PROCAL

MULTI DISCIPLINE CALIBRATION SOFTWARE

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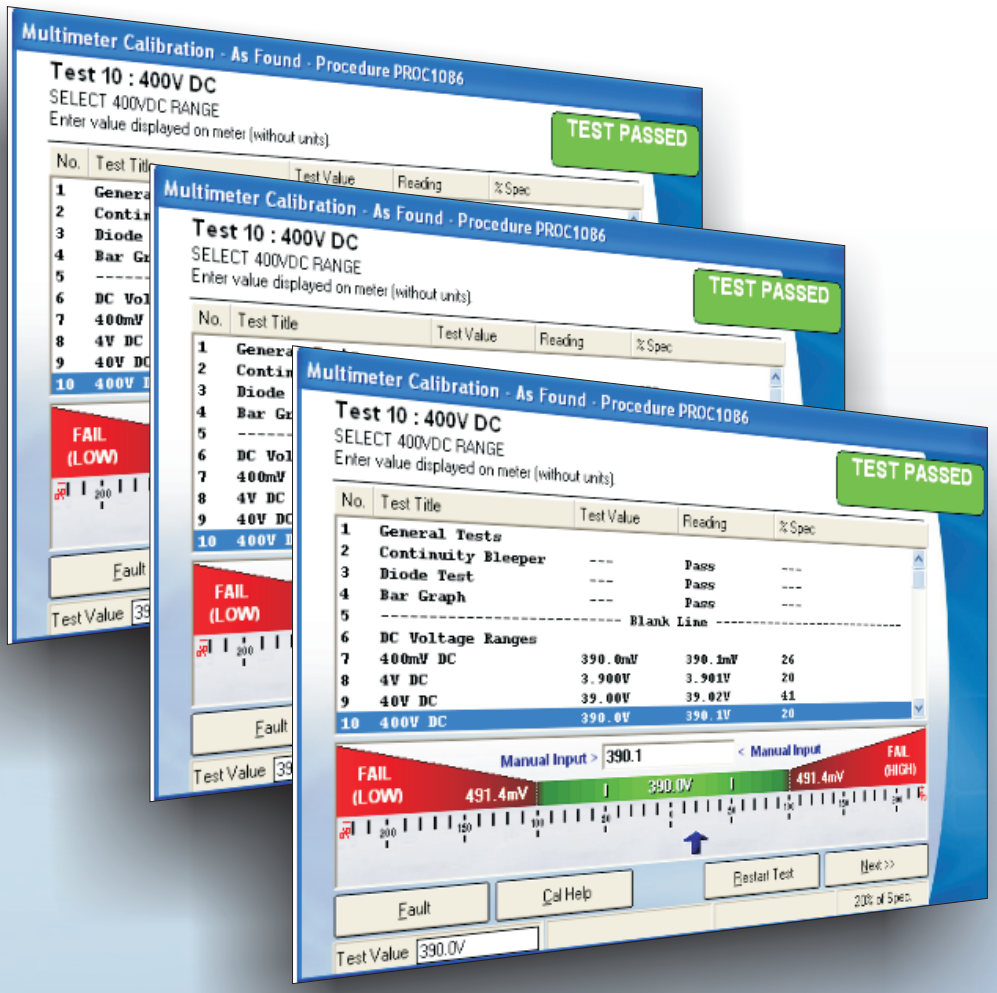


TRANSMILLE

SOLUTIONS IN CALIBRATION

ProCal

Calibration Software

User Guide

TABLE OF CONTENTS

INTRODUCTION TO PROCAL 7

General Overview 7
ProSet 7
ProEdit 7
ProCal 7
ProCert 8
Crystal Reports [Optional] 8
Setting up a System 9

INSTALLING THE PROGRAMS 10

INSTALLATION OVERVIEW 10
INSTALL PROCAL FROM THE CD 10
PROCAL SETUP WIZARD : INTRODUCTION 11

INSTRUMENT DETECTION 11

PROCAL SETUP WIZARD : STEP 1 12
PROCAL SETUP WIZARD : STEP 2 13
PROCAL SETUP WIZARD : STEP 3 14
PROCAL SETUP WIZARD : STEP 4 15
PROCAL SETUP WIZARD : STEP 5 16
PROCAL SETUP WIZARD : STEP 6 17
PROCAL SETUP WIZARD : STEP 7 18
PROCAL SETUP WIZARD : STEP 8 19
PROCAL SETUP WIZARD : STEP 9 20
PROCAL SETUP WIZARD : STEP 10 21
PROCAL SETUP WIZARD : STEP 11 22
PROCAL SETUP WIZARD : COMPLETION 23
RUNNING THE PROGRAMS 24
BOOK IN AN INSTRUMENT WITH PROCAL TRACK. 25
CALIBRATE AN INSTRUMENT 26

DESPATCH AN INSTRUMENT WITH PROCAL TRACK 34

CALIBRATION EXAMPLE COMPLETED 35

SETTING UP THE SYSTEM USING PROSET 36

The ProSet File Menu 36
Quick overview of the menu options: 36
In System Settings 36
In Instrument Traceability 36
Certificate Information 37
Program Options 37
ProCal Default Start-up Screen 38

USER ACCESS PERMISSIONS 38

Add a User 38
Edit a User's Permissions 38
Delete a User Button 38
Close Button 38
System Settings in detail 38
Drive & Directory Information 39
Drive & Directory Information continued 39
Sharing the 'C' drive on the Server 40
Setting up a Workstation 41
System Number 42
Marginal Pass Limit 42
GPIB Card Information 42

Auto Certificate Numbering Information 43
Language Setting 44
Traceability Information of Reference standards used. 45
Instrument Model Number and Description 46
Serial Number 46
Certificate Number 46
Calibration Date 46
Calibration Interval 46
COM Port (COM1 to COM8 or GPIB Address 0 to 30) 46
Measured Value (Including Unit) [Optional] 46
Uncertainty Template 47
Local / Server Storage 47
Setting up instrument Uncertainties 48
Adding / Editing Range information 49
Uncertainty Templates 50
Laboratory Information 51
Configuring the Label Printer 52

THE CALIBRATION PROGRAM PROCAL 53

ProCal Overview 53
Starting ProCal: 54
ProCal Menus: The File Menu 55
A new calibration may be started by selecting from the file menu either: 55
Calibrate an instrument: - use to start a new calibration. 55
Instrument Calibration Priority List: - select from a list of instruments in order of priority. 55
Search for a Procedure: - Select procedure before entering instrument details 55
An unfinished calibration can be completed by selecting: 55
Add after adjustment results 55
Recall a certificate 56
Resume a calibration 56
Recover a calibration 56
Other options from the file menu: 56
Print Test Summary 56
Print Job Sheet 56
Save and Exit 56
Check Instrument Traceability 56
ProCal Menus: Edit Menu 57
Job Information Screen 57
Instrument Information Screen 58
Control Menu 59
Auto Step (Y) (only in menu when autostep set) 59
Ignore Fail (only in menu when autostep set) 59
Show Auto Safety Prompts 59
Show Auto Connection Prompts 60
Set Current Test to Non Printing 60
Modify Print Type(s) 60
Run Calibration Tests 61
Finish Calibration (Review Results) 61
Abort Current Test 61
Abort Calibration Run 61
Help Menu 62
About 62
Settings 63
Uncertainties 63
Appearance 64
Advanced 64

PERFORMING A CALIBRATION WITH PROCAL: 65

Starting the Calibration 65
Selecting the Procedure 66
Traceable Reference Instruments & Uncertainty Statements. 67
Address of Device under Calibration 67
Before or After Adjustment 68
ProCal Measurement Tests 69
The Prompt Screen in ProCal 70

BASIC TEST TYPES IN PROCAL 71

Running a Pass /Fail Test 71
Running Meter type test: Using a calibrator 72
Uncertainty Calculation 73
Running a Measurement Test: using a DMM to take the reading 75
Running a General Test 75
Running other test types 76
Job information 77
Setting the Instrument status at the end of calibration 78
Assigning the certificate number 79

PROEDIT: MANAGING PROCEDURES 80

Overview and Introduction 80
ProEdit Shortcuts 80
ProEdit Menus 81
The File Menu 81
The Utility Menu 81
Edit Uncertainty Statements 82
Export Procedures 83
Import Procedures 83
Edit Custom Lists 83
View Edit procedure costing 83
Advanced 83
Writing and Editing procedures with ProEdit 84
Procedure Builder Wizard 84
Wizard for a Multi meter: - 85
Create new Procedure 88
The Procedure Header Page: - 88
Instrument Description 88
Manufacturer 88
Model Number 89
Version Number 89
Certificate Type 89
Date Created 89
Date last Used 90
Notes (Technical File) 90
Report File Name 90
Comment Fields 90
Print Options 90
Column Headings 90
Price / Code 90
Procedure uncertainty statements and Traceable reference instruments used. 91
Test Control 91
<Back: 92
Show All 92
Undo 92
Delete 92
Insert 92
Paste and Copy 93

Previous 93
Next/ Add New Test 93
ProEdit Test Types 93
DESCRIPTION OF TEST TYPES 94
Oscilloscope 94
Meter 94
Measurement 94
General 94
Pass / Fail 95
Certificate Format 95
Continuity / Insulation testers 95
PAT 95
RCD Testers 96
Loop Testers 96
Pressure 96
Oscilloscope Test. 96
Further options, setting and controls 96
Test Title 98
Test Value 98
Instrument Range: 98
Accuracy Boxes 98
Test Value D.P (Decimal Points) 99
Reading D.P. (Decimal Points) 99
Result Input 99
Uncertainties 99
Auto Units 99
Tab Function's in the test data screen in ProEdit 100
Tabs in the ProEdit test data screen 101
Prompt tab 101
1:Show Help Screen Before Test: 101
2:Before Test Prompt File: 101
3:Before Test Prompt Text: 101
4:Calibration Test Prompt file: 102
5: Calibration Prompt text: 102
The Instruments Tab 103
Ref Inst: 103
Uncert Temp (Uncertainty Template): 103
Uncert Line (Uncertainty Line): 103
Post-Test Commands: 103
Communicate with any instrument by directly using its address or COM port 104
Set Baud Rate, Parity etc. for serial Commutations. 104
To Communicate with an instrument in the Instrument Traceability List 105
To Commutate with the instrument under test (UUT) 105
Terminators: 105
OTHER COMMANDS: 106
Delays: 106
Reading a measurement back from a GPIB instrument 106
Formatting the string variable 'Reading' 106
Setting the Nominal or measured test values to the reading taken with FetchRead. 106
Post Test Commands 106
Example use of command Window 107
Example Reading from the UUT 107
The Advanced Tab 108
Formula Box 108
Dual Units 109
Number of turns: 110
Auto step: 110
Samples Before Auto step: 110

External UUT control Program 110
External UUT adjustment Program 111
The Print Tab 111
Always Print Test: 111
Print Only if Failed: 111
Do not Print test: 111
Print Only if Completed: 111

CERTIFICATE PRINTING USING PROCERT 112

Certificate Types & Styles 112

PROCERT MENUS 113

File menu: Search for certificates 113
Search Results 113
Print Dialogue Box 114
Options Menu 114
Set Logo Positions 114
Configure Label Printer: Configures Seiko type label printer. 115
Edit Certificate of Conformance 115
Data Paths 116
Certificates Database 116
Contacts Database 116
Digital Photos 116
Sales Database 116
Stock Database 116
PDF Scans 116
Advanced Edit 116
Certificate Number 118
Editing Signatories 118
Editing Traceable Instruments 119
Editing Drop Down Menus/ "…" 120

CONTACT US 121

Telephone 121
Fax 121
Email 121

Introduction to ProCal

General Overview

ProCal is a suite of programs designed to provide the tools to calibrate all types of instrumentation and equipment, with virtually no limitations on the types of measurements recorded. It provides the facilities to configure the basic system, to create and manage test procedures and also perform measurements or allow entry of measurements made independently which are stored within an organised database for producing printed or electronic certificates (i.e. viewable on screen).

This Suite of programs consists of the following:

ProSet

ProSet provides the facility to configure the system, including the certificate numbering, setting the reference instruments to be used by the system, laboratory Information, user, program and database paths for use on a network etc.
ProSet also provides the ability to customise user preferences, profiles can be set up for the system ,assign users login names and passwords, as well as individual user access permissions and the users level of access.

Note: If the software is installed to be used on a network, ProSet MUST be used to set the COM ports and instruments up, BEFORE ProCal is used. If the software is only being used on a single workstation then ProCal can be used without first setting up ProSet.

ProEdit

ProEdit is the procedure management program and allows the creation of a list of tests to be performed for a specific instrument. The procedures can also contain specific instructions on how to test an instrument by using picture, text or video prompts.
A procedure can provide information for remote control of instruments using either GPIB (General Purpose Instrument Bus) or RS232.

There are complete tools for editing, copying and deleting the procedures; there is also a powerful, yet easy to use Procedure Builder Wizard for the automated writing of procedures for a range of different equipment.

ProCal

ProCal is the program which ties together all aspects of the system, allowing the user to select a procedure and perform measurements with automated control of equipment where configured. This program is designed to guide the user through the series of tests, and incorporates the facilities to display help and prompts throughout the test sequence. ProCal can also be configured to produce printed certificates and calibration / test labels at the end of a test procedure.

ProCal can also allow integration with ProCal-Track, which incorporates job management from goods-inwards, to paperwork printing and final despatch.

ProCert

Provides the facility to print out certificates, which have been recorded and stored using ProCal. These certificates are easily searchable for by their certificate number, customer name and more.

Crystal Reports [Optional]

The Crystal Reports software is used to edit the templates for reports and certificates. This software is not needed to use the templates provided within the ProCal software.

Setting up a System

1: Install the programs:
Note that when you install the software, additional files containing procedures, reports, digital pictures, uncertainty templates and an example database containing a few instruments are also installed. Even paths and directories etc are set to the local drive allowing the program to be used directly for either evaluation or training without any further set up besides selecting a calibrator in ProSet.

2: Configure the system using the ProCal Wizard (plus advanced options using ProSet)

3: Connect up calibrator & reference instruments:
Use either the USB interface (or RS232 to USB converters)
or the GPIB (IEEE488) interfaces.

4: Run ProCal to calibrate an instrument.

Installing the programs

INSTALLATION OVERVIEW

The CD provided has both ProCal and ProCal-Track, which have separate installation programs. Please follow the instructions below to install the programs and example files :

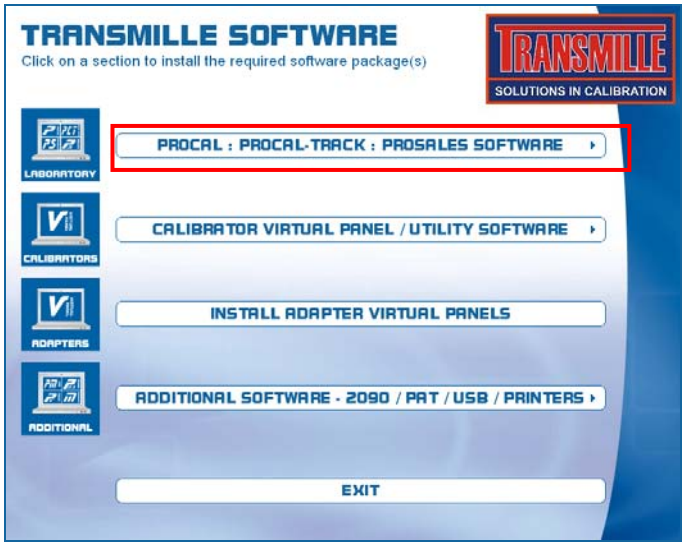
This disk contains the full program versions together with many support files, uncertainty templates and tables for ISO17025, procedures, reports/certificates files in Crystal Reports, etc. plus an example instrument database with 5 instruments, which can be used as examples to evaluate the software.

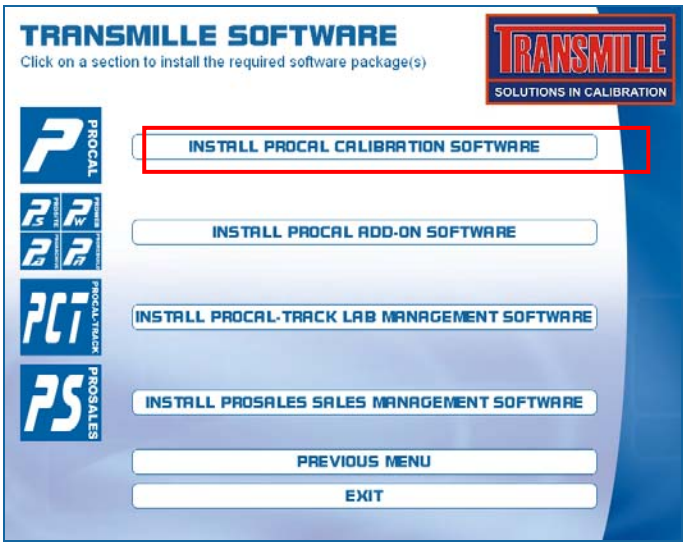
Note to use GPIB control of instruments a NI GPIB(IEEE488) interface will be needed.
To control a Transmille calibrator, use the USB Interface (or USB to RS232 converter if a Serial device).
To evaluate without a system calibrator or DMM select **DEMO** for instruments in ProSet.

The software will work fully for 60 days after installation. After this time a USB 'dongle' will be required to run ProCal and ProCal-Track (separate licence required). The dongle is supplied by Transmille when the software is purchased.

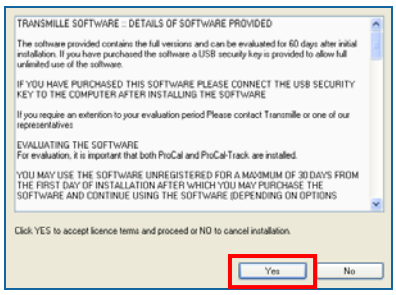
INSTALL PROCAL FROM THE CD

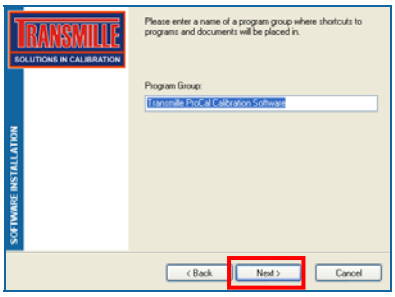
Put the Transmille CD in the drive, and allow to auto run

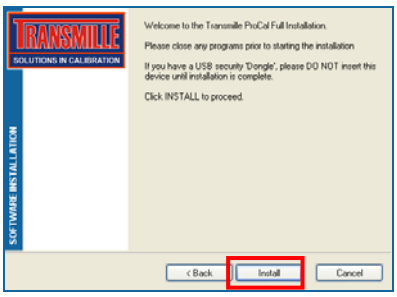




Step through the licence information and program group setting, then click **Install** to proceed :







PROCAL SETUP WIZARD : INTRODUCTION

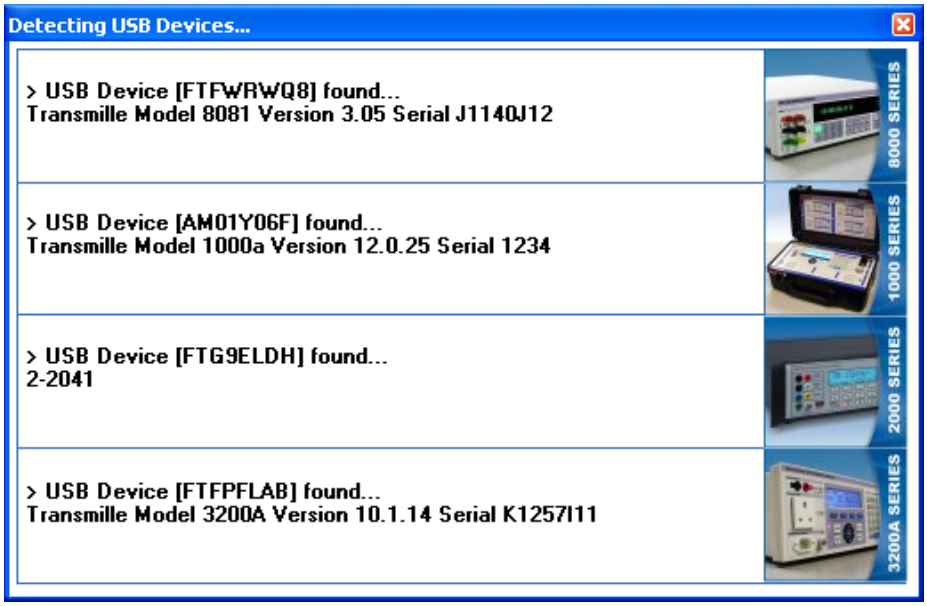
Following the ProCal installation, the computer may need to be restarted.

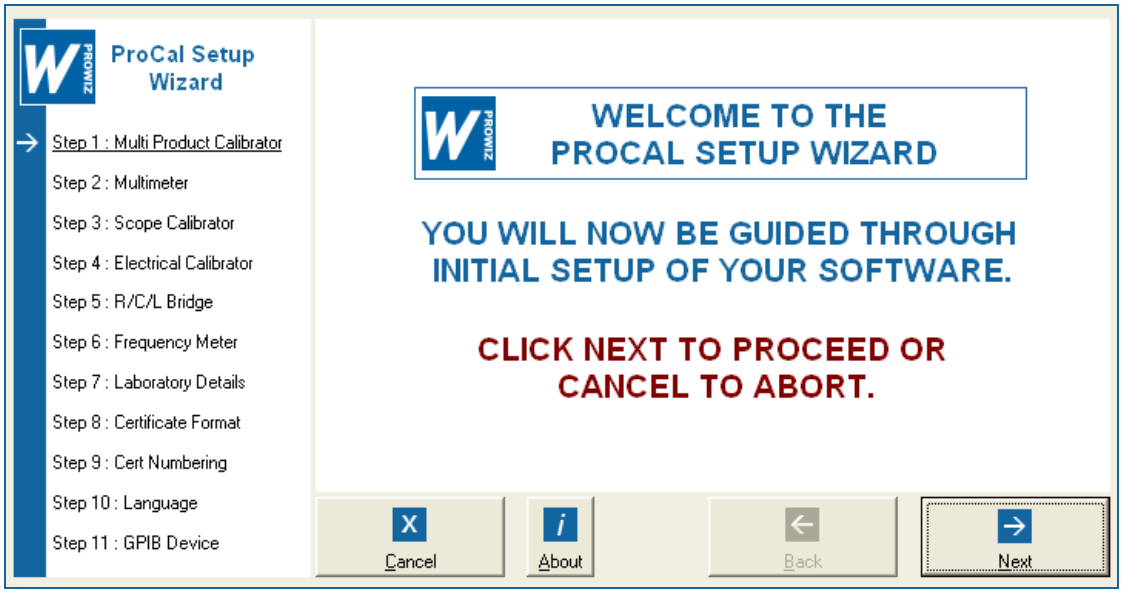
After the restart (if needed) the ProCal installer will automatically start the ProCal Setup Wizard.

The ProCal Setup Wizard will guide the user through setting up the software for the first time.
It is also useful to run if any changes to setting are required at any time after the initial installation.

INSTRUMENT DETECTION

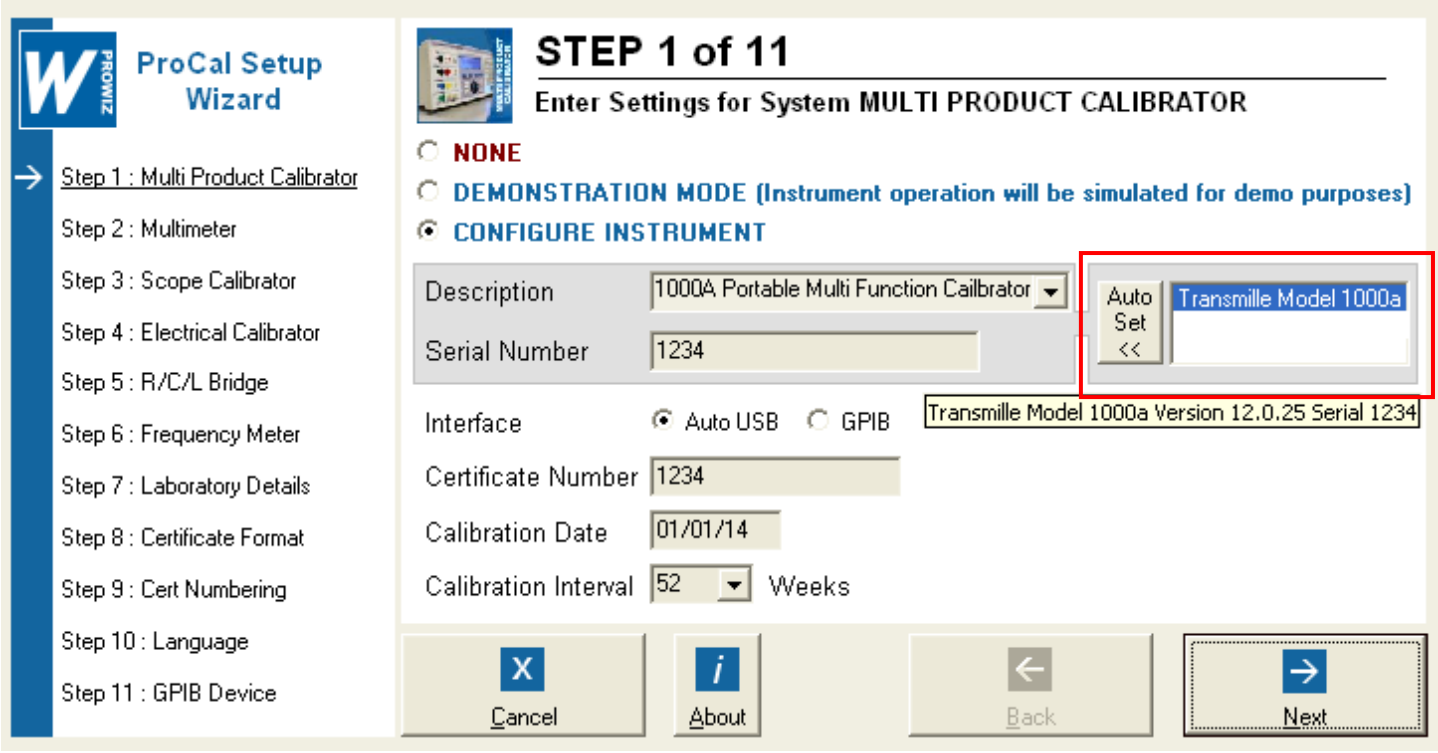
If any Transmille USB instruments or USB to RS232 adapters (FTDI type) are connected to the PC, the Wizard will detect and store the device information, ready for selection whilst configuring the system reference instruments.





The Wizard provides step-by-step assistance in configuring reference instruments, laboratory settings and other important settings in one easy to use program. If at any time information is not correctly entered, the Wizard will assist with help messages to indicate which information is not correct, ensuring the program is correctly set up ready for use on completion of the Wizard 11-step process.

PROCAL SETUP WIZARD : STEP 1



Step 1 - Set up the system multi product calibrator.

NONE
If you do not require a multi product calibrator to be configured in your software click NONE

DEMONSTRATION MODE
If the software is being used without any instruments connected, the DEMONSTRATION MODE setting can be selected to simulate the operation of the software without controlling a calibrator.

SETTING UP A CALIBRATOR

Description and Serial Number
Select the instrument from the list displayed on the right hand side of the screen and click **AUTO SET**,
or select the instrument description from the list and enter instrument serial number.

Interface
Set **Auto USB** if the instrument is USB controlled or
GPIB (enter address) if the instrument is GPIB controlled.

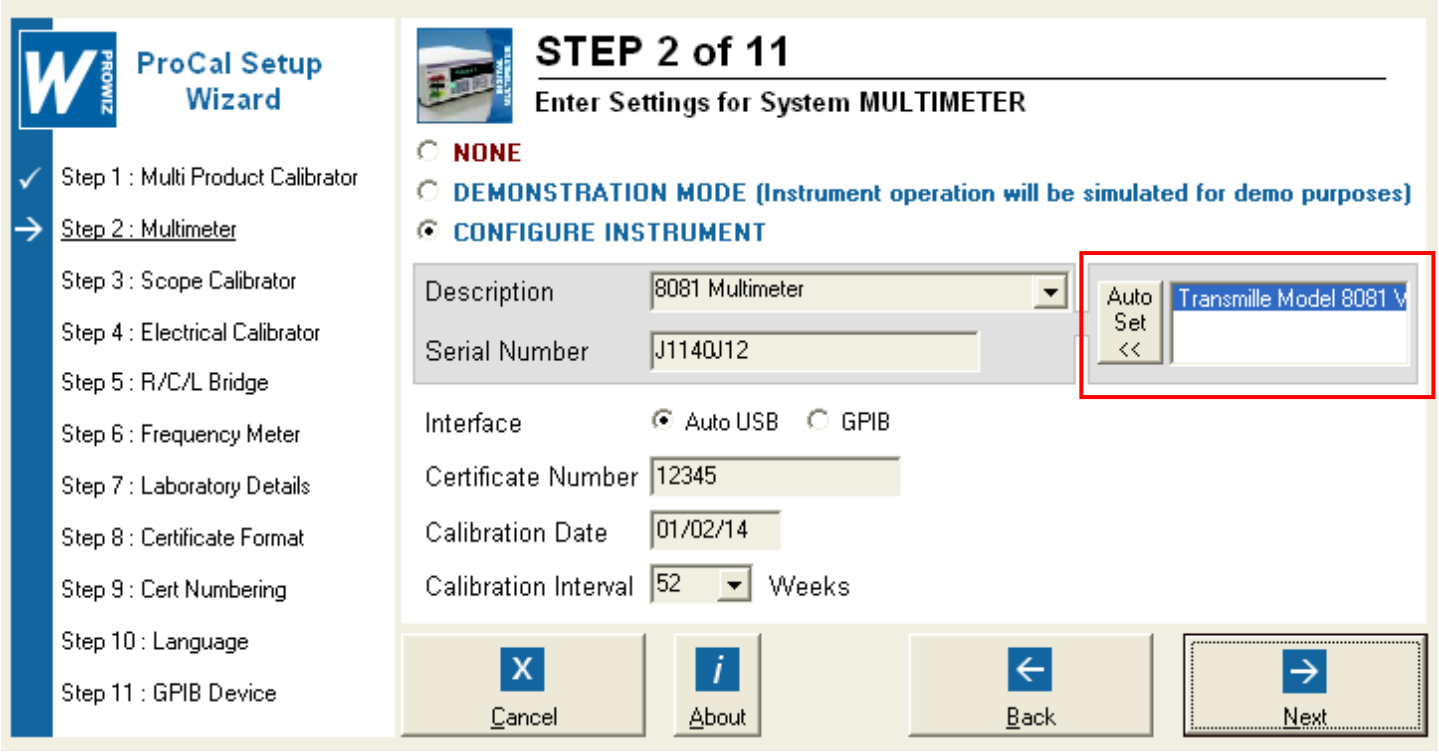
Certificate Number
Enter the certificate number of the instrument

Calibration Date
Enter the calibration date of the instrument in the format dd/mm/yy

Calibration Interval
Enter the calibration interval of the instrument in weeks

Click next to proceed to the next step – the Wizard will check the information entered and advise if any information is missing or incorrect.

PROCAL SETUP WIZARD : STEP 2



Step 2 - Set up the system multimeter.

NONE
If you do not require a multimeter to be configured in your software click NONE

DEMONSTRATION MODE
If the software is being used without any instruments connected, the DEMONSTRATION MODE setting can be selected to simulate the operation of the software without controlling a multimeter.

SETTING UP AN INSTRUMENT

Description and Serial Number
Select the instrument from the list displayed on the right hand side of the screen and click **AUTO SET**,
or select the instrument description from the list and enter instrument serial number.

Interface
Set **Auto USB** if the instrument is USB controlled or
GPIB (enter address) if the instrument is GPIB controlled.

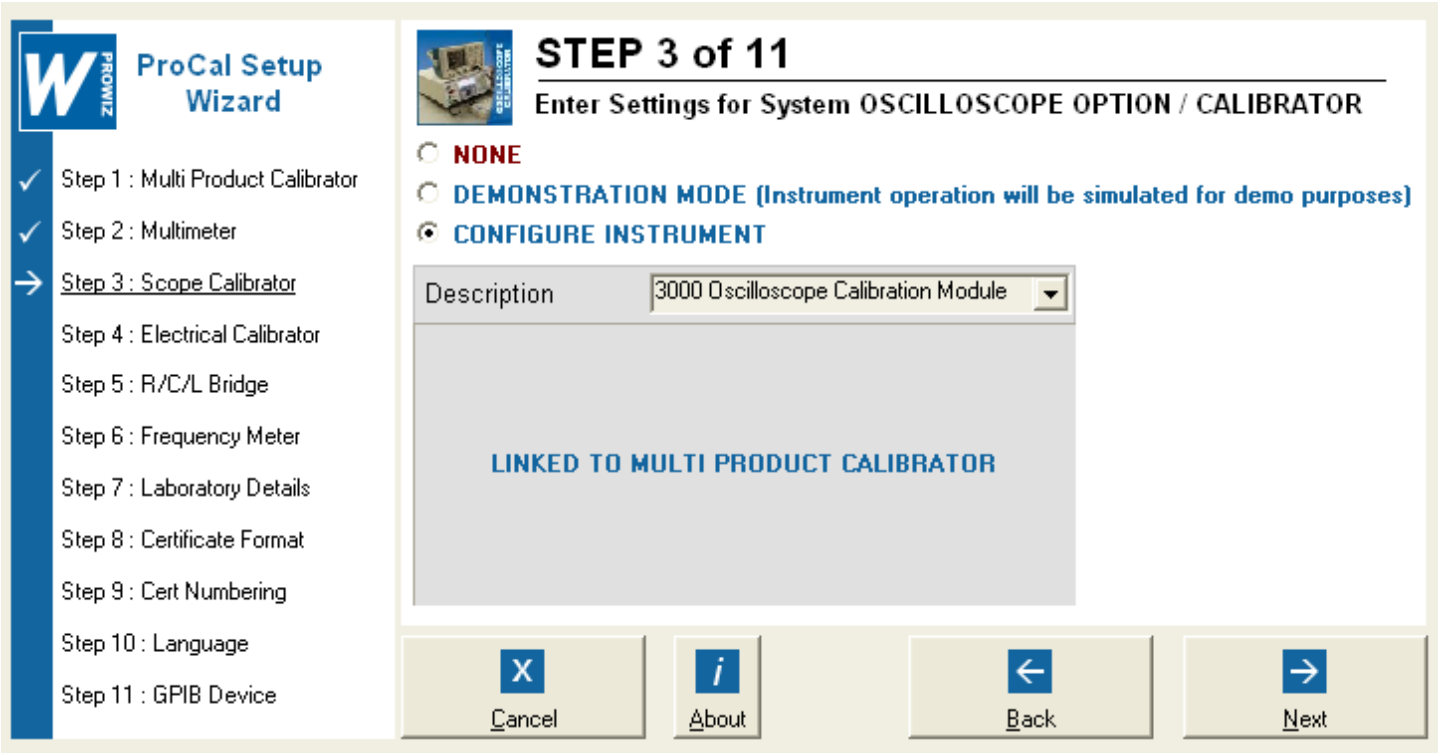
Certificate Number
Enter the certificate number of the instrument

Calibration Date
Enter the calibration date of the instrument in the format dd/mm/yy

Calibration Interval
Enter the calibration interval of the instrument in weeks

Click next to proceed to the next step – the Wizard will check the information entered and advise if any information is missing or incorrect.

PROCAL SETUP WIZARD : STEP 3



Step 3 - Set up the system oscilloscope option / calibrator.

NONE
If you do not require a oscilloscope option / calibrator to be configured in your software click NONE

DEMONSTRATION MODE
If the software is being used without any instruments connected, the DEMONSTRATION MODE setting can be selected to simulate the operation of the software without controlling a calibrator.

SETTING UP AN INSTRUMENT

Description and Serial Number
Select the instrument description from the list and enter instrument serial number.
NOTE : To configure the Oscilloscope option for Transmille calibrators, simply select 3000 Oscilloscope Calibration Module and the traceable information will be linked the calibrator as set in Step 1 automatically.

Interface
Set **Auto USB** if the instrument is USB controlled or
GPIB (enter address) if the instrument is GPIB controlled.

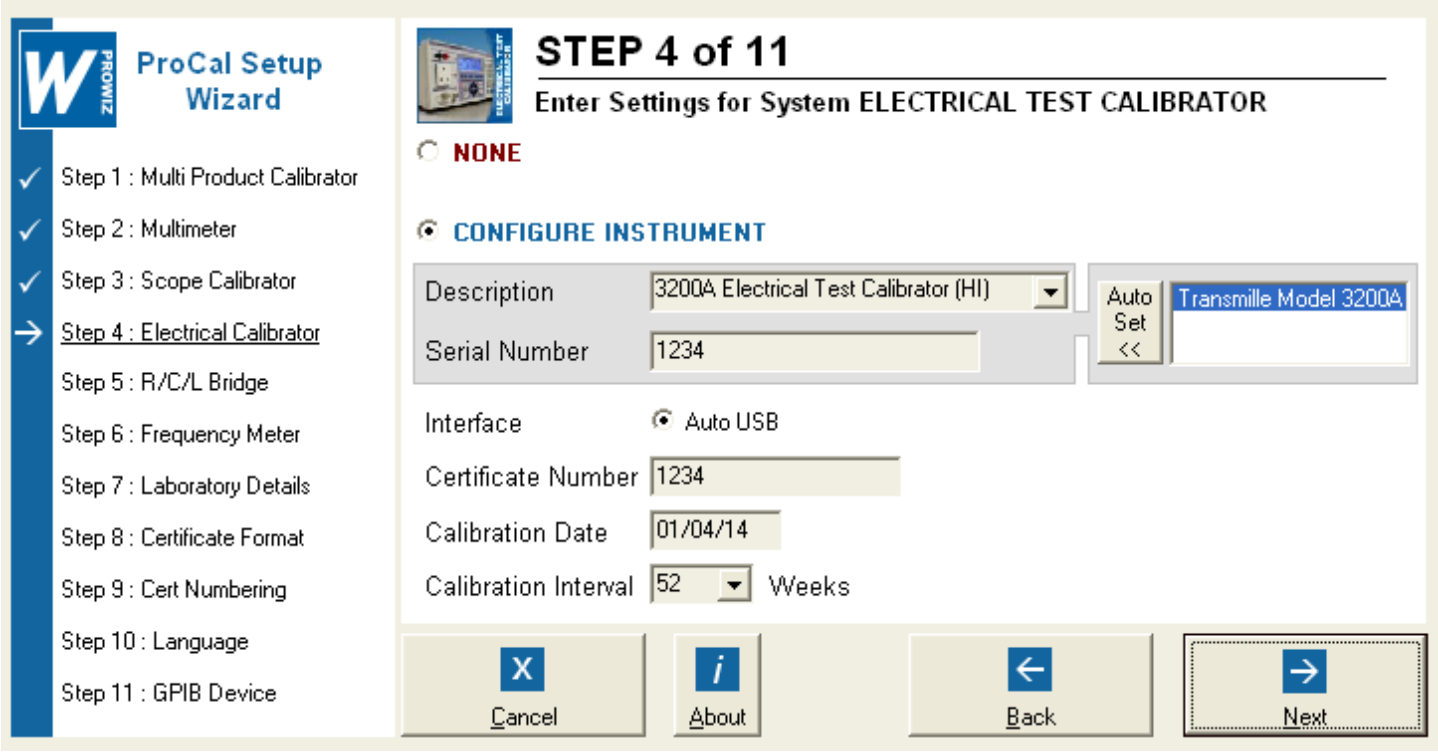
Certificate Number
Enter the certificate number of the instrument

Calibration Date
Enter the calibration date of the instrument in the format dd/mm/yy

Calibration Interval
Enter the calibration interval of the instrument in weeks

Click next to proceed to the next step – the Wizard will check the information entered and advise if any information is missing or incorrect.

PROCAL SETUP WIZARD : STEP 4



Step 4 - Set up the system electrical test calibrator.

NONE
If you do not require a electrical test calibrator to be configured in your software click NONE

DEMONSTRATION MODE
If the software is being used without any instruments connected, the DEMONSTRATION MODE setting can be selected to simulate the operation of the software without controlling a calibrator.

SETTING UP AN INSTRUMENT

Description and Serial Number
Select the instrument from the list displayed on the right hand side of the screen and click **AUTO SET**,
or select the instrument description from the list and enter instrument serial number.

Interface
Set **Auto USB** if the instrument is USB controlled

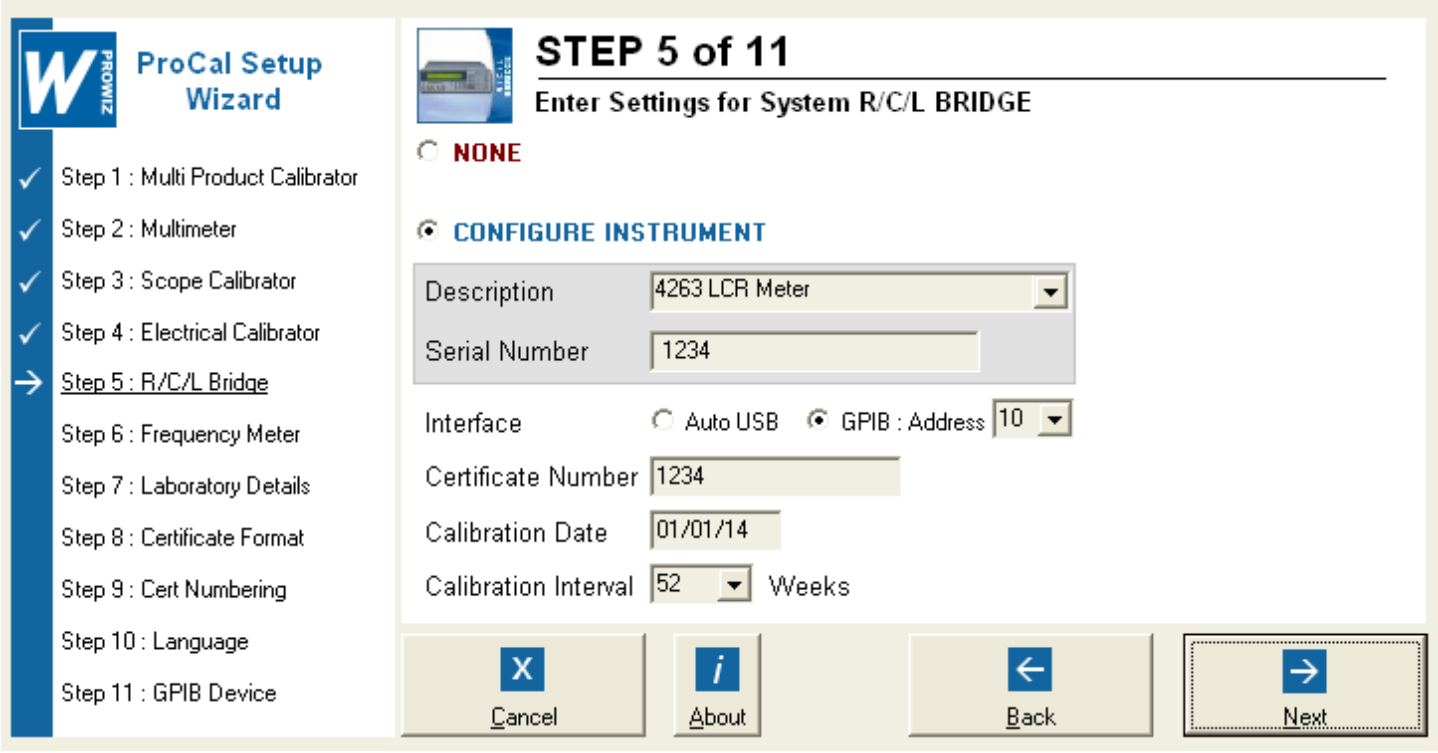
Certificate Number
Enter the certificate number of the instrument

Calibration Date
Enter the calibration date of the instrument in the format dd/mm/yy

Calibration Interval
Enter the calibration interval of the instrument in weeks

Click next to proceed to the next step – the Wizard will check the information entered and advise if any information is missing or incorrect.

PROCAL SETUP WIZARD : STEP 5



Step 5 - Set up the system R/C/L Bridge.

NONE
If you do not require an R/C/L Bridge to be configured in your software click NONE

SETTING UP AN INSTRUMENT

Description and Serial Number
Select the instrument description from the list and enter instrument serial number.

Interface
Set **Auto USB** if the instrument is USB controlled

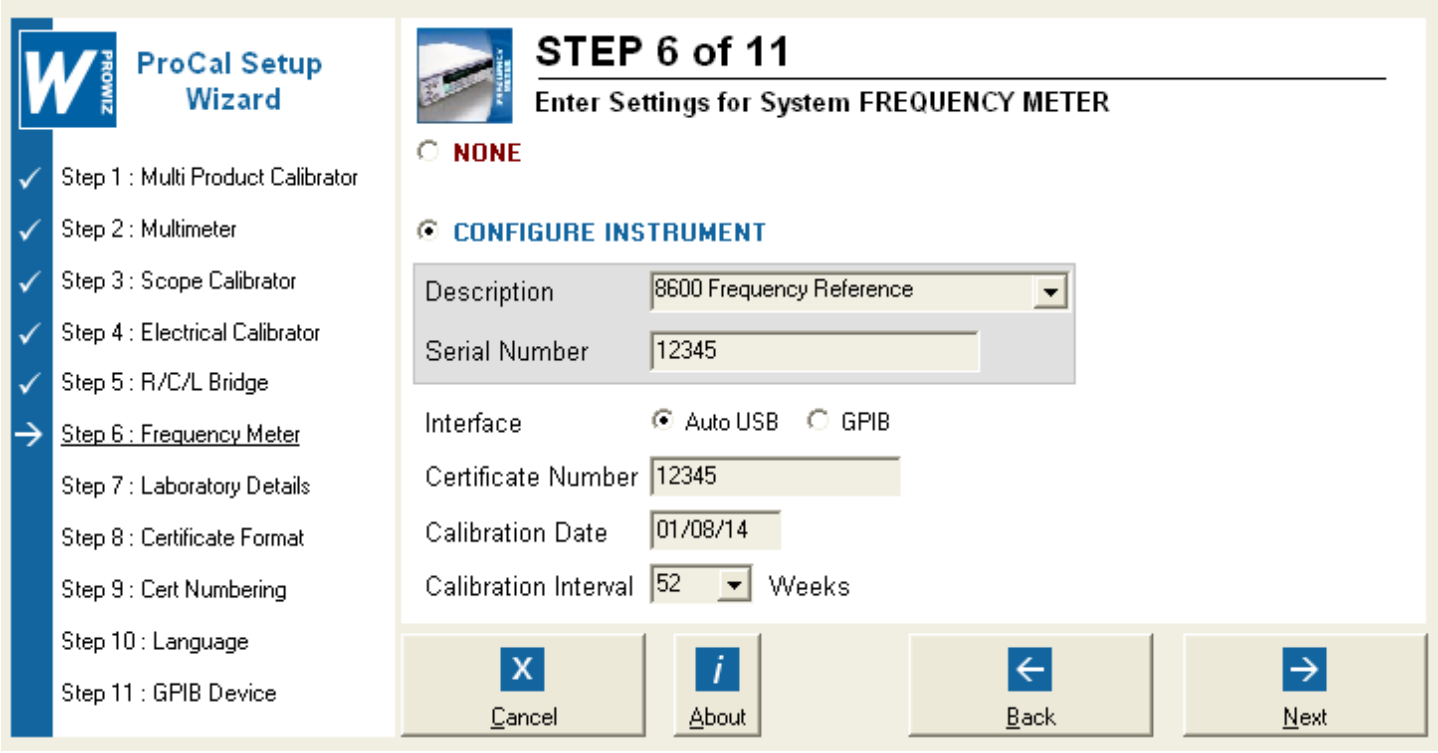
Certificate Number
Enter the certificate number of the instrument

Calibration Date
Enter the calibration date of the instrument in the format dd/mm/yy

Calibration Interval
Enter the calibration interval of the instrument in weeks

Click next to proceed to the next step – the Wizard will check the information entered and advise if any information is missing or incorrect.

PROCAL SETUP WIZARD : STEP 6



Step 6 - Set up the system frequency meter.

NONE
If you do not require a frequency meter to be configured in your software click NONE

SETTING UP AN INSTRUMENT

Description and Serial Number
Select the instrument description from the list and enter instrument serial number.

Interface
Set **Auto USB** if the instrument is USB controlled

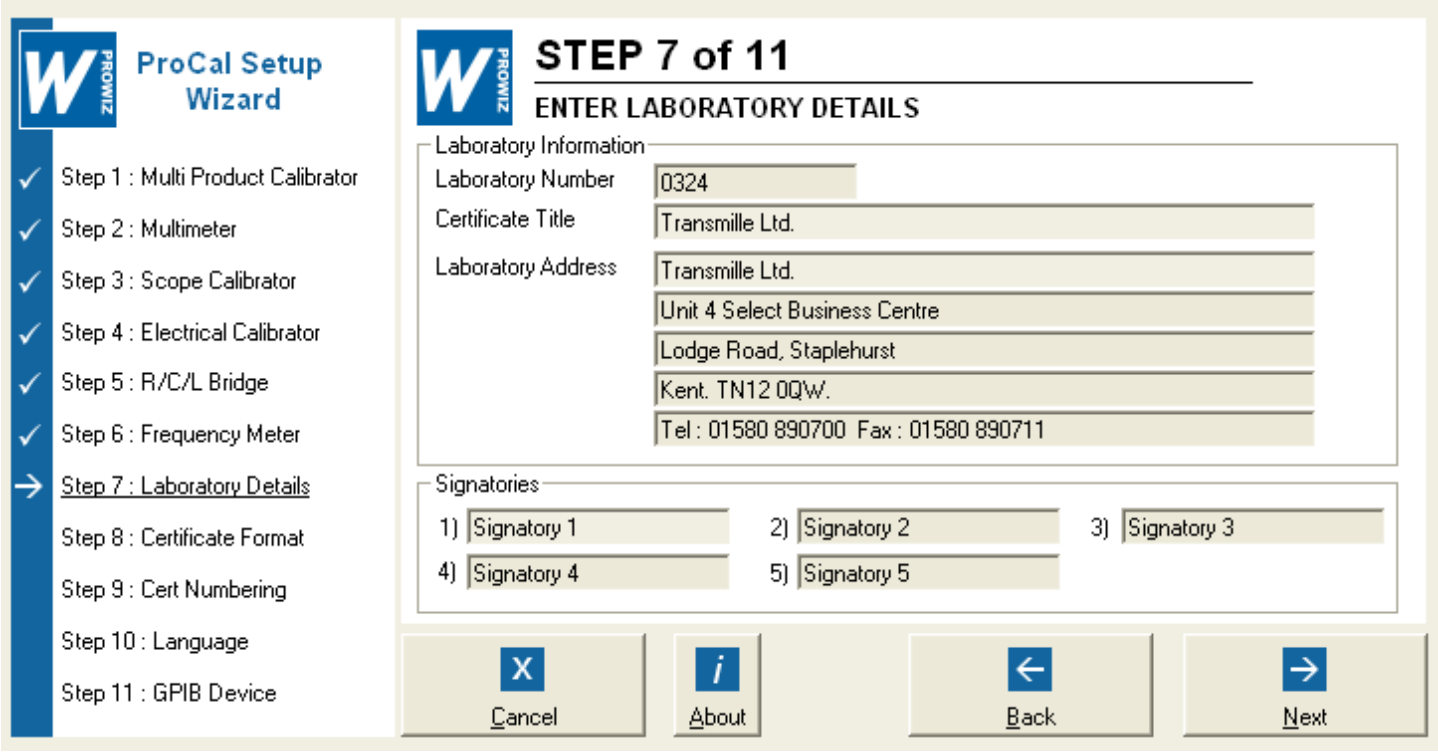
Certificate Number
Enter the certificate number of the instrument

Calibration Date
Enter the calibration date of the instrument in the format dd/mm/yy

Calibration Interval
Enter the calibration interval of the instrument in weeks

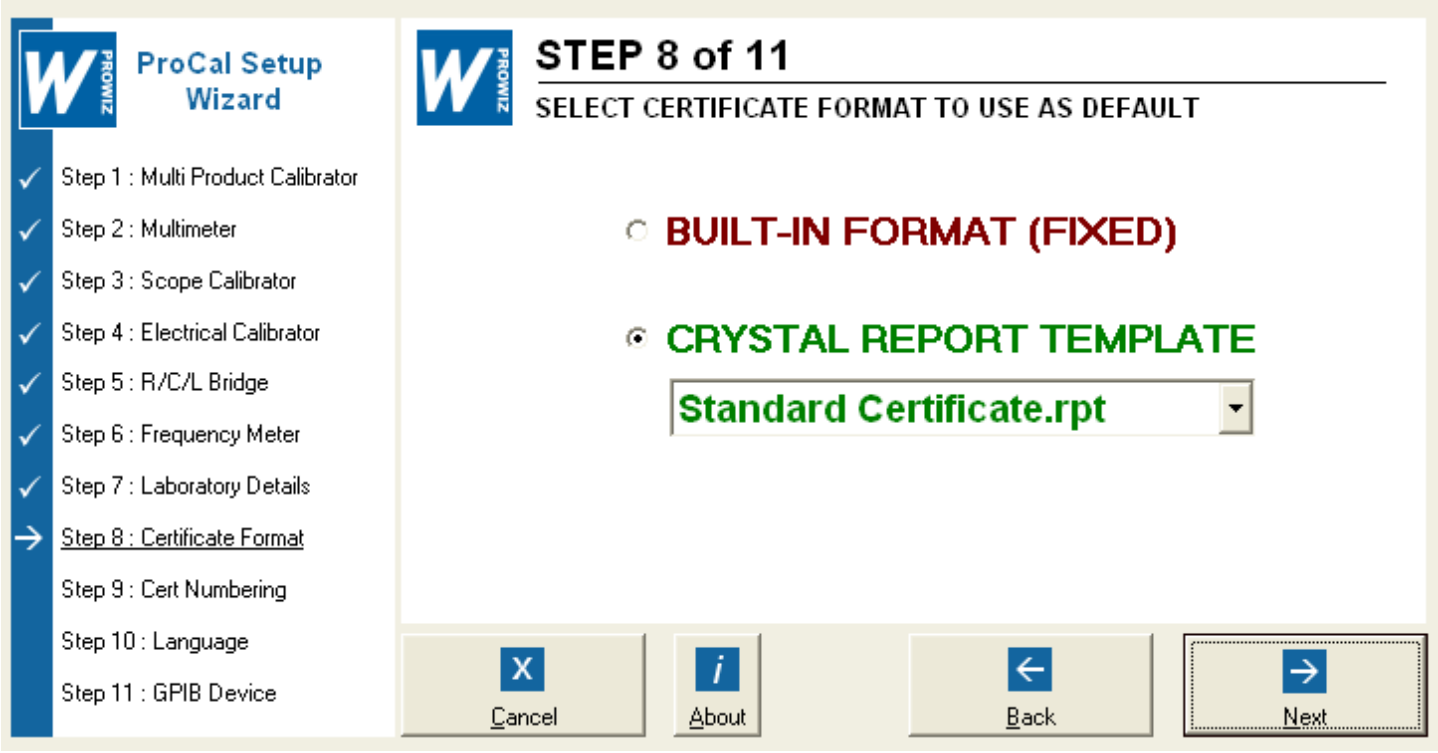
Click next to proceed to the next step – the Wizard will check the information entered and advise if any information is missing or incorrect.

PROCAL SETUP WIZARD : STEP 7



Step 7 – Set laboratory details and up to five signatories.

PROCAL SETUP WIZARD : STEP 8



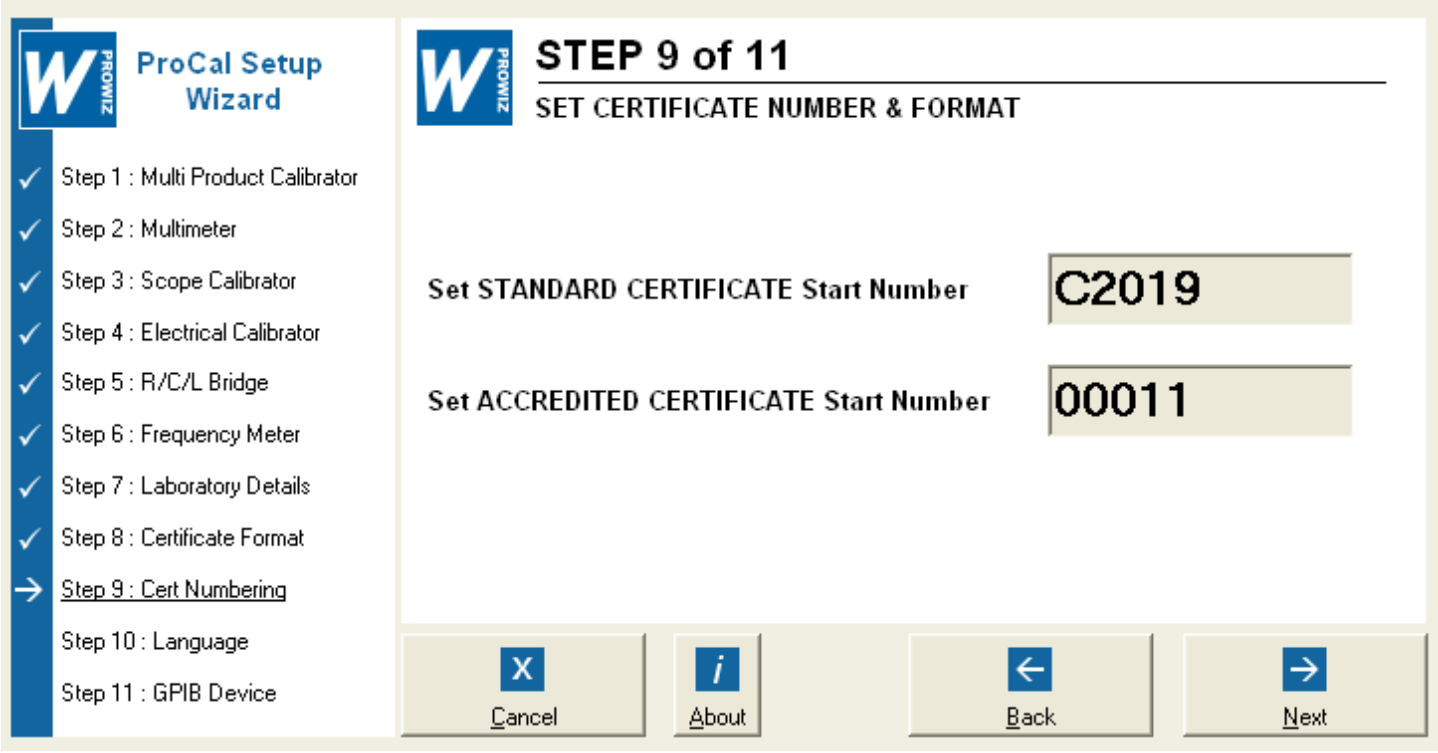
Step 8 - Set the certificate format.

BUILT-IN FORMAT (FIXED)
This is a fixed format, designed to conform to M3003 / ISO17025 guidelines and uses the laboratory address / signatory information as set up in the Wizard (Step 7) and will print a custom company logo (set up via ProCert)

CRYSTAL REPORT TEMPLATE
ProCal installs a default certificate layout which can be edited using Crystal Reports editor software*.
The crystal report template uses the laboratory address / signatory information as set up in the Wizard (Step 7)

*The full version of Crystal Reports is available separately (additional cost).

PROCAL SETUP WIZARD : STEP 9



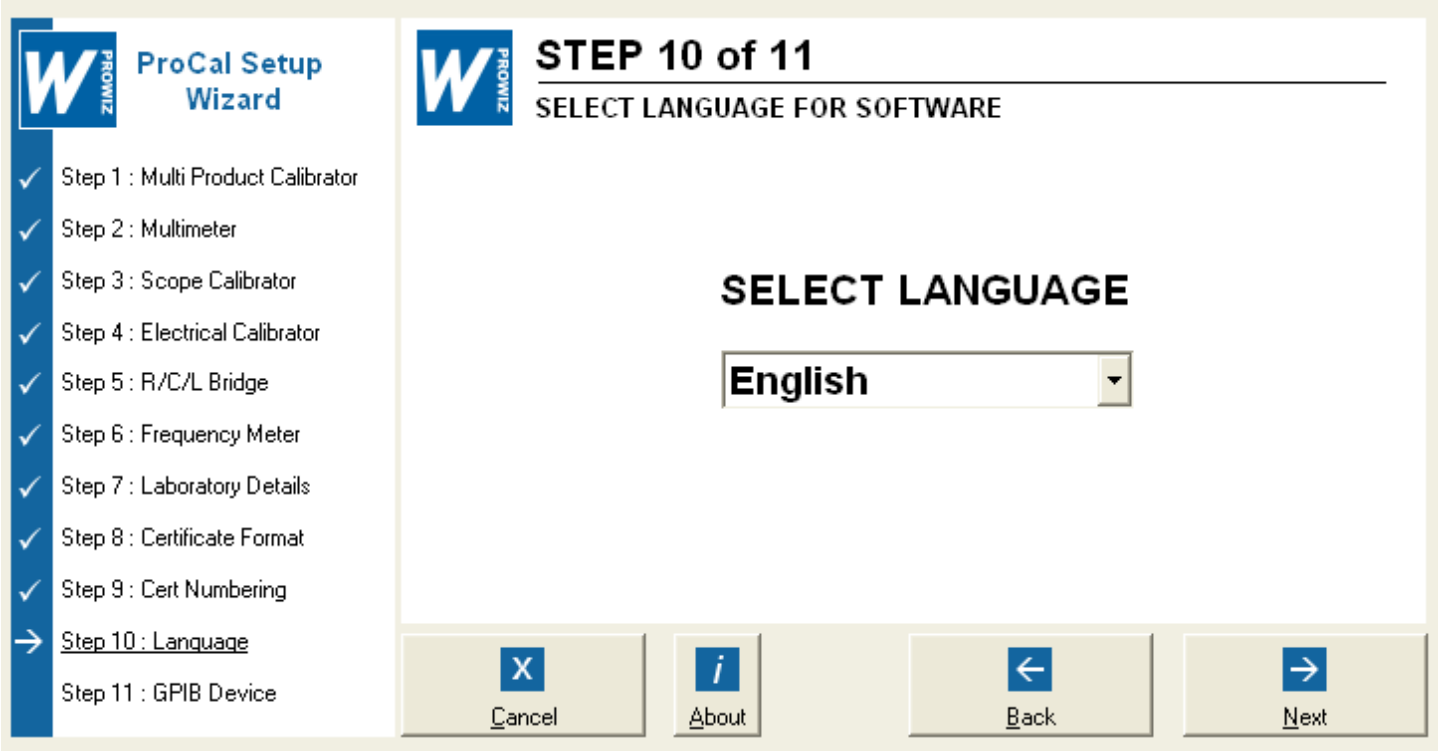
Step 9 - Set start numbers for both STANDARD and ACCREDITED calibrations.

ProCal will increase by 1 the numbers set per calibration type, preserving any prefix or suffix alphabetical characters.

Examples: **00011**
00012
00013

C2019
C2020
C2021

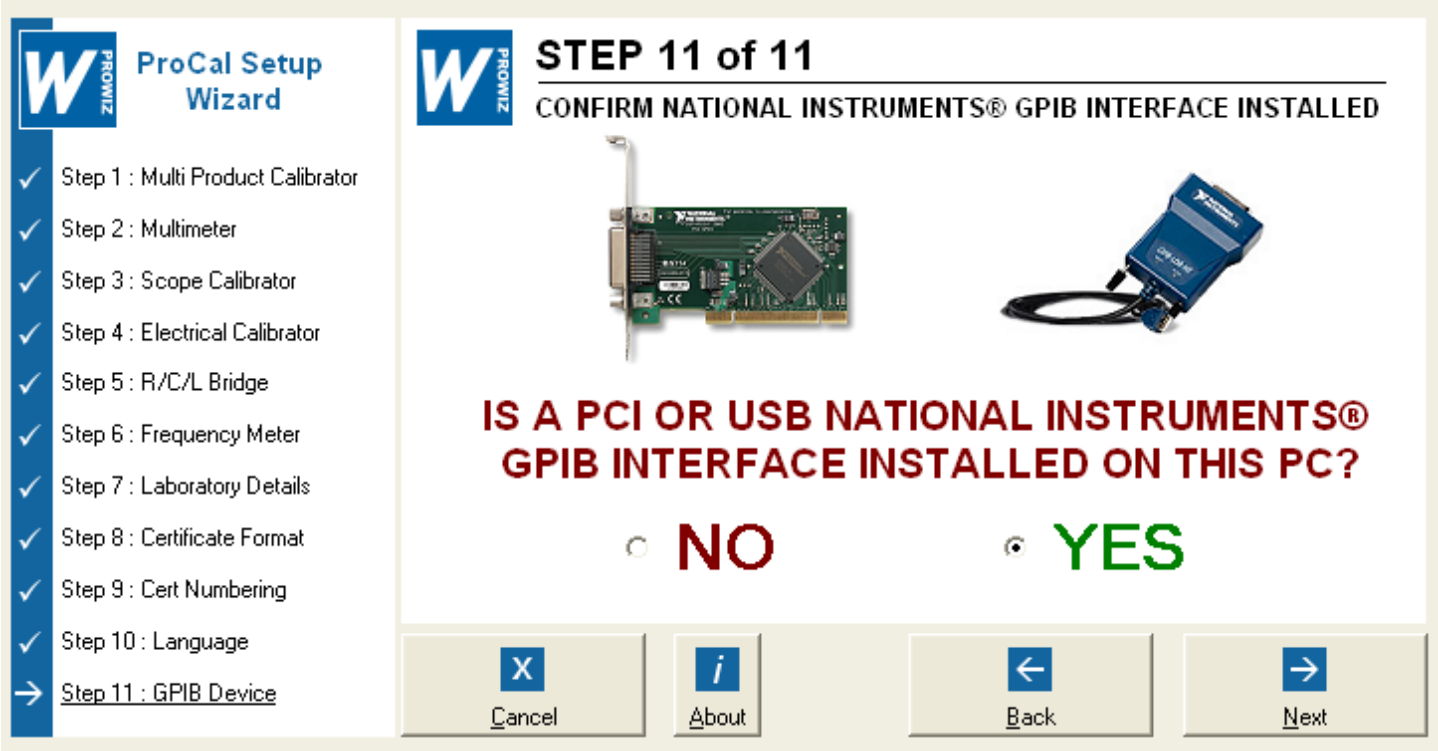
PROCAL SETUP WIZARD : STEP 10



Step 10 - Set language from the list of available translations.

Simply select the language from the list displayed.

PROCAL SETUP WIZARD : STEP 11

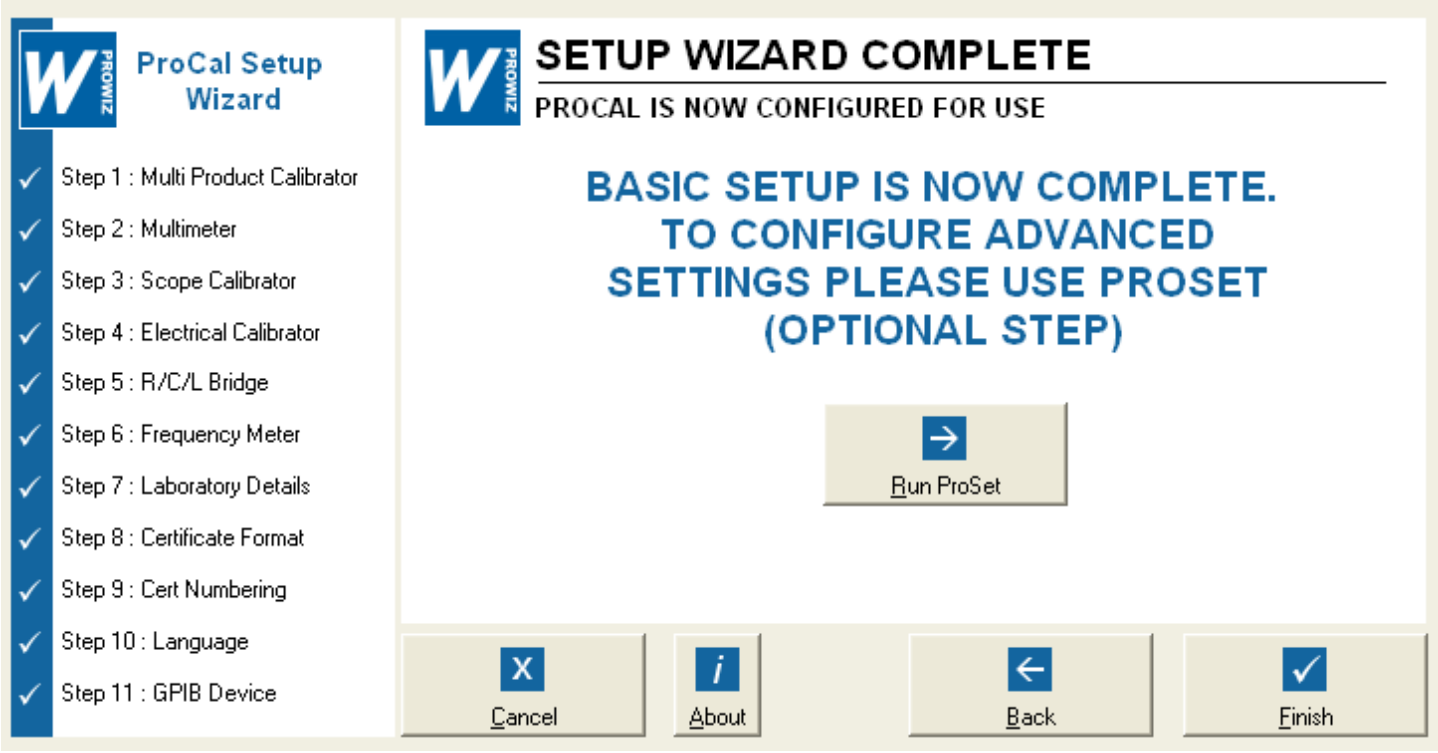


Step 11 - Set ProCal GPIB support for National Instruments Internal (PC Card) and External (USB) devices.

Simply select YES to activate support.

Note : The latest National Instrument GPIB drivers need to be installed (available from **www.ni.com**)

PROCAL SETUP WIZARD : COMPLETION



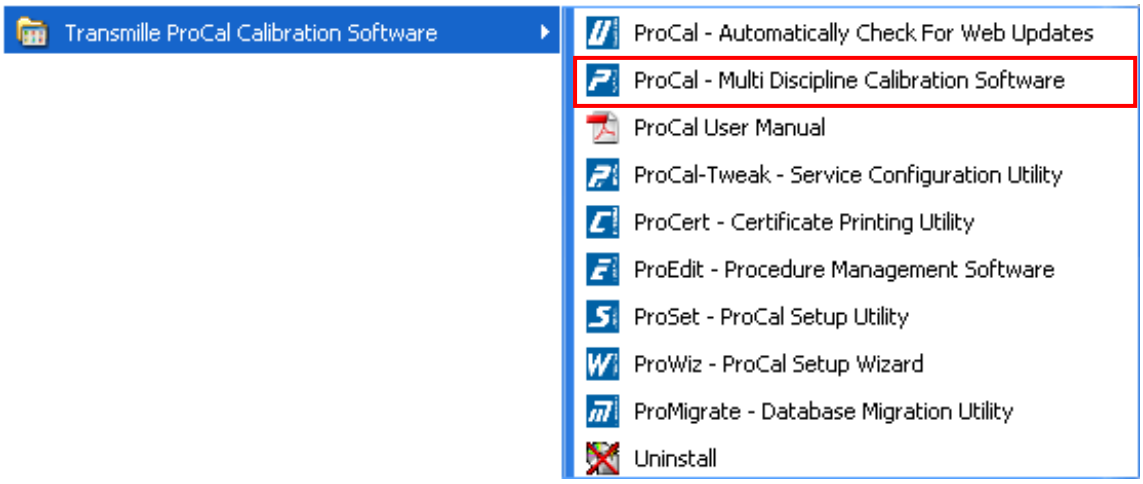
Once all Wizard steps are complete, ProCal is ready for use.

The Wizard will allow the user to run ProSet to configure advanced settings if required, but this is optional and is not required to start using the software.

Note : At any time a previous step can be returned to during the Wizard setup process by clicking the BACK button. The Wizard can also be re-run at any time to change settings as required.

RUNNING THE PROGRAMS

To start ProCal or ProCal-Track, click the Windows Start button, then click Programs. Next select the Transmille Software menu and choose a program to run.

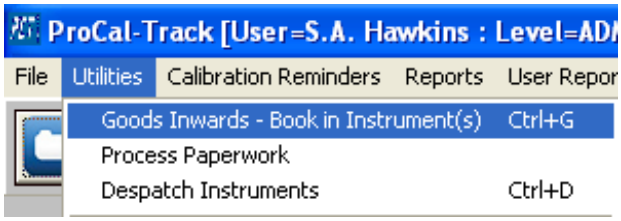


From here select the program required. Note there can be more than one program open at a time – for example ProCal *and* ProEdit.

BOOK IN AN INSTRUMENT WITH PROCAL TRACK.

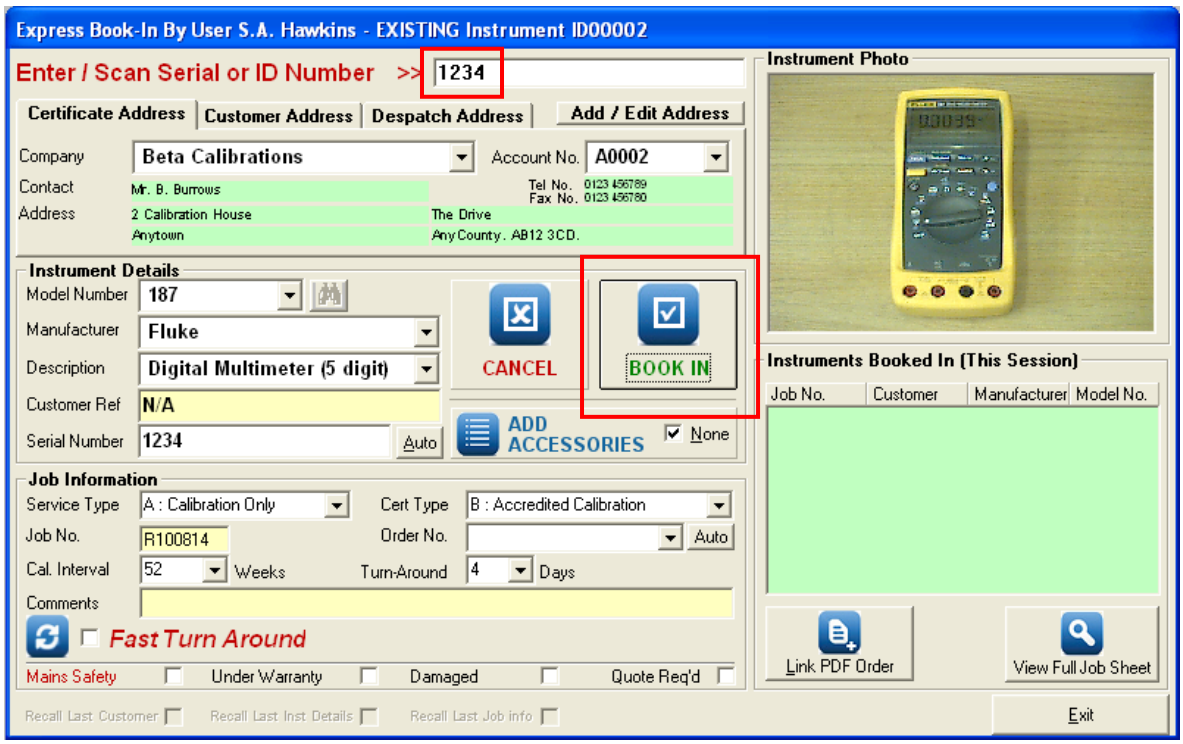
Step 1 Start ProCal Track.

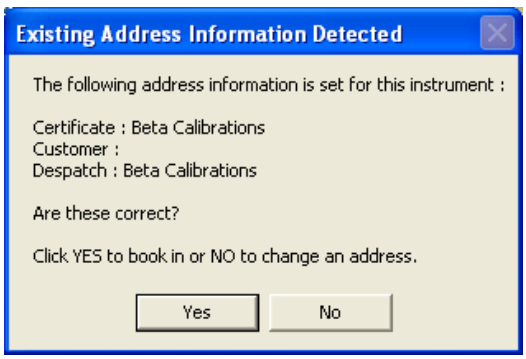
Step 2 Select Utilities → Goods Inwards - Book in Instrument(s)



Type '1234' in the serial number box at the top of the screen then press enter.
(This instrument is pre-installed in the database and known to ProCal).

Step 3 Click the **BOOK IN** button - ProCal Track can print either a Job Label or Job Sheet to identify the instrument.



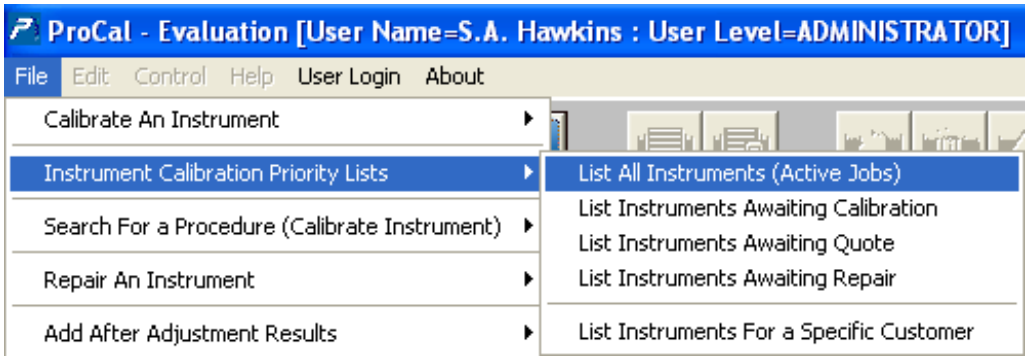


Click YES to confirm the address settings are correct
(this added step allows the user to double check the address settings before committing to book in the instrument)

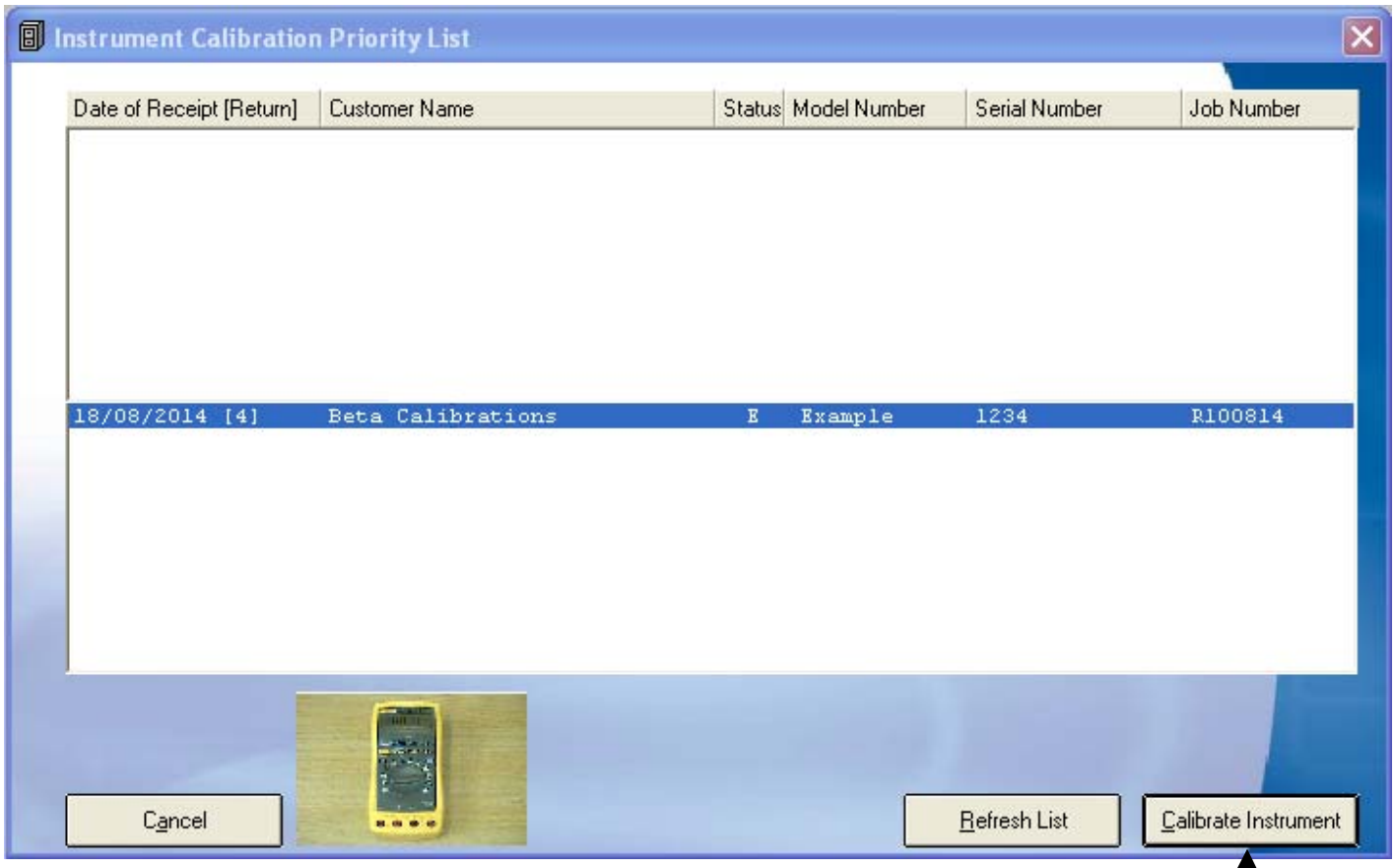
CALIBRATE AN INSTRUMENT

STEP 1 Start ProCal

STEP 2 Select File → Instrument Calibration Priority Lists → List all Instruments (Active Jobs)

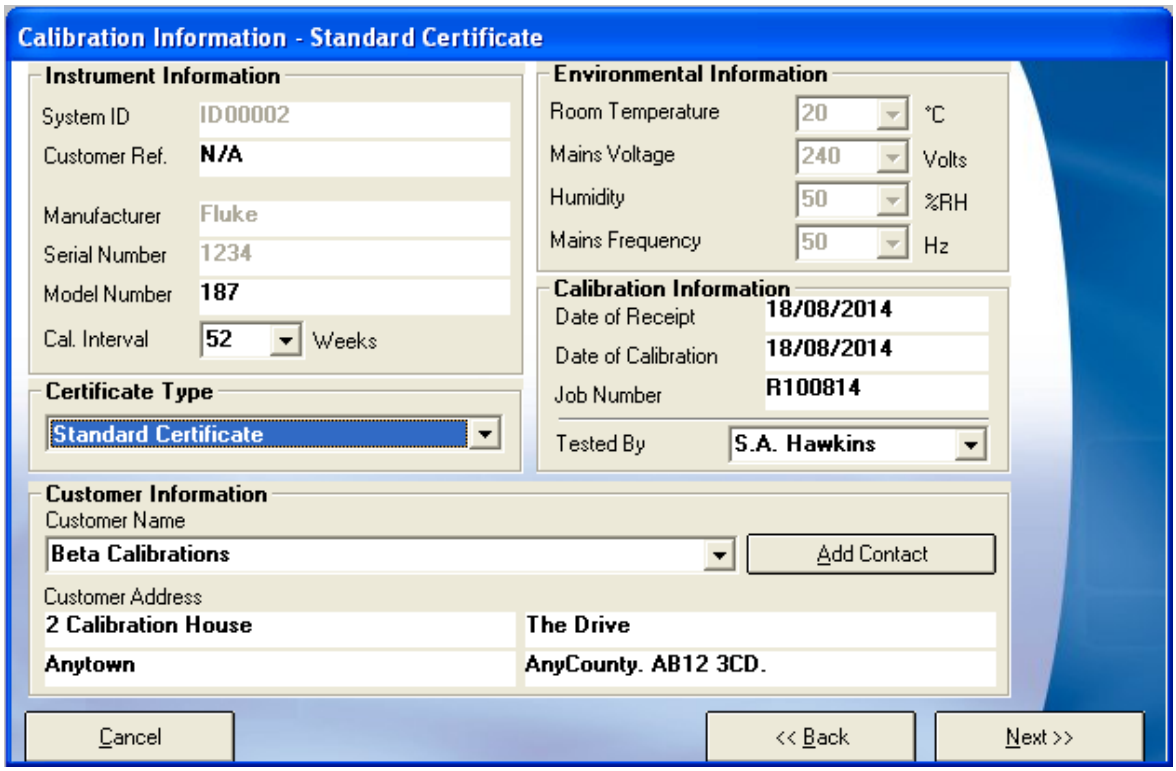


STEP 3 Click on the Fluke 187 (serial number 1234) booked in previously and click **Next >>**

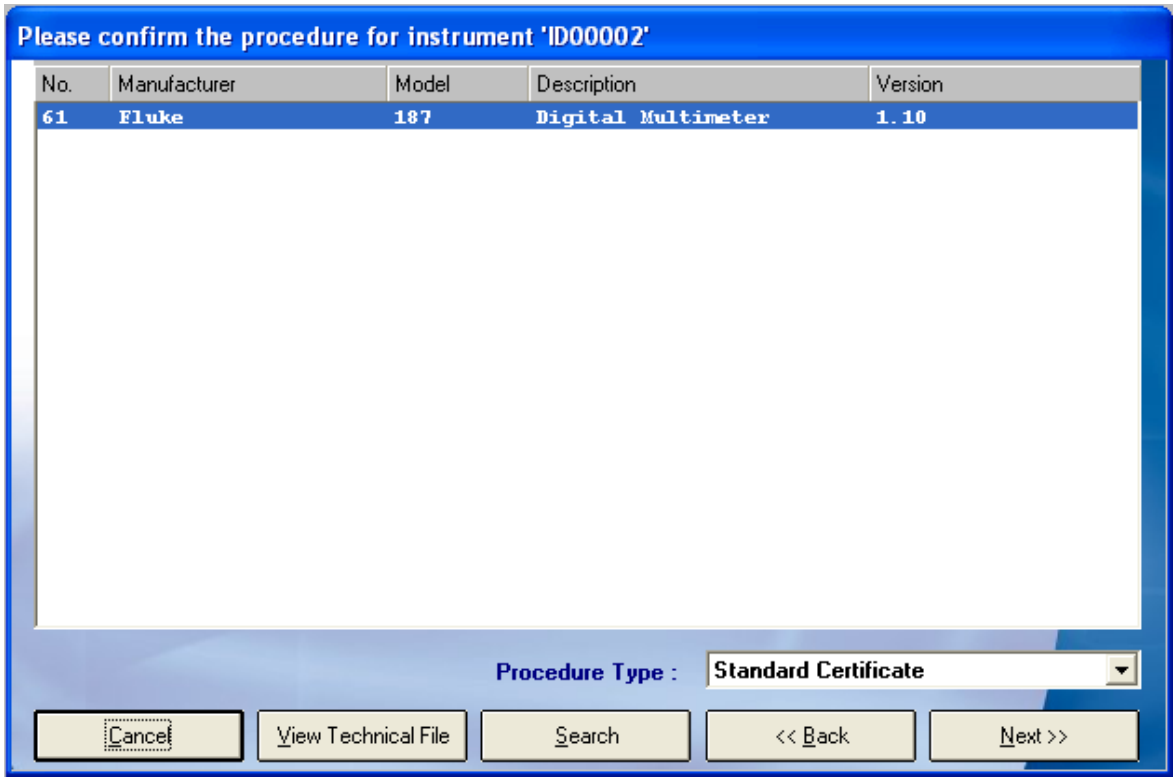


Click 'Calibrate Instrument'

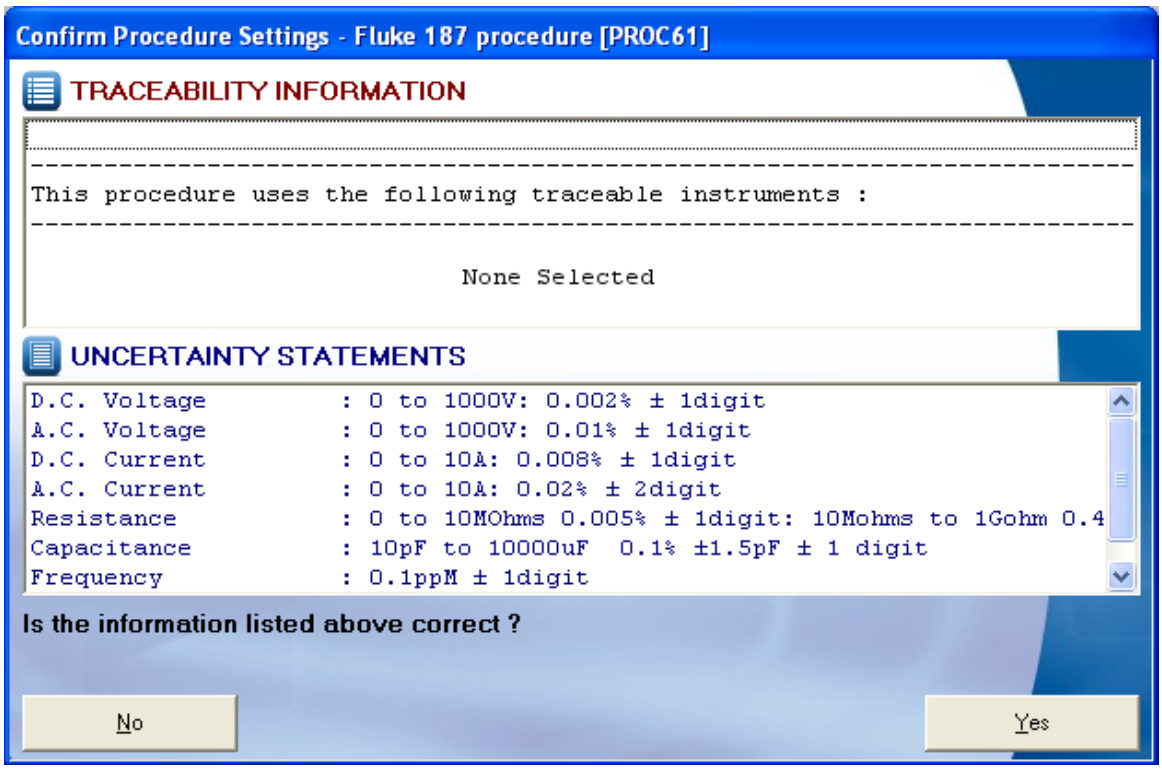
Step 4 The calibration information screen is now displayed, Drop down the 'Tested By' box and select name or type in manually then click Next >>



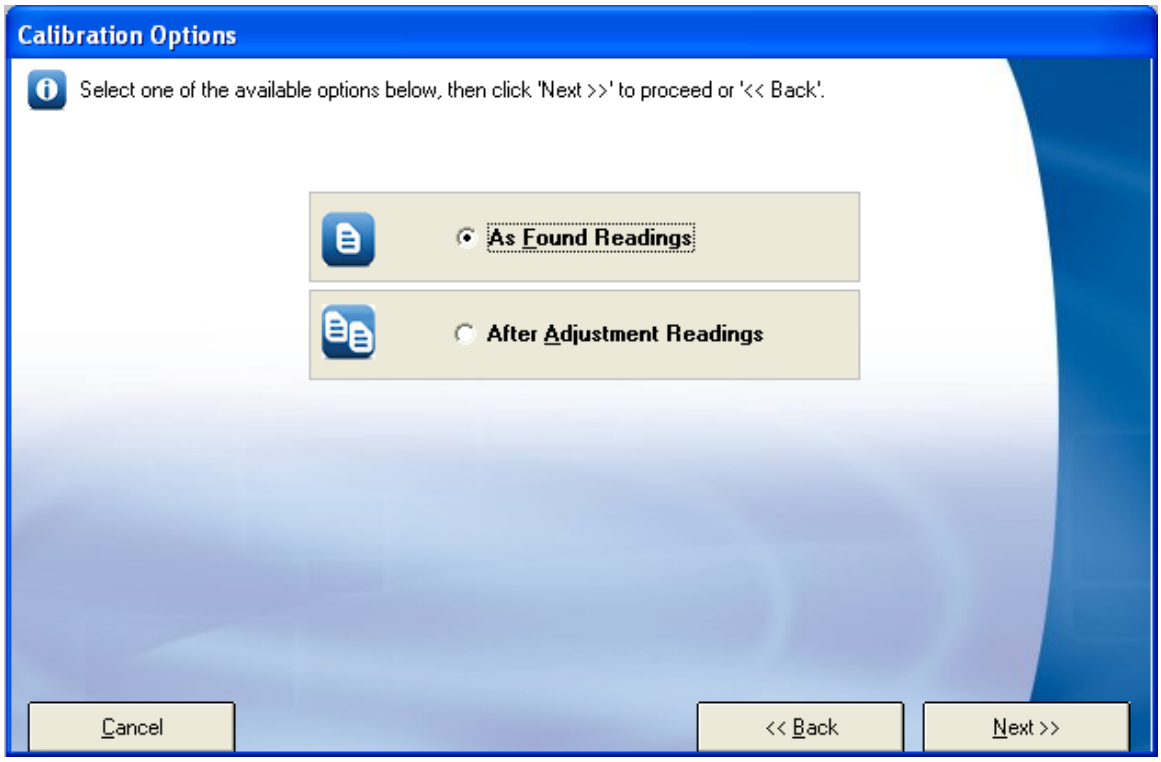
STEP 5 The list of procedures matching the model number will be displayed. Select procedure then click **Next >>**.



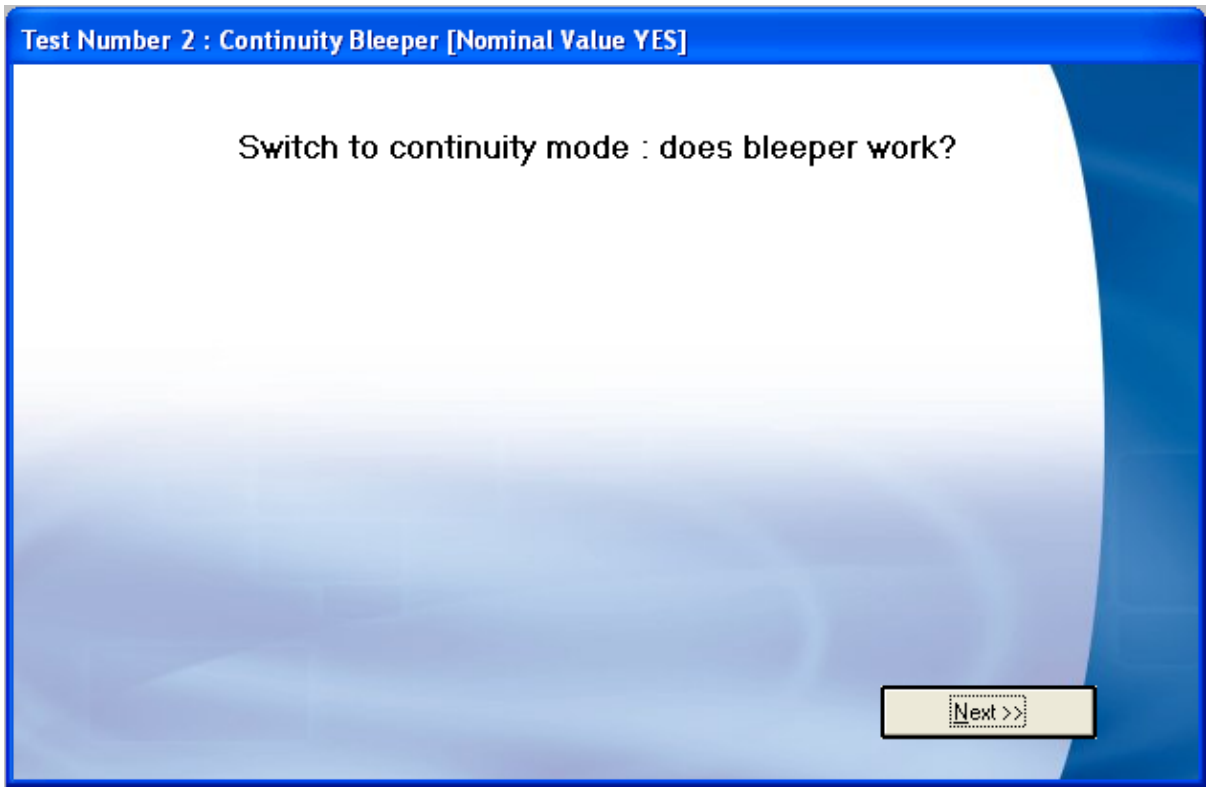
STEP 6 The next window lists reference instruments and uncertainty information.
(Note : In DEMO mode, Traceability Information will indicate **None Selected**)
Click **Yes** to proceed.



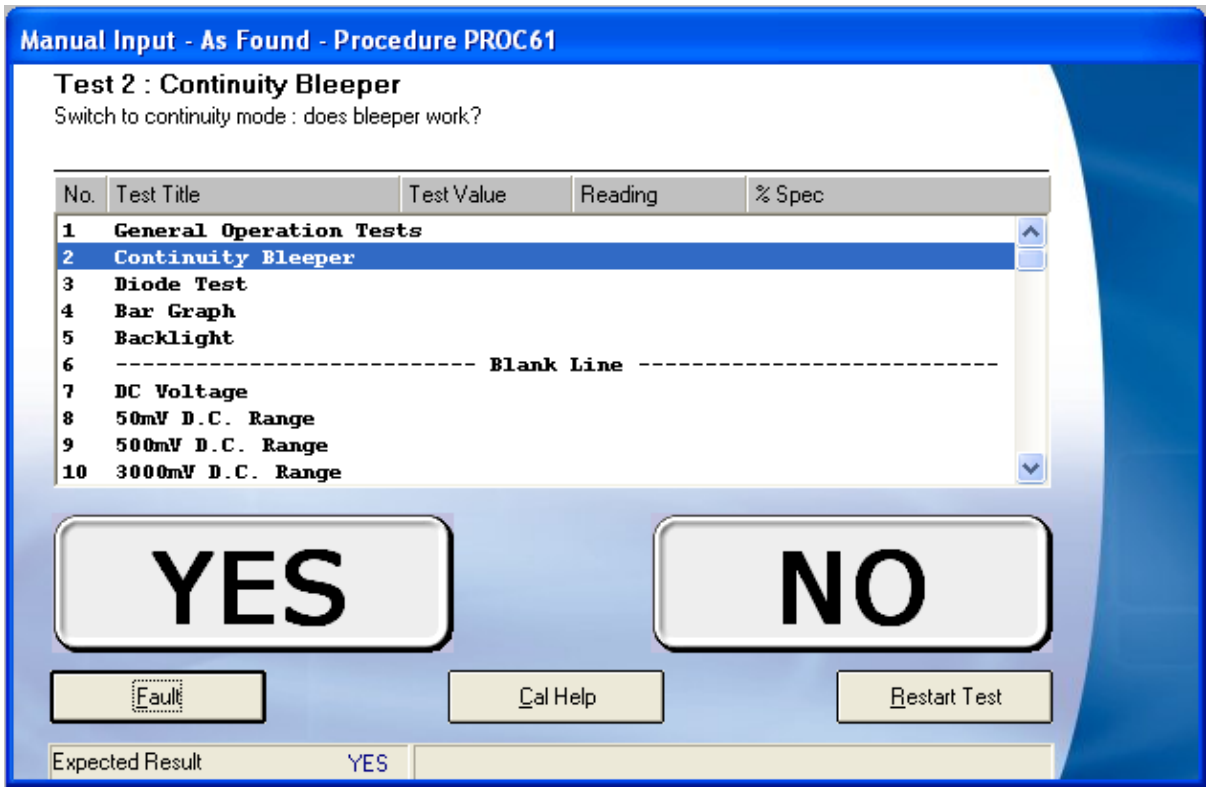
STEP 7 The next window asks if As Found or After Adjustment Readings
- click As Found Readings, then click Next >>.



STEP 8 : Prompt for first test is displayed - Click Next >.

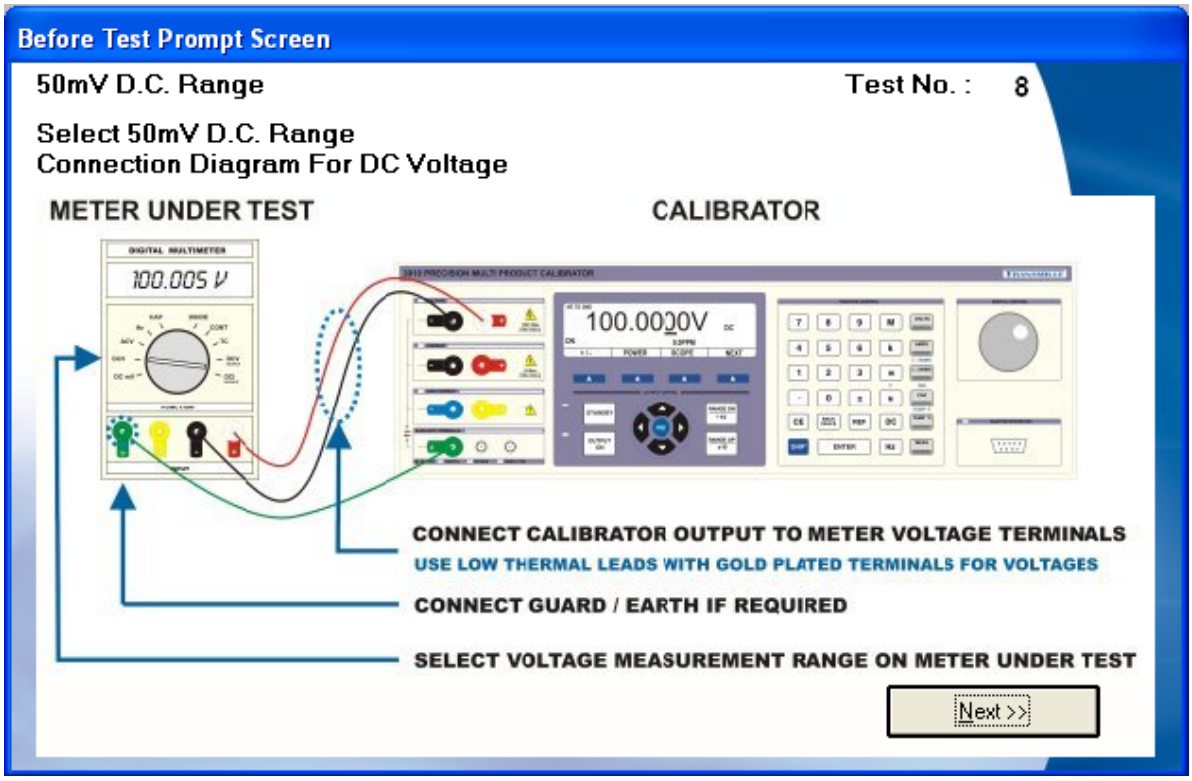


STEP 9 Tests 2, 3, 4 and 5 are YES / NO type tests – select **YES** for each of these tests.

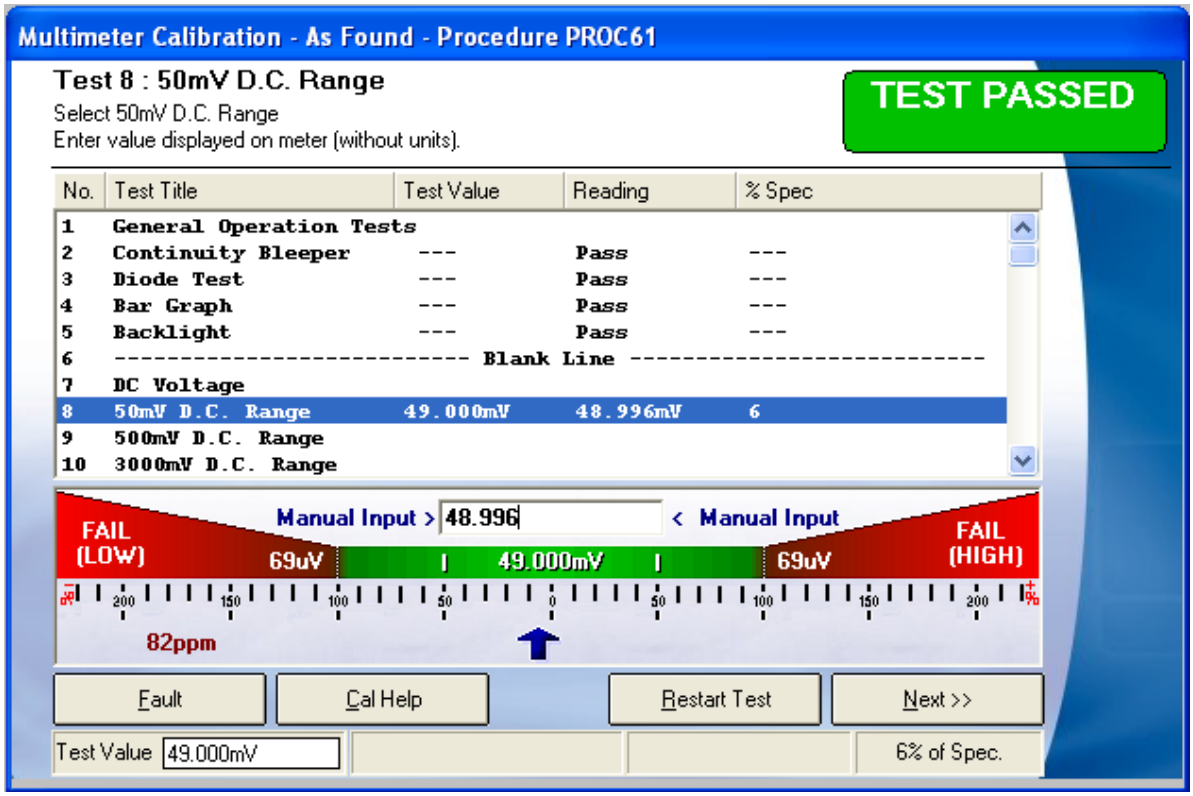


STEP 10 Test 8 displays a picture prompt, demonstrating the graphical capabilities of ProCal in aiding the user.

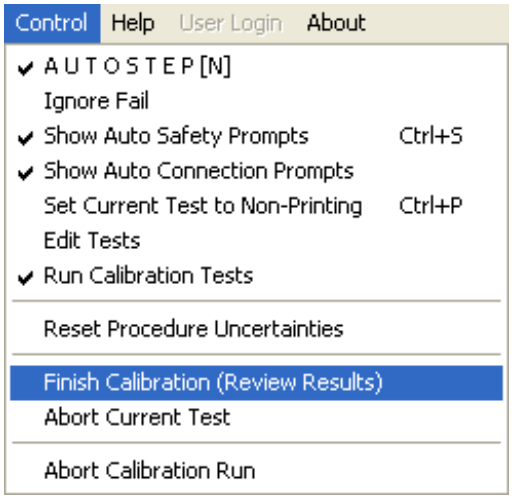
Click **Next >>** to continue.



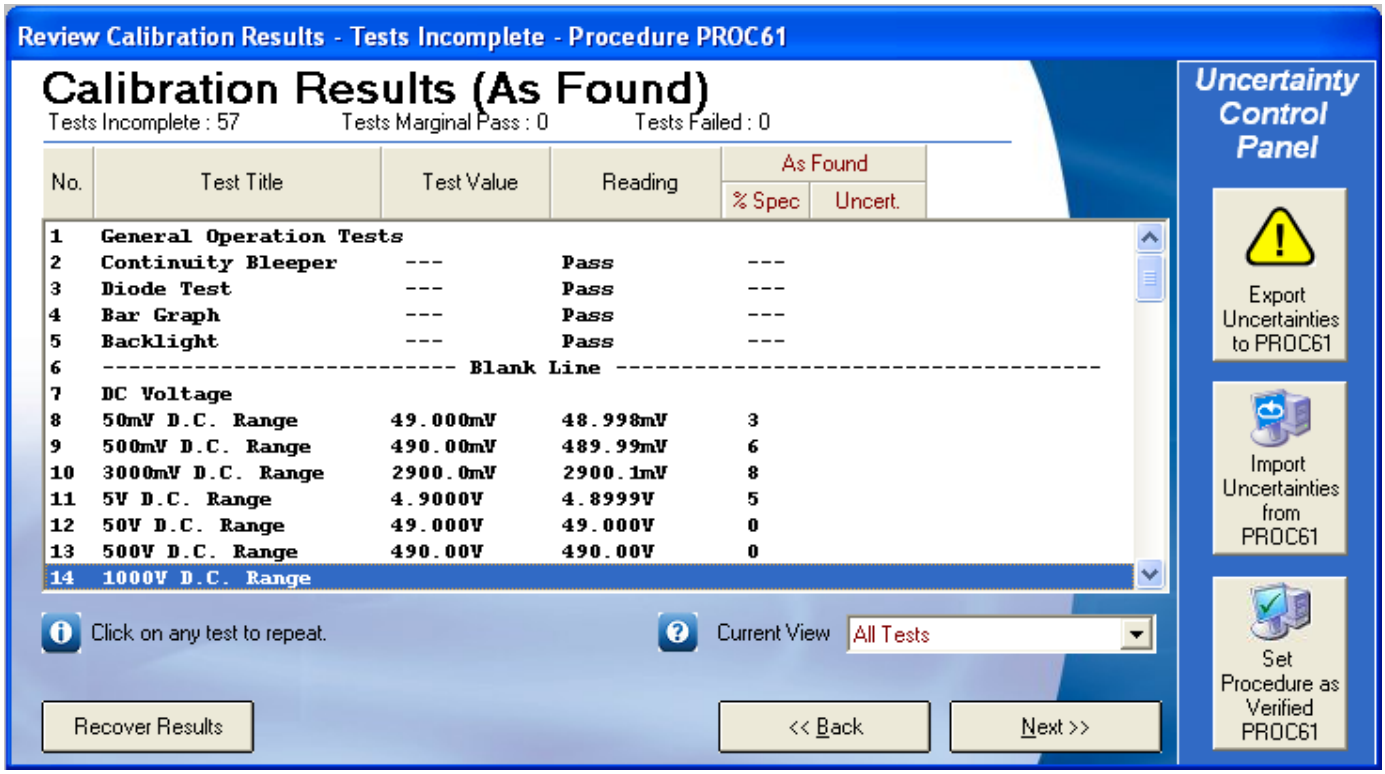
Tests 8 and above are **METER** type tests with keyboard entry of the value –
Type in the reading from the meter display and click **Next >>** to go to the next test.



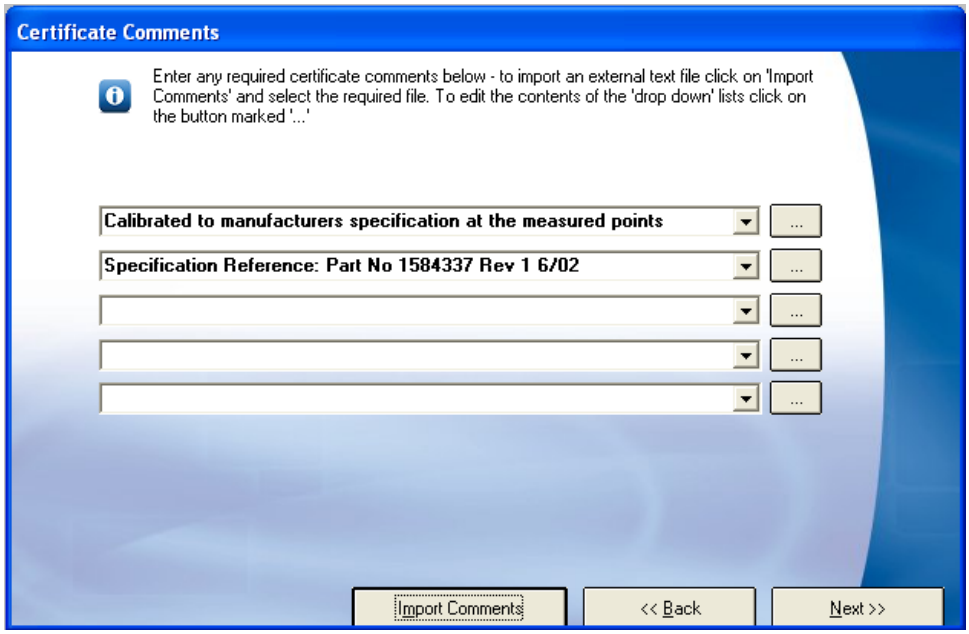
STEP 11 To finish at any time select Control → Finish Calibration.



STEP 12 When the last test is reached, the test Review Screen is displayed - Click Next >> (if a message stating some tests are not completed appears, simply click YES to proceed)

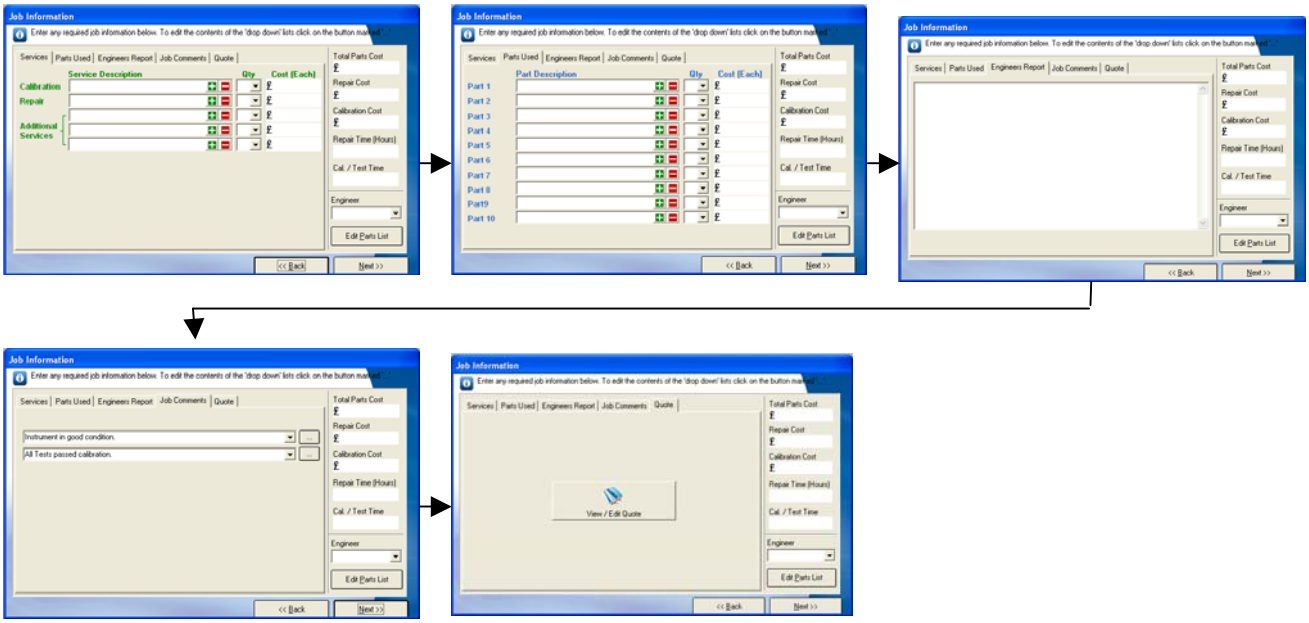


STEP 13 Enter / select certificate comments - Click **Next >>**



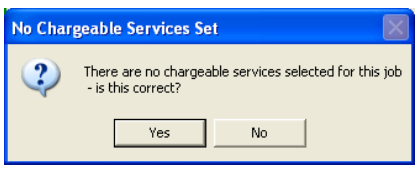
STEP 14 Services, Parts Used & Engineers Report, Job Comments & Quote - click **Next >>** to step through each tab and proceed to the status screen.

Services Screen Parts Used Screen Engineers Report Screen



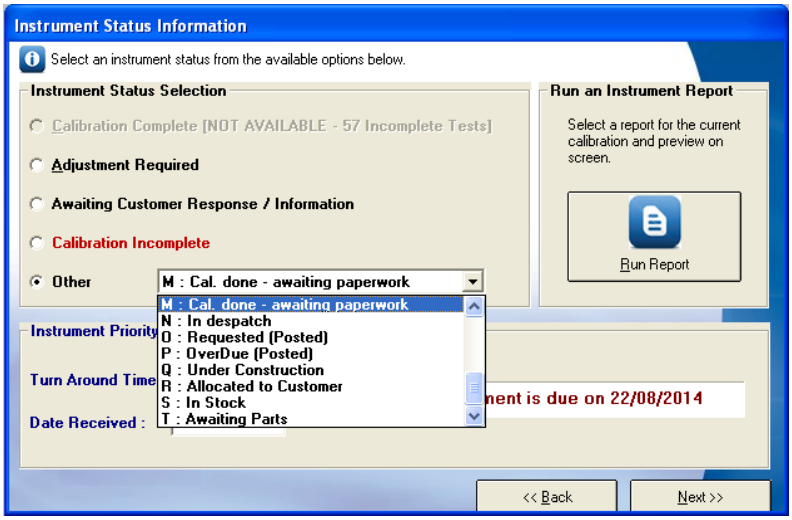
Job Comments Screen Quote Screen

Note : If no services are selected, ProCal may display a message :



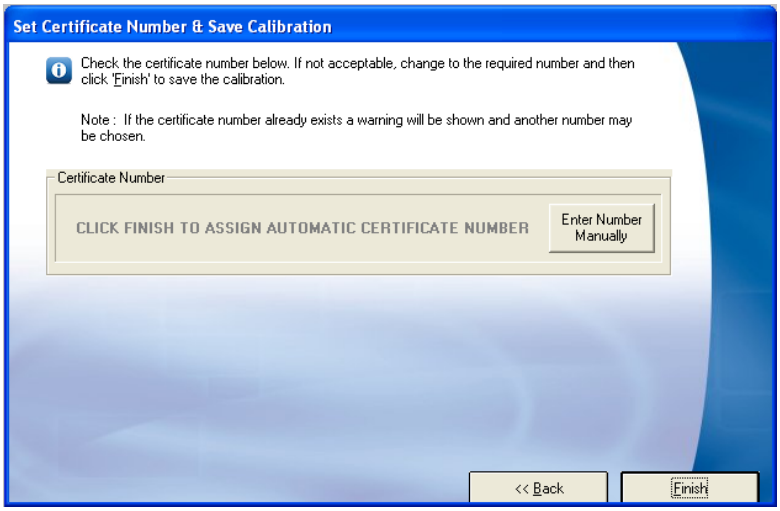
Simply click **Yes** to confirm no chargeable services are required for this particular instrument

STEP 15 Set instrument status - if unfinished, calibration complete will be disabled.
Use 'Other' and manually select **M Cal. done - awaiting paperwork**
then click **Next >>**

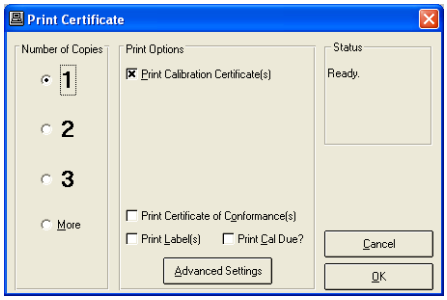


STEP 16 Click Finish to assign certificate number and save the calibration.

Note : To assign a manual certificate number, click **Enter Number Manually**



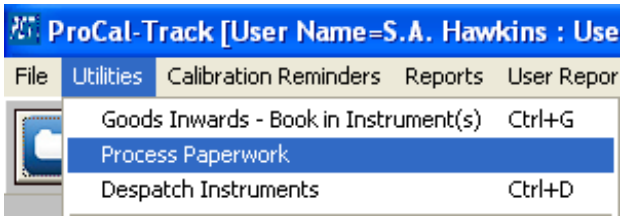
STEP 17 To print the certificate, click **OK** or click **Cancel** to print later using ProCert.



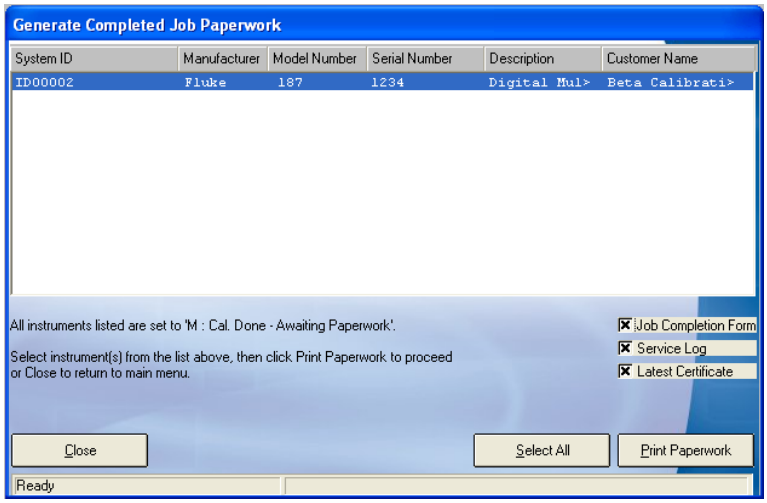
Note : This option to print can be enabled / disabled using ProSet -> Program Options

DESPATCH AN INSTRUMENT WITH PROCAL TRACK

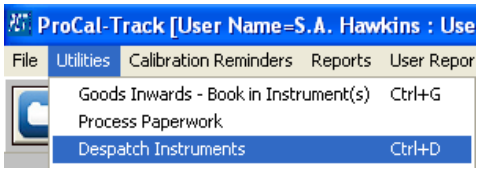
STEP 1 Start ProCal-Track : Select Utilities → Process Paperwork.



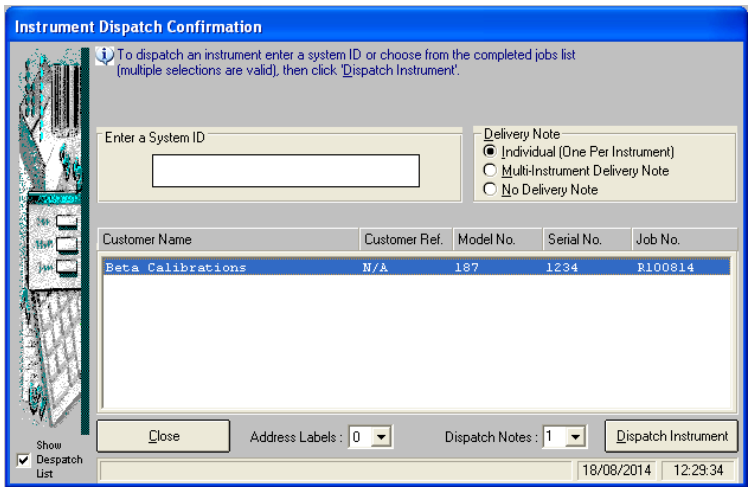
A list is displayed of instruments ready for paperwork processing.
Click on the *Fluke 187* calibrated previously and select the required paperwork items, then click **Print Paperwork**.



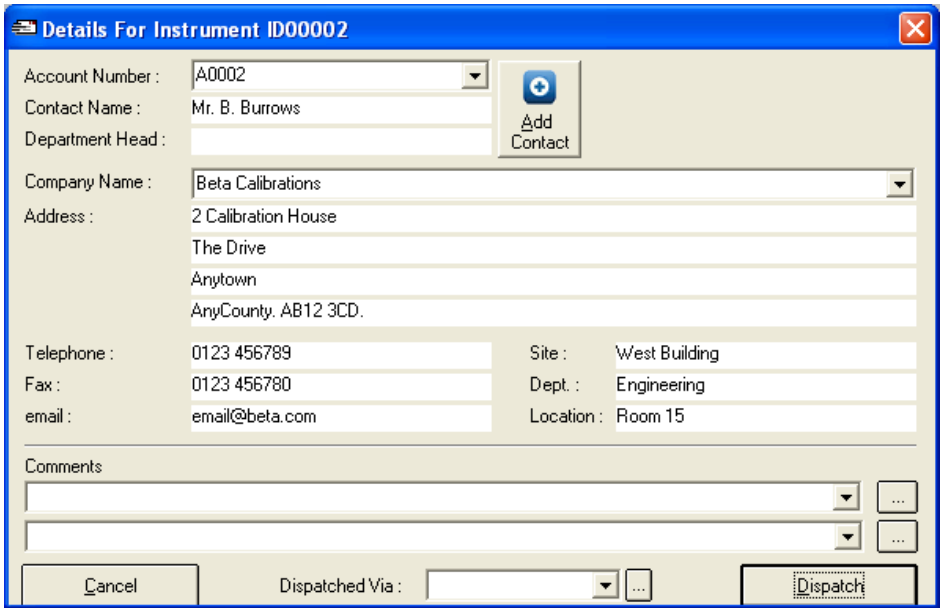
STEP 2 Select Utilities → Despatch Instruments



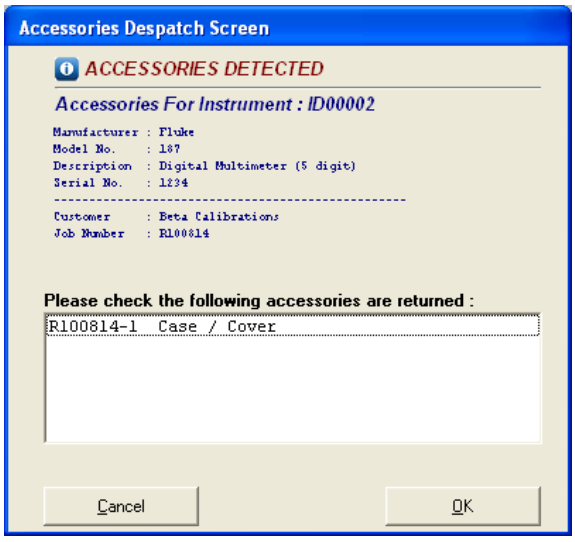
A list is displayed of instruments ready to despatch - Click on the instrument to produce a despatch note.



STEP 3 Confirm despatch information then click **Despatch**



STEP 4 Confirm Accessories



The software will confirm accessories are returned (if accessories set at time of booking in)

Tip : If the system is running with a barcode scanner connected, a label can be printed with a unique number for each accessory booked in - this label can then be scanned to confirm accessory return prior to the despatch paperwork being printed.

CALIBRATION EXAMPLE COMPLETED

This completes the cycle of calibration and the instrument status is returned to 'A - With Customer' – the calibration date & certificate number are updated automatically.

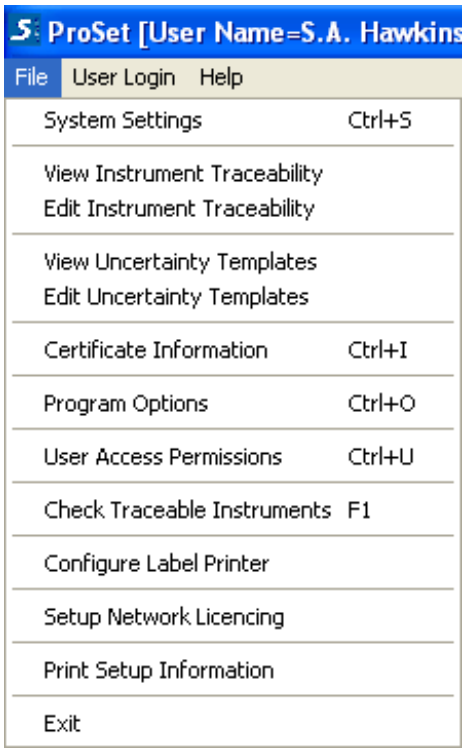
For more information please see the documentation installed with each program.

Please visit www.transmille.com for application notes and additional user documentation

Setting up the system using ProSet

ProSet allows the user to configure the ProCal software suite to their specifications.

The ProSet File Menu



Quick overview of the menu options:

In System Settings

1: To begin with set the starting number to use for certificates. Note there are 5 certificate/report types; each with its own counter which will be incremented each time a certificate of that type is saved. If required, characters can be added before the certificate number, e.g. ABC1234. This allows for a different numbering system to be used for example for accredited certificate's verses standard certificates.

2: For Network systems it is necessary to set the paths for results, procedures etc.
3: If an IEEE488 card is installed click the type installed.
4: Select the relevant Language

In Instrument Traceability

Enter the information about the calibrator & references to be used. This information will be passed on to the certificate automatically when that reference is used in a calibration. The instruments on the traceability list will need to be calibrated periodically to ensure the integrity of the results produced by ProCal.

Note: The traceable instruments are those that are kept in the laboratory and are used to calibrate all instruments that require calibration. These instruments will also need to be calibrated on an annual basis to ensure they output or receive the correct data.

Note the first 10 locations are for the system reference instruments, which ProCal will use as default. Use the 'add' button in the menu bar to add more reference instruments as required. On a networked system, reference standards can be placed on the server, which will make it available to all workstations.

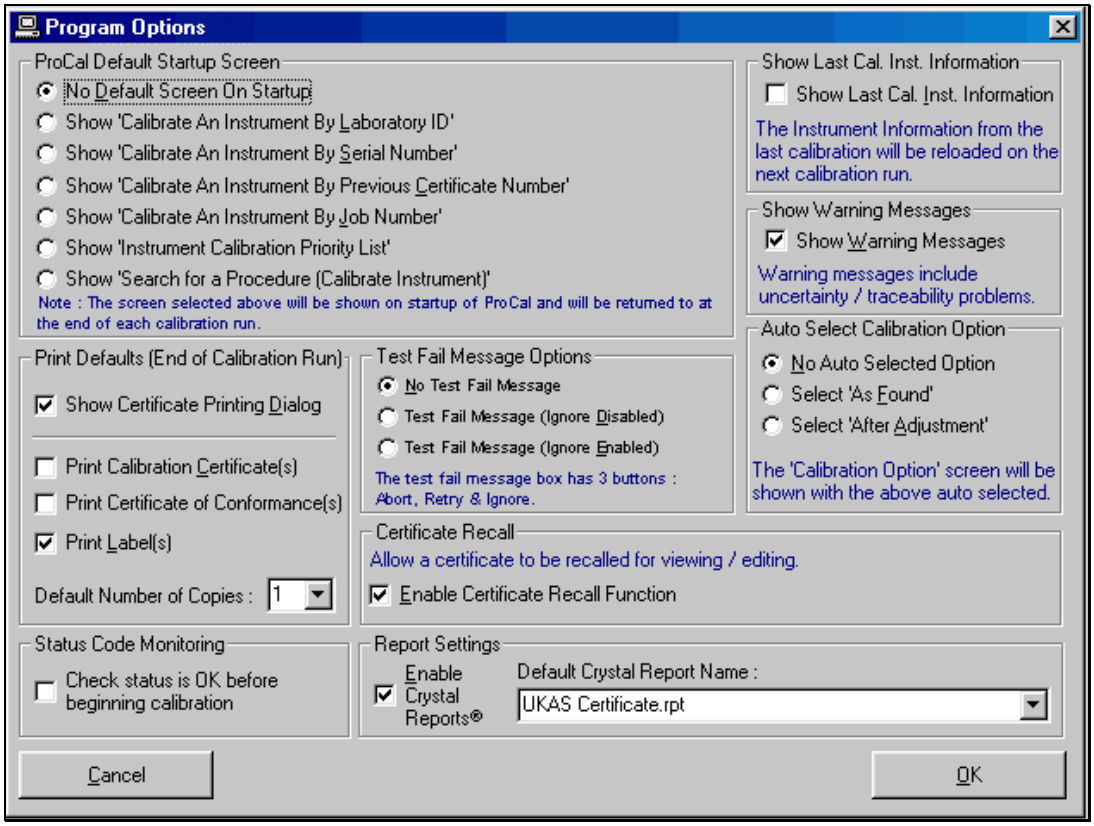
Note: That for evaluation purposes a demo mode can be selected for the three main instruments e.g. calibrator, scope calibrator and DMM. This mode allows a procedure to be run without a calibrator connected.

Certificate Information

This section should contain the name and address of the laboratory, contact details and names of signatories for the laboratory etc.

Program Options

Allows the user to set the defaults modes & operations of ProCal. For example if a certificate is to be printed at the end of a calibration. Also for options like the menu function in ProCal to recall a certificate. The Program settings can via File->Program Options to tailor ProCal to the users specifications.

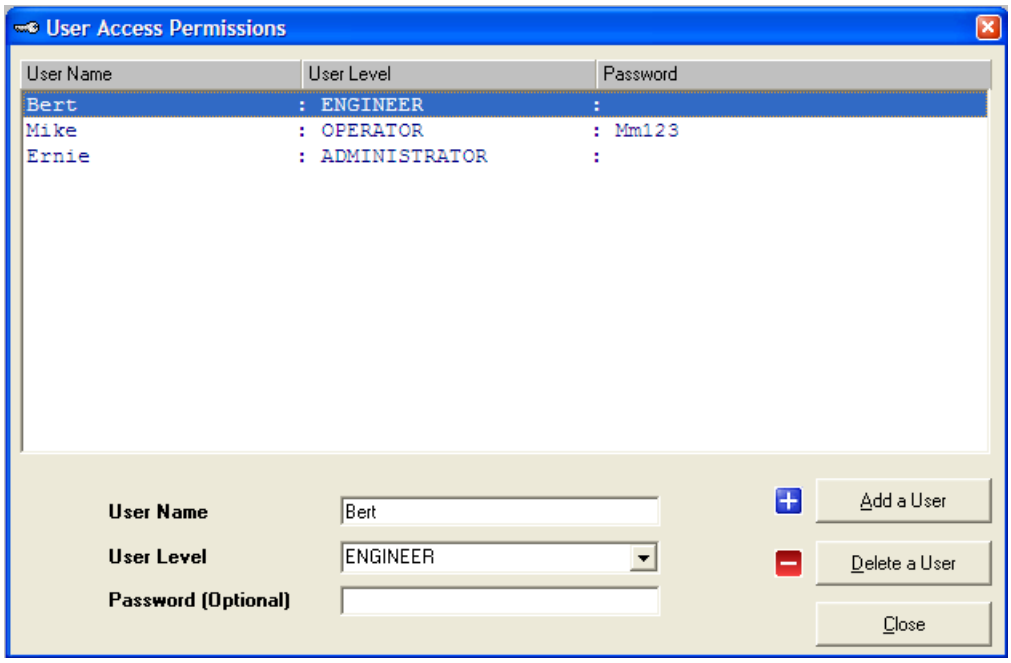


ProCal Default Start-up Screen

This allows the user to be presented with a default screen to minimise the menu selections required. For example if the job number were always used to begin a calibration, this screen would be selected as the default start-up screen. This helps to guide the operator through the program by automatically presenting the correct screen, which prompts the user to enter the required information – the job number in this example.

User Access Permissions

Administrators can modify the list of users by selecting the menu item Utilities->Advanced->User Access Permissions. A list of users and their user levels is shown:



Add a User

Click “Add a User”. The new user is now selected, Enter the user name, choose the user level from the drop-down list and choose a password if required.

Edit a User’s Permissions

Select a user in the list and select the new user level from the User Level drop-down list.

Delete a User Button

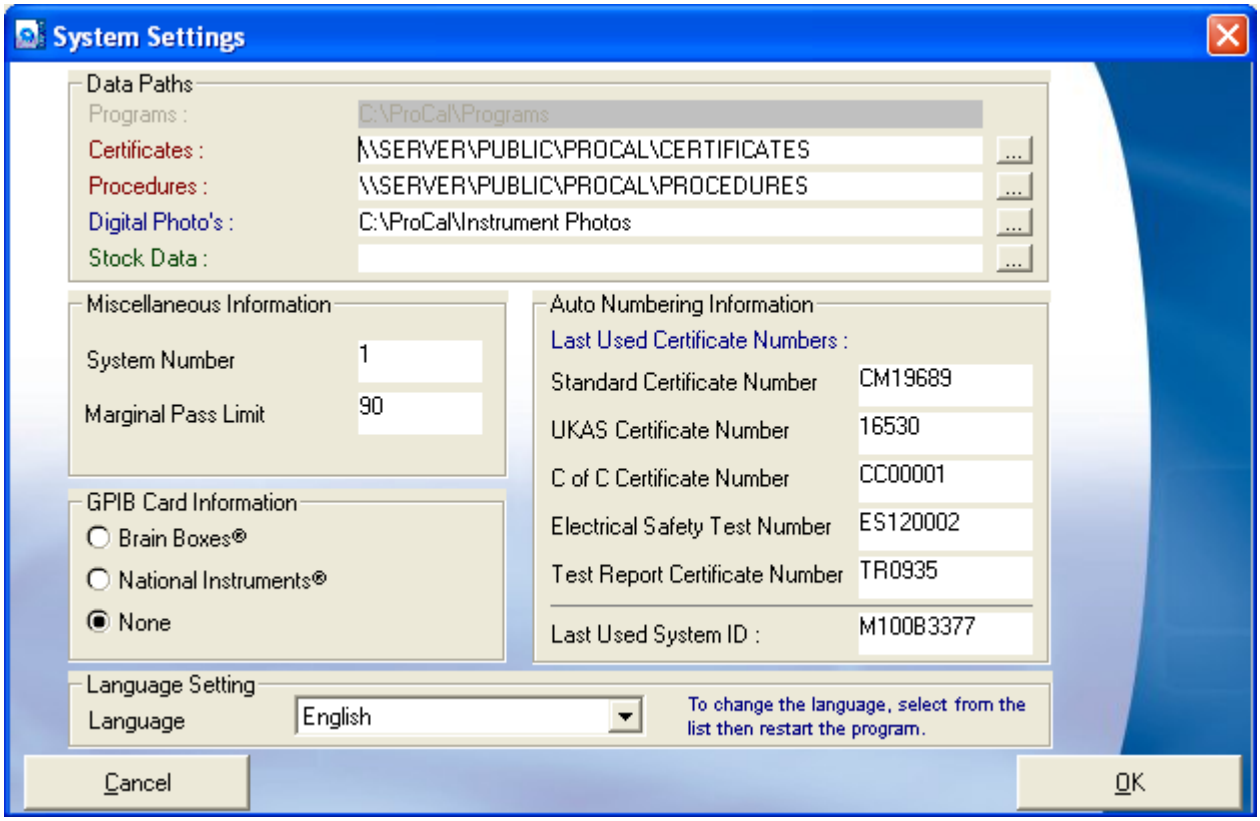
Select a user in the list and click “Delete a User”.

Close Button

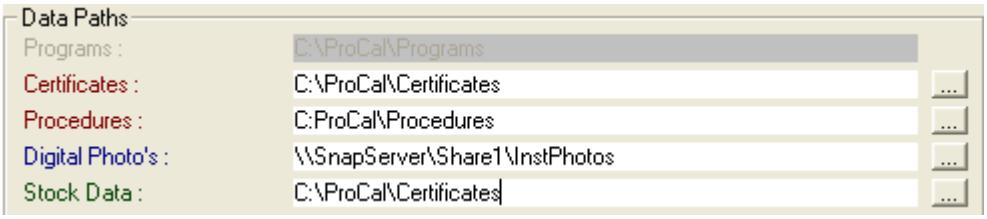
Click “Close” when user update is finished. If the list is empty ProCal-Track will operate with an unnamed user with the level of Administrator and no password.

System Settings in detail

The system setting screen from File>System settings



Drive & Directory Information



This section can be used to set the location of data, although on installation of the ProCal software the directories and paths will automatically be set to the local drive which is usually the C: drive.

Drive & Directory Information continued

To enable use of the software with networked computers, the certificates and procedures paths should be used to link a workstation with a main storage server.

To enable ProCal to share the Certificates database it is necessary to set the Certificates, procedures and also the digital photo paths.

When initially installed on a single computer, these paths are set to point to the local ProCal installation as default i.e. C:\ProCal\xxx

Using ProCal on a Windows network means that one of the computer will need to be used as the default location to store data (known as the server). This means that all the data is stored on this computer and shared by every other computer (known as a workstation) on the network.
To allow each workstation to use the server for data storage, the paths to the server need to be set.

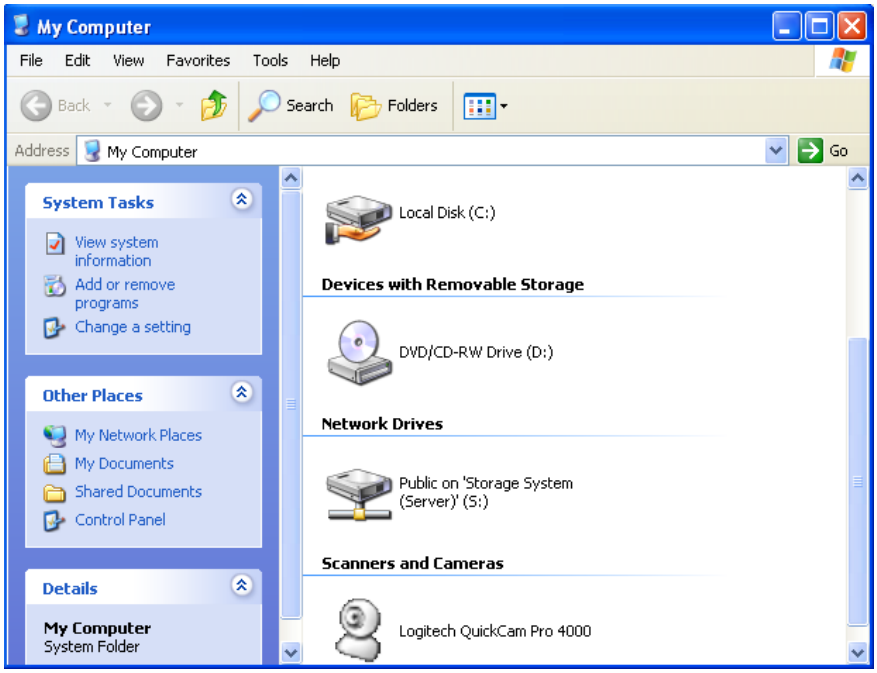
Note: The location of the stored data (the server) should be backed up to a separate location on a daily basis as a precaution.

Sharing the 'C' drive on the Server

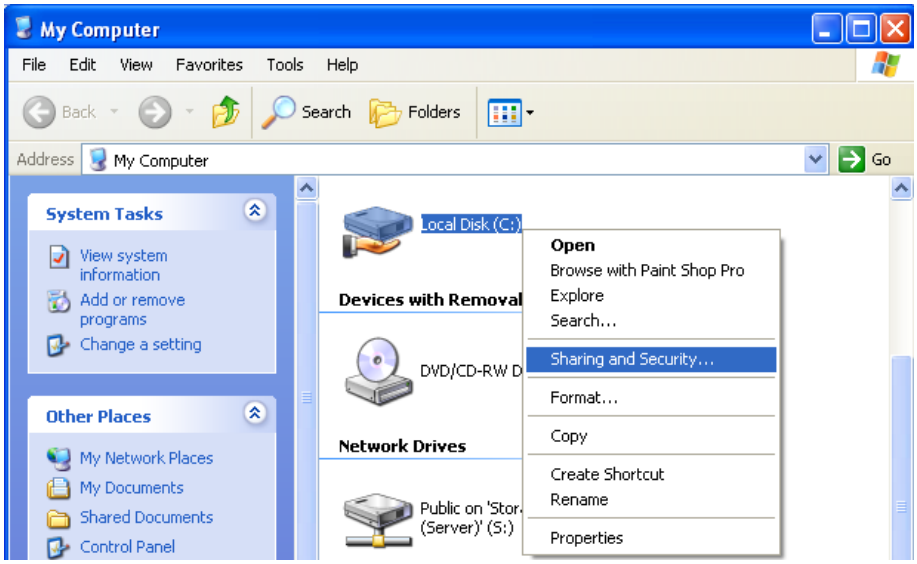
To set the path across the network, the server computer must have its 'C' drive shared for access across the network.

Windows can achieve sharing the 'C' Drive:

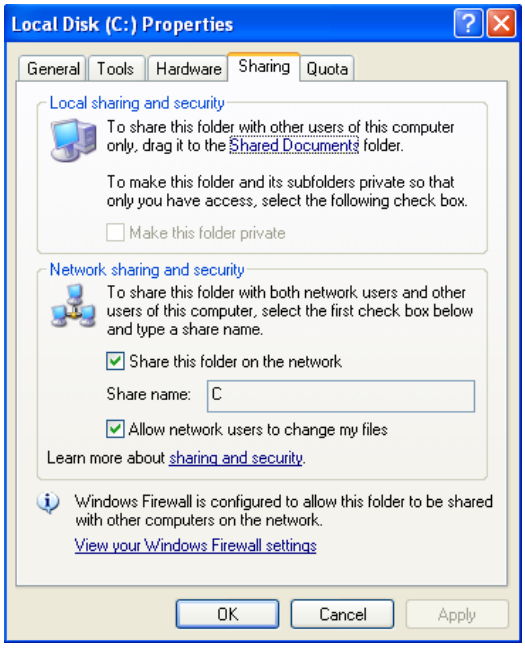
1. On your desktop, double click on ***My Computer***.



2. Right click on your 'C' Drive and choose SHARING (note: this will only be available if your computer is set up on a network).



3) Select Security and Sharing, set Shared Name as 'C:' Do not enter a password.
Click OK to set.



Now the server 'C' drive is shared, this can be accessed across the network by the workstations.

Setting up a Workstation

All that is now required is to set up each workstation to 'point' at the server. To do this, the name of the computer must be known - contact your IT administrator if you do not know this computer name.
This path will include the name of the computer on the network you will be using as the server.
In this example the name of the computer being used as the server is LabServer.

Note: this name does not need to indicate it is a server; it is simply the name of the computer you are going to use for the main data storage.

For the certificates database, the path would be:

\\LABSERVER\C\PROCAL\CERTIFICATES

For the procedures, the path would be:

\\LABSERVER\C\PROCAL\PROCEDURES

For the digital photo's database, the path would be:

\\LABSERVER\C\PROCAL\CERTIFICATE

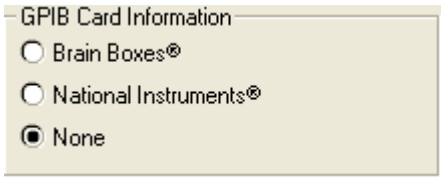
System Number

This is optional and will be recorded whenever this computer is used to perform a calibration.

Marginal Pass Limit

The marginal pass limit is 90% as default. This means that whenever a reading is made which is 90% or more of its specification (accuracy) then a certificate will display a marginal pass (where configured to show a Pass / Fail column). This value can be changed to any percentage required.

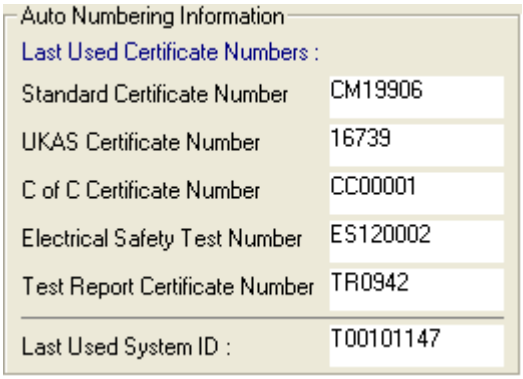
GPIB Card Information



This section allows a GPIB card to be configured for use by the ProCal software. This option should be set to 'None' unless your computer has a compatible GPIB card installed in the computer.

Note: To use either the Brain Boxes® or National Instruments® GPIB cards, the relevant drivers MUST be installed on the computer. The latest National Instruments® drivers are available to download from www.ni.com

Auto Certificate Numbering Information



The auto numbering system allows the user to set a start point from which the computer will automatically 'count on' from, e.g.

If the sequence XYZ0010 were to be entered as the starting number, then the computer would use this sequence and count up accordingly to XYZ0011, XYZ0012, and XYZ0013 etc.

The different counters are available because a procedure can be set as a specific type of test, i.e. Standard Certificate, Accredited Certificate, etc. and each of these may want to have a different prefix.

Note: The reason for these different types is to provide an easy way for users to select procedures. ProCal allows a user to search for a specific type of procedure, and then to find a specific model number. This way the user is not presented with a large number of procedures to choose from.

Standard certificate: Categorises a traceable or commercial certificate.

Accredited Certificate: For accredited laboratories.

C of C Certificate: A Certificate of Conformance, or CertCon.

Electrical Safety Test: For procedures which are concerned only with testing electrical safety (e.g. Portable Appliance Test results).

Test Report Certificate: A test report, typically for new instrument testing on product lines or in ATE (automatic test equipment) systems where sub assembly testing is performed.

In addition to the certificate numbering system, the System ID counter can also be customised. This unique reference is given to every instrument and is used by the computer to link together all related information.

Note: It is recommended that this System ID counter is left as per the default and is not changed unless you are an experienced user.

Language Setting

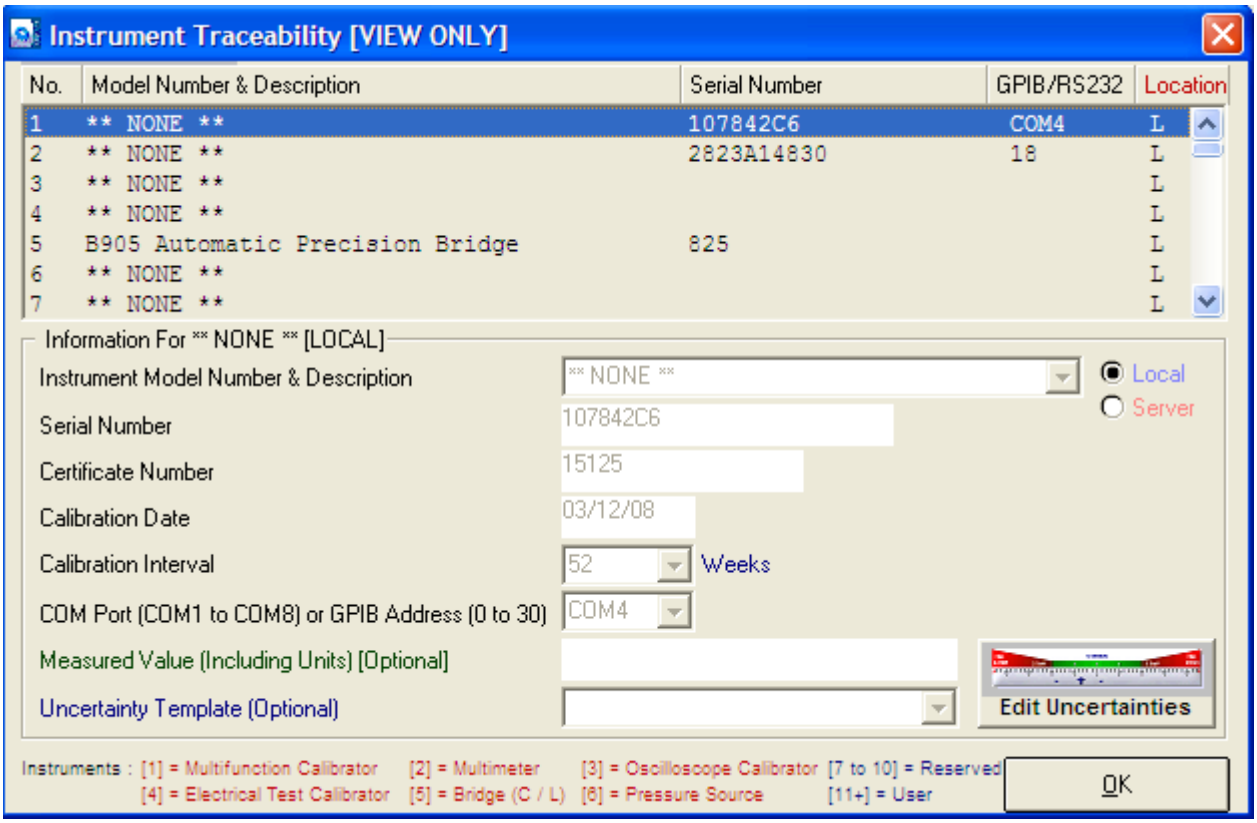
The ProCal suite of programs support multiple languages – if these are available on your system they will be listed in the drop down box. Simply select the language from this list. For the new language settings to be implemented, the program must be restarted.

Note: To apply the language change, any ProCal Suite program must be closed and restarted after selection.

Traceability Information of Reference standards used.

In order for ProCal to control instruments and / or record information about instruments used for a calibration these instruments need to be added to the systems traceability list. The traceable instruments and reference standards are those instruments that are consistently used to calibrate all of the instruments that pass through the system.

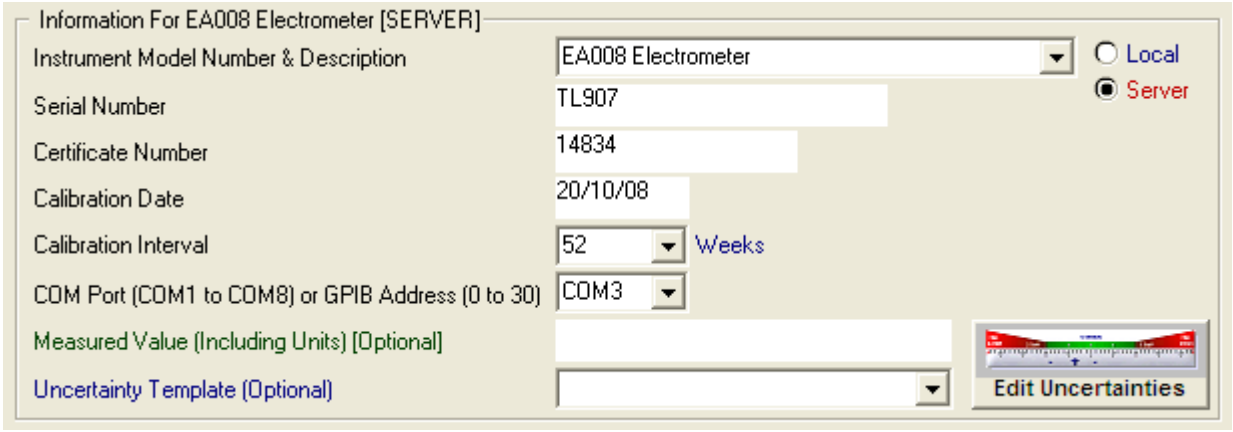
This list can be found in ProSet by clicking File->View Instrument Traceability. The is comprised of a list of traceable instruments, with the first 10 instruments reserved for specific types of instrument:



Instrument	Type	ProEdit Test Type
1	Multi-Product Calibrator	Meter
2	Multimeter	Measurement
3	Oscilloscope Calibrator	Oscilloscope
4	Electrical Test Equipment Calibrator	Insulation Tester PAT RCD Tester LOOP Tester
5	Reserved for Future Use	N/A
6	Reserved for Future Use	N/A
7	Reserved for Future Use	N/A
8	Reserved for Future Use	N/A
9	Reserved for Future Use	N/A
10	Reserved for Future Use	N/A
11+	User defined instrument – no restriction	N/A

As the list indicates, the system instruments are used by ProCal to determine which instrument to use for a specific type of test.

Each instrument requires full traceability information to be entered, including interface address and measured value if relevant:



Instrument Model Number and Description

This is selectable from a drop down list for the first 10 system instruments. This list is linked to the available software drivers enabling communication to / from the specific instrument selected.

Serial Number

The Serial Number of an instrument should be entered here. If an instrument doesn't have a serial number then one can be entered manually.

Certificate Number

Enter the latest calibration certificate number for this instrument here.

Calibration Date

Enter the latest date of calibration here, in the format DD/MM/YYYY.

Calibration Interval

Enter the calibration interval in weeks here – this enables the system to calculate the recalibration date based on the calibration date and the calibration interval and warn the user that this instrument is out of its calibration period (or nearing that period – the length of warning before the next calibration is due can be set by the user e.g. 3 weeks).

COM Port (COM1 to COM8 or GPIB Address 0 to 30)

Enter the relevant address for the instrument here.
This field can be left blank if it is not required.

Measured Value (Including Unit) [Optional]

This field is not valid for the first 10 instruments as the reference instruments use these places. It allows the measured value for a standard to be stored centrally to allow for easily updateable values, which may change from calibration to calibration.

Note: The measured value will be used by ProCal as the nominal test value for tests where this standard is selected as the reference in the procedure.

Uncertainty Template

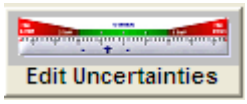
Each traceable instrument can have a specific uncertainty template associated with it as default. This allows the system to be set up so that when a specific traceable instrument is used within a calibration and the uncertainty is calculated at test time, the uncertainty template selected here will automatically be incorporated into this calculation. For more information on uncertainty templates, see the section further on.

Local / Server Storage

The local / server option allows an instrument's information to be stored on the designated server computer. This allows several workstations to share the same instrument information, and avoids the need to enter duplicate information on several workstations.

Setting up instrument Uncertainties

Each traceable instrument can have a table of uncertainties assigned to it, which can be accessed by clicking the Edit Uncertainties button



Uncertainties For Model xxx 3458A Multimeter

	No.	Range (must end with valid units, eg V, A, °C)	Imported Uncertainty		Stability of Reference	
			% Reading	Zero	% Reading	Zero
▶	1	DCV : 0 to 100mV	0.0002	0.44uV	0.0005	1uV
	2	DCV : 100mV to 1V	0.0002	0.44uV	0.0004	1uV
	3	DCV : 1V to 10V	0.0003		0.0004	2uV
	4	DCV : 10V to 100V	0.0003		0.0006	30uV
	5	DCV : 100V to 1000V	0.0003		0.0006	100uV
	6	DCI : 0 to 100nA	0.00235	20nA	0.003	.04nA
	7	DCI : 100nA to 1uA	0.00235	20nA	0.002	.04nA
	8	DCI : 1uA to 10uA	0.00235	20nA	0.002	.4nA
	9	DCI : 10uA to 100uA	0.00235	20nA	0.002	0.8nA
	10	DCI : 100uA to 1mA	0.000384		0.002	5nA
	11	DCI : 1mA to 10mA	0.000437		0.002	50nA
	12	DCI : 10mA to 100mA	0.000497		0.0035	500nA
	13	DCI : 100mA to 1A	0.000909		0.011	10uA
	14	ACV : 0 to 10mV (1Hz to 40Hz)	0.04	25uV	0.03	3uV
	15	ACV : 0 to 10mV (40Hz to 1kHz)	0.015	17uV	0.02	1.1uV
	16	ACV : 0 to 10mV (1kHz to 20kHz)	0.015	17uV	0.03	1.1uV
	17	ACV : 0 to 10mV (20kHz to 50kHz)	0.05	30uV	0.1	1.1uV
	18	ACV : 0 to 10mV (50kHz to 100kHz)	0.08	40uV	0.5	1.1uV

Delete Range | Add Range | Exit

Each range can be assigned the following information:

Calibration of Reference : % of Reading
: Zero

Enter the imported uncertainties from the calibration certificate for this instrument:

Stability of Reference : % of Reading
: Zero

Enter the accuracy of this instrument from the manufacturers specifications.

ProCal comes installed with all Transmille calibrator uncertainty tables complete, incorporating the imported uncertainties for calibrations as performed by Transmille.

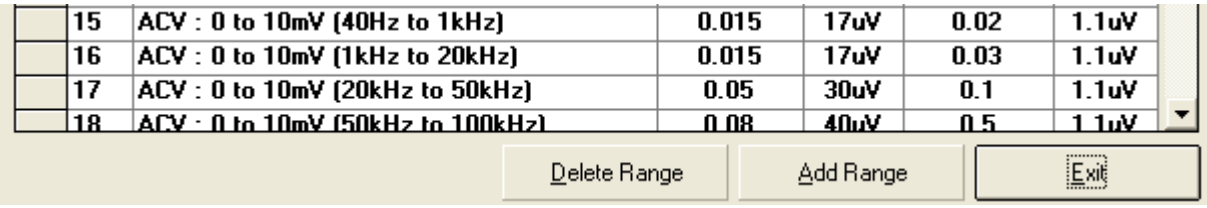
Note: If your Transmille calibrator is not calibrated by Transmille, these imported uncertainties will need to be updated to reflect the uncertainties from the laboratory that calibrated the instrument.

Adding / Editing Range information

The Uncertainties table can be edited by adding a new range or editing an existing range.

Note: The uncertainty table for system instruments 1 to 10 should not be changed as these are used by ProCal to automatically determine the correct line to use with a specific test value / frequency.

Simply click on the Add Range button to add a new range, an empty box will appear below the last range – then enter new details. To edit a range simply select that row and the new details. To delete a range again highlight the relevant ranges and click the 'Delete Button'



How does ProCal select the correct range / function from the uncertainties table?
ProCal uses a built in look up table to determine the correct range / function / frequency range for a specific test. This is preset for the following instruments:

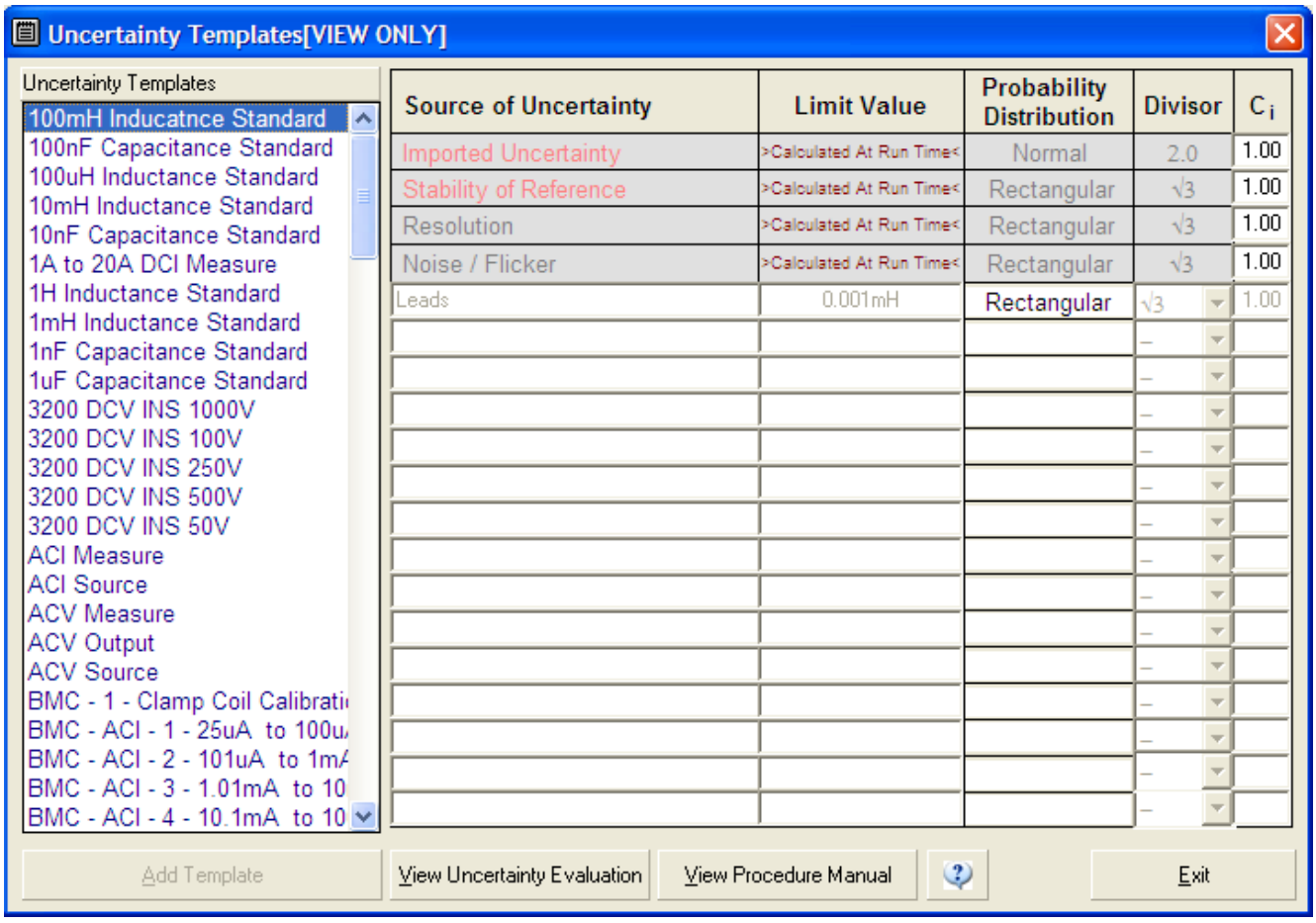
All Transmille 2000 Series calibrators
Transmille 2100 Electrical Test Equipment Calibrator
HP / Agilent 3458A

For all other instruments, the specific line required for use, to calculate the uncertainties must be manually selected. This is covered in further detail in the section on ProEdit.

Uncertainty Templates

For the comprehensive calculation of uncertainties, ProCal allows additional sources of uncertainty to be incorporated into uncertainty templates which can store such sources as connection / lead errors, noise etc.

Each uncertainty template can be uniquely named and record one or more source of uncertainty. As required by M3003, this includes the probability devisor to enable correct statistical calculation of the final uncertainty.



The left hand list displays the available uncertainty templates, which can be edited.
To create a new template, the user should click on the ‘Add Template’ button.
To edit the method sheet, use a word document with the file name as template. Click on ‘View method sheet’

To edit an existing uncertainty template first select the required template by clicking on the list. Then click on the box in the table to edit the contents, new uncertainty contributions can be added in the same way to an existing uncertainty template. Once all the new data has been entered, just close the Uncertainty Templates window or move onto the next template and it will save the data.

Note the top 4 lines are always present and are greyed out. The value of these will be dynamically calculated at run time. Data is taken from the ‘uncertainty’ table in ProSet, which

contains both the ‘imported uncertainty’ and ‘stability’ for the reference used by ProCal in that test. Note that ProCal will determine the reference used either automatically or by the reference selected manually in the procedure by ProEdit. If an uncertainty table does not exist for the reference selected then a warning message is displayed.

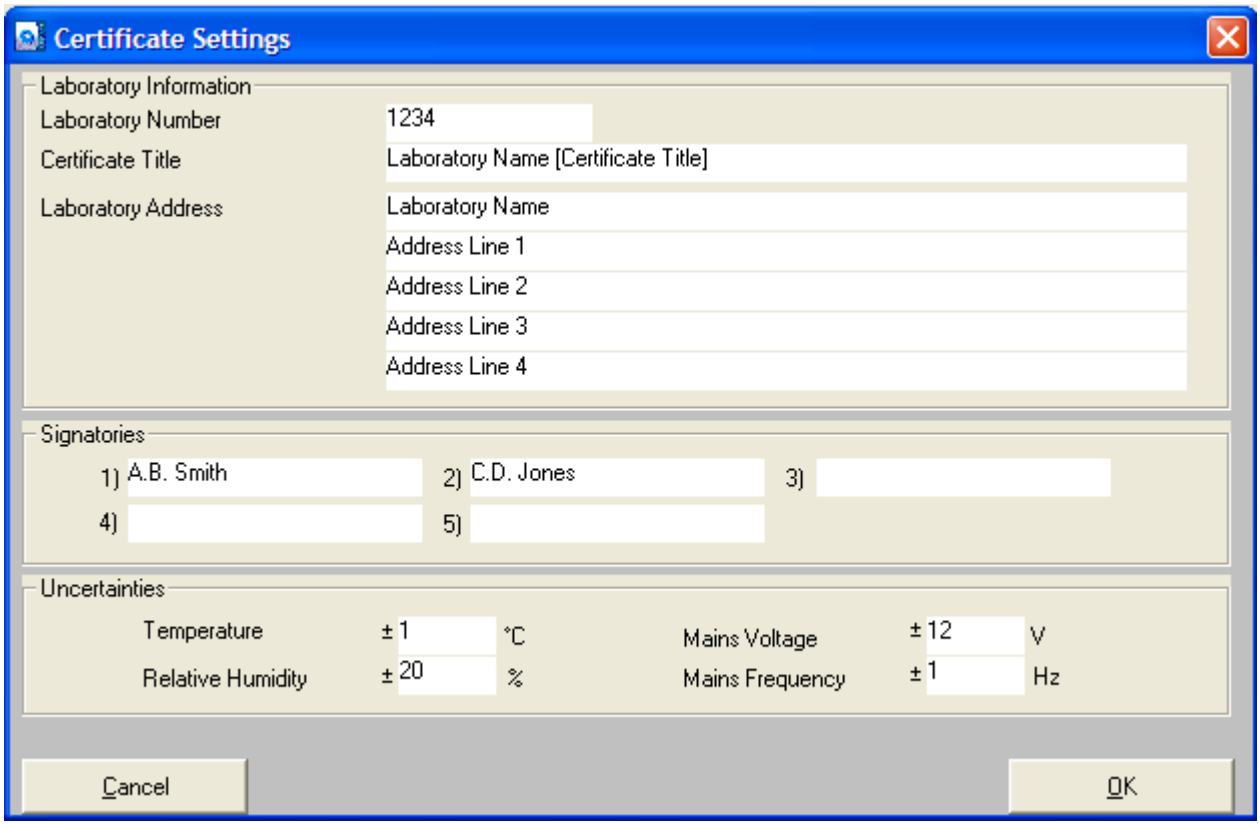
Resolution is taken from the ‘number of digits’ field in the procedure.

Noise/Flicker is entered in the drop down box on the measurement screen. This is treated as a rectangular contribution with degrees of freedom = infinity in the uncertainty calculation.

Note: All uncertainty contributions are assumed to have degrees of freedom = infinity. Should a calculation contain dominant terms or terms with low degrees of freedom then they should be calculated outside of the auto calculator inside ProCal and be entered either in the procedure as a Pre calculated term or calculated at run time term and be entered in the box at the bottom of the measurement screen.

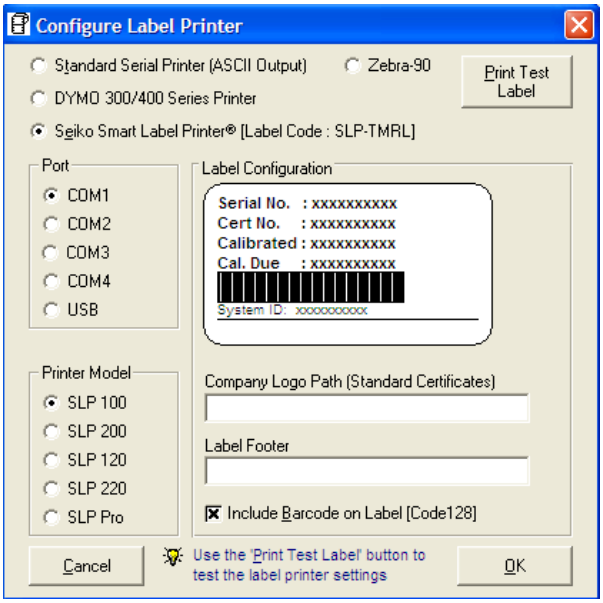
Laboratory Information

The address, signatories and environmental information for the laboratory are set up using this screen. These settings are stored with each calibration performed, so changing this information will only affect calibrations performed AFTER the changes. If a certificate or report is printed before any changes are made then the document will need to be reprinted.



Note: It is useful to put the laboratory telephone and fax numbers and Email address in the address line 4 location, address length permitting (e.g. TEL: xxxxx xxxxxx • FAX: xxxxx xxxxxx • Email x@x.COM).

Configuring the Label Printer



To set-up the system label printer select File -> Configure Label Printer or click the toolbar button.

Note: For the DYMO printer, all settings are configured by the DYMO printer installation. Simply select DYMO 300 Series to use this printer.

The Calibration Program ProCal

ProCal Overview

ProCal is the piece of software which is used to perform calibrations on instruments, it controls this sequence from the starting a calibration to the results of the calibration combining the before and after adjustment results to the results database in 'Access'. These results can then be viewed, or printed into multiple templates as required to meet the customer's requirements.

There are many settings in ProSet – 'program options' are used to control the default operation of ProCal to suit individual requirements, including the printing of certificates & labels after calibration.

ProCal controls the measurement process by loading a 'calibration procedure' that can be created in ProEdit. This procedure is made up of individual measurement tests; the data held in each test is used by ProCal to control the reference instruments, take the measurements, calculate uncertainties etc.

There are four main points for performing a calibration with ProCal.

Starting the calibration, entering data on the instrument to be calibrated, selecting the procedure etc.

Running the procedure, taking the measurements and recording the results.

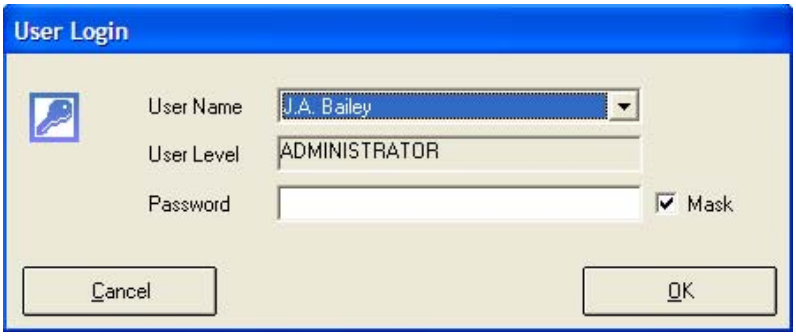
Conducting necessary adjustments if needed, retaking the measurements and recording the new results

Finishing the calibration, saving the results, entering comments etc.

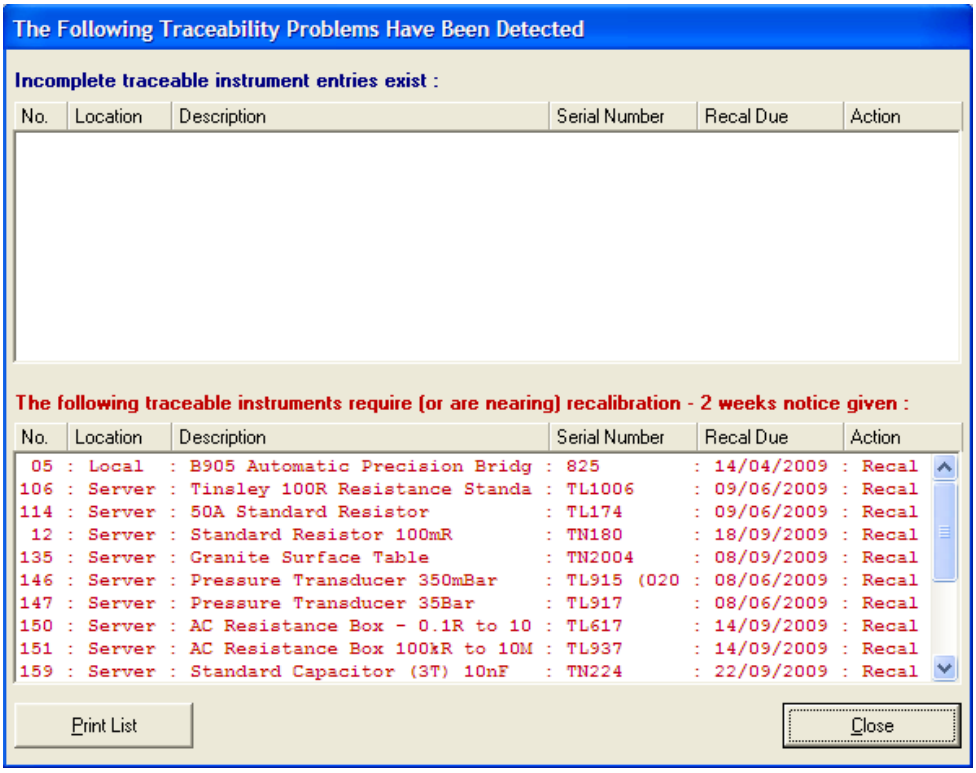
ProCal is very flexible in the way it can be operated to meet the requirements of different users, the options to the user on starting/finishing a calibration are different for the stand alone calibration system to the networked calibration station integrated with job control (ProCal Track) software.
In all cases running the measurement procedure is always the same.

Starting ProCal:

ProCal can be started either from the Start Menu->Transmille Software->ProCal or from the desktop shortcut, ProCal will ask for a user login (if users have been assigned in ProSet)



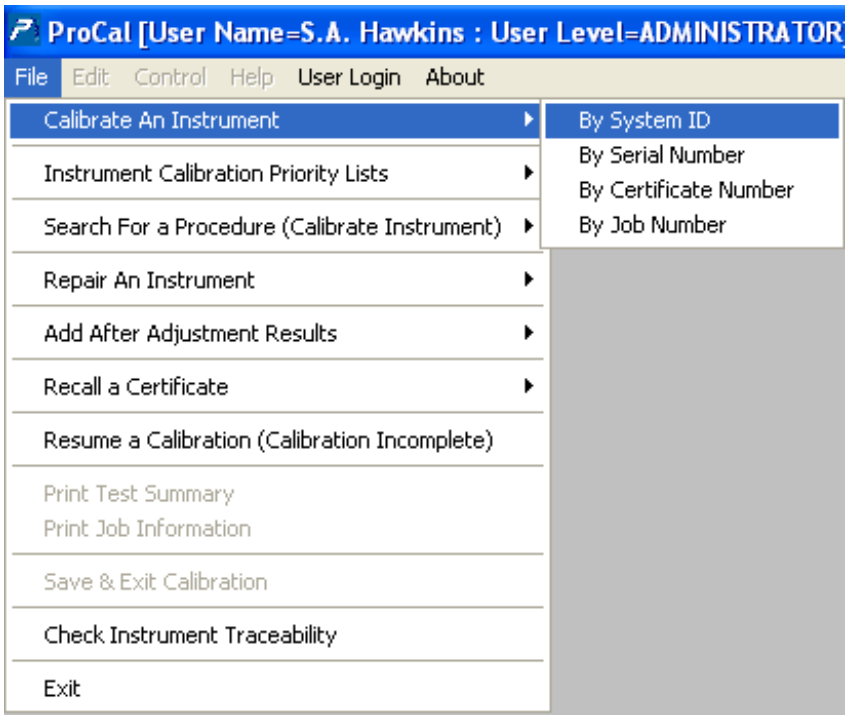
ProCal will then check the reference standards data (as set in ProSet) for any standards requiring calibration and will display a list of any instruments found. This menu can be set to appear on the start-up of ProCal to inform the user of any outstanding calibrations. This list is for information only, and may be closed.



If a procedure, which uses an instrument in this list, is selected to be used in ProCal, an error message will be displayed and the calibration will not be able to continue until the instrument has been calibrated.

ProCal will then display a message box as it initialises instruments connected to the PC's interfaces. The user will be prompted to either try again or cancel any instrument not responding.

ProCal Menus: The File Menu



A new calibration may be started by selecting from the file menu either:

Calibrate an instrument: - use to start a new calibration.

ProCal will search the database for the instrument from either the ID number, serial no, last certificate number or job number (if booked in by ProCal Track). This allows instrument information to be recalled from the database. When a new instrument, unknown to the database is entered ProCal will display a message box and ask if you wish to create this as a new instrument, ProCal will then add the instrument details to the data base as you enter them, saving them in the database so they only need to be entered once. In the future ProCal will recognise this instrument.
This powerful feature allows ProCal to learn the instruments as they come through the system, avoiding having to create instruments in the database first.

Instrument Calibration Priority List: - select from a list of instruments in order of priority.

Displays a list of instruments to be calibrated ordered by the number of days left to calibrate (only available if the instruments have been booked in with ProCal track). This helps organize the workload and keeps the procession of instruments being calibrated/repaired in order.

Search for a Procedure: - Select procedure before entering instrument details

Allows the calibration procedure to be selected first before entering instrument details. This may be useful for an ad-hock calibration or for checking to see if a calibration procedure exists.

An unfinished calibration can be completed by selecting:

Add after adjustment results

Entering the certificate number for the before readings starts after adjustment calibration.

Recall a certificate

Enter the certificate number to recall either the before or after adjustment results. Using this allows mistakes on certificates to be corrected, e.g. comments, instruments details, even measurements can be remade. This is a very powerful function of ProCal and can save a great deal of time, avoiding having to completely re-run a calibration. To avoid misuse of this function it must first be enabled in ProSet – ProCal 'options'.

Resume a calibration

Displays a list of calibrations marked incomplete as set at the end of calibration. This allows an incomplete calibration to be saved, then continued later. Click on the instrument in the list to resume calibration.

Recover a calibration

Should for any reason a calibration be halted unexpectedly (due to power failure for example) and the results have not been copied to the database, ProCal keeps a recovery file, which can be reloaded. To reload this file the system ID number must be entered.

Other options from the file menu:

Print Test Summary

Prints a results summary type sheet showing only basic instrument details and readings taken against % of spec. Very useful to show faulty ranges etc when passed on to a different engineer or department for repair, or to show the user the problem ranges.

Print Job Sheet

Prints job sheet, which contains the instruments, details, the customer details etc.

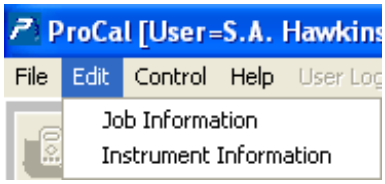
Save and Exit

Goes straight to the certificate save screen. The certificate number can be noted down onto the Job Label if one has been printed through ProCal-Track.

Check Instrument Traceability

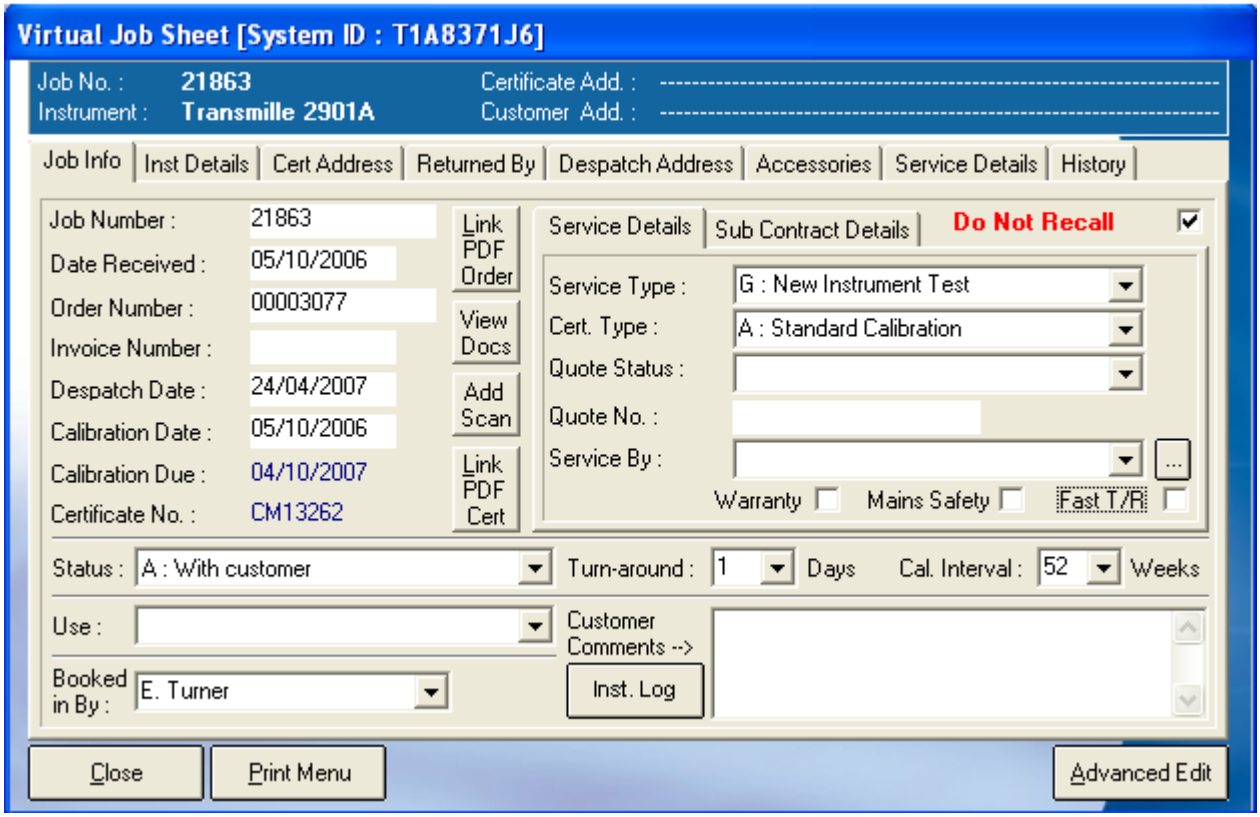
Checks the reference instrument database for incomplete traceability information or instruments, which are past their calibration date.

ProCal Menus: Edit Menu



The edit Menu allows access to the job information and Instrument information screens below:

Job Information Screen

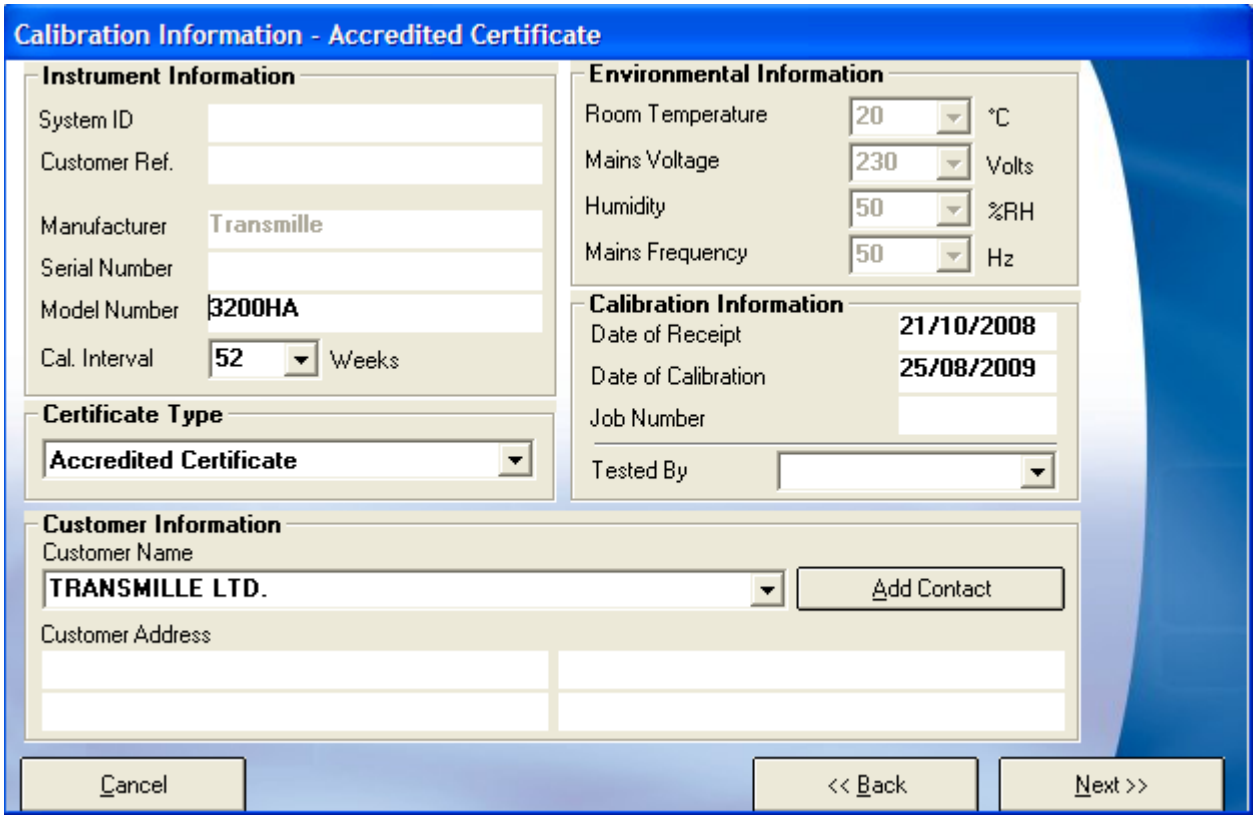


From this screen all aspects of a specific job can be viewed and edited. From this menu every aspect of the instruments information can be accessed.

Advanced Edit
Advanced Edit allows the user to change more intricate details about the instrument, such as the signatory for the certificate, or the traceable instruments used during its calibration.

All the details of an instrument can be changed in this menu, so care should be taken that important data is not lost, this function can be set to Administrator Access only. The list of enterable data is long; this list contains the information for every part of the instruments procession through Booking In, Calibration and its Despatch details.

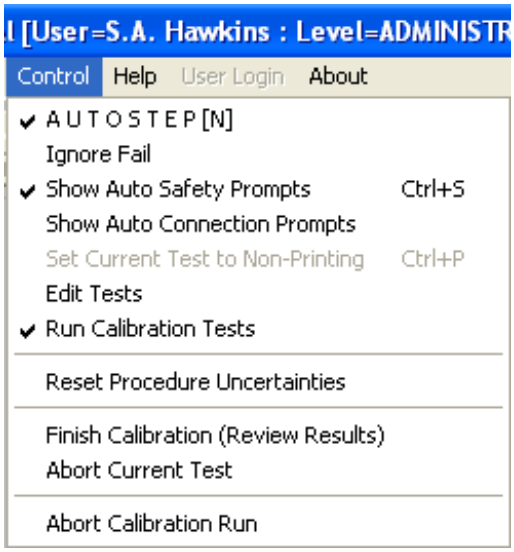
Instrument Information Screen



This menu enables the user to enter important information such as the System ID, Certificate Type and customer details.
Without a certificate type selected ProCal will be unable to select the correct procedure for the instrument. (More information can be found in the appendix).

Control Menu

The control menu allows several functions to take place,
There are two ‘control’ menus, a short menu for procedures, which use manual control to step on to the next test, and a longer menu for procedures, which use auto step.



Auto Step (Y) (only in menu when autostep set)

When Auto Step is selected, this function allows ProCal to automatically move onto the next test. For this process to take place, the auto step function must have been selected for the procedure, auto step can also be turned on through Control->AUTOSTEP.
If the procedure is for a close loop calibration then this will be checked to allow it to run automatically.

Note: If the user only wishes to run one test, then auto step should be turned off.

Autostep can be very useful even on manual instruments like decade boxes. Here the Autostep condition can be set to proceed on to the next test if the measurement is within specifications, this will allow the operator to simply switch round the values, with ProCal automatically proceeding to the next test when it has the correct value.

Ignore Fail (only in menu when autostep set)

This will allow ProCal to proceed on to the next test even if the test fails. This is required when an instrument is out of specification and it is required to let the ProCal procedure run through taking all the measurements without stopping.

Show Auto Safety Prompts

Selecting prompts allows ProCal to automatically display safety warnings before any test where the output from the calibrator is higher than 200 Volts or 2Amps, before the procedure will move on the operator must click the ‘OK’ button within the message box.

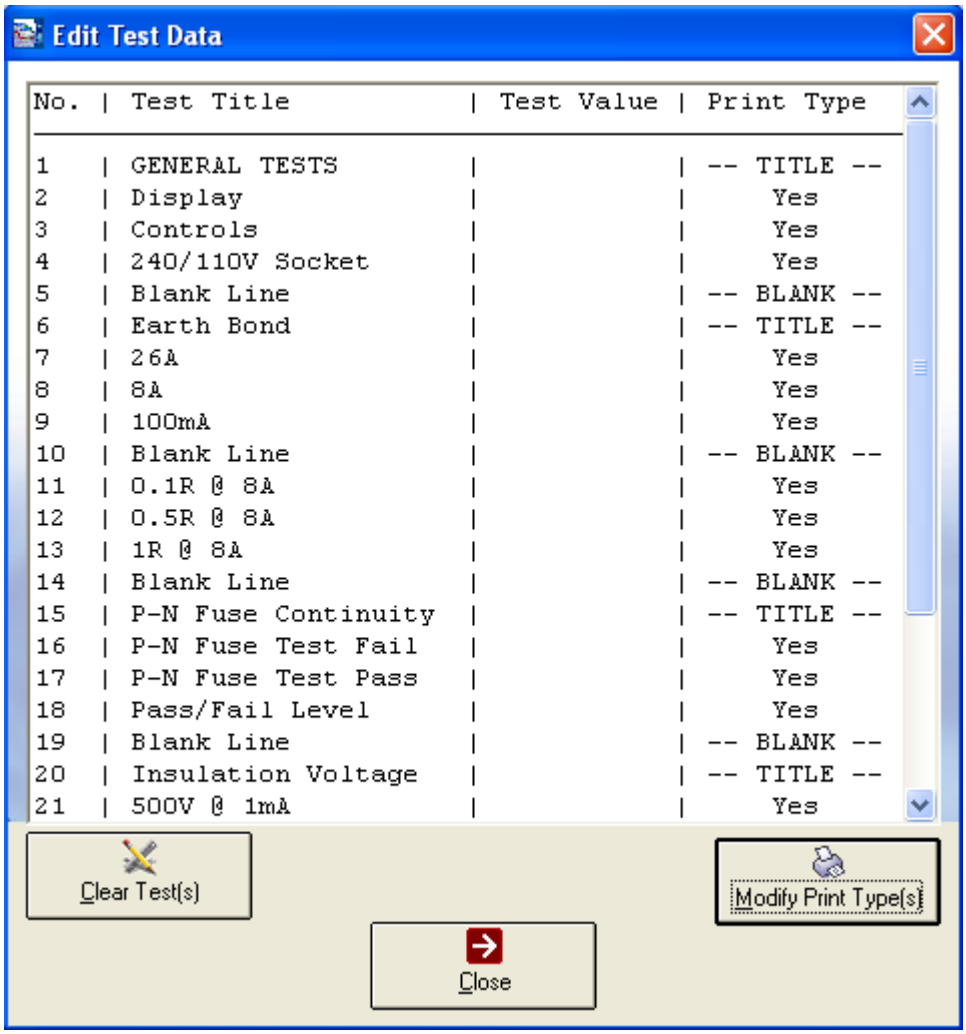
Show Auto Connection Prompts

Checking this will cause the program to automatically display connection diagrams based on the Transmille range of products for AC / DC Voltage, AC / DC Current and Resistance.

Set Current Test to Non Printing

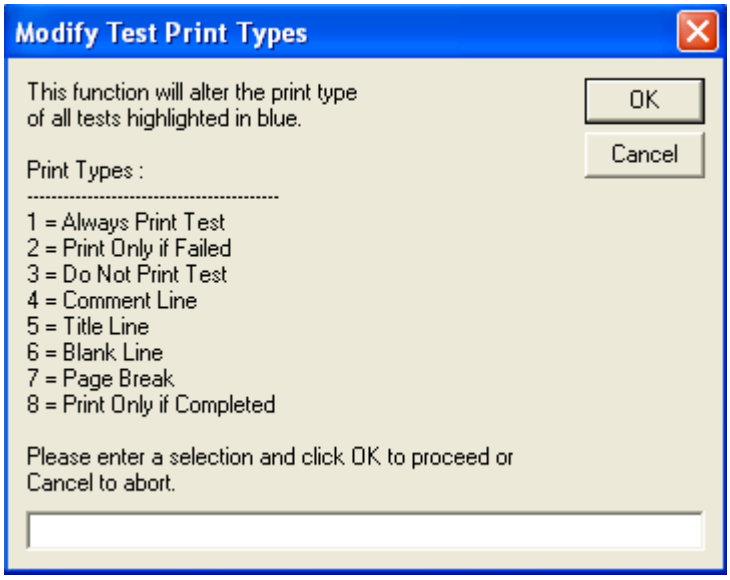
Selecting this will prevent individual test results being printed on the certificate. May be used where a limited calibration is being performed.

Edit Test
The Edit Test function can be accessed via the 'Control' Menu. This function allows the user to modify parts of tests, and to delete tests that have are not needed by highlighting the relevant test/line and then clicking 'Clear
Test



Modify Print Type(s)

If the 'Modify Print Type(s)' button is clicked, a new menu will open with eight options for the user to choose from. The selected option from the list is entered into the text box, to save click OK, to abort the current action click Cancel.



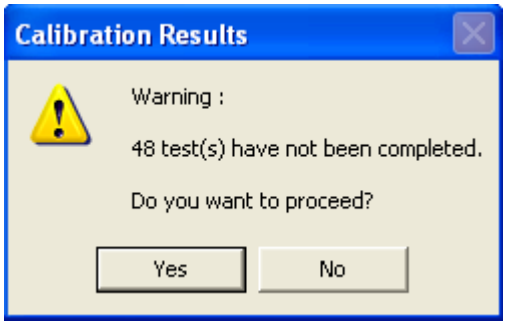
Run Calibration Tests

This will enable interaction to the external .exe program set in the procedure, allowing for automatic adjustment of the instrument under calibration.

Note: This interaction is still conditional on the instruments error being larger than that set in the procedure.

Finish Calibration (Review Results)

This option allows a direct step to the end of the procedure. A message box will display how many tests are left.

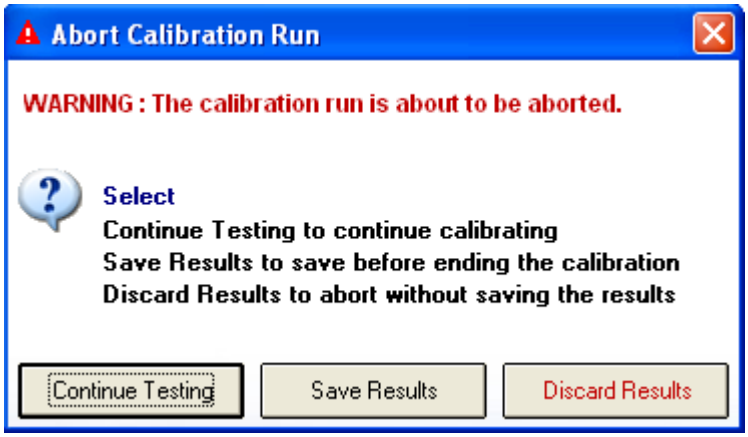


Abort Current Test

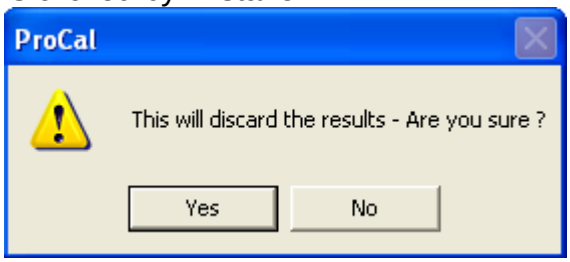
Halts the current test. Takes you to a list of all the test in the procedure, this list allows the user to select which test to complete and in what order, from this menu hitting next will allow the user to enter job comments, input the price and write an engineers report (if needed).

Abort Calibration Run

Stops calibration and displays the below message:

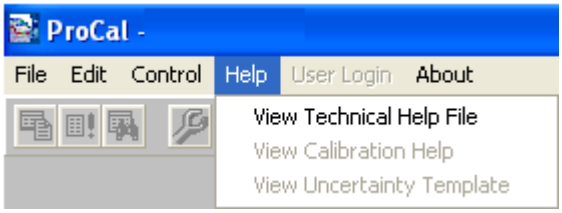


Select the required option; note there is a further 'are you sure' box after this if 'Discard results' is clicked by mistake.

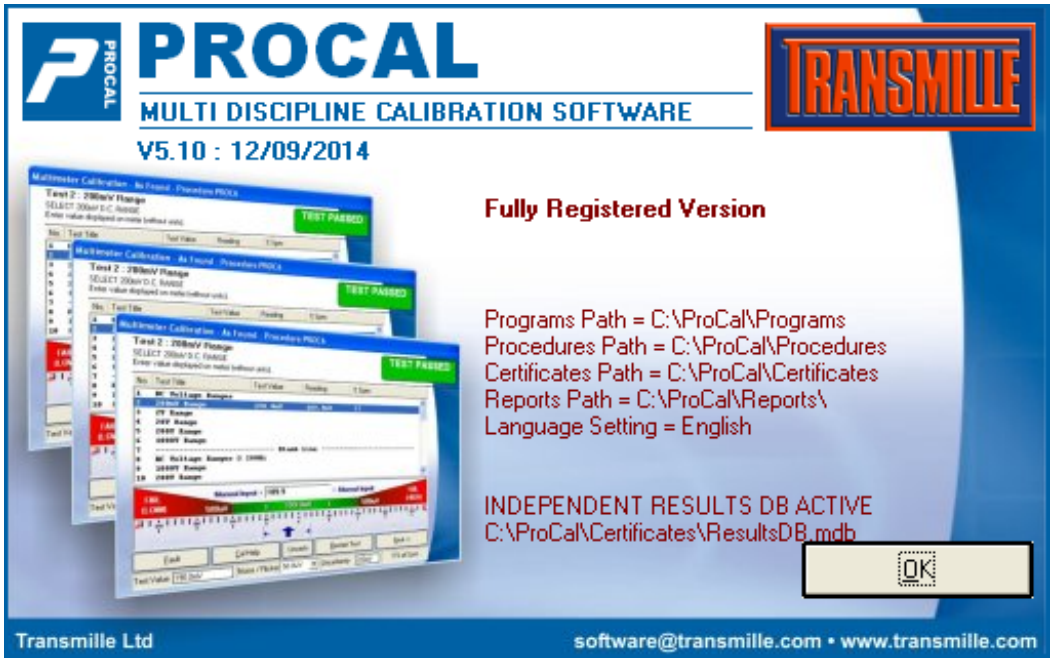


Help Menu

Used to display & view Technical Help File, Calibration Help and the Uncertainty Template. Note if these files are not present they will be greyed out.



About



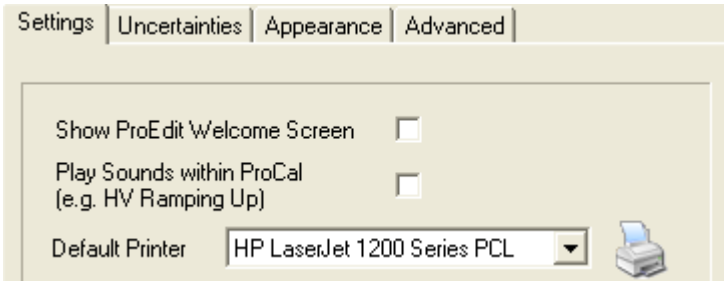
Displays the start up screen showing the version number program & data paths, the data paths can be changed by the user, but upon installation they are directed to the local drive on the workstation.

ProCal Tweak

ProCal Tweak is a quick adjustment tool for ProCal. This menu can be accessed by clicking 'About->ProCal Tweak).

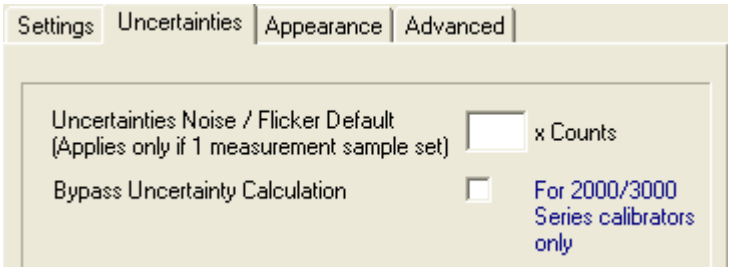
Settings

From here the user has access to the printer settings, and the choice of the ProEdit welcome screen, and allows the choice of sounds within ProCal.



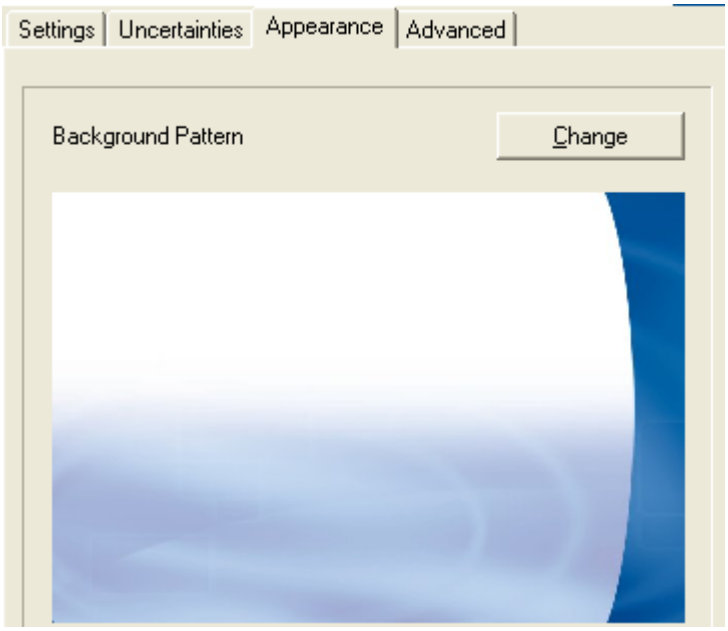
Uncertainties

The Uncertainties tab offers the ability to bypass the uncertainty calculations, although this option should be carefully used



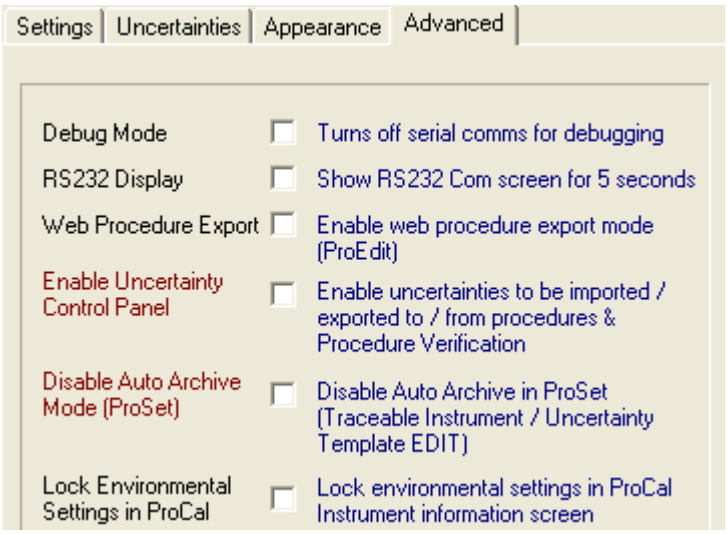
Appearance

From the user can change the appearance of ProCal, a new menu can chosen by clicking ‘Change’.



Advanced

The Advanced tab provides the options to several settings including enabling uncertainties to be imported and exported, and locking the environmental settings for the laboratory in Procal, e.g. the temperature.



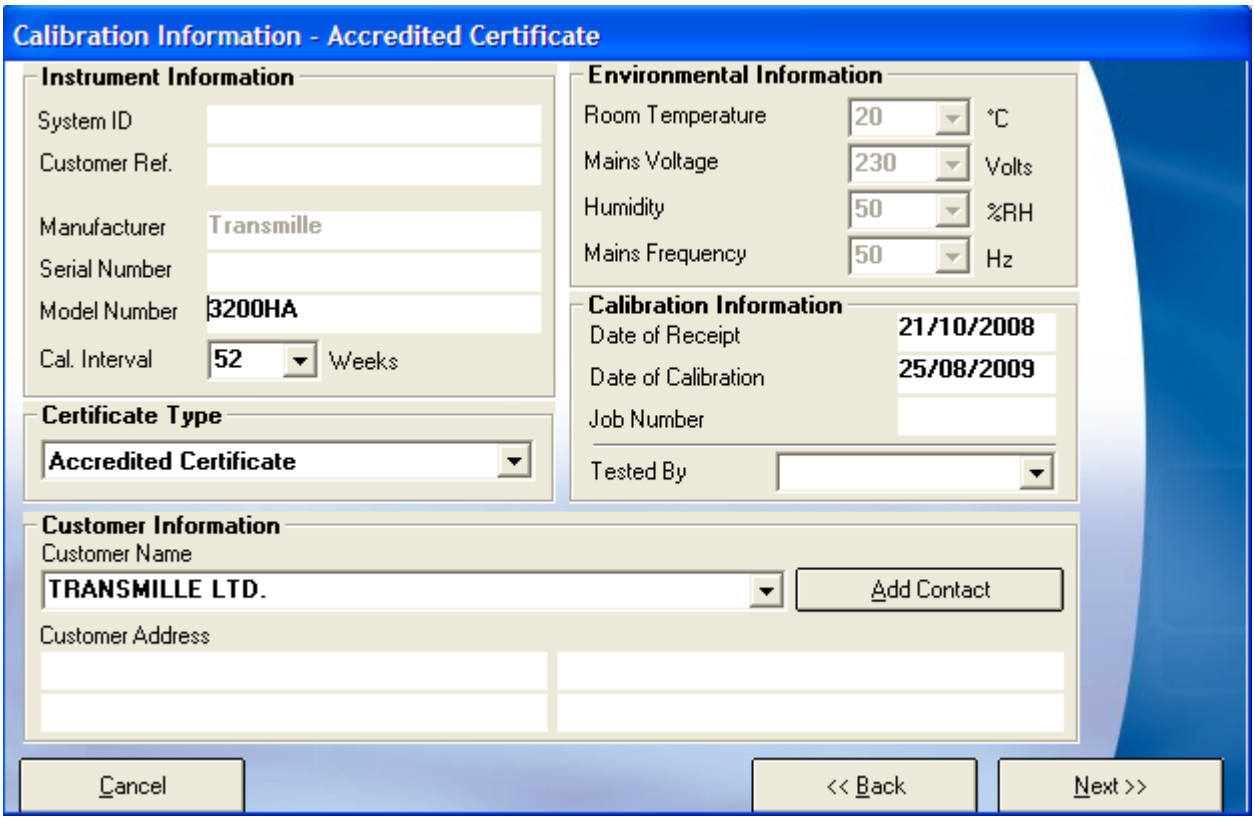
Performing a Calibration with ProCal:

Starting the Calibration

ProCal offers several ways to start a calibration to work the way you wish to. Use the file Menu to select the preferred way you wish to start the calibration.
The most popular method when running with ProCal Track is by Job number, which can be entered or scanned from the bar code label printed when the instrument was booked via ProCal Track.
If using ProCal by itself simply entering the serial number is often the preferred method.

Note: The default start up screen can be set in ProSet File>options. (Page15)

The Calibration Information screen details the instrument, environmental and calibration information.



complete this form with the instruments details and environmental information, the calibration information will be filled in automatically once calibration is complete.
This data will all be completed from the database if the instrument is on the database because it has been booked in by ProCal track or because it was previously known.

Note: You cannot leave this screen until the serial number and the calibration interval have been filled in.

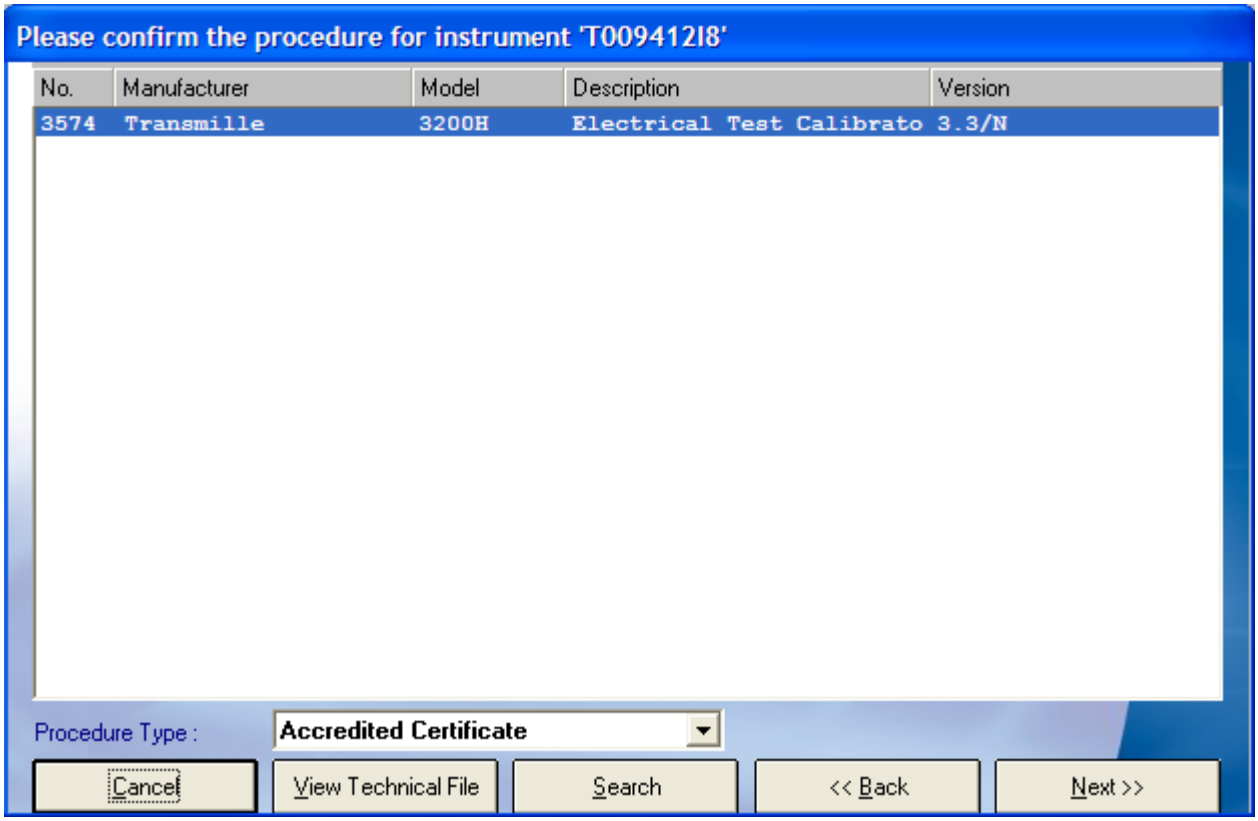
The environmental information will be remembered from the previous calibration.

Note: The variation, e.g. ±1°C printed on certificates is entered in ProSet.

Customer information can be stored in the customer database by entering the details of a customer and clicking ‘Add Contact’ button, which will add this customer to a drop down list to save re-typing frequently used addresses.

Selecting the Procedure

ProCal will automatically search for procedures, which match the model number and the type of certificate required, Standard, Accredited etc, and if there are several, it will highlight the one used last time.



Use the ‘Search’ button to manually search for a procedure if required.

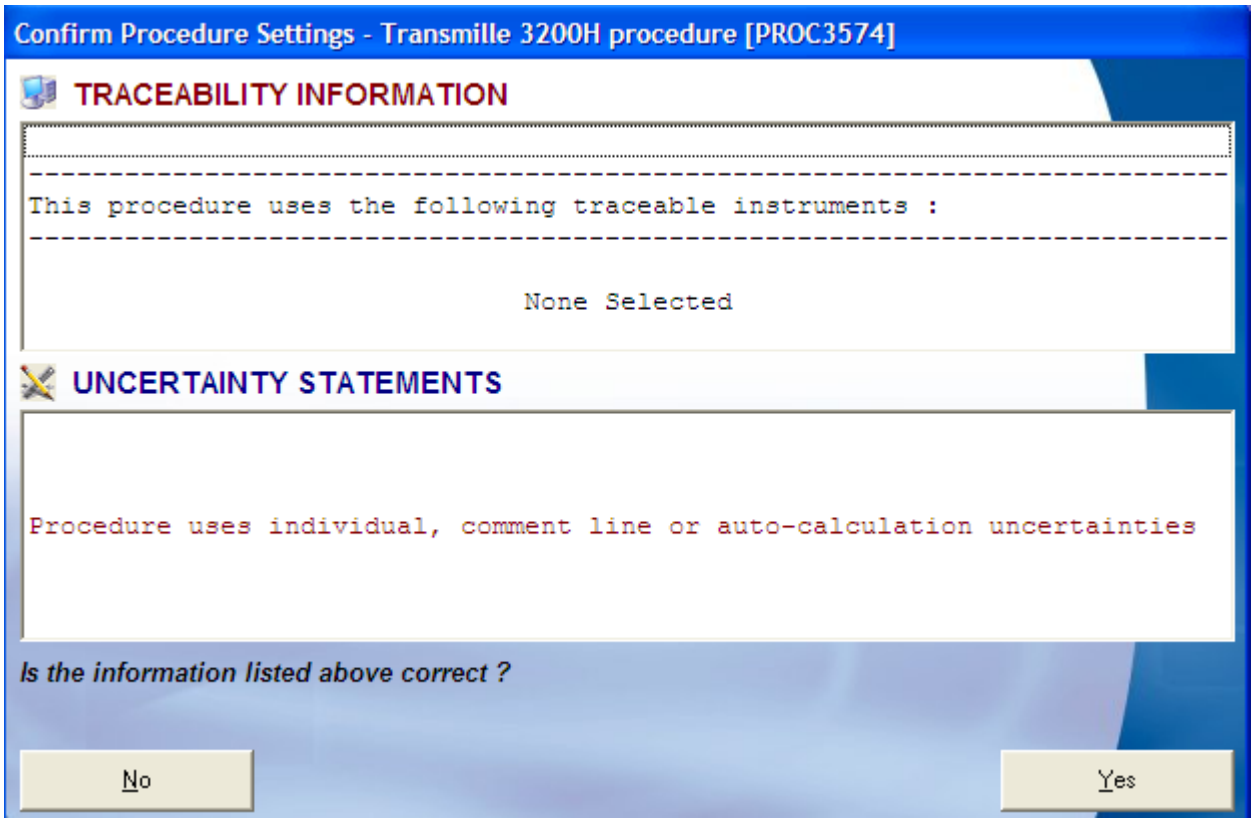
Note: That ProCal uses the Procedure TYPE selected in the search and will only list that TYPE.

Use the ‘Technical Help file’ to keep notes on procedures. Then if there are several procedures for one instrument it can be viewed to help select the correct procedure.

Traceable Reference Instruments & Uncertainty Statements.

The list of Reference instruments used in the selected procedure and also the uncertainty statements will be displayed in the below table.

Note: That 'none' may be displayed in the uncertainty box if the procedure is using individual uncertainties.



Note: Traceability information, calibration date etc, on the reference instruments used in this calibration is copied from the Instrument Traceability table in ProSet to the certificate file. The calibration will be halted if any reference instrument used is past its calibration date.

Address of Device under Calibration

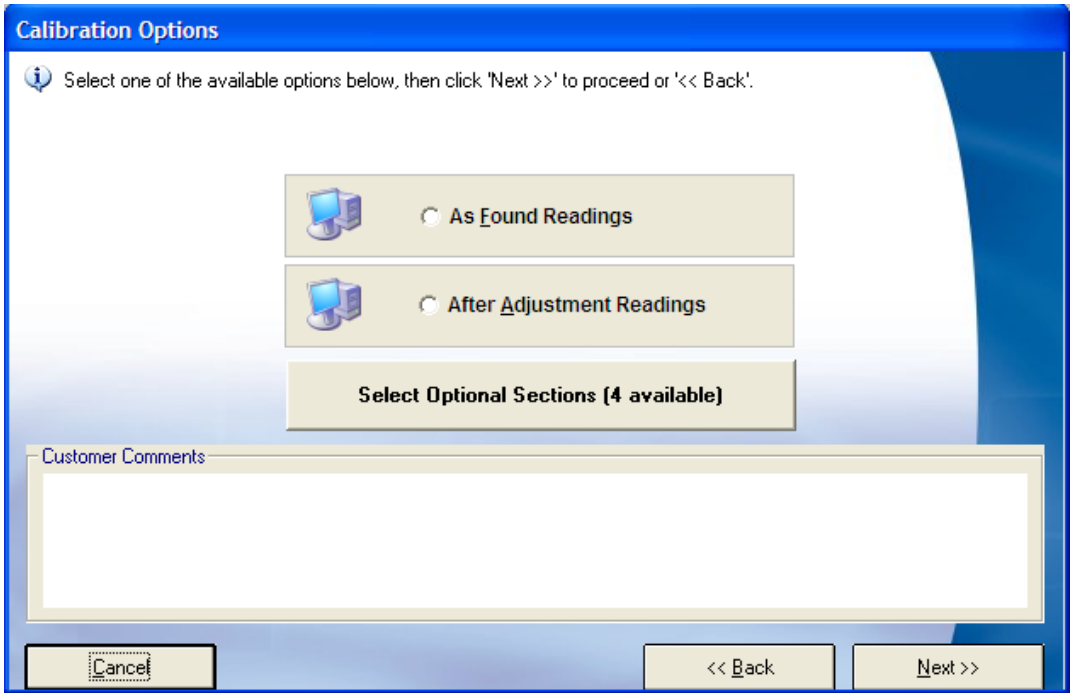
If the procedure has been written to calibrate a UUT (Unit Under Test) using an interface connection either GPIB (IEEE488) or serial COM, then ProCal will ask for the address/COM port of that instrument.

Before or After Adjustment

This screen allows the user to select whether the results to be taken are the before or as found or after adjustment. Normally the user will select first as Found readings, then if required make adjustments and return to the procedure then take another set of 'After Adjustment' readings. ProCal will know the 'As Found' results have been already taken and this option will be greyed out when returning to take the results.

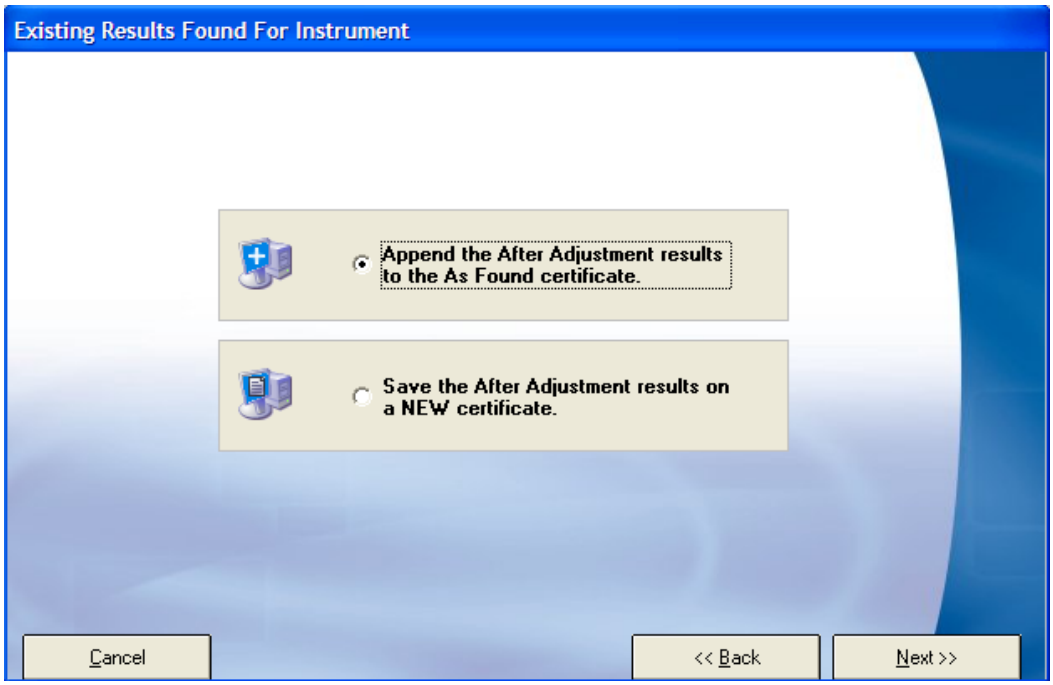
Both As Found and After Adjustment Results will be on the same certificate in this case.

If required the user may select directly the 'After-Adjustments' results, for example when the instrument had to be repaired first before any as found readings could be taken.
In exceptional circumstances it is possible to also select to make two certificates, one for before and one for after results. As this is not the normal way, ProCal will prompt you with an 'are you sure' message box.



Comments from the ‘customer comment box’ on the virtual job sheet are also displayed at this time. These may have been entered when the instrument was booked in. This is to bring to notice any special requirements asked for by the customer.

If existing results are found for an instrument, ProCal will ask the user to either attach the current ‘As Found’ results onto the same certificate as the new ‘After Adjustment’ results, or to have the ‘After Adjustment’ results saved onto a new certificate.



ProCal Measurement Tests

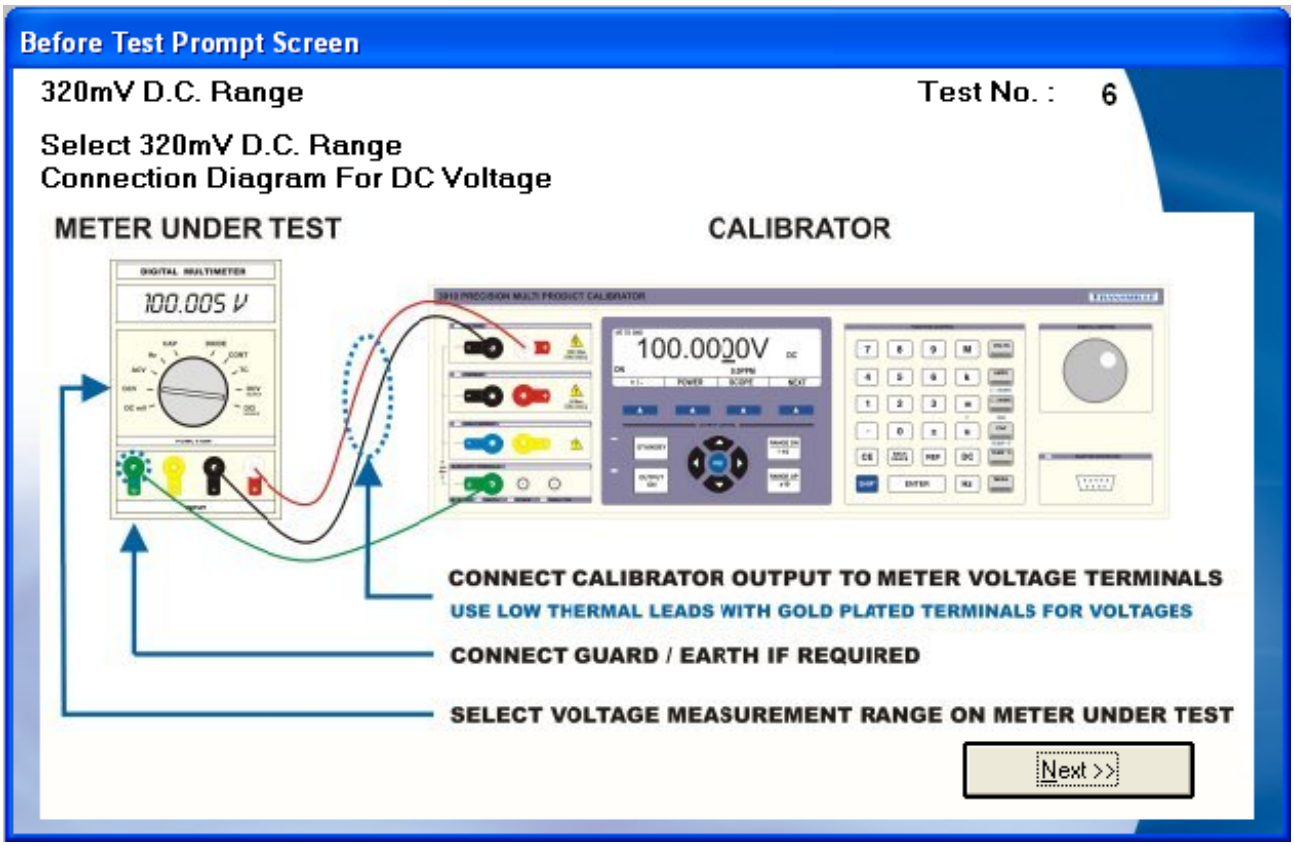
ProCal is now running the procedure as created in ProEdit. The procedure will contain many different types of test depending on the requirement for that test.

The measurement screen is very similar however for all types of test. This screen will display the tests in the procedure, of about which 10 can be viewed at one time, use the scroll bar to view all.
Normally a procedure will be started at test one and will run in sequence through to the end. However it is possible to jump to any test simply by clicking on it in the test list. (Note title tests and print formatting tests cannot be run).

Clicking the 'hand' symbol in the toolbar at the top stops a test running.

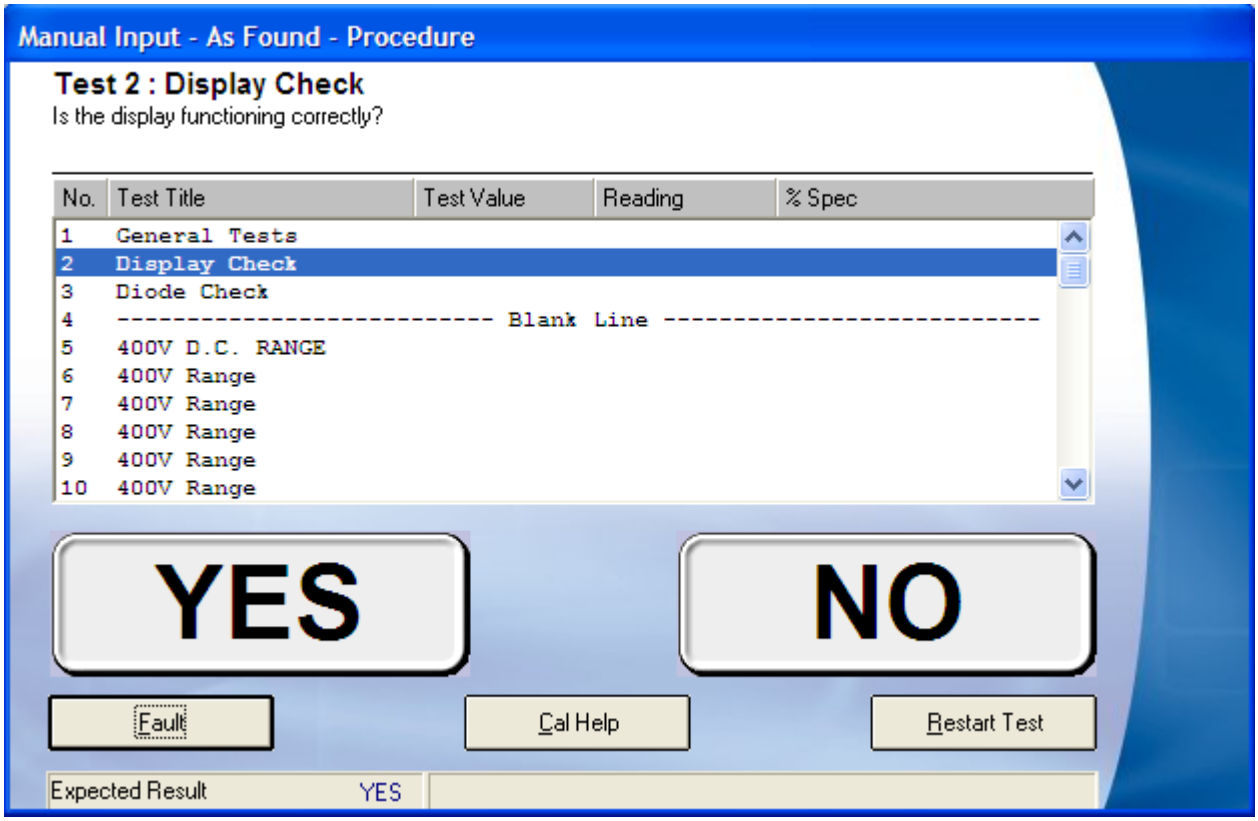
The Prompt Screen in ProCal

The prompt screen is displayed before a test if set in the procedure.
The information can be simply a typed message, a bitmap picture or even a video file. The prompt screen is there to inform the operator of the required connections, instrument settings etc.



Basic Test Types in ProCal

Running a Pass /Fail Test

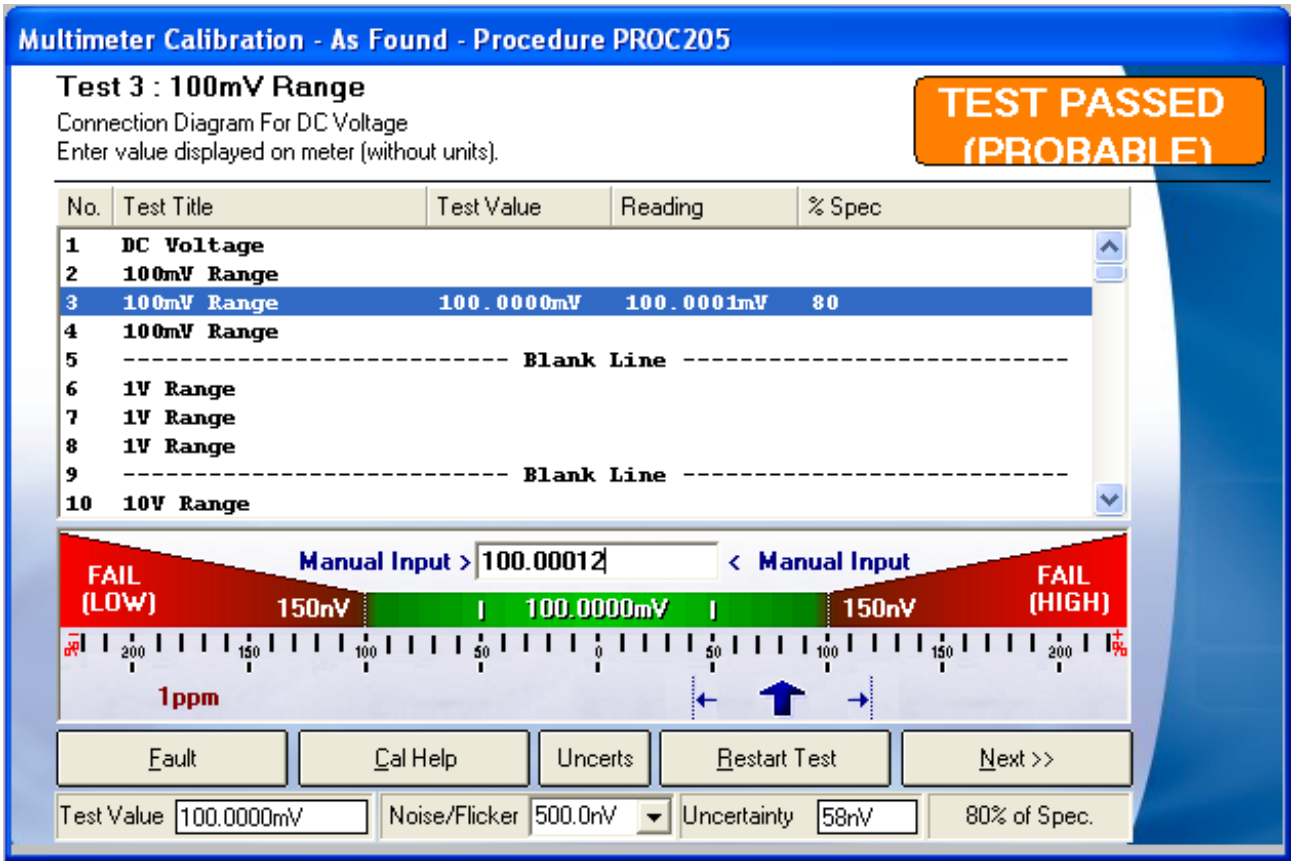


Simple click on the result, ProCal will automatically advance to the next test.

Running Meter type test: Using a calibrator

In this test the computer will set the system calibrator to the output set in the procedure. The operator will enter the reading displayed on the meter usually using the keyboard for a digital meter, or by slewing the output of the calibrator to align the pointer of an analogue meter to a scale mark.

Alternatively the reading from the meter under test may be read back using a GPIB (IEEE488) or serial interface. This type of calibration is called 'closed loop'. ProCal can even control the range and setting of the instrument under calibration, if it is entered into the procedure.



The bar graph display on the screen clearly shows the error related to the instrument under the test specifications in a graphical manner.
The width of the uncertainty band is also graphically shown as arrowheads extending to the left and right of the measurement pointer.

The result of the test is shown in the top right corner of the window.
Four possible results will be shown as described below

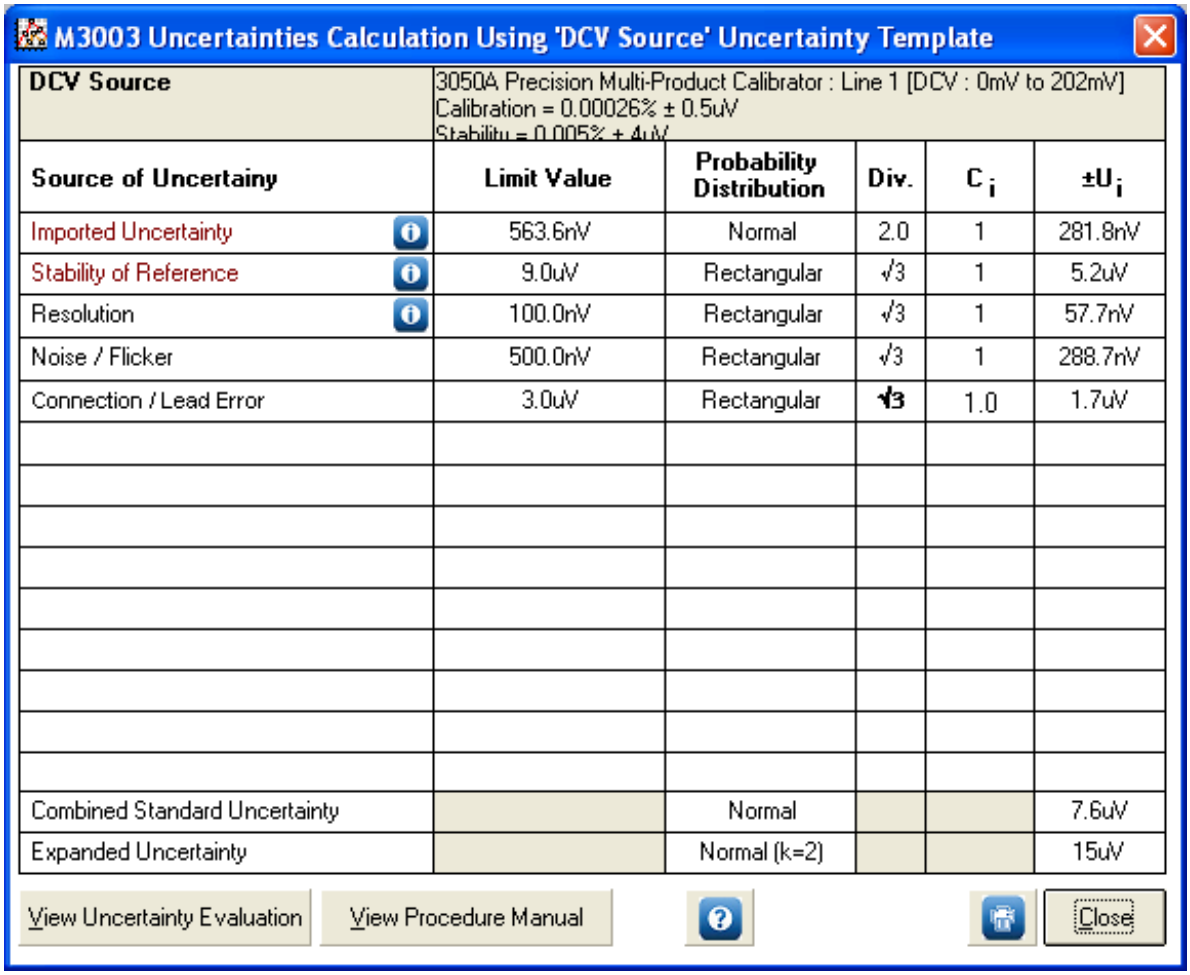
Pass: -	**Instrument passes regardless of measurement uncertainties**
Probable Pass:	**Instrument could be out of specification allowing for uncertainty**
Probable Fail:	**Instrument could be in specification allowing for uncertainty**
Fail:	**Instrument fails regardless of measurement uncertainties**

Uncertainty Calculation

To view the Uncertainty calculation window click on the 'UNCERTS' button whilst on the above menu.

Note: This button will only appear if there are no uncertainty statements selected for the procedure and there is no data in the 'uncertainty box'.

It is necessary to enter numerical value in the 'noise/flicker' drop down box to obtain an accurate calculation of uncertainty.



The Template for this spread sheet is 'DCV source' created in ProSet.

1: Imported Uncertainty is calculated at run time from data in the Uncertainty file created in ProSet for the calibrator in use. The figure is calculated by combining the Zero (Floor) and the % of reading (Gain) using root-sum of squares form the 'Calibration of reference' column.

2: Stability of Reference is calculated at run time from data in the Uncertainty file created in ProSet for the calibrator in use. The figure is calculated combining the Zero (Floor) and the % of reading (Gain) using root-sum of squares from the 'Stability of Reference' column. The data used must be entered in ProSet as K=2, 95% confidence level with infinite degrees of freedom.

3: Resolution is taken from the number set in the D.P (Decimal points box), in the test data for that test in ProEdit.

4: Noise/Flicker or the short term repeatability of a manual instrument, for example a hand held DMM must be observed by the operator and entered in the Noise/flicker drop down box at the bottom of the screen.

5: Connection Lead errors are taken directly from the DCV source template created in ProSet.

These values are then combined at run time using the standard method in GUM, M3003 etc as called for by ISO17025 to produce a dynamically calculated figure for uncertainty for 95% for each test reading. For quality audits this visual approach allows all the calculations to be easily verified.

Note: The automated calculation assumes that there are no dominate terms and all contributions have infinite degrees of freedom.

Running a Measurement Test: using a DMM to take the reading

This type of test controls & reads from the system DMM (Digital Multi Meter) using the GPIB or serial interface to automatically make a measurement.

Typically it would be used for calibrating a voltage source or measuring the output from a process control calibrator.

The system DMM must first be selected from the available models in the drop down list in line 2 of the Traceable instruments table in ProSet.
If the type of DMM needed is not supported in this list then it may be possible to order a custom driver to support your DMM. Alternatively use a general test to read a DMM using the command window to control the DMM

There are three advantages of using a driver to communicate with the DMM,

1: Avoids writing interface code in the procedure, which can be difficult and generally requires a higher level of understanding of controlling instruments.
2: With a driver all that is required to update the system DMM at a future date is to change the selection in the Traceable instruments table in ProSet.
3: A driver for the same procedure may be used on two or more systems with different models of DMM.

Note: Additional control commands can still be sent to the system DMM using the command window. Also commands to control the unit under test (UUT) can be sent which makes writing a closed loop procedure very simple. See ProEdit – command window.

The measured value is displayed in the same graphical way as the meter test above (Page 47), the only difference is that the reading is being read automatically from the system DMM, as opposed to the meter test above where the reading is being either entered manually using the keyboard or being read back from the UUT over the interface. The reading, Pass & Fail results, and uncertainties are displayed the same.

Running a General Test

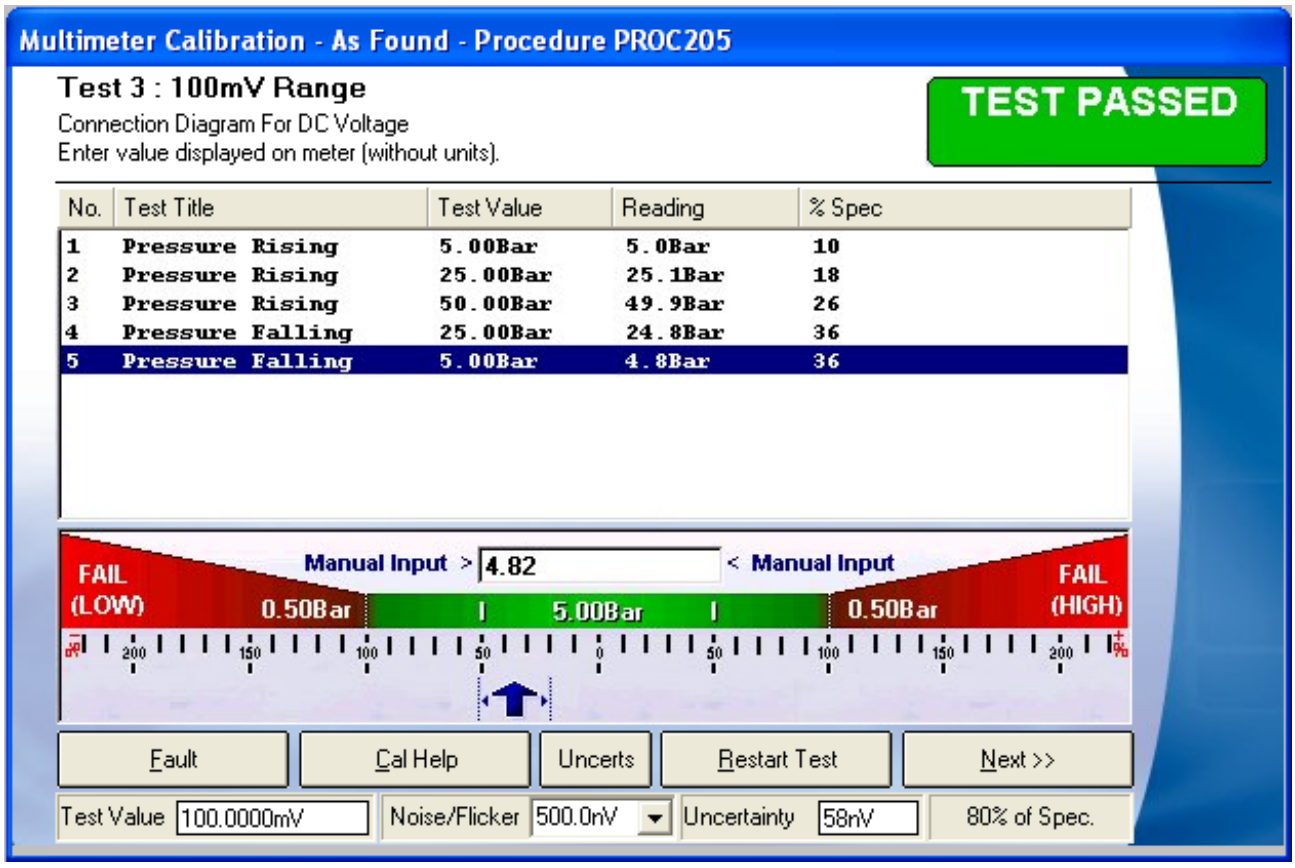
A general test is different from the above oscilloscope, meter and measurement tests etc in three ways: -

1: There is no ‘built in’ control of any instrumentation. Only using the command window controls the test.
2: There is also no Default reference instrument. This must be selected in the procedure.
3: There are no predefined units, e.g. volts,

Note: Every element of the procedure will need to be selected by the user

These differences allow a general test to be written for almost any calibration, using any reference in the Traceable instruments table, where there is a nominal value and a reading with a pass/fail tolerance.

For example calibrating a pressure gauge using a dead weight tester. Neither instrument is controlled in any way by the software, but a pressure is applied and a reading taken.



With this test type the result can be entered the same as any other reading and a certificate can still be produced, the only difference is the user has to manually enter the test results and conduct the test themselves instead of allowing the software to control the test This makes ProCal a universal solution for calibration software throughout the calibration laboratory.

Note: The Test Value box can be typed into, to change the Nominal test value if not correct for tests where the actual value cannot be known until the test is run.

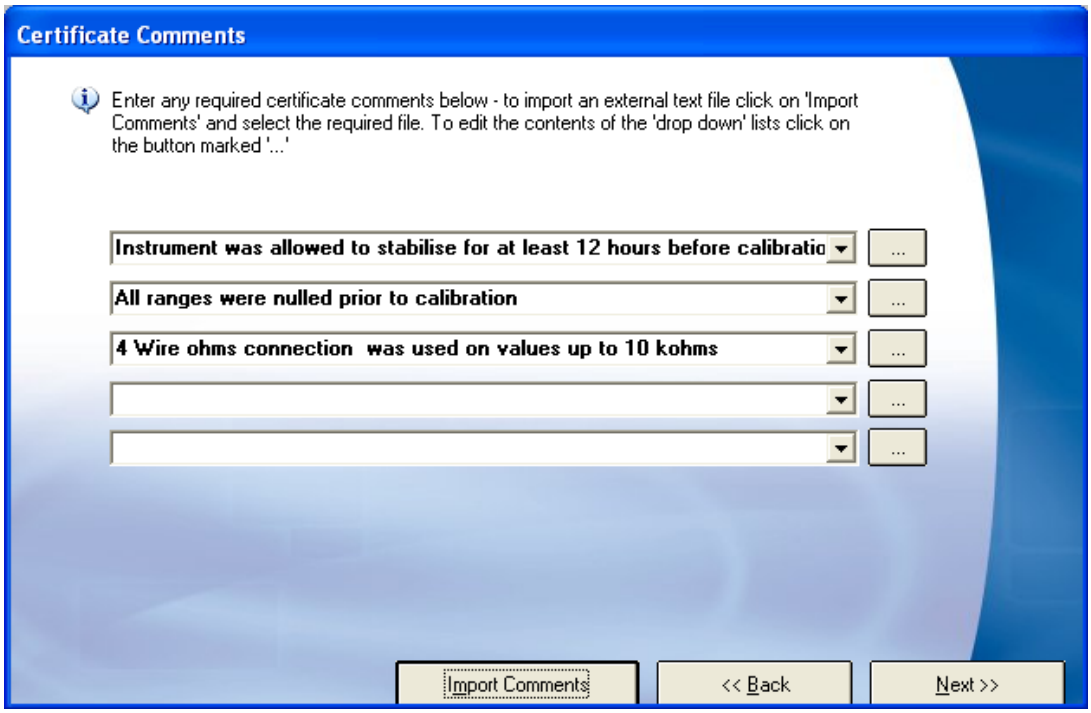
Running other test types

The other test types all follow the same format as the tests mentioned in the preceding examples e.g. they will either be a variant of a meter test, where the calibrator is set by the computer and a reading value is to be entered, a measurement type test where the computer will use an instrument to take the reading or a general test.

See the ProEdit section for details of how each test type is used.

Finishing The Calibration

After all the measurements have been taken and the instrument has passed calibration, the certificate comments should be edited. ProCal will copy comments in the procedure across automatically. Simply type in the relevant comments or use the drop down boxes to add further comments.

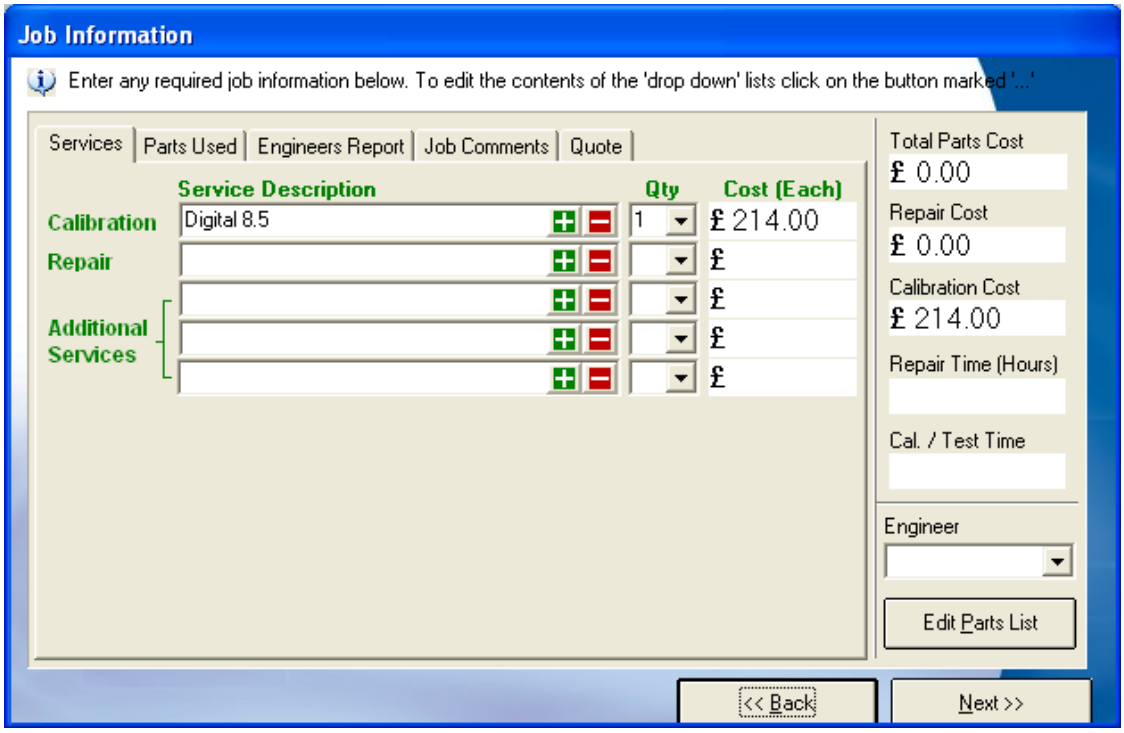


Note: To edit the content of the drop down boxes click the button '…'
Notepad will allow you to edit the file & save. The new text will only appear once the current screen has been closed and reopened.

Job information

Details of any parts used, prices, and an engineers report on any repair work are now entered.

Note: That the Job comments print on the service log, and that the engineers report can be used on a crystal report to inform the customer of any further details about the instrument.

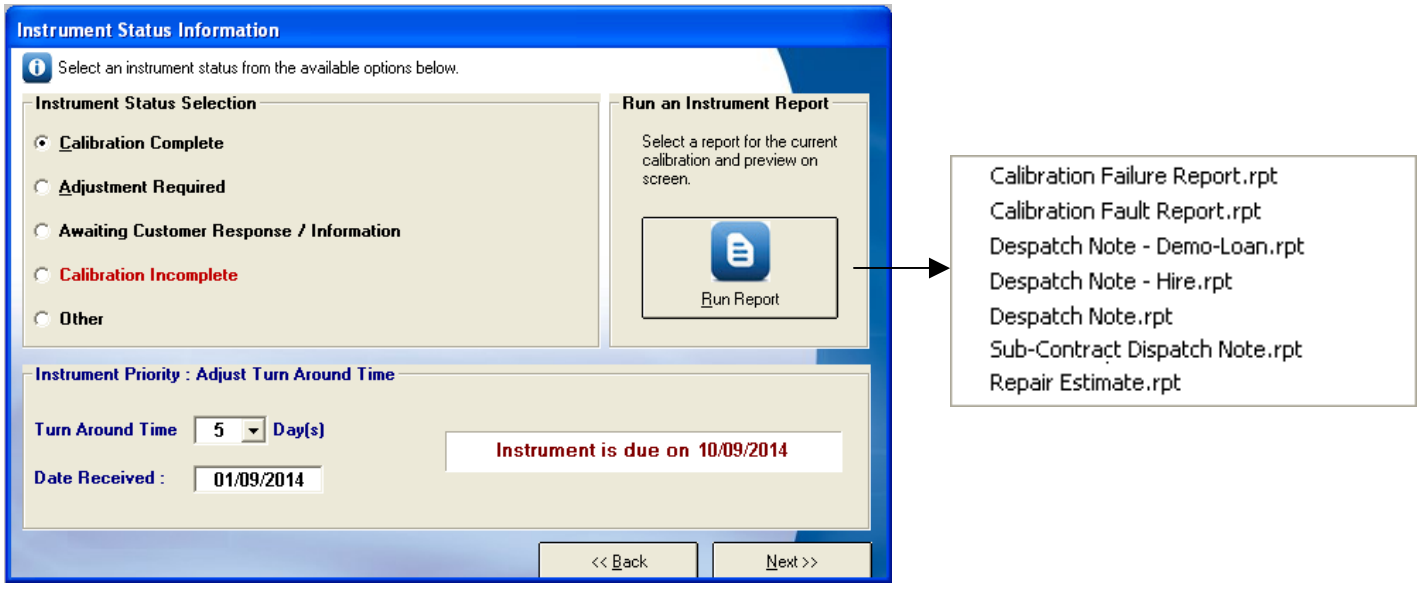


From here the costs for repairs and additional services can be added using the green cross button, this will open a new menu which contains a list of options, once the correct option is selected the new costs will be visible in the Services tab.

Setting the Instrument status at the end of calibration

Each instrument in the database has a status, which enables ProCal to keep track of what is happening to it and where it is in the calibration cycle. Before saving the results this status can be set.

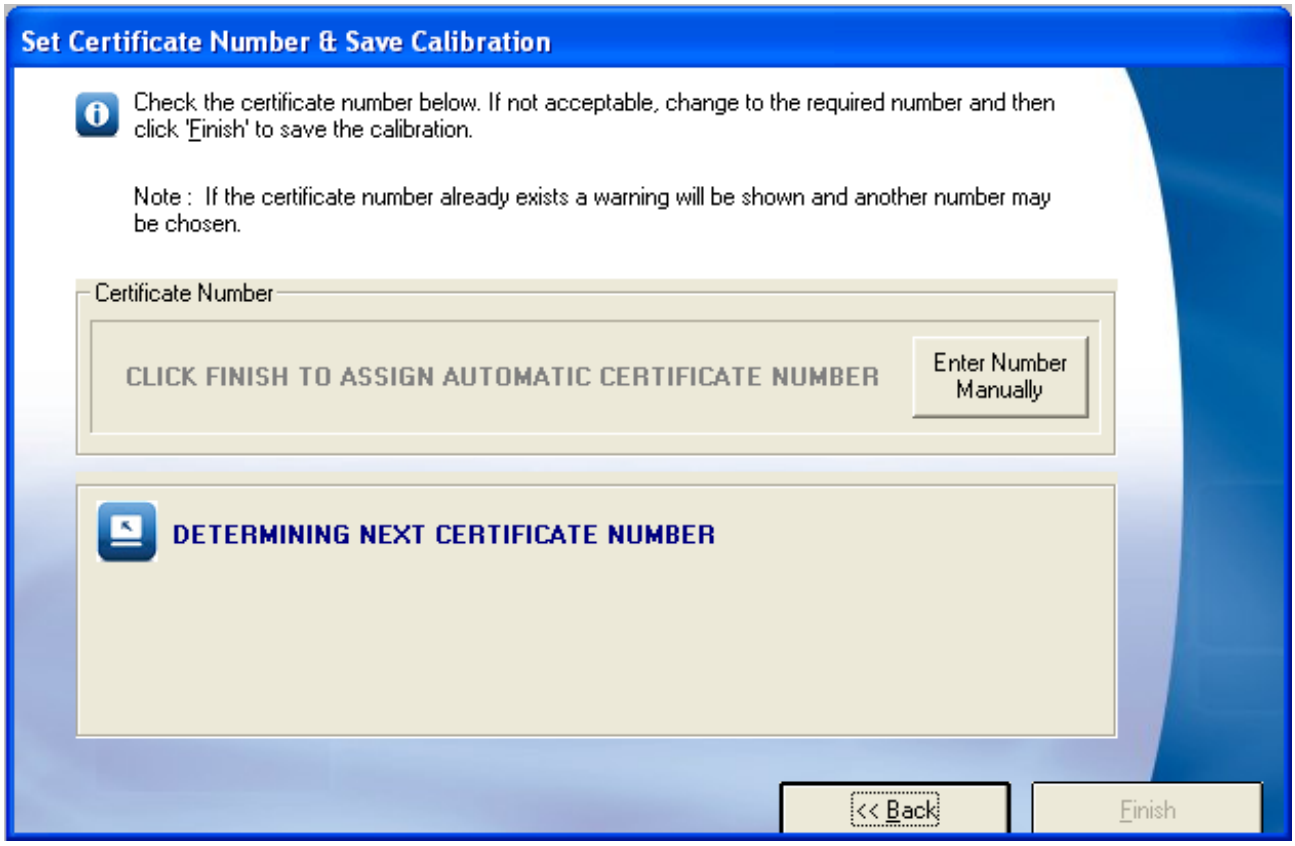
Note: Calibration complete cannot be selected, as the instrument requires adjustment.



From here a crystal report can also be generated which can be sent directly to the instruments owner to inform them, of any problems, see Calibration fault report.
If the calibration has not been completed then the 'Calibration Complete' option will be greyed out.
From the turn around time for an instrument can be updated, this means if an instruments needs repairs or adjustments the number of days can be changed to help keep track of instruments on the priority list.

Assigning the certificate number

ProCal will get the next number for the type of certificate produced (based on the procedure used) from the counters set in ProSet. The number is obtained at the completion of calibration to avoid having unused numbers if the calibration is aborted mid-test.
The user can type over the automatically generated certificate number to use a custom number. A warning message will be given if a duplicate number is entered.



Note: Use the back button to return to any previous screen

Click finish to complete the calibration and save the certificate number.

ProEdit: Managing Procedures

Overview and Introduction

ProEdit's prime function is to create and edit calibration procedures used by ProCal.
A procedure is made from a header, which contains information about model numbers, instrument manufacturers etc, followed by any number of individual tests. The use of in built wizards allows easy and rapid generation of procedures based on generic type instruments.

ProEdit also manages the procedure library. Allowing procedures to be copied, printed and deleted. In addition ProEdit can upload to its library, procedures which can be downloaded from the Transmille website.

Note: For this function to work a key code from Transmille must first be purchased.

ProEdit will be installed as part of the ProCal suite but can be run as a stand alone program, enabling procedures to be worked on remotely from the calibration station.

Procedures are stored in Microsoft Access as individual files in .mob format. There is also an index file, which logs the procedures in the library.

ProEdit Shortcuts

To have this menu open on start-up, click Help->Show Welcome Screen' and tick the box in the lower left corner. This menu does not need to be used; the same functions can be accessed via the normal menu.

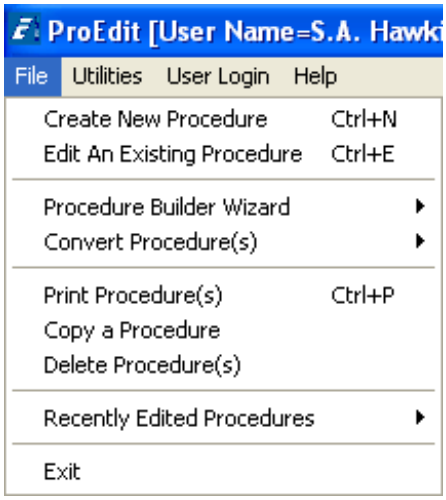
From this menu the user can 'Create a NEW Procedure' detailed instructions on this function can be found on Page 68. The users can also 'Edit an EXISITNG Procedure' with detailed instructions on Page 65. The user can also 'Search for a Procedure' via this menu. The final

option allows the user to ‘Start Procedure Wizard’ for which detailed instructions can be found on Page 66.

ProEdit Menus

The File Menu

The main file menu allows basic controls for creating, editing and copying procedures etc.

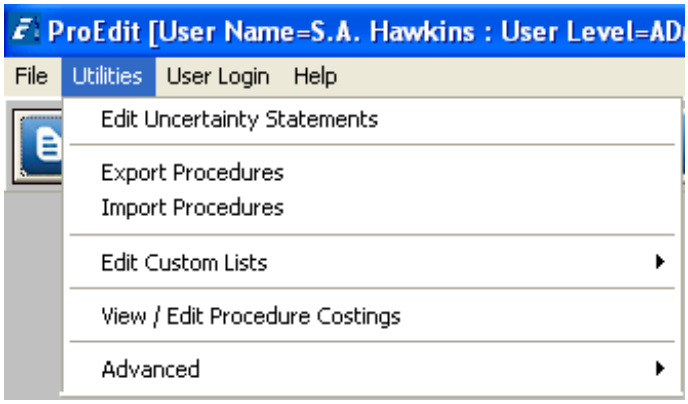


Create a New Procedure
Selecting File ->Create New Procedure will open up a new menu allowing the user to create a procedure without using the wizard, a detailed guide can be found on page 68.

Edit an Existing Procedure
Select File->Edit an Existing Procedure if changes or updates need to be made to a procedure, changes can be made to any part of a procedure, a detailed guide can be found on Page 65.

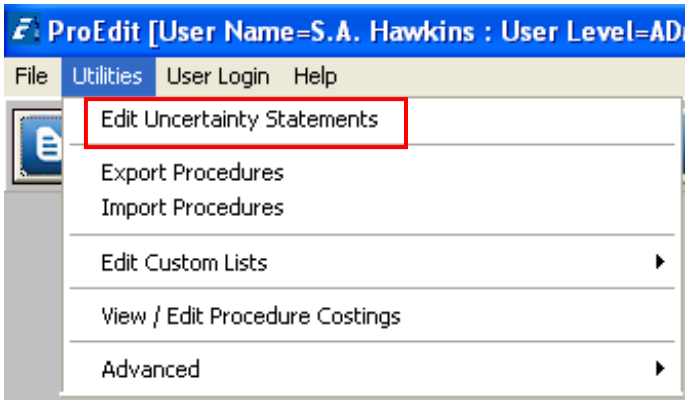
Procedure Builder Wizard
Selecting File->Procedure Builder Wizard opens a new menu with a series of images depicting various instruments that have pre-written procedures, a detailed guide can be found on Page 66.

The Utility Menu



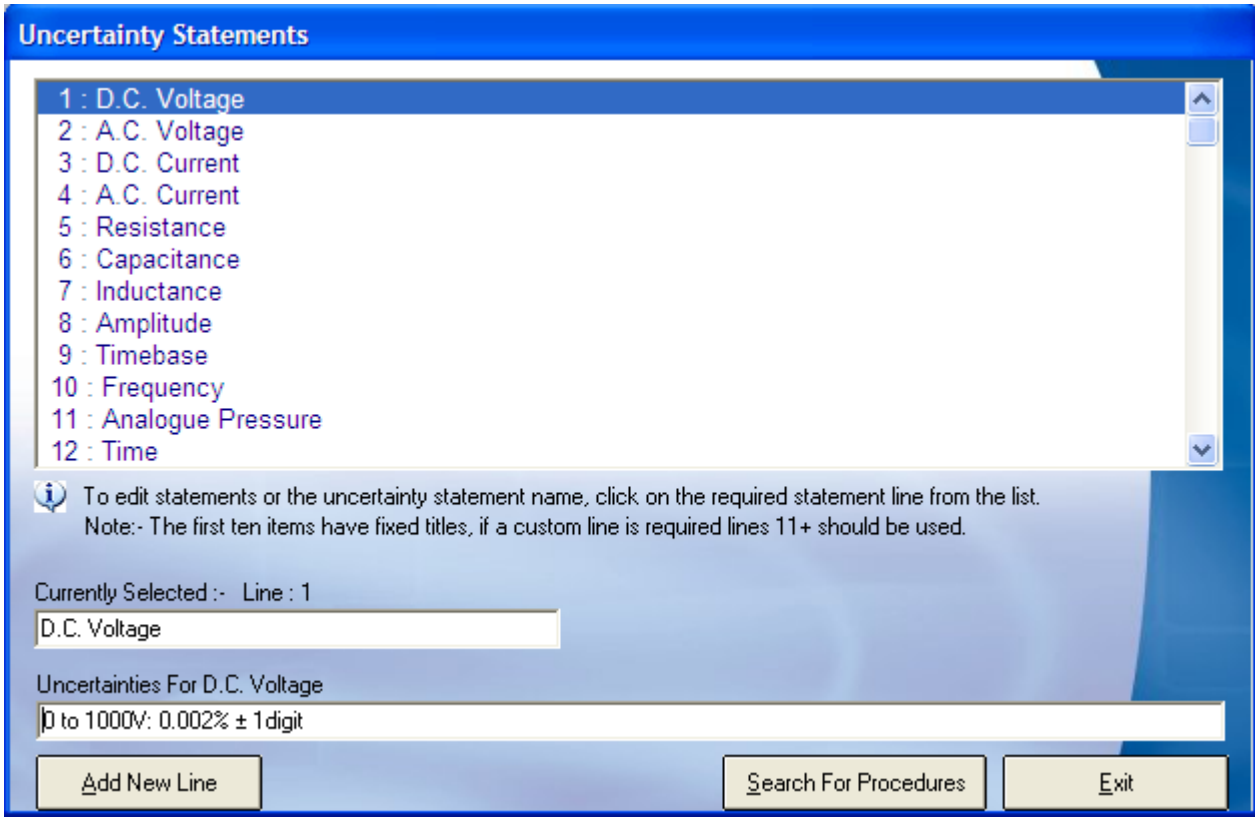
The Utilities menu allows access to the functions in the above image, 'Import Web Procedures' will only be greyed out if a key code hasn't be acquired from Transmille.

Edit Uncertainty Statements



Selecting Utilities->Edit Uncertainty Statements allows the uncertainty statements, which can be selected in a procedure and printed on the certificate to be created and edited. A default table is loaded when installed, but new lines can be added to suit the requirements of an instrument.

Note: This table is only used if uncertainty statements are selected in procedures. Otherwise individual uncertainties will print.



Note: A procedure only uses the line number of a statement. If the order of statements in this table is changed, a previously written procedure will transfer the new statement, which may be incorrect. Example: If the statement for AC volts were replaced with RPM any procedure that had AC volts originally selected would now transfer the RPM statement to the certificate when used.

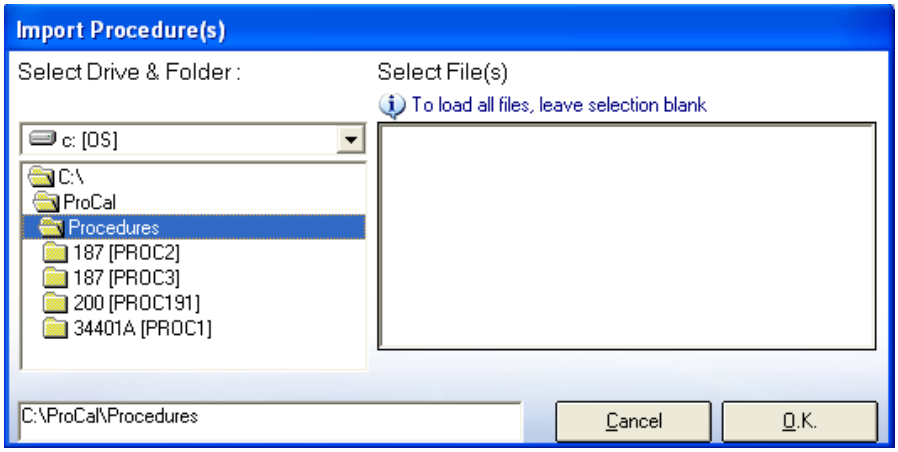
On Networked systems it should be remembered that this table is on the local C: drive, (as each system will require its own uncertainties) care should be taken to ensure the order of this table is the same for each workstation. Otherwise a procedure will select the incorrect statements on some stations.
To check which procedures use a particular statement use the 'search for procedures' button

Export Procedures

This function allows the selected procedures to be exported to back up the data, or to be transferred to another system.

Import Procedures

This function enables procedures that have been exported by the above method to then be re-imported onto the system.



Edit Custom Lists

Opens with notepad either the 'Manufacturers list' or 'Instrument description list for editing. These lists are used in the drop down boxes. The data in the drop down boxes will no be updated

View Edit procedure costing

Opens a list box showing procedures with the option to edit the price/code field.

Advanced

Offers the option to compact and update procedures to the archive for backup. Also allows the user to archive a copy of a procedure before it is edited.

Writing and Editing procedures with ProEdit

A ProCal procedure is made up of a header and a series of tests.
New procedures can be created in three ways: -

1: By Using the Wizards
2: By editing an existing procedure
3: By writing it line by line

A test can be dynamically edited using ProEdit while at the same time running that test in ProCal. In this way a test can be corrected in ProEdit, saved back to the database by using 'copy test' button, and then run directly by ProCal by using 'restart test'. This provides a very quick method to De-bug a procedure. Note An error will be generated if a test is added or deleted in a procedure by ProEdit when ProCal is running that procedure.

Procedure Builder Wizard

By using ProEdit, the user can create procedures very easily and quickly by using the inbuilt wizard, which can be used to build a basic procedure for a generic instrument type. If an instrument combines several functions such as a Loop and RCD tester, the wizard can actually amend the second instrument tests to an existing procedure, negating the need to create a new procedure.

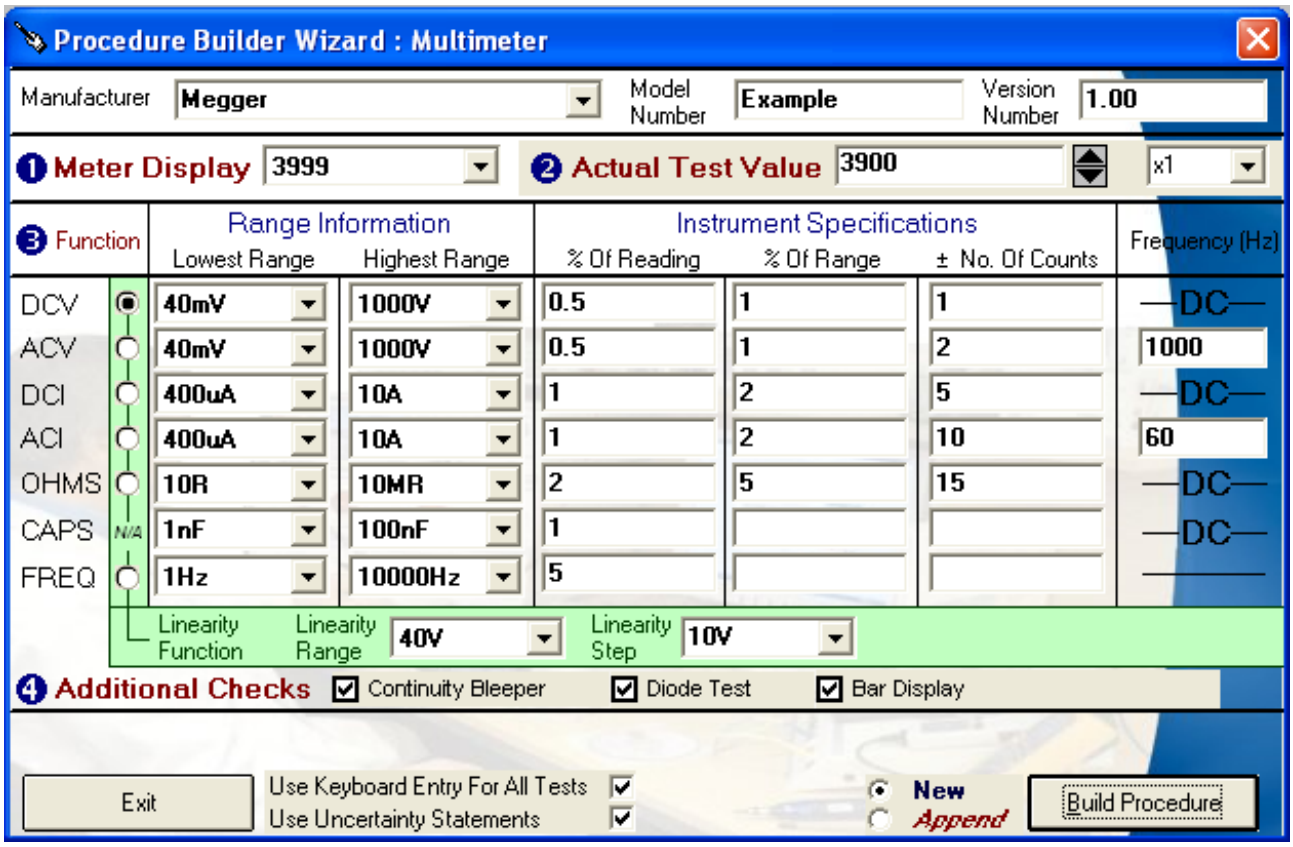
If extra tests or changes to the specification need to be made then using the edit function within ProEdit can perform this.

From this screen select the instrument you wish to create a procedure for -

Selecting the MultiMeter image will open the menu below.

Wizard for a Multi meter: -

To create a Procedure for a DMM (Digital Multi Meter) complete this form and click ‘Build Procedure’



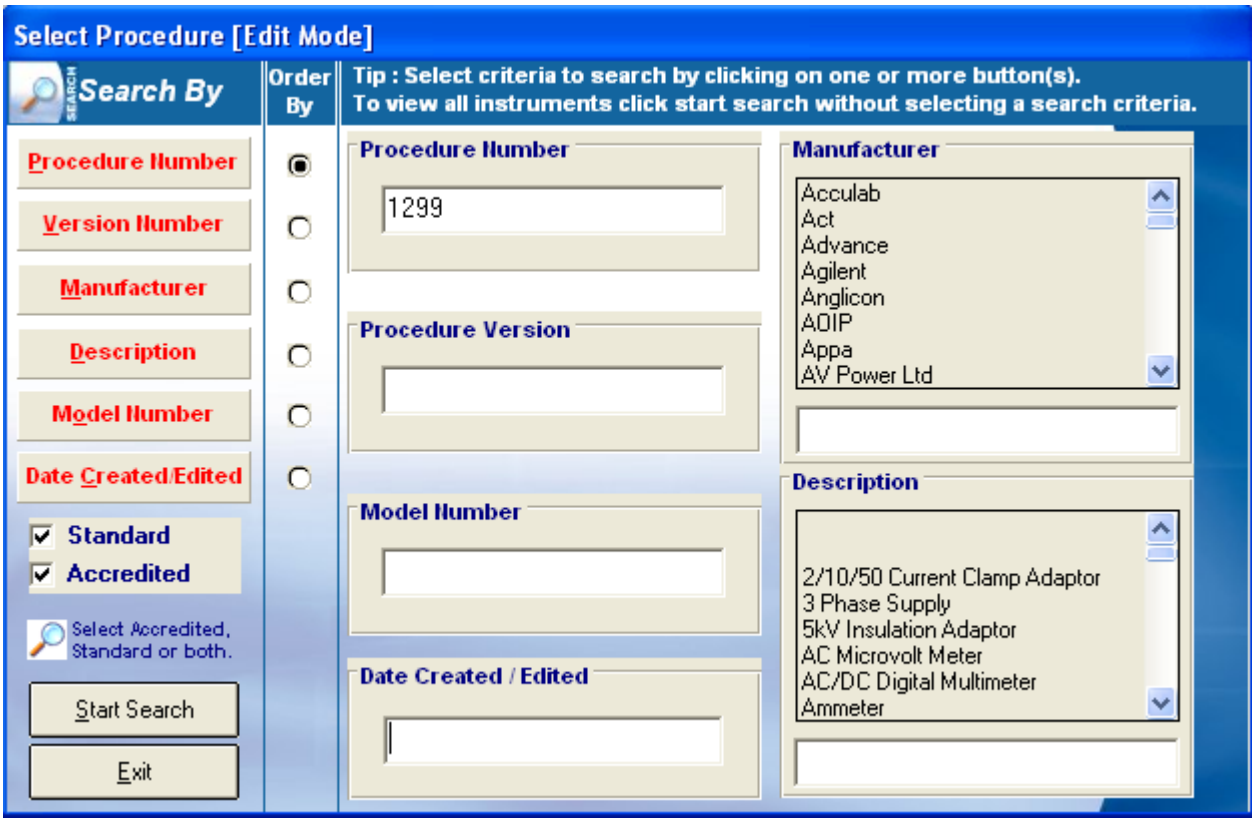
Each separate wizard is used in the same manner to create procedures for different instruments. Choosing a different instrument within the Wizard will open a different form; each one details the individual information that is needed to build the procedure.

Editing a Procedure

Once a procedure has been created it can be very easily edited. Tests can be deleted, copied, inserted & pasted which enables tests to be quickly duplicated and edited.

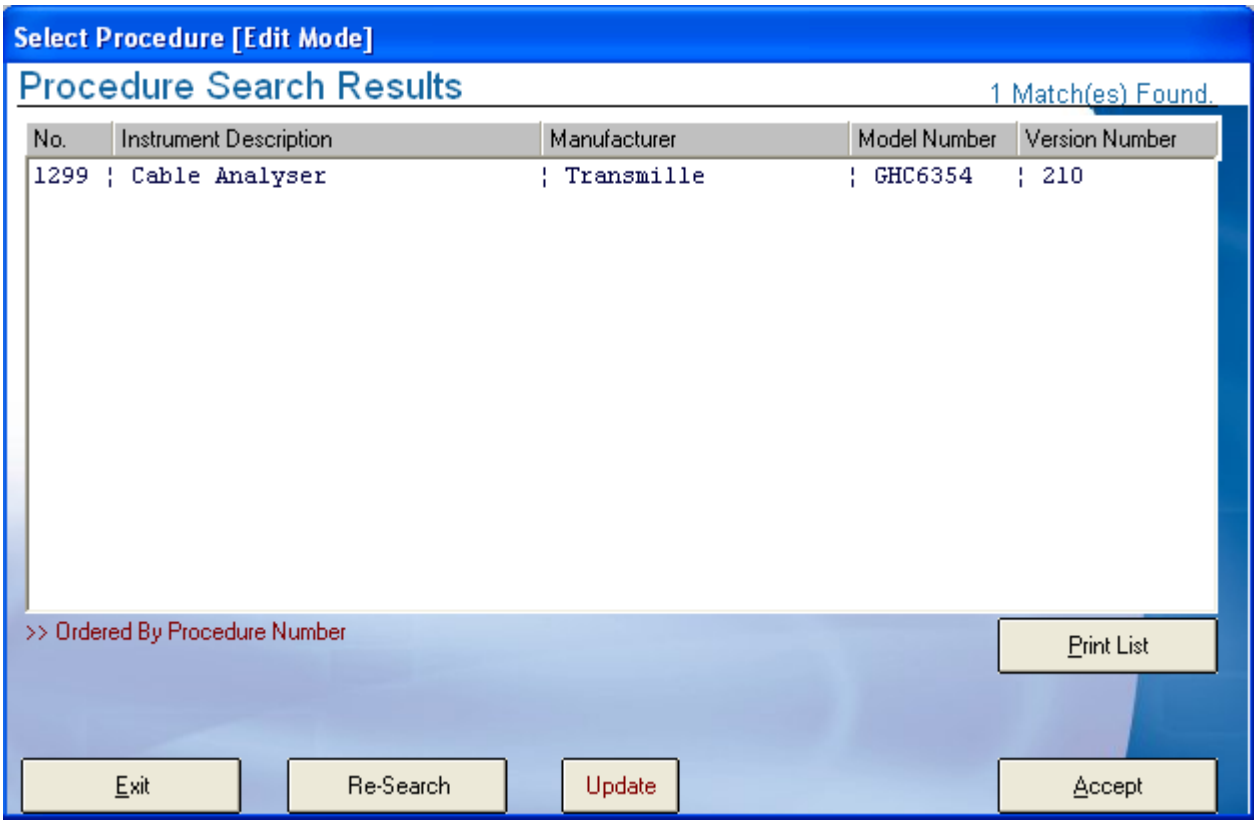
Note: A test can be dynamically edited using ProEdit whilst at the same time running that test in ProCal. In this way a test can be corrected in ProEdit, saved back to the database by using 'copy test' button, and then run directly by ProCal by using 'restart test'. This provides a very quick method to De-bug a procedure.
Note: An error will be generated if a test is added or deleted in a procedure by ProEdit when ProCal is running that procedure.

Each test in a ProCal procedure is independent, containing all the data required for that procedure and no other.



A procedure can be searched for by any one of the above methods, the description of the instrument and the manufacturer can be chosen via the scroll bar or by entering the name manually. Procedures can also be found by selecting if it is a Standard or Accredited procedure using the tick boxes, this option will load a seperate list of all accredited or standard procedures.

If the procedure is found a new menu will open allowing the user to select the correct procedure if more than has appeared depending on the search options used.



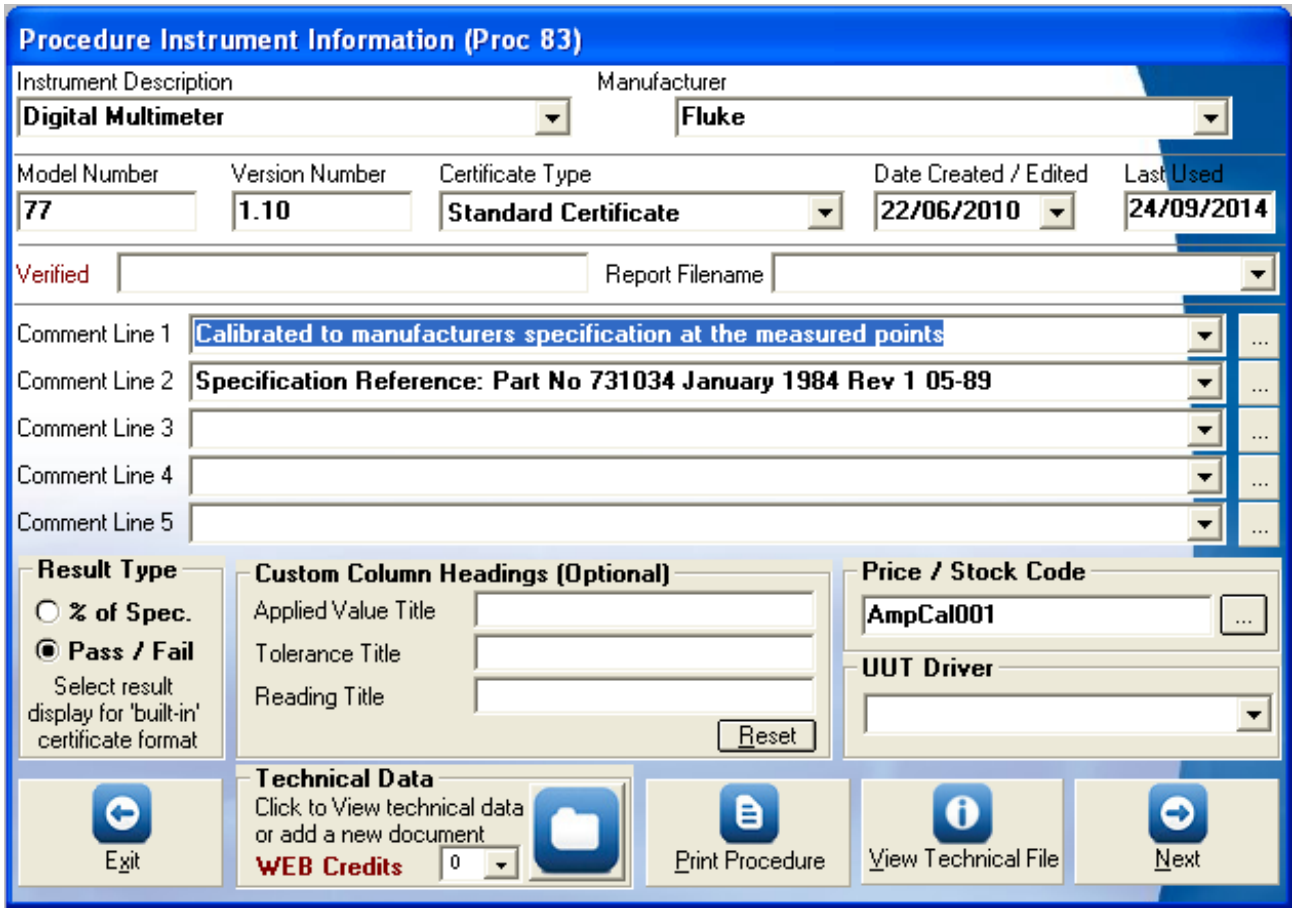
Double click the procedure, or select it and click ‘Accept’, if the wrong procedure is found then click ‘Re-Search’ to find the correct one.

The Procedure instrument Information menu will be opened, all information can then be edited and updated, the next menu will contain the Uncertainty statements and Traceable instruments that can be changed and updated if required. The final menu contains the tests of which all can be edited, to finish editing a procedure just click ‘Done’. Editing a procedure follows the same outline as creating a new procedure.

Create new Procedure

After selecting 'create new procedure' the user is first asked if they are sure they wish to create a new procedure, after selecting "Yes" the user will have the below form to fill in with the details of the procedure and the instrument.

The Procedure Header Page: -



Instrument Description

Use this field to describe instrument functions, this will be printed on the certificate and MUST be completed.

Note: The drop down box can be edited in the utilities menu.

Manufacturer

Used to highlight the manufacturer of the instrument, this will be printed on the certificate and MUST be completed.

Note: The drop down box can be edited in the utilities menu.

Model Number

This field is for the model number of the instrument and is very important, as the model number used in the procedure must match for ProCal to automatically search for it. It is a good idea to have a 'company standard' method to deal with spaces in model numbers and the use of Roman numerals when entering a model number.

Note: That any digital ID images and that the Technical help notepad file are linked to the procedure by model number. Changing model numbers here will require these files to also be renamed and updated.

Version Number

Used to identify the version of the procedure. Note that when editing a procedure there is an automatic archive option available. The archive option allows the user to save a copy of a procedure before it is edited; this is a valuable function of ProEdit.

Certificate Type

Used to select the type of calibration and certificate that this procedure will produce.
This selection sets both the certificate print style and also to only list procedures in ProCal which match the certificate/report style set for the instrument, as set in ProCal or ProCal-Track.

For example: Only procedures for standard calibration will be listed for an instrument which has been booked in for standard calibration, whereas an instrument which has been booked in for an Accredited calibration will only have the Accredited ISO17025 procedures listed. This stops the accidental selection of the wrong type of certificate format.

Note there are 5 different certificate/reports available:

Standard Certificate
Accredited Certificate
Certificate of Conformance
Electrical Safety Test
Test Report
None

Each with its own certificate number counter as set in ProSet. Any particular model may have for example both a standard certificate procedure, and an ISO17025 accredited style procedure with different test points, uncertainties comments etc. This allows the laboratory to provide complete flexibility in the choice of services it provides.

A separate counter is used for each type of certificate/report, allowing for the sequential numbering of certificates.
The Test report is of particular interest for hire equipment as it allows a short procedure to be used as a quick check before or after hire, whilst the certificate procedure allows for a full annual calibration.

Date Created

Used to log the date that a procedure is written.

Note: Use the Technical help file to keep details of the procedure history.

Date last Used

Automatically filled in by ProCal when used, useful when checking on the usage of a procedure.

Notes (Technical File)

Short text field used for procedure notes, e.g. special version. Use the Technical help file to keep longer notes.

Note: That the Technical note file is a simple text file edited by Windows notepad, and is automatically created by ProCal as model number .txt from a template file.
This file can be easily viewed and edited from many screens in ProCal simply by clicking on the 'View Technical File' button. It is very handy for keeping all sorts of notes relating to that instrument.

Report File Name

If a special style of certificate/report is required for this procedure then a crystal report file name can be entered here and this will always be used for any certificate produced by this procedure.

Comment Fields

Any comments made in these 5 lines will be copied across to the certificate when this procedure is used. These lines can be edited before the certificate is saved. This can save time and also mistakes.

Print Options

Set on standard certificates where a test result will be printed as pass/fail or as a percentage of specifications figure. The majority of quality mangers prefer to see Pass/fail printed.

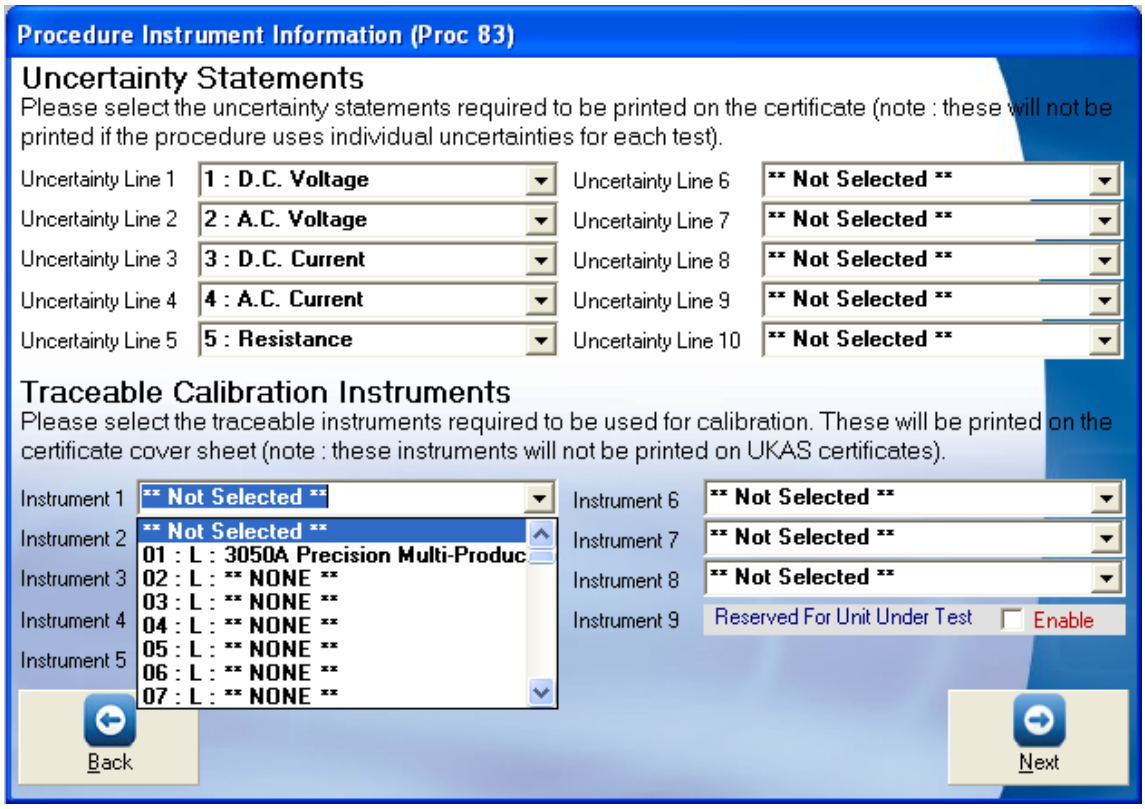
Column Headings

Sets the titles printed at the top of each measurement page on the printed certificates.

Price / Code

Sets the Price of a calibration using this procedure, this information is then transferred to ProCal track and used for Job costing and invoicing later.

Procedure uncertainty statements and Traceable reference instruments used.



Use the drop down boxes for the Uncertainty Statements if using this method of uncertainties for the certificate. Note there are a maximum of 10 lines of statements that can be printed on a certificate using this method.

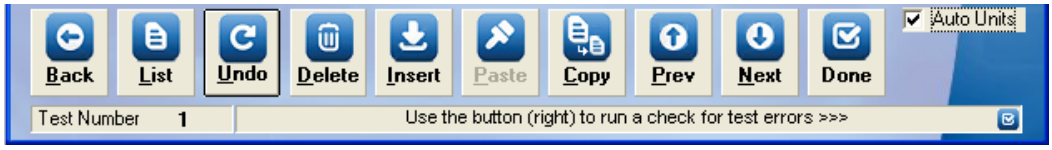
LEAVE ALL STATEMENT LINES SET TO 'NOT SELECTED**' IF YOU WANT TO PRINT INDIVADUAL UNCERTANTIES WITH EACH TEST AS REQUIRED FOR AN ISO 25 / 17025 ACCREDITED CERTIFICATE**

Use the drop down boxes for any reference standards used in the procedure. Not that ProCal automatically knows about reference standards used when manually selected in tests, or are the default instrument for that test. Other standards used as ancillary equipment, for example a thermometer to measure the temperature of a resistor will need to be added here.

Instrument 9 'Reserved For Unit Under Test (UUT)' must be clicked. Enable if the UUT's interface is being used to perform a closed loop calibration. This will cause ProCal to Prompt for the UUT's interface either as a GPIB (IEEE488) address or as serial COM port number before starting calibration.

Test Control

When editing a procedure or creating a new procedure the buttons below the data screen enable the user to control the process:

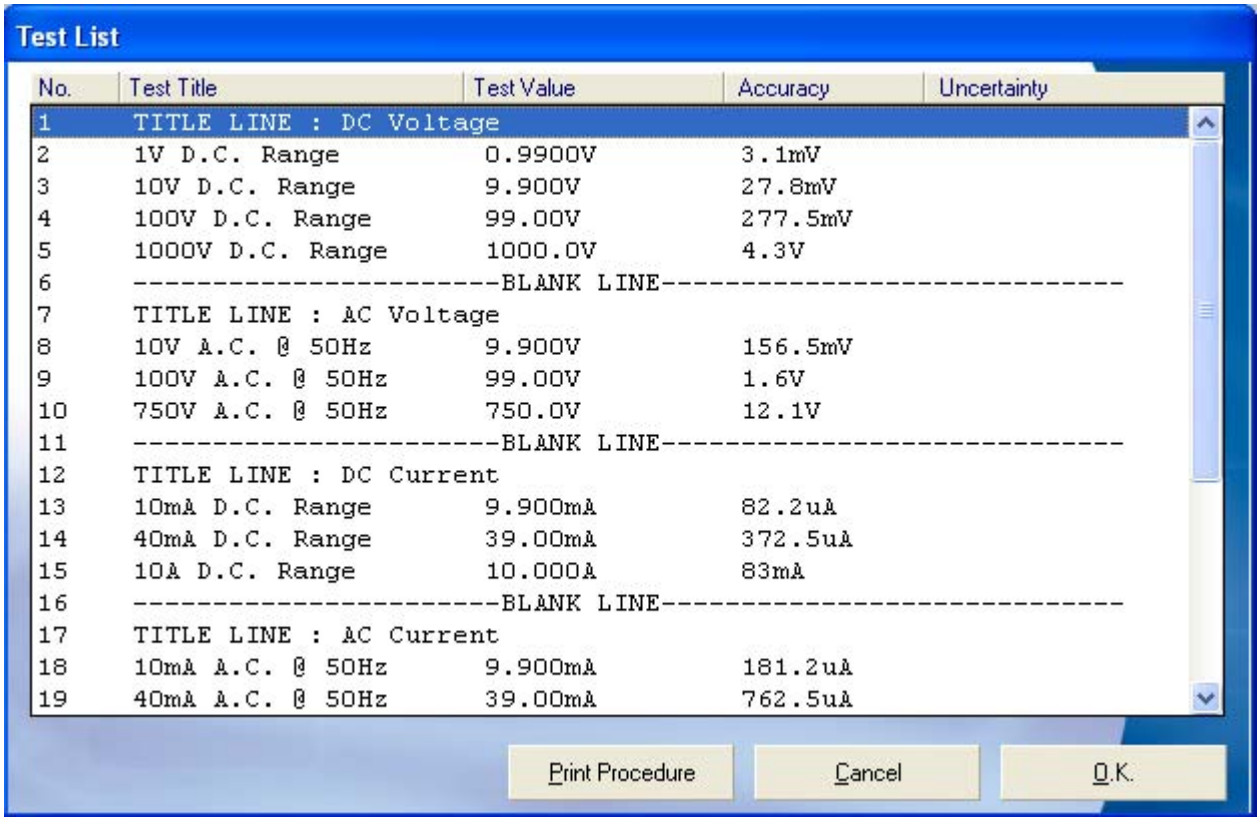


<Back:

Returns the user to the previous screen– Procedure instrument information screen

Show All

Displays a list of all the tests in the procedure



From this screen it is possible to jump to any test simply by double clicking on it or clicking ‘OK’ after highlighting the relevant line. A short print out of the procedure can also be generated from here by clicking on ‘Print Procedure’.

Undo

Undoes all changes since moving to that test.

Delete

Removes a test from a procedure. All other tests are shifted up one line. Any formula functions, which use a test number, are also adjusted.

Insert

Inserts a blank test above the current tests in the procedure, all tests below are shifted down one line. Any formula functions, which use a test number, are also adjusted.

Paste and Copy

Pastes a complete test, which was previously copied using ‘copy’ over the current test. If the ‘Paste’ button is greyed out then there is nothing in the buffer to paste, copy a test first.

Note: Paste does not insert a test, it will Paste over any existing data, use ‘Insert’ first to create a new blank test if required.

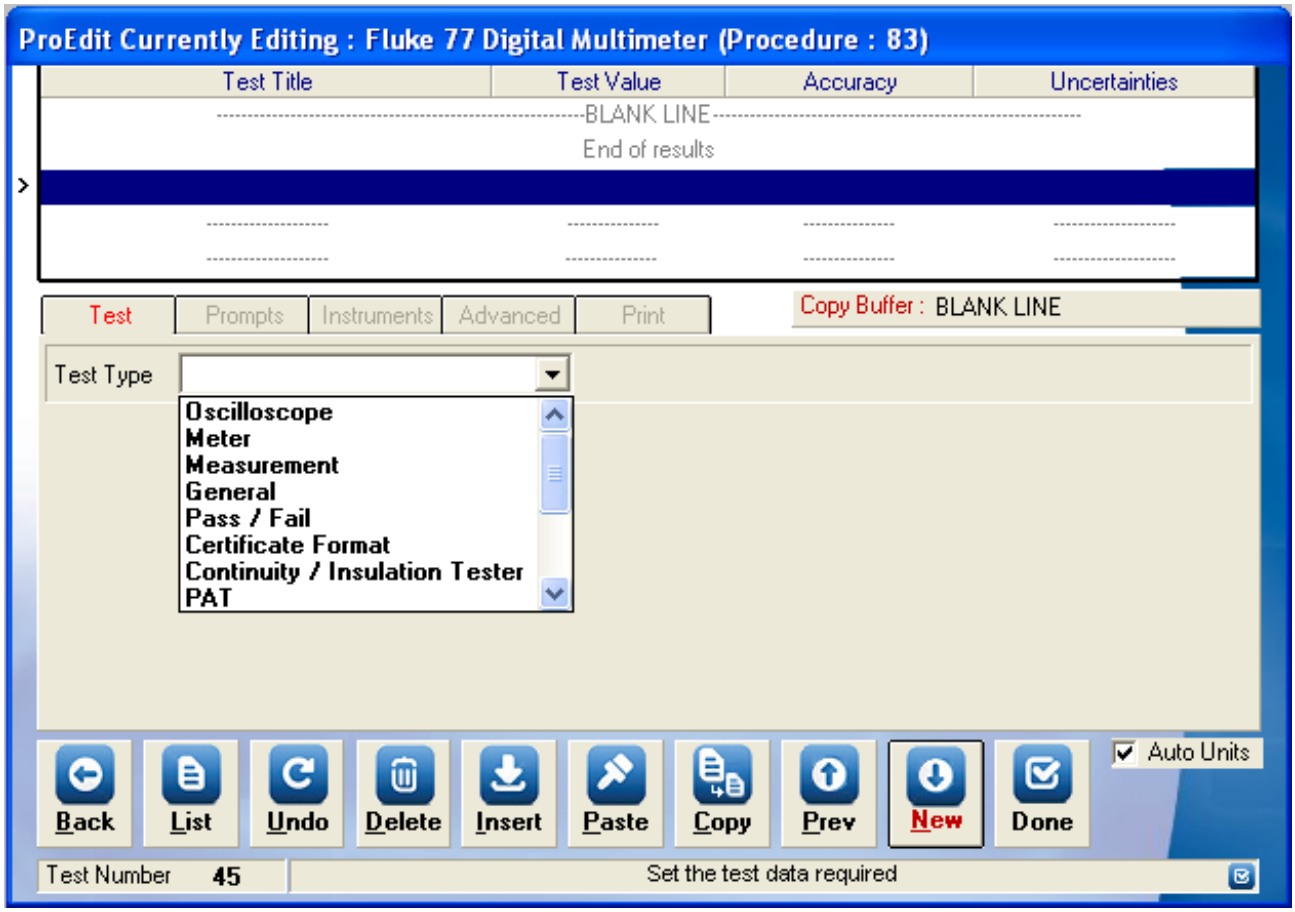
Previous

Click to step back a test. – Note you can also double click on the test in the test window.

Next/ Add New Test

Move down a test, if already on the last test, a new test will be automatically created. Note if you create a new test by mistake use delete.

ProEdit Test Types



Much of the power of ProCal is the speed and simplicity in which a Procedure can be written; this is due to the ease in which tests can be created.

In ProEdit the first action in creating a new test is simply to decide what type of instrument or test is needed. From this first selection ProEdit can restrict the information displayed and the format to only the data required for that test type.
When an oscilloscope, meter or measurement type test is selected, ProCal will also know what instrument to use, such as a calibrator or DMM (Digital Multi Meter). As ProCal already knows how to communicate with the default instruments via its inbuilt driver there is no need for any 'interface code' to be embedded in a test. All that is required is to set the values required and ProCal will do the rest.

This very powerful feature allows a ProCal procedure to be used on different calibrator's without modification as the driver imbedded within ProCal is handling the interface code.
As there is no need for most tests to get bogged down in writing interface code, control code tests can be generated very quickly.

Description of Test types

Oscilloscope

For calibrating oscilloscopes using the system oscilloscope calibrator, selected in Line 3 of the traceable instruments table in ProSet
Used for Amplitude, time base, rise time and bandwidth tests.

Meter

Use for calibrating any kind of meter using the system Multi product calibrator, selected in Line 1 of the traceable instruments table in ProSet

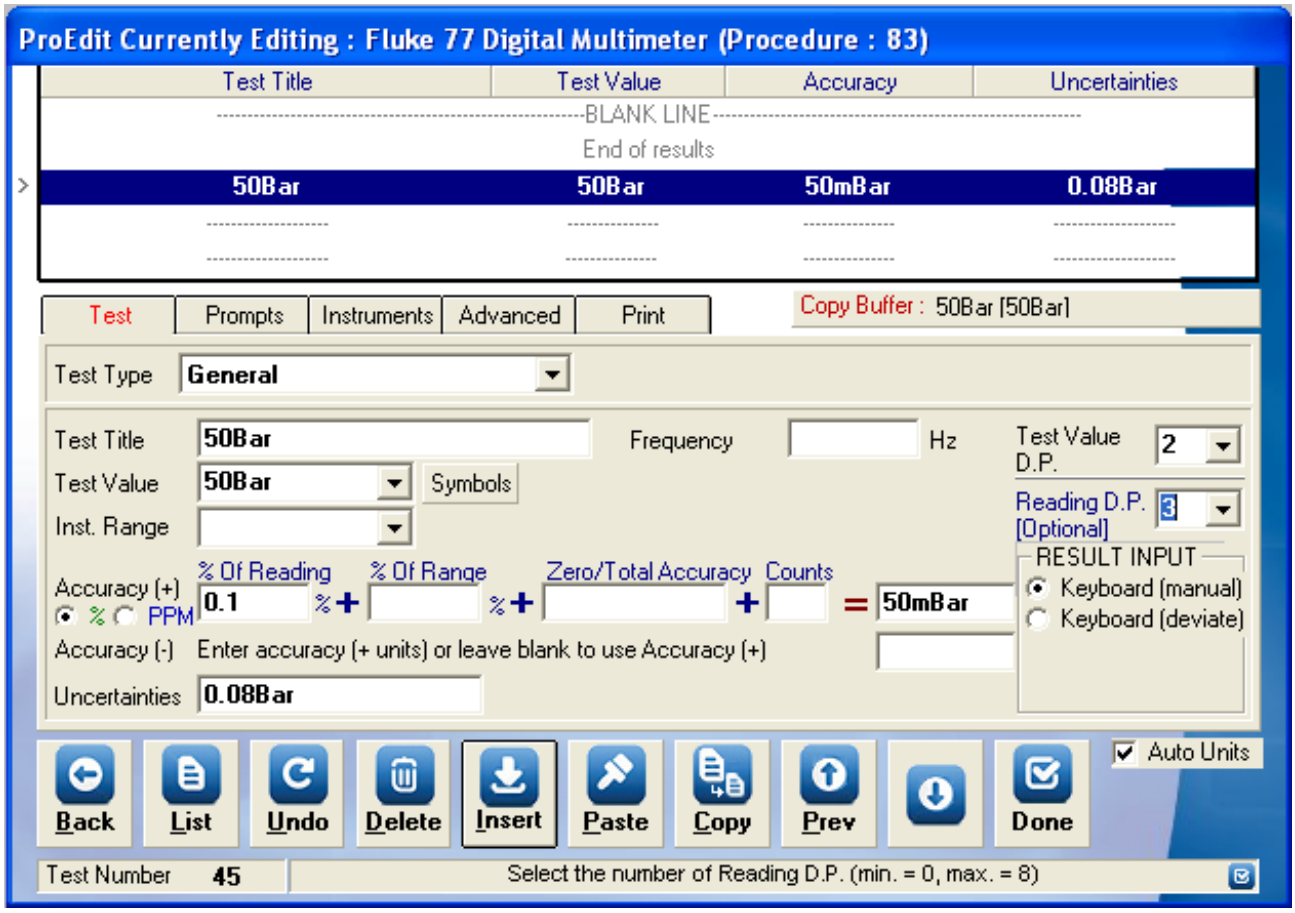
Measurement

Use for calibrating any instrument you need to measure the output, using the systems multi meter (DMM), as selected in line 2 of the traceable instruments table in ProSet.

General

This test is very powerful as it can be used for almost any type of calibration where there is a test/applied value and a result.

For example it could be used for calibrating a pressure gauge using a dead weight tester, or liquid in a glass thermometer with a liquid bath. It does not need to be electrical measurement and does not have to control any instruments at all. Although electrical tests can be performed using this and instruments can still be controlled from the command window.



Any units can be used in this test, PSI, kgs, millimetres, inches etc.
This General test type makes ProCal a completely universal calibration software package.

Pass / Fail

For tests where there is no numerical result, a simple Pass/Fail result can be chosen, for example a continuity bleeper.

Certificate Format

Used to format the certificate, although ProCal does not run a format test; they are passed through to the certificate. Allows page breaks, titles, and blank lines to be added to a certificate.

Continuity / Insulation testers

Tests specifically for calibrating insulation and continuity tester using the Transmille 2100. Covers high value resistance to 10 GOhms, Low value resistance and Insulation test voltage measurement.

PAT

Tests designed to cover the calibration requirements for PAT testers using the Transmille 2100. Tests include earth bond resistance & current, insulation resistance, leakage current, flash voltage measurement etc.

RCD Testers

A specific test that only works with the Transmille 2100 to calibrate both RCD current and time.

Loop Testers

For calibration of loop tester using only the 2100. Allows selection of loop values with read-back from 2100 of loop value after correction for local loop supply.

Pressure

Tests for calibration Pressure indicators, sources and switches using the Druck DPI515 calibrator.

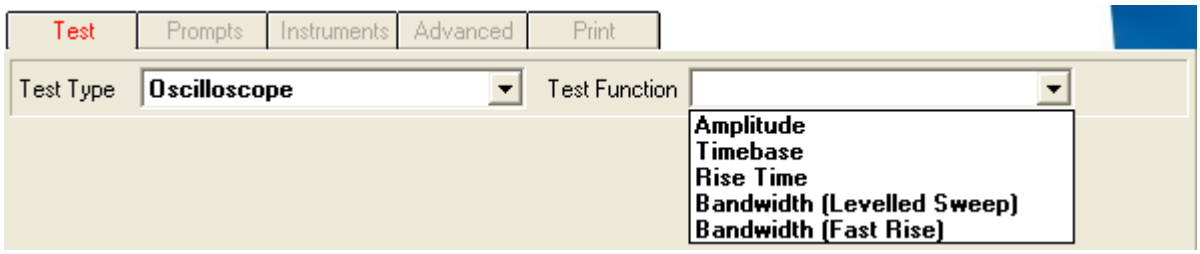
Oscilloscope Test.

Select this test type for calibrating an oscilloscope's amplitude, time base, bandwidth & fast rise. See pass/fail test and general tests and meter tests, which may also be used in an oscilloscope procedure

This type of test will use the oscilloscope calibrator selected in ProSet>file>instrument traceability: Line/Instrument 3

Select the Test Tab and test type then enter 'oscilloscope'

The functions that can then be selected are



Select the required option and fill in the test data as required. Most fields are obvious.

Note: To use deviate the calibrator for amplitude and time base so the trace can be aligned with the graticule.

To create an Oscilloscope procedure it is recommended to first use the wizard in ProEdit and then edit the procedure.

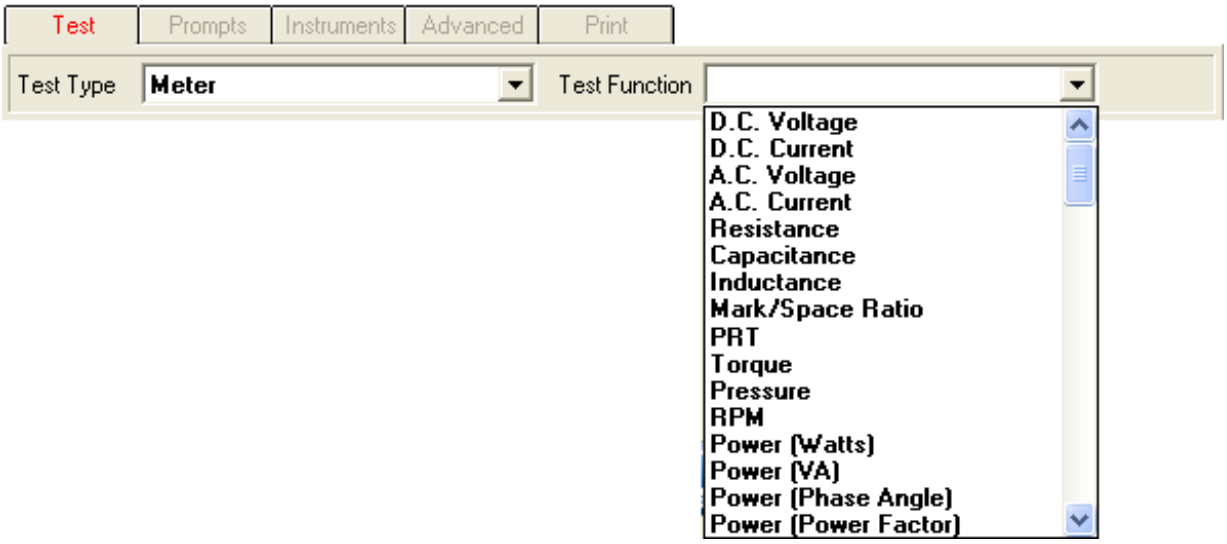
Further options, setting and controls

Many more functions, controlling the UUT, formula, etc are available in the other tabs; these functions are covered in the section following 'test types' on Page 79.

Meter Test (Use calibrator to calibrate meter)

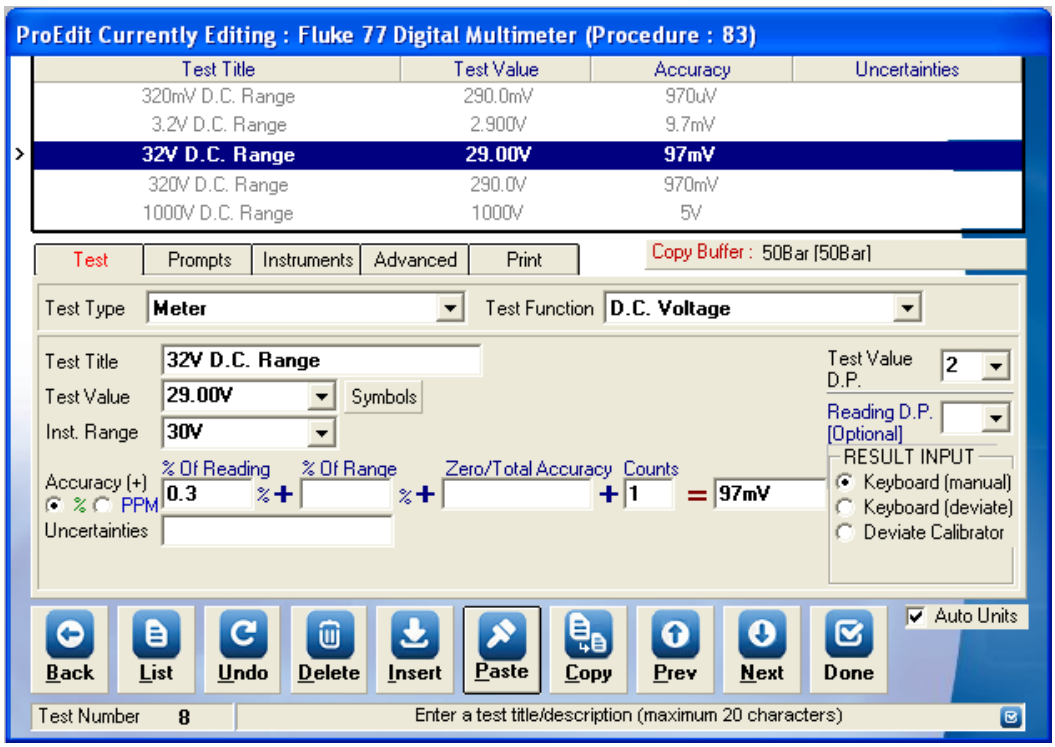
One of the most used test types for calibrating all types of meter.

1: Digital or analogue multi meter measuring volts, current and resistance etc.
2: RLC meter
3: Frequency meter
4: Temperature meter
5: Pressure meter
6: RPM meter (for 2000 Series calibrators only)
7: Torque meter
8: Power meter



After selecting this test type then select the test function and next select the measurement parameter of the meter.

Editing a Procedure



Test Title

This is the Printed title on the certificate, it has no control function and is just text.
If performing an AC test the frequency should be in the title.

Test Value

This is the value that the calibrator will be set too. The units must correspond to the function selected, e.g. mV or V for a voltage tests.

Note: The value in this box will be used in the accuracy calculation as the % of reading

Instrument Range:

This box can be left empty if there is no % of range accuracy, otherwise enter the full scale of range.

Accuracy Boxes

ProCal will calculate the total instrument error by adding together the contributions by

% Of reading
This is used to calculate the error of reading from the value in the Test value box above.

% Of range

This is used to calculate the error of range from the value in the instrument range box above.

Zero/Total accuracy

This must be entered in the same units as Test value and is used directly

Counts

Many DMM specifications quote a floor error as a number of digits or counts. The number entered here is used together with the resolution of the last digit taken from the decimal point (D.P. boxes) above. From this ProEdit can work out the error in the units of the test value.

These boxes are added together dynamically and the error can be seen to change as data is entered. The 4 boxes have been provided to allow for the way different specifications are written, if there is no specification for one or more boxes leave blank. It is only necessary for ProCal to have one box with data in.

Test Value D.P (Decimal Points)

This is the number of decimal places the applied value will be printed onto the certificate. Usually set to be one more than the reading.

Reading D.P. (Decimal Points)

This is the number of decimal places used to print the DMM reading to. If left blank it will default to the test value above. This is also used as part of the uncertainty calculation and accuracy calculation above.

Result Input

Keyboard (Manual);
Enter reading from DMM using keyboard.

Keyboard (Deviate):
Nominal test value is displayed, which may be incremented or decremented by using keyboard. Useful for a frequency counter with long display lengths.

Deviate Calibrator:
Use mouse/keyboard to slew calibrator until meter reads correct. Very useful for older analogue meters.

Uncertainties

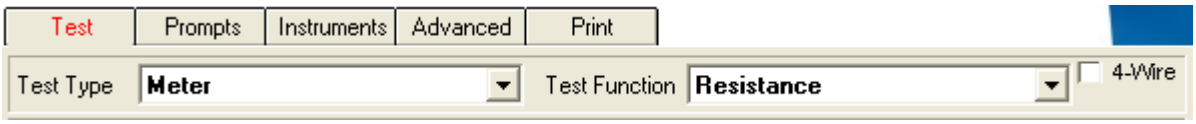
When uncertainties have been calculated manually enter the value here, this value will be used by ProCal in the test and passed on to the certificate when this test is run. The auto uncertainty calculations function is disabled when a value is entered in this box.

Auto Units

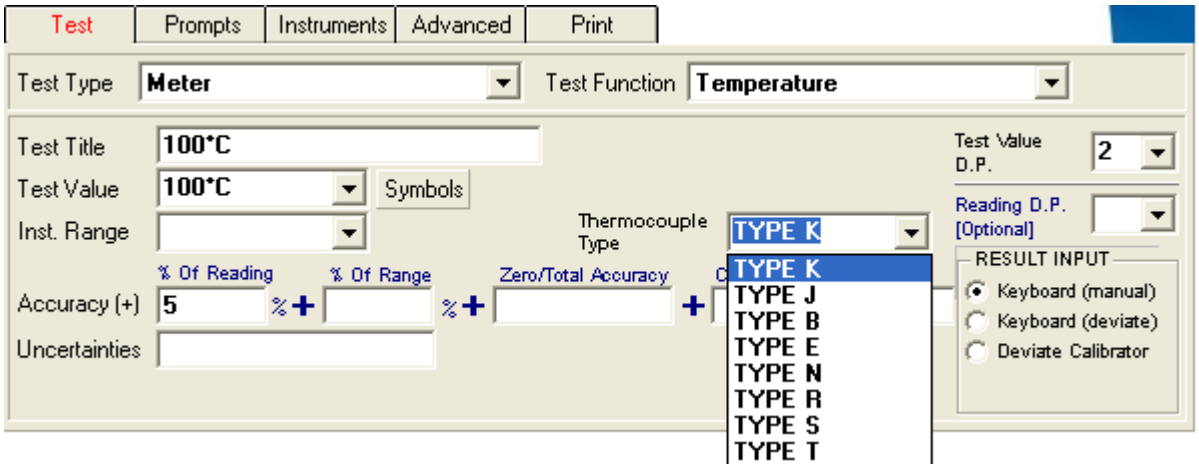
The auto unit's option allows units to be preserved as entered. When clicked ProCal will convert values to the most appropriate scaling (e.g. 0.05V would convert to 50mV).

Additional Information (Resistance, Temperature & Power Test Functions)

The **resistance** test function also has an additional 4-Wire selection checkbox

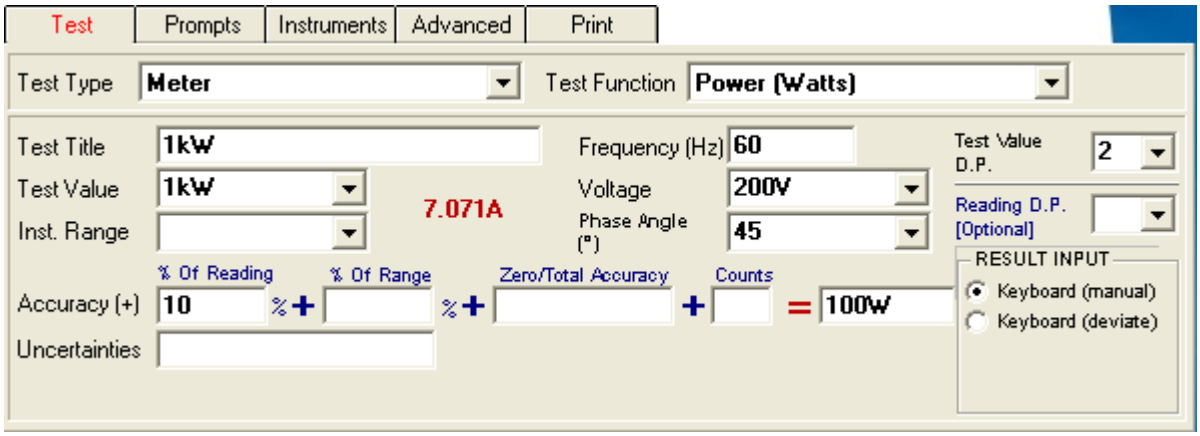


The **temperature** test function also requires the thermocouple type to be selected. This is displayed in a drop down list.



The **power** test function also requires the voltage and phase angle to be set.

Note: The current is automatically calculated based on the Voltage, Phase Angle and Test Value.



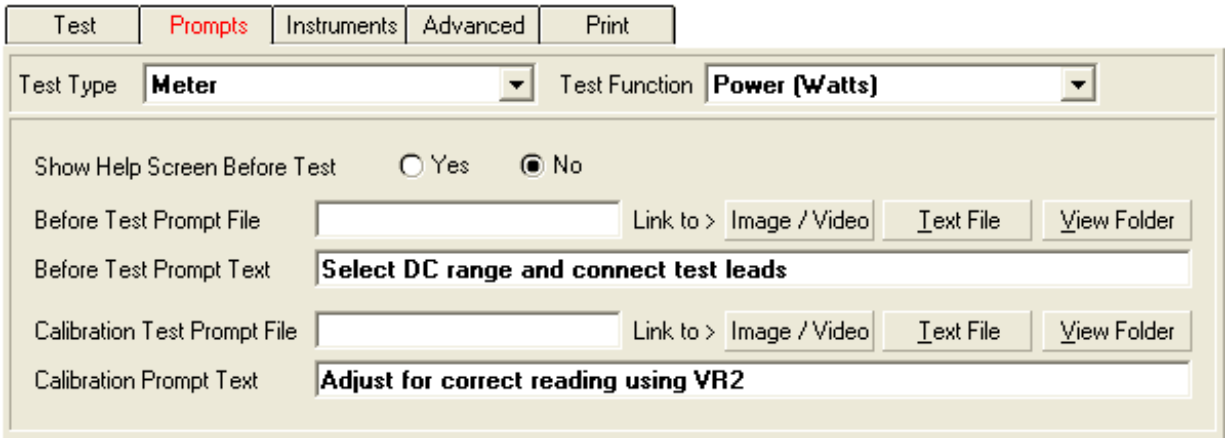
Tab Function's in the test data screen in ProEdit

Each test in a ProCal procedure has five 'tabs' the first tab selects the prime test function, covered in the previous section on Page 74.

The other tab functions perform basically the same for all test types:

Tabs in the ProEdit test data screen

Prompt tab



1:Show Help Screen Before Test:

Sets ProCal to display a help screen before starting the test. This is to allow the operator to set up the instrument and connection from the on screen information before the test is started. To run the test directly without displaying help click 'No'

2:Before Test Prompt File:

The name of either a text (.txt), Graphic (.BMP) or video (.AVI) file which will be displayed before the test starts (as above) or when selected with the 'help' button on the ProCal measurement screen. The '…' button & the 'Edit' button are to help select and edit these files.
The files may be created using any program that will produce the required file extension format

Note: Windows Media Player is used to play video files.

3:Before Test Prompt Text:

One line (40 Characters), which can be typed in here and displayed instead of using the file above. Useful for short instructions for that stage of the procedure.

4:Calibration Test Prompt file:

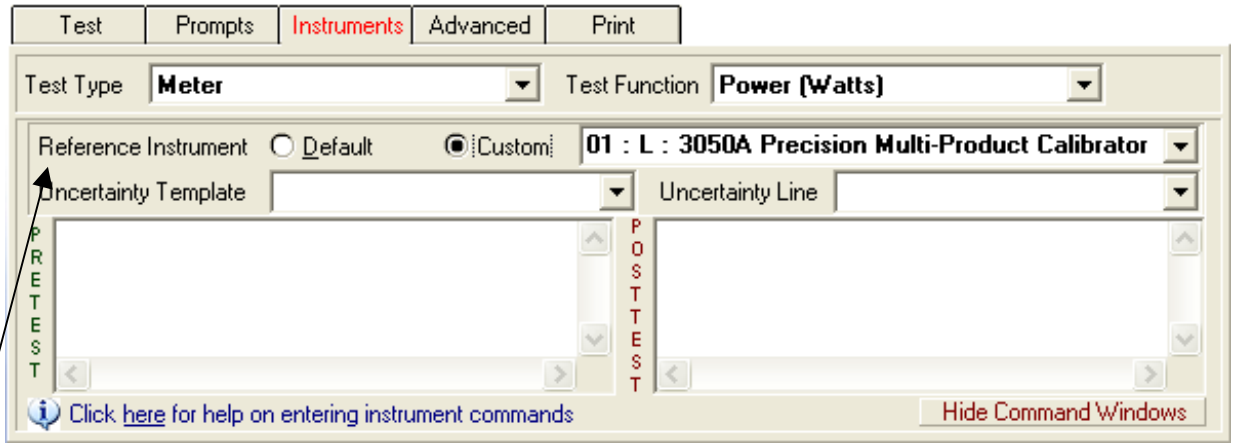
Same as 2:(Before Test Prompt File) but only shown when selected from ‘cal help’ (Calibration Help), button on the ProCal measurement screen. This is to give the operator instructions on how to adjust the instrument. – Note the ‘Technical help file’ is very useful for this as well. The ‘…’ button & the ‘Edit’ button are to help select and edit these files.
The files may be created using any program, which will produce the required file extension format.

Note: Windows Media Player is used to play video files.

5: Calibration Prompt text:

Same as 3:(Before Test Prompt Text) but can only be displayed when the option is selected via the ‘Cal help’ button.

The Instruments Tab



Ref Inst:

The Default option is usually selected which sets ProCal up to automatically use a reference instrument from the ten instruments listed in the Instrument Traceability List. ProCal will for example automatically select the DMM at position two if it is a measurement test, or the calibrator at position one if it is a meter type test.

For a general test it is necessary to select a Custom Reference Instrument, selecting Custom will preset a list of instruments in the drop down list to the right, this list will display all of the instruments in the Instruments Traceability List. (As set in ProSet>File>Instruments.) Select the required instrument.

Note: When a custom standard is selected, the value set in the Traceable instrument table will be used as the Nominal test value.

Uncert Temp (Uncertainty Template):

Selects the uncertainty template required to perform the uncertainty calculation for this test, as created in ProSet. This template will be called and used by ProCal at the time of measurement.

Uncert Line (Uncertainty Line):

If the reference standard used for this measurement has different bands of accuracy as set in the ‘uncertainty file’ in ProSet then the correct band can be selected here.

Post-Test Commands:

Type in here commands to be sent to instruments using either the GPIB interface or the RS232 serial COM’s port.
Click on the ‘?’ to show a list of available commands. Double click on the window to enlarge it.

There are three ways to select the address the instrument is to communicate with.

The address must be at the start of the line and immediately before the command

Communicate with any instrument by directly using its address or COM port

For GPIB start the line with the GPIB address of that instrument:
Example: 14 SETACV: Will send 'SETACV' to instrument with GPIB address 14

For RS232 serial start the line with COMxx, where xx is the COM port number.
Example: COM2 SETDCI: will send SETDCI to COM port 2

Set Baud Rate, Parity etc. for serial Commutations.

See example in the command window below.

The COM command is comprised of the following parameters:

COM [Baud Rate, Parity, Data Bits, Stop Bits]

Baud Rate: The following table lists the valid baud rates.

Setting
110
300
600
1200
2400
9600 (Default)
14400
19200

Parity: The following table describes the valid parity values.

Setting	Description
E	Even
M	Mark
N	(Default) None
O	Odd
S	Space

Data Bit: The following table lists the valid data bit values.

Setting	
4	
5	
6	
7	
8	(Default)

Stop Bit: The following table lists the valid stop bit values.

Setting	
1	(Default)
1.5	
2	

Notes on use:

UUT FUNC: DC 1 COM[1200,N, 8, 1]
UUT FUNC: AC 10 COM[1200,N, 8, 1]

The COM command MUST be placed at the END of each command line

The default COM settings are 9600,n, 8, 1 - these will be used if no COM command is present

To Communicate with an instrument in the Instrument Traceability List

Use '@' followed by the line number in the list. ProCal will then take the GPIB address entered for that instrument in the instrument data set by ProSet.
The advantage of using relative addressing is that should an address of a reference instrument be changed the procedure can remain the same, the only change is to update data in ProSet.

Example: @02 SETACV :will send the command 'SETACV' to the instrument in the 2 position in the traceability list, e.g. the system DMM.

To Commutate with the instrument under test (UUT)

If a procedure is set to communicate with the UUT by selecting on the Procedure Instrument information screen when creating/editing a procedure, then when ProCal runs this procedure a message box will prompt the user for an address of the UUT.

To use this address in the command window start the line with UUT, commands will then be sent to the address entered by the operator in the address message box.
This allows an instrument to be calibrated using it address as set, avoiding changing it.

Example: UUT DCV 1V: Will send 'DCV 1V' to the address of UUT.

Terminators:

All commands will be sent as entered, to add a carriage return or line feed the append

>CR add carriage return
>LF add line feed
>CR>LF add carriage return and line feed.

For GPIB commands the EOI line will be asserted with the last byte sent.

Other Commands:

Delays:

Use to allow a setting delay between two command lines

Example Delay 1.5 : Gives a 1.5 second delay.

Reading a measurement back from a GPIB instrument

Set addressed instrument to talker and place data into string variable 'READING' until EOI or line feed received. Return instrument back to talker. Timeout of 30 seconds.
This command simply reads directly, from the instruments, it usually necessary to first send a range and trigger/take reading commands. Note this command does not use the GPIB 'SRQ'.

Example: UUT FETCHREAD ?RDG : Get reading from the UUT
or @02 FETCHREAD ?RDG : Get reading from instrument 2 in the traceability list.

Note these commands are only meaningful in a General or Meter test type.

Formatting the string variable 'Reading'

The data sent by the instrument to ProCal is stored in the string variable 'reading'. This will contain other characters sent by the GPIB instrument, which will need to be removed before being changed into a numeric value, which can be used by ProCal.

Example TRIM 3, 4 : this will remove the 3 leading and the 4 trailing characters.

It may be useful if unsure of the string sent by the instrument to first check using a simple GPIB program first, for example the GPIB test programs supplied with the NI card.

Setting the Nominal or measured test values to the reading taken with FetchRead.

The readings taken and placed in the variable read, once formatted by the 'Trim' command above, can be stored as either the nominal test value or the test value itself used in the ProCal measurement screen.

Example MEAS=READ
NOM = READ

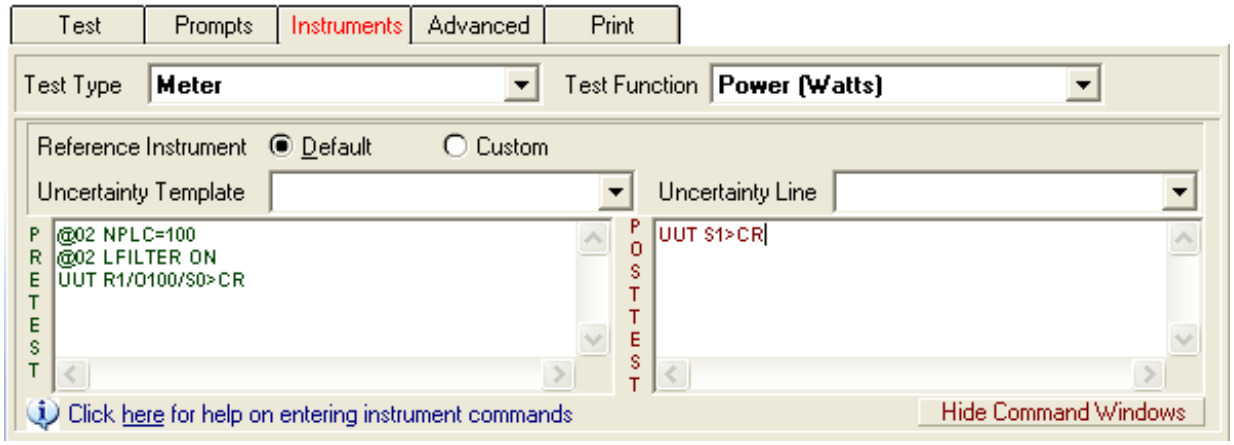
With these few simple commands it is possible to set a DMM range, trigger a reading and store it to the nominal test value, and then set and read from another DMM and store it as the test value.

Post Test Commands

Type in here the commands to be sent to instruments after the test is finished using either the GPIB interface or the RS232 serial COM's port. This is to reset instruments back to a safe state.

Example use of command Window

Sending extra commands to the System DMM in a measurement test and setting a calibrator:

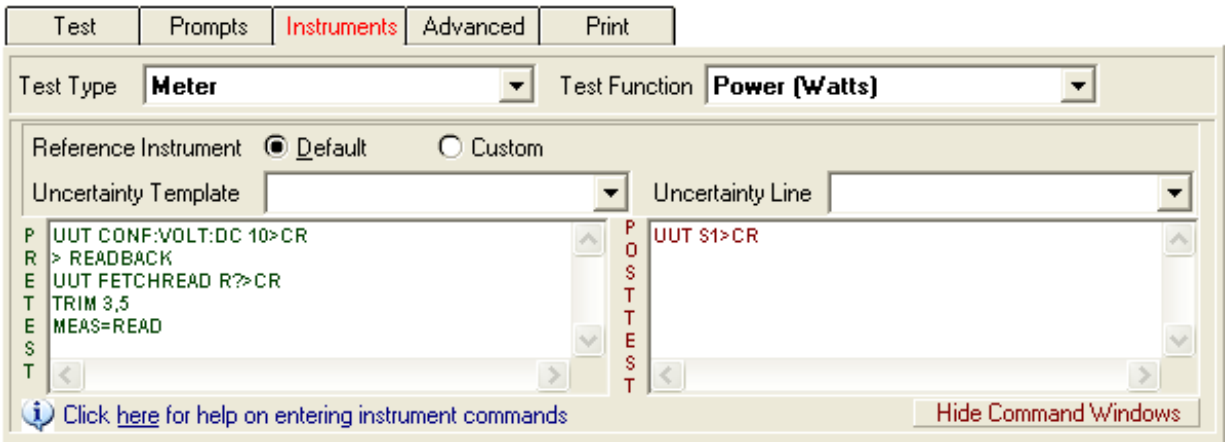


The DMM is the HP 3458A; the UUT is a Transmille 2000 series calibrator
Line 1: Sends the command NPLC=100 to the DMM to set reading rate
Line 2: Sends the command LFILTER ON to the DMM to set filter
Line 3: Sends the command R1/O100.5/S0 to the calibrator with a carriage return character as a terminator.

Note ProCal gets the COM port to which the calibrator is connected from the message box displayed at the start of the calibration.

Note: This function must be selected in the Procedure by ticking INSTRUMENT 9 in the calibration information screen.

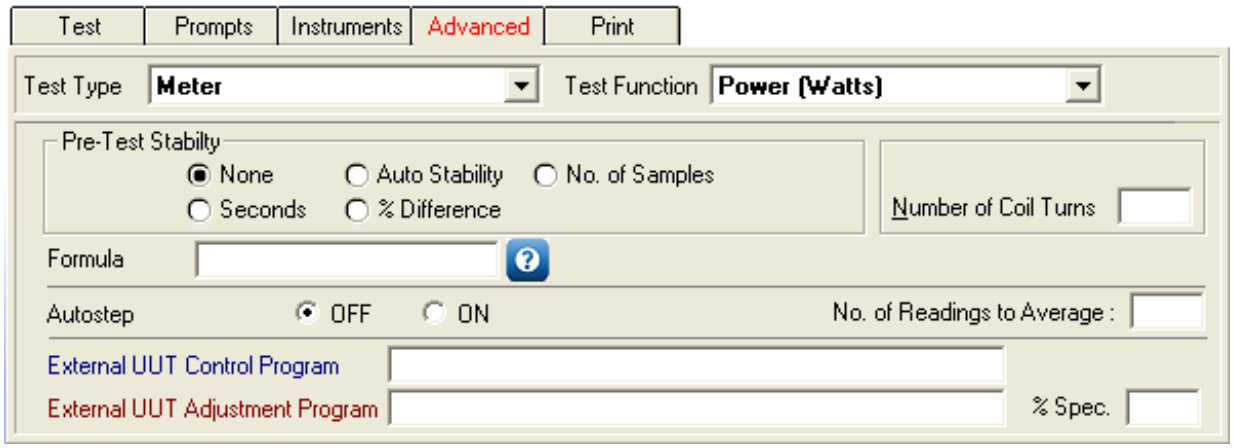
Example Reading from the UUT



Line 1: Send command READ? To the UUT to trigger a reading
Line 2: Get the reading from the UUT
The FETCHREAD command tells ProCal to set the addressed instrument to talk and then read in up to either EOI or Line feed. This data transfer is not using service requests.
Line 3: Trim off unwanted characters
Line 4: Set measurement to the value of the reading back from UUT.

Note: Click on 'Click here' for a list of commands and examples.

The Advanced Tab



Formula Box

Use this box to enter a formula to process or scale the reading.

Example 1: Taking off zero / end resistance from readings
If you needed to take lead resistance value off another measurement, simply create a test which measures this lead resistance (e.g. test 1), then in subsequent tests (e.g. tests 2 and above) use the formula to subtract the lead resistance value (result of test 1) from the measurements e.g. X-T1 (where X is the current test value and T1 is the reading taken in test 1 – the end resistance).

When using a 2000 Series calibrator in two-wire ohms mode, the zero value can be used to measure the resistance of the leads without needing to manually short the leads together.

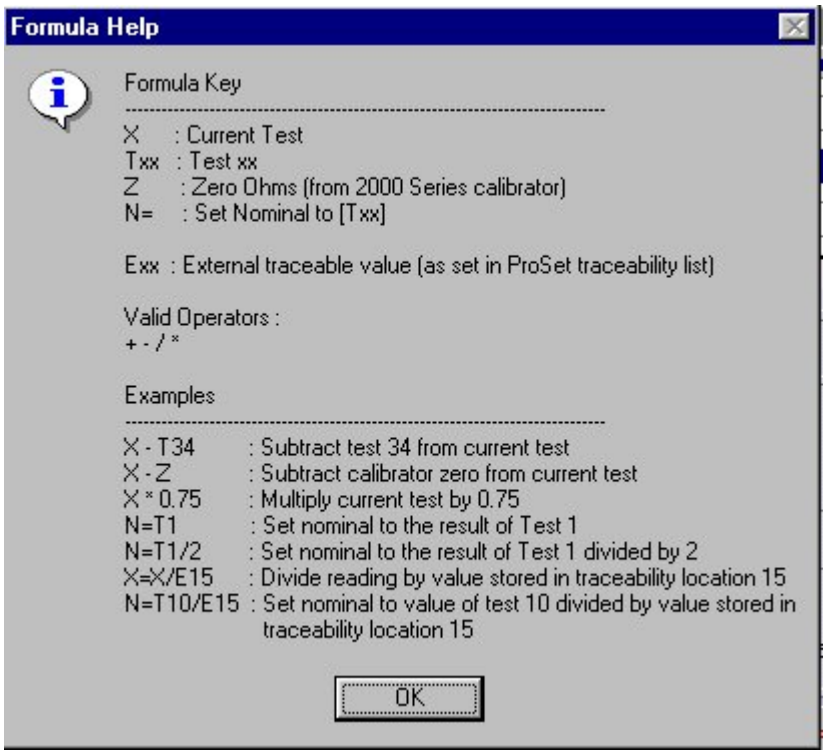
Create a two wire ohms meter test using the zero ohms output from the calibrator and use the formula X-Z (where X is the meter reading and Z is the calibrator zero ohm value). When the meter reading is subtracted from the calibrator zero ohm value this gives the actual lead resistance. This lead resistance value can then be used in subsequent tests by subtracting this value from the test value e.g. X-T1.

Example 2: Scaling the output from a transducer
If you are reading the output of a 20Bar pressure transducer (which gives 10V output for 20Bar pressure) with a DMM using a measurement test and you want the measurement to be in Bar, use a formula to SCALE the reading e.g. X*2 (where X is the voltage being read back by the DMM and 2 is the scale factor).

Note: This test would also use the DUAL UNITS function which allows a DMM range to be set to VOLTAGE but the test value to be set as BAR.

Example 3: Changing the nominal test value

If you want to perform a test where the nominal value is not known until measured, first create a test, which measures this required value (e.g. mains voltage). Then in each subsequent test which requires this value as its nominal, set the formula N=Tx (where N is the nominal value for this test and is being set to the value taken from that test x).



Note the ability to use the value for a reference standard in a formula, this can be useful in many cases for example using a current shunts for measuring high current, where the test type would be a measurement of DC voltage which would require the measurement to be divided by the certified value for the shunt to convert to amps.
For example X/E23 would divide the voltage read by the DMM by the value of the current shunt E23. The value of the standard must be entered in the instrument traceability table by ProSet first. The value of the shunt may of course be used directly in the formula, but by using this method only the value held in ProSet, need be changed when the standard is recalibrated.

The formula field does not recognise brackets, the expression is evaluated only from left to right.

Dual Units

Clicking the DUAL UNITS checkbox allows the test value units to be set to a different type than the DMM range units (e.g. 10Bar for test units and 10V for DMM range).

Note: Normally the test value and DMM range must be the same otherwise ProEdit will indicate a test error due to the different units being detected. Dual units permit different units.

This is particularly useful when reading back from transducers where a voltage or current is read back from a DMM but the signal is pressure, torque etc.

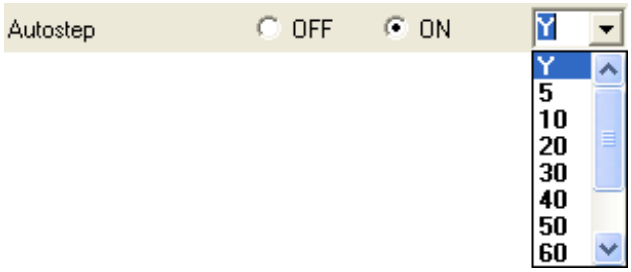
See ‘example 1’ of the formula function for more information

Number of turns:

This box is for the number of turns of a clamp coil adaptor. The current entered in the test value box for a meter type test is divided by the ‘number of turns’ before being sent to the calibrator. This then sets the calibrator to output the correct current when using a coil. The numbers of turns when using a Transmille Clamp Coil range from 5 to 10 to 50.

Auto step:

This selects if the test will automatically step on. If clicked ‘yes’ a drop down box can set a further condition, such as the length of time before the current test is stopped and the new one begun.



From this box the action can be conditional on the result of the test. Select ‘Y’ to allow the test to step on regardless of the result, or select the percent of specification to pass the test by before stepping onto the next test.

Note that selecting auto step changes the control menu in ProCal. Auto step can be over ridden via the ‘Control’ menu at run time allowing a procedure to be single stepped in the usual way, which is very useful for testing.

Samples Before Auto step:

This controls the number of samples or readings that are taken before stepping on to the next test. If left blank three readings are taken on a measurement test.

External UUT control Program

To perform advanced control and calculation functions outside of the scope of ProCal. By entering the file name of this external program in this box ProCal will automatically create and save test information to a file, and then execute an external program. With ProCal in suspension the external program can then open this file and perform whatever task it is written to do. On closing this program it will pass data in a file back and restart ProCal.

This feature allows ProCal to be used for any calibration task. The external program can be written in any language, visual basic, C, etc the user is familiar with. As the external program only has to perform control and measurement it can be relatively small, leaving ProCal to do all the major work. This approach can dramatically speed up the development of semi custom applications.

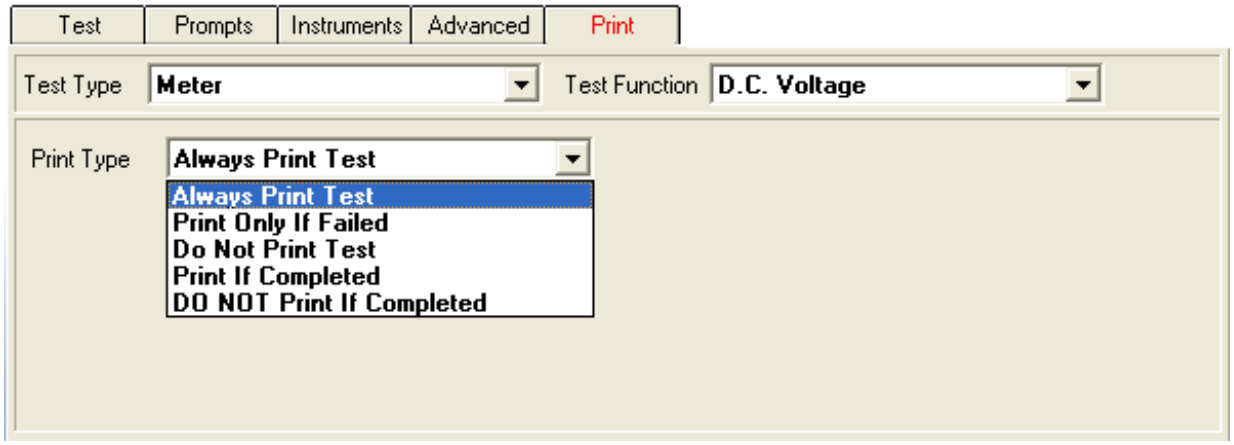
See Appendix for application notes on writing external programs.

External UUT adjustment Program

As above but this program will be written to make software adjustments to the UUT and will only be called under the following conditions.

1: ProCal will be running after adjustment tests
2: Run Adjustments tests in the ProCal control menu is selected
3: The % of spec error is larger than the figure entered in the '% spec' box.

The Print Tab



Always Print Test:

Most used option; the result of the test will always be printed on the certificate.

Print Only if Failed:

Used mainly for ATE (automatic test equipment) stations where only failed results are of interest.

Do not Print test:

Use for test to confirm operation or pre-tests, which may not form part of the calibration.
Also allows for 'lead connections error checks' to be performed, for example before a 20 Amp test perform a 2.1A test to check that the leads are in the correct sockets on the DMM before applying the full current with incorrect connections and blowing up the DMM.

Print Only if Completed:

This print type allows one procedure to cover an instruments model, which have different option combinations, fitted.

When ProCal starts to run a test with this set it will prompt the user if they whish to run this section. ProCal takes the title test before as the name of this section of tests. If the user answer yes the tests are run, if no then the block of tests with print only if completed is jumped over.

For example a DMM may come as standard with only DC volts, with options for AC volts, current and resistance. Normally this would require several procedures to be able to cover every combination. By using the print only if completed test, only one procedure is required.

Certificate Printing using ProCert

ProCert is the certificate-printing program and is installed as part of the program suite of ProCal. Using this program certificates can be searched for and reprinted. This program can be used on, as many PC's as required to print certificates locally from a central ProCal database.

Certificates can also be printed at the end of a calibration or from ProCal track.

Certificate Types & Styles

For flexibility ProCal offers a choice of two methods used for certificates & report styles

1: In built report styles (including a standard certificate and an accredited ISO17025 certificate) built into the program. These offer ease of use but cannot be edited by the user.

2: Crystal reports custom styles. There are several example reports (including a standard certificate and a accredited ISO17025 certificate), which are installed with ProCal and can be used as templates for the user to edit and create their own custom reports.

Crystal Reports allow the user complete flexibility in the design of the reports. A report is a mixture of data fields, which take information from the database and text. Once created this report can be given a file name and saved. Reports for all sorts of purposes can be written, as can been seen from the installed examples including instrument fault reports, Quotes, Reverse traceability etc.
To edit or create a crystal report the 'Crystal report' program must be installed. Once created a report can be used without installing Crystal reports on other workstations.

When this report is selected the data fields will be filled up and the complete report is displayed on screen, this can be then printed, emailed, faxed etc as per normal.

ProCert will use the type of report stored in the certificate data.
This can be either the built in standard certificate report, or the accredited style certificate or use the file name of certificate reports written by the user in Crystal Reports.

Note: ProCal will save the file name of a crystal report for ProCert to use. This file name will be copied from the procedure, or if not set in the procedure will use the 'Global' name set in ProSet>Program options. If this field is empty then the built in certificate format for that certificate type, standard/accredited/test report etc will be used.

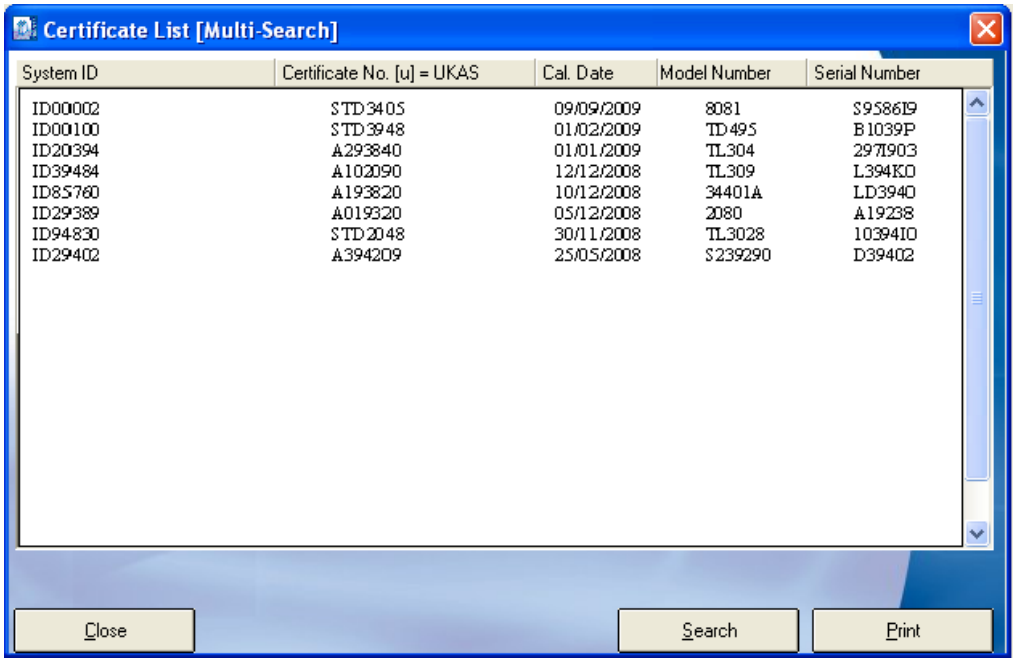
ProCert Menus

File menu: Search for certificates

Click on the 'Search by' buttons to open up a search box. Enter the details to search by, use '*' as a wildcard. Use more than one search button if required, then click the search button to start the search.

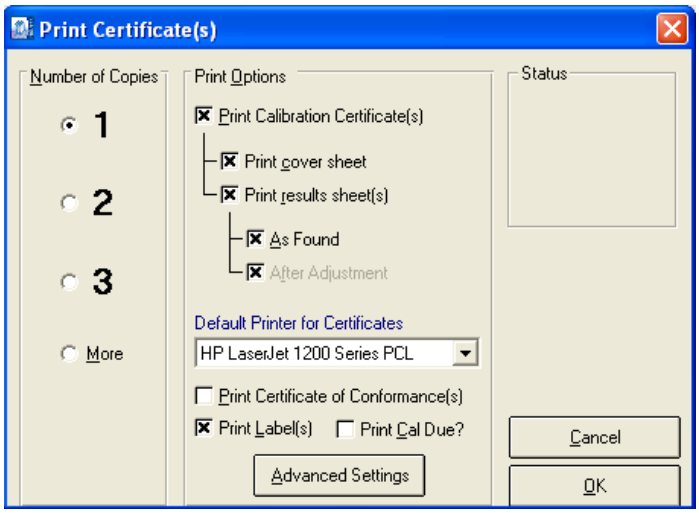
Note: that just clicking on 'search' will show all the certificates.

Search Results



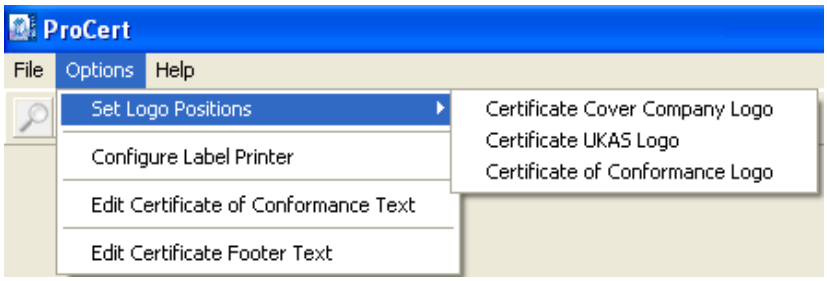
From this screen select the certificate to print.

Print Dialogue Box



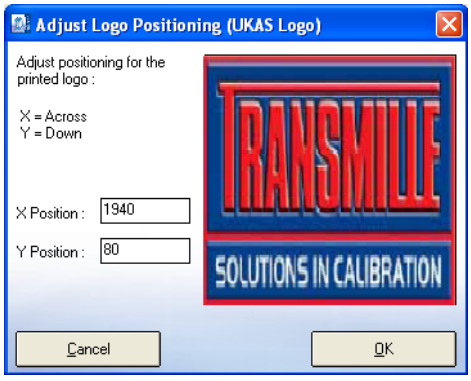
Select the required options for printing, select the printer and click OK to print certificate. Note a PDF printer can be installed on windows to enable a PDF certificate to be produced.

Options Menu

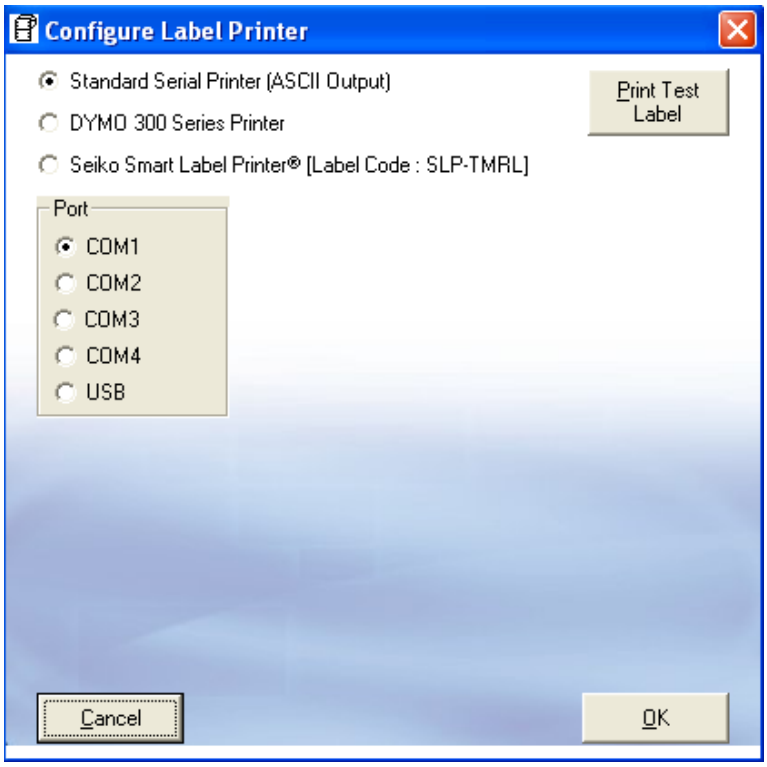


Set Logo Positions

This allows the logo print position to be set for the inbuilt reports. Depending on the logo size and printer resolution this will need to be set by trial and error. Note this positions two different logos, the company logo used on the standard certificate and the ACCREDITED/accreditation logo.



Configure Label Printer: Configures Seiko type label printer.



Edit Certificate of Conformance

Clicking Options->Edit Certificate of Conformance Text will open a Notepad file, which can hold customised information for the certificate.

Appendix

Data Paths

The below paths are automatically set upon installation of the software

Certificates Database

C:\PROCAL\CERTIFICATES

Enter the path to the certificates database. Click the "…" button to bring up a file window and navigate to the location of the database. The database file name will be ProResDB.mdb and is shared with the ProCal programs. This is where all certificate data will be stored, the data path should not be changed unless linking paths and files are also updated.

Contacts Database

C:\PROCAL\CERTIFICATES\CONTACTS.MDB

Enter the file name of the contacts database. Click the "…" button to bring up a file window and navigate to the location of the database.

Digital Photos

C:\PROCAL\INSTRUMENTPHOTOS

Enter the path containing digital photographs of the instruments. Click the "…" button to bring up a file window and navigate to the location of this directory. The digital photographs directory contains a number of bitmap files with the same name as the instrument they illustrate.

Sales Database

C:\PROSALES

Enter the location of the sales database. Click the "…" button to bring up a file window and navigate to the location of the database.

Stock Database

Enter the location of the stock database. Click the "…" button to bring up a file window and navigate to the location of the database.

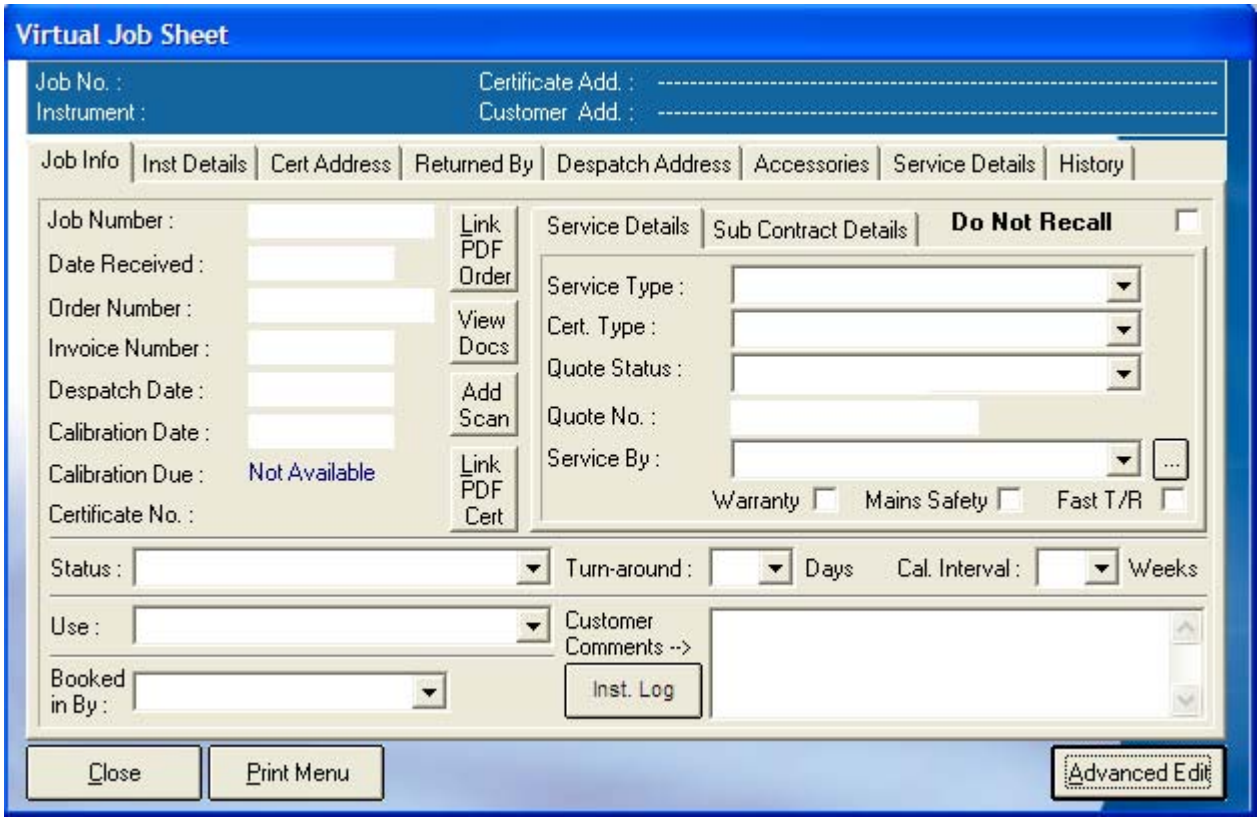
PDF Scans

C:\SCANTEMP

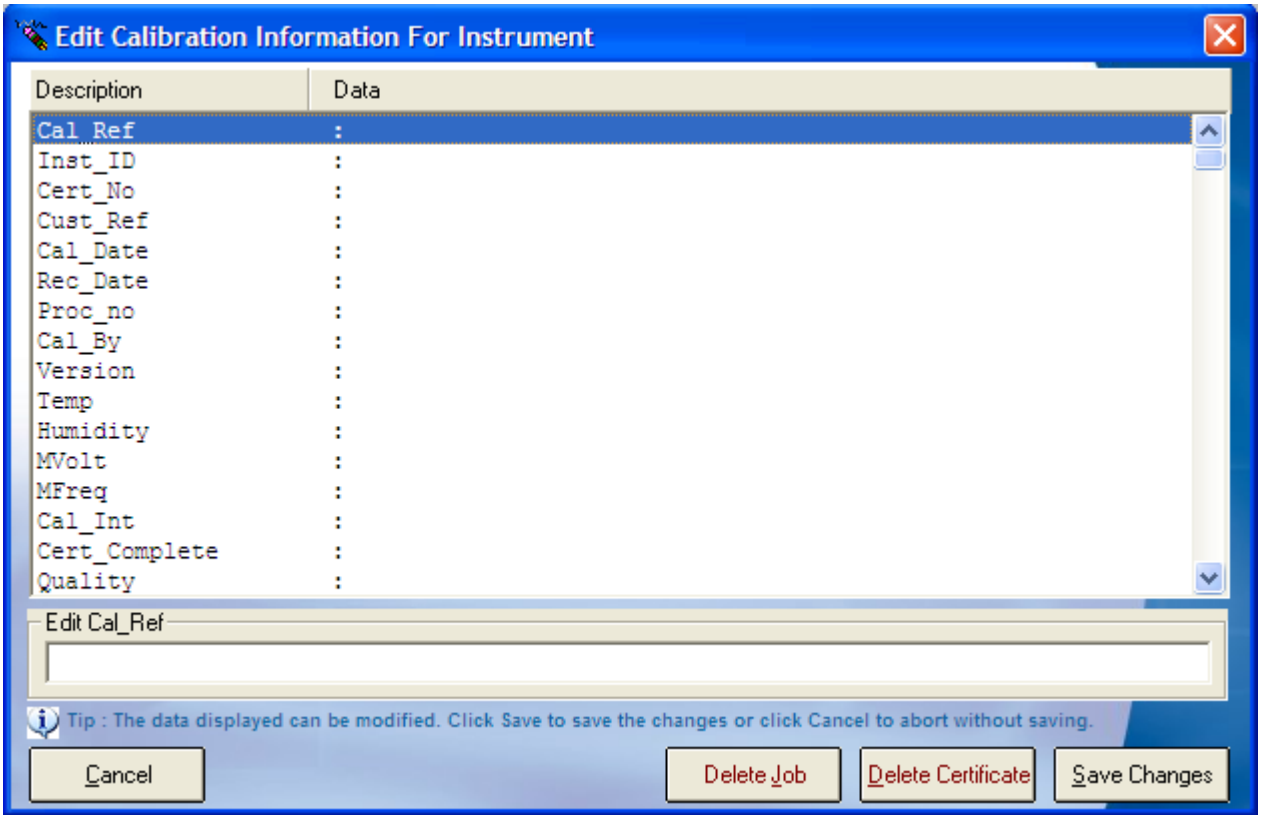
Enter the location where scanned documents will be stored. Click the "…" button to bring up a file window and navigate to the location of the .PDF files

Advanced Edit

Advanced Edit can be found on all virtual job sheets, to manoeuvre to this menu, click File->View/Edit an Instrument, enter the identifying number such as an instruments serial or job number, when the instrument details appear, double click them, or highlight them and click View/Edit.



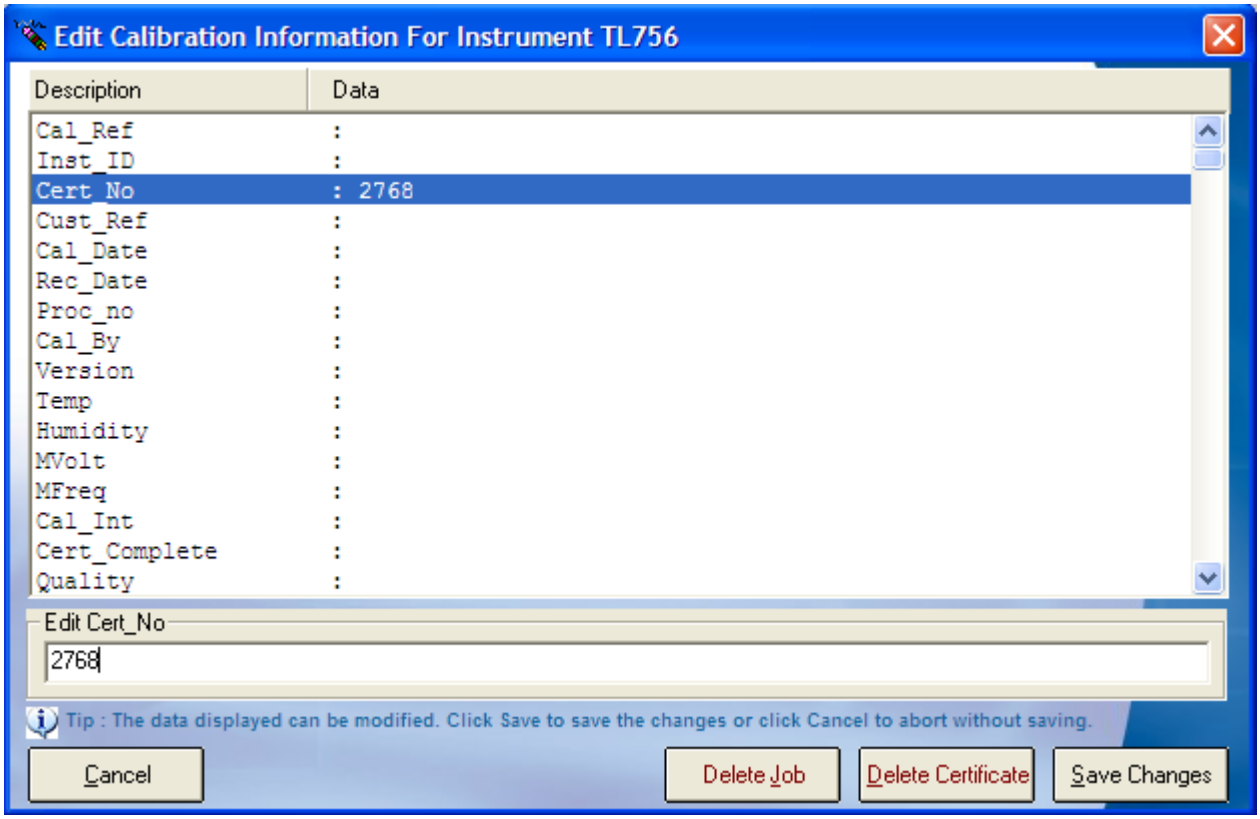
Once this menu appears, click on Advanced Edit to change more intricate details about the instrument, such as the signatory for the certificate, or the traceable instruments used during its calibration.



All the details of an instrument can be changed in this menu, so care should be taken that important data is not lost, this function can be set to Administrator Access only. The list of enterable data is long; this list contains the information for every part of the instruments procession through Booking In, Calibration and its Despatch details.

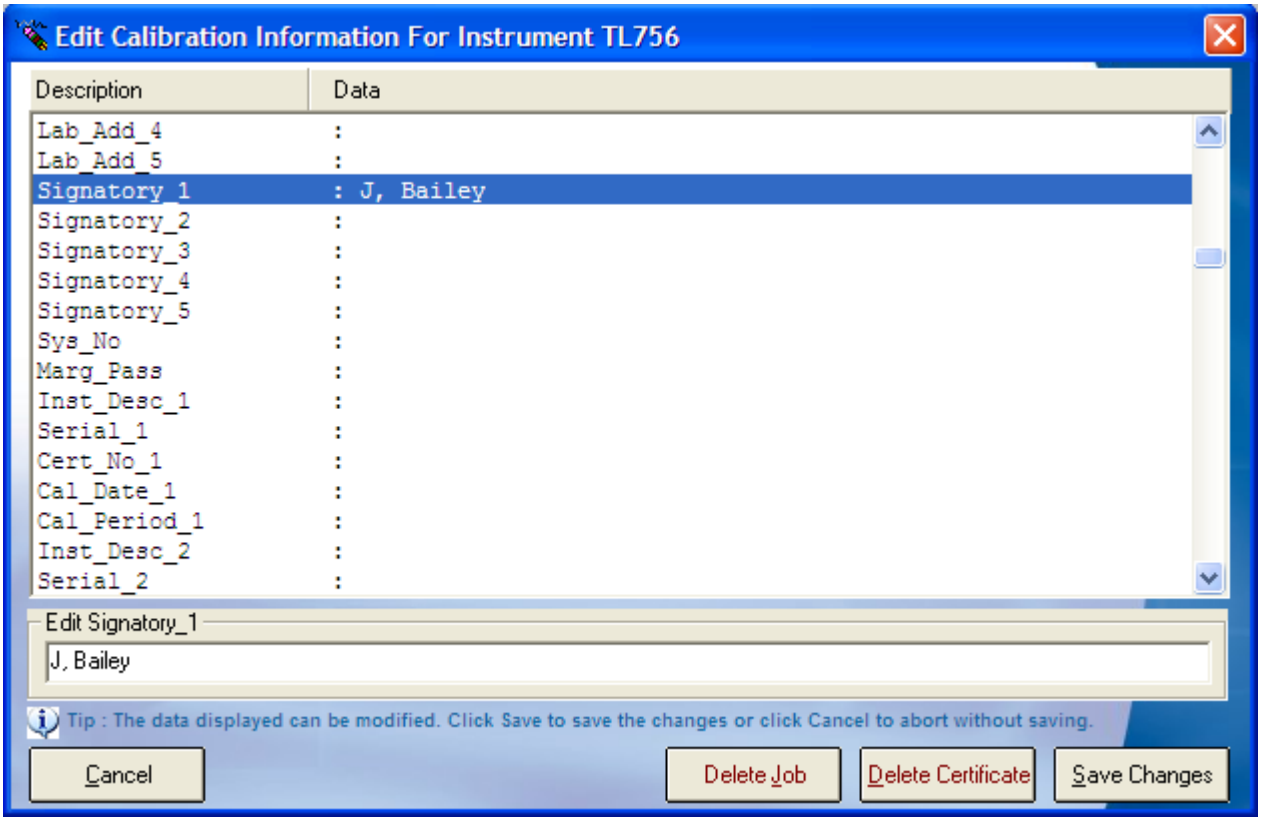
Certificate Number

If an instrument has been subcontracted out to an external company, then upon its return, the certificate will need to be linked to the instruments details, go into the Advanced Edit of that instrument, highlight 'Cert_No' by clicking it, and then type the certificate number into the text box below, once the information has been entered click "Save Changes" and then "Yes". For a sub-contracted instrument it is advisable to also scan and link the certificate to the instrument.



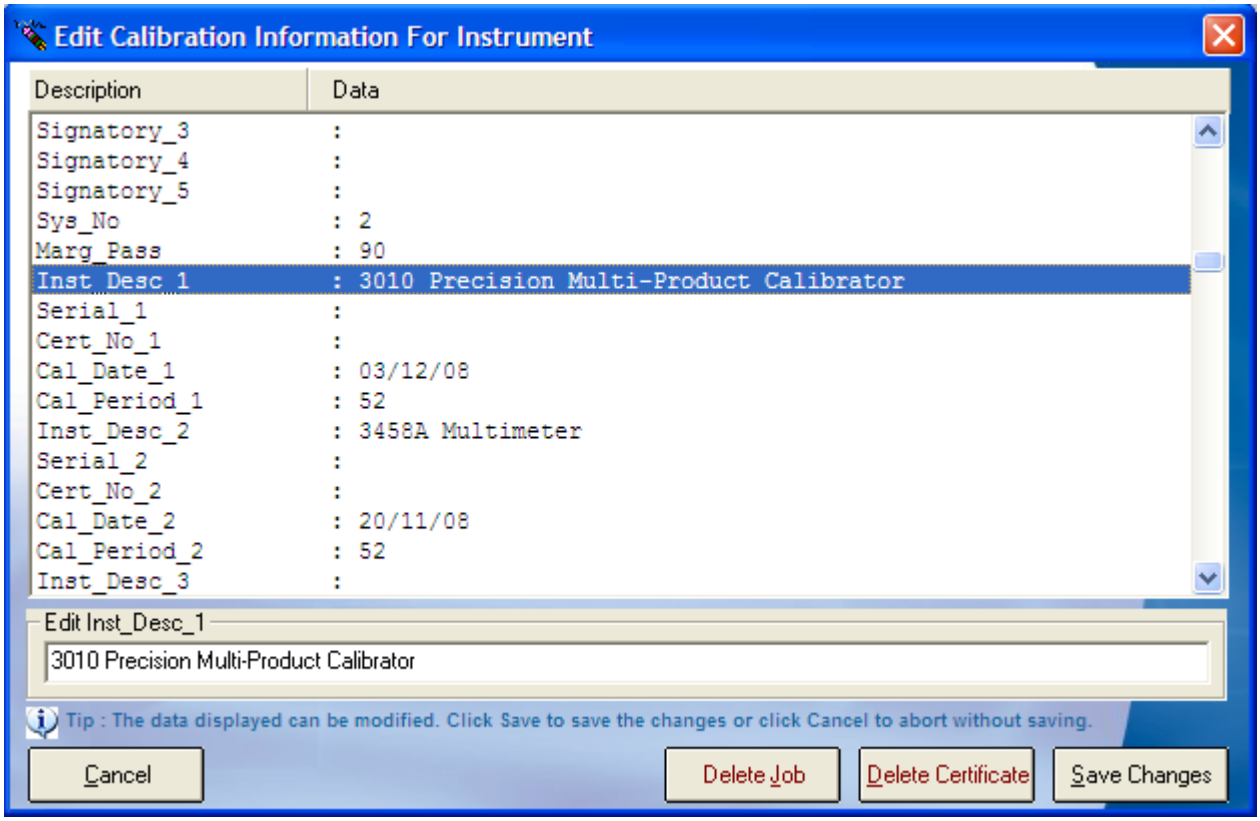
Editing Signatories

To edit the signatory of a certificate, the same method is followed as for entering a Certificate Number, search and open the Job Sheet of the required instrument, open The Advanced Edit menu, and scroll down, highlight the line data that needs to be entered, and type the information into the text box.



Editing Traceable Instruments

The same process can also be applied for editing the traceable instruments that were used during the calibration process. As the image below shows, each traceable instrument has its name, serial number, certificate number, the date that instrument was calibrated, and the calibration period.



Note: Once Save is clicked, any changed data will be saved and could affect certificates, reports, and can change information such as despatch addresses, therefore it is wise to operate within Advanced Edit with care.

Note: Only a user with administrator access will have the Advanced Edit function available to them on a Virtual Job Sheet, both the engineer and the operator are unable to access this menu.

Editing Drop Down Menus/ "…"

Each drop down menu will have a button next to it with three dots "…", once clicked this button will open up a text file in Notepad, once the changes have been made save and close the text file. For the changes to appear in the drop down menu, the screen that is being worked from must be reset.

Note: The program will not need to be reset, only the current screen or menu will need to be closed and reopened.

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