



# Auditor DC I / II Data Collector Operations Manual



**AIMCO**

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# CE Marking

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

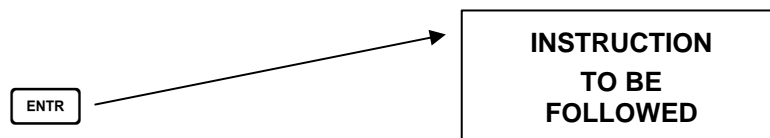
## How to use this Manual

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. Any special instructions or point to note will be shown as:

**Example:** 















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's 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:

1. Press  then press  or press  (Misc.).
2. Press  then press  or press  (Software Reset).
3. Press the  7 times to access the Shift Key Menu.
4. Select between Options 1, Characters, or 2 Numbers using  .
5. Pressing the  screen will prompt **End of Set-Up**.
6. Press   to return to the main menu.

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## Packing List

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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 (Fast Charge model)

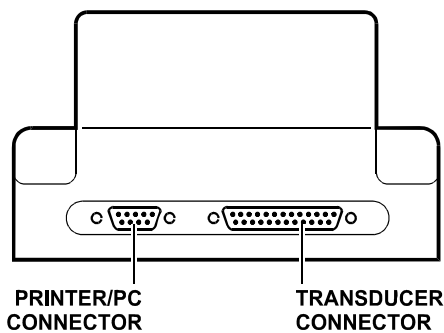
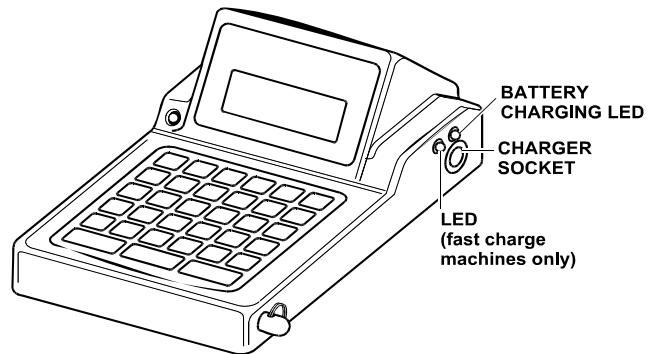
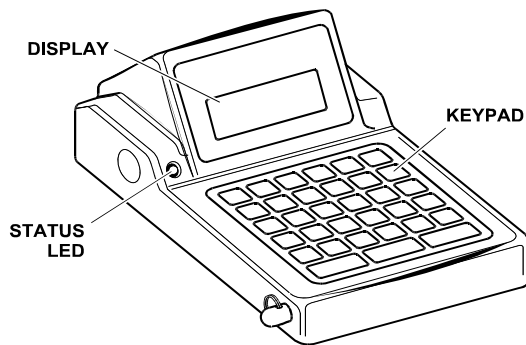
1 x camera (neck) strap

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 Fast Charge charging unit (max. current 1A)

1 x user manual



### Rear View

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## Care & Storage

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When not in use the unit should be returned to the supplied carry case. This unit is designed for indoor use only.

Operating temperature range: **5-40 degrees C**

Storage temperature range: **0-50 degrees C**

The membrane keypad may be wiped clean with a soft damp cloth. The unit is not waterproofed and spillages should be avoided.

**THIS UNIT CONTAINS NO USER SERVICEABLE PARTS.  
ONLY QUALIFIED SERVICE PERSONNEL SHOULD REPLACE OR FIT PARTS.**

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## Battery Charging

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The batteries in the Auditor DC unit are shipped fully charged.

In continuous use with a transducer connected, the batteries have a life of at least 8 hours.

**To charge the batteries following a period of non-use.** Connect the supplied charger to the charging socket on the right hand side of the unit. Plug in the charger to a suitable supply and switch on. The LED indicator above the charging socket will light (red) to indicate that the unit is being recharged. From fully discharged, the unit will require a charging period of 16-20 hours.

The batteries in the unit comprise a 7 cell NiCad with a capacity of 1.6Ahr.

With the unit switched off from a 10% charge state, the batteries will fully discharge in 25-50 days. To prevent the loss of all set-up data, the unit has additional battery backup for the internal memory.

### **Automatic Power Off**

To conserve battery life in use, the unit will switch off automatically after a predefined period. Pressing the on key will restore the unit to the last display prior to powering off.

### **Optional Fast Charge**

Auditor DCs with optional Fast Charge are supplied with internal NiMH (Nickel Metal Hydride) batteries. These are environmentally friendly batteries presenting no problems for safe disposal and are capable of sustaining a rapid recharge. From fully discharged, the unit will require a charging period of only 2.5 hours approx. Auditor DC models having this feature are identified by the additional green LED next to the existing LED above the mains adapter socket.

When the mains adapter is plugged into the socket and switched on at the mains, the green LED will come on to indicate the machine is charging and will start to flash when the unit is fully charged. If the red LED comes on, this means there is a problem and usually indicates a faulty battery.

The Fast Charge option also gives an increase in the effective life of the charged batteries.

**Note:** The mains adapter for the Fast Charge model terminates in a slightly larger diameter plug. This prevents the use of a standard mains adapter for charging the fast charge batteries. No attempt should be made to recharge the NiMH batteries using the standard mains adapter; failure to heed this warning could result in damage to the unit. The fast charge adapter can, however, be used to charge a standard Auditor DC.

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## 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 transducers 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 with a fitted 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: 1 (Configure)

Press: 2 (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 ← →.

1. Press ENTR.
2. Select transducer type H/O, I/S, SER, KPD or KEY using ← → press ENTR.
3. Depending on the type of transducer selected above, continue set-up in the appropriate section overleaf.

---

## Edit Transducer File (cont.)

---

### **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 II 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 to return to the main menu

press

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 1-2 volts. This analogue voltage signal will not be exact and may not be linear. If you are using a device that has a nominal 1 volt 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.




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## Edit Transducer File (cont.)




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### **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 the 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)

---

1. To start: press   
press   
press  (measure)

2. Plug in transducer then press

Select proper transducer using   then press . If using I/S or H/O type transducers, continue with instruct. If using SER, KPD, or KEY, you are now ready to take measurements.

3. Select units of measure using   press
  4. Select Peak, Track, Impulse or 'Click Dip'  
**Note:** Impulse available on Auditor DC II only using   press
  5. Select Measurement Direction using   (right is clockwise; left is anti-clockwise)  
press
  6. Select 'Cycle End Time' using   press
  7. Select Frequency Response using   press
  8. Type in Max Torque Value press
  9. Type in Min Torque Value press
  10. 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.
11. Type in Amount of Dip press
  12. Select Second Parameter using   press  (**Auditor DC II 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 and 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.


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## Measure Mode (Up to 200 Readings Stored) (cont.)


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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 and change from the right hand to the left hand. The screen will prompt you 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.

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







## Measure Mode - Circle Store Option

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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; however, the user is not limited to taking only 200 readings.

To select this option

### **From the main menu:**

1. Press  then press  or press  (Misc.).
2. Press  then press  or press  (Software Reset).
3. Press  6 times to access the **Circle Store** menu.
4. Select Option 2 **Circle Store On** using   and then press .
5. Pressing the  screen will prompt **End of Set-up**.
6. Press   to return to the main menu.

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## 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'  
**Note:** Impulse available on Type II only using   press
- 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 II only**)
- Screen shows 'End of Set-up' press  to exit
- Press   to return to the main menu

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

From the main menu:  
press  (direct)  
press  (direct measure)  
press  (read)

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

Connect transducer and press

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.

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## To Display Recorded Data

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1. From the main menu, press **9** (display/analyze).
2. Screen will show job name and specs, press **→**.
3. Screen will now show x-bar, R and sigma for total readings.
4. From any subgroup display, press **↓** (down arrow).
5. Screen will show the date and time the readings for that subgroup were taken.
6. Press **↓** (down arrow) screen will show subgroup comment.
7. Press **↓** (down arrow) again to see the individual readings displayed in groups of four readings per screen.

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## To View Cp and Cpk

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1. At the job name/spec screen, press **↓** (down arrow).
2. Screen will show the Cp and Cpk and the number of samples used in the calculations, press **↓** (down arrow).
3. 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 and expressed as a percentage.
4. Press **↓** (down arrow).
5. Screen will show the highest and lowest torques recorded and the number of readings that were above the maximum torque value and minimum torque value.
6. To return to the main menu, press **MENU**.

**For more information on Cp, Cpk, and CAM, please refer to the glossary on page 19.**

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## 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 the main menu:**

1. Press  then press , or press  (Misc.).
2. Press  then press , or press  (Software Reset).
3. Press  5 times to access the Cpk calculation screen.
4. Use the  and  arrow keys to access Option 2 **French Cpk/CAM** and press .
5. Press  to confirm; screen will prompt **End of Set-up**.
6. Press  to accept and exit or  to edit.
7. Press  to return to the main menu.
8. 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 19.**

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## To Erase Stored Data and Set-ups

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To erase readings stored in Measure Mode:

1. From the main menu, press  (Measure) then press .
2. Screen will prompt **Erase Measure Data?**
  - Press  to erase data.

**OR**

  - Press  to ignore and continue.

---

## Printing

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

To print readings taken in Measure Mode.

1. Connect Auditor DC to printer and switch printer on.
2. On Auditor DC:
  - Press **ON**.
  - Press **MENU**.
  - Press **→** (right arrow) then press **5** or press **5** (print).
  - Press **→ → →** then press **8** or press **8** (print measure).
5. Auditor DC will print details of stored readings taken in Measure Mode (with date/time stamp).
6. A sample printout can be found in Appendix A.
7. To return to the main menu press **MENU**.

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## To Set Date and Time

---

### **From main menu:**













1. Press **→** then press **6** or press **6** (Misc.).
2. Press **1** (set date/time).
3. Select date format using **←** **→**.
4. Enter date and time and press **ENTR**.
5. To return to the main menu, press **MENU** **MENU**.

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## To Set Power Off and Backlight Time Delays

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### From main menu:





















1. Press  then press  or press  (Misc.).
2. Press  (select Power Off/Backlight Time Delays).
3. Select Power Off Time Delay using   then press .
4. Select Backlight Delay using   then press .
5. To return to the main menu, press  .

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## To Configure Printer Port

---

### From main menu:









1. Press  then press  or press  (Misc.).
2. Press  then press  or press  (printer port).
3. Select Baud Rate using   then press .
4. Select number of data bits using   then press .
5. Select number of Stop Bits using   then press .
6. Select Parity using   then press .
7. To return to main menu press  .

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## To Display Software Version Number

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### From main menu:

1. Press  then press  or press  (Misc.).
2. Press  then press  or press  (version #).
3. To return to the main menu press  .

---

## To Set Password Protection

---

### From main menu:

1. Press  then press  or press  (Misc.).
2. Press  then press  or press  (password).
3. Screen will prompt **Enter New Password**.
4. Type in the password (4 characters) and press .
5. Screen will prompt **Confirm Password**.
6. Press  to accept or  to reject.
7. Select desired option using  . Options for protection are:
  - Power up
  - Configure
  - Direct Measure
  - Direct Char
  - Software Reset
  - Date and Time
8. 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.
9. Press  to exit.
10. Display now reads **End of Set-up**.
11. To return to the main menu, press  or press  to edit password protection.
12. The remaining options can be password-protected in the same manner.

---

## To Clear Password Protection

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### From main menu:

1. Press  then press  or press  (Misc.).
2. Press  then press  or press  (password).
3. Screen will prompt **Password**.
4. Enter the existing password (4 characters) and press .
5. Screen will prompt **Confirm Password** and display the existing password.
6. Screen will prompt **Confirm Password** and display the existing password.
7. Press  to confirm or press  to clear the password protection.
8. Screen will prompt **Enter New Password**.
9. Press  to clear the password.  
(keying in 4 characters before pressing  will result in a new password being created)
10. Screen will say **Confirm Password**.
11. 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.





















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## To Perform Software (S/W) Reset

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**CAUTION:** Use of this function will result in the loss of 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:**






1. Press  then press  or press  (Misc.).
2. Press  then press  or press  (S/W Reset).
3. Press the  key 8 times to access the Software Reset screen.
4. Screen will display **Erase all data and set mode?**
  - To carry out S/W reset: press 
  - To exit without performing S/W reset: press 
5. Screen will display **ERASING ALL CHARACTERISTICS ROUNDS AND MASTER ROUNDS** - wait a moment for display to change.
6. Select Subgroup Mode using   and press ; screen will say **End of Set-up**.
7. To return to the main menu, press  .
8. There are a number of other parameters which are set from the Software Reset Menu, some of which are detailed elsewhere in this manual.
9. Pressing  after making a selection will take the user on to the next screen.
10. Pressing  will give the user the option to exit to the Misc. menu by pressing  or continuing to edit by pressing .
11. Screens can be skipped by using the  and  keys.
12. These are the settings in the order they appear when the **Software Reset Menu** is accessed:

<b>Cm max samples</b>	- type in the required figure
<b>Cm min samples</b>	- type in the required figure
<b>Language</b>	- select using  
<b>Autoprint mode</b>	- select using  
<b>Capability label</b>	- select using  
<b>Cpk Calculation</b>	- select using  
<b>Circle-store (On/Off)</b>	- select using  
<b>Shift key mode</b>	- select using  

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## To Communicate with a PC (Optional Software Required)

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1. Connect Auditor DC to PC via cable provided.
2. On PC, start PCComms Software.
3. On Auditor DC:
  - Press .
  - Press .
  - Press  then press  or press .
4. 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.

# Example Printouts

## 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

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## Glossary of Terms

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<b>Characteristic</b>	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.
<b>Cp</b>	<p>This is a capability index which shows the process capability potential but takes no account of how centered 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.</p> $Cp = \frac{\text{Max} - \text{Min}}{6 \sigma}$ <p>(Max and Min are limit values)</p>
<b>CpK</b>	<p>This is an index which indicates whether the process will produce units within the tolerance limits. If the process is centered 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.</p> $CpK = \text{lesser of } \frac{(\text{Max} - \xi_-)}{3 \sigma} \quad \text{or} \quad \frac{(\xi_- - \text{Min})}{3 \sigma}$ <p>(Max and Min are limit values)</p>
<b>CAM</b>	<p>This is an alternative capability index requiring a minimum of 30 readings to be taken. In this implementation, 5 subgroups of 6 samples are used for each calculation. The CAM calculation uses the following formula:</p> $\frac{\text{Max} - \text{Min} \times \text{Cam Factor}^*}{6 \times \text{Average Sample Value}}$ <p>* CAM Factor is taken from a table (in the case of 5 x 6 samples = 1.910)</p>
<b>High Output Transducer (H/O)</b>	Torque transducer with no coding links but internal preamplifier giving an output signal level of typically 1 or 2 volts.
<b>Horizontal Sampling</b>	Collection of data by round, taking one reading for each characteristic in turn.
<b>Industry Standing Transducer (I/S)</b>	Type of transducer with no pre-amplifier or coding links, but with the exact rated torque marked on the body.
<b>Master Round</b>	A sequence of up to five rounds; it's used to allow a collection sequence which is part vertical, part horizontal.
<b>Max. Torque Value</b>	Upper tolerance level of any reading; this can equal but not exceed the torque rating of the transducer to be used.
<b>Min. Torque Value</b>	Lower tolerance level of any reading.
<b>No. of Sub-Groups</b>	Number used to allocate memory space in Auditor DC for a particular characteristic; may be set in the range of 1 to 99.

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## Glossary of Terms (cont.)

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**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  $\sigma$** 

Is a measure of the variation of the samples of a statistical group. If a group of n values has a mean of x- then its standard deviation is given by:

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

**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.

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## Error Messages

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<b>Code</b>	<b>Message</b>	<b>Explanation</b>
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 recognized. Use another transducer or get transducer recalibrated.
122	AZ OFSET	An auto-zero calibration on the transducer has detected an 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.

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## Error Messages (cont.)

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<b>Code</b>	<b>Message</b>	<b>Explanation</b>
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 the 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.

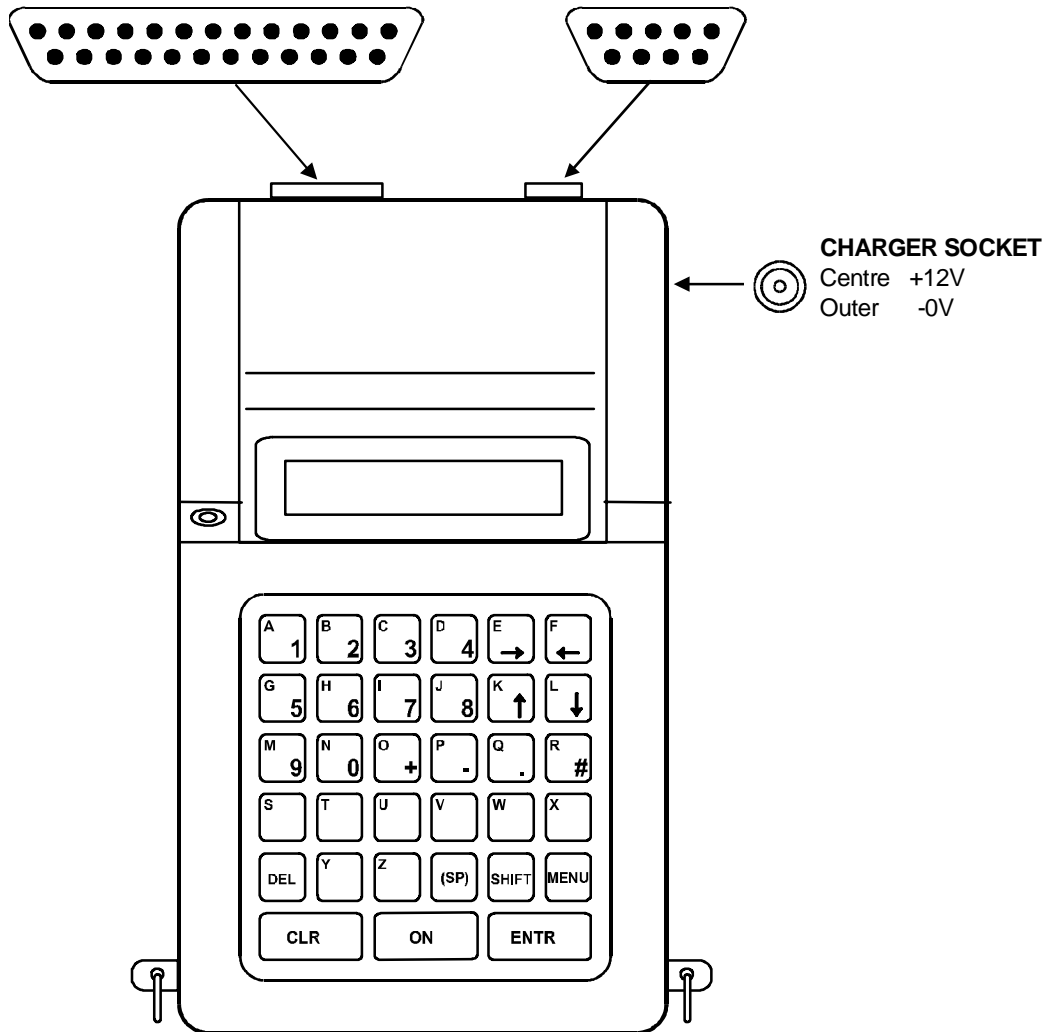
# External Connections

## 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



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## Notes

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