



**AUDITOR DC III / IV  
DATA COLLECTOR**

**Operations Manual**



AIMCO

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## CE Marking

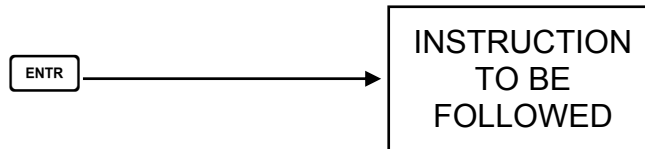
Declares that this product has been assessed and complies with the requirements of the relevant CE Directives.

### How to use this Manual

This manual is split into sections describing the steps to be taken to configure the Auditor DC for use in measuring and recording torque values.

The following method is adopted throughout this manual.

Keys to be pressed will be shown as the key legend in large type. Example . Any special instructions or point to note will be shown as









Refer to the table of contents to find action to be performed.


Follow instructions for key presses required to carry out required action.

Note: It is possible to change the default primary character on dual function keys. I.e. when text is entered into various fields, it is possible to set the Auditor DC to default to either the numerals or text as the primary character (the alternate character is selected by pressing the shift key before typing). To set this:


#### From main menu

Press  then press  or press  (Misc')

Press  then press  or press  (Software Reset)

Press the  7 times to access the *Shift key* menu

Select between options 1 *Characters* or 2 *Numbers* using  

Press  Screen will prompt; '*End of set-up*'

Press   to return to main menu

## Packing List

The following items are included in the carrying case supplied with the Auditor DC unit.

1 x Auditor DC

1 x Camera (Neck) Strap

1 x 9 way D type to 9 way D type PC cable

1 x 9 way D type to 25 way D type Printer cable

1 x Charging Unit (Max. current 500 mA)

1 x User Manual

1 x Auditor DC (fastcharge model)

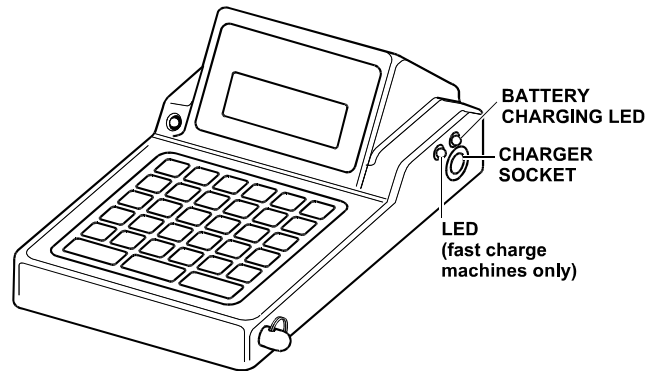
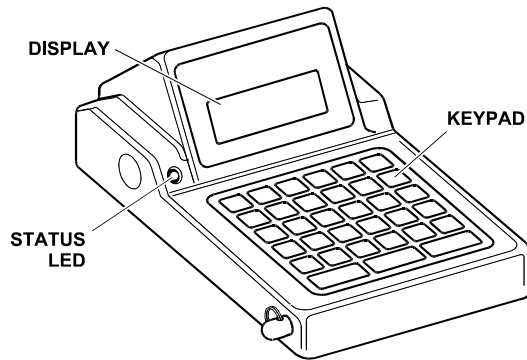
1 x Camera (Neck) Strap

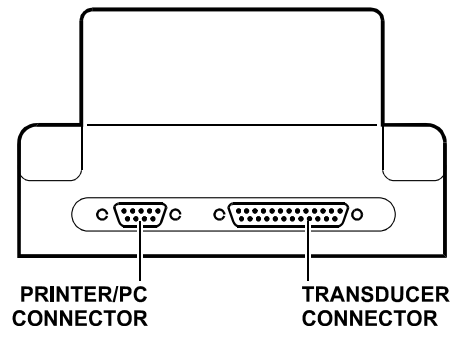
1 x 9 way D type to 9 way D type PC cable

1 x 9 way D type to 25 way D type Printer cable

1 x Fastcharge Charging Unit (Max. current 1 A)

1 x User Manual





**Rear View**



warning could result in damage to the unit. The fast charge adapter can, however, be used to charge a standard Auditor DC.

## Edit Transducer File

The following section deals with the editing of transducer files.

This section can be skipped if using Auditor Smart type Transducers.

If using any other types of transducer then the following instructions for 'Edit Transducer File' must be followed before any reading or measurements can be taken.

All Auditor Smart type transducers have in-built circuitry which allow the Auditor DC to identify the range of the transducer and calibrate the readings automatically. No set-up is necessary for these types of transducer.

There are 5 other types of transducer which the Auditor DC will accept.

1. High Output: (H/O) these transducers have an internal amplifier and give an output signal level of 1-2 Volts.
2. Industry Standard (IS): These transducers have no internal amplifier. The exact span or rated torque will be marked on the transducer nameplate. The sensitivity of these transducers is 2 mV/V., They are fitted with a 350 Ohm bridge.
3. Serial: These are digital type transducers and produce an RS232 signal
4. Keypad (KPD): This is an optional keypad which connects to the Auditor DC.
5. Keyboard (KEY): Keyboard on Auditor DC

Use of any of the above 5 transducer types requires that settings are made in the transducer file before any measurements can take place. The procedure for entering settings is given below.

At main menu press  (Configure)

press  (Edit Tx)

Screen will show

Transducer  
B (Current set-up)

Complete set-up

The 'B' indicates that this is the 'B' file in memory. It is the first of 8 memories (labelled B to I) reserved for the saving of transducer set-ups. Your most used transducer setting should be stored in this memory. The remaining memories (C to I) may be accessed by pressing  .


Press

Select transducer type H/O, I/S, SER, KPD or KEY using   press


Depending on type of transducer selected above continue set-up in the appropriate section overleaf.

**If you have chosen I/S**


Select units of measure - inlb, ftlb etc. using   press 



Type in transducer span - press 

Type in mV/V press 



Type in Bridge resistance press 

Type in Pulses Per Rev press  (**Auditor DC IV only**)

Type in serial Number press 

To set-up another transducer press  


Select another memory (B to I) using the   keys and press 

To return to the main menu press  


**If you have chosen SER**

Select location of decimal point using   press 



Select Baud Rate, Data Bits, Stop Bits and parity in the same manner

To set-up another transducer press  

Select another memory (B to I) using the   keys and press 


To return to main menu press 



**If you have selected H/O**

Select units of measure- inlb, ftlb, etc. using  

**Note:** High Output devices usually produce an output voltage of approximately 1-2Volts. This analogue voltage signal will not be exact and may not be linear. If you are using a device that has a nominal 1Volt output, we suggest that you multiply the span of your transducer by 2.5 to determine the new span setting.

Type in your new span press 




Type in Serial Number press 




Screen will indicate 'End of Set-up' press  



Connect your high output device and select measure mode  
(refer to instruction sheet for measure mode only)

Use an independent measuring device to apply a torque to the transducer and check the reading on the independent unit against the reading shown on the Auditor DC. It will be necessary to return to the 'Edit Tx' menu option and adjust the span setting until the two readings agree. You may have to repeat the above procedure several times until your high output transducer is correctly calibrated.


**If you have selected KPD**

Select location of decimal point using   then press 




Select Parity- *Odd, Even or Disabled* using   then press 

To set-up another transducer press  

Select another memory (B to I) using the   keys and press 


To return to main menu press 

**If you have selected KEY**

Select location of decimal point using   then press 

To set-up another transducer press  

Select another memory (B to I) using the   keys and press 

To return to main menu press 

## Barcode read input for characteristic names and comments.


It is now possible to scan a barcode name in Auditor DC at certain prompt lines. The input of a barcode is allowed at the characteristic name prompt in store characteristic, direct characteristic and edit characteristic modes. In addition it is also possible to scan a barcode in the comment field in store characteristic only. Edit characteristic and normal store behave in a slightly different manner to direct characteristic.

The Auditor DC will accept most bar code reading formats, but not all.

### General Operational Method for Scanning bar Code data.

Connect the Bar Code Reader to the Printer/PC connector at the rear of the Auditor DC.

Bar code readings can generally be taken at the prompt to input data (Characteristic name or a comment) when the flashing cursor is on the screen. This can be on a blank line or following a line of data (an existing characteristic or a comment). When the cursor is flashing, swipe the code with a bar code reader and observe the screen. If the flashing cursor disappears, the code has been captured - wait a few seconds for the data to appear in the display. If the flashing cursor remains, re-scan the code until it is accepted.

When the data is displayed, press  to continue. From this point, follow the instructions as for normal data input.

When entering data via the bar Code reader into a comment field, make sure you have reserved enough characters in the comment field to accept the code. If the number of characters scanned in exceeds the number reserved, the Auditor DC will beep and refuse to accept the data. Refer to the instructions on *Configuration* for more details.

## Measure Mode (Up to 200 readings stored)

To start press

press

press  (measure)

plug in transducer then press

select proper transducer using

then press

If using I/S or H/O type transducers  
continue with instructions

If using SER, KPD or KEY you are now  
ready to take measurements

select units of measure using   press

select peak, track, Impulse or 'Click Dip' using   press

**Note:** *Impulse available on Type IV only*

select measurement direction using   (Right is clockwise. Left is anti-clockwise)

press

select 'Cycle end Time' using   press

select frequency response using   press

type in Max torque value press

type in Min torque value press

type in threshold torque value press

**Note:** When selecting a threshold torque value the Auditor DC will ignore any torque which is below this value. You cannot take another reading until the applied torque falls below this value.

type in amount of Dip press

select Second Parameter using   press  (**Auditor DC IV only**)


If the set-up and transducer has not been changed since the Auditor DC was last used you are now ready to take torque measurements.

Pressing  after taking a series of readings will result in statistical information being displayed (Range, mean and standard deviation) for the stored readings.


to return to measure mode press


If you have selected 'Click Dip' type in the amount of 'Dip' to be sensed press

You are now ready to take torque measurements. When finished press


**Note:** When taking readings you can change the set-up parameters by pressing the up arrow . Changing any of the set parameters will result in the Auditor DC prompting to erase all data.

To erase stored readings press 

To return to set-up screens press 

**Example:** You have been measuring in a right hand direction and you want to switch to left hand. Press the up arrow twice, change from right hand to left hand. Screen will prompt to erase all data press  to erase all stored readings and return to the measure screen.

## Printing of stored readings from measure mode

Pressing  from the measure mode will result in all stored readings being printed to an attached printer.




**Note:** Transducer needs to be connected to Auditor DC.




## Measure mode circle-store option


Circle-Store is a function to increase the number of stored readings to extend beyond the normal maximum of 200 readings possible in measure mode. With the circle-store option selected, readings will be accepted beyond the 200 limit but the first readings taken will be lost. Effectively the last 200 readings taken will be stored but the user is not limited to taking only 200 readings.




### To select this option:


#### From main menu



Press  then press  or press  (Misc')

Press  then press  or press  (Software Reset)

Press the  6 times to access the *Circle-store* menu

Select option 2 *Circle-store On* using   press 

Press  screen will prompt; '*End of set-up*'

Press   to return to main menu

## Direct Measure Mode (Smart type transducers only)

Direct measure mode is to allow an operator to connect different transducers which may have different spans and an angle output and can switch between them using an external T switch. This is a display only function and readings are not stored or printed out.

To start press

press

press  (Direct)

press  (Direct Measure)

press  (Set-up)

Select units of measure using   press

Select peak, track, Impulse or 'Click Dip' using   press

**Note:** Impulse available on Auditor DC IV only

Select measurement direction using   (Right is clockwise. Left is anti-clockwise)

Press

Select 'Cycle end Time' using   press

Select frequency response using   press

Type in the Threshold Percent. (mx 50.0 mn 0.0) and press

Type in amount of Dip (mx 100.0Nm mn 0.0Nm) and press

Select Second Parameter using   press  (**Auditor DC IV only**)

Screen shows; 'End of set-up' press  to exit

Press   to return to main menu

The **READ** option allows you to read the torque from a connected transducer.

From the main menu press **4** (Direct)

press **1** (Direct Measure)

press **2** (Read)

If no transducer is connected, display will prompt; *'Insert Tx'* (transducer)



connect transducer and press **ENTR**

Screen will show the span of the connected transducer and the torque measured in units selected at set-up. The display will show the last reading taken until the next torque input exceeds the threshold level set.



**Note:** if password protection has been set on Direct measure, then exit is by password only. A correct password returns you to the set-up read sub-menu. Entering three incorrect passwords will force the user back into read mode. See password protection later in this book.


## To set up a Characteristic

To set up a job

To start press   
press 

plug in transducer

press  (Configure)  
press  (Edit Char)




Type in Job Name press 




Alternatively, when the cursor is flashing, connect a bar code reader to the Printer/PC connector on the back of the Auditor DC and scan the information from a bar code. Scan across the label (from left or right) and watch the display. If the flashing cursor disappears, the reading has been captured - wait a few seconds for the reading to be displayed, if not re-scan until the data is accepted.




When the information is displayed on the screen, press 

Type in No of samples press 




Type in No of subgroups press 

Select transducer ID using   press 




Select units of measure using   press 

Select 'Peak' 'Impulse' or 'Click' using   then press 

**Note:** *Impulse available on Auditor DC IV only*

Select measurement direction using   then press 


Select cycle end time using   then press 

Select Frequency Response using   then press 


**NOTE:** No prompt will appear for frequency response if this value is set as a default during a software reset.


Type in maximum torque specification then press 



Type in minimum torque specification then press 

Type in threshold torque value then press 

Select Second Parameter using   press  (*Auditor DC IV only*)

If you have selected 'Click Dip' type in amount of 'Dip' to be sensed then press 

Type in number of characters to reserve for subgroup comment then press 

To return to main menu press  

**NOTE:** Repeat above steps for each additional job or characteristic.  
If you wish to establish a route or 'ROUND' enter all of your characteristics or jobs now.

## Direct Characteristic Mode

Direct characteristic mode is a quick entry method of using a pre-set characteristic and can be used directly or stored for setting up torque measuring equipment. The characteristics used are taken from the edit characteristic function in Auditor DC.

At main menu press **4** (Direct)

press **2** (Direct Char)

select storage option by pressing **1** 'Do not store' or **2** 'Store'

type in the characteristic name and press **ENTR** or use the **←** and **→** keys to scroll through the available characteristics and press **ENTR**

Alternatively, when the cursor is flashing, connect a bar code reader to the Printer/PC connector on the back of the Auditor DC and scan the information from a bar code. Scan across the label (from left or right) and watch the display. If the flashing cursor disappears, the reading has been captured - wait a few seconds for the reading to be displayed, if not re-scan until the data is accepted. If a further reading needs to be taken, press **CLR** to clear the data and allow a further scan to be taken or data to be keyed in.

When the information is displayed on the screen, press **ENTR**

Display now shows the status of the characteristic, press **ENTR**

Display now prompts; 'Insert Tx' (transducer)

Connect the transducer to the Auditor DC and press **ENTR**

Torque measurement can now be taken and will be overwritten or stored depending on the selection made previously. At the end of the subgroup of readings, the display will return to characteristic name entry line and the LEDs on the Auditor DC will flash to show the subgroup status:

RED LED = one or more readings out of the specified range

GREEN LED = All readings within the specified range

Press **ENTR** to accept the subgroup and prepare to accept readings for the next subgroup. When all the subgroups are full, the display will return to characteristic name entry line (pressing **ENTR** will also do this)

**Note:** if password protection has been set on Direct measure, then exit is by password only.  
A correct password returns you to the Store/Not store sub-menu. Entering three incorrect passwords will keep the user at the current display. See password protection later in this book.

If Store mode has been used, results can be printed or analysed using the appropriate Auditor DC Functions.



### To Store Data *(single characteristic)*

At main menu press **3** (store)

press **1** (single characteristic)

press **ENTR**

A job name will appear on screen. If more than one job has been set up in the Auditor DC, you can scroll through the jobs in sequence using **←** **→**

You can also find your job by typing in the name after you press 1 and then pressing **ENTR**

Alternatively after pressing 1, when the cursor is flashing, connect a bar code reader to the Printer/PC connector on the back of the Auditor DC and scan the information from a bar code. Scan across the label (from left or right) and watch the display. If the flashing cursor disappears, the reading has been captured - wait a few seconds for the reading to be displayed, if not re-scan until the data is accepted. If a further reading needs to be taken, press **CLR** to clear the data and allow a further scan to be taken or data to be keyed in.

When correct job appears on screen press **ENTR**

If you are using a UTA type transducer and it is already plugged in, you are now ready to take readings. The screen will show transducer size and Sub 1 Sam 1

If you are using any other type of transducer or it is not yet plugged in, you will be prompted to insert transducer and select transducer type required.

Plug in correct transducer and press **ENTR**

When you have taken all readings, the screen will show that all torque collection is complete.

To return to the main menu press **MENU** **MENU**

**Notes:** When each reading is taken you will get an audible/Visual signal.

- 1 beep /Amber LED = Torque value or Angle/Pulse count is low (If used)
- 2 beeps/Green LED = Torque value or Angle/ Pulse count is OK (If used)
- 3 beeps/Red LED = Torque value or Angle/Pulse count is high (If used)

The final reading of a subgroup will be indicated by an extended beep.

If you make a mistake when taking a reading it can be erased by pressing **CLR**. If you continue to press **CLR** you can erase all readings within the current subgroup. It is not possible to erase readings taken in a previous subgroup.

No readings will be stored if the torque value is below the threshold value previously set.

If the characteristic has been configured with Subgroup comment size set to a value other than 0 then pressing **Z** will allow a subgroup comment to be entered.

Alternatively, when the cursor is flashing, connect a bar code reader to the Printer/PC connector on the back of the Auditor DC and scan the information from a bar code. Scan across the label (from left or right) and watch the display. If the flashing cursor disappears, the reading has been captured - wait a few seconds for the reading to be displayed - if not re-scan until the data is accepted. If a further reading needs to be taken, press **CLR** to clear the data and allow a further scan to be taken or data to be keyed in.

**Note:** if the bar code data exceeds the number of characters reserved for the comment, the Auditor DC will beep and show an error message. The data will not be accepted.

When the information is displayed on the screen, press **ENTR**

Pressing **#** gives analysis of last completed subgroup. (Press **#** again to continue).

Pressing **.** gives analysis of current subgroup, up to current reading. (Press **.** again to continue).

## To set up a Round

To set a sequence of jobs to be performed in a set order the method detailed below should be used.

**Note:** In order to set up a Round, there must be at least 2 Characteristics set up in the Auditor DC.

At main menu press  (configure)

press  (round)

press

Type in the name of your round and press

Type in the number of characteristics (jobs) that are to be included in the round and press

Select Vertical, Horizontal or Vert+Prompt sampling using   and press

**Note:** If you choose Vertical sampling the Auditor DC will automatically switch between jobs at the end of each subgroup. If you select Horizontal sampling the switch will be made after each individual reading. Vert+Prompt will ask you to insert a transducer at the start of each subgroup.

Screen will show '*Characteristic No 1 of ?*'

Select which job you want to be the first job using   and press

Screen will show '*Characteristic No 2 of ?*'

Select which job you want to be the second job using   and press

Continue selecting jobs in this way until all jobs to be included have been selected.

Screen will now show '*End of Set-up*'

To return to the main menu press

## To Store Data by Round

At main menu press **[3]**(store)

press **[2]** (Round)

Screen will show 'Select Round No'

select round number using **[←]****[→]** and press **[ENTR]**

The maximum number of rounds that can be stored is 25.

If you are using a Smart type transducer and it is already plugged in, you are now ready to take readings. The job that appears on screen will be the job that you selected to be first when you set up the round.

If you are using any other type of transducer or it is not yet plugged in, you will be prompted to insert transducer and select transducer to be used. Plug in transducer and press **[ENTR]**

When a complete subgroup of readings has been taken for all jobs in the round, screen will show 'Next Round Cycle-->'. To continue taking readings press **[→]** (this message will be repeated at the end of each complete subgroup Sub1, Sub2 etc.)

When you have finished taking all reading pressing **[→]** will result in a message that the round is complete. Press **[MENU]**.

To return to the main menu press **[MENU]****[MENU]**

**Note:** You can erase the last reading taken by pressing **[CLR]**. If you have selected Horizontal sampling and the Auditor DC has already switched to the next job, it will switch back when you press **[CLR]**.

It is not possible to erase any readings other than the last one taken in horizontal sampling mode.

If the characteristic has been configured with Subgroup comment size set to a value other than 0 -

Pressing **[Z]** will allow a subgroup comment to be entered.

Pressing **[#]** gives analysis of last completed subgroup. (Press **[#]** again to continue).

Pressing **[.]** gives analysis up to current subgroup. (Press **[.]** again to continue).

## To set up a Master Round

To set a sequence of Rounds to be performed in a set order the method detailed below should be used.

**NOTE:** In order to set up Master Round, there must be at least 2 rounds set up in Auditor DC.

At main menu press **1** (configure)

press **5** (Edit Master Round)

press **ENTR**

Type in the number of 'rounds' to be included and press **ENTR**

Select first 'round' to be included using **←→** and press **ENTR**

Continue selecting rounds to be included using **←→** and press **ENTR**

**NOTE:** When all rounds have been selected screen will show *'End of Set-up'*

To return to the main menu press **MENU****MENU**

## To Store Data by Master Round

At main menu press **3** (store)

press **3** (Master Round)

If you are using a Smart type transducer and it is already plugged in, you are now ready to take readings. The job that appears on screen will be the job that you selected to be first when you set up the master round.

If you are using any other type of transducer or it is not yet plugged in, you will be prompted to insert transducer and select transducer to be used. Plug in transducer and press **ENTR**

To return to the main menu press **MENU****MENU**

**Note:** You can erase the last reading taken by pressing **CLR**. If you have selected Horizontal sampling and the Auditor DC has already switched to the next job, it will switch back when you press **CLR**. It is not possible to erase any readings other than the last one taken in horizontal sampling mode.

If the characteristic has been configured with Subgroup comment size set to a value other than 0 then pressing **Z** will allow a subgroup comment to be entered.

Pressing **#** gives analysis of last completed subgroup. (Press **#** again to continue).

Pressing **.** gives analysis up to current subgroup. (Press **.** again to continue).

## To Display Recorded Data

From main menu press **9** (Display/Analyse)

Press **ENTR** to display the last recorded Characteristic

Select the job that you want to see using **←****→** and press **ENTR**

Screen will show job name and Specs press **→**

Screen will now show x-bar, R and sigma for Sub1 press **→**

screen will now show same information for Sub 2

You can use **←****→** to go back and forth between subgroups as required

From any Subgroup display press **↓** (down arrow)

Screen will show the Date and Time the readings for that subgroup were taken

Press **↓** (down arrow) screen will show subgroup comment.

Press **↓** (down arrow) again to see the individual readings displayed in groups of four readings per screen

By using the four arrow keys it is possible to move back and forth through all of the subgroups and individual readings.

To view another job press **MENU** and repeat above procedure.

## To View Cp and Cpk

At the job name/spec screen press **↓** (down arrow)

Screen will show the Cp and Cpk and the number of samples used in the calculations

Press **↓** (down arrow)

Screen will now show x-bar, R and sigma based on all of the data ( all subgroups calculated together)  
The number of samples that were NOK will also be displayed expressed as a percentage.

Pressing **↓** (down arrow)

Screen will show the highest and lowest torque's recorded and the number of readings that were above the maximum torque value and minimum torque value.

To return to the main menu press **MENU**

**For more information on Cp, Cpk and CAM, please refer to the glossary on page 41.**

## French Cp and Cpk




It is possible to view the French Cpk/CAM calculations as an alternative to the standard Cp and Cpk.


Readings must be a minimum of 30 samples.




### To set this function:


From main menu



Press  then press  or press  (Misc')

Press  then press  or press  (Software reset)

Press  5 times to access the Cpk Calculation screen

Use the  and  arrow keys to access option 2 *French Cpk/CAM* and press 

Press  to confirm. Screen will prompt; *'End of set-up'*

Press  to accept and exit or  to edit

Press  to return to main menu

Returning to Normal Cpk calculations is done as above, selecting option 1 *Normal Cpk/no CAM*

**For more information on Cp, Cpk and CAM, please refer to the glossary on page 41.**

## To Erase Stored Data and Set-ups

### To Erase Characteristic Set-up

From main menu press **1** (Configure)

press **3** (Erase)

press **1** (Char' Set-up)

Select Characteristic name by pressing **ENTR** and select Characteristic required by pressing **←****→**

Press **ENTR** Screen will display the Characteristic number and prompt '*Erase set-up data*'

Press **ENTR** to erase the characteristic data or **CLR** to return to *Erase* menu

If **ENTR** was pressed, display shows '*Erased OK*'

Press **↑** to erase more data or press **MENU****MENU****MENU** to return to main menu

### To Erase Characteristic Data

From main menu press **1** (Configure)

press **3** (Erase)

press **2** (Char' Data)

Select Characteristic name by pressing **ENTR** and select Characteristic required by pressing **←****→**

Press **ENTR** Screen will display the Characteristic number and prompt '*Erase data only*'

Press **ENTR** to erase the characteristic data or **CLR** to return to *Erase* menu

If **ENTR** was pressed, display shows '*Erased OK*'

Press **↑** to erase more data or press **MENU****MENU****MENU** to return to main menu

### To Erase Round Data

From main menu press **1** (Configure)  
press **3** (Erase)  
press **3** (Round Data)

Select required round by pressing **←****→** press **ENTR**

To erase data by round press **ENTR**

To exit without erasing round data press **MENU**

To return to main menu press **MENU****MENU****MENU**

### To Erase round set-up information.

From main menu press **1** (Configure)

then press **4** (Edit Round)

Select required round by pressing **←****→** press **ENTR**

Display shows 'Round Label' press **CLR**

Round label is cleared from display, press **ENTR**

Display will prompt 'Erase Rnd set-up'

To erase round set-up press **ENTR** - display will then show 'ROUND ERASED'

or press **CLR** to return to *Configure Menu*

To return to main menu press **MENU**

### To Erase readings stored in measure mode

From the main menu press **2** (Measure)

then press **Y**

Screen will prompt 'Erase Measure data?'

press **ENTR** to erase data  
or press **CLR** to ignore and continue

## Printing

### To print details of set-up or analysis of data

#### To print settings and readings taken by characteristic

Connect Auditor DC to printer and switch printer on

Ensure Auditor DC is configured to printer by referring to 'Configure Printer Port' section.

On Auditor DC -

Press

Press

Press  (right arrow) then press  or press  (Print)

Press  (Print Char')

Select Characteristic name by pressing  and select Characteristic required by pressing

To start printing press

Auditor DC will print details of set-up and stored reading by characteristic name.

#### To print settings and data analysis of readings taken by characteristic.

Connect Auditor DC to printer and switch printer on

On Auditor DC -

Press

Press

Press  (right arrow) then press  or press  (Print)

Press  (Print/Analyse Char')

Select Characteristic name by pressing  and select Characteristic required by pressing

To start printing press

Auditor DC will print details of set-up and analysis of stored reading by characteristic name.



**To print details of readings by round.**

Connect Auditor DC to printer and switch printer on

On Auditor DC -

Press

Press

Press  (right arrow) then press  or press  (Print)

Press  (right arrow) then press  or press  (Print Round)

Select round by using

To start printing press

Auditor DC will print details of set-up and stored reading by round name.

**To print details of set-up and analysis of readings by round.**

Connect Auditor DC to printer and switch printer on

On Auditor DC -

Press

Press

Press  (right arrow) then press  or press  (Print)

Press  (right arrow) then press  or press  (Print/Analyse Round)

Select round by using

To start printing press

Auditor DC will print details of set-up and analysis of stored reading by round name.

### To print details of all characteristic set-ups

Connect Auditor DC to printer and switch printer on

On Auditor DC -

Press

Press

Press  (right arrow) then press  or press  (Print)

Press  (right arrow) then press  or press  (Print All Char's Set-up)

Auditor DC will print details of all characteristic set-ups which are stored.

### To print details of a particular round set-up

Connect Auditor DC to printer and switch printer on

On Auditor DC -

Press

Press

Press  (right arrow) then press  or press  (Print)

Press  (right arrow) then press  or press  (Print Round Set-up)

Select round by using

To start printing press

Auditor DC will print details of all round set-ups which are stored.

**To print readings taken by characteristic.**

Connect Auditor DC to printer and switch printer on

On Auditor DC -

Press

Press

Press  (right arrow) then press  or press  (Print)

Press  then press  or press  (Print Char' Readings)

Select Characteristic name by pressing  and select Characteristic required by pressing

To start printing press

Auditor DC will print details of readings taken by characteristic.

**To print readings taken in measure mode**

Connect Auditor DC to printer and switch printer on

On Auditor DC -

Press

Press

Press  (right arrow) then press  or press  (Print))

Press  then press  or press  (Print Measure)

Auditor DC will print details of stored readings taken in measure mode (with date/time stamp)

A sample printout can be found in Appendix A


To return to main menu press




### To print set-up & readings for all used characteristics containing readings

Connect Auditor DC to printer and switch printer on.

On Auditor DC -

Press 


Press 

Press  (right arrow) then press  or press  (Print)

Press  then press  or press  (Print All Used Chars')

Auditor DC will print details of stored characteristic set-ups containing readings.

A sample printout can be found in Appendix A

To return to main menu press 

## To set Date and Time

From main menu

Press **→** then press **6** or press **6** (Misc')

Press **1** (Set Date/Time)

Select date format using **←****→**

Enter date and time and press **ENTR**

To return to main menu press **MENU****MENU**

## To set Power Off and Backlight Time Delays

From main menu

Press **→** then press **6** or press **6** (Misc')

Press **2** (Select Power Off/Backlight Time Delays)

Select Power Off time delay using **←****→** press **ENTR**

Select Backlight Delay using **←****→** press **ENTR**

To return to main menu press **MENU****MENU**

## To Configure Printer Port

From main menu

Press **→** then press **6** or press **6** (Misc')

Press **→** then press **3** or press **3** (Printer port)

Select Baud Rate using **←****→** then press **ENTR**

Select number of data bits using **←****→** then press **ENTR**

Select number of Stop Bits using **←****→** then press **ENTR**

Select Parity using **←****→** then press **ENTR**



To return to main menu press **MENU****MENU**

## To Display Software Version Number

From main menu

Press **→** then press **6** or press **6** (Misc')

Press **→** then press **4** or press **4** (Version #)

To return to main menu press  


## To set Password Protection

From main menu

Press  then press  or press  (Misc')



Press  then press  or press  (Password)

Screen will prompt; '*Enter new Password*'

Type in the password (4 characters) and press 



Screen will prompt; '*confirm password*'


Press  to accept or  to reject

Select desired option using  

Options for protection are:



- 1 *Power up*
- 2 *Configure*
- 3 *Direct Measure*
- 4 *Direct Char*
- 5 *Software Reset*
- 6 *Date and Time*

Press  to protect your selected option or  to exit

**Note:** when an option is password protected, # appears in the top right of the display window.  
Pressing  will remove the protection

Press  to exit

Display now reads; '*End of set-up*'

To return to main menu press  or press  to edit password protection

The remaining options can be password protected in the same manner.

## To clear Password Protection

### From main menu

Press  then press  or press  (Misc')

Press  then press  or press  (Password)

Screen will prompt; '*Password*' Enter the existing password (4 characters) and press   
Screen will prompt; '*Confirm Password*' and display the existing password

Press  to confirm or press  to clear the password protection.

Screen will prompt; '*Enter new Password*'

Press  to clear the password (keying in 4 characters before pressing  will result in a new password being created)

Screen will say '*Confirm password*'

Press  to confirm and password is cleared.




### Notes on Password Protection

Be aware of the implications of password protection. Always keep a note of the chosen password somewhere safe. As there is no function to enable an existing password to be removed without it first being entered, it may be advisable for the person who is ultimately responsible for the Auditor DC to initially set a password and issue it only to personnel who need the information. This will prevent an unknown password being entered, accidentally or deliberately, without anyone else's knowledge. If an unknown password is encountered, please contact AIMCO for advice.


## To Perform Software (S/W) Reset

**CAUTION:** Use of this function will result in the loss of all stored Characteristic set-ups, Round set-ups and all stored data. Following this procedure will return the Auditor DC to its factory default state. This feature should only be used when it is desired to clear all settings from the Auditor DC.


From main menu


Press  then press  or press  (Misc')

Press  then press  or press  (S/W Reset)




Press the  key 8 times to access the Software Reset screen.



Screen will display 'Erase all data and set mode?'

To carry out S/W reset press 


To exit without performing S/W reset press 




Screen will display 'ERASING ALL CHARACTERISTICS ROUNDS AND MASTER ROUNDS' - wait a moment for display to change



Select Subgroup mode using   and press  screen will say 'End of set-up'

To return to main menu press  

There are a number of other parameters which are set from the Software Reset Menu, some of which are detailed elsewhere in this manual.

Pressing  after making a selection will take the user on to the next screen.

Pressing  will give the user the option to exit to the Misc menu by pressing  or continuing to edit by pressing .

Screens can be skipped using the  and  keys.

These are the settings in order of they appear when the *Software Reset* Menu is accessed.


**Cm max samples** - type in the required figure



**Cm min samples** - type in the required figure



**Language** - select using  

**Autoprint mode** - select using  

**Capability label** - select using  

**Cpk Calculation** - select using  

**Circle-store (On/Off)** - select using  


**Shift key mode** - select using  


## To Communicate With a PC (optional software required)



Connect Auditor DC to PC via cable provided

On PC start PCComms Software

On Auditor DC

Press 

Press 

Press  then press  or press 

You can now set-up and view all information/data via the PC

**Note:** This optional PC software is used primarily to write and store characteristics and rounds on the PC. The format of the data stored on the PC, is of little use to the computer operator without further processing.

## Printout of Readings taken in measure mode

AUDITOR DC

07/01/95 12:39:12

MEASURE-Peak	Capability Results	Torque
No of Samples	200	Based on last 15. samples
Transducer	A UTA 75.00 Nm	/x 6.96 Nm
Serial Number:	99999	Range 8.30 Nm
Measurement Dir	Right	Sigma 2.210
Max Torque Value	20.00 Nm	Cp 0.754
Min Torque Value	10.00 Nm	Cpk - 0.458
Thrshld Torq Val	2.00 Nm	Max found 12.65 Nm
Freq response	1676 Hz	Min found 4.35 Nm
Cycle end time	0.1 Sec	Readings above max 0.
		Readings below min 13.
		Percentage not OK 86.66 %

	Date	Time	Torque
1	07/01/95	12:38:32	7.21 LO
2	07/01/95	12:38:35	4.87 LO
3	07/01/95	12:38:38	6.65 LO
4	07/01/95	12:38:40	6.56 LO
5	07/01/95	12:38:42	7.45 LO
6	07/01/95	12:38:45	5.76 LO
7	07/01/95	12:38:47	7.07 LO
8	07/01/95	12:38:49	12.65
9	07/01/95	12:38:52	9.37 LO
10	07/01/95	12:38:54	5.29 LO
11	07/01/95	12:38:56	6.09 LO
12	07/01/95	12:38:59	4.35 LO
13	07/01/95	12:39:01	5.90 LO
14	07/01/95	12:39:04	5.25 LO
15		07/01/95 12:39:06	10.03

## Printout of set-up and readings taken by characteristic (Auditor DC III / IV only)

AUDITOR DC		07/01/95 12:39:37	
Characteristic	WHEELNUT	Capability Results	Torque
-----			
No of Samples	4	Based on last	8. samples
No of Sub-groups	2		
Transducer	A UTA 75.00 Nm	/x	13.93 Nm
Serial Number:	99999	Range	17.21 Nm
Measurement Dir	Right	Sigma	5.936
Max Torque Value	14.00 Nm	Cp	0.224
Min Torque Value	6.00 Nm	Cpk	0.003
Thrshld Torq Val	2.00 Nm	Max found	22.17 Nm
Freq response	1676 Hz	Min found	4.96 Nm
Cycle end time	0.1 Sec	Readings above max	4.
		Readings below min	1.
		Percentage not OK	62.50 %

Sg-sp	Date	Time	Torque
1 1	07/01/95	12:32:52	4.96 LO
1 2			12.28
1 3			9.79
1 4			8.81
			/x 8.96
			Range 7.32
			Sigma 3.040
2 1	07/01/95	12:33:05	15.70 HI
2 2			18.93 HI
2 3			22.17 HI
2 4			18.84 HI
			/x 18.91
			Range 6.47
			Sigma 2.641

## Printout of analysis by characteristic (Auditor DC III / IV only)

AUDITOR DC

07/01/95 12:49:01

Characteristic	WHEELNUT	Capability Results	Torque
No of Samples	4	Based on last	8. samples
No of Sub-groups	2		
Transducer	A UTA 75.00 Nm	/x	13.93 Nm
Serial Number:	99999	Range	17.21 Nm
Measurement Dir	Right	Sigma	5.936
Max Torque Value	14.00 Nm	Cp	0.224
Min Torque Value	6.00 Nm	Cpk	0.003
Thrshld Torq Val	2.00 Nm	Max found	22.17 Nm
Freq response	1676 Hz	Min found	4.96 Nm
Cycle end time	0.1 Sec	Readings above max	4.
		Readings below min	1.
		Percentage not OK	62.50 %

Sg-sp	Date	Time		
1	07/01/95	12:32:52	/x	8.96
			Range	7.32
			Sigma	3.040
2	07/01/95	12:33:05	/x	18.91
			Range	6.47
			Sigma	2.641

**Printout of details of all Characteristic set-ups  
(Auditor DC III / IV only)**

AUDITOR DC

15/11/95 19:32:47

Name	smpl	sgrp	transducer	direc	max	min	thr	units
WHEELNUTS	16	3	A UTA 11.29 Nm	Right	8.	6.	2.	Nm
EX MANIFOLD	6	3	A UTA 11.29 Nm	Right	10.	6.	3.	Nm
DOORLOCK	3	3	A UTA 11.29 Nm	Right	9.	7.	3.	Nm

## Printout of Round set-up (Auditor DC III / IV only)

AUDITOR DC

15/11/95 19:35:57

Round 1

Round Label	CAVALIER	Complete Set-up
Sampling	Vertical	
No of charact's	3	
Characteristic 1	DOORLOCK	Complete Set-up
Characteristic 2	WHEELNUTS	All Data Stored
Characteristic 3	EX MANIFOLD	Complete Set-up

**Printout of Readings taken by Characteristic (Auditor DC III / IV only)**

5.90	10.0
6.28	9.0
7.39	10.0
2.90	5.0
2.87	4.0
3.46	5.0
3.62	5.0
3.19	6.0
3.23	3.0
3.07	5.0
3.78	4.0
4.03	5.0
4.01	6.0
2.93	4.0
3.07	3.0
2.70	3.0
4.51	4.0
3.63	4.0
4.99	4.0
4.06	2.0
4.25	4.0
7.53	4.0
6.10	4.0
2.90	3.0
4.71	3.0
5.64	4.0
5.62	3.0
7.78	3.0
5.19	2.0
5.72	4.0
9.74	5.0
5.16	5.0
8.22	1.0
6.27	4.0
5.42	3.0
5.38	3.0
6.22	3.0
5.84	3.0
7.70	3.0
7.01	3.0
4.98	3.0
5.71	3.0
5.52	3.0
7.40	3.0
5.98	3.0
5.11	3.0
8.33	3.0
5.93	4.0

## Glossary of Terms

**Characteristic** Specification of one particular torque value to be collected. Each characteristic has a name of up to 14 characters, 8 if downloaded from a PC. Auditor DC can store up to 48 different characteristics at any one time.

**Cp** This is a capability index which shows the process capability potential but takes no account of how centred the process is. This is used for capability studies and Cp may range in value from 0 to infinity. A large value indicates greater potential capability and a value of 1.33 or greater is desirable.

$$Cp = \frac{\text{Max} - \text{Min}}{6}$$

(Max and Min are limit values)

**CpK** This is an index which indicates whether the process will produce units within the tolerance limits. If the process is centred on the nominal value then CpK will have a value equal to Cp. For values of CpK between 0 and 1 then some of the 6 sigma spread will fall outside tolerance limits but for values greater than 1 these will all be within tolerance. A negative value of CpK indicates that the process mean is outside tolerance limits. A value of 1.33 or greater is desirable.

$$CpK = \text{lesser of } \frac{(\text{Max} - \text{Nominal})}{3} \text{ or } \frac{(\text{Nominal} - \text{Min})}{3}$$

(Max and Min are limit values)

**CAM** This is an alternative capability index requiring a minimum of 30 readings to be taken. In this implementation, 5 sub-groups of 6 samples are used for each calculation. The CAM calculation uses the following formula:

$$\frac{\text{Max} - \text{Min} \times \text{Cam Factor}^*}{6 \times \text{Average Sample Value}}$$

\* CAM Factor is taken from a table (in the case of 5 x 6 samples = 1.910)

**High Output Transducer (H/O)** Torque transducer with no coding links but internal pre-amplifier giving an output signal level of typically 1 or 2 volts.

**Horizontal sampling** Collection of data by round, taking one reading for each characteristic in turn.

**Industry Standard Transducer (I/S)** Type of transducer, with no pre-amplifier or coding links, but with the exact rated torque, marked on the body.

**Master Round** A sequence of up to five rounds. It is used to allow a collection sequence, which is part vertical, part horizontal.

**Max Torque Value** Upper tolerance level of any reading. This can equal but not exceed the torque rating of the transducer to be used.

Min Torque Value	Lower tolerance level of any reading.
No. of Sub Groups	Number used to allocate memory space in Auditor DC, for a particular characteristic. May be set in the range of 1 to 99.
Round Sample	A sequence of characteristics to be collected either horizontally or vertically. Each round has a name of up to 14 characters, 8 if downloaded from the PC. Individual torque reading.
Standard Deviation	Is a measure of the variation of the samples of a statistical group. If a group of n values has a mean of $\bar{x}$ then its standard deviation is given by;

$$= \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n - 1}}$$

Sub - Group	grouping of samples to enable analysis, with an allowable range of 1 - 50.
Threshold Torque Value	level of torque, which a signal must rise above and then fall below, to be considered a valid torque cycle. This may be set in the range of 1 to 50% of rated span or the Min Torque Value, whichever is the lower.
Units of Measure	It is possible with Auditor DC to read a transducer calibrated in say Nm and convert internally to display and store in any of the other torque units.
Vertical	Collection of data by round, where a full sub-group is collected for a characteristic, before stepping to the next characteristic.
Vertical plus Prompt	Identical in procedure to that of Vertical mode except that before stepping to the next characteristic, Auditor DC will prompt for the fitting of a transducer (even though the correct one is installed) and will require the ENTR key to be pressed.

## Error Messages

Code	Message	Explanation
101	RANGE	The selection made is not within the allowable range. See the limits specified max to min.
104	EXISTS	The characteristic name entered already exists.
105	NO SPACE	Insufficient memory space is available to create a new characteristic.
106	NONE	No characteristics have been created.
107	ON PC	Characteristic or round was sent from PC. These may not be edited or erased on Auditor DC.
108	CONV' OUT OF RANGE	The units selected would generate too great or too small a number.
109	NO NAME	A characteristic name must be entered.
110	NO SET-UP	The characteristic exists but configuration is not complete.
111	NO DATA	The characteristic exists, but no data is stored.
113	DAT STR	More than one sub group of data is now stored.
114	ALL STR	All of the sub groups for this characteristic have now been collected. Erase these after printing to allow further collection.
120	NO Tx	UTA Transducer has been selected but none is connected.
121	TxID - FLT	Transducer ID level not recognised. Use another transducer or get transducer recalibrated.
122	AZ OFFSET	An auto-zero calibration on the transducer has detected an excessive offset from zero.
123	AZ DISCR	An auto-zero calibration on the transducer has detected an excessive discrepancy between the Tracking and Peak inputs.
124	Tx FAULT	ADC saturation due to transducer fault, no transducer fitted or over torque.
200	INCOR-TX	The correct UTA transducer is not connected.
300	IN ROUND	This characteristic has already been included in the round.
301	CHARACTS	A minimum of two characteristics must be defined before entering Edit Round.
306	RS232	Invalid RS232 data on the serial input.
400	INVALID	Incorrect time or ate format.

600	ONLY 1	Only one round programmed so not possible generate master round.
601	NO RND	No rounds programmed so not possible to generate master round.
602	IN M RND	This round has already been entered into the master round. It is not possible to enter a round twice.
701	RND COMP	The round is complete, no skipping is allowed.
702	ALL SKIP	All other characteristics have already been skipped.
800	MEMORY	Message on power up if memory error found. (See 6.4)
801	MENU ERR	Invalid menu entered due to fault.
802	PROM CKS	The EPROM has an error.
803	OP CODE ERR	The processor has attempted to execute an illegal instruction.
804	STACK ERR	The processor stack has overflowed.
901	TX SPEC	Illegal transducer specification number received from PC.
902	TX TYPE	Illegal transducer type received from PC.
904	TX UNITS	Illegal transducer units data received from PC.
905	SERIAL	Illegal serial transducer data received from PC.
906	UNITS	Illegal units of measure data received from PC.
907	DIRECT	Illegal direction data received from PC.
908	NAME	Name sent from PC is too long.
909	RANGE	Numeric Parameter sent from PC is out of range.
920	RS232	Error receiving RS232 data from PC.
921	TIMEOUT	Timed out receiving message from PC.
922	CRC	Message received from PC has incorrect CRC value.
923	ILL MSG	Illegal message received from PC.

**Note:** If Auditor DC can be switched on, but fails to respond to the keyboard, the electronic circuitry may be reset by linking pins 5 and 6 in the PC connector, with a length of wire. This will turn the unit off. Turn the unit on again by pressing 'ON'. If after this reset Auditor DC still fails to operate correctly, use '6' for Miscellaneous and '6' Software Reset to clear memory. Having carried out a hardware reset as described above the message '800 MEMORY' may be displayed on the next power up, and a software reset should be carried out.

## External Connections

**TRANSDUCER CONNECTOR**

- 1 0V
- 2 High Level I/P
- 3 +5V
- 9 -Ve Excitation
- 13 +Ve Excitation
- 14 -Ve Signal
- 15 +Ve Signal

**PRINTER/PC CONNECTOR**

- 1 RTS Ready To Send
- 2 Rx Receive Data
- 3 Tx Transmit Data
- 4 DTR Data Terminal Ready
- 5 -0V
- 6 Not Reset
- 7 Analogue O/P
- 8 CTS Clear To Send
- 9 +5V

