Adam Equipment

PGW SERIES

(P.N. 8080, Revision D3, January 2007)

Software rev.: 2.39

TABLE OF CONTENTS

1.0 KNOW YOUR BALANCE

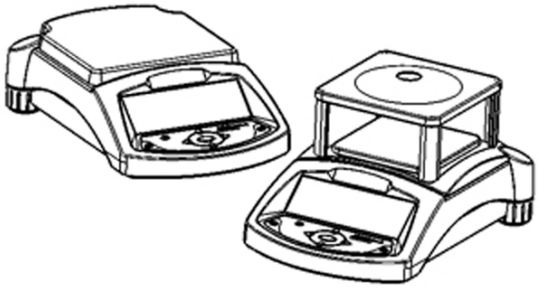
Thank you for selecting the PGW Balance.

This Instruction Manual will familiarise you with the installation, accessories, trouble-shooting, after sales service information, general maintenance of the balance, etc. and will guide you through the various applications.

Please read this Manual thoroughly before starting the operation. If you need any clarifications, feel free to contact your supplier or Adam Equipment.

PRODUCT OVERVIEW

The PGW balances are ideal for laboratory and general purpose weighing. The balances can also be used for some advanced weighing functions.



PGW series

FEATURES:

- Large easy to read LCD display with backlight
- Standard applications include weighing, check weighing, percentage weighing, parts counting, animal / dynamic weighing and density determination
- Internal Calibration using motorised internal calibration weight
- External calibration models available
- Bi-directional RS-232 interface
- Can be configured to print a GLP Compliant report after each calibration to include the time, date, balance number and a verification of the calibration
- Automatic temperature compensation
- Display in 4 languages- English, French, German and Spanish
- Multiple weighing units
- Capacity tracker
- Date and time
- Easy to use, sealed keypad
- Below balance weighing facility
- Password protection
- Security locking point
- Robust metal casing

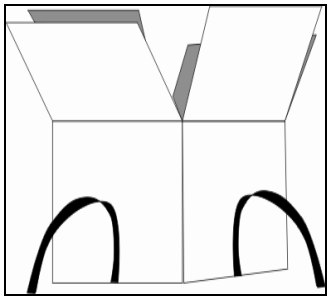
2.0 SPECIFICATIONS

Model*	**PGW 153e**	**PGW 253e**	**PGW 453e**	**PGW 753e**	**PGW 1502e**	**PGW 2502e**	**PGW 3502e**	**PGW 4502e**
Maximum capacity	150g	250g	450g	750g	1500g	2500g	3500g	4500g
Readability	0.001g				0.01g			
Tare range	Full							
Repeatability	0.001g				0.01g			
Linearity (±)	0.002g				0.02g			
Units of measure	grams, milligrams (for 0.001g units only), kilograms, carats, ounces, pounds, troy ounce, grains, pennyweights, drams, taels (Hong Kong, Taiwan and Singapore), mommes, tolas, ticals and Newtons							
Interface	RS-232 bi-directional							
Operating temperature	10°C - 40°C							
Power supply	15 VDC, 50/60 Hz, 800 mA							
Calibration	Internal or External, Selectable automatic calibration due to change in time or temperature							
External calibration mass	100 g	200 g		500 g	1000 g	2000 g		
Display	Backlit LCD with dual digits (24 mm high) and capacity tracker							
Draught shield	Supplied as standard				Not applicable			
Housing	Die cast aluminium housing (glass weighing chamber for models with 1mg readability)							
Pan size	140×140mm				192×192mm			
Overall dimensions (w x d x h)	251 × 358 × 104 mm							
Net weight	5.5 kg							
Applications	Weighing, Check weighing, Percentage weighing, Parts counting, Animal / dynamic weighing, Density determination							

*__The same models are available with motorised internal calibration as series denoted with ‘i’__

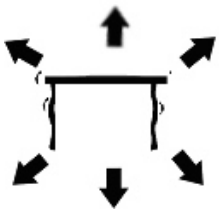
3.0 UNPACKING THE BALANCE

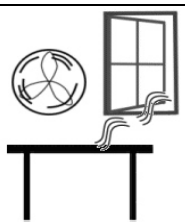
Remove the balance from the packing by carefully lifting it out of the box. Inside the box you will find everything needed to start using the balance-



- ✓ AC adapter
- ✓ Four rubber pan supports
- ✓ Stainless Steel Top Pan
- ✓ Draught shield (for mg models only)
- ✓ This User Manual

4.0 LOCATING THE BALANCE





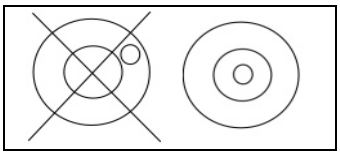
- The balance should not be placed in a location that will reduce the accuracy.
- Avoid extremes of temperature. Do not place in direct sunlight or near air conditioning vents.
- Avoid unsuitable tables. The table or floor must be rigid and not vibrate.
- Avoid unstable power sources. Do not use near large users of electricity such as welding equipment or large motors.
- Do not place near vibrating machinery.
- Avoid high humidity that might cause condensation. Avoid direct contact with water. Do not spray or immerse the balances in water.
- Avoid air movement such as from fans or opening doors. Do not place near open windows or air-conditioning vents.
- Keep the balance clean. Do not stack material on the balances when they are not in use.

5.0 SETTING UP THE BALANCE

5.1 ASSEMBLING THE BALANCE

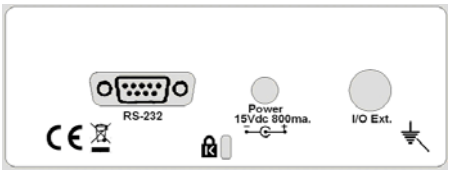
- Locate the balance on a solid surface, free from vibration
- Gently place the 4 pan supports (if not already fitted) and then the stainless steel pan on the weighing platform
- Place the draught shield frame and the top cover around the pan (for mg models only)
- Level the balance using the adjustable feet and spirit level
- Connect power to the balance
- For best performance, let the balance warm up for 30-60 minutes and calibrate before using

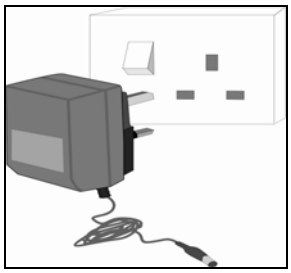
5.2 LEVELLING THE BALANCE



After placing the balance in a suitable place, level it by using the spirit level on the rear of the balance. To level the balance turn the two adjustable feet at the rear of the balance until the bubble in the spirit level is centred.

5.3 WARM-UP TIME





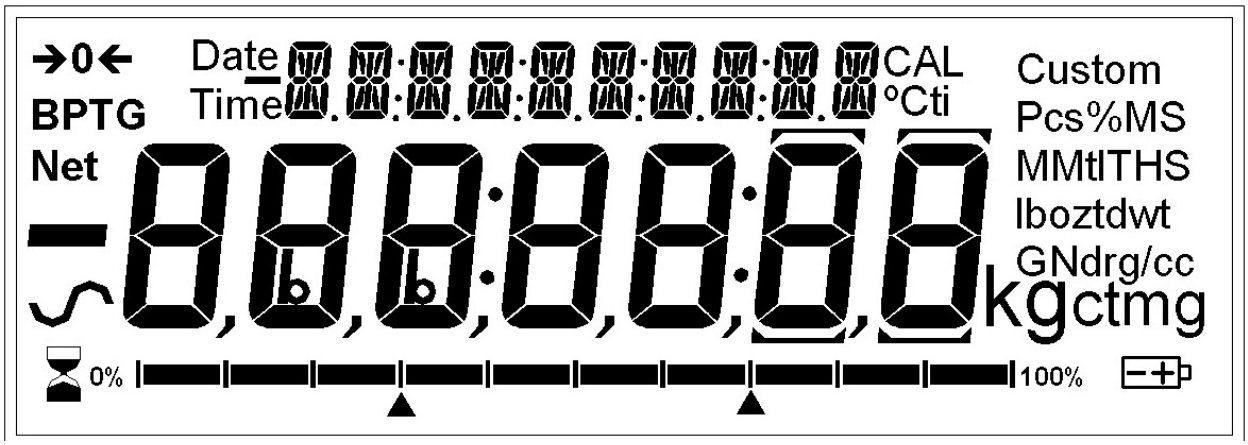
Attach the power supply cable to the connector on the rear of the balance. Plug the power supply module into the mains. The display will indicate the balance serial number (if set) and the software revision number followed by the capacity of the balance. Next the balance will run a self-test by displaying all segments followed by a symbol indicating the balance is in busy mode. If the balance serial number is not set the display will show dashes. The display will show zeroes accompanied by the →0← symbol. If the balance is not used for a long time, it will go back to the auto-calibration mode.

Before you start weighing, you have to wait for the balance to achieve a stable internal temperature. Typical initial warm-up time suggested for a balance already at room temperature is about 1 hour.

A stable sign ~ is shown when the balance is in stable condition. It will turn off if the balance is not stable.

Exact zero is shown when the "**→0←** " symbol is on to the left of the display area.

6.0 DISPLAY



This display includes areas for the weight value (up to 7 digits), symbols for common weighing units, tare, stability, zero and low battery, arrows used for check weighing, a 0-100% bar graph and a text area for menu.

The LCD has 7 x 7-segment digits for the weight and 10 x 14-segment digits for messages, symbols for weighing units and common use such as stability etc.

The 14 segment digits allow a large amount of flexibility for any unusual weighing unit, and messages concerning operation or errors.

The Percentage indicator known as capacity tracker has 10 large segments for showing the percentage of the total range used. This is also used during check-weighing.

The 10 digit text area is used to display the current weighing mode or to guide the user through processes such as density determination.

SYMBOLS AND TEXT

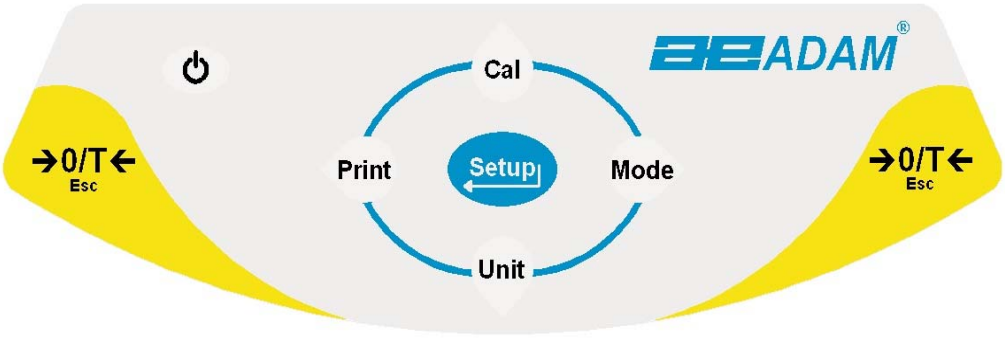
The LCD has unique symbols to indicate the following:

→0←	Zero
	Busy
	Stable
	A fill guide with set point markers
g, mg, kg, ct, oz, lb, ozt, GN, dwt, dr, tl H, tl T, tl S, MM, T, ti, N, g/cc, Pcs, %, M, and S	Text is shown for the weighing units and modes

INDICATORS

"CAL"	When calibration is occurring or about to occur
"°C"	When a temperature is shown or a temperature driven calibration is to occur
"ti"	For a time driven calibration
"Net"	When a net weight is shown
"0%", "100%"	When the capacity tracker is showing percent of maximum range used

7.0 KEYPAD



The keypad has the following keys to operate the balance.

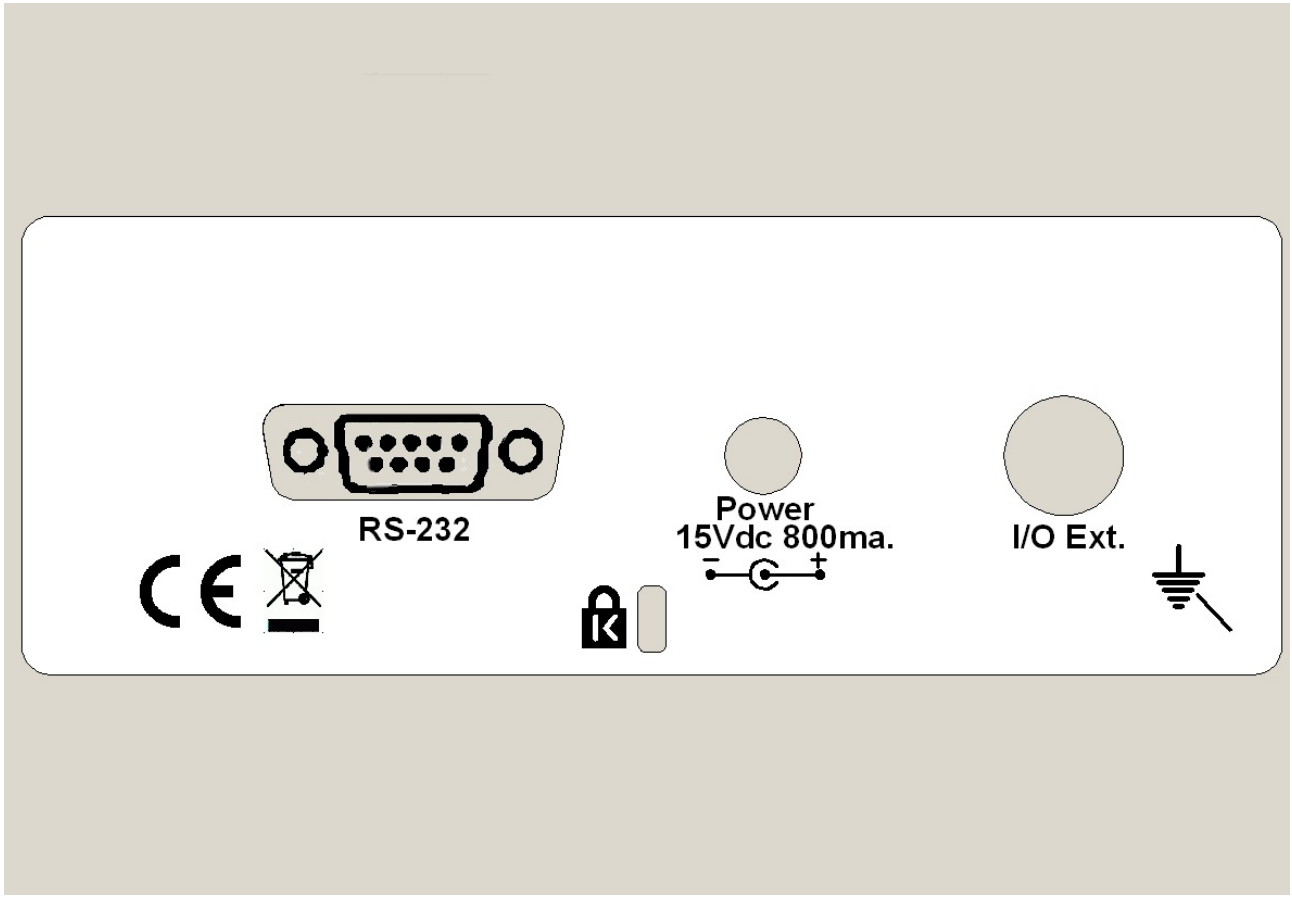
Keys	Primary function	Secondary function
⏻	To turn the balance to ON or OFF	-
[→0/T←] or **[Esc]**	A combined zero and tare function	To escape from setup functions and modes
[Unit] / ↓ or **[Down]**	Selects weighing units by cycling through a set of enabled units	To decrement or change a displayed value or scroll through options backwards
[Mode] / → or **[Advance]**	Selects functions by cycling through a set of enabled functions, for example parts counting, animal weighing, percent weighing or density	To advance a flashing digit by one position to the right To go back by one step during setup functions
[Print] / ← or **[Back]**	Instructs the balance to print data	To advance a flashing digit by one position to the left
[Cal] / or ↑ **[Up]**	Starts the calibration function	To increase or change a displayed value or scroll through options forward
[Setup]/ ↵ or **[Enter]**	Enters a function or saves a value during setting up such as entering unit weight or check weighing limits manually	-

7.1 NUMERIC ENTRY METHOD

To set a value when required, use the keys as given below-

- **[Up]** and **[Down]** keys to increase or decrease the flashing digit,
- **[Advance]** and **[Back]** keys to advance or move back the digit and
- **[Enter]** key to accept the value

8.0 INPUT/OUTPUT

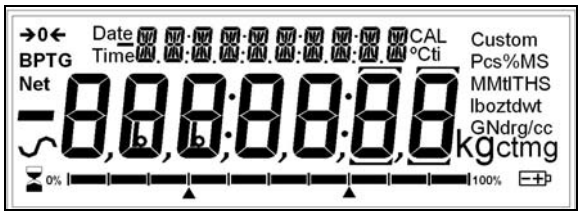


The rear panel has connectors for RS-232 serial and buffered I^2C-bus interfaces and a power input socket. Required power input is a low-voltage external supply, 15VDC @ 800mA.

Various communication options, e.g. USB, LAN, Wireless, will be implemented in the future via add-on “black-boxes” which will convert the RS-232 serial output or I^2C to the desired protocol. The basic unit includes RS-232 serial communications only.

9.0 OPERATIONS

9.1 INITIALISATION



When the balance is first switched on, it will display the balance serial number (if set), software revision, model capacity and then all segments on the display will be shown. Overall the time taken is usually 5 -10 seconds.

If a passcode has been set, the display will show "**PASSCODE**" and the main display will show a zero. In this case you must enter the passcode to continue using the numeric entry method (see section 7.1). A different passcode may be set for a Supervisor to weigh or to have access to the selected User menus. If the passcode has not been set the balance will continue as below.

The display will show zero reading along with the zero symbol "**→0←**" and the weighing unit last used. If automatic time calibration is enabled the balance will calibrate after power up and again after the pre-set time interval.

9.2 PASSCODES

If a passcode has been set to limit access to the weighing functions of the balance the display will show "PASSCODES" with the main digit set to zero. The display will change to show 7 digits set to zero with the rightmost digit flashing. Use the numeric entry method (see section 7.1) to enter the code. Make sure to enter the correct passcode to continue. See the Section 13.6 for details.

9.3 WEIGHING

- Press **[➔0/T←]** to zero the balance, if required
- "**➔0←** " will be displayed
- Place a mass on the pan and the weight will be displayed
- If a container is used press **[➔0/T←]** to tare the balance when the balance symbol "~" is on. "Net" will be displayed to indicate that the balance is tared
- When the display shows zero, place the item to be weighed. Only the net weight will be displayed. The capacity tracker at the bottom of the LCD will indicate the weight graphically with respect to the maximum weighing capacity
- At any time the **[Unit]** key can be pressed to select another unit. Use the **[Up]** or **[Down]** key to scroll through the units and select the desired unit by pressing the **[Enter]** key, the display will change to show the weight in the selected weighing unit. The available weighing units can be enabled or disabled by the user (see section 13.1). Only weighing units that have been enabled will be cycled through when the **[Unit]** key is pressed

9.3.1 Weighing Units

You can select alternative weighing units to display the weight by pressing the **[Unit]** key. The common weighing units are:

	Unit	Symbol	Models	Conversion Factor 1g =	Conversion Factor 1 unit = grams
1	Grams	g	All	1	1.0
2	Milligrams	mg	not 0.01g units	1000	0.001
3	Kilograms	kg	All	0.001	1000
4	Carats	ct	All	5	0.2000
9	Ounces	oz	All	0.035273962	28.349523
5	Pounds	lb	All	0.0022046	453.5924
10	Troy ounces	ozt	All	0.032150747	31.103476
6	Grains	GN	All	15.43236	0.0647989
11	Pennyweights	dwt	All	0.643014865	1.555174
8	Drams	dr	All	0.564383422	1.7718451
14	HK Taels	tl H	All	0.026717251	37.42900
13	Taiwan Taels	tl T	All	0.026666702	37.49995

15	Sing Taels	tl S	All	0.026455464	37.799375
12	Mommes	mm	All	0.266666951	3.749996
16	Tolas	T	All	0.085735323	11.663804
17	Ticala	ti	All	0.0612395	16.32933
18	Newtons	N	All	0.00980665	101.921623

It is possible to set the balance to display only grams. Grams will always be one of the units enabled, by default.

The balance displays the alternate weighing units with as much precision as possible. For example, the 450g x 0.001g balance could weigh up to:

Unit	**Maximum**	**d =**
g.	**450g**	**x 0.001g**
ct.	2250	0.005
mg	450000	1
GN	6944.52	0.02
dr	253.972	0.001
oz	15.87325	0.00005
ozt	14.86780	0.00005
dwt	289.356	0.001
MM	119.9995	0.0005
tl.T	12.00000	0.00005
tl.H	12.02275	0.00005
tl.S	11.90415	0.00005
T	38.5808	0.0001
ti	27.5577	0.0001

9.4 FUNCTIONS

When weighing, the user can access the applications that have been enabled (see section 13.2).

The following applications are available in this version (2.35):

- Weighing
- Parts counting
- Percent weighing
- Check weighing
- Animal / dynamic weighing
- Density determination

The selectable functions can be enabled using a similar method to the Units above by turning the functions on or off.

9.4.1 Parts Counting

This allows the user to weigh a sample of parts to compute an average unit weight and then determine the number of items being weighed by dividing the net weight by the unit weight value. The result is always a whole number of parts.

The balance will have a preset number of parts to be used as a sample. These values are 10, 25, 50 or 100 items.

Steps:

- Press **[Mode]** to show parts counting, “PARTS” will be displayed
- Enter parts counting by pressing **[Enter]**
- Press the **[Up]** or **[Down]** key to select the sample size, “REF QTY”, 10, 25, 50, 100, etc., then press **[Enter]** to confirm
- When “LOAD XX Pcs” is shown place XX number of items on the pan and press **[Enter]** to compute the average piece weight. Display will indicate the busy symbol
- Remove the sample when display shows “XX Pcs” and then place an unknown quantity on the pan. The balance will then compute the number of parts based upon the average piece weight. The display will show the result in Pcs
- To count another item press **[Mode]** and continue as before
- Checks will be made to determine that the weight of the reference parts is large enough for reasonably accurate counting (weight of each piece should be > 1d)
- To return to normal weighing, press **[Esc]**

9.4.2 Percent Weighing

Percent weighing will be done by defining a certain weight to be 100%. The weight to be used can either be entered by the user or taken from a sample

- Press **[Mode]** and then the **[Up]** or **[Down]** key to select Percent weighing, “PERCENT” will be displayed
- Press **[Enter]** to enter the function
- Display will show, “PERCENT SAMPLE”
- Press **[Enter]** to select the sample method
- When “LOAD 100 %“ is shown, add the sample
- Press **[Enter]** to set this weight to be 100%, the busy symbol will turn on. When ready the display will show “100%”
- Remove the sample and place an unknown sample to display the percentage weight
- To set another weight as 100%, press **[Mode]** and continue as before
- To manually enter a value to be set as 100%, press **[Up]** or **[Down]** key when “PERCENT SAMPLE” is shown to select “PERCENT Ent Wt”
- Press **[Enter]** to select the manually entered weight method
- Enter the weight using the numeric entry method (see section 7.1)
- Place unknown sample to display the percentage weight
- To perform percent weighing with another sample press **[Mode]** and continue as before
- To return to normal weighing, press **[Esc]**

Note: Percentage will be displayed to the maximum number of decimal places based on the resolution of the balance. To increase or decrease by one decimal place, press the **[Up]** or **[Down]** key respectively.

9.4.3 Check Weighing

During weighing of a sample the balance can be set to show if the weight is above or below an upper and a lower limit. The display will use the arrows under the fill guide to show the check weighing is operating. The arrows and bars between the arrows will indicate when the weight is below the lower limit, between the limits or above the upper limit.

The buzzer can be set to be active when the weight is outside the limits (below the lower or above the upper) or within the limits (above the lower and below the upper limit), or turned off. If desired, only one limit needs to be set. If only one limit is set the other limit is considered to be zero (lower) or the maximum (upper).

The Check weighing is not active from zero to 50d however the arrows will still be turned on below the fill guide and the weight will still be displayed.

Steps:

- Press **[Mode]** and then the **[Up]** or **[Down]** key to select Check Weighing. When “CHECK” is displayed press the **[Enter]** key to enter Check Weighing mode

- Press **[Up]** or **[Down]** to set the “LOW LIMIT” to “On” or “OFF”

- Press **[Enter]** to proceed. If the “LOW LIMIT” was set to “On” the display will show the current low limit and allow you to change the limit using the numeric entry method (see section 7.1)

- Press **[Enter]** to proceed

- If the “LOW LIMIT” was set to “OFF” or the setting of the low limit is complete, then the display will change to “HIGH LIMIT”. Use **[Up]** and **[Down]** to set the “HIGH LIMIT” to “On” or “OFF”

- Press **[Enter]** to proceed

- If the “HIGH LIMIT” was set to “On”, the display will show the current high limit which can be changed by using the numeric entry method (see section 7.1)

- Press **[Enter]** to proceed

- Next the beeper setting is displayed. Press **[Up]** or **[Down]** to scroll through the options –

  "BUZZER OFF" (Beeper set to off at all times)
  "BUZZER In" (Beeper will sound when the weight on the pan is within the limit) or
  "BUZZER Out" (Beeper will sound when the weight on the pan is outside the set limits)

- Confirm the beeper setting by pressing **[Enter]**

- Press **[Enter]** again to start the Check Weighing

- When a weight is placed on the pan now, the display will indicate whether the weight is below the LOW LIMIT between the LOW and HIGH LIMITS or higher than the HIGH LIMIT using the capacity tracker,

- To perform check weighing with another sample press **[Mode]** and continue as before

- To return to normal weighing, press **[Enter]**

9.4.4 Animal / Dynamic Weighing

The balance can be set to weigh animals or moving items, also known as dynamic weighing. The balance will collect the weight over a period of time to arrive at an average value and display the value till the operator resets the balance. The actual weighing process can begin either automatically when the weight is placed on the pan or when initiated by the operator. The weighing unit to be used can be selected as normal using the **[Unit]** key, before entering the Animal / Dynamic Weighing process.

Steps:

- Press **[Mode]** and then the **[Up]** or **[Down]** key to select Animal / Dynamic Weighing. When "ANIMAL" is displayed press **[Enter]** to enter Animal Weighing mode

- Press **[Up]** or **[Down]** to select "rUN" for starting the animal / dynamic weighing using the method previously set or "SEtUP" to set up the balance for animal weighing (see the section 9.4.4.1 **Animal Weighing Setup Parameters**)

MANUAL MODE

When the balance is in the MANUAL mode –

If **[Enter]** is pressed when “rUN” is selected, balance will display “START ?”

Place the item on the pan and press **[Enter]** again

The result will be displayed by showing “FINISHED xx.xx x” after a pre-set time Delay and Sampling period (see the section 9.4.4.1 **Animal Weighing Setup Parameters**)

AUTO MODE

When the balance is in the AUTO mode –

If **[Enter]** is pressed when “rUN” is selected, balance will display “LOAD PAN”

Place the item on the pan. The animal weighing test will begin automatically

After the configured Delay and test time are computed by the balance, the result will be shown displaying “FINISHED xx.xx x” (see the section 9.4.4.1 on **Animal Weighing Set-Up Parameters**)

- During animal weighing if the **[Print]** key is pressed, the balance will display “PAUSED” and show the current average
- To resume, press **[Print]** again or
- Pressing **[Mode]** will display “STOPPED” and terminate the weighing
- Remove the item from the pan
- Press **[Mode]** to go back to “ANIMAL rUN” to weigh another item or **[Esc]** to return to normal weighing

9.4.4.1 Animal Weighing Setup Parameters

- Press **[Mode]** and then **[Up]** or **[Down]** to select Animal Weighing. When “ANIMAL” is displayed press **[Enter]** to enter the function
- Press the **[Up]** or **[Down]** key to select “rUN” or “SEtUP”
- Press **[Enter]** to select “SEtUP” to set up the balance for animal weighing
- Use the **[Up]** or **[Down]** key to scroll through the options for setting up the mode. The display will show “MODE AUTO” or “MODE MANUAL”.
- Select “MANUAL” or “AUTO”

Test time

- After **[Enter]** is pressed to select “MODE MANUAL” or “MODE AUTO”, it will display “TEST TIME XX”, where XX is the number of seconds over which the balance will average to compute the final weight as set during last operation
- The XX can be changed from 1-200 using the numeric entry method (see section 7.1)
- To confirm the desired value, press **[Enter]**

Delay

- Next, the display will show “DELAY XX” where XX is the time in seconds taken by the balance before the sampling starts
- The XX can be changed from 0-200 using the numeric entry method (see section 7.1)
- To confirm the desired value, press **[Enter]**

Threshold (During AUTO mode only)

- While in the AUTO mode, the display will next show “THRESHOLD XX g” where XX is the minimum weight in gram of the item required by the balance to start the process for animal weighing.
- The XX can be changed from 1 to 99 using the numeric entry method (see section 7.1)
- To confirm the desired value, press **[Enter]**

9.4.5 Density Determination

It is possible to determine the density of solids or liquids using this mode. The user selects the type of density to be determined and then enters values to be used by the balance.

The density mode allows the user to use a special Density Kit or use the below pan weighing facility to perform the necessary weighing.

DENSITY OF SOLIDS

To perform the density of solids test, the user must have a method to immerse the sample in the chosen liquid. The density of the liquid must be known or determined from a look-up table.

For water and ethanol the density will be calculated based on the temperatures entered using the numeric entry method (see section 7.1)

Steps:

- Press **[Mode]** and then **[Up]** and **[Down]** keys to select density
- Press **[Enter]** to enter Density mode.
- Press the **[Up]** and **[Down]** keys to select the solids or Liquid method when “DENSITY SOLId”” or “DENSITY LIqUId” is displayed
- Press **[Enter]** to select the solids method
- Press **[Up]** or **[Down]** to select the liquid of choice- Water, Ethanol or Other
- Press **[Enter]** to select the choice. For water and Ethanol the temperature will be asked for. Enter the temperature using the numeric entry method (see section 7.1)
- For the “Other” choice the density will be asked for. Enter the density (g/cc) using the numeric entry method (see section 7.1)
- Press **[Enter]** to continue
- The balance will request the weight of the sample in air by displaying “AIR WEIGHT”. Place the item on the pan or receptacle, if the density kit is used. Press **[Enter]** to determine the value
- After completion of the air weighing, the balance will request the weight in liquid by displaying “LIQUID WT”. Submerge the item in the liquid and

press **[Enter]** to start the liquid weighing. The balance will compute the density of the sample and display it as “DENSITY XXXX g/cc”

- After completion of the liquid weighing, remove the item from the pan
- Press **[Mode]** to continue with a new sample or press **[Esc]** to return to normal weighing

DENSITY OF LIQUID

When finding the density of a liquid, it is necessary to weigh a sample of known volume in air and then in the liquid. The volume of the sample must be entered by the user. The last known volume is stored for use at any time.

If using the density determination kit, the volume of the plumb is marked on its support, i.e. 10.123

Steps:

- Press **[Mode]** and then **[Up]** and **[Down]** to select Density
- Press **[Enter]** to select the Density mode
- Use **[Up]** and **[Down]** to scroll through the solid or liquid method
- When “DENSITY LIqUId” is displayed, press **[Enter]** to enter the liquids method
- The volume will be asked for. Enter the volume using the numeric entry method (see section 7.1) or continue using the last volume entered
- Press **[Enter]** to continue
- The balance will request the weight in air by displaying “AIR WEIGHT”. Place the glass plumb supplied with the density determination kit in air on the weighing pan and press **[Enter]** to start the air weighing
- On completion of the air weighing, the balance will request the weight in liquid by displaying “LIQUID WT”. Submerge the glass disk in the liquid and press the **[Enter]** key. The balance will compute the density of the liquid and display it. Remove the item from the pan
- Press **[Mode]** to continue with a new sample or press **[Esc]** to return to normal weighing

10.0 CALIBRATION

The PGW XXXe series can only be calibrated with an external mass. The PGW XXXi series can be calibrated with either an internal mass (default method) or an external mass (if setup by the user to do this). See the User Parameters section.

10.1 MANUAL CALIBRATION

Pressing the **[Cal]** key will start calibration. Calibration can also be initiated by a change in internal temperature or a set time period as determined by the user (see section 13.5).

10.1.1 Calibration using Internal Calibration mass

- Pressing **[Esc]** will abort the calibration at any time
- Check the display is at zero. Tare if necessary
- Calibration will begin automatically. When calibration is complete the balance will return to weighing.

10.1.2 Calibration using External Calibration mass

- Pressing **[Esc]** will abort the calibration at any time
- Check the display is at zero. Tare if necessary
- Press the **[Cal]** key
- The display will show the balance setting a new Zero condition by showing “LOAD 0”. Make sure the pan is empty then press the **[Enter]** key to continue
- The balance will then show the value of the calibration mass required sounding a beep, for example “LOAD 1000 g”
- Place the mass on the balance. Press **[Enter]** to continue
- The display will show the busy symbol and after calibration is complete it will display “UNLOAD” sounding a beep. Remove the weight. Another beep will be heard confirming the unloading action. The balance will then return to normal weighing.

10.2 AUTOMATIC CALIBRATION

The balance will have the ability to calibrate (or ask for calibration) when the balance has automatic calibration enabled and the conditions of the automatic calibration have been meet.

Conditions that will cause an automatic calibration are:

1. Internal temperature change greater than a preset amount, typically 2ºC
2. Time since last calibration exceeds a preset time, typically 4 hours or 15 minutes after power is applied.

On the balances with internal calibration the calibration will be done automatically when the balance is at a stable zero. . The user knows a calibration is asked for by the flashing of the “CAL” symbol on the display. The display will show a 5 second countdown when calibration will start. If the user presses the **[Esc]** key the calibration will be delayed one minute to allow time for a process to be finished.

On balances with external calibration the balance will call for calibration to be carried out by flashing the “CAL” symbol on the display. As soon as the balance is calibrated the symbol will be turned off.

The Auto calibration feature can be enabled, disabled or changed within the user options to meet the requirements of the users.

10.3 CALIBRATION ERRORS

Occasionally during calibration an error will be detected. These errors can be caused by:

Unstable readings
Improper calibration weights being used
Large shifts of zero from the factory settings

When an error is found a displayed message will be shown and the calibration must be done again. If the balance has error messages more than once it is possible the mechanics have been damaged.

11.0 RS-232 INTERFACE

The balances have the ability to send or receive data over the serial interface.

The weighing data can be sent over the interface either automatically or when the user presses the **[Print]** key.

The user has control over what data is to be printed.

The following gives a description of the RS-232 interface.

HARDWARE

The RS-232 interface is a simple 3 wire connection. The input and output connections are:

Connector: 9 pin D-sub miniature socket
Pin 2 input to balance RXD
Pin 3 output from balance TXD
Pin 5 Signal ground GND

Handshaking is not applied.

Baud rate: 4800, **9600,** 19200, 38400

Parity: NONE (=**8N1)**, EVEN (=7E1) or ODD (=7 O 1)

All lines are terminated with carriage return and line feed (<CR><LF>).

In continuous output mode, or if single-line output on demand is selected, the serial output format will be a single line in the form “1234.567 g<CR><LF>”.

The format of the single-line output will change depending on the mode in which the balance is operating, as described below.

If output on demand is selected, the user may optionally configure the serial output as a choice of 3 styles of form, either in a default format or in one of two custom formats. Each of the custom formats can be configured to output up to 15 lines of data. The data types that can be printed are:

NAME	TEXT PRINTED
ID number	ID no.: xxxxxxxxxxxx
Serial number	Serial no. xxxxxxxxxxxx
Date	DATE dd/mm/yyyy
Time	TIME hh:mm:ss
Net weight	Net: xxx.xxx g
Gross weight	Gross: xxx.xxx g

Tare weight	Tare: xxx.xxx g
Unit weight	Unit wt: xxx.xxx g
Count	Count: xxxx pcs
Reference weight	Ref. wt: xxx.xxx g
Percent	Percent: xx.xxx %
Checkweigh lower limit	Low: xxx.xxx g
Checkweigh upper limit	High: xxx.xxx g
A blank line printed	<CR><LF> only.

Any of these can be printed on any of the 15 lines available. Not all items need to be used and any one can be used more than once (see section 13.3).

The data for each form will be preceded by a start-of-header <SOH> character (01) and terminated with an end-of-transmission <EOT> character (04). These characters will be ignored by a serial printer but will allow a computer program which reads the data to distinguish between this block report format and the single-line output format described above.

STANDARD FORMAT

The balance will print the following data as the standard form. The standard form cannot be changed. The format of the custom forms #1 and #2 will be the same as the standard form until modified by the user.

Line 1	Date
Line 2	Time
Line 3	Blank line
Line 4	ID number
Line 5	Blank line
Line 6	Result
Line 7	Blank line
Line 8	Blank line

This will result in a printout that looks like:

```
Date:  23/09/04
Time:  15:45

ID No: 123456

Net: 123.456 g
```

***NOTE:** The format of the results line will change depending on the mode in which the balance is operating, e.g.

Normal weighing, Check weighing, Animal weighing: “123.456 g”
Parts counting: “1234 pcs”
Percent weighing: “12.345 %”

INPUT COMMANDS USING REMOTE KEYS

The balance can be controlled with the following commands sent using remote keys such as from a PC. The commands must be sent in upper case letters, i.e. "**KT**" not "**kt**". Press the Enter key of the PC after each command (the action of Carriage Return is denoted as <CR> as shown below).

Basic Input Commands:

!KT<CR>	Tares the balance to display the net weight. This is the same as pressing the **[Zero / Tare]** key when the balance is in the normal weighing mode.
!KS<CR>	Enters the Setup section. This is the same as pressing the **[Setup]** key when the balance is in the normal weighing mode. Once entered the Setup section, the balance can be controlled remotely using the Input Commands (as mentioned in this table) which will perform the same key functions as described in section 13.0.
!KP<CR>	Transmits data over RS-232 interface. This is the same as pressing the **[Print]** key when the balance is in the normal weighing mode.
!KM<CR>	Enters the Modes section. This is the same as pressing the **[Mode]** key when the balance is in the normal weighing mode.
!KC<CR>	Enters the Calibration section. This is the same as pressing the **[Cal]** key when the balance is in the normal weighing mode.
!KU<CR>	Enters the Unit selection section. This is the same as pressing the **[Unit]** key when the balance is in the normal weighing mode.

Invalid Input Command:

If an invalid command is received, then the command is returned as follows-

Invalid Command	Message returned	Remarks
!NT<CR>	!EU<CR>	Command character is not 'K'
!KK<CR>	!EK<CR>	Key character is not 'T', 'S', 'P', 'M', 'C' or 'U'
!KT-<CR>	!EF<CR>	Command format error, <CR> is not the fourth character
KT<CR> or !KT -	No reply	Either '!' or <CR> is missing in the command string

12.0 ERROR CHECKING

During weighing the balance is constantly checking to see if the balance is operating within the limited parameters. The errors likely to occur are:

A/D counts below lowest allowed value
A/D counts above highest allowed value
A/D not operating
Maximum capacity exceeded

Other errors may be detected during special functions or operations. These will be described in the section that applies.

Error messages and the reasons are:

Concerning A/D counts	
ERROR ADc UL	A/D counts below a limit
ERROR ADc OL	A/D counts above a preset limit
Concerning calibration	
ERROR St	Calibration could not be completed because the results were not stable
ERROR LO or ERROR HI	Calibration constant not within 20% of old calibration constant
Concerning weighing	
ERROR LO	Weight display is below zero by >4%max
ERROR HI	Weight is above maximum plus 90d

13.0 SUPERVISOR MENUS

Pressing the **[Setup]** key while in normal weighing gives access to the menus.

- When **[Setup]** is pressed and passcodes are not enable the display will show the message “SUPERVISOR”. If passcodes are enabled, the balance will ask for it by displaying “PASSCODE 0”

- If a wrong code is entered an “ERROR CODE” message will flash and the balance will return to weighing mode

- If the passcode has been enabled and entered, the balance will allow the operator to access the Supervisor’s menus

- When the display shows “SUPERVISOR” press **[Enter]** to view the topics that can be modified

- From this menu the user can enable/disable weighing units or modes, set balance parameters for the conditions, set time and date, set parameters for the RS-232 interface, calibration parameters and security parameters

- The **[Up]** and **[Down]** keys will cycle through the main headings, pressing the **[Enter]** key will enter the heading and sub-parameters or options can be set. Press **[Mode]** to come out of a sub-menu or to **[Esc]** to return to normal weighing from any menu

13.1 ENABLE WEIGHING UNITS

- When “UNITS” is displayed, press **[Enter]**. The display will show the symbol for the first unit, e.g. carats, ct, together with its enable state “OFF” or “On”. The user can then enable or disable the carats unit by using **[Up]** or **[Down]**. Pressing **[Enter]** will confirm the setting and will advance to the next weighing unit. Repeat for each weighing unit in turn. Gram is always set to “On”

- Press **[Mode]** to advance to setting of the next menu or press **[Esc]** to return to normal weighing

13.2 ENABLE WEIGHING MODES

Same steps are followed to enable or disable the weighing modes.

- Press **[Enter]** when “MODES” is displayed. The display will show the first mode i.e., Parts Counting (“PARTS”) together with its enabled state “OFF” or “On”. The user can enable or disable the parts counting mode by using **[Up]** or **[Down]**. Pressing **[Enter]** will confirm the setting and will advance to the next weighing mode. Repeat for each mode in turn

- Press **[Mode]** to advance to setting of the next menu or press **[Esc]** to return to normal weighing

13.3 ENABLE SERIAL INTERFACE PARAMETERS

The parameters affecting the serial setup are set in a similar manner to the other parameters.

Press **[Enter]** when “SERIAL” is displayed to enter the sub-menu.

The parameters that can be set are:

ENABLE	The serial port can be set to On or OFF
BAUD RATE	Set the Baud Rate to 4800, 9600, 19200 or 38400
PARITY	Set the Parity to NONE, EVEN or ODD
STABLE	To print when stable (On) or regardless of stability (OFF)
CONTINUOUS	Set the RS-232 to send data continuously to On or OFF
PERIODIC	Set the RS-232 to send data periodically (set in seconds) to On or OFF. If On is selected, the value can be changed between 1 and 999 seconds, using **[Up]** and **[Down]**
FORMAT	To send data as a single line of data, using the standard format or using a customer designed format (FORM 1 or FORM 2).

Format of custom forms #1 and #2

If FORM1 or FORM2 is selected, it can be changed by the user using a selection of available data. By default the 2 forms are the same as the standard form unless changed by the user as below.

When FORM 1 or FORM 2 is selected the user can set the information to be printed on each line of the form. Pressing the **[Up]** or **[Down]** keys will cycle through the options available. The options are:

INST ID	Instrument ID number
SER No	Serial Number
TIME	Time
DATE	Date
NET	Net Weight (Gross weight – Tare Weight)
GROSS	Gross Weight
TARE	Tare Weight
UNIT	Unit weight in parts counting mode
COUNT	Number of items in parts counting mode
REF	100% weight in percent weighing mode
PERCENT	Percentage of reference weight in percent weighing
LO LIMIT	Low Limit when check weighing
HI LIM	High Limit when check weighing
Cr Lf	Inserts a blank line
END	Signifies the end of the report When END is entered the display returns to the RS-232 Sub-menu

Enter the data to be printed on the first line by pressing the **[Up]** or **[Down]** key to cycle through the options. If the current information is OK then press the **[Setup]/Enter** key to move to the next line.

e.g. “LINE No1” “DATE” - prints date

Select a code for one of the preset data formats as detailed above.

The next line shows: “LINE NO 2” “TIME” - prints time
Only one item can be entered per line.

Continue until the formatting of the form is complete. There are 15 lines of possible data. After the 15th line has been set or “END” has been selected, the balance will return to the RS-232 Sub-menu.

Press **[Mode]** to advance to setting of the next menu or press **[Esc]** to return to normal weighing.

13.4 SETUP PARAMETERS

The user parameters that control the balance are shown under the SETUP. When “SETUP” is displayed, press the **[Setup]/Enter** key. The options for each parameter can be scrolled through by using the **[Up]** or **[Down]** key.

LANGUAGE	English French German Spanish
TIME	Set Time using the numeric entry method (see section 7.1)
DATE DATE FORM EUROPE (dd/mm/yy) USA (mm/dd/yy)	Set Date using the numeric entry method (see section 7.1)
INST ID	Enter a user number to identify this balance
BUZZER	On= Enable OFF= Disable
BACKLIGHT	On OFF AUTO
POWER DOWN	Set the time after which the unit will go into Stand-by power settings, On=Enable, OFF=Disable, If set to On- the options are 1 to 9 minutes
FILTER	Set a value for the amount of filtering to be done, set a value of 5, 10, 20, 30, 40 or 50. A larger number is more filtering and a slower response. Default is 20
STABILITY	Set a value to be used to determine balance stability, set a value of 1, 2, 5 or 10d. A larger number corresponds to a larger stable zone. Default is 5
AUTO ZERO	Can be set to On or OFF to enable the auto-zero function. If set to On- select from 1, 2 or 5d

The sub-menu is entered by pressing **[Enter]** –

- Use the **[Up]** and **[Down]** keys to increase or decrease the value for setting. Press **[Enter]** to accept the setting and advance to the next item in the menu

- Press **[Mode]** to advance to setting of the next parameter or **[Esc]** to return to normal weighing

13.5 CALIBRATION SETUP

This menu allows the user to set the calibration parameters.

- Press **[Enter]** when "CAL SETUP" is displayed to select the calibration parameters

- The options for each parameter can be scrolled through by using the **[Up]** or **[Down]** key

ENABLE	NO =operator calibration is disabled YES=operator calibration is enabled
CAL REPORT	On = Enabled. Prints out Calibration report after successful calibration OFF = Disabled
TIME CAL	On = Enabled. Select time from 1 to 24 hours. Default setting is 4 hours OFF = Disabled
TEMP CAL	On = Enabled. If set to On, set the temperature variation from 0.2 to 4°C OFF = Disabled
INT CAL (Only on balances with internal calibration masses)	YES = Use Internal calibration mass NO = Use external calibration mass

Press **[Mode]** to advance to setting of the next menu which is "PASSCODES" or **[Esc]** to return to normal weighing.

13.6 PASSCODES

To enable the security features in this balance it is necessary to set passcodes. There are 2 passcodes called Operator Passcode and Supervisor Passcode. The Operator Passcode allows an authorised user to operate the basic weighing functions of the balance but will not allow access to the Supervisor Menus if the Supervisor Passcode has been set.

To change or disable a Passcode it will be necessary to enter the current passcode.

Press **[Enter]** when "PASSCODES" is displayed to enter this section.

OPERATOR	Enter the current passcode (OLD) first then enter a new passcode if desired. A passcode set to zero will disable the security feature and allow unlimited access.
SUPERVISOR	First enter the current passcode (OLD) and then enter a new passcode if desired. A passcode set to zero will disable the security feature and allow unlimited access.

13.6.1 Forgotten Passcodes

Keep a record of the passcode to ensure you can access this section again. If however you have forgotten your passcode you can still gain access by entering a universal code.

If you have forgotten the current passcode a code of "15" will always allow you to enter the Supervisor area.

Using the Supervisor menus go to the PASSCODE section and reset the operator or Supervisor passcode using the "15" code as the old number when asked.

14.0 PERIPHERALS

The peripherals that can be used with the balance are the following:

14.1 DENSITY DETERMINATION KIT (for 0.001g units only)

The Density Determination Kit includes everything needed to carry out precise and repeatable measurement. The kit allows a sample to be weighed in air and then a liquid to determine the density of the sample. It also allows a glass sinker of known volume to be weighed in air or in a liquid, to determine the density of the liquid.

14.2 ANTI-VIBRATION TABLE

The anti-vibration table is a support for laboratory balances that isolate the balance from vibration through the floor. The table has a granite surface for the balance with a separate table top surrounding the balance.

14.3 ADAM PRINTERS

The Adam printer is a compact thermal printer which is ideal for use with laboratory balances. There are 3 versions, one to print data as it is received from the balance, second one prints data and time along with weighing data if enabled by the balance and the other one has the ability to perform statistical analysis of the weighing results if enabled by the balance.

15.0 SAFETY AND MAINTENANCE

CAUTION

Use the AC adapter designed by the manufacturer for the balance. Other adapters may cause damage to the balance.

Avoid overloading or dropping material onto the platform which could damage the balance.

Do not spill liquids on the balance as it is not water-resistant. Liquids may damage the case and if it gets inside the balance it may cause damage to the electronics.

Material that has a static electric charge could influence the weighing. Discharge the static electricity of the samples, if possible. Another solution to the problem is to wipe both sides of the pan and the top of the case with an anti-static agent.

16.0 TROUBLE-SHOOTING

Service of a PGW balance will generally be necessary when the balance does not perform as expected. The balances are not user-serviceable. For Service Information, see section 18.0 and contact Adam equipment or your supplier.

Problems usually fall into one of the following categories:

User Problems:

The user is asking the balance for something it cannot do or is confused by the modes and functions of a balance. It is also possible the user has set a parameter that has affected the balance operation. Resetting the parameter to a normal value will restore operation.

Mechanical Problems

The balances consist of complicated and fragile mechanical devices. They can be damaged by placing a weight on it which is too high for the balance or by dropping the balance or occasionally shipping it without taking care. The most fragile parts are the flexures. Dust, dirt, spills and other foreign objects in the balance can also cause problems.

Electronic Problems:

These are the rarest of the problems affecting balances. If an electronic problem is suspected make sure the mechanical problems that can cause similar symptoms have been eliminated before attempting electronic repairs. With the exception of cables most electronic repairs are solved by board replacement.

The table that follows is a guide of common problems and their solutions. Note that many problems may have multiple solutions and there may be problems found that are not listed in the table. For Service Information, contact Adam Equipment or your supplier.

BALANCE DOES NOT FUNCTION		
Problems	**Possible causes**	**Suggestions**
The balance is dead when power is applied	Power supply failure	Check adapter is working Check adapter is correct for the balance Normal adapter is 15VDC, 800mA. *Power supply circuit board failure *Short circuit on any circuit board
The display does not turn on but the calibration motor moves when power is applied	Power is getting to balance, display is not working	*Display cables may be faulty *Display module failure
The display stays on the initial test screen when power is applied. Calibration weight motor is on.	Unstable balance Balance not working correct Power supply	*Check if balance is stable by using service menu and view A/D values Put draught shield over pan Check power supplies
BALANCE WORKS BUT IS NOT STABLE		
Balance is unstable by a few divisions	Noise or vibration from environment Friction in mechanics	Check the balance is positioned correctly to avoid vibration, wind or air movement, it is on a solid table, It is not near sources of heat or cool air, Check balance with weights if problem occurs when sample is used. Static electricity on the samples can cause drifting and instability. Check the area around the weighing pan for hair, dust, obstructions under the pan, *A complete inspection of the

		mechanics to look for sources of friction may be needed.
Balance is very unstable and does not weigh correctly	Mechanical problems Balance programming Electronic problems	*A complete inspection of the mechanics to look for sources of friction. *Verify the A/D is also unstable. If the A/D is OK then suspect the programming of the balance. Reset parameters, check temperature compensation, and redo the calibration. Some electronic problems can also cause this. But all mechanical problems must be resolved first.
BALANCE IS NOT ACCURATE		
You must have accurate and trusted weights to test a balance. If you suspect that the balance is not accurate then you must know your weights are accurate. A balance calibrated using a bag of flour is not accurate even if it works OK otherwise.		
Balance is not accurate	Repeatability Eccentric loading Linearity	Verify the balance shows the same value when the same mass is placed on the centre of the pan for a few tests. Verify the balance shows the same reading (within a tolerance depending upon the model) when a mass is placed at positions around the pan. Verify the balance is acceptable throughout the weighing range. The balance must give acceptable readings from low weights up to the capacity.
Poor Repeatability	Usually a mechanical problem.	Inspect the area around the pan for hair, dust or other obstructions, *Inspection of the mechanics may be needed for any possible problems.
Poor Eccentric loading	A mechanical problem	Inspect the area around the pan for hair, dust or other obstructions, *Inspection of the mechanics may be needed for any possible problems. *Readjusting of the Eccentric loading is recommended.

Poor Linearity	Usually a mechanical problem Electronic Problems	Re-check repeatability *Inspection of the flexures for damage or loose hardware may be required *Use the Linearity Function in the service menu to reset linearity *A problem in the analogue circuit board or power supplies can cause poor linearity. Make sure all mechanical problems have been eliminated first
OTHER PROBLEMS:		
Cannot calibrate	Zero shifted more than allowed Calibration timeout	*Check all flexures for damage *Reset factory calibration *Verify linearity and repeatability *The balance may be unstable. Verify stability as above. Try using a more aggressive filter
Calibration weight motor does not stop		*Check the cables to the motor, try plugging the balance into the power again *Look for friction in the calibration weight movement *Check the opto-coupler that controls the motor position.
RS-232 not working	Doesn't print	Check parameters match the device connected Verify cable is correct *RS-232 circuits damaged
Display dark, keys beep	Display contrast poor Cable unplugged or damaged	*Check the cables to the display *Replace the display which could be damaged

***To be carried out by authorised technicians only.**

17.0 REPLACEMENT PARTS AND ACCESSORIES

If you need to order any spare parts and accessories, contact your supplier or Adam Equipment. A partial list of such items is as follows-

- **Power Supply Module**
- **Stainless Steel top Pan**
- **Below Balance Hanger**
- **Density Determination Kit**
- **Anti-Vibration Table**
- **Security Lock and Cable**
- **Dust Cover**
- **Printers, etc.**

18.0 SERVICE INFORMATION

This manual covers the details of operation. If you have a problem with the balance that is not directly addressed by this manual then contact your supplier for assistance. In order to provide further assistance, the supplier will need the following information which should be kept ready:

A. Details of your company

-Name of your company:
-Contact person's name:
-Contact telephone, e-mail, fax or any other methods:

B. Details of the unit purchased

(This part of information should always be available for any future correspondence. We suggest you to fill in this form as soon as the unit is received and keep a print-out in your record for ready reference.)

Model name of the balance:	**PGW_____**
Serial number of the unit:	
Software revision number (Displayed when power is first turned on):	
Date of Purchase:	
Name of the supplier and place:	

C. Brief description of the problem

Include any recent history of the unit. For example:
-Has it been working since it's delivered
-Has it been in contact with water
-Damaged from a fire
-Electrical Storms in the area
-Dropped on the floor, etc.

WARRANTY INFORMATION

Adam Equipment offers Limited Warranty (Parts and Labour) for the components failed due to defects in materials or workmanship. Warranty starts from the date of delivery.

During the warranty period, should any repairs be necessary, the purchaser must inform its supplier or Adam Equipment Company. The company or its authorised Technician reserves the right to repair or replace the components at the purchaser's site or any of its workshops depending on the severity of the problems at no additional cost. However, any freight involved in sending the faulty units or parts to the service centre should be borne by the purchaser.

The warranty will cease to operate if the equipment is not returned in the original packaging and with correct documentation for a claim to be processed. All claims are at the sole discretion of Adam Equipment.

This warranty does not cover equipment where defects or poor performance is due to misuse, accidental damage, exposure to radioactive or corrosive materials, negligence, faulty installation, unauthorised modifications or attempted repair or failure to observe the requirements and recommendations as given in this User Manual.

Repairs carried out under the warranty does not extend the warranty period. Components removed during the warranty repairs become the company property.

The statutory right of the purchaser is not affected by this warranty. The terms of this warranty is governed by the UK law. For complete details on Warranty Information, see the terms and conditions of sale available on our web-site.

CE

Manufacturer's Declaration of Conformity

This product has been manufactured in accordance with the harmonised European standards, following the provisions of the below stated directives:

Electro Magnetic Compatibility Directive 89/336/EEC

Low Voltage Directive 73/23/EEC

Adam Equipment Co. Ltd.
Bond Avenue, Denbigh East
Milton Keynes, MK1 1SW
United Kingdom

FCC COMPLIANCE

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. The 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.

Shielded interconnect cables must be employed with this equipment to insure compliance with the pertinent RF emission limits governing this device.

Changes or modifications not expressly approved by Adam Equipment could void the user's authority to operate the equipment.

WEEE COMPLIANCE

Any Electrical or Electronic Equipment (EEE) component or assembly of parts intended to be incorporated into EEE devices as defined by European Directive 2002/95/EEC must be recycled or disposed using techniques that do not introduce hazardous substances harmful to our health or the environment as listed in Directive 2002/95/EC or amending legislation. Battery disposal in Landfill Sites is more regulated since July 2002 by regulation 9 of the Landfill (England and Wales) Regulations 2002 and Hazardous Waste Regulations 2005. Battery recycling has become topical and the Waste Electrical and Electronic Equipment (WEEE) Regulations are set to impose targets for recycling.

ADAM EQUIPMENT is an ISO 9001:2000 certified global organisation with more than 30 years experience in the production and sale of electronic weighing equipment. Products are sold through a world wide distributor network supported from our company locations in the UK, USA, SOUTH AFRICA and AUSTRALIA.

ADAM's products are predominantly designed for the Laboratory, Educational, Medical and Industrial Segments. The product range is as follows:

-Analytical and Precision Laboratory Balances
-Counting Scales for Industrial and Warehouse applications
-Digital Weighing/Check-weighing Scales
-High performance Platform Scales with extensive software features including parts counting, percent weighing etc.
-Crane scales for heavy-duty industrial weighing
-Digital Electronic Scales for Medical use
-Retail Scales for Price computing

Adam Equipment Co. Ltd. Bond Avenue Milton Keynes MK1 1SW UK Tel:+44 (0)1908 274545 Fax: +44 (0)1908 641339 E-mail: sales@adamequipment.co.uk	**Adam Equipment Inc.** 26, Commerce Drive Danbury, CT 06810 USA Tel: +1 203 790 4774 Fax: +1 203 792 3406 E-mail: sales@adamequipment.com	**Adam Equipment S.A. (Pty) Ltd.** 7 Megawatt Road, Spartan EXT 22, Kempton Park, Johannesburg Republic of South Africa Tel: +27 (0)11 974 9745 Fax: +27 (0)11 392 2587 E-mail: sales@adamequipment.co.za	**Adam Equipment (S.E. ASIA) Pty Ltd.** 2/71 Tacoma Circuit Canning Vale, Perth WA 6155, Australia Tel: +61 (0) 8 6461 6236 Fax: +61 (0) 8 9456 4462 E-mail: sales@adamequipment.au.com

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