Technical Bulletin #25 Formulator Scale Board Calibration

Definitions

Supplier: the supplier of the Formulator
System: the Integra Formulator or computer contained therein

Introduction

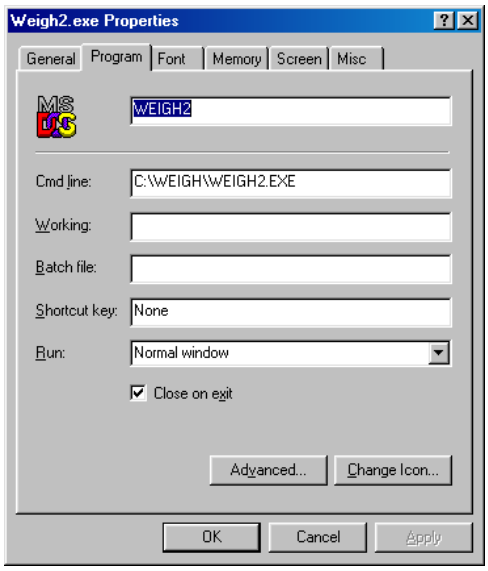
This procedure is intended to provide sufficient information to enable the calibration of the scale board. Basic knowledge of Windows and a working knowledge of the Integra Formulator are assumed.

1 Scale Board Set Up

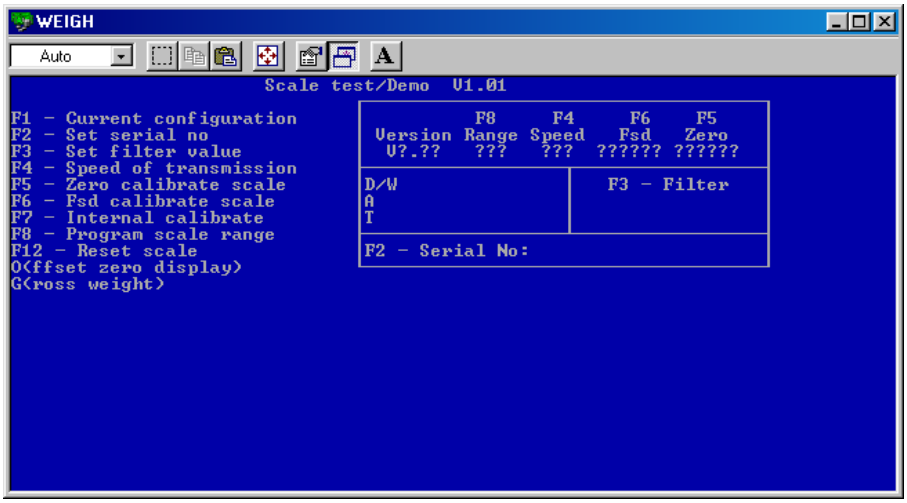
1.1 Calibration Software

The current software for the calibration of the scale board is 'Weigh.exe'. Weigh is a dos program that runs under Windows 9x on an Integra, requires a boot disk to run on an IDS. If the program is not on the hard drive already, a copy will either have been provided on floppy disk, or will be available through your 'supplier'. In this instance, copy the 'Weigh.exe' program from the supplied floppy disk to the hard drive of the Formulator, into the directory 'Weigh'. If the directory does not already exist, create one in the root directory (C:\) of the system hard drive.

Right click on the program Icon in the directory and click on the Properties option of the drop down menu that opens. This opens the Properties window. From the Program Tab, set the 'Close on exit' box as shown so that the program will shutdown with the escape key. Click on 'Apply' and then 'OK', this will create a shortcut in the directory, but the ESC key will shut down the application with either icon.



Launch the program by double clicking on the icon or use the 'Run' command from the 'Start bar' on an Integra, the program auto-launches from the boot disk. The following screen will be seen as the program launches:

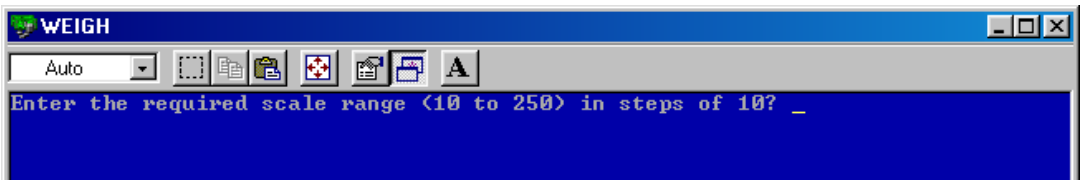


If the scale board has already been set-up, the rest of this section can be skipped and you should go straight to section 2 'Scale Board Calibration'.

There are no values for Version, Range, Speed etc. at this time because the memory chip has not yet been programmed.

1.2 Setting Up The Scale Board Range

Press the F8 key to enter the scale range.



At present only two ranges are set; 10kg, and 30kg. Enter the range as '10' for a 10kg range, and '30' for a 30kg range. Check with your supplier what range the scale board is configured to - if the wrong range is set, unacceptable errors may be experienced. Press the enter key to accept the entered value and the main screen will appear with the newly entered value under the 'Range' heading. Values for Version, Speed, D/W, A, T, etc. will also appear in the main screen.

1.3 The Version No.

The version number will be read from the PIC and displayed below the 'Version' heading after the range has been set. Check that this is the current version before proceeding. If the version number is not the current level, the PIC will need reprogramming: consult with your supplier to resolve this issue should it arise.

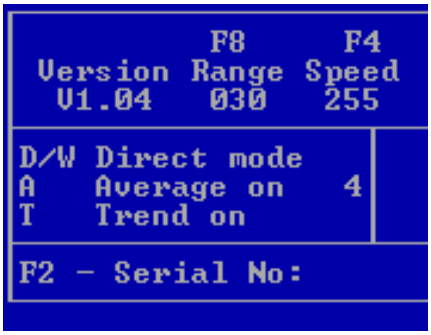
1.4 Setting Up The Scale Board Speed Value

Although this value can be changed to slow the display down, it is usually left at the default value of 255 to provide a fast response to changes.

1.5 Setting Up The Scale Board Direct/Weigh Mode Toggle

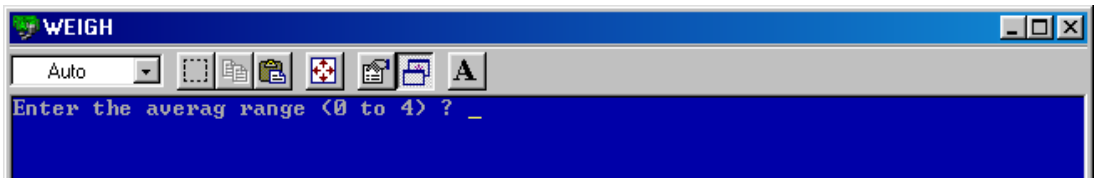
The software can return readings in two formats, 'Direct' or 'Weigh'. If the real hexadecimal value is required, set 'D/W' to 'Direct' with the 'D' key. If the weight value is required, set 'D/W' to 'Weigh' with the 'W' key. The returned value will toggle between the two formats. The mode is displayed to the left of the 'D/W' heading.

The 'Direct' mode has been selected in the illustration below:

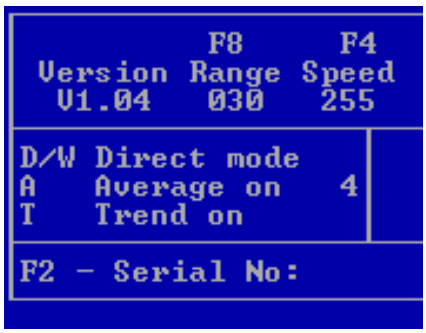


1.6 Setting Up The Scale Board Average Value

Press 'A' to enter the 'Average' menu, as shown below:



Enter a value from 0 to 4 for the average value - the usual value entered here is '4'. Press '4' and then the enter key to be returned to the main screen. The new value will be seen to the right of the 'Average on' heading as shown:

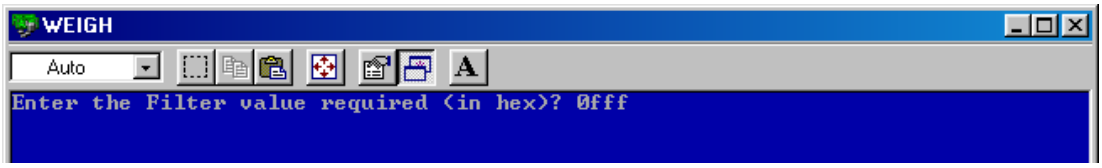


1.7 Setting Up The Scale Board Trend Toggle

Toggle 'Trend on' and 'Trend off' with the 'T' key. The default setting is 'Trend on' as shown above. Pressing the 'T' key will set the heading from 'Trend on' to 'Trend off', and visa-versa.

1.8 Setting Up The Scale Board Filter Value

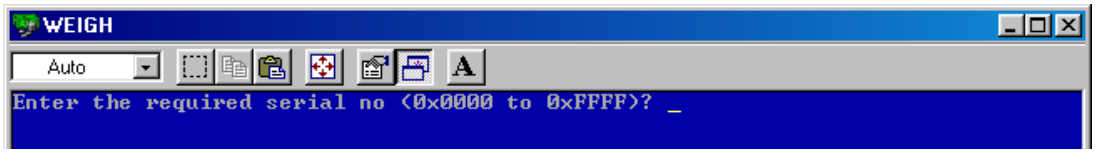
Press the F3 key to enter the 'filter value' menu as seen below:



Enter the hexadecimal '0ff' as shown above. The first character is the numeric 0, not the letter o, or O. It is very important that this value is set as shown, as a high value entered at this stage will be stored in the memory chip and will not be easily cleared - this usually results in having to replace the memory chip. Press enter when the value has been correctly set.

1.9 Setting Up The Scale Board Serial Number Value

Press the F2 key to enter the 'serial no' screen as shown below:



A serial number can be entered using this menu with the value entered being a hexadecimal number between 0000 and ffff. Enter a value if required and press the enter key to accept. Re-entering this screen and entering a new number will change the serial number.

2 Scale Board Calibration v1.04 Firmware

2.1 Software And Firmware Versions

The ‘firmware’ is the program code held in the PIC. The ‘firmware’ version number is displayed in the ‘test software’ under the ‘version’ heading. Test software v1.01 and v1.02 can be used on ‘firmware’ v1.04. For ‘firmware’ v1.05 ‘test software’ v1.02 must be used. This section is for the calibration of scale boards with ‘firmware’ v1.04 only. For ‘firmware’ v1.05 and v1.06 go to section 3.

2.2 The Scale Board Internal Calibration

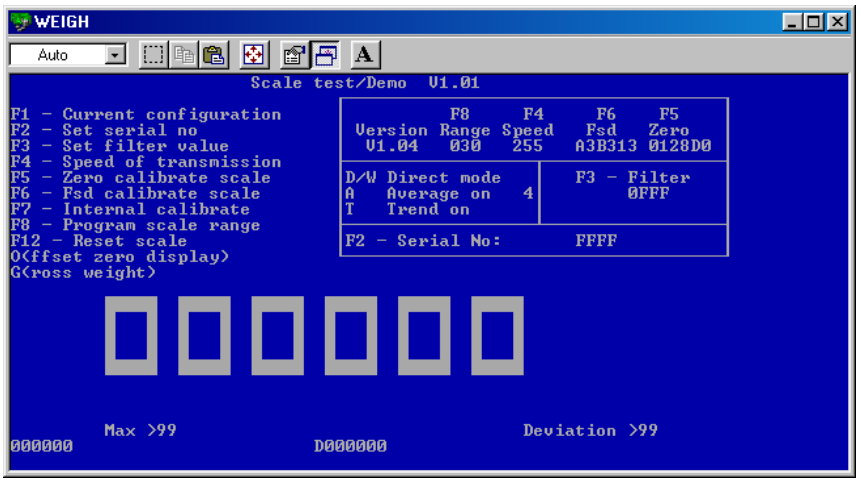
The internal calibration feature is only used if the load cell or scale board have been changed, otherwise skip this sub-section.

The standard board will be fitted with the appropriate components for a standard calibration with a 30kg load cell with a 30kg range. However, if the supplied scale board has been re-configured for a new load cell or range, internal calibration may be required.

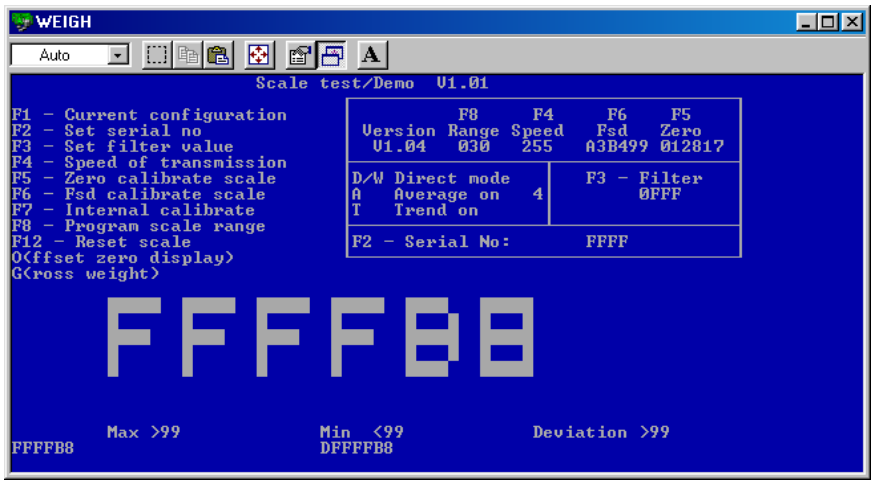
Place weights equal to the full scale deflection (FSD), (full scale reading), plus 10% of this value, directly on to the weigh pan. Example; if the new scale is 10kg, place 11kg onto the scale. With the scale in ‘Direct’ mode, press the internal calibrate function key ‘F7’. A value will be returned and this should be in the range of 800000 to 900000. If it is not, the scale board will need to be changed.

2.3 Scale Board Calibration

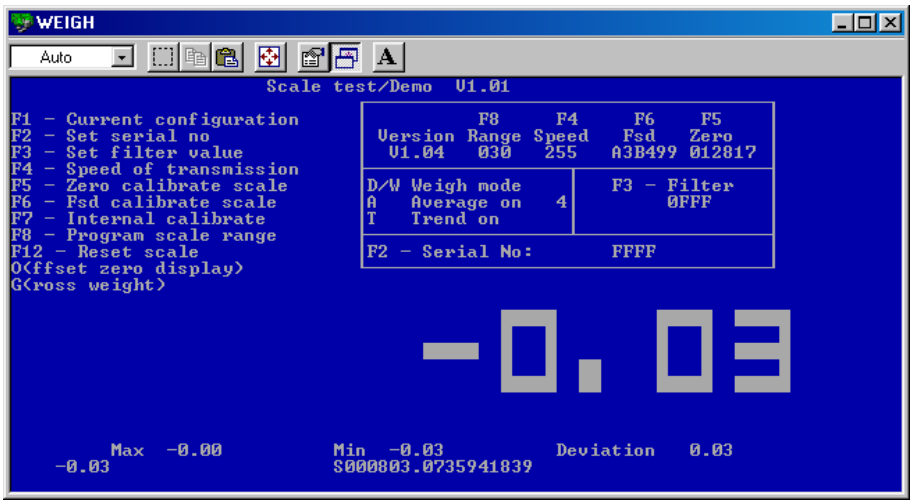
With the scale in Direct Mode and with no weights on the weigh pan, press the zero function key ‘F5’. The display will pause for a brief second as the value is saved, then display all zeros. A value will be recorded below the ‘Zero’ heading. A small amount of fluctuation should be seen; this is acceptable in the two least significant digits. If the value steadily increases to affect the third least significant digit, re-zero until the changes are cyclic in nature. If no change is seen at all, the trend may be downward and therefore not shown, re-zero until some variation can be seen.



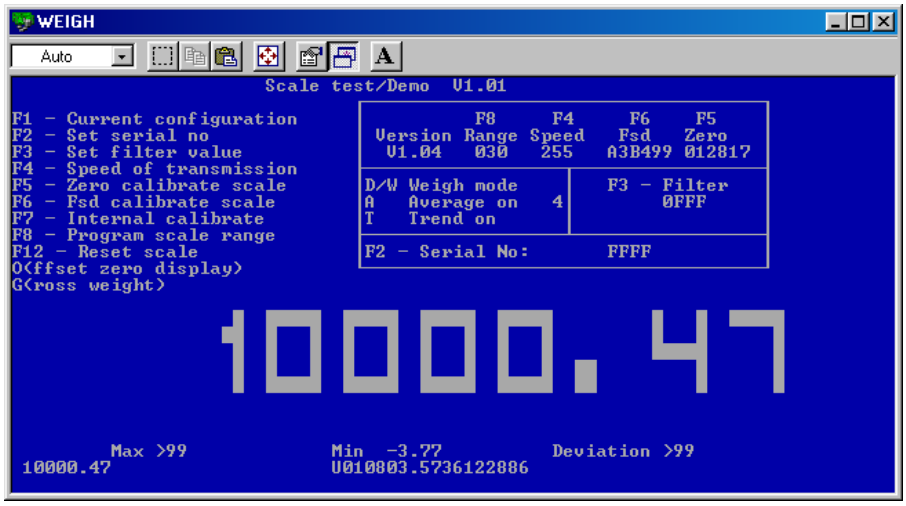
Place weights to the FSD + 10% on the weigh pan, (e.g. 33kg for a 30kg scale range), allow the scale to stabilise and press the FSD function key ‘F6’. Again, the display will pause briefly and a value of ‘FFFFFE’ will be displayed. The same cyclic effect should be seen at this value also. Downward trends or constant FFFFFE values indicate the load cell has not yet stabilised. If this is the case, press ‘F6’ again to re-set the FSD point. Variation in the two least significant digits is acceptable.



Remove all weights and place the pot locator plate on to the weigh pan, press the ‘W’ key so that the scale is displaying weight, and press the ‘O’ key to ‘Offset’ the reading to zero.



Place several weights on to the pot locator plate to check the errors are within tolerance.



The scale board is now set-up and calibrated. Close the calibration software down using the escape key and launch compatible Ink Management software.

3 Scale Board Calibration v1.05 and v1.06 Firmware

3.1 Software And Firmware Versions

The ‘firmware’ is the program code held in the PIC. The ‘firmware’ version number is displayed in the ‘test software’ under the ‘version’ heading. Test software v1.01 and v1.02 can be used on ‘firmware’ v1.04. For ‘firmware’ v1.05 ‘test software’ v1.02 must be used. This section is for the calibration of scale boards with ‘firmware’ v1.05 and v1.06 only. For ‘firmware’ v1.04 go to section 2.

3.2 The Scale Board Internal Calibration

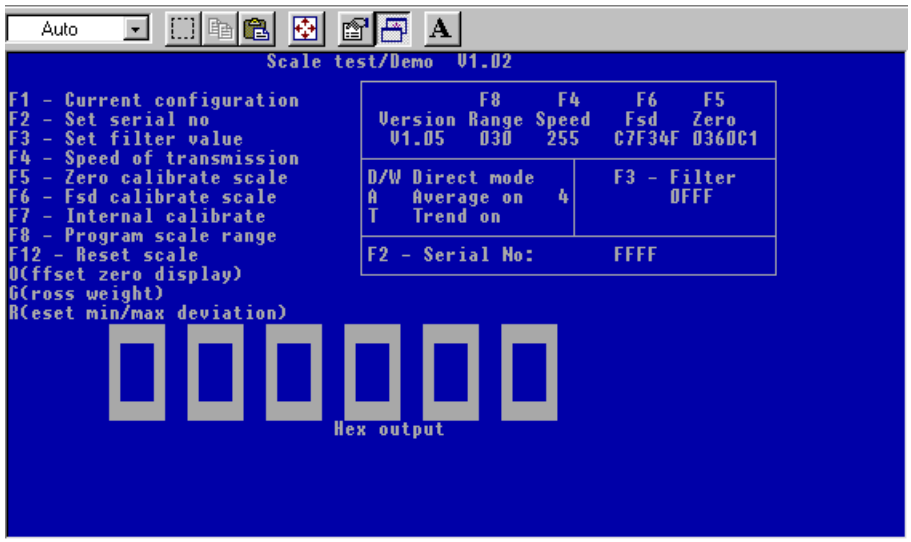
The internal calibration feature is only used if the load cell or scale board have been changed, otherwise skip this sub-section.

The standard board will be fitted with the appropriate components for a standard calibration with a 30kg load cell with a 30kg range. However, if the supplied scale board has been re-configured for a new load cell or range, internal calibration may be required.

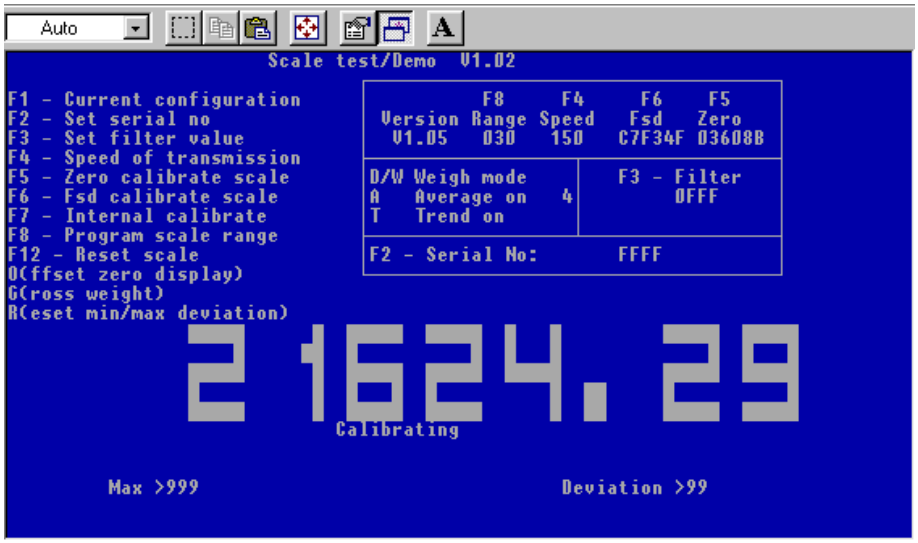
Allow the scale to stabilise for five minutes. Place weights equal to the full scale deflection (FSD), (full scale reading), directly on to the weigh pan. Example; if the new scale is 30kg, place 30kg onto the scale. With the scale in ‘Direct’ mode, press the internal calibrate function key ‘F7’. A value will be returned and this should be in the range of 700000 to 900000. If it is not, the scale board will need to be changed.

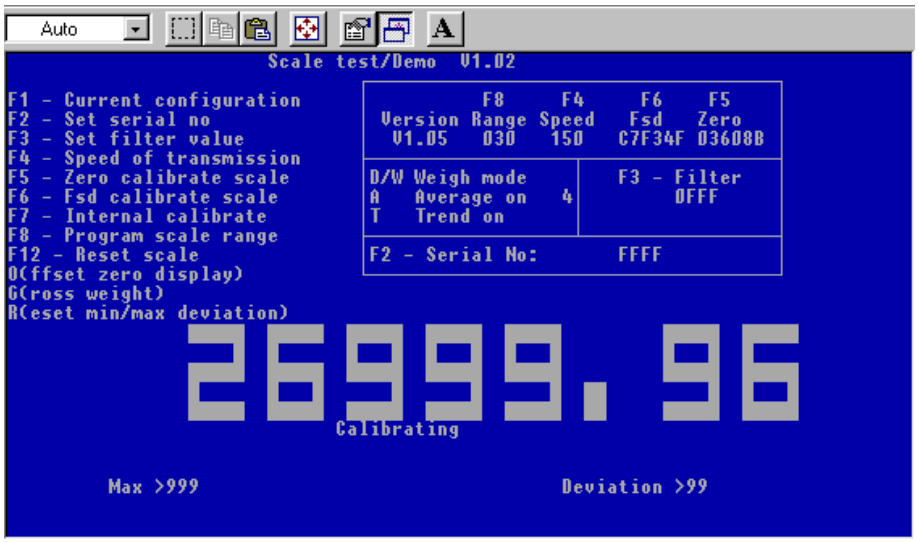
3.3 Scale Board Calibration

With the scale in Direct Mode and with no weights on the weigh pan, press the zero function key ‘F5’. The display will pause for a brief second as the value is saved, then display all zeros. A value will be recorded below the ‘Zero’ heading. A small amount of fluctuation should be seen; this is acceptable in the two least significant digits. If the value steadily increases to affect the third least significant digit, re-zero until the changes are cyclic in nature. If no change is seen at all, the trend may be downward and therefore not shown, re-zero until some variation can be seen.

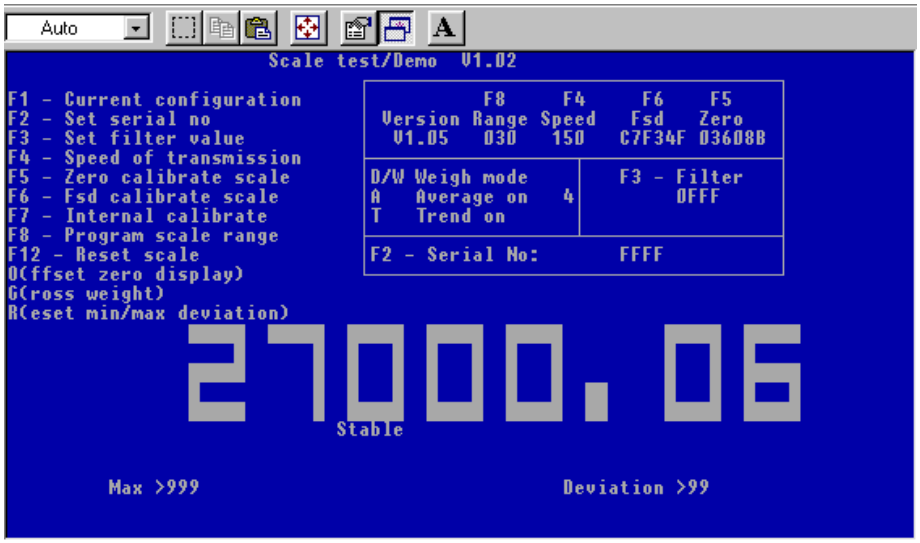


Place weights to the FSD - 10% on the weigh pan, (e.g. 27kg for a 30kg scale range), allow the scale to stabilise for a couple of minutes and press the FSD function key ‘F6’. The displayed value will change and the message ‘Calibrating’ will appear below it. The number will count up for about three to four minutes, after this time the ‘Calibrating’ message will change to ‘Hex reading’. Calibration can also be done showing the weight as shown.



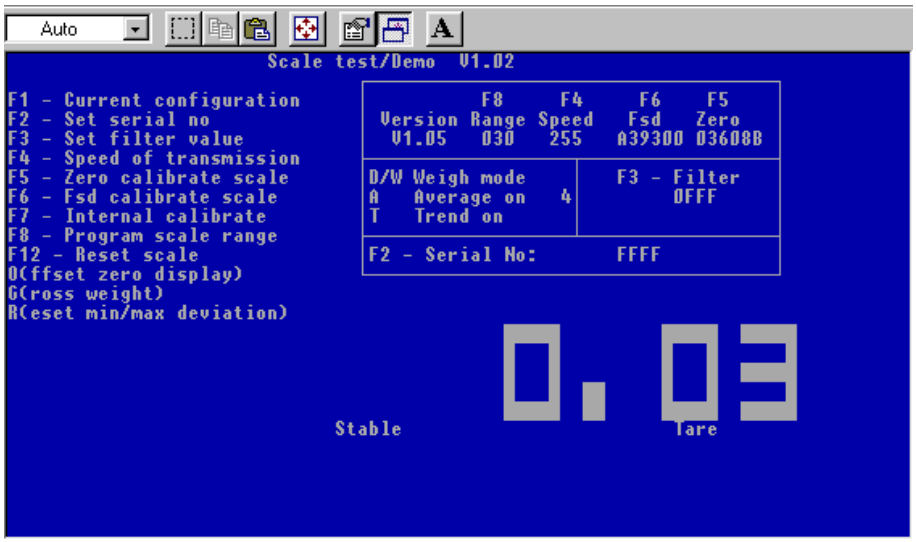


Calibration is now complete. Press ‘w’ to go into ‘weigh’ mode if not already in ‘weigh’ mode, a value close to ‘27000.00’ should be displayed, watch the number for a few minutes, if it increases or decreases substantially, press ‘F6’ again to re-set the FSD point, the above will be seen except the value will increase until the calibration weight is achieved. Variation of plus or minus half a gram is acceptable, (±0.2 grams is the norm.).

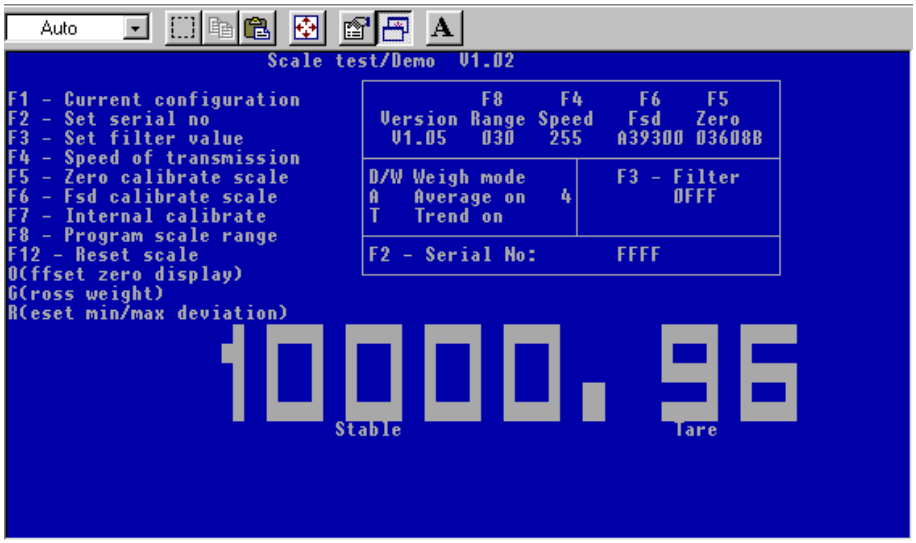


During the calibration process the speed of the boards data transmission will have been slowed down, this should be set back to 255 using the ‘Speed’ function key F4. Press F4, enter 255, then hit return; the value of 255 will replace 150 under the ‘Speed’ heading.

Remove all weights and place the pot locator plate on to the weigh pan, press the ‘W’ key, if not already done, to display the weight, and press the ‘O’ key to ‘Offset’ the reading to zero.



Place several weights on to the pot locator plate to check the errors are within tolerance. If the scale errors are excessive, this could be due to the scale board or load cell not having stabilised fully prior to calibration, re-calibration may improve errors. To re-calibrate, press ‘g’ to put the scale in ‘gross’ mode, this removes the ‘offset’ applied earlier, then go back to the beginning of this section, and repeat the process.



The scale board is now set-up and calibrated. Close the calibration software down using the escape key and launch compatible Ink Management software.

4 Appendix

4.1 Key Function Look Up Guide

A	selects the average value setting screen
D	selects direct display mode
G	displays the gross weight
O	offsets the displayed reading in weigh mode
R	resets the Min. and Max. deviation values
T	toggles ‘Trend on’ or ‘Trend off’
W	selects weigh display mode
F1	reads the current configuration from the memory chip
F2	enters the serial no entry screen
F3	enters the filter value entry screen
F4	enters the speed of transmission entry screen
F5	sets the zero calibration point
F6	sets the full scale deflection + 10% point
F7	returns the internal calibration value
F8	enters the scale range entry screen
F12	resets the scale
ESC	quits the program