FLUKE ®

Calibration

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Pressurements
PressCal
Deadweight Tester Software

Users Manual

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What is PressCal

Pressurements PressCal software (PressCal) provides a quick and effective solution to enhance the pressure measurement accuracy of Deadweight Testers (DWT). PressCal provides an easy-to-use GUI (Graphical User Interface) that allows you to calculate all the necessary corrections needed (such as local gravity, temperature etc.) to accurately determine the pressure generated by your DWT.

PressCal also provides:

- Automatic certificate generation
- Customer details management
- Real-time auditing

How Does It Work

PressCal works from first principles using the actual DWT pressure equation:

$$P_e = \frac{\sum_i^{m_1 g} \cdot \left(1 - \dfrac{\mathrm{P}_a}{\mathrm{P}_{mi}}\right) + \sigma c}{A_0(1+\lambda\mathrm{P})\left[1 + (\alpha_\rho + \alpha_c)(t - t_r)\right]} + \mathrm{P}_f g \Delta h$$

By using a combination of data files and your environmental/working details, PressCal can achieve true accuracy and consistency in its calculations.

System Requirements

The following system specifications are required as a minimum to successfully install and run the PressCal software:

- Microsoft® Windows 95 or higher
- 486 PC with maths coprocessor

Installation

Double click on *setup.exe*, then follow the online PressCal installation instructions.

System Operation

This software only runs if you have purchased the correct software version and installed it into the default *C:\PressCal* directory.

The software keeps the last setup and other settings in a configuration file (*PressCal.cfg*) so that on power-up the user can carry on from the last settings prior to power down.

To maintain the accuracy and security of the software, the PCU's and Weight Sets' data is preloaded by SI Pressure Instruments.

Future upgrades are available from SI Pressure Instruments on a chargeable basis provided the software users can provide mass and effective area calibration data of the relevant Deadweight Testers.

Getting Started

Double click on the "PressCal" icon or alternatively click on **Start> Programs >PressCal > PressCal**.

Using the PressCal Interface

The PressCal user interface (as shown in Figure 1-1) comprises the following:

- Menu Bar
- Correction Parameters
- Weight Selection Details
- Calculation Results
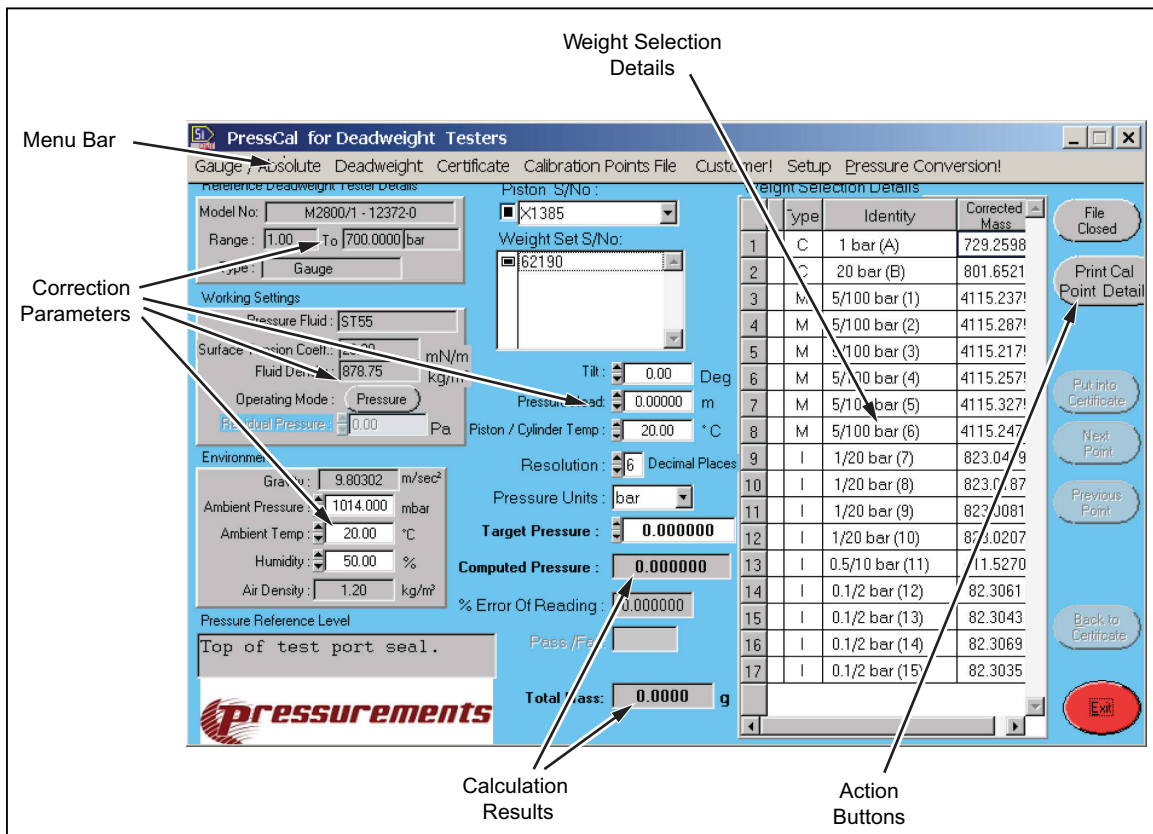
Figure 1-1. PressCal User Interface (Main Window) - Action Buttons

gmp01.eps

Menu Bar

The Menu Bar is positioned at the top of the main interface window (as shown in Figure 1-1) and provides the following actions:

Table 1-1. Menu Bar Actions

Menu Action	Options	Description
Gauge/Absolute	Gauge, Gauge (Absolute), Absolute	Use to toggle between Absolute, Gauge and Gauge (Absolute). For further details refer to Performing a Calculation.
Deadweight	As shown (e.g. DWT6000)	Select the model type of the deadweight tester to be used.
Certificate	New ▶	Select either Auto or Manual. A new form appears allowing you to enter the new certificate details. For Further information refer to Managing New Certificates.
	View	Allows you to open and view an existing certificate, see Viewing an Existing Certificate.
	Print	Allows you to print an existing certificate, see Printing an Existing Certificate.
	Convert To ▶	Allows you to convert the current certificate format into either Microsoft Word or Excel, see Converting an Existing Certificate's format.
Calibration Points File	View, Print, Delete	Allows you to manage the calibration points files. Existing files can be opened, printed and deleted. See Creating an Audit Trail for details.
Customer	Opens the customer details form. For further information refer to Setting up Customer Details.	
Setup	Deadweight Tester	Allows you to select or specify the deadweight tester model. You can also amend and remove pre-defined DWTs. For further information refer to Managing Deadweight Tester Details.
	PCU	Allows you to display and print the details for each available PCU. For further information refer to Managing PCU.
	Weight Set	Allows you to view and print the weight details for a particular weight set. Refer to Managing Weight Set Details.
	Fluids	Allows you to create, amend, print and delete fluid characteristics (e.g. Fluid Density and Surface Tension). Refer to Managing Fluid Details.
	Default Settings	Allows you to view and modify the current environmental and physical default settings. Refer to Setting the Default Values.

Menu Action	Options	Description
Setup	Gravity ▶	Allows you to select the gravity, Standard or Local. You can also amend the gravity to suit the local testing environment. Refer to Setting the Gravity.
	File convert Path	Allows you to enter the application location for Microsoft Excel and Word. Refer to Altering the Excel/Word Conversion Path.
	Password	Allows you to create password protection. Refer to Password Protection.
	User Names	Allows you to activate or modify the identity of the current user. Refer to Setting Up Certificate User Names.
	Certificate Header/Footer	Allows you to define the Header and Footer that is shown on the resultant certificate. The Header and Footer can also be toggled On/Off from this window. See Setting Up Headers and Footers.
	Tag Front Page to Certificate ▶	Before generating or printing a certificate you can decide whether you want the Front page (see Producing Certificates) to be attached to the front of the certificate. Select Yes to attach or No to leave the certificate on its own.
	Recalibration Report	Provides a facility that allows you to view all the PCUs (Piston Cylinder Units) and Weights, within a particular time period, that are due for recalibration. Refer to Recalibration.
	PressCal Software	Shows the Version Number, Serial Number and Issue Date (Disk and Software) for the current version of PressCal.
Pressure Conversion	Opens the remote pressure converter window. See Pressure Conversion!	

Correction Parameters

The "Correction Parameters" area shows the current configuration for the calibration. The area comprises both information that is read-only (obtained from related files) and fields that can be modified directly allowing you to finely tune the correction parameters.

Weight Selection Details

The "Weight Selection Details" area shows the Type, Identity and Corrected Mass for each weight within the currently selected weight set (identified by the "Weight Set S/No:").

The table can be used to highlight the weights that are required to produce a particular pressure, or alternatively weights can be selected within the list and the resultant pressure is then shown taking into account the correction parameters.

A weight is selected within the list by double-clicking on it, the row is then highlighted and a cross (X) is shown immediately adjacent. To unselect double-click on the highlighted row. For further information refer to Performing a Calculation.

Calculation Results

After all correction parameters have been entered, and the Target Pressure or Weights selected, the following results are displayed:

- Computed Pressure: shows the actual pressure using the highlighted weights and all correction parameters.
- % Error of Reading: shows the percentage difference between the Target Pressure and the Computed Pressure.
- Total Mass: shows the overall mass (g), taking into account the sum of the individual weights (including the weight of the PCU), and the influences of the corrective parameters.

Action Buttons

The "Action Buttons" are featured throughout PressCal and are used to perform specific operations and to allow you to advance through the various processes (e.g. **Amend, Print, Exit** etc.).

Note

Some of the Action Buttons are dimmed and do not perform any function until enabled by the software.

Chapter 2
Setting Up PressCal

Introduction

To use PressCal effectively and to ensure that all calculations are accurate, it is imperative that PressCal is correctly configured and all influential factors are correct at the time of computation.

Before performing the calculation, the following should be considered:

Table 2-1. Performing Calculations

Initial Factor		Correct Configuration
DWT Type		
Is the DWT model that you require for the test shown within the Deadweight Menu Bar Option?	➔	Refer to Creating a New DWT Model to enter details of a new DWT Model.
PCU Types		
Are all PCU Types correct and is the right PCU associated with your selected DWT?	➔	Refer to Managing PCU Details to view all PCU types, or alternatively got to Selecting an Existing DWT Model to check that the correct PCU is assigned to your DWT.
Weight Sets Available		
Are the correct Weight Sets available and is the right set associated with your DWT?	➔	Refer to Managing Weight Set Details, or alternatively go to Selecting an Existing DWT Model to check that the correct Weight Set is assigned to your DWT.
Gravity		
Have you got the correct gravity value for your environment or location?	➔	Refer to Setting the Gravity to select an alternative gravity value.
Default Settings		
Are the default settings correct?	➔	Refer to Setting the Default Values to select the default value.

Managing Deadweight Tester Details

Click on **Setup > Deadweight Tester** within the "Menu Bar" to open the "Dead Weight Functions" window as shown in Figure 2-1.
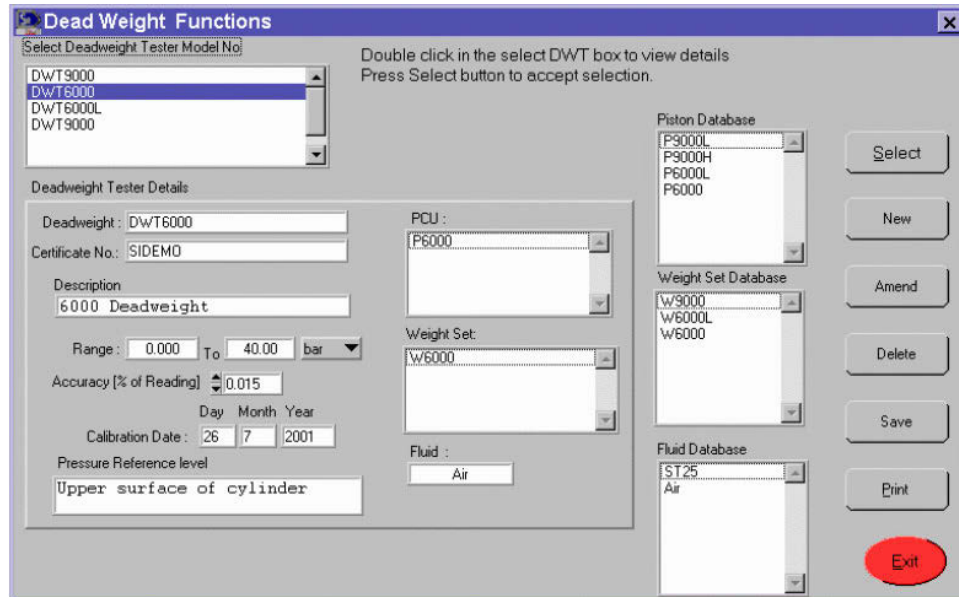
gmp02.bmp

Figure 2-1. Dead Weight Functions Window

Selecting an Existing DWT Model

1. Double-click on the chosen "Deadweight Tester Model No." The "Deadweight Tester Details" update accordingly showing the current setup for the selected DWT, including the associated PCU, Weight Set, and Fluid Type.

2. Click on Select to use the chosen deadweight. The "Dead Weight Function" window closes and the main window is updated showing the new DWT model details.

Creating a New DWT Model

1. Click on New to enter the details of a new DWT model. The current "Deadweight Tester Details" are removed and the fields are left empty and in an editable state.

2. You can enter the following details:

Deadweight	Enter a suitable name/serial no. for the DWT model.
Certificate	Enter the certificate number for the current DWT calibration
Description	Enter a suitable description for the DWT. The information entered here is included on the calibration certificate.
Range	Enter a suitable range for the DWT. The range is necessary so that PressCal can calculate results at equal intervals, any results calculated outside the range are classed as failed. Use the drop-down menu to select the associated units.
Accuracy	Enter the Accuracy (in relation to the Range) by either inputting the value directly or by using the arrows (⬥) for fine adjustment.

Calibration Date	Enter the date of when the DWT was last calibrated.
Pressure Reference Level	Briefly identify the location of the pressure reference level, which is the point at which pressure is referenced when no external pressure head is applied.
PCU/Weight Set/Fluid	Double-click on the items within the Database lists (Piston, Weight Set and Fluid) that you want the DWT model to contain. The chosen items are then shown within the DWT Details area. To remove a selection, double-click on the chosen item within the appropriate details list.

Note

Only one Fluid type can be selected. To change the Fluid type, double-click on an alternative from the database list.

3. Click on Save to create the new DWT.

Modifying an Existing DWT Model

1. Double-click on the chosen "Deadweight Tester Model No."

    The "Deadweight Tester Details" update accordingly showing the current setup for the selected deadweight, including the associated PCU, Weight Set, and Fluid Type.

2. Click on Amend to modify the chosen DWT. For information on how to complete the fields refer to "Creating a New DWT Model" above.

Note

The Deadweight name field cannot be modified.

3. Click on Save to store the changes.

Removing an Existing DWT Model

To remove a DWT, double-click on the chosen "Deadweight Tester Model No." then click on **Delete**. A confirmation window appears, click on **Yes** to proceed with the DWT removal.

Printing DWT Model Details

To print out the details of a DWT, double-click on the chosen "Deadweight Tester Model No." click on **Print**, then follow the online instructions.

Click on **Exit** to close the "Dead Weight Functions" window.

Managing PCU Details

Click on **Setup > PCU** within the "Menu Bar" to open the "PCU Details" window as shown in Figure 2-2.
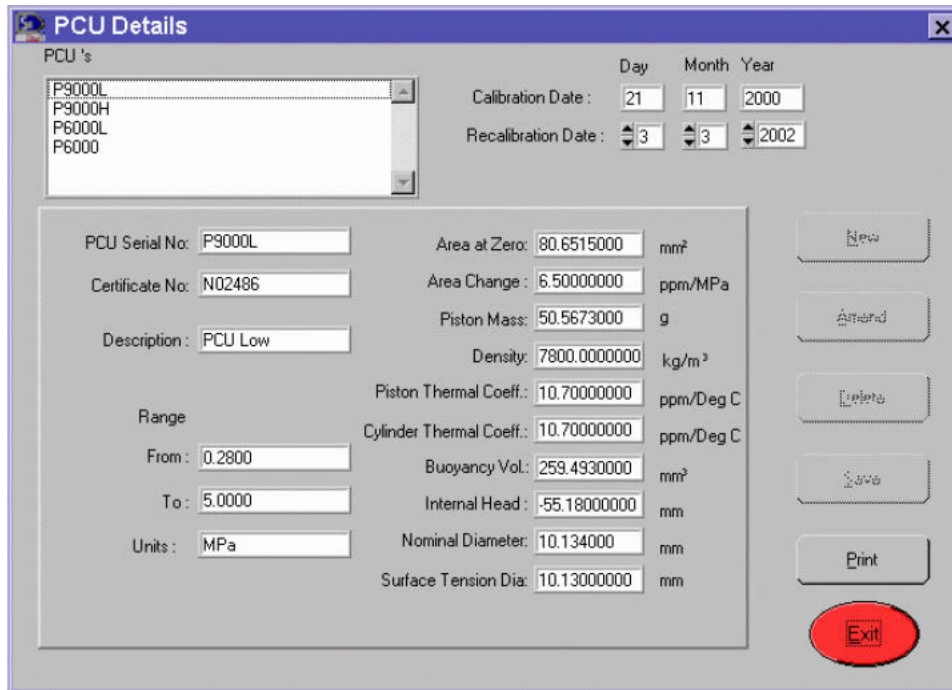
gmp03.bmp

Figure 2-2. PCU Details Window

Viewing PCU Details and Modifying the Recalibration Date

Double-click on the chosen "PCU" from the options shown in the list. The PCU details update showing the current values for the selected PCU, as well as the previous calibration date.

The details shown within the window are read-only and can only be modified by SI Pressure Instruments. However, it is possible to set a new calibration date by using the "Recalibration Date" scroll bars. The new date is then shown on any printouts of the "PCU Details", and if expired is also shown in a pop-up window whenever the details are accessed.

Printing PCU Details

To print out the details of a PCU, double-click on the chosen "PCU" from the options shown in the list, click on **Print**, then follow the online instructions.

Click on **Exit** to close the "PCU Details" window.

Managing Weight Set Details

Click on Setup > Weight Set within the "Menu Bar" to open the "Weight Set Details" window as shown in Figure 2-3.
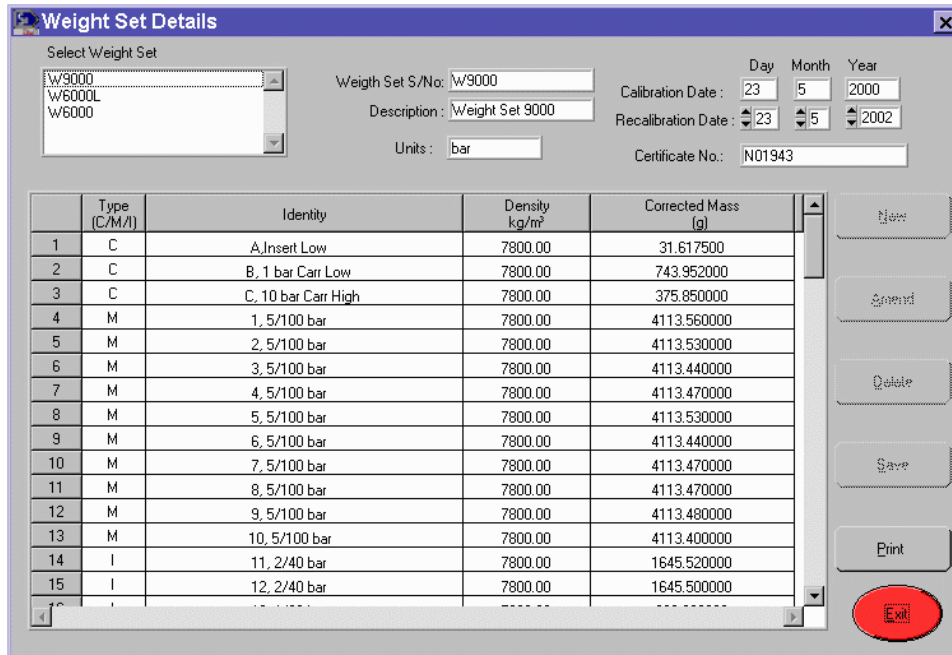
gmp04.bmp

Figure 2-3. Weight Set Details Window

Viewing Weight Set Details (and Modifying the Recalibration Data)

Double-click on the chosen Weight Set from the options shown in the list. The main table updates showing the following:

Type (C/M/I)	The type of weight shown is either **C** (Carrier), **M** (Major Mass), or **I** (Incremental).
Identity	The identity of the weight, as labeled on the weight itself
Density (kg/m³)	Shows the physical density of the weight. This is dependent upon the weight's material type.
Corrected Mass (g)	The corrective mass as specified by SI Pressure Instruments.

The window also shows general information on the Weight Set, as well as the previous calibration date.

The details shown within the window are read-only and can only be modified by SI Pressure Instruments. However, it is possible to set a new calibration date by using the "Recalibration Date" scroll bars (♦). The new date is then shown on any printouts of the "Weight Set Details", and if expired is also shown in a pop-up window whenever the details are accessed.

Printing Weight Set Details

To print out the details of a weight set, double-click on the chosen "Weight Set" from the options shown in the list, click on **Print**, then follow the online instructions.

Click on **Exit** to close the "Weight Set Details" window.

Managing Fluid Details

Click on **Setup > Fluids** within the "Menu Bar" to open the "Fluid Details" window as shown in Figure 2-4.
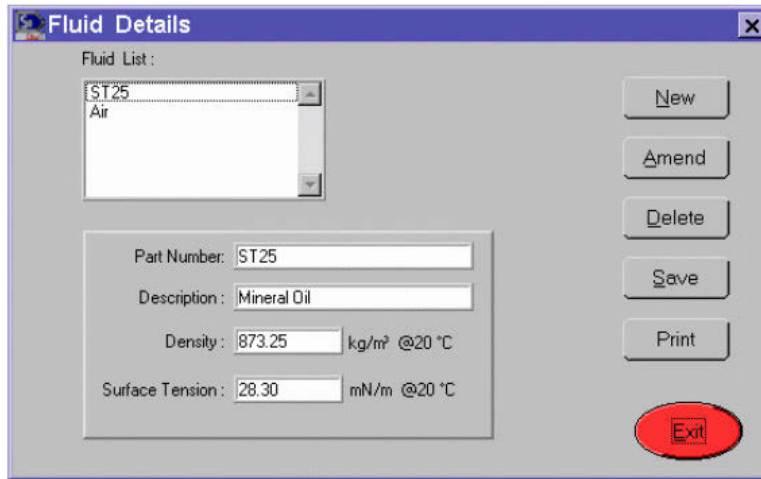

gmp05.bmp

Figure 2-4. Fluid Details Window

Viewing an Existing Fluid Type

Double-click on the chosen fluid type within the "Fluid List".

The "Fluid Details" update accordingly showing the current setup for the selected fluid, including the **Density** and **Surface Tension** qualities.

Creating a New Fluid Type

1. Click on **New** to enter the details of a new fluid type.

    The current "Fluid Details" are removed and the fields are left empty and in an editable state. You can enter the following details:

Part Number	Enter a name for the new fluid type.
Description	Enter a description of the fluid type. This field can be used to clarify the consistency of the fluid (e.g. water, oil, gas etc.).
Density	Enter the density of the fluid in kg/m^3 at the ambient temperature of 20 ºC. This information should be available from the fluid supplier.
Surface Tension	Enter the surface tension of the fluid in mN/m at the ambient temperature of 20 ºC. This information should be available from the fluid supplier.

2. Click on Save to create the new fluid type.

Modifying an Existing Fluid Type

1. Double-click on the chosen fluid type within the "Fluid List". The "Fluid Details" update accordingly showing the current setup for the selected fluid.

2. Click on **Amend** to modify the chosen fluid type. For information on how to complete the fields refer to Creating a New Fluid Type.

Note

The Part Number field cannot be modified.

3. Click on **Save** to store the changes.

Removing an Existing Fluid Type

To remove an existing fluid type, double-click on the chosen fluid type within the "Fluid List" then click on **Delete**. A confirmation window appears, click on **OK** to proceed with the fluid type removal.

Printing Fluid Type Details

Double-click on the chosen fluid type within the "Fluid List", then click on **Print** to print the details to the default printer.

Click on **Exit** to close the "Fluid Details" window.

Setting the Gravity

To set the gravity, click on **Setup** within the "Menu Bar" then scroll down to the **Gravity ▸** option.

1. Select one of the following options:

Standard Gravity	Shows the working gravity value to the internationally agreed standard (9.80665 m/sec²).
Local Gravity	Shows the currently modified local gravity.
Change Local Gravity	Allows the user to change the **Local Gravity** value.

Note

If the software is currently using the local gravity value then it will be updated in the working environment.

A window opens allowing you to enter a new gravity value (m/sec^2). Click on **Save** to accept the new value or click on **Exit** to close the window without saving. You must then select the **Local Gravity** option (if not already selected) from the "Menu Bar".

2. Click on **OK** to close the confirmation window.

Setting the Default Values

The default values have been defined by SI Pressure Instruments. However, depending on your environment and your testing specifications, these may need to be modified.

Click on **Setup > Default Settings** within the "Menu Bar" to open the "Default Values" window as shown in Figure 2-5.
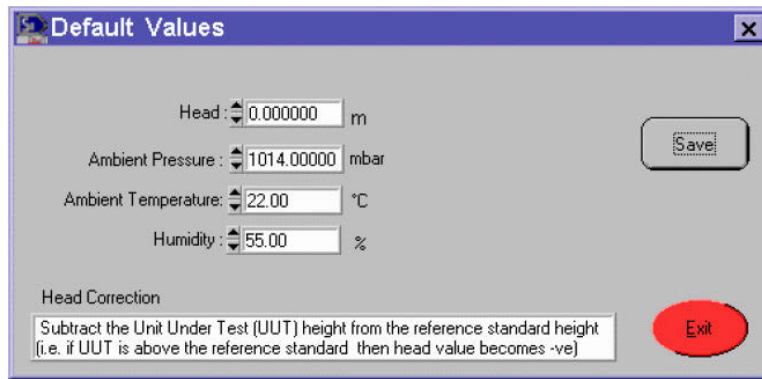
gmp06.bmp

Figure 2-5. Default Values Window

1. Enter the following:

Note

Either use the arrows (⬍) to finely adjust the default values, or alternatively enter the values in directly.

Head	Subtract the Unit Under Test (UUT) height from the reference standard height (i.e. if the UUT is above the reference level then the **Head** value becomes -ve). *Default is zero.*
Ambient Pressure	Enter the ambient pressure of the calibration test environment. This can be obtained by using a suitable manometer (such as SI Pressure's PC6).
Ambient Temperature	Enter the ambient temperature of the calibration test environment. The default calibration temperature is 20 ºC.
Humidity	Enter the current humidity. This can be obtained by using a suitable hygrometer.

2. Click on **Save** to store the default value changes or click on **Exit** to close the window without saving the changes.
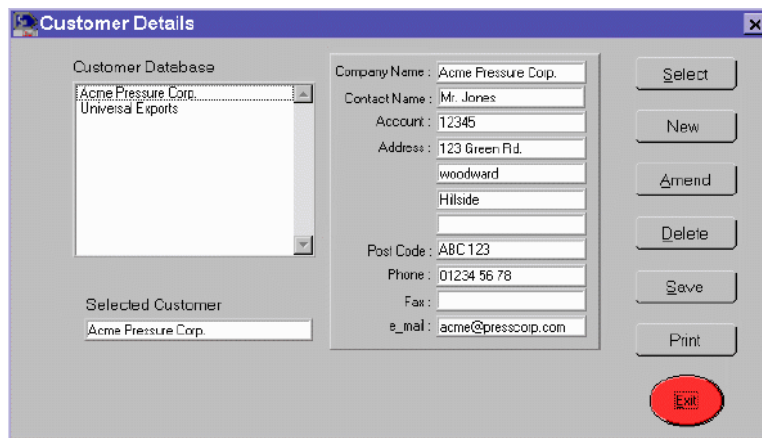
Chapter 3
Setting Up Customer Details

Introduction

PressCal allows the pre-defining of customer details that can easily be inserted within calibration certificates.

Managing Customer Details

Click on "Customer!" within the "Menu Bar" to open the "Customer Details" window as shown in Figure 3-1.

gmp07.bmp

Figure 3-1. Customer Details Window

Creating New Customer Details

Click on **New**. The current customer detail's fields are cleared.

Note

*You can either enter information directly into the blank fields, or you can select an existing customer from the **Customer Database** and use their details as a template.*

1. Enter the following customer details:

Customer Database	Shows a list of the existing customer names. Double-clicking on a customer name refreshes the adjacent fields to show the details for that particular customer.
Selected Customer	Only updates after **Select** has been clicked on.
Contact Name	Enter the identity of the person to be contacted.
Account	Shows the account reference.
Address/Postcode/Phone /Fax/e-mail	Shows the full contact details of the company

2. Click on **Save** to enter the new details within the database. The window refreshes showing the new customer within the **Customer Database**. To enter further customer details click on **New** again.

Selecting Existing Customer Details

Double-click on the customer name within the **Customer Database**, then click on **Select**. The **Selected Customer** field updates showing the selection.

Modifying Customer Details

Double-click on the customer name within the **Customer Database**, then click on **Amend**. You can now modify the customer details (see "Creating new Customer Details" above for field information).

Note

The Company Name cannot be modified.

Click on **Save** to accept the changes.

Removing Customer Details

Double-click on the customer name within the **Customer Database**, then click on **Delete**. A confirmation window appears, click on **Yes** to delete the customer from the database.

Printing Customer Details

Double-click on the customer name within the **Customer Database**, then click on **Print** to print the details to the default printer. Click on **Exit** to close the "Customer Details" window.

Creating an Audit Trail

Introduction

PressCal can be used to provide an audit trail of the calibration points by saving the individual calculations to file. Each file contains information on the weights, PCUs, correction parameters etc.

Managing the Calibration Points File

Opening the Calibration Points File

To save the calibration point details for future reference, click on **File Closed** to the right hand side of the "Main PressCal" window.

Note

This should be selected prior to performing the calculations or generating a certificate.

A new window opens asking for the file name and location where the calibration point details are going to be saved. Enter a suitable filename with the **.clp** extension and click on **OK**.

The window closes and the **File Closed** button changes to **File Open**. The file is now open and ready for details to be printed to it.

Printing Calibration Points to the File

To print calibration point details to the file, ensure that a suitable file has already been opened as described above.

Follow the procedure described in Performing a Calculation, to obtain the calibration results or if you are creating a certificate follow Obtaining Certificate Calibration Data.

For every calculation that you want to store, click on **Print Cal Point Details** to the right hand side of the "Main PressCal" window.

Note

*If you have not opened a calibration points file, clicking on **Print Cal Point Details** automatically sends the current details to the default printer.*

If you want to print a previous calculation to the calibration points file, click on the **Previous Point** button, until the calculation is shown, then click on **the Print Cal Point Details** button. You can then use the **Next Point** button to return to the final calculation.

When you have finished printing to the file, click on the **File Open** button to close and save the file.

Viewing an Existing File

Click on **Calibration Points File > View** within the "Menu Bar". A file manager opens allowing you to navigate to the appropriate directory. Select the desired file **(*.clp)** within the directory and click on **OK**. The file is opened in read-only format and can be fully viewed by using the vertical and horizontal scroll bars.

Click on **Exit** to close the window.

Printing an Existing File to the Default Printer

Click on **Calibration Points File > Print** within the "Menu Bar". A file manager opens allowing you to navigate to the file storage directory. Select the file within the directory and click on **OK**. The file is printed to the default printer.

Deleting an Existing File

Click on **Calibration Points File > Delete** within the "Menu Bar". A file manager opens allowing you to navigate to the file storage directory. Select the file within the directory and click on **OK**. The file is deleted.

Chapter 5
Performing a Calculation

Introduction

Before using PressCal to perform a calculation or to generate a certificate, please ensure that all settings are correct for the current DWT. Please refer to Setting up PressCal for details.

Preparation

1. Using the Gauge/Absolute "Menu Bar" option select one of the following:

Gauge	Used to calculate the results relative to atmospheric pressure.
Gauge (Absolute)	Used to produce absolute results using gauge pressure.
Absolute	Used to calculate results relative to zero pressure (i.e. in a complete vacuum).

2. Select the DWT from the Deadweight "Menu Bar" options. If the required DWT is not shown, refer to Creating a New DWT Model.

3. Check that the following are correct within the main window:

   - "Reference Deadweight Tester Details".
   - "Working Settings"
   - Click on **Operating Mode** to switch between **Pressure** and **Vacuum**.

<p style="text-align:center">*Note*</p>

*If Gauge type is **Absolute**, only the **Pressure** option is available, as well as the option to adjust **Residual Pressure**. You should adjust the **Residual Pressure** to allow for the practical constraints in achieving true absolute.*

4. Adjust or accept the "Environmental" settings.

Gravity	For details on adjusting the gravity refer to Setting the Gravity.
Ambient Pressure, Ambient Temp, Humidity	Either accept the default settings or enter new values directly, or you can also adjust the values by using the adjacent arrows ($\Leftrightarrow$).

Note

*If new values are manually entered they are only available for the current
session. When the session is restarted the values reset to default.*

For information on how to adjust the default settings, refer to Setting the Default Values
for details.

5. Check:

    - Correct **PCU** shown within the "Piston S/No." field. If the required PCU is not
      Shown, use the pull-down list to view all PCU options for the current DWT, then
      select. Alternatively, refer to *Managing PCU Details.*

    - Correct **Weight Sets** shown within the "Weight Set S/No." field. Clicking on a
      new option in the list causes the "Weight Selection Details" to update.

6. Adjust the following settings:

Note

*If new values are manually entered they are only available for the current
session. When the session is restarted the values reset to default.*

Tilt	Enter the **angle** of the DWT by either inputting the value directly or by using the arrows (⬍) for fine adjustment.

Note

*Where possible the DWT should be level, as
stated within the DWT's operating instructions.*

Pressure Head	Adjust the height of the pressure head or accept the default. Refer to Setting the Default Values.
Piston / Cylinder Temp	Due to the thermal characteristics of the PCU it may be necessary to adjust the value of the piston/cylinder temperature within PressCal. Please refer to the DWT operating manual (or supplier's information).
Resolution	Adjust the number of decimal places that you want the **Target Pressure** and **Computed Pressure** to be calculated to.
Pressure Units	Using the pull-down list select the preferred units, e.g. *bar, mbar, MPa, kPa, psi, kg/cm^2 etc.*

Calculation

There are two methods of calculation:

Note

Both methods take into account all environmental and working settings.

- Select a **Target Pressure** and allow PressCal to automatically select the
  combination of weights from the Weight Set that will achieve the closest match to
  the target pressure.
- Select the preferred weight(s) from the "Weight Selection Details" and allow
  PressCal to calculate the resultant pressure.

Selecting a Target Pressure

1. Complete all stages described within Preparation.

2. Enter a suitable **Target Pressure** by either inputting the value directly or by using the arrows (⬍) for fine adjustment.

Note

Ensure that the correct units have been selected within the Pressure Units field.

3. Press **<Return>**. The "Weight Selection Details" table updates, highlighting the selection of weights needed to achieve the **Target Pressure**. The results fields are also updated.

Calculating the Pressure by Using Preferred Weights

1. Complete all stages described within Preparation.

2. Double-click on each row of the "Weight Selection Details" table for the weights that you want to find the resultant pressure for.

Note

*If the weights are physically going to be used on the DWT, ensure that the appropriate carrier (**C**) has been selected from the list.*

3. The results' fields update accordingly.

Note

*The **Target Pressure** field does not change when selecting weights manually.*

Understanding the Results

Regardless of the calculation method used, the following results are shown:

Computed Pressure	The pressure generated by the weights/PCU under the defined operating conditions.
% Error of Reading	The percentage difference between the **Target Pressure** and the **Computed Pressure**.
Pass/Fail	If a certificate is being generated, results are calculated over a range of pressures. If the results achieved are within the range then the calculation is given a **Pass**, if not, **Fail** is shown.
Total Mass	The overall mass in grams (including PCU and carrier).

Chapter 6
Producing Certificates

Introduction
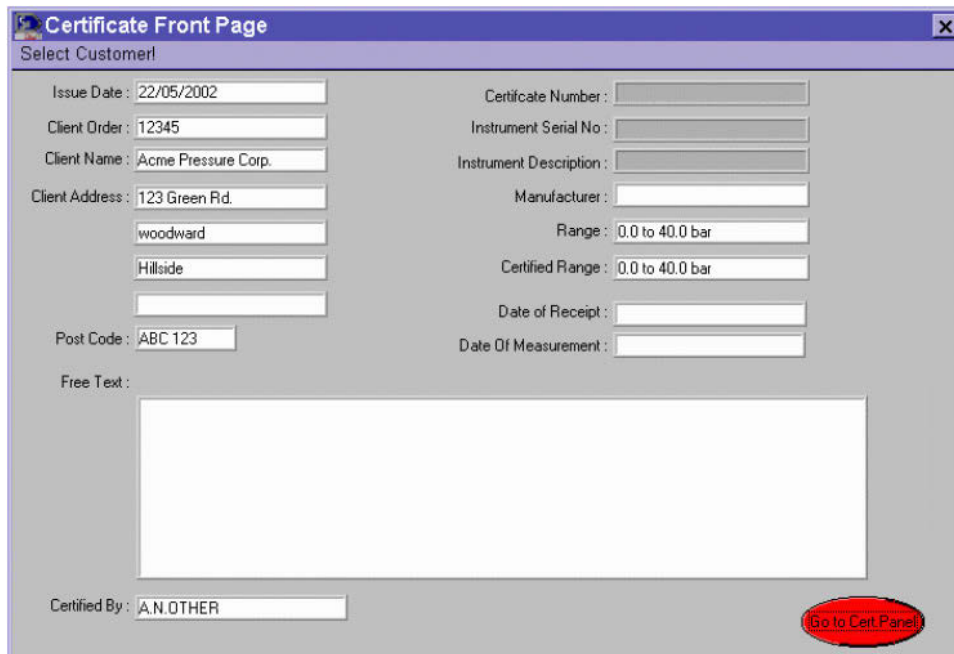
PressCal allows either automatic or manual generation of "Certificates of Calibration".

Automatic Generation   Extracts the results of a calculation and inserts them automatically into the certificate of calibration.

Manual   All calculation results are manually entered into the "Certificate of Calibration".

Managing New Certificates

Click on **Certificate > New** ▶ within the "Menu Bar" and select either **Auto** or **Manual** to open the "Certificate Front Page" window as shown in Figure 6-1. Complete the details as described in *Managing a Certificate Front Page*, then click on **Go to Cert Panel** to open the "Certificate of Calibration" window, as shown in Figure 6-2.

gmp10.bmp

Figure 6-1. Certificate Front Page Window

Note

Front Page window is only shown if it has been tagged to the certificate.
See Tagging a Front Page to the Front of a Certificate.
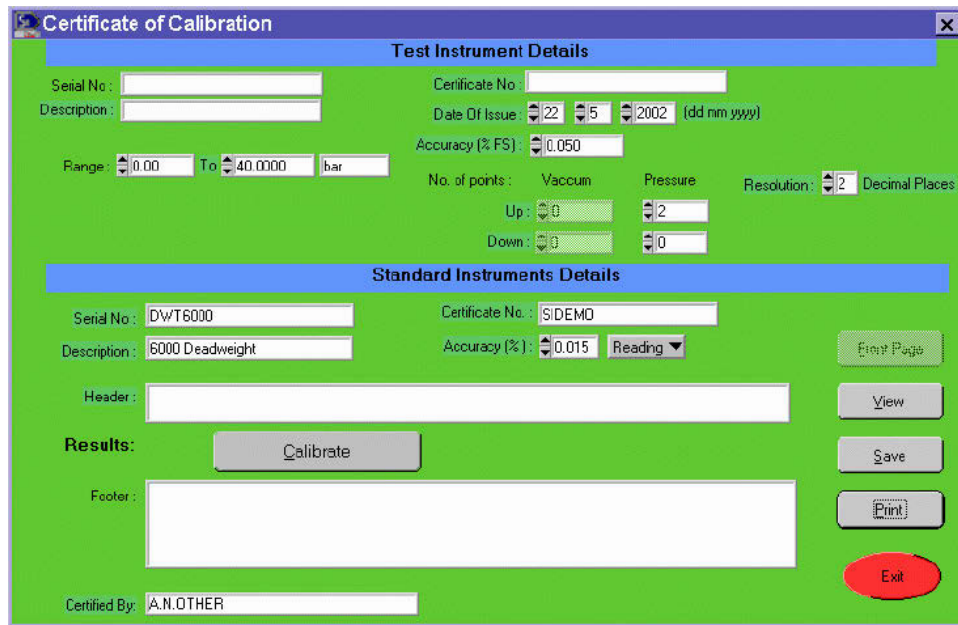
gmp08.bmp

Figure 6-2. Certificate of Calibration Window

Creating and Saving a New Certificate

1. Enter the following certificate details.

Note

*Depending on whether you selected **Manual** or **Automatic** determines*
what can be modified.

Test Instrument Details

Serial No.	Enter the serial number of the equipment (e.g. gauge) under test.
Certificate No.	Enter the unique calibration certification number.
Date of Issue	Defaults to present day. Use the arrows (♦) to adjust the date. Enter the accuracy level that is acceptable. If the difference between the **Target pressure** (instrument reading) and the **Actual Pressure** is within the set accuracy, then the calculation is given a **Pass**, if not **Fail** is shown within the certificate.
Accuracy (%FS)	The value entered is a percentage of the maximum pressure, i.e. Full Scale (FS).
	Either Enter the values directly or use arrows (♦) for fine adjustment.

Test Instrument Details

Range	Specify the pressure range that you want the results to be obtained within. Either enter the values directly or use the arrows (⬍) for fine adjustment. Also ensure that the correct units are displayed.
No. of Points	Select the interval points within the range that you want results to be calculated for (max. 20). Select the number of points going up and the points going down. If the range starts below zero (-ve) you can also select interval points for the Vacuum.
Resolution	Select the number of decimal places that you want the results to be calculated for (max 20). Select the number of points going up and the points going down. The range starts below zero (-ve) you can also select interval points for the vacuum.
	Either enter the values directly or use the arrows (⬍) for fine adjustment.
Resolution	Select the number of decimal places that you want the results to be calculated to (max 5). Use the arrows (⬍) to adjust the value.

Standard Instrument Details

Serial No. *	The serial number of the selected DWT
Certificate No. *	The certificate number of the DWT.
Description*	Brief description of the equipment.
Accuracy (%)	Shows the accuracy of the DWT.
Header/Footer	Shows the current header and footer
Calibrate	Click on **Calibrate** to generate the calibration results for the certificate.
Certified By	The name of the person who certified the calibration. This is defined within the "Certificate User Name" window. See *Setting Up Certificate User Names* for details.

** Can only be modified if **Manual** Certificate was selected*

2. Click on **Save** to store the certificate details.

Obtaining Certificate Calibration Data

Click on **Calibrate** to open the "Certificate Data" window. The window shows a series of columns categorized as *"Instrument Reading", "Applied Pressure", "Instrument Error", "Error (%FS)"* and *"Outside Accuracy Statement"*.

Manual Certificate

If you are generating a manual certificate you can enter the values directly into the columns. These values may have been provided by PressCal during an earlier calculation.

When entering the values ensure that the units are correct and that the values entered match the original calculations.

Use the mouse to select the rows that you are going to enter the data into, or alternatively, use the **Next** and **Previous** buttons to scroll through the editable rows.

Click on **Main Cert. Panel** to return to the "Certificate of Calibration" window.

Automatic Certificate

If you are generating an automatic certificate the results are inserted directly from the main computation window.

Each of the cells within the "Instrumental Reading" column has a default value set, which evenly divides the selected range by the number of points, for example a range between 0 and 40 bar with 4 Pressure points would have values of *0, 13.33, 26.67* and *40.00* within the columns.

You can either compute the results for the given values or you can modify the values to increments of your choice.

There are two methods of changing the values, you can either change the values directly within the column, then compute, or you can change the values using the **Target Pressure** field within the main PressCal window.

To compute the results you have to calculate the values one row at a time. Use the **Previous** and **Next** buttons to select the first row, then click on **Compute**. The window closes and the main PressCal window is displayed.

The calculation is performed automatically, taking into account all previous settings (see *Setting up PressCal*). If you wish to replace the **Target Pressure** with one of your own, do so now and press **<Return>** to recalculate.

Note

Changing the **Target Pressure** *may cause the selected weights to change.*

Click on **Put into Certificate** to accept the results and to go back to the "Certificate Data" Window.

The next calibration point is selected from the list. Alternatively, use the **Previous** or **Next** buttons to highlight a particular point. Click on **Compute** and go through the computation process again until all rows have been processed.

Click on **Main Cert. Panel** to return to the "Certificate of Calibration" window.

Viewing the New Certificate

Click on **View** to see an example of how the certificate will look when printed. If a front page has been tagged to the certificate, then that page is also shown. See Figure 6-3 for an example of a "Certificate of Calibration".
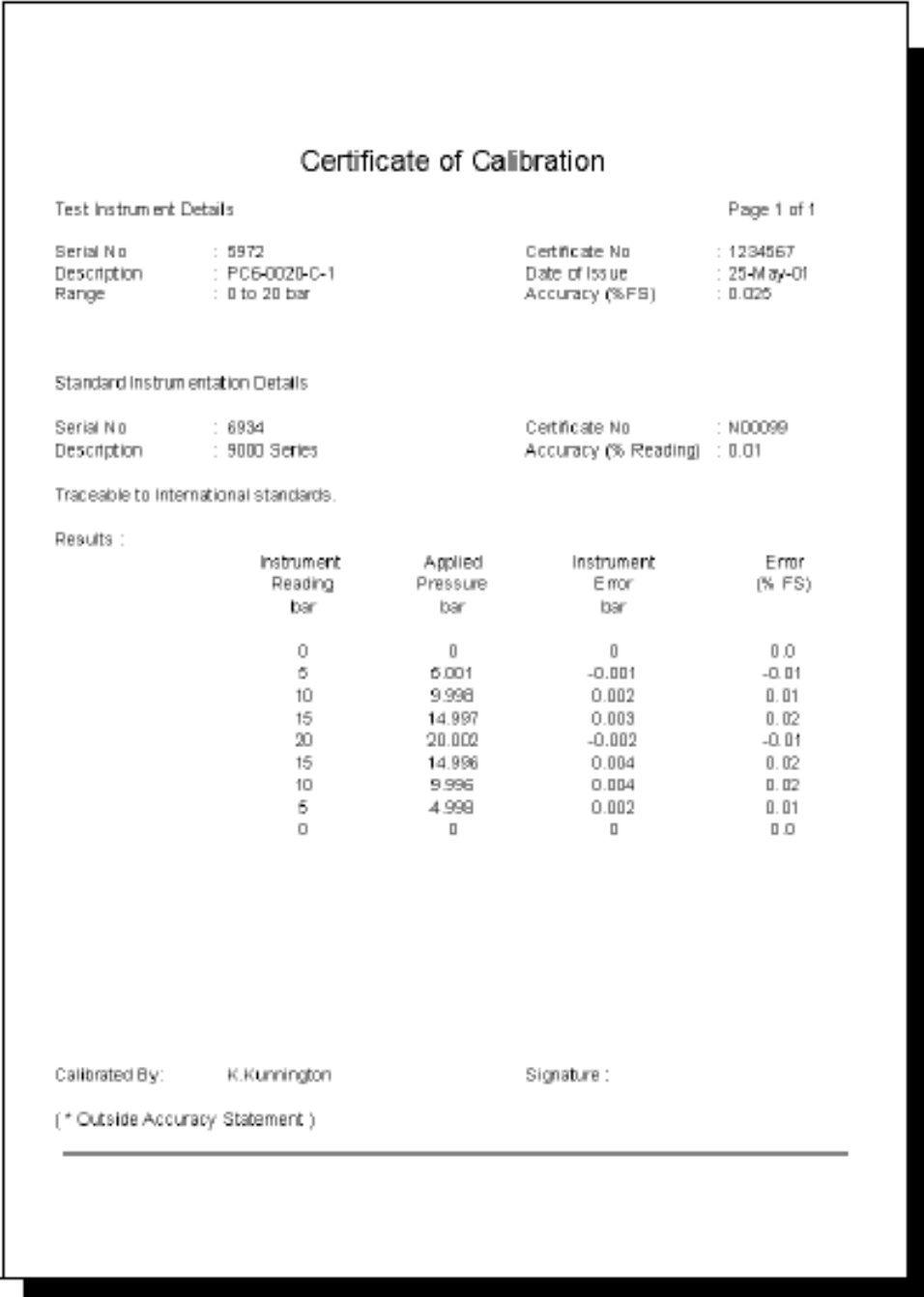

Figure 6-3. Certificate of Calibration

Click on **Exit** to close the window.

Printing the New Certificate

Click on **Print** to print out the certificate.

Click on **Exit** to close the "Certificate of Calibration" window.

Managing Existing Certificates

Viewing an Existing Certificate

Click on **Certificate > View** within the "Menu Bar". A file manager opens allowing you to navigate to the certificate storage directory. Select the certificate within the directory and click on **OK**. The certificate is opened in read-only format and can be fully viewed by using the vertical and horizontal scroll bars.

Note

If a front page has been tagged to the certificate then that page is also shown.

Click on **Exit** to close the window

Printing an Existing Certificate

Click on **Certificate > Print** within the "Menu Bar". A file manager opens allowing you to navigate to the certificate storage directory. Select the certificate within the directory and click on **OK**. The certificate is printed to the default printer.

Converting an Existing Certificate's Format

Converts files with extension "*.cer*" to Word text format (retaining the filename but with "*.doc*" extension) or Excel format.

Click on **Certificate > Convert to** ▶ within the "Menu Bar" and select either **Excel** or **Word Format**. A file manager opens allowing you to navigate to the certificate storage directory. Select the certificate within the directory and click on **OK**. The certificate is converted into the desired format.

Note

*The Excel conversion is carried out into an existing file, C:\PressCal\PressCal.xls and it is up to the user to save this file under a different filename by using the option **File > Save As** from the Excel menu. Any existing data in PressCal.xls will be cleared.*

Setting Up Headers and Footers

Allows you to add text to the header and footer of the certificate, with the option for the text to be automatically inserted on any new certificates.

1. Select **Setup > Certificate Header / Footer** within the "Menu Bar" to open the "Certificate Header / Footer" window.

2. Enter suitable text within the **Header** and **Footer** fields as required. This is restricted to 100 characters for the header and 200 characters for the footer.

Note

*If an existing Header and Footer has been saved, the fields are shown as read-only. Turn **OFF** both Insert buttons and resave the form. Re-enter the "Certificate /Footer" window and continue.*

3. Click on the adjacent **Header/Footer Insert** buttons to toggle the text between being included (**ON**) or not included (**OFF**) within any generated certificates.

4. Click on Save to accept the page setup, or alternatively, click on Exit to close the window without saving the changes.

Managing a Certificate Front Page

PressCal allows you to either "tag" or "not tag" a front page to any certificates produced. The front page holds the customer and instrument set details. If this option is "tagged," then a two-page certificate is produced.

Tagging a Front Page to the Front of a Certificate

Before a front page can be created or modified you must first set up the certificate so that the front page is tagged. Go to **Setup > Tag Front Page to Certificate** ▶ and select **Yes**.

Creating a Certificate Front Page

A certificate's front page comprises mainly of the current customer's details, therefore it is necessary to update the customer database before a front page can be generated. See *Setting up Customer Details*.

1. Click on **Certificate > New** ▶ within the "Menu Bar" and select either **Auto** or **Manual** to open the "Certificate Front Page" window as shown in Figure 6-4.

gmp10.bmp

Figure 6-4. Certificate Front Page Window

2. Click on **Select Customer** within the "Menu Bar" to open the "Customer Details" window. Double-click on the desired customer within the **Customer Database** selection window, then click on **Select**. The window closes and the "Certificate Front Page" window is updated showing the customer details (Client Name, Address, Order information etc.).

3. Enter or modify the following additional details:

Manufacturer	Name of the manufacturer of the unit under test.
Range/Certified Range	Shows the pressure range that the results have been obtained and certified for.
Date of Receipt	Date of acceptance for testing.
Date of Measurement	Date that the actual calibration test was carried out.
Free Text	Enter any further details about the calibration test.
Certified By	The name of the person who certified the calibration. This is defined within the 'Certificate User Name' window.

4. Click on **Go to Cert Panel** to close the window and to attach the information to the subsequent certificate.

    The "Certificate of Calibration" window is shown. See *Managing New Certificates* for details on how to complete the certificate.

Setting Up Certificate User Names

It is possible to setup a list of users who are certified to sign the calibration certificate.

1. Click on **Setup > User Names** within the "Menu Bar" to open the "Certificate User Name" window.

    The window contains a list of User IDs each with their corresponding User Names (if no names exist, the cells are either blank or contain a number).

2. Click on each **User Name** cell individually and enter the name of a certified user.

3. Using the **Active User** scroll arrows (⬍) select the **User No. ID** of the user you want the certificate to be certified by. The appropriate **User Name** cell is highlighted showing your choice.

4. Click on **Save** to select the certificate user name details.

Chapter 7
Additional Features

Password Protection

It is possible to set up password protection for PressCal.

Click on **Setup > Password** within the "Menu Bar" to open the "Modify Password" window.

Note

By default no password is defined, but once a password is entered it must be remembered or access is denied. If you forget your password or cannot access PressCal due to a previous user's password, please contact SI Pressure Instruments for assistance.

Creating a new Password

1. Enter a suitable password within the **New Password** field.

2. Click on **Save** to accept the password.

3. Type in your password again to confirm, then click on **Save** again.

   You will now be asked to enter your password whenever you access PressCal.

Note

The password is case sensitive, so must be typed in using the correct use of uppercase and lowercase characters.

Modifying an Existing Password

1. Enter the current password within the **Old Password** field.

2. Click on **Save**.

3. Enter your new password, then click on **Save**.

4. Type in your new password again to confirm, then click on **Save** again.

Removing the Password

1. Enter the current password within the **Old Password** field.

2. Click on **Save**.

3. Select **Yes** from the **Delete Password** pull-down options, then click on **Save**.

The password is now deleted and you will no longer be prompted for one when you log in.

Pressure Conversion!

PressCal provides a facility that allows you to convert a pressure value from one type of units into another (using BS 350).

Click on **Pressure Conversion!** within the "Menu Bar" to open the following window:


gmp11.bmp

Figure 7-1. Pressure Conversion Window

Type in the original value and select the associated units from the pull-down menu (e.g. *bar, mbar, MPa, kPa, etc.*), then select the units you wish to convert into from the other pull-down list. The conversion is automatically performed as the new units are selected.

Click on **Exit** to close the window.

Recalibration

PressCal allows you to view or print the dates that the PCUs and Weight Sets are due for recalibration. The information is stored within a database which can be searched between specific date ranges.

Click on **Setup > Recalibration Report** within the "Menu Bar" to open the "Calibration Dates" window, as shown in Figure 7-2.
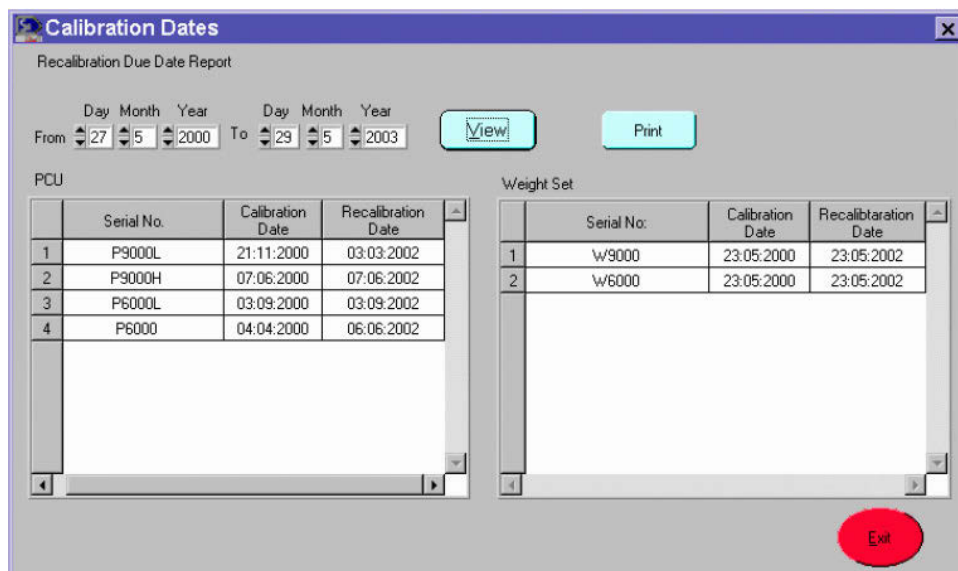
gmp12.bmp

Figure 7-2. Calibration Dates Window

Viewing Recalibration Dates

To view a list of the calibration and recalibration dates for each PCU and Weight Set:

1. Use the **From** and **To** arrows (♦) to select the date range for the calibration scheduling that you want to view.

2. Click on **View**.

   Both the **PCU** and **Weight Set** display fields refresh showing a list of those items whose recalibration date falls within the specified time period.

   For each item the **Serial No, Calibration Date** (when it was last calibrated) and **Recalibration Date** (when it is scheduled for recalibration) is shown.

Printing Recalibration Dates

Follow the procedure to view calibration dates, as described above, then click on **Print** to send the information to the default printer.

Modifying the Recalibration Date

For information on how to alter the PCU recalibration date refer to *Managing PCU Details* and for Weight Set recalibration refer to *Managing Weight Set*.

Click on **Exit** to close the "Calibration Dates" window.

Altering the Excel/Word Conversion Path

If a certificate is converted to MS-Word or MS-Excel, PressCal automatically opens the appropriate application to allow you to view the converted file immediately in the new format.

To do this you need to configure the location of each application so that PressCal knows where to find it.

Click on **Setup > File Convert Path** within the "Menu Bar" to open the "MS-Excel \ MS-Word Conversion Path" window.

MS-Excel Path

Click on **Browse** to select the location of Microsoft Excel (e.g. C:\Program Files\Microsoft Office\Office\EXCEL.EXE).

MS-Word Path

Click on **Browse** to select the location of Microsoft Word (e.g. C:\Program Files\Microsoft Office\Office\WINWORD.EXE).

Click on **Save** to accept the new application paths.

Chapter 8
Glossary and Pressure Equation

Glossary

C
Carrier Weight

DWT
Deadweight Tester

FS
Full Scale

GUI
Graphical User Interface

I
Incremental Weight

M
Major Weight

MS
Microsoft®

PC
Personal Computer

PC6
SI Pressure Instruments' Pressure Calibrator

PCU
Piston Cylinder Unit

PressCal
SI Pressure Instruments' Deadweight Tester Pressure
Calculation and Certificate Generator Software

UUT
Unit Under Test

Pressure Equation

$$P_e = \frac{\sum_i^{m_i g} \cdot \left(1 - \dfrac{P_a}{P_{mi}}\right) + \sigma c}{A_0(1+\lambda P)\left[1+(\alpha_\rho+\alpha_c)(t-t_r)\right]} + P_f g \Delta h$$

where

P_e	gauge pressure measurements
$\sum_i^{m_i}$	total mass applied on piston (including all float elements)
g	local gravity
P_a	density of air
P_{mi}	density of weights
A_0	effective area of piston-cylinder assembly at reference temperature t_r at null pressure
λ	pressure distortion coefficient of the piston-cylinder assembly
a_p	linear thermal expansion coefficient of the piston
a_c	linear thermal expansion coefficient of the cylinder
t	temperature of the piston-cylinder assembly
σ	surface tension of the fluid
c	piston circumference
P_f	measuring fluid density
Δh	difference between the reference height level h_i and the height of the instrument under calibration h_2, e.g. $\Delta h = h_1 - h_2$