step.

Before using the balance, carefully review the Symbols Used for Operation of the Balance shown on page 16, Navigating the Menus on page 71and Operational Guide/ Index on page 18.

Please read the entire manual as there are many features which can be enabled. The balance is shipped from the factory ready to operate with default settings as shown in the menus.

The balance is a high precision instrument and will give you years of service if kept clean and handled carefully. If you have any problems operating the instrument or require additional information, please feel free to contact our Customer Service Department at (800) 526-0659.

Symbols Used for Operation of the Balance

This instruction manual uses certain symbols to explain various operational procedures and actions that occur. Examples of the symbols used are shown as follows:

Pushbutton Switches:

= **NORMAL PRESS AND RELEASE**

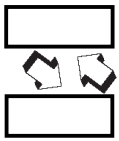
= **MULTIPLE PRESS**

= **PRESS AND HOLD FOR DESIRED DISPLAY**

Display Area:

DISPLAY AREA - AS A RESULT OF USER ACTION

DISPLAY AREA - AUTO CHANGE OCCURS



DISPLAY AREA -SWITCHES BACK AND FORTH

Navigating the Menus

There are **four menus** used in the balance:

CALIBRATION | USER | SETUP | PRINT

To enter the menus, the ON TARE button is pressed and held until MENU is displayed. When released, CAL is displayed which is the Calibration menu.

When in the menus, repeated pressing of MODE advances through the menus. CALIBRATION | USER | SETUP | PRINT | END MENU

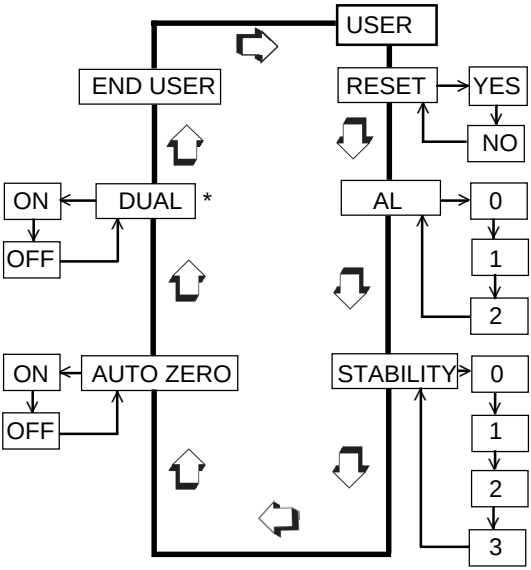
Each menu contains selections (submenus) which can be set for specific operations.

The MODE button is used to advance though the submenu selections.

The ON TARE button enters or accepts the submenu selection and returns to the beginning of the submenu selection.

The PRINT button is used to backup in the submenu if a change is desired.

The following sample illustrates the **USER menu** and submenu items



NOTE:

Each menu is constructed in the form of a loop. Advancing from one submenu item to the next by using the MODE button will eventually return to the beginning of the menu.

* Only on AP250D Models.

RULES: Use MODE button to advance.

Use ON TARE button to enter or accept submenu.

Use PRINT button to backup.

After selections are made, always exit menus through END MENU to store settings.

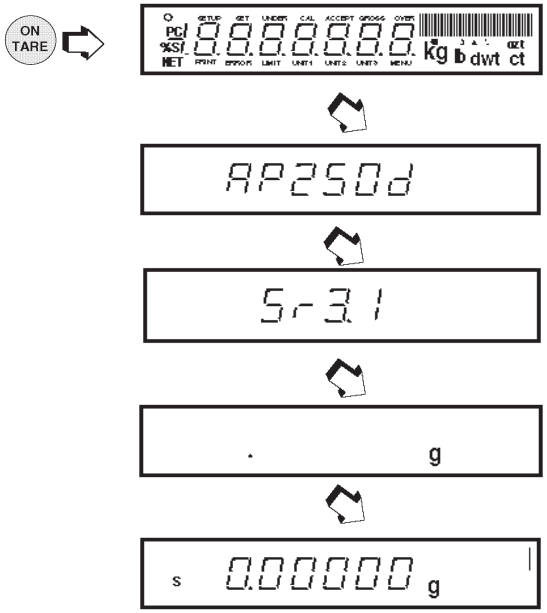
Operational Guide/Index

The Operational Guide/Index lists the pages for all balance operations and options. After settings are made, exit menus to save settings.

FUNCTION	TO OPERATE (See pages)	SETUP (See pages)
1. Turning the Balance ON	19	----
2. Weighing (grams)	20	----
3. Taring	20	----
4. Percent Weighing	21	44
5. Parts Counting	22	44, 49
6. Check weighing	23	44, 49
7. Animal Weighing	24	44, 52
8. Fill Guide	25	44, 52
9. High Point	26	44
10. Printing Data	27 to 32	56, 57, 61 to 65
11. List	28	56, 65
12. Menu Lockout	34	----
13. Calibration	35 to 37	----
14. Net/Gross Weighing	----	46
15. Custom Units	----	46
16. GLP	----	48, 60
17. Time	----	53, 54
18. Date	----	55
19. Lockswitch	----	56
20. Legal for Trade	----	41, 42
21. Changing Units	----	42
22. Statistics	----	45
23. Averaging Level	----	38, 39
24. Stability	----	38, 39
25. Auto Zero	----	38, 40
26. Dual Range (AP250D)	----	38, 40
27. Reset User	----	38
28. Reset Setup	----	42
29. Reset Print	----	58
30. Communications	----	58 to 60

Turning the Balance ON

1. After the Self Test in the Installation Section is completed (power applied to the balance), make sure the pan on the balance is clear, then, close the chamber doors.

2. 

Display Indications

The following table describes each of the display indicators.

DISPLAY INDICATORS

g	grams		check weighing limits
dwt	pennyweight	UNIT 3	custom unit/volume
ct	carats	NET	net indicator
oz	ounces	PCS	parts counting
ozt	troy ounces	%	percent weighing
UNIT 1	grains	S	stability indicator
t	taels	GROSS	gross (total) indicator
UNIT 2	mommes		fill guide
▲	user calibration indicator		center of zero
	capacity guide		

Stabilization

Before initally using the balance, allow time for it to adjust to its new environment. The balance only requires to be plugged in to warm up. Recommended warm up period is twenty (20) minutes. The balance is powered whenever it is plugged into a power source.

Auto Range (AP250D and E Only)

Modes AP250D and E offer both a fine range (0.01 mg readability from 0 to 52 g) and a coarse range (0.1 mg over 52 g). When first turned on, the balance is in the fine range. It remains in this range until the weight on the pan exceeds 52 g. When weight on the pan is greater than 52 g, the balance switches to the coarse range.

If weight on the pan falls below 52 g, it automatically switches back to the fine range.

Weighing

1. ON TARE to rezero the display.

2. Place the object(s) or material to be weighed on the pan.

3. Wait for the stability indicator to appear before reading the weight.

NOTE: The capacity guide (bars) indicates the percentage of the current weight to the balance capacity. The example above illustrates a 200 gram weight, (balance full capacity 210 grams).

Taring

When weighing material or objects that must be held in a container, taring stores the container weight in the balance's memory, separate from the weight of the material in the container.

1. Place an empty container on the pan. Its weight is displayed.

2. ON TARE, the display blanks until stable weight readings are received, then indicates zero. The container's weight is stored in memory.

3. Add material to the container. As material is added, its net weight is displayed.

4. Removing the container and material from the pan will cause the balance to display the container's weight as a negative number.

5. ON TARE resets the balance to zero.

Percent Weighing

Percent Weighing is ***enabled only*** when the Percent Function is selected under the Setup menu. Refer to page 38. Percent weighing permits you to place a reference load on the balance, then view other loads as a percentage of the reference. The load you place on the platform as a reference may be displayed as any percentage you select from 5% to 100% (in 1% increments). One hundred percent does not necessarily have to represent the reference load. Subsequent loads, displayed as a percentage of the reference are limited only by the capacity of the balance. The default setting is Reference 100%.

EXAMPLE

A 10g reference load is set for 20%:

- A subsequent load of 100 g will be displayed as 200%.
- A subsequent load of 200 g will be displayed as 400%.

To perform percent weighing when in a weighing mode, use the following procedure:

1. (ON TARE) → % PctCon.
2. Place an empty container on the pan (if one will be used).
3. (ON TARE) → % SEt 100. This is the current reference percentage.

NOTE: The reference percentage can be changed to any value from 5 to 100.

4. (MODE) → % SEt 5 increments to % SEt 100.

NOTE: (PRINT) → → does not return to a lower number. Instead, it sends Set x% command through the RS232 Interface, where x = 5 to 100.

5. When the selected reference value appears on the display, place the reference load in the container (or directly on the pan if no container is used).

8. (ON TARE) → %S 100.0, display indicates the reference load as the percentage entered. The bar graph indicates the load relative to the capacity of the balance.

9. Remove the reference load from the balance and replace it with another load. The second load is displayed as a percentage of the reference.

10. (MODE) → %S 100.0000 g to view alternate display in units.

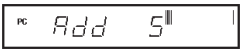
11. To restart percent weighing at any time, (ON TARE) → % PctCon.

12. (ON TARE) → to exit to a weighing mode.

Parts Counting

Parts Counting is ***enabled only*** when the Parts Counting Function is selected in the Setup menu. Refer to page 38. In the parts counting mode, the balance displays the quantity of parts you place on the pan. Since the balance determines the quantity based on the average weight of a single part, all parts must be reasonably uniform in weight. The accuracy of parts counting results is determined by the error level entered in PC Err of the Setup Options submenu. Refer to page 43. The default setting for PC Err is off.

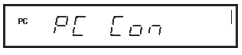
To perform parts counting when in a weighing mode, use the following procedure:

1. ON TARE  .
2. ON TARE  . The balance requires a sample of the parts to use as a reference for counting. The default for the sample size is 5 parts, but this can be changed to 10, 20, 30, 40, 50, or 100 parts by MODE (Larger samples yield more accurate results). Add the required number of sample pieces to the pan.
3. ON TARE  (indicates 5 pieces).
4. If Add X is displayed, the sample is too small to provide results within the selected error level (PC Error of the Setup Options submenu).

NOTE: X represents the number of additional parts needed to provide a sufficient sample.

5. Add the required number of parts, then ON TARE again.
6. To count additional pieces, add them to the pan. The display indicates the actual number of pieces based on their sample size. Tolerance will be within whatever was selected under the Parts Counting Error Level.

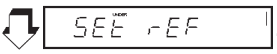
NOTE: If the balance controls are not touched, the sample size is stored in memory. You can continue to use the balance to measure quantities as long as the samples to be measured are of the same weight.

7. MODE to display the weight of the pieces on the pan.
8. MODE again to display the number of pieces.
9. To restart parts counting, ON TARE  .
10. MODE, the balance returns to a weighing mode.

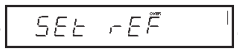
Check Weighing

Check Weighing is ***enabled only*** when the Check Weighing Function is selected in the Setup menu. Refer to page 38. Refer to page 43, Check Weighing Options under the Setup menu to set the Reference Type and Display Type options. In the check weighing mode, a reference weight can be set into the balance either as a reference weight on the pan or as a user entered number. The balance display shows either under, accept or over as each sample is weighed.

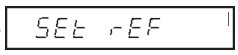
If **reference weight** was selected under CW Options submenu:

1. With the balance in the weighing mode, ON TARE  .

NOTE: If **reference number** was selected, go to step 7.

2. Place a sample weight on the pan which is considered to be the under limit for check weighing.
3. ON TARE  .
4. Place a sample weight on the pan which is considered to be the over weight limit for check weighing.
5. ON TARE . The display blanks until a stable reading is achieved, then it goes to either the (Normal, None or Sign) display type previously selected in CW Options submenu to indicate under, over or acceptacle limits of the objects being weighed.
6. Check weighing can now be made by removing a sample and placing a new sample on the pan.

If **reference number** was selected under the CW Options submenu:

7. With the balance in the weighing mode, ON TARE  .
8. MODE to return to weighing .
9. ON TARE  indicates under value with first digit flashing.
10. MODE until the first digit (under weight) is correctly displayed.
11. ON TARE to accept the value.
12. Repeat steps 10 and 11and set all digits to the desired value. When the last digit is entered, display changes to an over value to be entered with the first digit flashing  .

NOTE: PRINT allows going back.

Check Weighing (Cont.)

13. Repeat steps 10 and 11 to set the over value. When the last digit is entered, the display indicates one of three display modes for check weighing.

14. Check weighing can now be performed by removing a sample and placing a new sample on the platform.

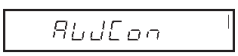
15. MODE ⇨⇨ allows other weighing units to be displayed if previously selected.

Animal Weighing

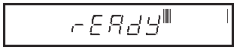
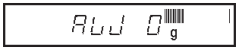
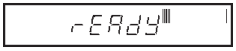
Animal Weighing is ***enabled only*** when Animal Weighing Function is selected under the Setup menu. Refer to page 38. To set options, refer to page 46, Animal Weighing Options under the Setup Options submenu. Under normal weighing conditions, the movement of animal subjects on the balance platform causes unstable fluctuating display readings and corresponding inaccuracies in the weighing result. The Animal Weighing mode is a feature designed to minimize these fluctuations through a combination of several digital signal processing techniques.

When used in this mode, the balance automatically detects the presence of a subject placed on the platform and starts an animal weighing cycle. The balance samples the weight data for a variable sampling interval and processes the data to filter out the instabilities by the live animal.

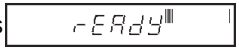
With the balance in a weighing mode, proceed as follows:

1. ON TARE ⇩  (Animal Weighing Container).
2. Place the container on the platform.

NOTE: MODE ⇨ to return to weighing mode.

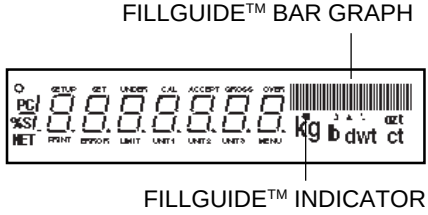
3. ON TARE ⇨  . The container weight is tared.
4. Place the subject in the container. The balance indicates a countdown to  . This cycle accommodates for movement.
   The balance then displays the actual weight of the subject with flashing unit indicator and returns to  after approximately six seconds.
   Repeat steps 1 through 4 for another subject or ON TARE ⇨ to start another weighing cycle.

NOTE: If Auto Print is enabled, the display returns to ready in approximately one second.

5. MODE ⇨ to return to weighing mode while display shows  .

Fill Guide

Fill Guide is ***enabled only*** when Fill Guide Function is selected under the Setup menu. Refer to page 38. To set options, refer to page 46, Fill Options under the Setup Options submenu.



The FillGuide™ is a bar graph which appears in the upper right hand portion of the display. When the load on the balance is at the balance's capacity, all of the segments are on. When the load is at half capacity, only the first half of the segments are on. During normal operation of the balance, the bar graph displays the relationship between the load on the pan and the capacity of the balance. In the Fill Guide mode, the bar graph can be set to a desired target value. The FillGuide™ feature can be used in any one of the available weighing units.

The Fill Option under the Setup Options submenu provides two choices for a reference weight (similar to check weighing). Either a mass can be placed on the pan and used as a reference weight or a number can be entered to establish the weight value. Both methods are used to establish a reference for a 100% bar graph reading. Target parameter provides two choices, one is fill to the reference, the other to zero weight and Target = to reference..

With the balance in a weighing mode, proceed as follows:

Reference Weight

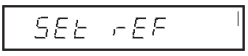
With the balance in a weighing mode, and if reference weight was selected under Fill Options submenu proceed as follows:

1. ON TARE → SEt rEF.
2. Place a sample weight on the pan which is the reference weight → SEt rEF. Assumes 50 grams weight reference.
3. ON TARE → s 50.00 g. The display indicates a 50 gram mass (target = reference. For target = to zero, display shows 0.0000 as the actual weight of the sample with the bar graph at 100%.
4. The Fill Guide feature can now used by placing samples on the pan. If the sample is equal to the reference weight used to calibrate the fill mode, the actual weight is displayed with a full bar graph. When target is selected, the balance will show the normal weight of the object on the pan.
5. ON TARE → SEt rEF to exit the fill option mode.
6. MODE → s 0.00000 g, the balance is now in a weighing mode.

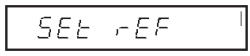
Fill Guide (Cont.)

Reference Number

If reference number was selected under the Fill Option submenu with the balance in a weighing mode, proceed as follows:

1. ON TARE 

.
2. ON TARE 

. Set the flashing digit to the desired weight value.
3. MODE until the first digit is correctly displayed.
4. ON TARE to accept the digit.
5. Repeat steps 3 and 4 until all digits are set. When the last digit is entered , the balance is automatically in the fill mode.
6. The fill mode can now be used by placing samples on the pan. If the sample weight equals the reference weight, the bar graph indicates 100%, the weight is displayed.
7. ON TARE 

to exit the fill option mode.
8. MODE 

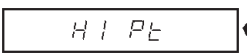
, the balance is now in a weighing mode.

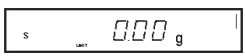
High Point

High Point is ***enabled only*** when High Point Function is selected under the Setup menu. Refer to page 38. High point is a feature which permits a number of samples to be weighed with the balance ***storing the lowest*** sample weight and the ***highest sample weight***. The samples which are in between the low and high points are disregarded and not displayed.

NOTE: When using this function, the balance does not respond to weights below 100 digits.

With the balance in a weighing mode, proceed as follows:

1. ON TARE 

. 

, LIMIT is displayed, indicating the function is on.
2. Place the first sample on the balance pan. When the balance has stabilized, the weight is displayed. Remove the weight.
3. Place a second sample on the pan. After the balance stabilizes, the second sample weight is displayed if it is greater than the first sample. This procedure can be continued with a number of samples. The highest weight sample is always displayed.

High Point (Cont.)

4. ON TARE ⇨ To view the lowest and highest sample weight. The display LIMIT flashes, the lowest sample weight is displayed followed by two short beeps, the display then indicates the highest sample weight for a few seconds then automatically changes back to the normal weighing mode.

5. To use the High Point function again, repeat steps 1 through 4.
6. MODE ⇨ s 0.00000 g to exit High Point and return to a weighing mode.

Printing Data

Printing data to an external computer or printer requires that the communications parameters in the Print menu be set first. Refer to page 51 Print menu. A wide variety of printing options are available, refer to page 55, Print Options under the Print menu and set the desired options before proceeding. To print data, PRINT ⇨.

This section defines the various printing setups with printing samples.

Time and Date

When time and date are entered in the balance through the Setup menu and with both Time and Date options set to ON under the Print Options submenu, each printout starts with the time and date on the first line.

```
6/22/95          1:00:30 PM
```

Printing Data (Cont.)

List

List is a convienent method of examining which parameters are set up in the balance. The parameters do not show up on the display but print out when selected. Both the Setup and Print menus have a List function.

When LIST is displayed in either the Setup or Print Menu, 

causes the parameters of the User, Setup and Print menus to be printed on an external printer or computer screen.

The sample shown, indicates the status in three menus.

```
AP250D 98101-35    Sr# 3.0
183
User Menu
AL = 1, Stb = 1
AZT = On

Setup Menu
LFT is Off
Enabled Modes:
g, dwt,
ct, oz,
oz t, GN
custom
Tael = Hong Kong
Function = Animal Weighing
  AW Lev = 1
Statistics On
  Std Dev = Pop
  Mean = On
  Sum = On
  Max = On
  Min = On
Diff = On
Net = On
GLP
  Time/Date On
  Bal Id = On
  User Id = On
  Project # = On
  Cal = On
Name = On
Time = US 8:24:06 AM
Date = US 6/22/95
Lock Switch is Off

Print Menu
  RS-232 = 2400: N: 7: 2
  Print Options
    Auto Print = Off
    Interval = 6
    Non - PL = 100.0000g
    Non - PH = 200.0000g
    Stable Print = Off
    Nu = Off
    Time  = On
    Date  = On
    Print Ref = On
    Print Ref = On
    Print Diff = Off
```

Printing Data (Cont.)

Automatic Calibration Printout

When performing an Automatic calibration with CAL option (GLP submenu of the Setup Options submenu set to ON), a printout is made after calibration is completed.

```
- - - - - AUTO SPAN CAL - - - - - -
6/22/95          8:42:24 AM
Bal Id  183
Auto. Cal. completed !
Dif:                    - 0.00136g
ID 2000000
PR 10000
Name.....

- - - - - END - - - - -
```

User Calibration Printout

When performing User calibration with CAL option (GLP submenu of the Setup Options submenu set to ON), a printout is made after calibration is completed.

```
- - - - - USER SPAN CAL - - - - - -
6/22/95          8:52:21 AM
Bal Id  183
Cal:             200.0000g
Old:             200.0398g
Dif:               0.0398g
Wt. Ref.....
ID 2000000
PR 10000
Name.....

- - - - - END - - - - -
```

Calibration Test Printout

When performing a Calibration Test with with CAL option (GLP submenu of the Setup Options submenu set to ON), a printout is available.

```
- - - - - CAL TEST - - - - - -
6/22/95          8:47:02 AM
Bal Id  183
Cal. test completed !
Dif:                   -0.00045g
ID 2000000
PR 10000
Name.....

- - - - - END - - - - -
```

Printing Data (Cont.)

Statistics Printout

When statistics is enabled, a printout can be made with any of the major balance functions such as; Percent, Parts Counting, Check Weighing, Animal Weighing and FillGuide™. Under the Setup Options menu, Statistics has parameters such as Enable, Standard Deviation, Mean, Sum, High, Low and Difference which can be turned on or off. Statistics can be printed any time the balance is operational and statistics is enabled (turned on).

For example, to weigh ten samples and obtain a printout, proceed as follows:

Sampling

1. PRINT → StArt.
2. Place the *first* sample on the platform, wait for the stability indicator **S** on the display to show.
3. PRINT → Sn 1 appears and the printer outputs the first sample weight.
4. Remove the first sample.
5. Place the *second* sample on the platform, wait for the stability indicator **S** on the display to show.
6. PRINT → Sn 2 appears and the printer outputs the second sample weight.
7. Remove the second sample.

NOTE: The weight of each sample is shown on the display and printed. Maximum sample size = 256.

8. Repeat procedure for as many samples as required.
9. PRINT → StOP to end the sampling procedure. Printout completes the data. See sample at right.

```
- - - - - START - - - - -
6/22/95          1:40:00 PM
  1          200.0369 g
  2          200.0372 g
  3          200.0370 g
  4          200.0369 g
  5          200.0371 g
  6          200.0372 g
  7          200.0372 g
  8          200.0369 g
  9          200.0369 g
 10          200.0371 g
- - - - - - - - - - - - - - - - - - - - - - - -
SD Pop.        0.000119
Mean         200.037030
Sum         2000.03720
Max.         200.03720
Min.         200.03690
Diff             0.00030
Finish       1:43:17 PM
Bal Id  183
ID 2000000
PR 10000
Name.....

      - - - - - - END - - - - - -
```

Printing Data (Cont.)

Percent Weighing

Statistical printouts of Percent Weighing are similar to sampling statistics. Loads on the balance platform may be displayed as a percentage of a defined sample. To obtain a printout in this mode, the balance must be set up in Percent Weighing. Refer to basic Sampling procedure for operation. The sample illustration shown at the right had the balance reference set to 100% using a weight of 25.22573 grams.

```
     - - - - - START - - - - -
6/22/95          10:53:24 AM
  1                100.0%
  2                148.9%
  3                 46.9%
  4                 70.4%
  5                 94.0%
 - - - - - - - - - - - - - - - - - - - - - -
SD Pop.            34.077
Mean               92.040
Sum                 460.20
Max.               148.90
Min.                46.90
Diff               102.00
Finish       10:53:39 AM
Bal Id  183
ID 2000000
PR 10000
Name.....

     - - - - - - END - - - - - -
```

```
     - - - - - START - - - - -
6/22/95          9:58:00 AM
  1                 20 Pcs
  2                 14 Pcs
  3                 11 Pcs
  4                 25 Pcs
  5                 23 Pcs
 - - - - - - - - - - - - - - - - - - - - - -
SD Pop.             5.31
Mean               18.60
Sum                 93.0
Max.                25.0
Min.                11.0
Diff.               14.0
Finish       10:01:00 AM
PC Ref       0.888604 g
Bal Id  183
ID 2000000
PR 10000
Name.....

     - - - - - - - - END - - - - - -
```

Parts Counting

When the balance is in a Parts Counting mode, each time a batch of items are counted, they can be recorded statistically by pressing PRINT as described in the Sampling procedure. The example shown on the left used a five piece sample weight of 80.2273 grams.

Printing Data (Cont.)

Check Weighing

When the balance is in a Check Weighing mode, each sample can be checked to print an under, accept or over weight on the printout by setting the Print Options parameter Difference to ON. Use the procedure described in Sampling to obtain data by pressing PRINT each time a sample is weighed.

```
- - - - - START - - - - -
6/22/95      12:09:29 PM
  1      17.28667 g
Fill Dif                 7.95202 g
  2      31.75109 g
Fill Dif                 6.51240 g
  3      13.85533 g
Fill Dif                11.38335 g
  4      200.0372 g
Fill Dif                174.7985 g
  5      28.18002 g
Fill Dif                 2.94133 g
 - - - - - - - - - - - - - - - - - - - - - - -
SD Pop.                 71.216407
Mean                    58.222062
Sum                     291.11031
Max.                    200.03720
Min.                     13.85533
Diff                    186.18187
Finish                 1:30:25 PM
Fil Ref                 25.23869 g
Bal Id  183
ID 2000000
PR 10000
Name.....................................

- - - - - - END - - - - - -
```

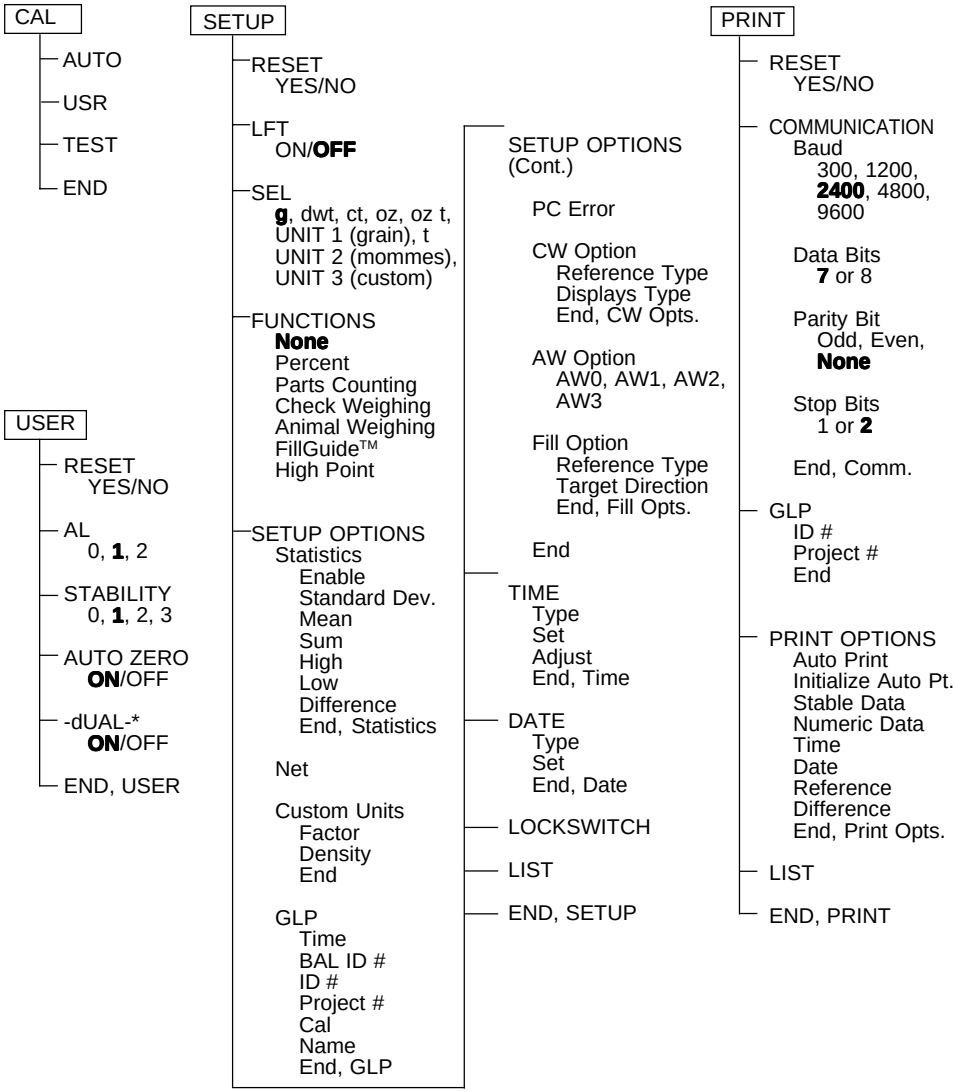
```
- - - - - START - - - - -
6/22/95      12:09:29 PM
  1      5.96781 g
CW UNDER                0.00397 g
  2    14.84395 g
CW OVER                 2.98037 g
  3    20.50947 g
CW OVER                 8.64589 g
  4      5.96424 g
CW UNDER                0.00753 g
  5      8.93100 g
CW ACCEPT               8.93100 g
- - - - - - - - - - - - - - - - - - - - - - - -
SD Pop.                 5.654601
Mean                   11.243294
Sum                     56.21647
Max.                    20.50947
Min.                     5.96424
Diff                    14.54523
Finish                12:12:57 PM
Min Ref                 5.97177 g
Max Ref                11.86358 g
Bal Id  183
ID 2000000
PR 10000
Name.....................................

- - - - - - END - - - - - -
```

FillGuide™

When the balance is in the FillGuide™ mode, each sample can be checked against the defined FillGuide™ full capacity and to print the difference on the printout by setting the Print Options parameter Difference to ON. Use the procedure described in Sampling to obtain data by pressing PRINT each time a sample is weighed.

MENUS

Each submenu of the AP Balance contains numerous selections which can be set for specific operations. To customize the operation of the balance for specific measurements, functions and printing, it is necessary to make selections in each menu. The following illustration identifies the major items in each menu. The factory default settings are shown in bold type.



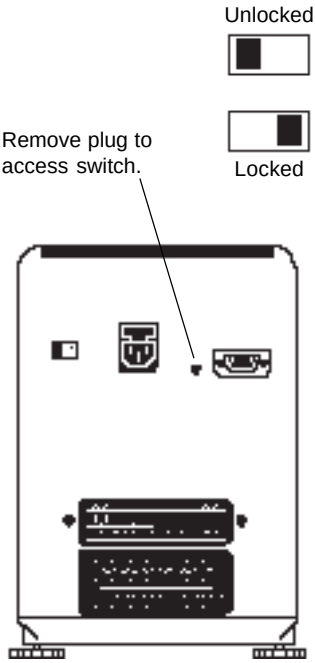
* For AP250D only.

MENU LOCK-OUT PROTECTION

The menus can be locked out to prevent settings from being changed. When locked out, Setup and Print menus may still be accessed for viewing but settings may not be changed. The word SAFE will be displayed before the menus indicating they have been locked out.

Before setting menus for Lock or Unlock in the Loc SW section , this lock-out switch must be set to Unlock. After selections are made, set this switch to Lock.

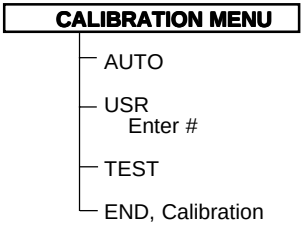
1. Turn the balance OFF.
2. Locate the hole plug next to the RS-232 Interface connector at the rear of the balance.
3. Remove the hole plug to access the switch.
4. Using a small screwdriver, slide the switch to the right to lock out, or to the left to unlock menus.
5. Replace the hole plug.
6. Turn the balance ON again.



For verified balances:
Place verification label over hole with switch in locked position. Fully verified balances are sealed with the Setup menu locked out.

CALIBRATION MENU

Analytical Plus balances features ***Auto***, ***USER*** and ***TEST*** calibration methods. ***Auto*** is a method where the balance calibrates itself using internal calibrated masses. ***USER*** is a method where the balance can be calibrated using an external mass of known value by entering that value into the balance. ***Test*** allows the stored calibration data to be tested against the internal mass being used for the test. The following figure illustrates the sequence in which submenus appear on the Calibration menu. Item shown bolded is a default setting.



Calibration Menu Protection

NOTES:

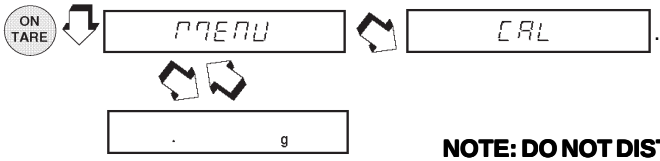
1. Calibration may be locked out to prevent unauthorized personnel from changing calibration. If calibration has been locked out, you can only access Test.

2. To lock out calibration menu, after calibration, refer to the section titled Menu Lock-Out Protection.

Auto Calibration

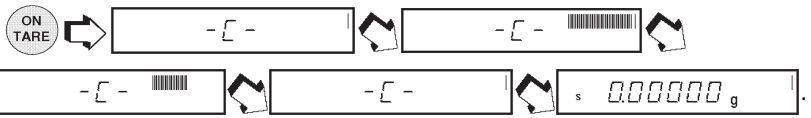
Auto calibration is used when it is desired to calibrate the balance automatically. Proceed as follows:

1. Make sure there is no load on the pan and close the chamber doors.

2. 

NOTE: DO NOT DISTURB THE BALANCE WHEN -C- IS DISPLAYED.

3. 

4. 

User Calibration

User calibration is used when it is desired to calibrate the balance using a mass of known value.

NOTE: Before beginning user calibration, make sure masses are on hand.

If you are in the calibration menu and realize masses are not available or you do not want to calibrate, exit the menus and return to normal weighing.

Refer to the adjacent table for correct mass values to use with the balance. For optimum calibration, the exact value of masses should be known. The value will be entered to four decimal places during the procedure.

USER CALIBRATION MASSES	
MODEL	**MASS VALUE**
AP110S	100 g
AP210S	200 g
AP310S	300 g
AP250D	200 g

Calibration weights must meet or exceed ASTM Class 1 Tolerance. In Europe, use OIML Class E2 weights.

Proceed as follows:

1. Make sure there is no load on the pan and close the chamber doors.
2. ON TARE → MENU → CAL.
3. ON TARE → AUTO
4. MODE → → USER.
5. ON TARE → 200.0000 g the value of last calibration mass is displayed.
6. MODE → → to change value of flashing digit.
7. ON TARE → to accept value.
8. Repeat steps 6 and 7 and set the numbers to match the value of the selected calibration mass.
9. ON TARE → CAL 0 g.
10. ON TARE → -C- → CAL 200 g = required mass.
11. \+ XXX grams → CAL 200 g.
12. ON TARE → -C- → s 200.0000 g.

⚠ = User Calibration Indicator

Cal Test

This feature checks the calibration against last stored calibration information. The Cal Error display indicates the difference since the last automatic calibration.

1. Make sure there is no load on the pan and close the chamber doors.
2. ON TARE → mENU → CAL.
3. ON TARE → AUTO
4. MODE → TEST.
5. ON TARE → -C- → -C- → 0.00000 g → . g → s 0.00000 g

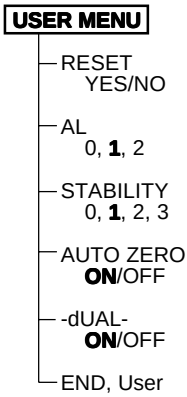
Cal End

To exit the calibration menus, proceed as follows:

1. ON TARE → mENU → CAL.
2. ON TARE → AUTO.
3. MODE → End.
4. ON TARE → CAL.
5. MODE → End.
6. ON TARE → s 0.00000 g.

USER MENU

The User menu is used to adapt the balance to environmental conditions. It contains submenus which enable you to turn features on or off, and program balance parameters. *Reset* changes all submenus to original factory default settings. *Reset* does not appear if menu has been locked out. *AL* specifies the averaging level. *STB* specifies the desired stability range. *Auto Zero* sets the automatic zero threshold. *Dual,* when set on, enables dual range function on model AP250D. *End User* is used to exit the User menu and store the selections. The following figure illustrates the sequence in which submenus appear on the User menu. Items shown in bold type are the default settings.



User Menu Protection

The User menu may be locked out to prevent unauthorized personnel from changing the settings. If -SAFE- is displayed, the User menu has been locked out. Settings may be viewed but not changed. To lock out the User menu, refer to the section titled Menu Lock-Out Protection.

Reset

This submenu enables you to reset all User menu selections to the *factory default settings:* Averaging Level **1**, Stability Range **1,** Auto-Zero Tracking **ON** and Dual Range **ON.** Reset does not appear if the menu has been locked out.

1. ON TARE → nnEnU ↔ CAL.
2. MODE → USEr.
3. ON TARE → rESEt.
4. ON TARE → YES.
5. MODE → to select YES or no.
6. ON TARE → rESEt. If YES is selected, the balance signals a *long beep*. Reset values are stored only if exited through End USr.

Averaging Level

Averaging level compensates for vibration or excessive air currents. Factory default setting is shown in bold type.

AL 0 reduced stability, fastest stabilization time

AL 1 normal stability, normal stabilization time

AL 2 more stability, slow stabilization time

NOTE: Averaging level does not affect balance accuracy, but it does affect stabilization time.

To view or change the averaging level:

1. Access the Averaging Level [AL] submenu.
2. ON TARE → [AL 1].
3. MODE → → to select [AL 0] through [AL 2].
4. ON TARE → [AL].

Stability Range

The stability range specifies the weighing results must be within a preset tolerance limit for a certain time to turn the stability indicator ON. When a displayed weight changes beyond the allowable range, the stability indicator turns OFF, indicating an unstable condition. Factory default setting is shown in bold type.

Stb 0 Smallest range: stability indicator is ON only when displayed weight is within a preset tolerance limit for one second.

Stb 1 Normal range.

Stb 2 Larger range.

Stb 3 Largest range: stability indicator is ON when displayed weight is within a preset tolerance limit for several seconds.

When the RS232 interface is configured to print stable data only, the stability range also governs data output. Displayed data will only be output if it is within the selected stability range.

To view or change the stability range:

1. Access the Stability Range [Stb] submenu.
2. ON TARE → [Stb 1].
3. MODE → → to select [Stb 0] through [Stb 3].
4. ON TARE → [Stb].

Auto-Zero

Auto-Zero minimizes the effects of temperature changes and shift on the zero reading. The balance maintains the zero display until the threshold is exceeded. Factory default setting is shown in bold type.

OFF	Turns Auto-Zero OFF.
On	**Turns Auto-Zero ON.**

To view or change the auto-zero setting:

1. Access the Auto-Zero [AUTO-0] submenu.
2. ON TARE → [On].
3. MODE → → to select [On] or [OFF].
4. ON TARE → [AUTO-0].

Dual Range Function

Enables dual range operation on model AP250D only. To turn the feature ON, proceed as follows:

1. Access the Dual [-dUAL-] submenu.
2. ON TARE → [On].
3. MODE → → to select [On] or [OFF].
4. ON TARE → [-dUAL-].

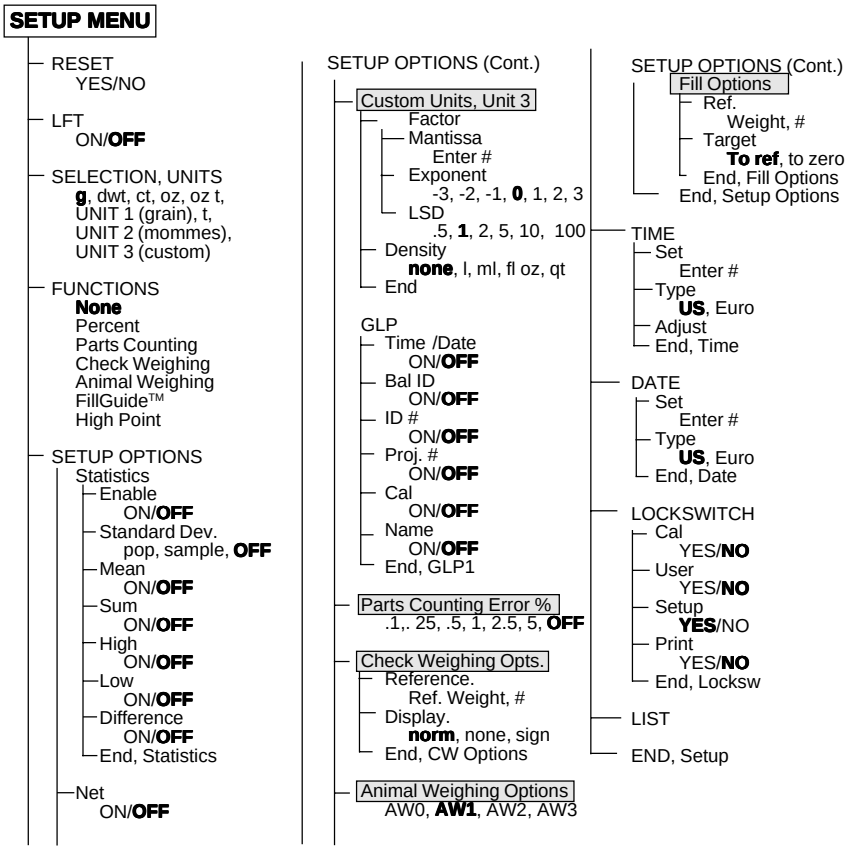
Exiting User Menu

To exit the User menu and store settings, proceed as follows:

1. Access End Usr [End USr] submenu.
2. ON TARE → [USEr].
3. MODE → → [End].
4. ON TARE → [s 0.00000 g].

SETUP MENU

The Setup menu is used to customize the operation of the balance for your specific requirements. It contains submenus which enable you to turn features on or off, and program balance parameters. *Reset* changes all submenus to original factory default settings. *Reset* does not appear if menu has been locked out. *LFT* sets the balance for type approved operation. *SEL* (selection) specifies one of nine weighing units with a custom unit for specialized applications. *Functions* contains six mutually exclusive items, only one at a time can be selected for operation. The functions are: Percent, Parts Counting, Check Weighing, Animal Weighing, FillGuide™ or High Point. Several of these functions have submenus under the Setup Options Menu which permit various options to be selected and printed. *Setup Options* contains submenus as follows: Statistics, Net, Custom Units, Good Laboratory Practices, Parts Counting Error, Check Weighing Options, Animal Weighing Options, Fill Options, Time, Date, Lock Switch, List and End. The following figure illustrates the sequence in which submenus appear on the Setup menu. Areas shaded only appear in the menu if the appropriate function or weighing unit is selected. Items shown in bold type are the default settings.



Setup Menu Protection

The Setup menu may be locked out to prevent unauthorized personnel from changing the settings. If -SAFE- is displayed, the Setup menu has been locked out. Settings may be viewed but not changed. To lock out the Setup menu, refer to the section titled Menu Lock-Out Protection.

Reset

This submenu enables you to reset **all** Setup menu selections to the factory default settings shown in the table. Reset does not appear if the menu has been locked out.

NOTES:
1. Default settings of the Lockswitch menu only appear if the hardware Lock-out switch is set to the locked position.
2. Function related options shown in itailics in the table only appear if that function is enabled.

SETUP MENU
FACTORY DEFAULTS

Unit Selection	grams
Functions	None
Statistics	All-Off
Net	Off
Conversion Factor	
Mantissa	1.000000
Exponent	0
LSD	1
Density	None
GLP	Off
Animal Weighing	*AW1*
PC Error Level	*OFF*
Check Weighing	
Reference	Ref Wt.
Display	Normal
Fill Options	
Reference	Ref Wt.
Target	To Ref
Time	U.S.
Date	U.S.
Lockswitch Menu	
Cal	Yes
User	No
Setup	Yes
Print	No

1. ON TARE → mENU → CAL.
2. MODE → SEtUP.
3. ON TARE → rESEt.
4. ON TARE → YES.
5. MODE → YES or no.
6. ON TARE → rESEt. If YES is selected, the balance signals a *long beep*.

Type Approved/LFT

LFT can be set to ON or OFF. Selecting ON automatically sets the parameters shown in the table to conform to type approved requirements. For sealing method, refer to Type Approved Sealing section. Default setting are shown as follows:

Lockswitch Menu Print Stable Data Only	Setup Locked ON

1. Access the [LFt] submenu.
2. (ON TARE) [On].
3. (MODE) [On] or [OFF].
4. (ON TARE) [LFt].

Unit Selection

The Unit Selection (SEL) submenu permits the selection of weighing units for use during operation. The balance can display weights in every unit of measure listed in table. The default setting is shown in bold type.

NOTE:
If Taels is enabled, see next page before exiting the menu.

Weighing Units	
g	**Grams**
dwt	Pennyweight
ct	Carats
oz	Ounces
ozt	Troy ounces
UNIT1	Grains
t	Taels (see note)
UNIT2	Mommes
UNIT3	Custom

To view or change the various weighing units:

1. Access the [SEL] submenu.
2. (ON TARE) [On g].
3. (MODE) [On g] or [OFF g].
4. (ON TARE) for next unit status.
5. Repeat steps 2 through 4 for each unit.
6. (ON TARE) [SEL].

Unit Selection (Cont.)

Taels

If taels are enabled, choose one of three different taels: Hong Kong, Singapore, or Taiwan.

1. ON TARE → On .
2. MODE → → tAEL 1 (Hong Kong), tAEL 2 (Singapore), or tAEL 3 (Taiwan).
3. ON TARE → On .

Functions

The Functions submenu permits the selection of only one function. These functions are: Percent, Parts Counting. Check Weighing, Animal Weighing, FillGuide™, High Point or None. The default setting is **none**. *Only **one** function at a time can be selected for balance operation.* Selection of a function, other than None or Percent, requires additional selections to that function be reviewed in the section titled Setup Options.

1. Access the Functn submenu.
2. ON TARE → nonE .
3. MODE → → PCt, PC, CUU, AUU, FILL, HI Pt .
4. ON TARE → Functn .

Statistics

Statistics provides printed display data of: Standard Deviation either population or sample, Mean, Sum, High, Low and Difference readings. Each can be individually set ON or OFF.

1. Access [OPtions] menu.
2. ON TARE [STATS].
3. ON TARE [ENABLE]. Enable allows the statistics feature to be turned off without losing the individual settings programmed into memory.
4. ON TARE [On].
5. MODE [On] or [OFF].
6. ON TARE [ENABLE].
7. MODE [Std d].
8. ON TARE [SAMPLE].
9. MODE [SAMPLE], [OFF], [POP].
10. ON TARE [Std d].
11. MODE to select other parameters.
12. ON TARE to accept.
13. MODE [On] or [OFF].
14. ON TARE [MEAN].
15. Continue the same procedure to set Sum, High, Low and Difference parameters and finish by selecting [End].

Net

Weight shown on the display can be referred to as a zero value (gross value) or tare value (net value). When enabled the display value also has GROSS/NET Indicator turned ON, this feature will allow you to obtain a zero value by a long press on ON TARE. A short press is a tare.

Net Weight - the weight of a material or sample after deducting the weight of its packaging or container with which it had previously been weighed.

Gross Weight - the weight of object or sample (Net Weight) including container or packaging.

NOTE: When in a weighing mode, MODE switches between Gross weight and Net weight.

The Net function can be set either ON or OFF.

1. Access the nEt menu under the Setup Options menu.
2. ON TARE → On .
3. MODE → → On or OFF .
4. ON TARE → nEt .

Custom Unit or Volume Selection

Custom Unit is enabled when Unit 3 under Unit Selection is selected. When you need to display weight measurements in a weighing unit other than those provided standard with the balance, this feature can be used to create your own custom weighing unit. It permits you to enter a conversion factor which the balance will use to convert grams to the desired unit of measure.

Conversion Factor x *Weight in grams* = *Weight in custom unit*

Conversion factors are expressed in scientific notation and entered into the balance in three parts:

- a number between 0.1 and 1.999999 called the mantissa
- a power of 10 called the exponent
- a least significant digit (LSD)

SCIENTIFIC NOTATION

Conv. Factor	Number Between 0.1 and 1.999999	Power of 10	Mantissa	Exp.
123.4	= .1234 x	1000 =	.1234 x	10^3
12.34	= .1234 x	100 =	.1234 x	10^2
1.234	= .1234 x	10 =	.1234 x	10^1
.1234	= .1234 x	1 =	.1234 x	10^0
.01234	= .1234 x	.1 =	.1234 x	10^{-1}
.001234	= .1234 x	.01 =	.1234 x	10^{-2}
.000123	= .123 x	.001 =	.123 x	10^{-3}

Custom Unit or Volume Selection (Cont.)

1. Access the CUnit submenu under the Setup Options menu.
2. ON TARE → FACtor.
3. ON TARE → 1000000.
   The mantissa of the current conversion is displayed. The mantissa of the current conversion factor is displayed. This is a number between 0.1 and 1.999999 with the first digit flashing. For conversion factors outside of this range, the exponent will be used to move the decimal point.
4. MODE → → changes first digit.
5. ON TARE → 1000000. next digit flashes.
6. Repeat steps 4 and 5, and set value of all digits.
7. PRINT → → to backup for errors.
8. After the last digit is entered, the display indicates the current exponent preceded by the letter E 0. There are 7 exponent values which you can choose from (see table).
9. MODE → → to change the exponent.
10. ON TARE →. When released, the display shows the current least significant digit. The least significant digit is the digit in the last decimal place on the display. The selection you make causes the balance to count by 1's, 2's or 5's in this position. There are 6 LSD settings you can choose from (see table).
11. MODE → → to change the LSD.
12. ON TARE → FACtor.
13. MODE → dEnSitY.

Density permits the selection of the density of a liquid by measuring the volume by weight. If the Factor is the density of a liquid, the appropriate unit of volume can be selected for printing.

EXPONENTS	
E-3	Moves decimal point 3 places to the left.
E-2	Moves decimal point 2 places to the left.
E-1	Moves decimal point 1 place to the left.
E0	**Leaves decimal point in normal position.**
E1	Moves decimal point 1 place to the right.
E2	Moves decimal point 2 places to the right.
E3	Moves decimal point 3 places to the right.

LSD's	
LSD .5*	Adds one decimal place display counts by 5's.
LSD 1	**Display counts by 1's.**
LSD 2	Display counts by 2's.
LSD 5	Display counts by 5's.
LSD 10	Display counts by 10's.
LSD 100	Display counts by 100's.

* Sensitivity to vibration is increased with this LSD setting.

Custom Unit or Volume Selection (Cont.)

14. ON TARE → [nonE].
15. MODE → → [LitEr], [mL], [FL 02], [9uArt]. Selecting NONE disables the volumetric units.
16. ON TARE → [dEnSity].

NOTE: To use this function the printer must be on and all communication parameters must be set first.

Operating Procedure

1. Place a container on the platform, ON TARE → to tare the container .
2. Fill the container.
3. PRINT →, printer will now print out quantity of selected unit of measurement.

Good Laboratory Practices

Good Laboratory Practices (GLP) submenu allows the selection of Time, Balance Identification Number, Identification Number, Project Number, Calibration and Name data to be printed. The purpose of this submenu is to permit the printing of the above selected items. These items are not displayed. The default setting is off.

When an external printer is used, and all items are set ON and the balance is calibrated, the printer will print out calibration data for audit trail purposes and will indicate date, and time. The Balance ID number is entered through the RS232 command xxxxID. It should be noted that the ID number and Project number must be entered in the Print/GLP submenu before printed data is available. Since all of the settings for the GLP submenu are done in a similiar manner, only one example is shown.

1. Access the [GLP] submenu under SETUP Options menu.
2. ON TARE → [tiME].
3. ON TARE → [On].
4. MODE → → [On] or [OFF].
5. ON TARE → [tiME] .
6. Repeat steps above for Balance ID#, ID#, Project#, Calibration and Name.

Parts Counting Error

Parts counting Error is enabled only when the Parts Counting Function is selected.

The parts counting error level is the level of accuracy you consider acceptable for parts counting results. The adjacent table lists error levels that you can choose from. The default setting is shown in bold type.

EXAMPLE: With 5 Pct selected, 100 parts on the platform may yield a displayed count from 95 to 105 parts.

ERROR LEVELS	
OFF	**Disables error level limits.**
.1 %	±0.1% acceptable error.
.25 %	±0.25% acceptable error.
.5 %	±0.5% acceptable error.
1 %	±1.0% acceptable error.
2.5 %	±2.5% acceptable error.
5 %	±5.0% acceptable error.

To view, change or disable the PC Error Level:

1. Access the PC Err submenu under the Setup Option submenu.
2. ON TARE → % SEt .1 indicates percentage of acceptable error. Settings are shown in table.
3. MODE → → % SEt .1 ••• % SEt 5 to change the percentage error limits,
4. ON TARE → PC Err when the desired setting is reached.
5. MODE → End.
6. ON TARE → OPt ionS.

Check Weighing Options

Check Weighing is enabled only when the Check Weighing Function is selected. This feature may be used for check weighing or package weight control in any one of the available weighing units. When in use, the display will show the relationship between the load on the pan, and the selected target weight. The bar graph will visibly display where the weight of the load falls in relationship to the under, acceptable, and over limits. The balance also displays UNDER, ACCEPT, and OVER messages as appropriate. The default settings are: Reference = Reference weight, Display = normal.

Two choices are provided for programming the Reference Weight. One choice is the use of a mass (package, container, etc,) and the other is a number which can be entered as a high and low limit.

Three choices are provided for programming the display: normal, none, and sign. Sample displays are shown on the next page.

SAMPLE DISPLAYS

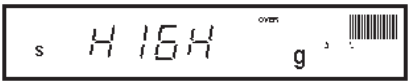
NOTE: Samples of the displays for check weighing are shown as follows using a reference weight of 50 grams. The over limit was set at 55 grams, and the lower limit was set at 45 grams.

NORMAL DISPLAYS

When normal is selected, the display indicates the actual weight.

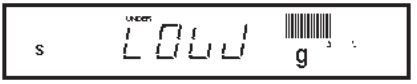
NONE DISPLAYS

When none is selected, the numeric section of the display is blank if the values exceed the limits. Numbers appear only if they are within the limits.



SIGN DISPLAYS

When sign is selected, the display spells in words; HIGH, LOW or ACCEPT with no weight values showing.



Check Weighing Options (Cont.)

The following procedure describes how to set up the balance for all choices. Before starting, the Check Weighing option must have been selected under the Functions submenu.

1. Access the [CuJ OPt] submenu under the Setup Options sub menu.
2. ON TARE → [rEF] (reference).
3. ON TARE → [rEF WJt] (reference weight).
4. MODE → [rEF WJt] ⇄ [nuMbEr].
   If REF WT is selected, a sample reference is used later to set the weight parameter into the balance. If NUMBER is selected, a number representing the sample weight has to be entered manually. See section titled Check Weighing.
5. ON TARE → [rEF] .
6. MODE → [dISPLAY] .
7. ON TARE → [norMAL].
8. MODE → [norMAL], [nonE], [SIGN].
9. ON TARE → [dISPLAY].
10. MODE → [End].
11. ON TARE → [CuJ OPt].
12. MODE → [End].
13. ON TARE → [OPtIonS].

Animal Weighing Options

Animal Weighing Options is enabled only when Animal Weighing Function is selected. The balance samples the weight data for a variable sampling interval and processes the data to filter out the instabilities by the live animal.

The strength of the filtering activity as well as the duration of the sampling period can be adjusted by selecting one of four AW OPT levels, 0 through 3. 0 is the least amount of processing, as well as the shortest sampling interval while level 3 is the maximum processing amount and the longest sampling interval. AW3 should be used for an active subject. The default setting is AW1.

1. Access the AUJ OPt submenu under the Setup Option sub-menu.
2. ON TARE → AUJ 1.
3. MODE → → AUJ 1, AUJ 2, AUJ 3, AUJ 0 for desired sensitivity.
4. ON TARE → AUJ OPt.
5. MODE → End.
6. ON TARE → OPtions.

Fill Option

Fill Option provides two choices for a reference weight (similar to check weighing). Either a mass can be placed on the pan and used as a reference weight or a number can be entered to establish the weight value. Both methods are used to establish a reference for a 100% bar graph reading. Target parameter provides two choices, one is fill to the reference, the other to zero. The following procedure describes how to set up the balance for all choices. Before starting, the Fill Function must have been selected.

1. MODE → → to select the desired weighing unit, g, dwt, oz, etc.
2. Access the FiLL OPt submenu under the Setup Options sub menu.
3. ON TARE → rEF (reference).
4. ON TARE → rEF Wt (reference weight).

Fill Option (Cont.)

5. MODE → rEF WT ⇄ NUMBER.

If REF WT is selected, a sample reference weight is used later to set the weight parameter into the balance. If NUMBER is selected, a number representing the desired sample weight has to be entered. Select either REF WT or NUMBER.

6. ON TARE → rEF.

7. MODE → tAr-SEt. When target is selected, the balance will show the normal weight of the object on the pan.

8. ON TARE →.

9. MODE → to rEF or to ZEr0. When zero is selected, the balance indicates the weight as a negative number after the reference is set in the main menu. When an object is placed on the balance that weighs exactly what the reference was set to, the display shows zero with a full bar graph.

10. ON TARE → tAr-SEt.

11. MODE → End.

12. ON TARE → FILLOPt.

13. MODE → End.

14. ON TARE → OPtions.

Time

Time is a feature which enables the balance to be set to the current time in either U.S.A. standards (12 hour periods) or European/Military standards (24 hour periods). The default setting is US Standard. To enter time, proceed as follows:

1. Access the tIME submenu which is under the Setup menu.
2. ON TARE → tYPE.
3. ON TARE → US.
4. MODE → US or EU-0.
5. ON TARE → tYPE.

Time (Cont.)

6. MODE → SEt .
7. ON TARE → 12 00 A first two digits are flashing.
8. MODE → → or MODE ↓ to change flashing digits to current local hour.
9. ON TARE → 1 00 A flashes the last two digits.

   NOTE: PRINT → will back up display.

10 MODE → → or MODE ↓ changes minutes display.

11. ON TARE → to accept. AM or PM is flashing, A for AM, P for PM.
12. MODE → → to select AM or PM.
13. ON TARE → SEt .

Adjust

Adjust is a feature which enables the internal clock of the balance to be corrected + or - 59 seconds a day. The internal clock is accurate to within 8 seconds a day. To enter or subtract time, proceed as follows:

1. Access the AdJUSt submenu which is under the Time sub menu.
2. ON TARE → AdJ 00 . First digit is flashing.
3. MODE → → to change first digit (ten seconds) from 0 to +5 or -5.
4. ON TARE → AdJ 00 , seconds digit is flashing.
5. MODE → → to change seconds from 0 to 9.
6. ON TARE → AdJUSt .
7. MODE → End .
8. ON TARE → t imE .

Date

Date is a feature which enables the balance to be set to a U.S.A. date standard or European date standard. U.S. standard has the month, date followed by the year each separated by (/) in the printout. The European date standard has the day first, followed by the month and then the year each separated by a period. The default setting is US Standard.

1. Access the dAtE submenu which is under Setup menu.
2. ON TARE → tYPE.
3. ON TARE → US.
4. MODE → US or EU-D.
5. ON TARE → tYPE.
6. MODE → SEt.
7. ON TARE → 00.00.00 flashes first two digits.
8. MODE to change the first flashing digit to current month for US or day for European standard.
9. ON TARE → 3.00.00.
10. MODE to change flashing digit.
11. ON TARE → 3.0 1.95.
12. MODE to change year.
13. ON TARE → SEt.
14. MODE → End.
15. ON TARE → dAtE.

NOTE: At power up, if Time in the GLP submenu is set to ON, the display flashes t* IME for about 1.5 seconds to prompt setting of time and date .

Lockswitch

Lockswitch enables you to lock out one or more menu selections. Each menu can be individually locked on or off ***after all functions have been set***. The **Calibration**, **User, Setup** and **Print** menus can be individually locked on or off by selecting the appropriate menu and then locked by the switch located under the front of the control panel. See Menu Lockout Section. Cal Test under Calibration remains functional with the Lockswitch On or Off. Before performing the lockout procedure, decide which functions of the balance are to be locked on or off.

1. Access the LOCSUD submenu which is under the Setup menu.
2. MODE to access either Calibration, User, Setup or Print menus.
3. ON TARE to access selected desired menu.
4. MODE to select YES or no.
   YES = locked, NO = not locked.
5. ON TARE to accept.
6. MODE to change to other menus.
7. To change other menus, repeat steps 2 through 5.

List

This submenu can be used to output a listing of current menu settings via the RS232 interface. When selected, all menu settings for the User, Setup and Print menus will be output either to an external printer or computer. To use this feature, your balance must be connected to a computer or printer.

1. Access the LIST submenu under the Setup or Print menus.
2. ON TARE LIST . . . . The display indicates a series of dots traveling right to left when the balance is sending information.

Exit Setup Menu

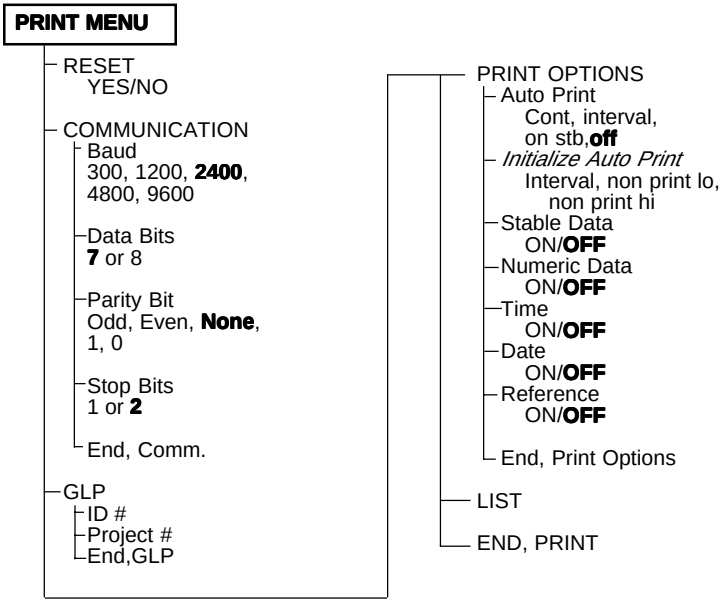
1. MODE End.

NOTE: If any Setup parameter is different from previous settings, indicator SETUP in the display flashes while the balance is storing new settings. Proceed with next step.

2. ON TARE SETUP.

PRINT MENU

The Print menu provides a number of options which includes: reset, communications, good laboratory practices, print options, and list. *Reset* sets all submenus contained in the Print menu to factory default settings. *Communication* specifies baud rate, number of data bits, parity bit type and stop bits. *GLP* Good laboratory practices permits the entering of your own identification number and project number which shows up on printing. *Print Options* Enables/disables Auto print feature, specifies time interval for automatic output of displayed data and/or exclude a range of weights from being output. The following items can be turned on or off: Stable data-only feature, numeric only or full display data for output, time and date. Items shown in bold type are default settings. Items shown in italics in the print menu below appear only if the appropriate Functions are turned on.



Print Menu Protection

The Print menu may be locked out to prevent unauthorized personnel from changing settings. If SAFE is displayed, the Print menu has been locked out. Settings may be viewed but not changed. To lock out the Print menu or unlock, refer to the section titled Menu Lock-Out Protection.

Reset

This submenu enables you to reset **all** Print menu selections to the factory default settings shown below. Reset does not appear if the menu has been locked out.

Function	Default
Baud Rate	br2400
Data Bits	7 data
Parity	none
Stop Bits	2 stop
Auto Print	OFF
Auto Print interval	1 second
Non Print Low Limit	0
Non Print High Limit	0
Stable data Only	OFF
Numeric Data Only	OFF
Time	OFF
Date	OFF

1. ON TARE → mENU → CAL.
2. MODE → PrInt.
3. ON TARE → rESEt.
4. ON TARE → YES.
5. MODE → YES or no.
6. ON TARE → rESEt. If YES is selected, the balance signals a ***long beep*** and all selections reset to factory settings.

Communication

The Communication submenu contains submenus which permit the setting of: baud rates, data bits, parity and stop bits necessary for communications to an external printer or computer.

Access the COMM submenu under the Print menu..

Baud Rate

This submenu is used to select the desired baud rate. There are five available baud rates to choose from: 300, 1200, 2400, 4800 and 9600. The default setting is 2400 baud.
To view or change the baud rate:

1. Access the bAud submenu.
2. ON TARE → br 1200.
3. MODE → br 1200, br2400, br4800, br9600, br 300, br 1200. Normal baud rate is 2400.
4. ON TARE → bAud.

Data Bits

To set the number of data bits to 7 or 8:

1. Access the dAtA submenu.
2. ON TARE → 7 dAtA.
3. MODE → 7 dAtA or 8 dAtA.
4. ON TARE → dAtA.

Parity

Parity can be set to Odd, Even or None. The default setting is None. To set parity, proceed as follows:

1. Access the PAr itY submenu.
2. ON TARE → nonE.
3. MODE → → nonE, -E-, -Odd-.
4. ON TARE → PAr itY.

Stop Bits

The number of stop bits can be set to 1 or 2. The default setting is 2. To set stop bits, proceed as follows:

1. Access the StOP submenu.
2. ON TARE → 2 StOP.
3. MODE → → 2 StOP or 1 StOP.
4. ON TARE → StOP.

Good Laboratory Practice (GLP)

This submenu enables the storage of an identification number and/or a project number. When entered into the balance, the identification number and project number are available when printing. The reason the entries are made under the Print submenu, is that when legal for trade operation (LFT) is enabled, the Setup submenu is locked out, leaving the Print submenu free to make entries.

1. Access the GLP submenu.
2. ON TARE → Id no.
3. ON TARE → 0000000 first digit is flashing.
4. MODE → → changes the value of the first digit.

Good Laboratory Practice (GLP) (Cont.)

NOTE: MODE allows going back to the previous digit for correction.

5. ON TARE accepts value and moves to second digit.
6. MODE to change next digit.
7. Repeat steps 4 through 6 to change all digits.
8. ON TARE | Id no | .
9. MODE | Pr no | to enter project number.
10. ON TARE and repeat steps 3 through 7.
11. MODE | Pr no | .

Print Options

This submenu contains additional features which can be set and include Auto Print, Initialize Auto Print, Stable Data only, Numeric Data only, Time, Date and Reference data and Difference. To change any of the above listed options, enter the submenu.

Auto Print Feature

When enabled, the Auto Print feature causes the balance to automatically output display data in one of three ways: continuously, at user specified time intervals, or upon stability.

To select one of these Auto Print methods, or to turn the feature off:

1. Access the | AutoP | submenu.
2. ON TARE | OFF | .
3. MODE | OFF | , | Cont | , | IntEr | or | On Stb | .
4. ON TARE | AutoP | .

NOTE: If you select interval to automatically output data at user specified time intervals, the interval is entered in the Initialize submenu which follows.

Initialize

This submenu allows you to:

- Specify a time interval (in seconds) for automatic output.
- Exclude a range of weights from being output, or specify a range for output, by the Auto Print feature.

It does not appear on the Print menu if Auto Print is set to OFF. Use the following procedure to set these features:

1. Access the `In it` submenu under the Print Options submenu.
2. (ON TARE) `IntEr` displays if Interval was selected in the Auto Print submenu and you may continue with step 3. If interval was not selected, `non-PL` is displayed. Proceed to step 7.
3. (ON TARE) `Int 1` to enter time interval for automatic data output.
   The current interval from `Int 1` to `Int 256` (in seconds) is displayed.
4. (MODE) to increase or (PRINT) to decrease the interval number.
5. (ON TARE) `IntEr`.
6. (MODE) `non-PL` to enter a range of non printing values.
7. (ON TARE) `0000000 g`, the current value for the low end of the range is displayed with the first digit flashing.
8. (MODE) to change the number, start with the first digit (flashing). Change the value to any number from -9 to +9. A minus sign will light to indicate a negative value.
9. (ON TARE) to accept it and the next digit will begin flashing.
10. Set all digits in the same manner. If an error is made, (PRINT) to backup to the desired digit and change it.

To exclude data WITHIN SELECTED RANGE:
SET non-PL < non-PH

Example: non-PL=7g, non-PH=11g
Values <7 **OR** >11 will be output.

To exclude data OUTSIDE SELECTED RANGE:
Set non-PL > non-PH

Example: non-PL=11g, non-PH=7g
Values >7 **AND** <11 will be output.

Initialize (Cont.)

11. After the last digit is entered, [non-PL] is displayed again.
12. MODE → [non-PH] for the high limit.
13. ON TARE → [0000000] indicates current high end value.
14. Repeat steps 8 through 10 to change the numbers as required.
15. After the last digit is entered, [non-PH] displayed again.
16. MODE → [End].
17. ON TARE → [Init].

Print Stable Data Only

When enabled, this feature permits only stable display data to be output. To set the feature ON or OFF, proceed as follows:

1. Access the [StAbLE] submenu under the Print Options menu.
2. ON TARE → [OFF].
3. MODE → → [OFF] or [On].
4. ON TARE → [StAbLE].

Print Numeric Data Only

This submenu is used to select numeric data only, or full display data for RS232 output. Set this feature ON to output numeric display data only, or OFF to output full display data as follows:

1. Access the [nu] submenu under the Print Options menu.
2. ON TARE → [OFF].
3. MODE → → [OFF] or [On].
4. ON TARE → [nu].

Time

When the Time function is set ON, allows the balance to output the current time to the printer. To set the Time feature ON or OFF, proceed as follows:

1. Access the [tIME] submenu under the Print Options menu
2. (ON TARE) → [OFF].
3. (MODE) → → [OFF] or [On].
4. (ON TARE) → [tIME].

Date

When the Date function is set ON, allows the balance to output the current date to the printer. To set the Date feature ON or OFF, proceed as follows:

1. Access the [dAtE] submenu under the Print Options menu
2. (ON TARE) → [OFF].
3. (MODE) → → [OFF] or [On].
4. (ON TARE) → [dAtE].

NOTE: With Print Time or Date set to ON, if either current Time or Date has not been set in Setup menu, "Set Time/Date !" is sent through the RS232 Interface with each press of (PRINT) button.

Reference

When the Reference function is set ON, prints the value of weight used as a reference in either Check Weighing, Fill Guide, Percent and Parts Counting modes. When set to Current, the printer prints the current reference immedediately.

1. Access the [rEF] submenu under the Print Options menu
2. (ON TARE) → [OFF].
3. (MODE) → → [OFF], [On] or [CurrEnt].
4. (ON TARE) → [rEF].

Difference

Difference data is only output to the printer when Check Weighing or Fill Guide™ mode was selected.

1. Access the [d iFF] submenu under the Print Options menu
2. ON TARE → [OFF].
3. MODE → → [OFF] or [On] .
4. ON TARE → [d iFF].

List

This submenu can be used to output a listing of current menu settings via the RS232 interface. When selected, all menu settings for the User, Setup and Print menus will be output either to an external printer or computer. To use this feature, your balance must be connected to a computer or printer.

1. Access the [L iSt] submenu under the Setup or Print menus.

2. ON TARE → [L iSt] ↻ [. . . . .] The display indicates a series of dots traveling right to left when the balance is sending information.

CARE AND MAINTENANCE

To keep the balance operating properly, the housing and platform should be kept clean and free from foreign material. If necessary, a cloth dampened with a mild detergent may be used. Keep calibration masses in a safe dry place.

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE(S)	REMEDY
Unit will not turn on.	Power cord not plugged in or properly connected to balance.	Check power cord connections.
Incorrect weight reading.	Balance was not re-zeroed before weighing. Balance not properly calibrated.	Press ON TARE with no weight on the pan, then weigh item. Recalibrate correctly.
Cannot display weight in desired unit or cannot access desired weighing mode.	Desired unit/mode not set to ON in Unit Selection of Setup menu.	See Unit Selection section of Setup menu.
Unable to store menu settings/changes.	End not being used to exit menus.	You MUST use End to exit menus and save settings.
RS232 interface not working.	Print menu settings not properly set up. Cable connections.	Verify interface settings in Print menu correspond to those of peripheral device. Check cable connections.
Random segments displayed or display locks up.	Microprocessor locks up.	Turn power off, then turn on again. If condition persists, unit must be serviced.
Unable to change settings.	Lock set ON. (LFT set ON)	Set Lock switch to OFF.
Unstable readings.	Vibration on table surface.	Place balance on a stable surface or change averaging level.
Error message display.	———————	See Error Codes list.

Error Codes List

The following list describes the various error codes and which can appear on the display and the suggested remedy.

Data Errors

0.0 Internal data errors. If error persists, the balance must be serviced.

1.0 Internal data errors. If error persists, the balance must be serviced.

Tare Errors

2.0 Illegal tare operation or balance is unable to stabilize within time limit after taring. Environment is too hostile or balance needs recalibration.

Calibration Errors

3.0 Incorrect or no calibration weight used for User calibration. Recalibrate with correct weights.

5.0 Auto calibration failed. Environment is to hostile, recalibrate the balance.

RS232 Errors

4.4 RS232 buffer is full (if installed). May occur if no printer or computer is connected to the interface. To clear buffer, turn balance off or enter Print menu and select END.

4.5 Function is disabled by the Lock switch.

User Errors

7.0 User entry out of range (custom factor, non-pH, non-pL, etc...)

7.1 Bad percent (%) mode, sample too low.

7.2 Number outside of display capacity.

Over-Under Load Errors

8.0 Hardware error causing an internal weight signal which is too low. Check if platform or platform support is off. If not, the balance must be serviced.

8.2 Internal power on error. Turn the power off, then turn it back on.

8.3 Hardware error caused by an internal weight signal which is too high. Check load on the platform which may be excessive. If error persists, the balance must be serviced.

Error Codes List (Cont.)

System Errors

5.1 thrrough 5.9
System errors. Turn the power off, then turn it back on. If error persists, have the balance serviced.

Checksum Errors

9.7 Invalid setup data checksum. Check Setup, User, and Print menus settings. if possible, try to enter menus and exit using END to restore menu settings. May be caused by a faulty component, or in rare cases, a severe static charge. If error persists, balance must be serviced.

SERVICE INFORMATION

If the Troubleshooting section does not resolve or describe your problem, you will need to contact an authorized Ohaus Service Agent. For Service assistance in the United States, please call Ohaus Corporation toll-free at (800) 526-0659. An Ohaus Product Service Specialist will be available to help you.

REPLACEMENT PARTS

	OHAUS Part No.
Power Cords:	
U.S. 120 V ac	6569-00
European 220 V ac	76212-00
European 240 Vac	76448-00
Pan (AP110, AP210 and AP250 modes)	9773-00
Pan (AP310 models)	9773-01
Pan Shield	9773-02
Pan Ring	9773-03
Leveling Foot	9773-04
In-Service Cover	9773-78
Fuse (160 mA/250 V for all models)	90167-42

ACCESSORIES

Anti-Theft Device	77401-00
Density Determination Kit	77402-00
Storage Cover	9773-79
Calibration Masses - ASTM Class 1 Tolerance:	
100 g	49015-11
200 g	49025-11

SPECIFICATIONS

MODEL	AP110	AP210	AP310	AP250D
Capacity (g)	110	210	310	52/210
Readability (mg)	0.1			0.01/0.1
Weighing modes	g, oz, ct, dwt, (3) taels, oz t, gn, mommes, 1 custom unit, parts counting, percent weighing,			
Repeatability (Std. dev.) (mg)	0.1		0.2	0.02/0.1
Linearity (mg)	±0.2		±0.5	±0.03/0.2
Tare range	To capacity by subtraction			
Stabilization time (sec)	4		8	12/5
Sensitivity drift (10 - 30 °C)	±2 ppm/ °C			
Operating temperature range	50° to 104°F/10° to 40°C			
Calibration	Motorized internal and manual external			
Internal calibration weights	Stainless steel - measured to ±0.1 mg at an air density of 1.2 mg/cm^3 on virtual mass with density 8.0 g/cm^3			
Power requirements	100, 120, 220, 240 V ac, 50/60Hz			
Display (in/cm)	Vacuum fluorescent (0.5/1.3 high)			
Pan size (in/cm)	3.5/9			
Free height above pan (in/cm)	9.5/24			
Dimensions (WxHxD) (in/cm)	7.7 x 12.2 x 15.7 19.5 x 31 x 40			
Net weight (lb/kg)	22.5/10.2			

LIMITED WARRANTY

Ohaus products are warranted against defects in materials and workmanship from the date of delivery through the duration of the warranty period. During the warranty period Ohaus will repair, or, at its option, replace any component(s) that proves to be defective at no charge, provided that the product is returned, freight prepaid, to Ohaus.

This warranty does not apply if the product has been damaged by accident or misuse, exposed to radioactive or corrosive materials, has foreign material penetrating to the inside of the product, or as a result of service or modification by other than Ohaus. The warranty period shall begin at the date of installation, or three months from shipment to the buyer, whichever occurs first. A properly completed Warranty Registration Card must be received by Ohaus within 30 days from date of purchase to initiate coverage under the warranty. No other express or implied warranty is given by Ohaus Corporation. Ohaus Corporation shall not be liable for any consequential damages.

As warranty legislation differs from state to state and country to country, please contact Ohaus or your local Ohaus dealer for further details.

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P/N 78209-01 R1099