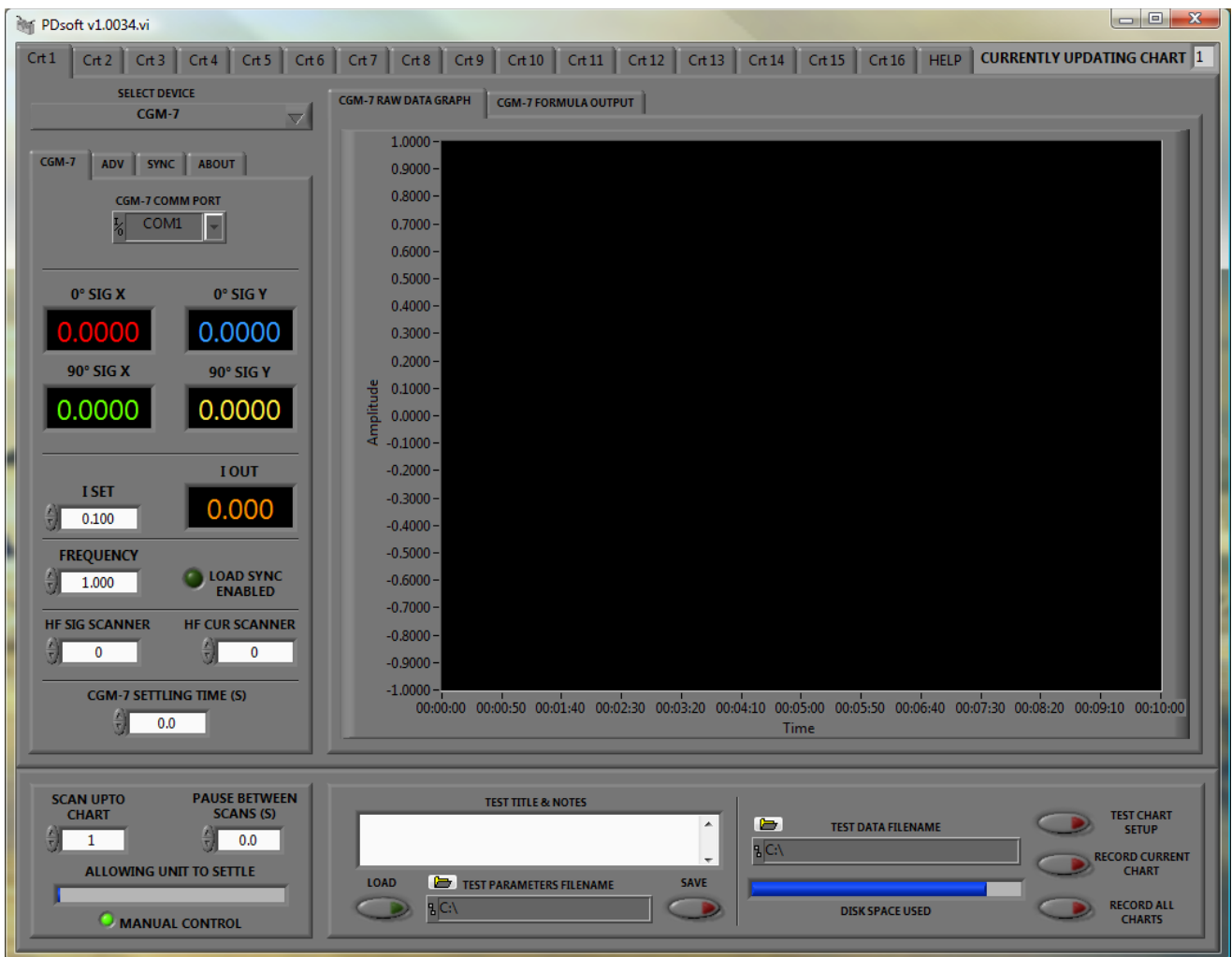


# MATELECT LTD

## PDsoft v1.00



# INSTRUCTION MANUAL



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## SYSTEM REQUIREMENTS

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PDsoft requires a fairly up to date PC system to work effectively, the following are the absolute minimum system requirements.

- An IBM compatible PC running Windows XP, or Windows Vista.
- A Pentium 4 processor or higher.
- 4 GB of system memory.
- A video resolution of 1024x768 or greater.
- 100 MB of free hard disk space.

## TECHNICAL SUPPORT

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Matelect prides itself with its technical support and willingness to help. If at any point during the installation or running of this application you require assistance please do not hesitate to contact Matelect. This can be done via phone or via email at:

[PDsoftsupport@matelect.com](mailto:PDsoftsupport@matelect.com)

You can expect a response within 24hours under normal circumstances. If after using PDsoft you have and suggestions that could improve the application please email,

[PDsoftimprovement@matelect.com](mailto:PDsoftimprovement@matelect.com)

If you would like bespoke software written to your specific requirements, Matelect is capable of providing a quick turnaround service. Please get in touch to discuss your requirements.

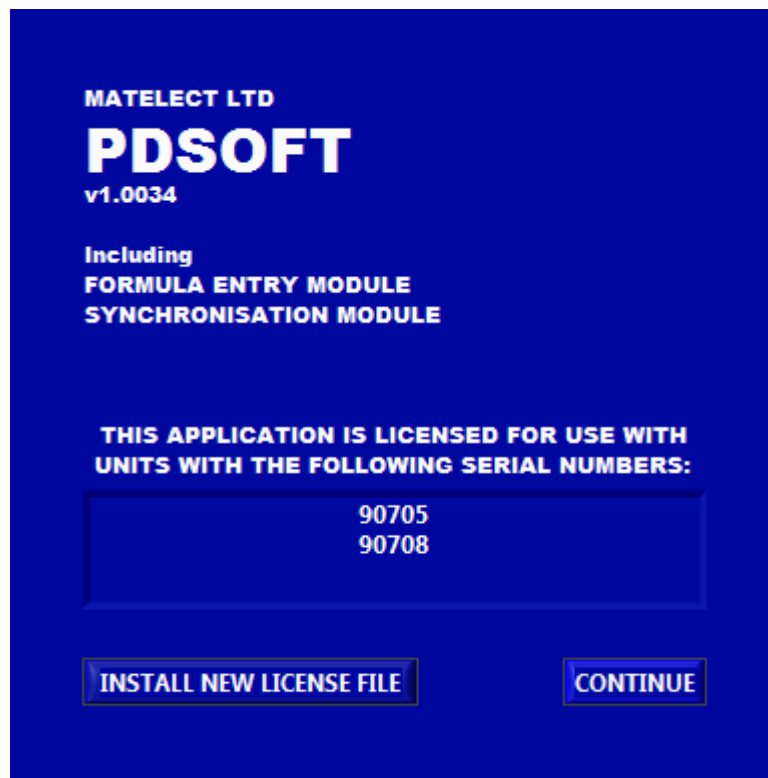
## INSTALLING THE LICENSE FILE

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A license file arrangement is incorporated into PDsoft. In order to use all the advanced features of PDsoft a valid license file must be installed, if it is not you will still be able to use PDsoft in a trial version, however you will not be able to save any data and you will not be able to use the 'TEST CHART SETUP', 'RECORD CURRENT CHART' or 'RECORD ALL CHART' facilities, as well as some other features such as load synchronisation.

The license file locks the software to a particular potential drop (PD) unit's serial number or group of serial numbers. The software interrogates the unit(s) connected to the PC at various points during execution of the programme and checks to see if they match with the license file information. If they do not then a popup display informs the user of this and as mentioned above will not allow certain aspects of the program to function.

When initially installing the software a valid license file will be installed, however if a user wishes to add more PD units to be controlled by PDsoft a new license file can be installed at any time by clicking 'INSTALL NEW LICENSE FILE' from the splash screen and following the onscreen instructions.



The splash screen interrogates the license file on start-up and shows a list of valid serial numbers that may be used with the application, see screenshot above. If you wish to use PDsoft with a unit whose serial number is not shown on the splash screen, please contact Matelect for a new license file.

## ABOUT PDsoft

PDsoft has been developed to work with all of Matelect's potential drop units. PDsoft will work with the ACM-1A, CGM-5R, CGM-7, DCM-1, and DCM-2. The basic function of PDsoft is to log the output data from the selected PD unit and if appropriate set up any parameters.

PDsoft is also capable of controlling any scanner devices connected.

Dependent on the PD unit used with PDsoft the application has multiple advanced features (some of which may need to be independently purchased), these include formula entry to give a real time 'mm' output, load synchronisation for ACPD units, (load synchronisation is built into our DCPD products).

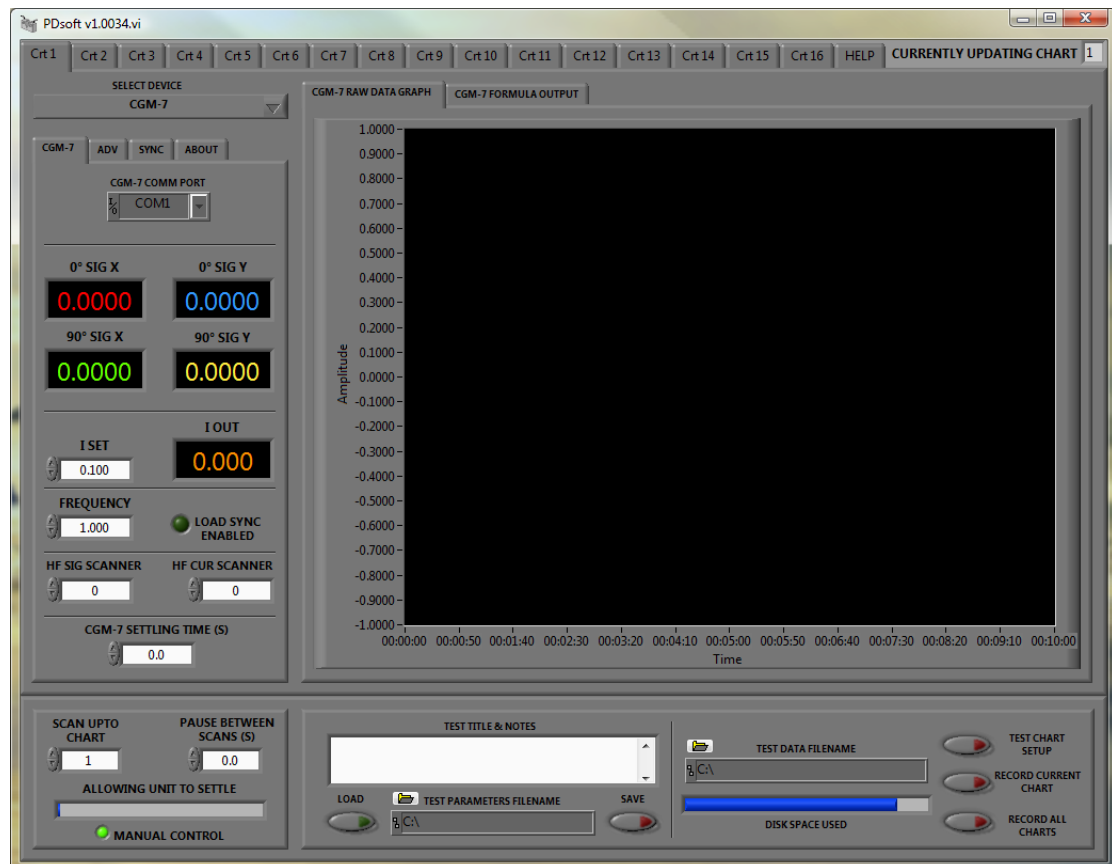
The logged data is stored in a simple comma separated file for easy importation to other applications for further investigation.

## A GUIDED TOUR OF THE USER INTERFACE

The application can be broken down into 4 main sections, these are clearly distinguished, see image below. The four main sections are as follows,

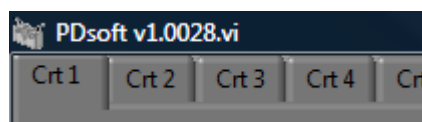
1. Unit selection and setup.
2. The graph and formula entry section.
3. The scan setup section.
4. The data recording section.

Each of these sections will be described in turn. The usual approach when setting up a test sequence is to first configure PDsoft for the type of PD equipment being used, then to set up the particular equipments parameters, then any scanning sequence required and finally the data recording options.



## CHART TABS

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The first thing to note is the row of tabs along the top of the screen, each one of these represents a separate chart, you can think of a chart as a separate experiment. Each chart can be set up completely independently from each other. Click on any chart tab along the top row to select and set-up the Matelect PD instrument that will be used. The user should start at chart 1 and work their way down to chart 16, adjusting parameters and setting channels etc. as they go. Once they have finished a scan of all adjusted charts can be tested or initiated.

## SELECT DEVICE

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This is a simple pull down menu, within which any current Matelect PD product can be selected, if the user is working with a CGM-7 for example they should selected this device from the list, the available parameters and outputs will change accordingly and the relevant tabs will appear below in the application window.

**Please note: Not all PD units may be currently available for use in PDsoft, more will be added as time allows, please contact Matelect for a list of currently available units.**

As already mentioned this application has been written to control multiple devices. Please refer to the relevant section at the back of this manual for further detailed information concerning your specific device setup.

## CHART SCANNING CONTROL

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The chart scanning window controls the timing and how many charts PDsoft scans through. If you have setup charts 1 to 5 let's say you should adjust the 'SCAN UPTO CHART' parameter to 5. Once either the 'TEST SCAN SETUP' or 'RECORD ALL CHARTS' button is pressed (see data recording for further information) the program will set the chart tab to chart 1 and start scanning through the charts sequentially until it reaches the 'SCAN UPTO CHART' value. At this point the program will pause for so many seconds, (if set up by the user under 'PAUSE BETWEEN SCANS') and start the process again until the user stops it by depressing either the 'TEST SCAN SETUP' or 'RECORD ALL CHARTS' buttons.

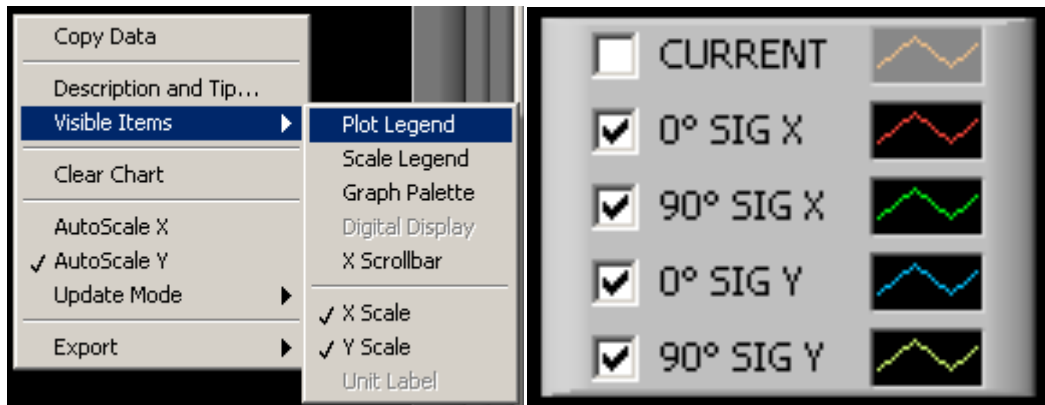
The 'ALLOWING UNIT TO SETTLE' bar shows how long before PDsoft will take the next reading, this is set up under each specific devices user interface, if applicable. The 'MANUAL CONTROL' indicator is on whilst the user is setting up the charts, whenever a scan or recording is taking place this indicator will be off showing the user that they should not adjust any of the parameters, and that the program is under automated control.

## PLOT SELECT

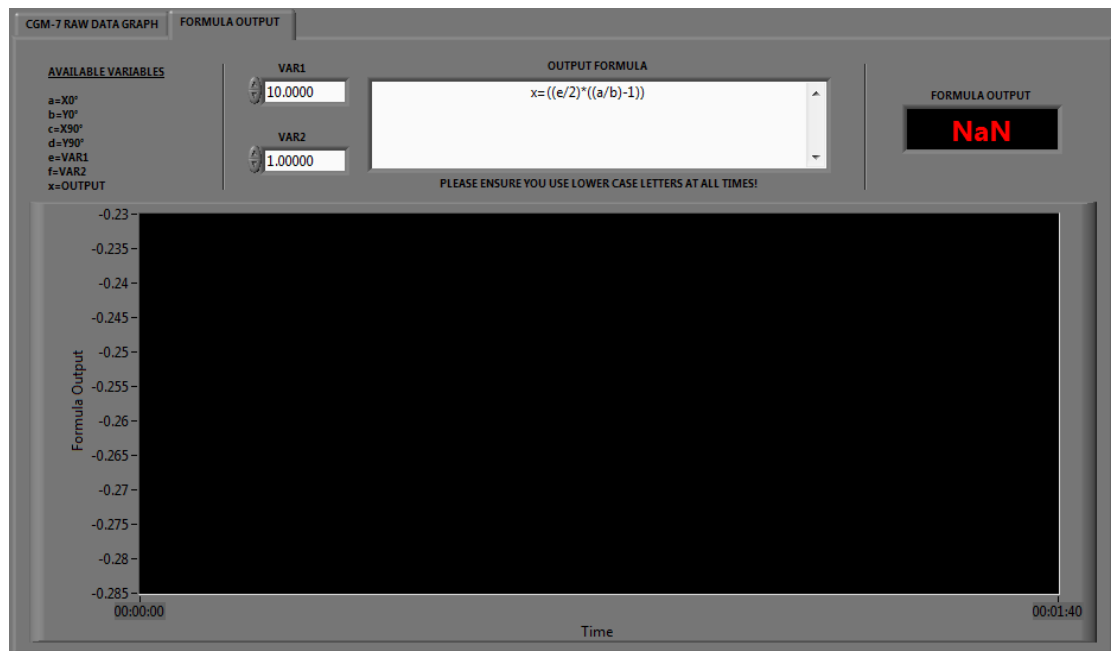
Using the CGM-7 as an example we can see that all the parameters from the unit are displayed in real time on the 'CGM-7 RAW DATA GRAPH', however sometimes it is useful to remove some of the traces from the graph or indeed all but one so that we can see greater detail.

In order to do this, the following will need to be done;

- Right click anywhere on the graph.
- Select Visible Items and then select 'Plot legend'
- The image on the right should now appear inside your graph, simply select or deselect the desired traces. As an example in the image below the 'current' has been deselected.



## FORMULA ENTRY AND OUTPUT



Independent of the PD unit selected, a formula output window is available for direct entry of formulas allowing, for example, a real time 'mm' output display, this can be found by clicking the 'FORMULA OUTPUT' tab behind the standard 'RAW DATA GRAPH'. The user is advised to use a dual channel unit such as the DCM-2 or CGM-7 for a more accurate result, although this is not an absolute necessity. (The use of dual channel systems will allow for a reference and active signal to be measured concurrently.)



As can be seen above, (this is with a CGM-7 unit selected), a list of available variables from the CGM-7 are shown on the left hand side, these can be entered into the 'OUTPUT FORMULA' window in order to give a 'mm' output display, or anything else the user wishes to produce. A list of available expressions for use with the formula entry window is shown on the following page.

It should be noted that once a user has finished entering a formula they must click outside the 'OUTPUT FORMULA' window for the changes to take effect and everything must also be written in lower case.

VALID MATHEMATICAL EXPRESSIONS FOR FORMULA ENTRY

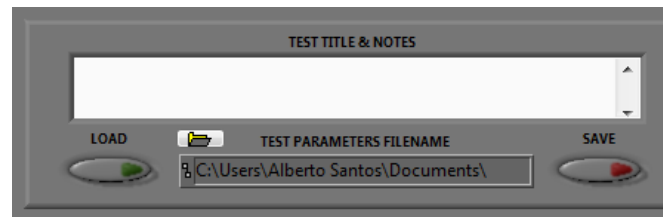
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The following expressions may be used with the formula entry system in PDsoft.

Function	Description
abs(x)	Returns the absolute value of x.
acos(x)	Computes the inverse cosine of x in radians.
acosh(x)	Computes the inverse hyperbolic cosine of x.
asin(x)	Computes the inverse sine of x in radians.
asinh(x)	Computes the inverse hyperbolic sine of x.
atan(x)	Computes the inverse tangent of x in radians.
atan2(y,x)	Computes the arctangent of y/x in radians.
atanh(x)	Computes the inverse hyperbolic tangent of x.
ceil(x)	Rounds x to the next higher integer (smallest integer x).
ci(x)	Evaluates the cosine integral for any real nonnegative number x.
cos(x)	Computes the cosine of x, where x is in radians.
cosh(x)	Computes the hyperbolic cosine of x.
cot(x)	Computes the cotangent of x (1/tan(x)), where x is in radians.
csc(x)	Computes the cosecant of x (1/sin(x)), where x is in radians.
exp(x)	Computes the value of e raised to the x power.
expm1(x)	Computes one less than the value of e raised to the x power ((e^x) – 1).
floor(x)	Truncates x to the next lower integer (largest integer x).
getexp(x)	Returns the exponent of x.
gamma(x)	Evaluates the gamma function or incomplete gamma function for x.
getman(x)	Returns the mantissa of x.
int(x)	Rounds x to the nearest integer.
intrz(x)	Rounds x to the nearest integer between x and zero.
ln(x)	Computes the natural logarithm of x (to the base of e).
lnp1(x)	Computes the natural logarithm of (x + 1).
log(x)	Computes the logarithm of x (to the base of 10).
log2(x)	Computes the logarithm of x (to the base of 2).
max(x,y)	Compares x and y and returns the larger value.
min(x,y)	Compares x and y and returns the smaller value.
mod(x,y)	Computes the remainder of x/y, when the quotient is rounded toward – Infinity.
pow(x,y)	Computes x raised to the y power.
rand( )	Produces a floating-point number between 0 and 1 exclusively.
rem(x,y)	Computes the remainder of x/y, when the quotient is rounded to the nearest integer.
si(x)	Evaluates the sine integral for any real number x.
sec(x)	Computes the secant of x, where x is in radians (1/cos(x)).
sign(x)	Returns 1 if x is greater than 0, returns 0 if x is equal to 0, and returns –1 if x is less than 0.
sin(x)	Computes the sine of x, where x is in radians.
sinc(x)	Computes the sine of x divided by x (sin(x)/x), where x is in radians.
sinh(x)	Computes the hyperbolic sine of x.
sizeofDim(ary,di)	Returns the size of the dimension di specified for the array ary.
spike(x)	Generates the spike function for any real number x.
sqrt(x)	Computes the square root of x.
step(x)	Generates the step function for any real number x.
tan(x)	Computes the tangent of x, where x is in radians.
tanh(x)	Computes the hyperbolic tangent of x.

## TEST SETUP

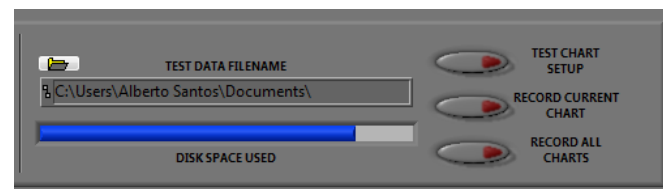
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The test setup section allows the user to store or retrieve a previous setup. When setting up a test that involves all 16 charts this can take a long time to achieve, however once a user is happy with a particular setup they may store the test parameters to file for retrieval at a later date. Simply enter a valid file location and filename under 'TEST PARAMETERS FILENAME', no extension is required, or browse to a location by clicking the folder icon. Once you have done this click on 'SAVE' to store the file or 'LOAD' to retrieve a previously saved test file. A user may also enter a description under 'TEST TITLES & NOTES' this will also be saved at the beginning of the comma separated data file. It is often a good idea to fill this in with as much information as possible to remind the user of the particular test which was undertaken at the time.

## DATA RECORDING

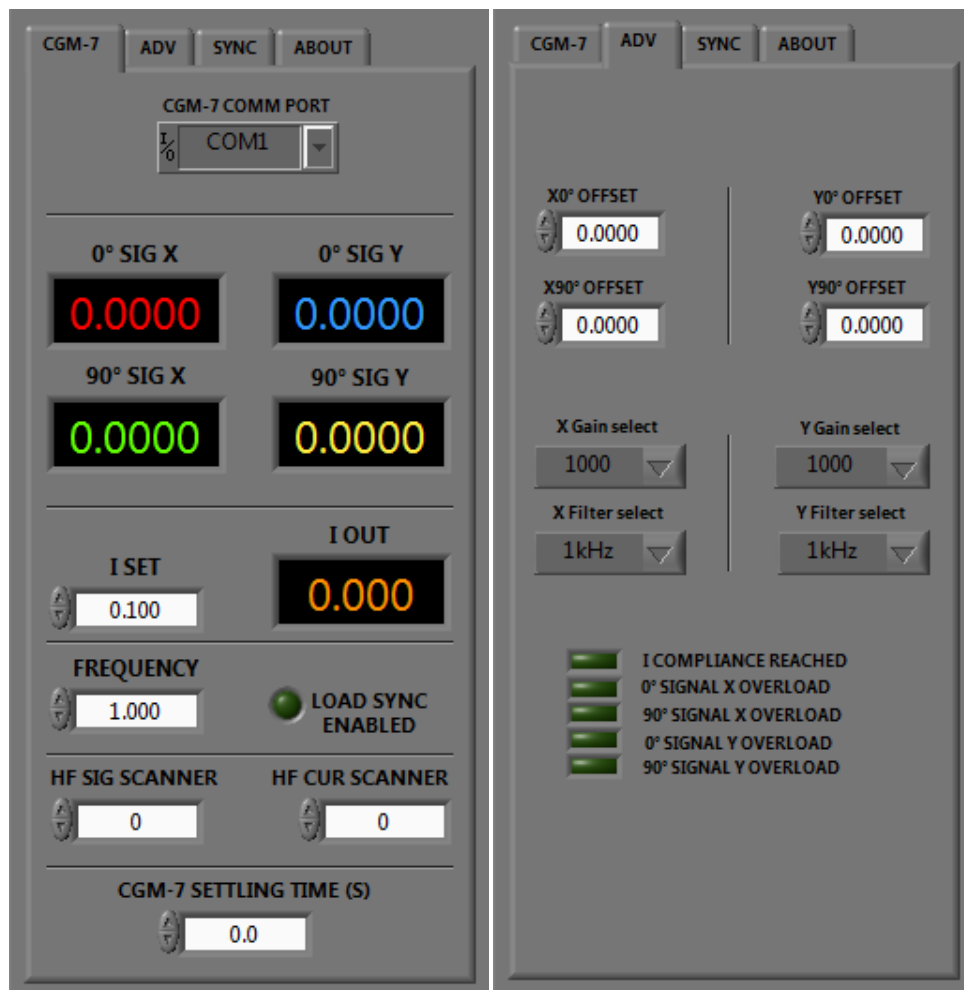
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The data recording section allows the user to store the data gathered from the selected unit into a date and time stamped comma separated file. Enter the desired data filename in the 'TEST DATA FILENAME' box or browse to a location by clicking the folder icon. To test the user setup, hit the 'TEST CHART SETUP' button, the programme will run through your setup and any corrections can be made during this time. Once satisfied that your setup is correct you may proceed to use either the 'RECORD CURRENT CHART' or 'RECORD ALL CHARTS'. The 'DISK SPACE USED' bar gives an up to date display of the hard disk space left in the location the user has chosen to save their data file to.

## CGM-7 USER INTERFACE

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This section of the manual concerns itself with the specific CGM-7 user interface. Once a user has selected the CGM-7 from the drop down menu the following screen appears.

Set the correct 'com' port for the attached CGM-7, the user should start to see the data from the CGM-7 being displayed in real time.

Items in a black background window are data out readings whilst those in a white background window are user input values.

The data out values signal and current are colour coded, these match up to the colours on the graph output display, so that the orange line on the graph is the current output.

The user can set the current and frequency values as well as any scanners that may be connected within this tab.

The final user setting, the 'SETTLING TIME' is used to allow the CGM-7 to settle in order to stabilize, this is only used when scanning between charts, when scanning is commenced the program changes the chart selected then applies the user settings and waits for a period as set by the settling time before taking a reading and proceeding to the next chart.

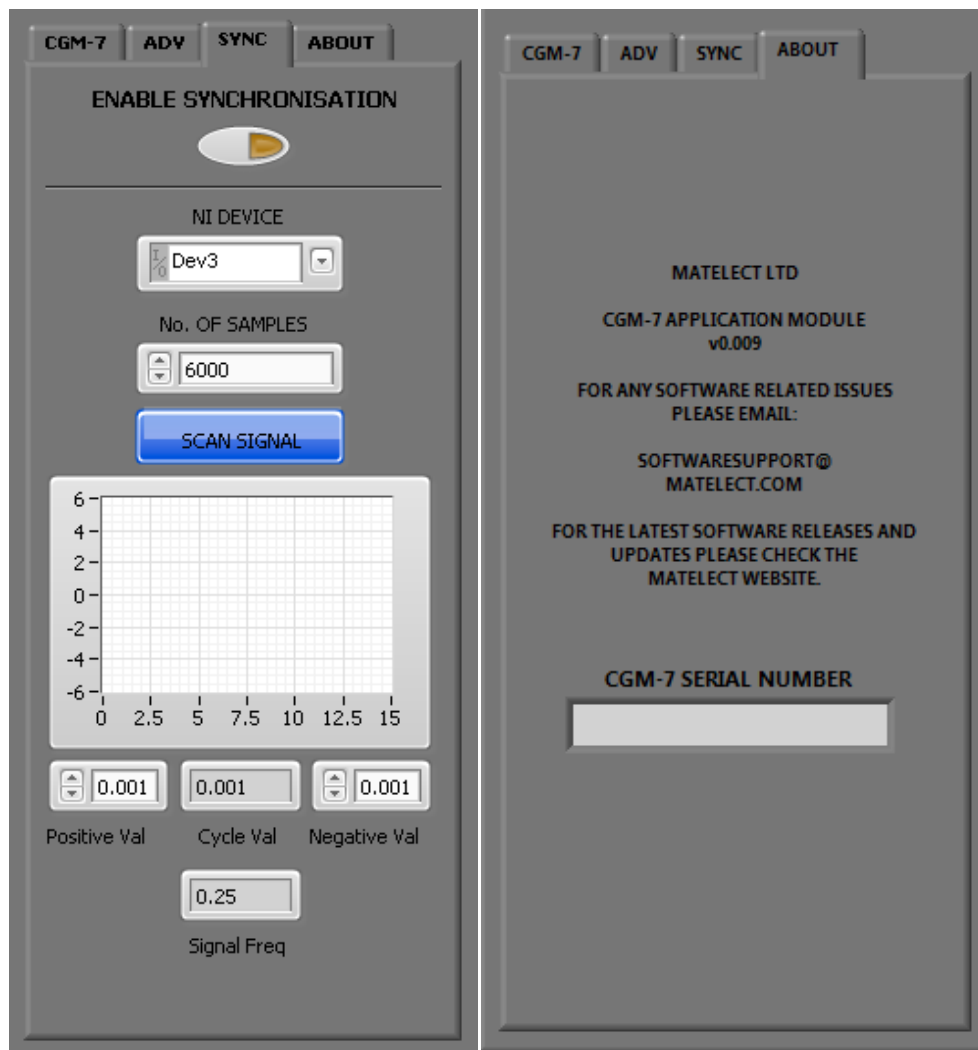
Finally the 'LOAD SYNC ENABLED' indicator is used to show the user when the application is waiting for a load signal before taking a reading, it should be noted that if a settling time is set the program will wait the set time and then wait for a load signal before taking a reading.

## CGM-7 ADVANCED FEATURES

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The user can access the advanced features of the CGM-7 by pressing the 'ADV' tab, here the user can adjust the offset of each signal as well as select filter options and gain settings for both the X and Y signals of the CGM-7.

## CGM-7 LOAD SYNCHRONISATION



The CGM-7 PDsoft interface is capable of taking a reading in sync with the load signal of a testing machine. If the user wishes to do this they will require extra hardware usually in the form of a small USB module capable of reading the test machines load signal, please contact Matelect for further information on this, currently PDsoft only works with Matelect's load synchronisation module, the MCI-1.

In order to set up synchronisation between your testing machine and the MCI-1 ensure the MCI-1 is correctly installed and then do the following;

- Ensure the signal from the testing machine is within +/- 10v, and not faster than 0.25Hz. (The CGM-7 requires about 1second to stabilize after a step change, dependant on filter mode, please contact Matelect for further information)
- Once you are sure the machine cycle signal is within the required range connect it to the MCI-1 via a BNC lead.
- Select the correct MCI-1 'NI Device' from the pull down menu, this will be in the form of 'Dev?' where the '?' will normally be 1.
- The MCI-1 is set to read 1000 readings a second when scanning your load waveform, set the number of signals appropriately to ensure you get at least two full waveform cycles. (For example if you have a waveform that takes 4 seconds for a full cycle, set the number of samples to 8000)
- Press the 'ENABLE SYNCHRONISATION' button, note that the 'SCAN SIGNAL' button was already highlighted for you, after a time a load signal will appear on the graph. Ensure that the resultant readings from the waveform are correct, press the 'SCAN SIGNAL' button again if not so.

- if the user switches back to the 'CGM-7 BASICS' tab they will note that the 'LOAD SYNC ENABLED' indicator is now on and the display will only update on the falling edge of the load signal.

The final tab shows the version number of the CGM-7 interface along with the serial number of the connected CGM-7. The serial number shown here must match that of the license file for complete operation of PDsoft, please refer to the license file section at the beginning of this manual for further information.

## CGM-7 AUXILIARY ANALOGUE OUTPUT CONTROL

Since revision D of the CGM-7, the inclusion of an auxiliary analogue output has been added to the rear panel. This gives an analogue output derived from the formula output from PDsoft.

The auxiliary output is in the form of a BNC connection found on the back of the CGM-7. It has a maximum voltage range of 0 to 10 volts.

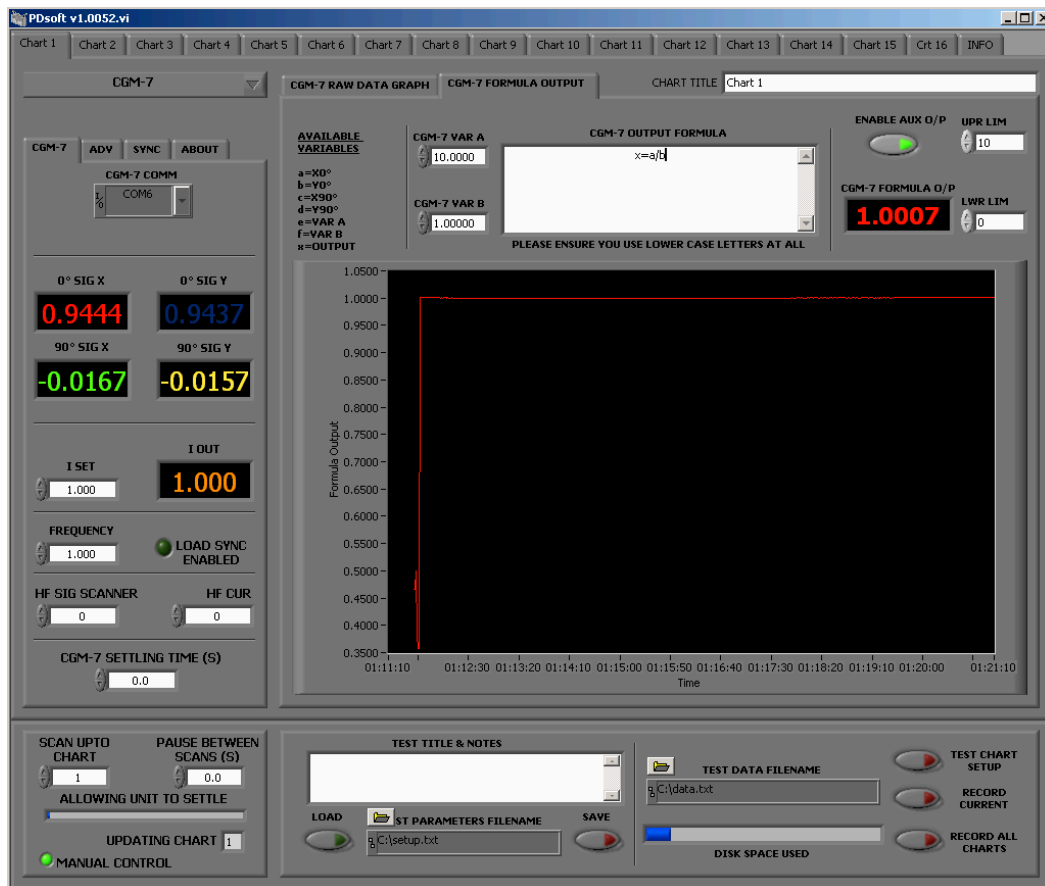
To setup and enable the auxiliary output of your CGM-7 the following needs to be done.

Start up PDsoft, select the chart you wish to use and select the CGM-7 unit from the drop down menu. Select the CGM-7 formula output tab, you should now see something similar to the image below.

Enter the formula you wish to use in the formula output window as normal, to send this output to the BNC on the rear of the unit select the 'Enable AUX O/P' button, the formula output value will now appear on the rear AUX O/P BNC.

If you need to scale you analogue output value in any way this should be done via the formula entry window.

Use the lower and upper limit value to limit the max and min voltages from the BNC, these should be selected to match your data acquisition system.



Please note in order to use this feature your CGM-7 will need to be running firmware v6.500 or above. If you are running a firmware version before this but do have an analogue output BNC on the back of your unit please contact Matelect who will be able to supply a firmware upgrade for you.

## CGM-7 ANALOGUE OUTPUT VIA NI9263

This version of PDsoft has been modified to work with the National Instruments NI9263 analogue out card.

Simply plug the NI device to the computer via the supplied USB cable assuming PDsoft has been installed first the machine will find the device and install the necessary device drivers that were included with your build of PDsoft.

Once the NI device has been successfully installed onto the computer start PDsoft.

Select the CGM-7 and then select the formula tab you should have something as shown below.

Please note the top right hand side of the screen, this will display not only the formula output but you may tick the selection box to have this value sent to your analogue output device. You may type any formula into the formula box, therefore should your signal need to be scaled in any way you may do so here.

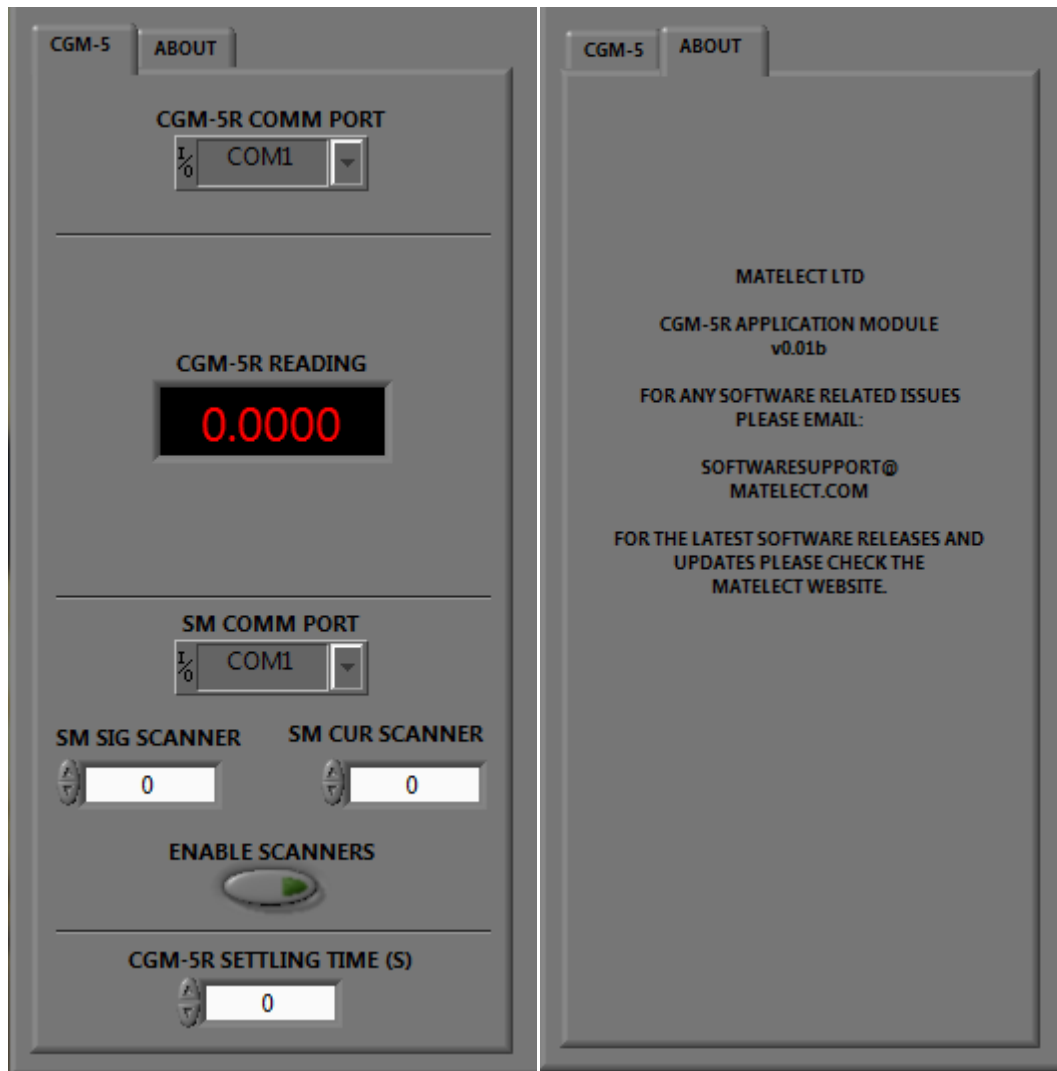
Please note the following;

- The output of the card has a fixed scale of +/- 10v, should this be exceeded the led will light up in PDsoft to indicate this.
- The output of chart 1 will be sent to analogue channel 1, chart 2 to analogue channel 2, etc. This cannot be changed or re-arranged in any way.
- The output of the analogue signals are updated every time the formula output window is updated and will hold the value from the previous read in the mean time.



## CGM-5R USER INTERFACE

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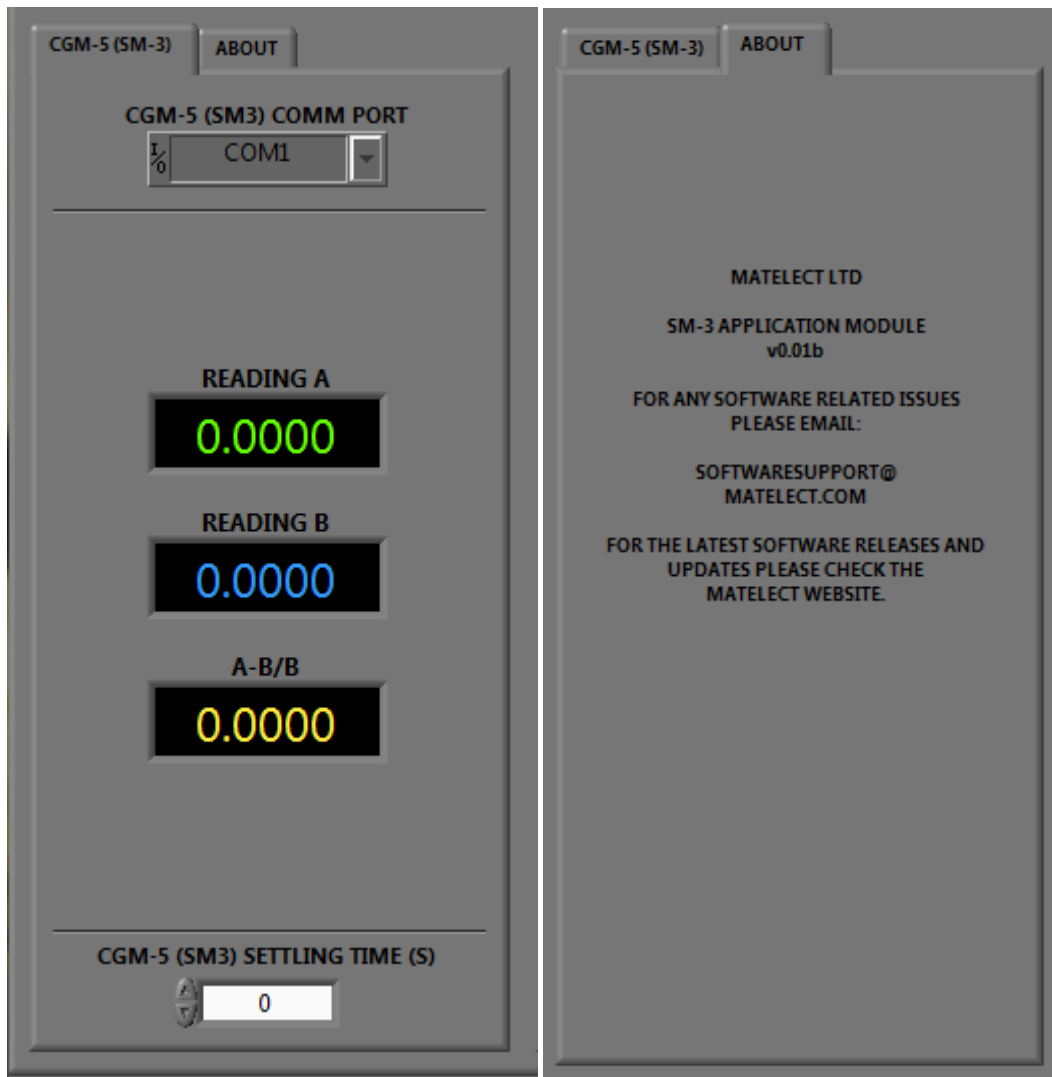


This section of the manual concerns itself with the specific CGM-5R user interface. Once a user has selected the CGM-5R from the drop down menu the following screen appears. Set the correct 'com' port for the attached CGM-5R, the user should start to see the data from the CGM-5R being displayed in real time.

Items in a black background window are data out readings whilst those in a white background window are user input values.

The CGM-5R does not have two-way communication, so all values such as current and frequency must first be set on the CGM-5R manually, see the unit's manual for further advice. The final user setting, the 'SETTLING TIME' is used to allow the CGM-5R to settle in order to stabilize, this is only used when scanning between charts, when scanning is commenced the program changes the chart selected then applies the user settings and waits for a period as set by the settling time before taking a reading and proceeding to the next chart.

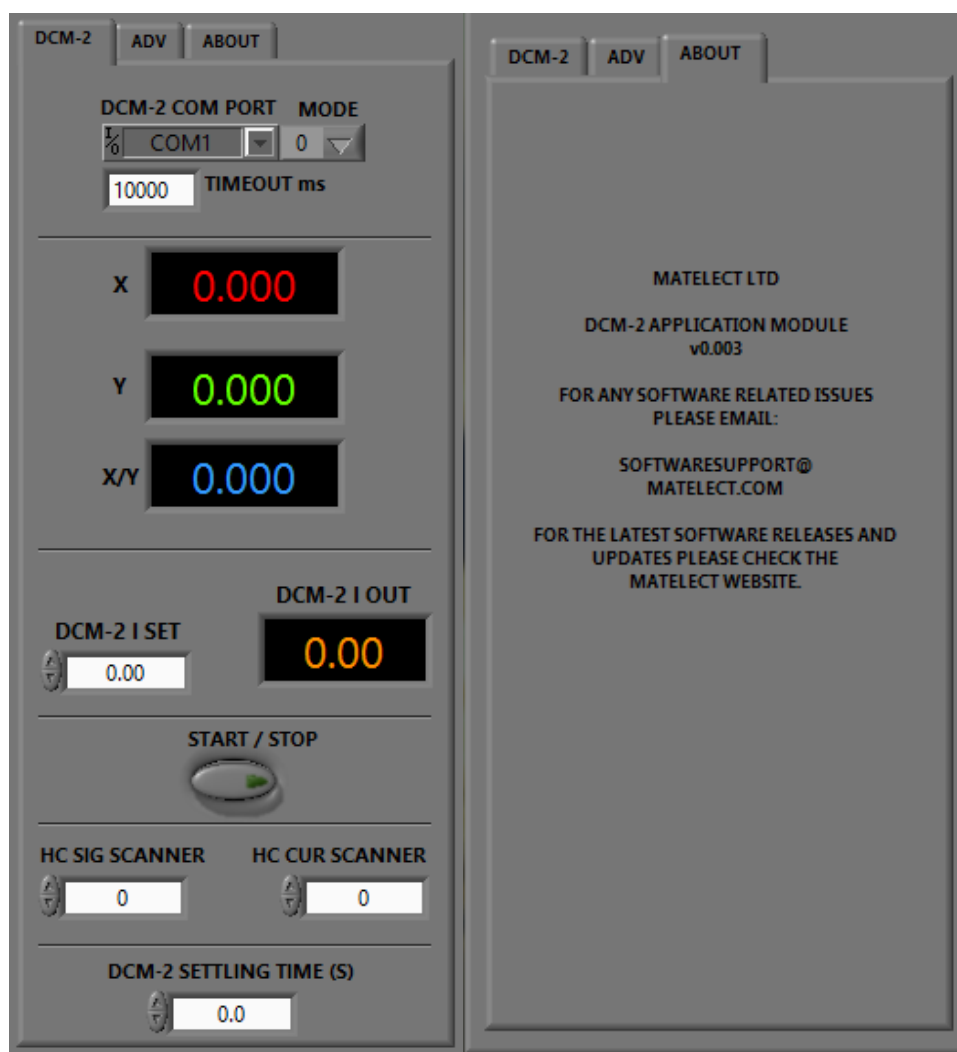
## CGM-5R (With SM3 control) USER INTERFACE



If you are using the CGM-5R with the SM3 thermal compensation unit then wire up the two units as described in the SM3 manual. Select the SM-3 tab and set the correct 'com' port for the attached SM3, the user should start to see the data from the SM3 being displayed in real time.

The final user setting, the 'SETTLING TIME' is used to allow the CGM-5R to settle in order to stabilize, this is only used when scanning between charts, when scanning is commenced the program changes the chart selected then applies the user settings and waits for a period as set by the settling time before taking a reading and proceeding to the next chart.

## DCM-2 USER INTERFACE



This section of the manual concerns itself with the specific DCM-2 user interface.

Once a user has selected the DCM-2 from the drop down menu the screen above appears.

Before proceeding any further the user must do the following;

- Firstly set the units com mode. Most DCM-2's are set to mode 0, however some users may have their unit set to mode 1 which mimics our older DCM-1 unit, this is often done to work with older Instron software. Either way if the user is unclear as to which mode their unit is set to they are advised to contact Matelect for assistance.
- Now set the DCM-2's com port. If the user selects an incorrect com port they shall receive an automated message in the error log indicating this.
- Finally the coms timeout field must be correctly set. This should be at least twice the update period of the DCM-2, which is dependent on the filtering selected and any synchronisation signal being used. Information on this can be found in the DCM-2 manual, Front Panel section Mode and Filter, and also in the Advanced Menu section.

Now these items have been selected you may proceed to completing the remaining setup of the DCM-2. It should be noted at this stage that these values have been automatically set on all subsequent charts. If the user wishes to use multiple DCM-2's with the same copy of PDsoft, which it is capable of doing, they will need to deselect the 'Copy chart1 DCM-2 parameters to all charts' check box in the setup tab.

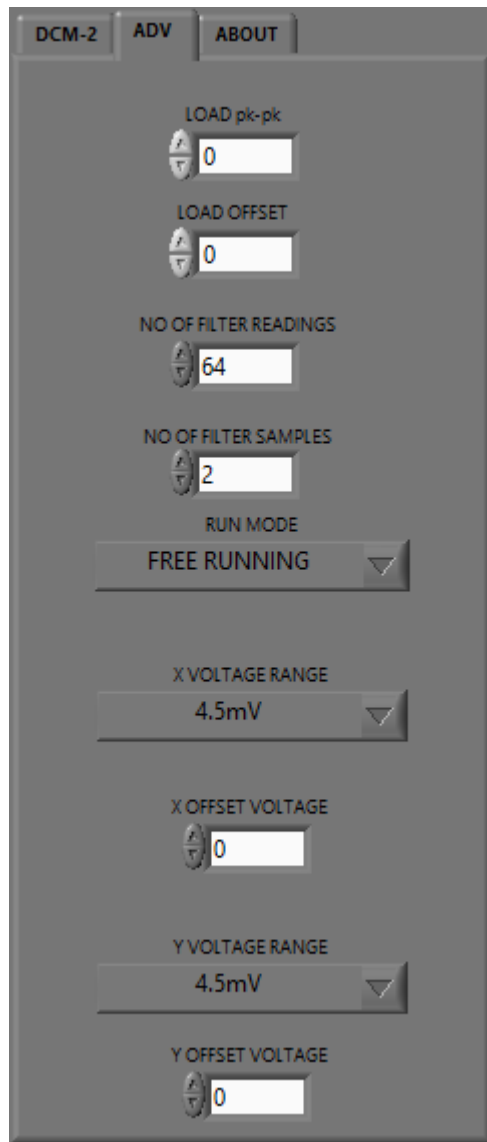
Set the desired current and press the 'Test chart setup' button, the user should start to see the data from the DCM-2 being displayed in real time. Items in a black background window are data out readings whilst those in a white background window are user input values. The data out values signal and current are colour coded, these match up to the colours on the graph output display, so that the orange line on the graph is the current output. The user can set the current value as well as any scanners that may be connected within this tab.

**Please note: The 'Start/Stop' button can no longer be used to start the DCM-2 running, this now happens automatically whenever the user presses either the 'Test chart setup' or any of the two 'record' functions. The 'Start/Stop' button function will be reviewed in the forthcoming version. (28/04/2016)**

The final user setting, the 'SETTLING TIME' is used to allow the DCM-2 to settle in order to stabilize, this is only used when scanning between charts, when scanning is commenced the program changes the chart selected then applies the user settings and waits for a period as set by the settling time before taking a reading and proceeding to the next chart.

## DCM-2 ADVANCED FEATURES

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The user can access the advanced features of the DCM-2 by pressing the 'ADV' tab, here the user can adjust the offset and gain of each signal as well as select filter for both the X and Y signals of the DCM-2.

The user can enter any combination they wish for the filter readings and samples however the following table shows the combinations built into the DCM-2.

DCM-2 filter Range	No: Filter Readings	No: Filter Samples
MINIMUM	64	2
MEDIUM	64	4
MAXIMUM	64	8

Please see the DCM-2 manual for further information on these settings.

The user can also set the peak to peak load value and load offset from the advanced menu. Users should ensure that the values they have selected are valid as there is currently no feedback to ensure this from the DCM-2, this will be added in the forthcoming version. To check to see if the value entered has been accepted the user can review the setting under the advanced tab on the DCM-2 unit itself.

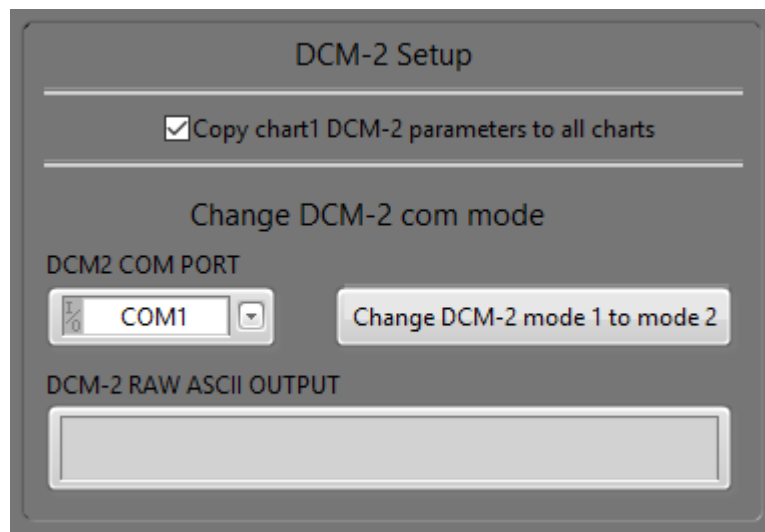
Please note: As with the basic coms setup of the DCM-2, the 'load peak to peak' value and 'load offset' value are automatically set on all remaining charts, if the user wishes to change these they will need to deselect the 'Copy chart1 DCM-2 parameters to all charts' check box in the setup tab.

## DCM-2 MODE 1 TO MODE 2 CHANGE

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As previously described the DCM-2 is available in a number of com modes. Com mode 1 simulates the DCM-1 and is often used when talking to Instron software, however this mode gives very limited information, changing to mode 2 is required if the user wants to record both current and load readings from there testing machine.

In order to change a mode 1 DCM-2 to mode 2 select the 'info' tab in pdsoft, something as shown below should appear.



Select the correct com port for the DCM-2 and then press the 'change DCM-2 mode 1 to mode 2' button, moments later a message should appear telling you that the operation has been successful.

Remember to select mode 2 in your DCM-2 setup under any used charts.

## DCM-1 USER INTERFACE



This section of the manual concerns itself with the specific DCM-1 user interface. Once a user has selected the DCM-1 from the drop down menu the following screen appears. Set the correct 'com' port for the attached DCM-1, the user should start to see the data from the DCM-1 being displayed in real time.

Items in a black background window are data out readings whilst those in a white background window are user input values.

The DCM-1 does not have two-way communication, so all values such as current must first be set on the DCM-1 manually, see the unit's manual for further advice. The final user setting, the 'SETTLING TIME' is used to allow the DCM-1 to settle in order to stabilize, this is only used when scanning between charts, when scanning is commenced the program changes the chart selected then applies the user settings and waits for a period as set by the settling time before taking a reading and proceeding to the next chart.

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