

## **EASYEPD2**

EPD Mk2 Configuration Software

### A Guide to using EasyEPD2

December 2003

DATE OF ISSUE: 04/12/2003

©Thermo Electron Corporation 2003. All rights reserved.

The information contained herein is the property of Thermo Electron Corporation and is supplied without liability for errors or omissions. No part may be reproduced or used except as authorised by contract or other written permission. The copyright and the forgoing restriction on reproduction or use extend to all the media in which this information may be embodied.

Blank Page

# Contents

<b>Getting Started</b>	<b>7</b>
What is EasyEPD2? .....	7
Equipment Required to Run EasyEPD2 .....	7
How to Install EasyEPD2 .....	8
How to Run EasyEPD2 .....	8
How EasyEPD2 Operates .....	8
EPD Types .....	9
Help .....	10
<b>Using EasyEPD2</b>	<b>11</b>
The Main Window .....	11
Tool Bar .....	12
The Menu Bar .....	13
The Status Bar .....	14
Data Representation .....	14
<b>Setting Up EasyEPD2</b>	<b>15</b>
The Set Up Form .....	15
Access Control and Administration .....	19
Access Administration .....	20
Example: Creating Access Control File .....	22
Date and Time .....	25
Numbers .....	25
Communications Port .....	26
<b>Reading</b>	<b>29</b>
How to read from an EPD .....	29
<b>Writing</b>	<b>31</b>
How to write to an EPD .....	31
<b>Logging</b>	<b>33</b>
Logging Description .....	33
<b>Wearer Dose and Alarms</b>	<b>35</b>
The Dose and Alarms Window .....	35
Wearer .....	36
Dose and Rates .....	36
Counts Since .....	38
Dose Quality .....	38
Alarm Thresholds (uSv or mrem or cGy) .....	40
Clear .....	42
EPD Control .....	43

<b>Status</b>	<b>45</b>
The Status Window .....	45
EPD State .....	46
EPD Configuration .....	47
Voltages .....	48
Alarms .....	49
Clear Alarms Button.....	49
Faults .....	50
Clear Faults Button.....	51
ADS.....	51
History .....	52
<b>Dose Profile</b>	<b>53</b>
Dose Profile Textual Window .....	53
Dose Profile Graphical Window .....	55
Rate Text Window .....	56
Rate Graph Window.....	57
<b>Special Total Dose Store</b>	<b>59</b>
Special Total Dose Store Window .....	59
<b>Approved Dosimetry Service</b>	<b>61</b>
What is an ADS?.....	61
The ADS Window .....	62
<b>Calibration</b>	<b>63</b>
What is EPD Calibration?.....	63
The Calibration Window .....	63
EPD-N Calibration .....	64
Adjusting N-Gain Constants .....	65
Restoring Factory Setting.....	67
Caution.....	67
EPD-N2 Calibration .....	67
Adjusting Gain Constants.....	68
Restoring Factory Setting.....	70
EPD-N and EPD-N2 Changing the Password .....	70
Warning.....	70
<b>Scratch Pad</b>	<b>71</b>
The Scratch Pad Window .....	71
<b>Set Up EPD</b>	<b>73</b>
Alarm Controls .....	73
Alarm Set Up.....	74
Alarm Test.....	75
Regulated Voltage .....	76
Battery Voltages.....	76
Display .....	77
Events .....	80
Dose Profile Events .....	80
Other Events .....	82
Communications .....	84
Teledosimetry Controls .....	85
Switch .....	86

<b>Batch Write</b>	<b>89</b>
The Batch Write Window.....	89
Creating a Batch Write File.....	89
Performing a Batch Write.....	89
<b>Error Handling</b>	<b>91</b>
Communications Errors.....	91
Errors.....	91
<b>Glossary of Terms</b>	<b>93</b>
<b>Index</b>	<b>97</b>

**Blank Page**

# Getting Started

---

## What is EasyEPD2?

EasyEPD2 is a program that reads and writes EPD data via an Infrared communications link and displays the data in a PC window.

EasyEPD2 can be set up to allow certain data to be logged to a text file.

EasyEPD2 can be used to batch write a set of EPDs into the same configuration.

---

## Equipment Required to Run EasyEPD2

### Computer

An IBM Compatible PC running Windows operating system. See the Readme file delivered with the application for details of what platforms EasyEPD2 has been tested on.

A minimum of 16Mb RAM

### Infra-red link

Any Ir adapter that can emulate a PC's Comm port. E.g. ACTiSYS IR Computer link ACT-IR220L

### Built-in Infrared ports

EasyEPD2 does not work with the internal infra-red port when used on operating systems other than Windows NT. You must have an external Ir port connected to a standard comm port.

### EPD

Electronic Personal Dosimeter.

## How to Install EasyEPD2

EasyEPD2 is supplied on disk. From your Windows Start menu select Settings – Control Panel – Add/Remove Programs and use the Install button or Browse button to select the Setup.exe file on the installation disk. Follow the instructions, clicking 'Next' when you are happy with the settings selected.

To un-install EasyEPD2 use the Remove Programs option.

---

## How to Run EasyEPD2

The installation program will have created a program group. From your Tool Bar select Start – Programs – Thermo – EasyEPD.

You may wish to create a shortcut to EasyEPD2 on your computer desktop.

---

## How EasyEPD2 Operates

EasyEPD2 detects an EPD when placed with its button facing towards and within range of the Ir adapter, automatically reads data from the EPD and displays it in a window. Once an EPD has been detected EasyEPD2 maintains the link with the EPD to ensure that the EPD does not time out and to check that the EPD is still present.

In order to ensure that EasyEPD2 operates in the most efficient manner only data required for open windows is read from the EPD. Each time a Window is opened the data for this window is read from the EPD (with the exception of the Dose Profile and Scratchpad Windows). Click the Read button at any time in order to read the present values from an EPD. Once a window is open then the data for that window will only be read if the Read button is clicked.



Writing to an EPD is performed on sets of data. When a value is changed on EasyEPD2 then all values in the appropriate set of data are marked as modified and are displayed in blue. Click the write button to write to the EPD all data marked as modified. EasyEPD2 automatically reads the EPD again after a write.

EasyEPD2 displays units in Sieverts, rems or centiGray where  $1\text{Sv} = 100\text{rem} = 100\text{cGy}$ . The units displayed are determined by settings within the EPD being read.

---

Note: Some values of cGy are displayed in scientific notation. E.g.:  $5\text{E}-6\text{ cGy} = 0.000005\text{ cGy}$

---

---

## EPD Types

Different customers may have different types of EPD Mk2. EasyEPD2 displays data differently depending on the EPD being read at the time.

At the moment there are three EPD Mk2 types:

EPD Measures dose equivalents Hp(10) and Hp(0.07)

EPD-N Measures Hp(10) for photons and slow neutrons

EPD-N2 Measures Hp(10) for photons and neutrons of all energies

Dose can be displayed in different units –

uSv, mrem, cGy.

(cGy is not currently available for neutron measurement using EPD-N or EPD-N2 because  $1\text{rem} \neq 1\text{cGy}$  for neutrons)

Dose can be referred to using different terms –

Hp10, DDE, HpG

Hp07, SDE, HpN

This manual is written primarily using Hp10, Hp07 and uSv nomenclature, the appropriate term for the EPD being read will be used by EasyEPD2.

EPD-N and EPD-N2 EPDs can have certain calibration parameters adjustable by the user.

EPD-N and EPD-N2 EPDs do not store Special Total Dose values.

Different EPD Types have different counter designations.

EPD: HG, SG, FB, BC

EPD-N: HG, SG, NU, NC

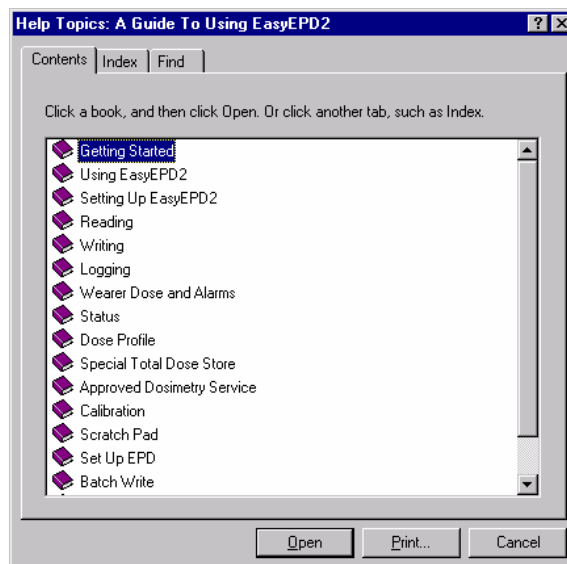
EPD-N2: HG, SG, FN, AN.

---

## Help

Use the Menu Bar to select Help – Contents.

Click the 'Help Topics' button to display a list of contents.



Double click on an item to select it and read more details.

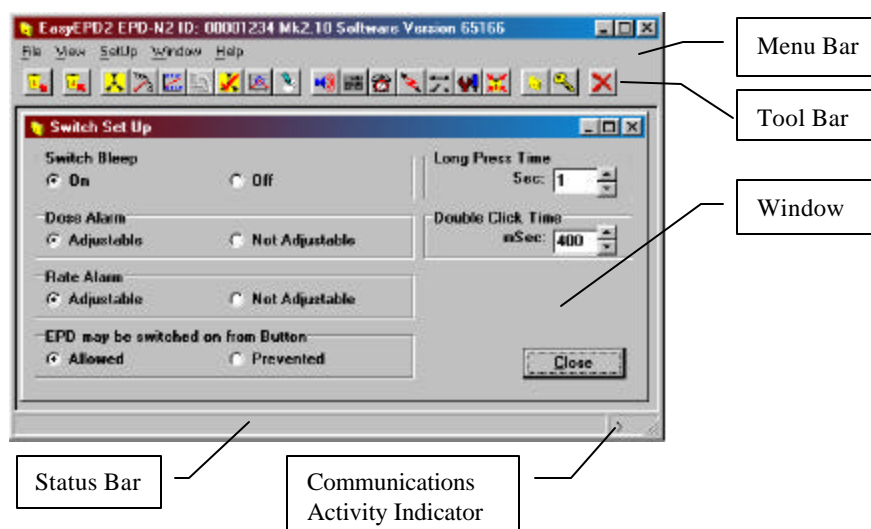
Use the 'Index' tab to find any item from the index.

Select the 'Find' tab if the word you are looking for does not occur in the index. Double Click on a topic to display that topic and all instances of the selected word will appear highlighted within the page for that topic.

# Using EasyEPD2

---


## The Main Window





The main window provides access to all EasyEPD2 operations via either the toolbar buttons or the menu selections. Further windows open within the main window.

## Tool Bar



 Read EPD: Reads data required to populate the windows that are open. If no window is open then the Dose and Alarms window is opened and that data read.


 Write EPD: Writes data changed since the last read. An EPD must be present. The write is followed by a read.

 Dose and Alarms: Display data associated with an Issue of an EPD to a person, including the dose status.


 Status: Display the operational status of an EPD.


 Dose Profile: Display the EPD dose profile.

 Special Total Dose Store: Display the Total Doses as recorded in the EPD at specified times.

 ADS: Display data associated with an ADS Issue of an EPD to a person, including the dose status.


 Calibration: Display the Calibration parameters of the EPD.

 Scratchpad: Displays the data in the EPDs user writable non-volatile store.

 Alarms: Display/Configure the Alarm controls for the EPD.


 Display: Display/Configure the EPD display settings.


 Events: Display/Configure EPD event timers.

 Comms: Display/Configure EPD communications.

 Switch: Display/Configure EPD switch settings.

 Configuration: Display/Configure additional EPD settings.

 Batch: Batch-write a set of parameters to EPDs.

 Set Up: Set up EasyEPD2.

 Access Control: Enter User Name and Password.

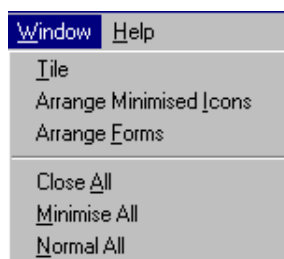
---

## The Menu Bar

The menu bar reproduces all the functionality of the toolbar. In addition it also provides the ability to close or re-organise the Windows and to display Help.

The menu items may be accessed either via the mouse or by using the keyboard <Alt> key together with the underlined letter on the Menu bar.

### Window Menu



Tile: arranges windows so that they are all the same size.

Arrange Minimised Icons: arranges the icons of minimised windows.

Arrange Forms: places the forms so that they do not overlap.

Close All: Closes all open windows.

Minimise All: minimise open windows.

Normal All: restores minimised windows.

### Help Menu



Version: Displays the present version number of EasyEPD2

Contents: Displays on-line help.

DLL: Displays the location, name, date and size of the interface file used by EasyEPD2 to talk with the EPD.

## The Status Bar

The status bar is used to give information about what EasyEPD2 is doing, in particular the state of the Ir interface with the EPD is shown by messages such as:

- EPD Removed... Waiting to detect an EPD.
- Waiting to detect an EPD.
- Reading EPD.
- An error occurred while reading the EPD.
- Writing to EPD.

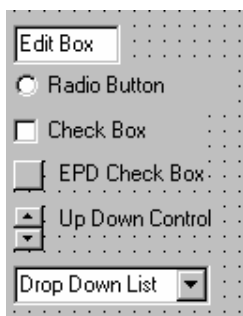
The communications activity indicator flickers twice a second when no communications activity is occurring and faster than that when there is activity.

---

## Data Representation

EasyEPD2 represents data in a variety of ways such as:

- Edit boxes
- Drop down lists
- Radio buttons
- Check boxes
- Up Down Controls



These items are blank when EasyEPD2 has no data associated with them.

They are displayed in blue when changed by the user.

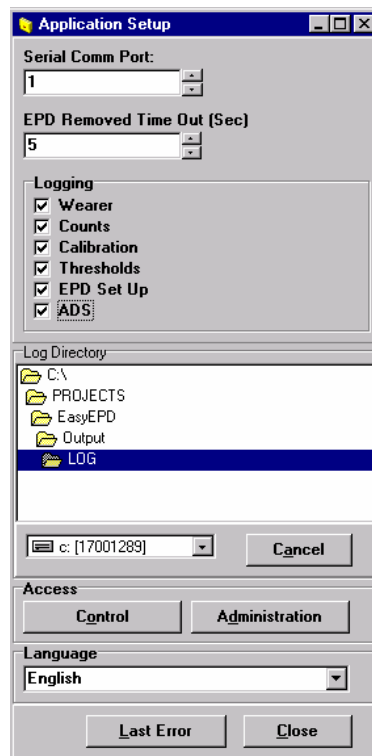
Note: Data is written to the EPD in groups. If one item in a group is changed then all items in that grouped are displayed in blue and will be written to the EPD together.

# Setting Up EasyEPD2

---

## The Set Up Form

From the main toolbar select Set Up Application: 



---

Note: Windows XP and 2000: Requires Administrator privileges to install and initially set up com port, removed timeout, logging, logging directory, access control. If appropriate privileges are not available then the fields are greyed out and disabled.

---

### **Serial Communications Port**

This is the PC port on which an Ir adapter is installed for communicating with an EPD. Any valid Comm port number may be entered. (Default = 1).

### **EPD Removed Timeout**

(Default = 5 seconds)

This is used to prevent unnecessary reads due to movement of an EPD out of the Ir range.

If an EPD is moved outside the Ir range and returned within this time then a read will not occur.

Note: A read will occur if a different EPD is in the field.

### **Logging**

Check the boxes if EasyEPD2 is to log data on detecting a new EPD and on Writing to an EPD.

Note: DO NOT ENABLE THIS FUNCTION unless you are sure you want logging as it causes EasyEPD2 to read all EPD parameters and thus slows down communications.

See section Logging Description for further details.

### **Log Directory**

This is the directory in which the data selected for Logging will be saved. You may set this directory to any existing directory on your computer or network. Select a drive using the drop down box and then select a directory using the directory list box, Clicking on the directory you require. Cancel only cancels the last directory selected, if you have made a mistake you will need to re-select the directory you require.

---

Note: Windows XP installs with read only access to directories. The default logging directory therefore cannot be written to. Create a new writable directory or change the folder properties.

---

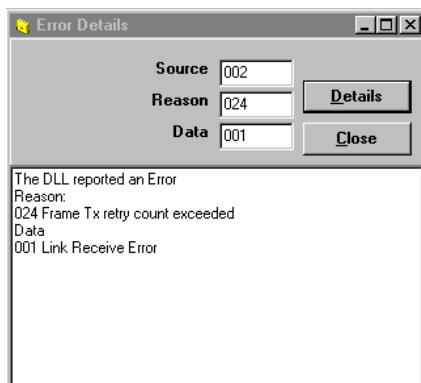


## Language

Please enquire at your local sales office if you require this application in another language.

At present the application can be run in English, French or German, although the help is only available in English.

## Last Error



Errors such as communications problems, or EPD problems sometimes occur and error codes generated within the interface dll. These codes can be viewed and reasons displayed using the Error Details form, you can type in the numbers in the edit boxes. Clicking the Details button toggles the details box on and off.

If no error has occurred then the default source, reason and data values are 0 and no useful information is gained by looking at the details.

Source: indicates if the error was reported by the dll itself or by the EPD.

Reason: gives some indication of why the dll or EPD reported an error.

Data: Sometimes provides additional information such as the command being sent at the time or data received with the error message.

## **Access Control and Administration**

---

Note: Windows XP and 2000: Access control Password requires administrator privilege to change.

Access Control displays a User Name and Password Form. This only needs to be used if access control has been set up on this application.

Access Administration displays a form that allows the user to restrict access to the application. Fuller details may be found in the following section.

## Access Control and Administration

---

Note: You do not need to set up Access Control. EasyEPD2 will operate normally if no Users are added to the Access Administration form.

Note: Windows XP and 2000: Access control Password requires administrator privilege to change.

---

### Security

The access control is **not** intended to be secure but merely to provide a level of access limitation based on a user name. User names and passwords are clearly visible on the administration form and are stored in the registry in unencrypted form.

### Removing Access Control

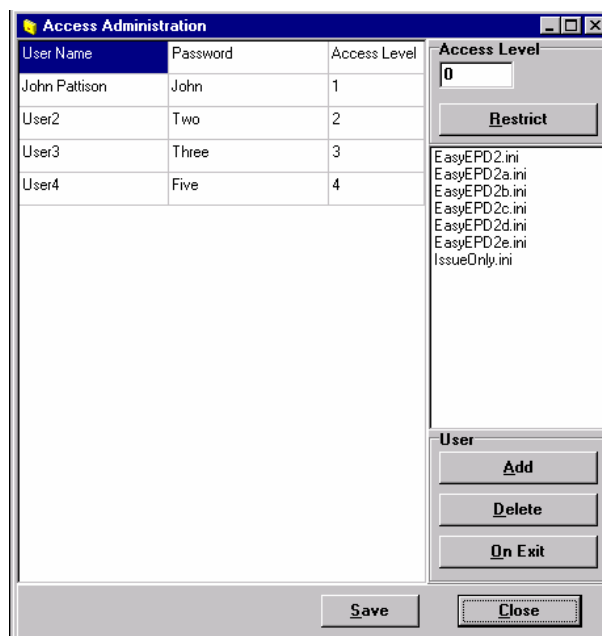
If you wish to delete password control all you have to do is to delete the file EasyEPD2.ini from your application directory and delete all the keys 'A..' in the registry: HKEY\_LOCAL\_MACHINE\Software\Thermo\EasyEPD2

### Access Control Description

Access control operates on the basis that any user may access all features. If you wish to restrict access to any feature you may give that feature an 'Access Level' which means that a person with that Access Level privilege or lower number is allowed Access to that feature. A person with a higher number is not allowed access. (eg: if on the main form you give a task bar button access level 3 then anyone with access levels 1 or 2 or 3 can press the button but anyone with access levels 4 and above cannot press the button).

When EasyEPD2 opens it looks for a file EasyEPD2.ini in the application folder and uses that as the access control information.

## Access Administration



### Add an Administrator:

User – Add

Allocate an ‘Administrator’ and give them access level 1 (The highest). (Access Level 0 is not allowed).

Exit EasyEPD2 and re-start. You will now be prompted for a User Name and Password.

### Setting up access:

You must be logged in as a person with Access Level 1.

You may either double click on one of the ‘.ini’ files listed and save it as EasyEPD2.ini or you can set up your own file and then press the ‘Save’ button.

To create your own access control set. Decide the level you wish to create an access control set (eg: level 3 to allow Issue and Return only). Type that number in the **Access Level** box and press the **Restrict** button. The application is now in a mode where **right clicking** on Forms, Group Boxes, Edit Boxes or Buttons will add this level of restriction to the EasyEPD2.ini file. To restrict a radio-group item you have to click on the panel or group box that contains it.

**User – Add (or Edit):**

Enter a User Name, password and Access Level.

Note: A user with Access Level 3 has access to all level 3, 4, 5 etc. items. So to see the above example in operation you need to create a user with access level 4.

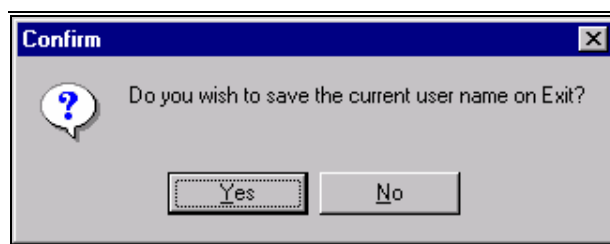
To Edit a User's details click **Add** and then you can change user names passwords or access levels.

**User – Delete:**

Click on the user you wish to delete and then click the User Delete button.

**User – On Exit:**

Prompts you to decide if you want the Access Control form to be populated with the User Name of the last person to use EasyEPD2 or not.

**Save**

Saves your present settings prompting you for a file name for the .ini file.

---

**When You Have Finished Setting Access Levels:** Exit the EasyEPD2 application, re-open and check the operation is as expected.

---

### Example: Creating Access Control File

Start up EasyEPD2 and log on as an Administrator.

Open the Access Administration form and enter Access Level 3 in the Access Level box and press the ‘Restrict Button’.

Whilst keeping the Access Administration form open:

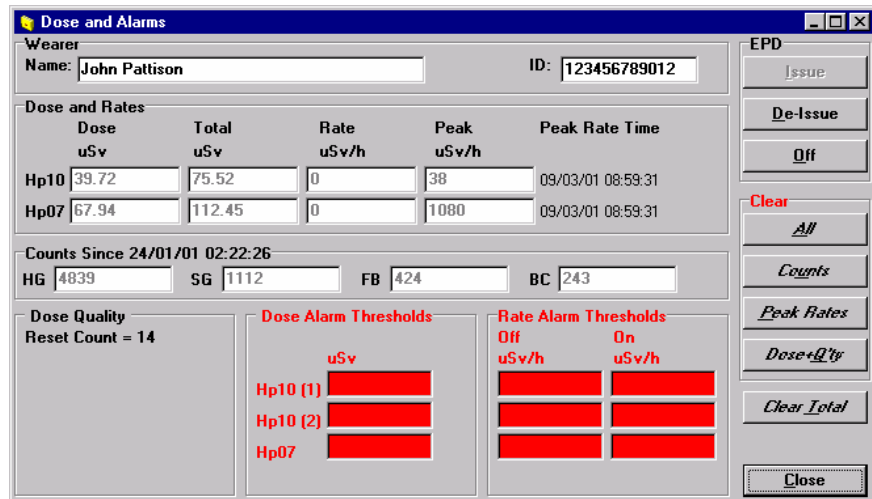
Right click on any of the tool bar buttons you wish to restrict and they will go hashed (right click again and they will un-hash).

E.g.:



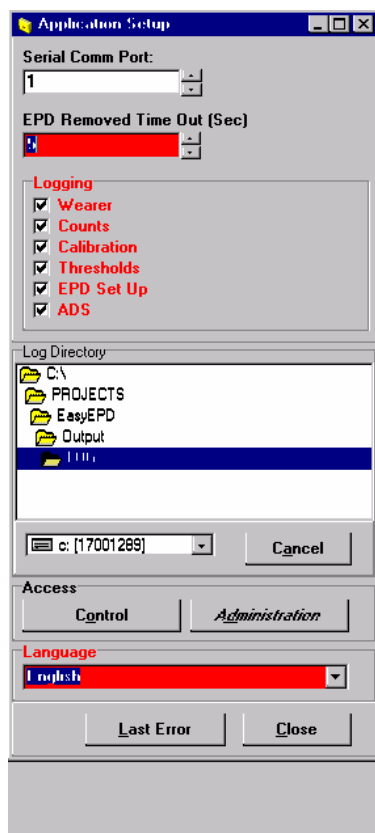
Open the Dose and Alarms form and right click on the Dose Alarm Thresholds and Rate Alarm Thresholds and Clear group boxes and on the Clear Total Button in order to set Access Level 3 on those items on that form.

Eg:



To restrict at another level return to the Administration form and enter Level 1 and press the restrict button. Then open the Application Setup Form and right click on the ‘Administration’ button the ‘EPD Removed time out’ and ‘Language’ Edit boxes and the ‘Logging’ Group box.

Eg:



Return to the Access Administration form and 'Save'. Give the file a file name (eg. MyExample.ini) and press OK.

To use this example open the Administration form and double click on the MyExample.ini in the list of ini files and save as EasyEPD2.ini

To confirm what restrictions are set you can look at the MyExample.ini file, here is the example we have just done:

```
FMain"TTToolButton"tbWrite"3"
FMain"TTToolButton"tbEpdStatus"3"
FMain"TTToolButton"tbDoseProfile"3"
FMain"TTToolButton"tbDoseStore"3"
FMain"TTToolButton"tbADS"3"
FMain"TTToolButton"tbCalibration"3"
FMain"TTToolButton"tbScratchPad"3"
FMain"TTToolButton"tbAlarms"3"
FMain"TTToolButton"tbDisplay"3"
FMain"TTToolButton"tbEvents"3"
FMain"TTToolButton"tbComms"3"
```

FMain"TToolButton"tbSwitch"3"  
FMain"TToolButton"tbBatch"3"  
FMain"TToolButton"tbEasyEpd"3"  
fmDoseAlarms"TGroupBox"GbRateAlarmThresholds"3"  
fmDoseAlarms"TGroupBox"GbDoseAlarmThresholds"3"  
fmDoseAlarms"TButton"btnClearTotalDose"3"  
fmDoseAlarms"TGroupBox"GbClear"3"  
fmEasyEpdSetUp"TButton"btnAdministration"1"  
fmEasyEpdSetUp"TCheckBox"cbLogADS"1"  
fmEasyEpdSetUp"TCheckBox"cbLogCalibration"1"  
fmEasyEpdSetUp"TGroupBox"gbLanguage"1"  
fmEasyEpdSetUp"TCheckBox"cbLogEpdSetUp"1"  
fmEasyEpdSetUp"TPanel"Panel3"1"  
fmEasyEpdSetUp"TGroupBox"GroupBox1"1"  
fmEasyEpdSetUp"TEdit"edRemovedTimeOut"1"



## Date and Time

EasyEPD2 uses the PC 'Short' Date time format for displaying date and time. If two digit year values are selected then you must be aware that the century being displayed may not be the current century.

It is recommended that you set your Windows Short Date Style to four-digit year e.g.: dd/MM/yyyy

This style can be found on your PC Regional Settings Window:

Start – Settings – Control Panel – Regional Settings – Date

The EPD has no concept of real time but maintains a counter which increments every second. EasyEPD2 calculates all dates and times from the PC Clock and adjusts by the appropriate number of seconds as read from the EPD.

You should regularly ensure that the PC clock is correct.

---

You may need administrator privilege to permanently set the Regional Settings.

---

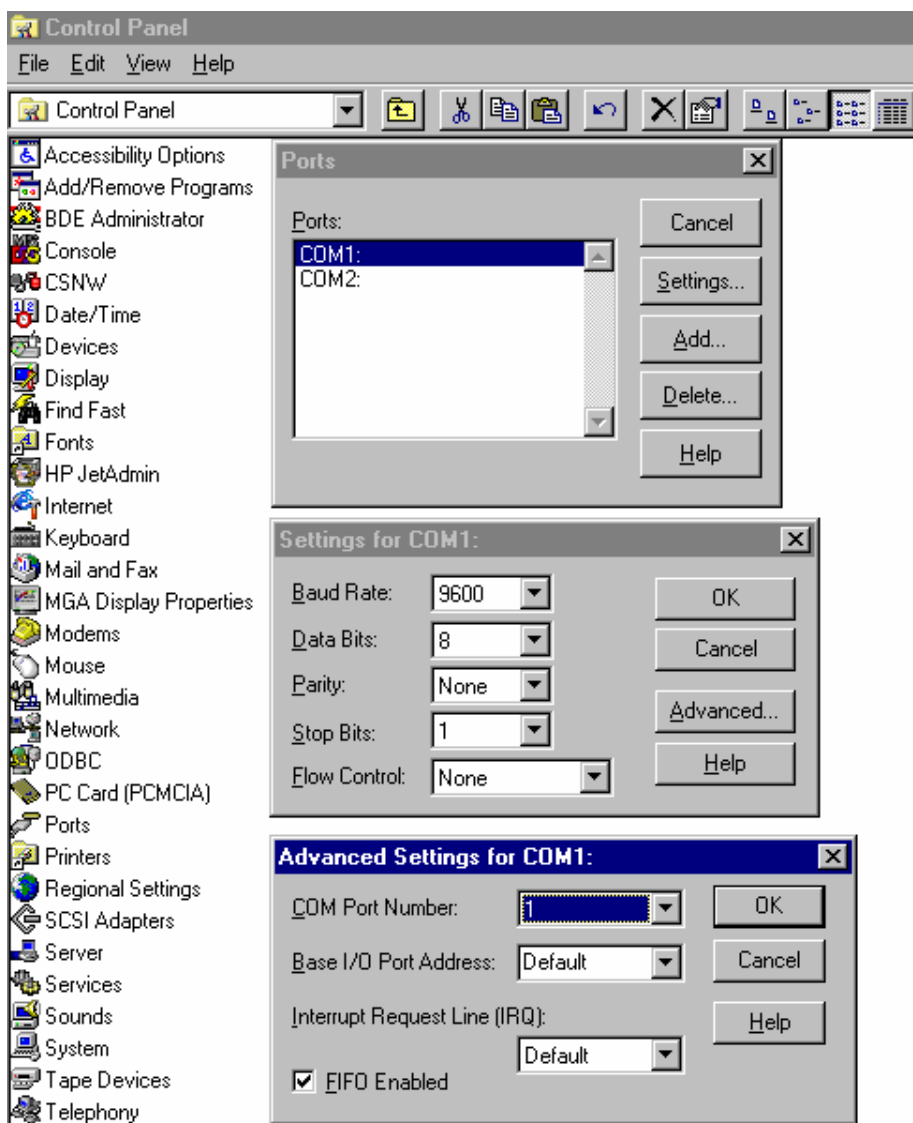
---

## Numbers

EasyEPD2 uses the PC Regional Settings Number format. Any files you save from within EasyEPD2 will use this format. When subsequently opening these files your PC should be set up to use these formats otherwise an error "... is not a valid floating point value" may occur.

# Communications Port

## Communications Ports



The above example is of an PC running Windows NT found under: Start – Settings – Control Panel – Ports

Where you are using a standard PC Comm port as the interface you will not normally have to perform any set up. EasyEPD2 allows you to select one of the Comm ports on your PC as the Interface.

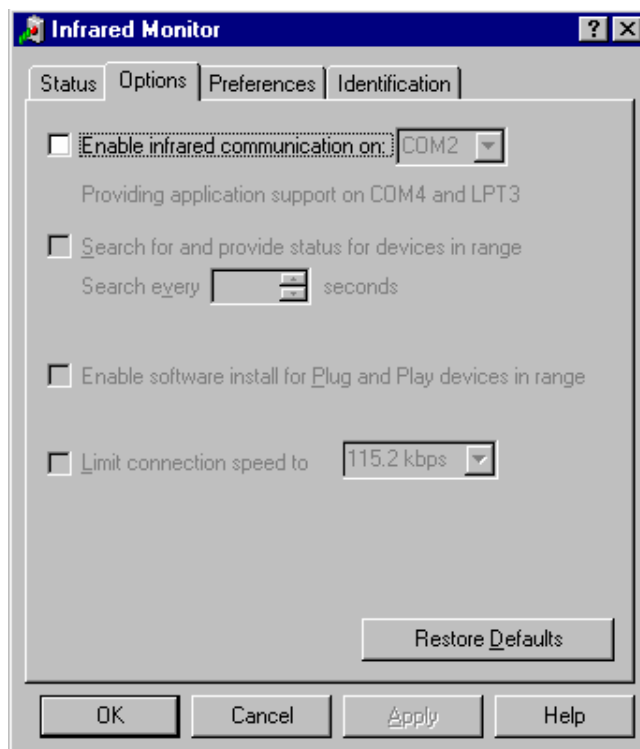
## Drivers

This only applies when your PC has a built-in IRDA port running under Windows NT. If your PC is using another operating system then you must interface with the EPD via a standard COM port and an external IR adaptor.

Ensure the settings are such as to allow EasyEPD2 to communicate with the EPD without the protocol being changed.

To check your Infrared settings select

Start – Settings – Control Panel – Infrared




- Ensure that the 'Enable infrared communication on:' check box is NOT checked so that the text 'providing an application support on...' is greyed out. You must set up the EasyEPD2 Comm port to point at the Comm port used by the Infrared Monitor (in this example COM2).

Blank Page

# Reading

---

## How to read from an EPD


- Place the EPD with its pushbutton facing towards the Ir adapter.
- EasyEPD2 will detect the EPD and read and display data from this EPD in any open window. If no window is open then the Dose and Alarms window will open and data for that window will be read from the EPD.
- Open a window containing the data you wish to read. The data for that window will be read from the EPD when the window is first opened.
- If an EPD is present then the Read button  may be clicked at any time. This will cause a read of data from the EPD and overwrite any existing values currently displayed by EasyEPD2.

Blank Page

# Writing

---

## How to write to an EPD

- Place an EPD with its pushbutton face towards the Ir adapter.
- Read data from the EPD by opening a window that contains the data to be changed.
- Edit the value to be changed. The value will be displayed in blue along with associated values that will be written to the EPD.
- Click on the Write button  and the values will be written. EasyEPD2 follows the write with a read.

Blank Page



# Logging

---

## Logging Description

If logging has been set up as described in the section 'Setting Up EasyEPD2' then the data requested is placed in a comma delimited text file. The results are placed in files named with the date '.log' in a sub-directory 'Log'.

E.g.: 19980922.log for September 22, 1998.

20020103N.log for EPD-N (2002 January 03<sup>rd</sup>)

20020422N2.log for EPD-N2 (2002 April 22<sup>nd</sup>)

Lines marked 'R' contain data Read when the EPD was first inserted. Lines marked 'W' contain data when a write to an EPD is performed. (French: L 'Lire', E 'écrire', German: L 'Lesen', S: 'schreiben')

Note: Reads take longer when logging is enabled because all EPD data is read whenever a read occurs so that the data is available to log. You are advised NOT to enable logging if you do not require it.

Blank Page

# Wearer Dose and Alarms

## The Dose and Alarms Window

**Dose and Alarms**

Wearer  
Name:  ID:

EPD

Dose and Rates					
	Dose uSv	Total uSv	Rate uSv/h	Peak uSv/h	Peak Rate Time
Hp10	<input type="text" value="39.75"/>	<input type="text" value="75.55"/>	<input type="text" value="0"/>	<input type="text" value="38"/>	09/03/01 08:59:31
Hp07	<input type="text" value="67.94"/>	<input type="text" value="112.45"/>	<input type="text" value="0"/>	<input type="text" value="1080"/>	09/03/01 08:59:31

Counts Since 24/01/01 02:22:26

HG	<input type="text" value="4843"/>	SG	<input type="text" value="1112"/>	FB	<input type="text" value="424"/>	BC	<input type="text" value="243"/>
----	-----------------------------------	----	-----------------------------------	----	----------------------------------	----	----------------------------------

	Dose Alarm Thresholds uSv	Rate Alarm Thresholds	
		Off uSv/h	On uSv/h
Hp10 (1)	<input type="text" value="678.00"/>	<input type="text" value="123"/>	<input type="text" value="124"/>
Hp10 (2)	<input type="text" value="1234567.56"/>	<input type="text" value="234"/>	<input type="text" value="235"/>
Hp07	<input type="text" value="890.11"/>	<input type="text" value="345"/>	<input type="text" value="346"/>

Dose Quality  
Reset Count = 14

This window displays data normally associated with an Issue of an EPD to a person, including the dose status.

## Wearer

<b>Wearer</b>	
Name: <input type="text" value="John Pattison"/>	ID: <input type="text" value="123456789012"/>

### Wearer Name

This is a string of up to 22 characters

### Wearer ID

An issued EPD should have a string of up to 12 decimal numbers. By convention an un-issued EPD wearer ID is all 'F's and this is the value set by the EPD when the Return button is pressed.

## Dose and Rates

Dose and Rates					
	Dose uSv	Total uSv	Rate uSv/h	Peak uSv/h	Peak Rate Time
Hp10	7.98	7.98	0	2599	23/09/1998 09:15:00
Hp07	39.28	39.28	1	2776	23/09/1998 09:15:00

Dose and Rates					
	Dose mrem	Total mrem	Rate mrem/h	Peak mrem/h	Peak Rate Time
DDE	1.923	1.923	511.4	511.4	23/09/1998 10:22:32
SDE	20.828	20.828	756.6	756.6	23/09/1998 10:22:32

Dose and Rates					
	Dose cGy	Total cGy	Rate cGy/h	Peak cGy/h	Peak Rate Time
Hp10	0.000227	0.000684	0	0.013	08/09/00 09:22:07
Hp07	0.015927	0.024602	0	0.879	08/09/00 09:22:07

### EPD-N:

Dose and Rates					
	Dose mrem	Total mrem	Rate mrem/h	Peak mrem/h	Peak Rate Time
HpG	7.416	7.416	0	0.8	22/04/2002 17:37:51
HpN	428.664	428.664	0	60	22/04/2002 19:00:27

### EPD-N2:

Dose and Rates					
	Dose uSv	Total uSv	Rate uSv/h	Peak uSv/h	Peak Rate Time
HpG+HpN	37.51				
HpG	6.38	12.89	0	110	30/05/2002 16:43:01
HpN	31.13	32.16	320	550	30/05/2002 16:43:13

**Hp10 (or DDE)**

This is the Personal, Penetrating or Deep Dose Equivalent at a depth of 10mm of soft tissue, Hp(10).

**Hp07 (or SDE)**

This is the Personal, Superficial, Shallow or Skin Dose Equivalent at a depth of 0.07mm of soft tissue, Hp(0.07).

**HpG and HpN**

These are the Gamma and Neutron components of Hp(10).

**Dose (uSv or mrem or cGy)**

The 'Dose' is regarded as a short-term record of dose received, usually associated with the 'Issue' of an EPD. This is the value that is compared with the dose alarm thresholds for raising dose alarms. The EPD records dose in units of 1/64 uSv and EasyEPD2 converts this to the nearest 0.01 uSv (0.001 mrem or 0.000001 cGy).

Note: Some values of cGy are displayed in scientific notation. Eg: 5E-6 cGy = 0.000005 cGy

**Total Dose (uSv or mrem or cGy)**

The 'Total Dose' is a store provided for long-term record of dose accumulated by an EPD.

**Rate (uSv/h or mrem/h or cGy/h)**

This is the dose rate calculated by the EPD at the time of the Read.

**Peak (uSv/h or mrem/h or cGy/h)**

This is the highest dose rate calculated by the EPD since this value was last cleared.

**Peak Rate Time**

This is the time at which the peak dose rate occurred. 'No Peak' is displayed if there has not been a peak recorded since the peak dose rate was last cleared.

Note: Date and time are calculated by taking the present PC clock date and time and subtracting the number of seconds that the EPD has been operating since the peak occurred. Thus this value will only be as accurate as your PC clock and assumes that the EPD has been powered (and not reset) for the entire time since the peak occurred.

## Counts Since

Counts Since 23/09/1998 09:14:42  
 HG 691 SG 572 FB 170 BC 0

Counts Since 22/04/2002 13:48:00  
 HG 264 SG 58 NU 17 NC 16

Counts Since 22/04/2002 13:59:13  
 HG 9622 SG 6806 FN 82 AN 3521

This displays the time at which the EPD counts were cleared and the counts accrued by the EPD since that time. (Note: counts are not actually cleared but a snapshot (or baseline) taken. The value displayed here is the difference between the snapshot and the actual counter value.)

The EPD has four counters:

	1	2	3	4
EPD	HG	SG	FB	BC
EPD-N	HG	SG	NU	NC
EPD-N2	HG	SG	FN	AN.

The values on these counters are used in conjunction with the calibration constants to calculate the equivalent Doses and dose rates.

---

## Dose Quality

Dose Quality  
 Reset Count  
 KnockTime Secs  
 Dose Over-range  
 Rate Over-range  
 Abuse Warning  
 CRC Failure  
 Counter Over-range  
 Low Volts  
 Detector Fault

This field is normally blank indicating that the dose values are OK. If one of the Dose Quality items is displayed then an assessment of the dose value should be made. This status belongs to the dose reading and is cleared using the Clear Dose+Q'ty button.

### **Reset Count**

This is a count of the number of times the EPD has been reset since the Dose Quality was last cleared.

### **Knock Time Secs**

This is the number of seconds that dose substitution has occurred because the EPD has been knocked or dropped.

### **Dose Over-range**

This indicates that the Dose has exceeded 1Sv (100 rem or cGy). Dose continues to accumulate above this value to a maximum of 16777215uSv (1677721.5 mrem or 1677.7215 cGy).

### **Rate Over-range**

This indicates that the Dose Rate has exceeded 1Sv/h (100 rem/h or cGy/h). Dose Rate continues to be displayed above this value.

### **Abuse Warning**

This indicates that the EPD has been knocked continuously for more than 15 seconds.

### **CRC Failure**

This is an integrity check on a set of data, which indicates that the EPD detected a checksum error in the Dose data. Checksum failures are corrected by retrieving the last stored dose from secure store, which means that up to 15 minutes of dose may be lost.

### **Counter Over-range**

Counts on at least one detector exceeded the maximum value expected. (This depends on the EPD Type but is of in the region of 300000 counts/second on the gamma counters and 26000 counts/second on the beta counters for the standard EPD Mk2)

### **Low Volts**

Indicates that the voltage has dipped low since the dose quality factors were last cleared.

**Detector Fault**

Indicates that a detector fault has occurred since the dose quality factors were last cleared.

---

**Alarm Thresholds (uSv or mrem or cGy)**

Dose Alarm Thresholds		Rate Alarm Thresholds	
	uSv	Off uSv/h	On uSv/h
Hp10 (1)	3210.00	211	234
Hp10 (2)	6543.20	282	305
Hp07	180.00	393	426

Dose Alarm Thresholds		Rate Alarm Thresholds	
	mrem	Off mrem/h	On mrem/h
DDE (1)	321	21.1	23.4
DDE (2)	654.32	28.2	30.5
SDE	18	39.3	42.6

Dose Alarm Thresholds		Rate Alarm Thresholds	
	cGy	Off cGy/h	On cGy/h
Hp10 (1)	0.321	0.0211	0.0234
Hp10 (2)	0.654319	0.0282	0.0305
Hp07	0.018	0.0393	0.0426



EPD-N:

Dose Alarm Thresholds		Rate Alarm Thresholds	
	mrem	Off mrem/h	On mrem/h
HpG (1)	100	100	100
HpG (2)	100	200	200
HpN	100	300	300

EPD-N2:

Dose Alarm Thresholds		Rate Alarm Thresholds	
Red Indicates Alarm		Off uSv/h	On uSv/h
	uSv		
HpG (1)	5.00	900	1000
HpG (2)		1800	2000
HpN	10.00	9000	10000
HpG+HpN	12.00		

When the 'Dose' equals or exceeds the Dose Alarm Threshold then the EPD will operate the appropriate alarm. (See section Alarm Controls for details of Alarm settings)

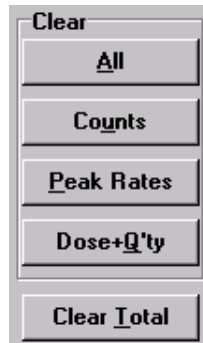
When the 'Dose Rate' equals or exceeds the Rate Alarm On Threshold then the EPD will operate the appropriate alarm.

When the 'Dose Rate' is less than the Rate Alarm Off Threshold then the EPD will cease the appropriate alarm.

The Rate alarm Off Threshold may not exceed the On Threshold.

Note: Threshold (1) is normally set below threshold (2) because threshold (2) is a higher priority in the alarm structure, however there is no restriction on the alarm thresholds.

## Clear



### **Dose+Q'ty**

Clear the Dose values and clear the Dose Quality Factors.  
(Note: Does not clear the Total Dose values)

### **Peak Rates**

Clear the Peak dose rates.

### **Counts**

Make a record (baseline) of the four counter values  
(effectively clearing the counts).

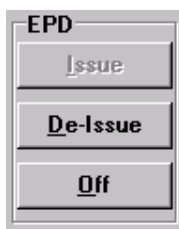
### **All**

Perform all of the above actions. (Note: Does not clear  
the Total Dose values)

### **Clear Total**

Clear the Total dose values.

## EPD Control



### Issue

Clicking this button causes the EPD to be issued performing the following:

- Clear Peaks
- Clear Dose (but not total dose)
- Clear counts
- Clear Latched alarms (see status section)
- Clear Fault Flags (see status section)
- Write Dose and Rate Alarm Thresholds
- Write Wearer Name and Wearer Id

If the EPD is removed during this operation the EPD will alarm.

Note: The Wearer ID should be a valid number between 1 and 999999999999.

The EPD increments its Issue Count which EasyEPD2 displays in the Status Window.

The EPD issue process that occurs when the Issue button (on the Dose and Alarms form) is pressed has been modified in order to ensure that the EPD has switched on properly and that the Detectors are operating properly. EPDs should normally now be set to Issue Causes On = no and Issue causes Detector test = no because these functions are now initiated via comms commands during the Issue process described here.

A valid Wearer ID must be entered prior to pressing the issue button.

The status of the EPD is read and the EPD is switched on if it is off. The EPD is then instructed to display horizontal parallel bars and to run detector test. The status is again read to check that this test has been successful, if not the test is repeated once more. If the test was successful then the EPD is issued, otherwise an error message is displayed. The EPD is instructed to display its default display.

If the EPD is removed whilst the tests are in progress then the parallel bars remain displayed as a warning to the user.

NOTE: Issue Causes On and On Causes Detector Test are EPD states and do NOT influence the operation of the new issue process.

The new issue process takes approximately 8 seconds if no retries occur.

### **Issuing an ADS Issued EPD**

If the EPD is already ADS issued then the entered Wearer Name must be the same as the ADS Wearer Name. This ensures that the EPD is only issued to the person authorised by the ADS. (Wearer id and ADS wearer id do not have to be the same). EasyEPD2 does not compare Wearer Names, but the EPD will return an error if you try to write an invalid Wearer Name to an ADS issued EPD.

### **De-Issue**

Clicking this button causes the EPD to be De-Issued.

De-Issuing the EPD sets the Issued Flag to False and sets the WearerID to FFFFFFFFFF.

### **On/Off**

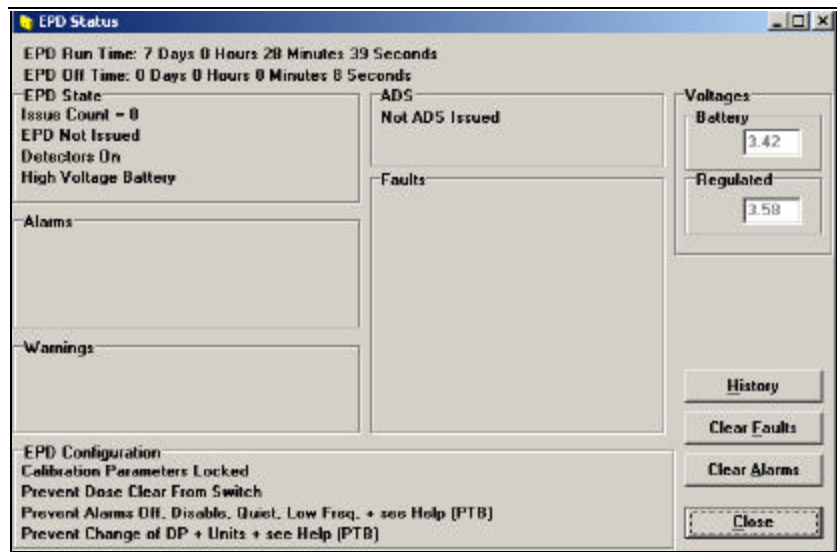
The EPD has a power conservation mode in which the detectors are turned off. In this mode no dose is calculated.

On – turns the EPD Detectors On

Off – turns the EPD Detectors Off

# Status

## The Status Window



### EPD Run Time

The EPD Clock (seconds) converted into Days, Hours, Minutes, Seconds.

Note: When power is removed or a reset occurs then the EPD Clock reverts to a value up to 15 minutes prior to the value on power loss or reset.

### EPD Off Time

The number of seconds that the Detectors have been switched off (while the power has been present) converted into Days, Hours, Minutes, and Seconds.

## EPD State

```
EPD State
Issue Count
Issued
DetectorsOn
Calibration Parameters Locked
Converter On
```

```
EPD State
Issue Count = 44
EPD Issued
Detectors On
Calibration Parameters Unlocked
High Voltage Battery
```

## Issue Count

The number of times the EPD has been Issued.

## Issued

The present state of the EPD Issued flag, either EPD Issued or EPD NOT Issued.

## Detectors On

The present state of the EPDs power conservation mode. On or Off.

## Converter On

Converter On/Off indication occurs for EPD-N version 1, EPD-N2 versions 1 and 2 and gamma/beta EPD software version 8 and 9. Other versions do not have this indicator.

The converter is used to ensure that sufficient voltage is available in the EPD for all situations and once on is only switched off when a battery load test has been completed and the voltage is above the levels required by the EPD.

Some of the conditions under which the converter will be on are: during battery load tests, during and after alarms, when using alkaline batteries and later in life for lithium batteries, ie you will only see this Off for new lithium batteries.

## Low Voltage Battery / High Voltage Battery

Available from gamma/beta EPD version 11; EPD-N version 2; EPD-N2 version 3.

This indicates that the battery voltage is either Lower or Higher than the Battery Type Discriminator voltage. (See Alarm Controls)

## EPD Configuration

<b>EPD Configuration</b> Calibration Parameters Locked Prevent Dose Clear From Switch Prevent Alarms Off, Disable, Quiet, Low Freq. + see Help (PTB) Prevent Change of DP + Units + see Help (PTB)
--

### Calibration Parameters Locked

Some customers require the ability to change the EPD calibration factors. For those units the Calibration parameters are Unlocked.

### Prevent Dose Clear From Switch

Some customers require the ability to clear the Dose by using one of the display configurations and using the switch. EPDs can be factory configured to enable or disable this function.

### Prevent Alarms Off, Disable, Quiet, Low Freq, + see Help (PTB)

This ensures that Alarm sound level is >85dB(A) at 30cm from the EPD.

EPDs can be configured such that the alarms may not be changed to off, disabled or set to quiet, or set to low frequency. The alarm times may not be less than 10 minutes (they may be 0 = continuous).

EPDs are factory configured to the required Alarm Configuration Settings and then set up such that any subsequent attempt to configure them off, disabled or quiet, low frequency or change the settings listed above, will NOT be allowed. EasyEPD2 gives the error message 2 28 if an attempt to write invalid values occurs. This configuration is required for PTB approved EPDs.

### **Prevent Change of DP + Units + see Help (PTB)**

EPDs can be configured such that the settings for decimal places, dose units, off display, wearer display, overrange flashing, battery alarm levels and 1 minute logging, cannot be changed.

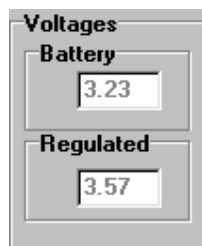
EPDs are factory configured to the required Display Settings and then 'locked' in that condition. This configuration is required for PTB approved EPDs.

The following features may not be changed from the factory configuration Display Set Up settings: Decimal Places, Units, Off display, Wearer Display, Overrange Flashing.

The following features may not be changed from the factory configuration Alarm Control settings: Battery alarm level 1, Battery Alarm Level 2, Battery Type Discriminator, Regulated voltage alarm level.

### **Voltages**

Available from gamma/beta EPD version 11; EPD-N version 2; EPD-N2 version 3.



This indicates the internal voltage last measured by the EPD.

The EPD measures these to a resolution of 16mV and EasyEPD2 displays the voltage to 2 decimal places.

See section Alarm Controls for details of voltage alarm operation and hysteresis.

### **Battery Voltage**

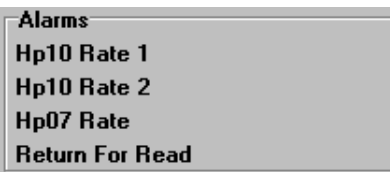
This is the value that the EPD measured when the Battery Load Test was last successfully run. (Note: Battery load test is not run during comms).



## Regulated Voltage

This is the regulated internal voltage maintained within the EPD. This is measured by the EPD at least every 14 seconds and at least every 1 second under high processing conditions (such as during comms).

## Alarms



### Hp10 Rate 1

The dose rate has exceeded the dose rate alarm threshold Hp10(1) since the alarms were last cleared.

### Hp10 Rate 2

The dose rate has exceeded the dose rate alarm threshold Hp10(2) since the alarms were last cleared.

### Hp07 Rate

The dose rate has exceeded the dose rate alarm threshold Hp07 since the alarms were last cleared.

### Return For Read

The EPD clock has exceeded the Return for read time.

## Clear Alarms Button

Clears the alarm flags within the EPD.

Note: the alarms will only clear if the Alarm condition is no longer present.

## Faults



### Event Logged

An event (possibly but not necessarily a fault) has been logged in the EPDs event store. Reading the History clears this indicator.

### Connection Fail

Communications was terminated before all data was written. (The EPD will be displaying horizontal bars when in this condition).

### Cal Factors Bad

The EPD calibration factors have failed a CRC check and cannot be recovered from secure store.

### Eeprom Fail

An un-recoverable secure store failure has occurred. Typically this is caused by a worn out sector when all spare sectors have been re-allocated.

### Detector Test Fail

The detector test has been run and the number of counts received were less than expected.

### Detector Threshold Fail.

The detector thresholds failed to load successfully.

### Radio Fail

Reserved for future use

### **Other Fault**

A fault has occurred causing the EPD to reset. See the History for details.

### **Disabled**

The EPD is not calculating Dose.

### **Bad Sectors**

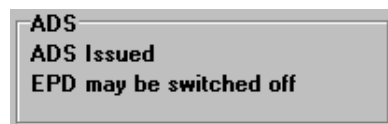
The number of bad secure store sectors. (There is a maximum of 9 spare sectors).

The EPD can happily operate with bad sectors.

### **Clear Faults Button**

Clears the fault flags within the EPD. (Note: The issue process also performs this function). This requests the EPD to clear the fault flags displayed in the Faults window of EasyEPD2 except for the Event Logged bit which is only cleared when the Event History is read.

### **ADS**



### **ADS Issued**

The EPD has been ADS issued by an ADS. The EPD may not be issued on the dose and alarms window unless the Wearer Name is the same as the ADS Wearer Name.

### **EPD may be switched off**

The EPD may or may not be switched 'Off' whilst ADS Issued.

## History

The EPD logs up to 23 Events in non-volatile store together with a time stamp.

This is only valid for approximately 194 days (16777215 seconds), after 194 days of EPD operation this store's time wraps and events that occurred in a previous 194 days are reported as having occurred in the last 194 days. The following diagram shows an (unusual) example of this limitation:

Date Time	Event
25/07/2000 14:35:38	220 Failure Alarm off
25/07/2000 14:32:22	240 Power Converter Switched On
25/07/2000 14:32:21	241 Power Up Cold Start
13/01/2000 10:24:06	220 Failure Alarm off
13/01/2000 10:24:02	220 Failure Alarm off
13/01/2000 10:23:58	220 Failure Alarm off
13/01/2000 10:23:53	220 Failure Alarm off
13/01/2000 10:23:26	209 Return for read Alarm on
13/01/2000 10:23:19	220 Failure Alarm off
13/01/2000 10:23:09	209 Return for read Alarm on
13/01/2000 10:19:42	220 Failure Alarm off
25/07/2000 14:39:27	209 Return for read Alarm on
25/07/2000 14:39:13	220 Failure Alarm off
25/07/2000 14:38:49	220 Failure Alarm off
25/07/2000 14:38:38	220 Failure Alarm off
25/07/2000 14:38:15	220 Failure Alarm off
25/07/2000 14:33:41	220 Failure Alarm off
25/07/2000 14:31:08	220 Failure Alarm off
25/07/2000 14:27:52	220 Failure Alarm off
25/07/2000 14:27:38	240 Power Converter Switched On
25/07/2000 14:27:37	241 Power Up Cold Start
08/02/2000 12:21:28	240 Power Converter Switched On
08/02/2000 12:21:27	241 Power Up Cold Start

In this example the first 3 records are recent, the next 8 records occurred nearly 194 days ago, the next 12 records occurred 388 days earlier than the dates shown.

'220 Failure Alarm Off' or '220 Clear Faults' event occurs every time the EPD receives a Clear Faults command, so 23 of these will effectively clear out the history store.

## Event List

Displays a List of Event codes and their meanings.

## Save

Allows the History to be saved to a file.

## Open

Allows a previously saved History file to be read.

# Dose Profile

## Dose Profile Textual Window

The screenshot shows a window titled "Dose Profile" with a menu bar and a toolbar. The window contains a table with the following data:

Record	DateTime	Interval	EpdClock Sec	Hp10 uSv	Hp07 uSv
000	09/03/01 12:33:21	00:01:00	30975346	5	417
001	09/03/01 12:32:21	00:01:00	30975286	5	415
002	09/03/01 12:31:21	00:01:00	30975226	3	253
003	09/03/01 12:30:21	00:01:00	30975166	1	99
004	09/03/01 12:29:21	00:01:00	30975106	0	0
005	09/03/01 12:24:53	00:00:20	30974838	62	1710
006	09/03/01 12:24:33	00:00:20	30974818	62	1698
007	09/03/01 12:24:13	00:00:20	30974798	61	1649
008	09/03/01 12:23:53	00:00:20	30974778	60	1588
009	09/03/01 12:23:33	00:00:20	30974758	60	1537
010	09/03/01 12:23:13	00:00:20	30974738	59	1488
011	09/03/01 12:22:53	00:00:20	30974718	58	1437
012	09/03/01 12:22:33	00:00:20	30974698	58	1390
013	09/03/01 12:22:13	00:00:20	30974678	57	1345
014	09/03/01 12:21:33	00:00:20	30974638	56	1310
015	09/03/01 12:18:53	00:00:02	30974478	56	1307
016	09/03/01 12:18:51	00:00:02	30974476	56	1302
017	09/03/01 12:18:49	00:00:02	30974474	56	1298
018	09/03/01 12:18:47	00:00:02	30974472	56	1294
019	09/03/01 12:18:45	00:00:02	30974470	56	1289

The window also includes a "Profile Since" field set to "08/03/01 12:33:33" and a "Profile read at" field set to "09/03/01 12:33:38". At the bottom, there are "Open", "Save", and "Close" buttons.

The EPD stores changes in Hp10 and Hp07 dose in non-volatile storage so that a profile of the dose over time can be recreated. The interval between stores is set up on the 'Set up Events' window.

The Date Time is calculated based on the current PC clock and therefore is only as accurate as that clock. The Date Time is only valid if the EPD has been powered and not reset during the entire duration of the profile.

Note: Dose usually increases. A decrease in dose will be due to the Dose Clear command where the dose is set to 0 or due to an EPD reset where the dose will be reset to the value at the last 15 minute log.

**Textual Tab**

Displays the data in tabular form.

**Graphical Tab**

Displays the dose profile graphically.

**Rate Text Tab**

Displays a calculation of the dose rate in tabular form. (Note: this is the average dose rate calculated from the points stored in the dose profile information and is not the rate displayed on the EPD.) The rate is calculated as the difference in dose between samples divided by the time between the samples, ignoring samples where the dose has not changed and reporting zero where dose has decreased.

**Rate Graph Tab**

Displays the calculated rate graphically.

**Profile Since**

Defaults to one day, you may enter any other valid date and time or blank if you want all the dose profile.

**Save**

Allows the dose profile text to be saved to a file.

**Open**

Allows a previously saved dose profile file to be opened and viewed.

**Additional features on the Graphical Tabs**

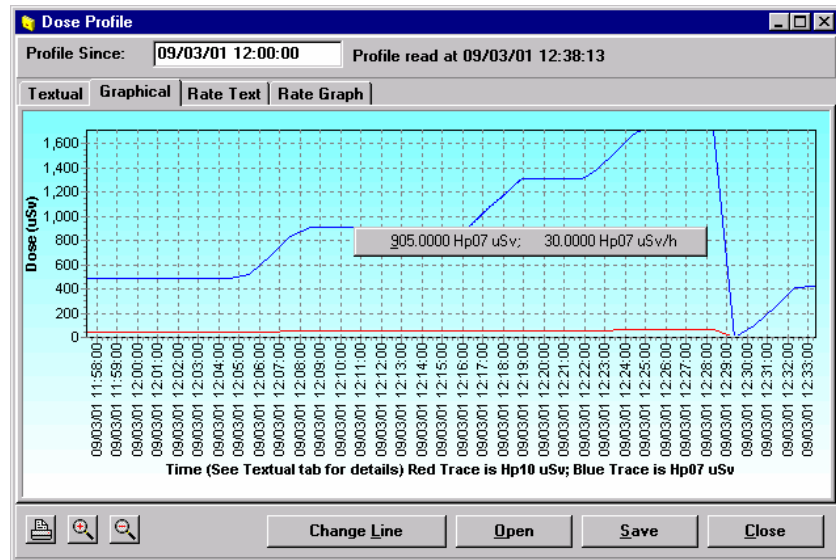
Print, Zoom In, Zoom Out.

Right click to centre. Left click on the line to see the Dose and Dose Rate of the previous point on the graph.

**Change Line**

Cycles through Hp10, Hp07, both (see the x-axis caption for details of which is being displayed).

## Dose Profile Graphical Window



The graphical tab displays the same information as the textual tab. The red line is the Hp10 Dose (DDE) and the blue line is the Hp07 Dose (SDE).

Straight-line interpolation between points is used and so the textual information should be used for obtaining precise dose at specific times. A 'dummy' point is added at the profile time before a dose change.

A full screen view can be obtained using the Maximise button on the caption bar. 

Zoom in on an area of a graph: click at the top left point of a rectangle describing the part of the graph required and drag to the bottom right corner of the rectangle.

Zoom out again by drawing a rectangle from bottom right to top left.

'Pan' by right clicking and moving the mouse in the direction you wish to view the graph details.

You may have to close the Dose Profile window and re-open it to restore the graph to normal after some panning operations.

## Rate Text Window

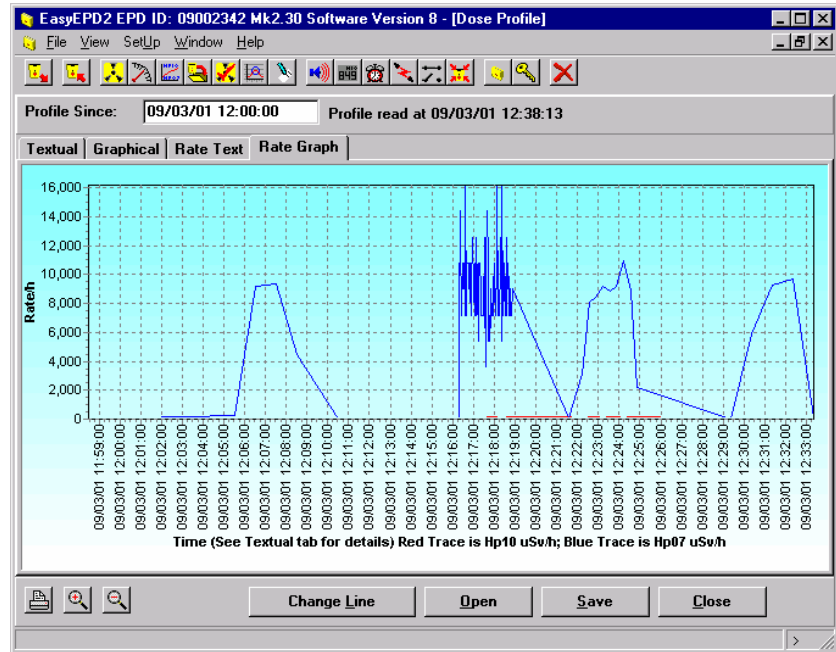
The screenshot shows a software window titled "Dose Profile". At the top, it displays "Profile Since: 09/03/01 12:00:00" and "Profile read at 09/03/01 12:38:13". Below this is a tabbed interface with four tabs: "Textual", "Graphical", "Rate Text", and "Rate Graph". The "Rate Text" tab is selected, showing a table with the following columns: "Record", "DateTime", "Hp10 uSv/h", and "Hp07 uSv/h". The table contains 19 rows of data. At the bottom of the window are three buttons: "Open", "Save", and "Close".

Record	DateTime	Hp10 uSv/h	Hp07 uSv/h
000	09/03/01 12:33:21	120.0000	120.0000
001	09/03/01 12:32:21	120.0000	9720.0001
002	09/03/01 12:31:21	120.0000	9240.0000
003	09/03/01 12:30:21	60.0000	5940.0000
004	09/03/01 12:29:21	0.0000	0.0000
005	09/03/01 12:24:53	180.0000	2160.0000
006	09/03/01 12:24:33	180.0000	8820.0002
007	09/03/01 12:24:13	90.0000	10979.9998
008	09/03/01 12:23:53	180.0000	9180.0002
009	09/03/01 12:23:33	180.0000	8819.9999
010	09/03/01 12:23:13	90.0000	9179.9999
011	09/03/01 12:22:53	180.0000	8460.0001
012	09/03/01 12:22:33	180.0000	8099.9999
013	09/03/01 12:22:13	16.6667	3150.0000
014	09/03/01 12:21:33	128.5714	67.5000
015	09/03/01 12:18:53	128.5714	8999.9979
016	09/03/01 12:18:51	128.5714	7200.0006
017	09/03/01 12:18:49	128.5714	7200.0006
018	09/03/01 12:18:47	128.5714	9000.0007
019	09/03/01 12:18:45	128.5714	7199.9983

The values in this window are calculated from the Textual information. The rate is calculated as the dose change over the time since the dose last changed. Note that this is merely an indication of the rate from the dose profile information, it is not the dose rate that the EPD displays. If the dose change is negative then the rate is reported as 0 (i.e. negative rates are not displayed).



## Rate Graph Window



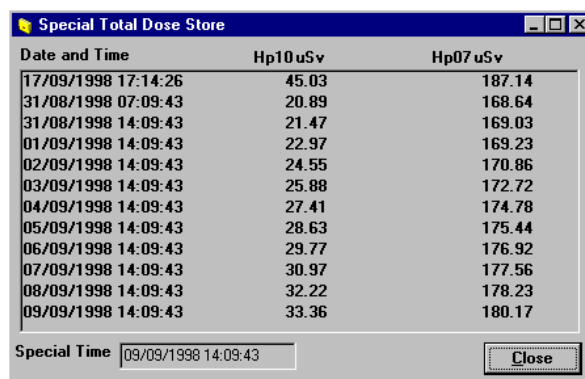
The rate graph tab displays the same information as the rate text tab. The red line is the Hp10 Dose (DDE) and the blue line is the Hp07 Dose (SDE).

Straight-line interpolation between points is used and so the textual information should be used for obtaining precise dose rates at specific times.

Blank Page

# Special Total Dose Store

## Special Total Dose Store Window





Date and Time	Hp10 uSv	Hp07 uSv
17/09/1998 17:14:26	45.03	187.14
31/08/1998 07:09:43	20.89	168.64
31/08/1998 14:09:43	21.47	169.03
01/09/1998 14:09:43	22.97	169.23
02/09/1998 14:09:43	24.55	170.86
03/09/1998 14:09:43	25.88	172.72
04/09/1998 14:09:43	27.41	174.78
05/09/1998 14:09:43	28.63	175.44
06/09/1998 14:09:43	29.77	176.92
07/09/1998 14:09:43	30.97	177.56
08/09/1998 14:09:43	32.22	178.23
09/09/1998 14:09:43	33.36	180.17

Special Time:

The EPD contains 12 stores, which can be set up to record the dose values at any time in the future. Any store can be set to any time (the order is not restricted).

If the time is in the future then no dose value is displayed.

To change a time:

- Insert an EPD and open the Special Total Dose Store Window 
- Select one of the stores
- Select the 'Special Time' edit box
- Insert the time in your machine's date time format
- Repeat for as many stores as you want
- Write to the EPD 

### Neutron EPDs

The EPD-N and EPD-N2 do **not** have a special total dose store so this application disables the access to special total dose store.

# Approved Dosimetry Service

---

## What is an ADS?

An Approved Dosimetry Service is an organisation that is legally responsible for the maintenance of Personal Dose Records.

An ADS can issue an EPD to an individual to wear for personal dose monitoring.

The EPD is designed to allow the wearer to use an ADS Issued EPD in a Dose Control situation where short-term issues and returns occur provided the Wearer Name is the same as the ADS Wearer Name. Clearing the short term 'Dose' does not effect the ADS dose so the EPD can be returned to the ADS and the Dose accrued for the ADS Issue period can be recorded.

No ADS dose is accrued if the EPD is not ADS issued, but the counters and dose quality values are updated.

## The ADS Window

### ADS Issue Process

This process writes the ADS wearer id (a 12-digit number) to the EPD and sets an ADS issued flag within the EPD status. It does not perform the EPD issue process described in section EPD Control on page 43.

Fields are the same as on the Dose and Alarms Window except for:

#### Counts –

These are the total counts accrued on each of the EPDs four counters.

#### Password

To write any ADS data a password must be entered. An ADS will have a unique password for EPDs under their jurisdiction.

#### EPD may be Switched Off

When set to 'No' then ADS Issued EPDs may not be switched off. This is a read-only status bit, to change the state of the EPD press the Change button.

# Calibration

---

## What is EPD Calibration?

The EPD is a sensitive electronic instrument and each EPD requires individual characterising for response to different types of radiation source.

The calibration is performed on manufacture and is expected to be unchanged throughout the life of the EPD provided it remains un-damaged.

---

## The Calibration Window

The screenshot shows a software window titled "Calibration". It is divided into two main sections: "Calibration Constants" and "Detector Thresholds".

Calibration Constants	
HGSens10	973
SGSens10	453
HGSens07	943
SGSens07	588
FBSens07	23206
BCSens07	25855

Detector	Thresholds	
	Coarse	Fine
HG	80	1
SG	76	4
FB	72	3
BC	72	5

A "Close" button is located at the bottom right of the window.

EPD Calibration Values are 'read only' to prevent unauthorised changing, customers with unlocked EPDs have customised software for changing the calibration parameters within limits.

### Calibration Constants

These are used to convert counts on the four detector channels into Dose Equivalents.

### Detector Thresholds

These are used to set internal comparator thresholds to discriminate between radiation pulses received by the EPDs detectors. The setting of these values is performed at calibration and may not be adjusted by the user.

The threshold values have changed from gamma/beta EPD version 11; EPD-N version 2; EPD-N2 version 3.

Calibration Constants		Detector Thresholds	
		Coarse	Fine
HGSens10	973	HG	7 / 146
SGSens10	453	SG	3 / 142
HGSens07	948	FB	12 / 134
SGSens07	588	BC	11 / 143
FBSens07	23806		
BCSens07	25855		

Coarse values range from 0 to 15 and Fine values range from 96 to 159.

---

## EPD-N Calibration

The EPD-N is a sensitive electronic instrument and each EPD requires individual characterising for response to different types of radiation source.

The calibration is performed at manufacture, but two calibration parameters, N-Gain Resolution and N-Gain Time, can be changed by users providing they have the correct access privilege (Calibration Parameters Unlocked displayed on the EPD State section of the Status form).

Access is protected by password held in the EPD. Customers supplied with unlocked EPDs should have been told the default password by their supplier.



Calibration Constants	
HGSensG	1000
SGSensG	450
NGainResn	1
NGainTime	4096
NUSensN	3000
NCSensN	3000

Detector Thresholds		
	Coarse	Fine
HG	80	4
SG	90	4
NU	80	4
NC	80	4

Neutron Dose Rate Response  
 Slow     Medium     East

	Present	Required
Detector Response (counts/uSv)	10.92	
Present Settings (%)	100	
Thermal Neutron (%)	100	

Recalculate

Change Password    Enable    Close

Calibration consists of setting factors that govern the sensitivity and responsiveness of the EPD-N. The EPD is pre-calibrated to correctly indicate x-ray, gamma and thermal neutron radiation. It is possible to change the sensitivity and response by changing the N-Gain Resolution and N-Gain Time values. These are normally password protected to prevent unauthorised changes.

### Adjusting N-Gain Constants

The settings are initially read-only. Adjustment can be made as follows,

- Click the Enable button, the password entry box will appear
- Enter the password code ( a numeric sequence)
- Click the OK button

The two N-Gain edit boxes may now be written to. New values can be calculated as described in the EPD-N Technical Manual and entered directly into the Calibration Constant boxes. Alternatively, adjustments may be made using the Neutron Dose Rate Response and Neutron Gains Panels. When using the Neutron Gain panel the constants are calculated and updated on clicking the Recalculate button.

A 'Slow', 'medium' or 'fast' Neutron dose rate response may be selected. Resolution and statistical accuracy is described in the EPD-N Technical Manual. The absolute value of the response time varies with the indicated dose rate and value of Neutron Gain.

**Caution:**

Changing the gains will affect the accuracy of the EPD. The EPD-N Technical Manual should be studied carefully before any changes are made.

Three alternative methods of setting the neutron sensitivity are available.

The neutron sensitivity can be set to a known detector sensitivity (customer calibration) as follows,

- Enter the known detector response in the Detector Response - Required box
- Click the Recalculate button

New values appear in the N-Gain Constant boxes.

- Click on the Write button .

The neutron sensitivity can be set as a percentage of the current value as follows,

- Enter the required percentage of the present value in the Present Settings - Required box
- Click the Recalculate button

New values appear in the N-Gain Constant boxes.

- Click on the Write button .

The neutron sensitivity can be set as a percentage of the Thermal Neutron calibration value as follows,


- Enter the required percentage of the factory value in the Thermal Neutron - Required box
- Click the Recalculate button

New values appear in the N-Gain Constant boxes.

- Click on the Write button .

## Restoring Factory Setting

The Thermal Neutron response set at the factory can always be restored as follows,

- Enter 1 in the NGainResn box
- Enter 4096 NGainTime box
- Click on the Write button .

## Caution

The only acceptable values of NGainResn are 1,8,64. The hint shows these values but this application only checks that the value is within the range 1 to 64, displaying other values in red. If an invalid value is written to an EPD then the EPD will display a status of 'Calibration factors are faulty' and 'The EPD is faulty and not reading dose' and the display will be four dashes ' - - - - '. To clear the fault you must write valid calibration values to the EPD and then reset the EPD by removing the battery for greater than 10 seconds and then inserting the battery.

---

## EPD-N2 Calibration

The EPD-N2 is a sensitive electronic instrument and each EPD requires individual characterising for response to different types of radiation source.

The calibration is performed at manufacture, but two calibration parameters, FNGain and ANGain, can be changed by users providing they have the correct access privilege (Calibration Parameters Unlocked displayed on the EPD State section of the Status form).

Access is protected by password held in the EPD. Customers supplied with unlocked EPDs should have been told the default password by their supplier.

Calibration Constants		Detector Thresholds Coarse / Fine	
HGSens	1114	HG	78 / 1
SGSens	386	SG	70 / 2
FNGain	100	FN	80 / 2
ANGain	100	AN	82 / 4
FNSens	13000		
ANSens	1300		

Neutron Dose Rate Response  
 Normal     Fast

Neutron Gains		Present	Required	
Detector Response /uSv	FN	0.1		Recalculate
	AN	1.008		
Present Settings (%)				

Change Password    Enable    Close

Calibration consists of setting factors that govern the sensitivity and responsiveness of the EPD-N2. The EPD is pre-calibrated to correctly indicate x-ray, gamma and typical neutron radiations. It is possible to change the sensitivity and response of the EPD-N2 to neutron by changing the FNGain and ANGain values. These are normally password protected to prevent unauthorised changes.

### Adjusting Gain Constants

The settings are initially read-only. Adjustment can be made as follows,

- Click the Enable button, the password entry box will appear
- Enter the password code ( a numeric sequence)
- Click the OK button

The two Gain edit boxes may now be written to. New values can be calculated as described in the EPD-N2 Technical Manual and entered directly into the Calibration Constant boxes. Alternatively, adjustments may be made using the Neutron Gains Panel. When using the Neutron Gains panel the constants are calculated and updated on clicking the Recalculate button.

A 'Normal' or 'Fast' Neutron dose rate response may be selected. Resolution and statistical accuracy is described in the EPD-N2 Technical Manual. The absolute value of the response time varies with the indicated dose rate and value of Neutron Gain as well as the spectral composition of the neutron radiation.

**Caution:**

Changing the gains will affect the accuracy of the EPD. The EPD-N2 Technical Manual should be studied carefully before any changes are made.

Two alternative methods of setting the neutron sensitivity are available.

The neutron sensitivity can be set individually for each of the two neutron detectors to a known detector sensitivity (customer calibration) as follows,

- Enter the known detector response in the Detector Response - Required box
- Click the Recalculate button

New values appear in the Gain Constant boxes.

- Click on the Write button .

The neutron sensitivity can be set as a percentage of the current value as follows: (Note that the same percentage factor is applied to both neutron detectors)


- Enter the required percentage of the present value in the Present Settings - Required box
- Click the Recalculate button

New values appear in the Gain Constant boxes.

- Click on the Write button .

## Restoring Factory Setting

The Neutron response set at the factory can always be restored as follows,

- Enter 100 in the FNGain box
- Enter 100 in the ANGain box
- Click on the Write button .

---

## EPD-N and EPD-N2 Changing the Password

EPDs have internal passwords that protect certain sensitive communication commands. It has already been seen that the password protects changes to the calibration constants. This password may be changed by the user provided they know the existing one.

- Click the Change Password button. A password change dialogue box will appear.
- Enter the old password in the box entitled “Old Password”
- Enter the new password in the two boxes entitled “New Password” and “Confirm New Password”.
- Click OK.

This application will now request the EPD to change its password. If the old password is correct the new password will come into force.

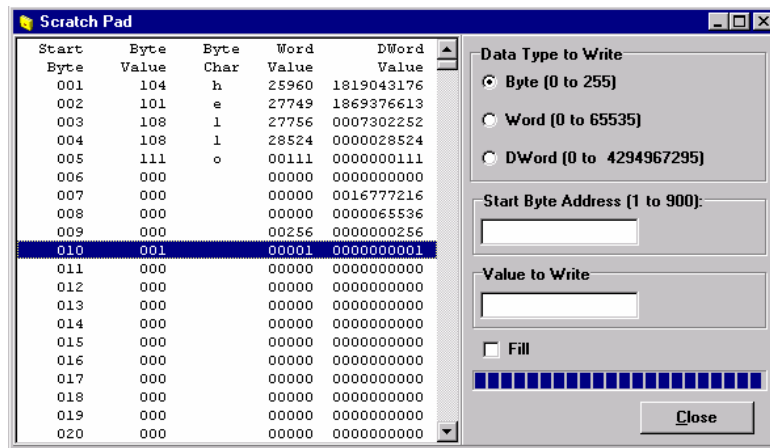
### Warning


Remember the password.

You will have to return the EPDs to the supplier to set a default password if you forget the password and subsequently wish to change the EPD calibration factors.

# Scratch Pad

## The Scratch Pad Window




To read the Scratch Pad click the read button on the toolbar 

The EPD Scratch Pad is an area of non-volatile store in which users or systems may store data. There are 960 Bytes of data available. Bytes 901 to 960 are reserved for manufacturers use.

The Scratch Pad Window displays the data in Byte Word and Dword values and provides functions to write Byte, Word or Dword values to the Scratch Pad starting at a particular byte address.

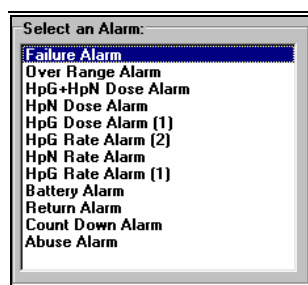
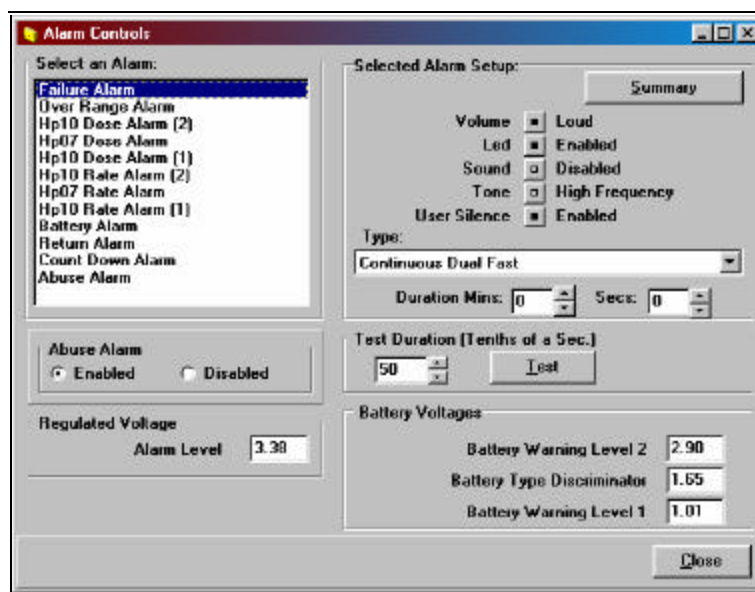
To write to a byte in the Scratch Pad

- Select the Data Type to Write
- Enter the Start Byte Address
- Enter the Value to be Written
- Check or uncheck the Fill box as required
- Click on the write button on the toolbar 



# Set Up EPD

## Alarm Controls



*EPD-N2 Alarms*

The EPD has twelve alarms as shown in the 'Select an Alarm' list. Each alarm can be configured to any combination of the Alarm Set-up conditions.

These alarms are prioritised within the EPD in the order shown on the Select an Alarm List with the Failure Alarm being highest priority and the Abuse Alarm lowest priority.

If an alarm of higher priority occurs then that overrides any lower priority alarm. Take care not to mask lower priority alarms by disabling Led or Sound of higher priority alarms (see note below).

---

Note: It is possible (but not recommended) to set an alarm with both Disabled Led and Disabled Sound. If you wish to disable an alarm then select the Alarm Type to be OFF. (effectively removing it from the priority list)

---

Alarms do not occur during communications.

## **Alarm Set Up**

### **Volume**

Loud / Quiet

### **Led**

Enabled / Disabled

### **Sound**

Enabled / Disabled

### **Tone**

High Frequency / Low Frequency

### **User Silence**

Enabled = User may silence an alarm by holding the EPD button down for greater than the long press time.

Disabled = User may not silence the alarm.

### **Type**

- Off
- Continuous single tone
- Continuous dual slow
- Continuous dual fast
- Intermittent single slow
- Intermittent single fast

- Intermittent double beep slow
- Intermittent double beep fast

### **Duration**

Alarm duration may be set to a maximum of 17 minutes to a resolution of 4 seconds. If the alarm has not been acknowledged by the user within this time then the alarm will stop and a beep occur every 30 seconds until the alarm is acknowledged or the alarm condition ceases.

### **Summary**

Lists the Alarm settings in a table.

### **Alarm Test**

**Warning: Unnecessary exposure to the loud alarm should be avoided.**

To demonstrate an alarm you must set up that alarm in the way you wish the alarm to be demonstrated.

- Select an Alarm
- Set up an Test Duration
- Click the Test button

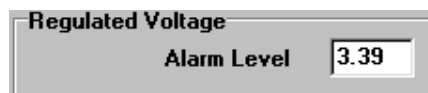
---

Note: Some EPDs are factory configured (by customer request) for loud alarms, duration of 10 minutes or longer LED enabled, prevent quiet alarms, prevent disabled Sound, prevent disabled LED, prevent alarms off, and prevent duration less than ten minutes (0 = continuous is allowed). EasyEPD2 still displays these options but if the user attempts to change these settings the whole command is rejected when a write to EPD is attempted.

---

## Regulated Voltage

Available from gamma/beta EPD version 11; EPD-N version 2; EPD-N2 version 3.



The regulated voltage is the internal voltage maintained by the EPD to sustain internal circuit functions whilst the battery voltage fluctuates and decays.

The Alarm Level is the voltage below which the EPD will Reset. This level is checked at least every 14 seconds by the EPD and at least every 1 second under high processing conditions (such as during comms).

## Battery Voltages

Available from gamma/beta EPD version 11; EPD-N version 2; EPD-N2 version 3.

The voltage levels are pre-configured for the manufacturer's recommended battery types.

The EPD can operate with a variety of batteries (See EPD specification for details). The Battery Type Discriminator is the value above which a high voltage battery is identified as being in use (e.g. a 3.6V Lithium) or below which a low voltage battery is being used (e.g. a 1.5V Alkaline). There are two Battery Warning Levels - Level 1 is used for low voltage batteries and Level 2 is used for high voltage batteries.

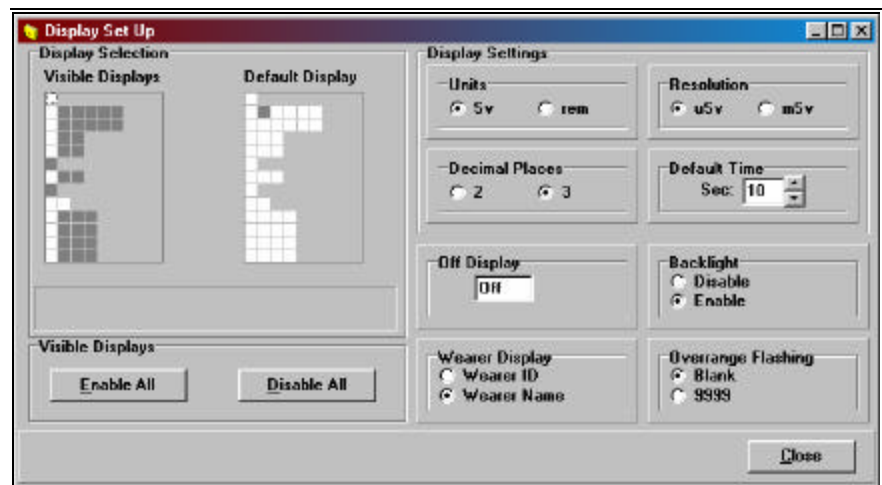
A Battery Alarm occurs only after a second consecutive battery load test that measures the voltage as less than the alarm level. Battery alarm is cleared when the battery voltage measured during a battery load test exceeds the alarm threshold by 128mV (for 1.5v batteries) or 256mV (for 3.6v batteries).

It is recommended that the battery be replaced with a good new battery as soon as possible after a battery low alarm is noticed, particularly if high dose rates and alarms are expected, or the time at which the alarm was first raised is unknown.

It is not advisable to use an EPD more than ten hours after the battery low was raised.

NOTE: Do NOT adjust the alarm level values except in consultation with the manufacturer. Typical values are: Battery Warning Level 1 (1.02), Battery Type Discriminator (1.65), Battery Warning Level 2 (2.90), Regulated Voltage alarm Level (3.39)

## Display



This window indicates what the user may show on the EPD display.

### Display Selection – Visible Displays

Shaded boxes indicate a display that the user can see on the EPD.

To see what a display is, click on the box and read the caption that appears in the box below. On the EPD a short press navigates across a row and a long press down the rows (modes)

To enable/disable a display use a mouse and double click in the appropriate box.

To enable/disable all displays use the Enable All or Disable All push buttons.

### Display Selection – Default Display

One Enabled Display should be selected as default

### **Display Settings – Units**

This displays the units of the EPD being read at the time and any alternative display units available.

### **Display Settings – Decimal Places**

This displays the number of decimal places that the EPD being read can display and any alternative setting available.

### **Display Settings – Default Time**

If the EPD switch is not pressed within this time then the display will revert to the default display.

On displays that can be locked on to then the colon appears on the EPD display for an additional 2 seconds prior to the display defaulting.

### **Display Settings – Resolution**

EPD-N and EPD software versions greater than version 8 allow Resolution to be restricted to rem or cGy on those EPDs with rem or cGy displays.

Note: This only affects the way the EPD displays the values, it does not effect the way EasyEPD2 displays values.

### **Backlight**

When Enabled the backlight will come on when the EPD switch is pressed and remain on until the display defaults.

---

Note: Some EPDs are factory configured (by customer request) to prevent units change and prevent decimal places change. EasyEPD2 still displays these options but if the user attempts to change these settings the whole command is rejected when a write to EPD is attempted.

---

### **Off Display**

Available from gamma/beta EPD version 11; EPD-N version 2; EPD-N2 version 3.

This is for use by system software that sets a calibration date on the EPD display when in 'off' mode.

The EPD default condition is to display 'OFF ' on the display when the detectors are off. The value of 0 in this field causes the default 'OFF ' to be displayed.

Any other Hexadecimal value in this field will cause that value to be displayed instead of 'OFF'. This is to provide customers who wish to have a Calibration date displayed when the EPD is off to do so. E.g. '2512' could mean calibrate on 25<sup>th</sup> December or '1225' could mean December 25<sup>th</sup>. Take care when using this field as it could easily be mistaken for the middle 4 digits of the Wearer ID.

**Wearer Display**

Available from gamma/beta EPD version 11; EPD-N version 2; EPD-N2 version 3.

The EPD default condition is to display the 12 digit Wearer ID. The EPD can be configured to display the first 12 digits of the Wearer Name - but note that because the EPD display is a seven-segment display the character representations are not ideal. Any other character is represented by a blank display.

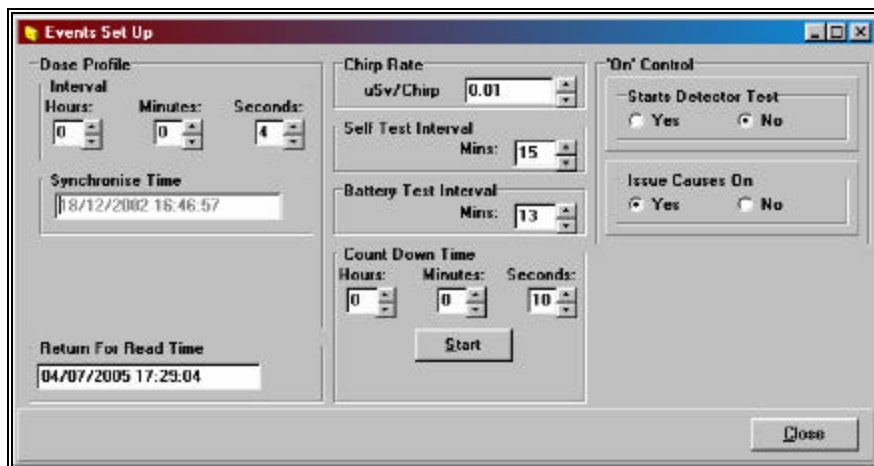
A a	A	B b	b	C c	C	D d	d	E e	E	F f	F
G g	9	H h	h	I i	i	J j	J	K k	μ	L l	L
M m	3	N n	n	O o	o	P p	P	Q q	9	R r	r
S s	5	T t	t	U u	u	V v	U	W w	H	X x	4
Y y	4	Z z	2								
0	0	1	1	2	2	3	3	4	4	5	5
6	6	7	7	8	8	9	9				

**Overrange Flashing**

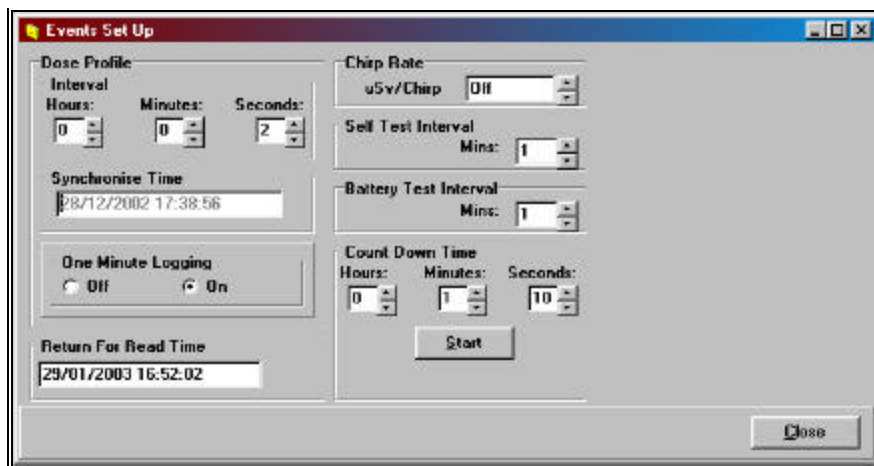
Available from gamma/beta EPD version 11; EPD-N version 2; EPD-N2 version 3.

In over range the EPD default condition is to alternate 'blank' and the normal EPD display on the four display digits. The EPD can be configured to alternate '9999' and the normal EPD display on the four display digits.

## Events



Or from gamma/beta EPD version 11; EPD-N version 2; EPD-N2 version 3:



EPD Events are things that occur at a particular EPD Clock value or on the occurrence of a particular event.

### Dose Profile Events

#### Dose Profile – Interval

Typical settings recommended for normal use are 30 Seconds or 1 minute intervals. It is possible to set the interval down to 2 seconds for test purposes but this is not recommended for general use.



On power-up or on changing the Interval the EPD records the dose presently being displayed. Every interval after this the EPD checks to see if the dose has changed and if so records the change in dose. If no dose has changed then no record is made. Choose a value based on how long the EPD may be issued to a person, the expected dose and the time between dose profile reads.

Because of the dynamic nature of this store the maximum duration before overwriting cannot be easily defined in terms of number of records. A few examples are shown below:

Dose Rates		Log Interval	Data Records		Max Duration	
Hp(10) uSv/h	Hp(07) uSv/h		Actual	Effective		
0.05	0.05	30	289	695999	241	days
0.1	0.1	30	289	348000	120	days
1	1	30	347	41760	14.5	days
10	10	30	347	4176	1.4	days
100	100	30	542	651	5.4	hours
1000	1000	30	578	578	4.8	hours
10000	10000	30	578	578	4.8	hours
100000	100000	30	347	347	2.9	hours
1	1	60	347	20880	14.5	days
100	100	60	578	578	9.6	hours
1000	1000	60	578	578	9.6	hours
10000	10000	60	347	347	5.8	hours

### **Dose Profile – Synchronise Time**

If you want the EPD profile to occur at a particular time of day, e.g. hourly on the hour, then set the Synchronise Time to the next occurrence of this time and write to the EPD. Note: this synchronisation is lost if the EPD is reset or re-powered. If synchronisation is not required then do not set this value.

The time is greyed out if the time is prior to now. This field only has any effect if the time is after now and its effect is to instruct the EPD to make a dose profile record at the specified time (if a dose increment has occurred) and then continue recording dose increments at the specified Interval.

### **Other Events**

#### **Self Test Interval**

0 to 255 minutes. – The time between running internal self-test (stack, ram, detector test) (recommended value is 15 minutes). Note: No dose is accrued during detector test (a period of approximately 1mS).

#### **Battery Test Interval**

1 to 255 minutes – The time between running battery test. (Recommended value is 15 minutes)

#### **Count Down Time**

0 to 99minutes 59 Seconds - The value at which the count down timer starts

When the start button is pressed the EPD is instructed to start its count down timer immediately.

#### **Return For Read Time**

This is the time at which the Return for Read alarm will occur.

### **Chirp Rate**

0.01uSv to 100 uSv per chirp. (0.001 mrem or 0.000001 cGy to 10 mrem or .01 cGy per chirp) - The EPD will beep every time the Hp10 dose received increases by more than the specified value. 0 = Off.

Note: Chirp can also be adjusted by the user from the Chirp display. The following values can be set:

(0, 0.01, 0.05, 0.1, 0.5, 1, 5, 10, 50, 100 uSv/chirp)

(0, 0.001, 0.005, 0.01, 0.05, 0.1, 0.5, 1, 5, 10 mrem/chirp)

(0, 0.000001, 0.000005, 0.00001, 0.00005, 0.0001, 0.0005, 0.001, 0.005, 0.01 cGy/chirp)

Note: On the EPD cGy unit itself the chirp display is in mcGy/chirp not cGy/chirp.

### **On Control**

When used in dose control systems it is recommended that the following controls are set to OFF because the dose control systems themselves switch the EPD on and perform detector test on Issue.

#### **On Control – Starts Detector Tests**

Available up to gamma/beta EPD version 10; EPD-N version 1; EPD-N2 version 2.

If the detectors have been switched off, switching the EPD on will cause detector test to run.

#### **On Control – Issue Causes On**

Available up to gamma/beta EPD version 10; EPD-N version 1; EPD-N2 version 2.

If the detectors have been switched off, then Issuing the EPD will cause the detectors to switch on.

### **One Minute Logging**

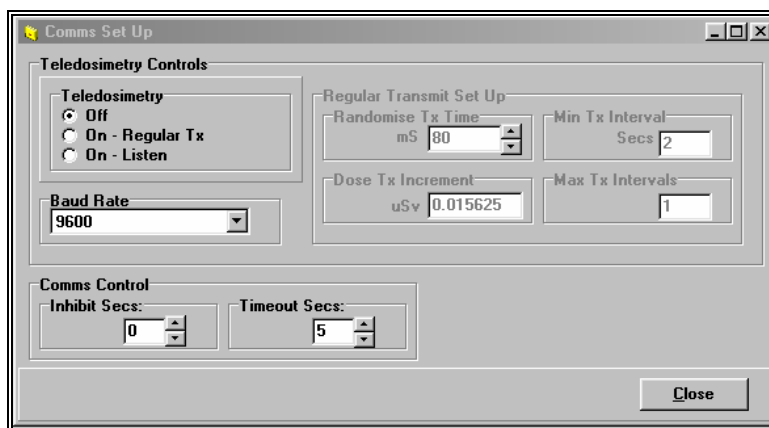
Available from gamma/beta EPD version 11; EPD-N version 2; EPD-N2 version 3.

When 'Off' the EPD will log essential data to EEPROM at least once every 15 minutes.

When 'On' the EPD will log within 1 minute of a dose profile entry being made. Thus if you set the dose profile interval to 30 seconds, for example, you will guarantee that any dose increment (1 uSv) will be recorded in EEPROM within 1 minute 30 seconds of the increment occurring. A log will be made at least once every 15 minutes even if there has been no dose increment.

---

## Communications



### Comms Control – Inhibit Secs

0 to 255 Seconds - This is the time after comms has been terminated during which the EPD will not respond to communications requests. Used where multiple EPDs are expected to appear within range of an Ir adapter. (Recommended value = 0)

Do not set this value too high as you will be unable to communicate with the EPD for this time after comms and this may cause dose control systems to fail to issue or return the EPD.

### Comms Control – Timeout Secs

4 to 255 Seconds – The EPD will cease operating in communications mode if communications have not occurred during this time. (Recommended value = 5).

---

Note: Do NOT set this value too long as to do so will delay the communications warning that is issued by the EPD in certain circumstances if the EPD is removed from the reader prematurely.

---

## Teledosimetry Controls

Teledosimetry Controls

Teledosimetry

Off

On - Regular Tx

On - Listen

Baud Rate

9600

Regular Transmit Set Up

Randomise Tx Time

mS 240

Min Tx Interval

Secs 4

Dose Tx Increment

uSv 0.015625

Max Tx Intervals

4

### Teledosimetry

Default is Off

The EPD has two modes of operation for teledosimetry:

Regular Transmit – the EPD transmits dose data every Min Tx Interval provided that the Dose Tx Increment (resolution 1/64 uSv) has been exceeded, otherwise it will transmit anyway if (Max Tx Intervals \* Min Tx Interval) seconds have elapsed since the last transmission.

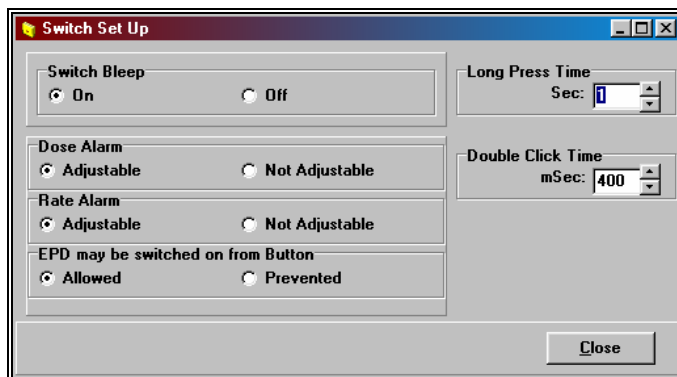
Note: Take care not to set Min Tx interval to 0 (Off) otherwise you will not get any Regular Transmit.

Listen – Wait for a message via the teledosimetry port.

### Baud Rate

9600, 19200, 38400, 57600 Baud.

## Switch



This defines how the EPD switch works.

### Long Press Time

0.5 to 2 seconds in 0.25 second steps – The EPD long switch press is used to acknowledge (mute) alarms and to navigate through the display modes. (Recommended value = 1 Second)

### Double Click Time

50 to 400 mSeconds – The EPD has certain displays on which you can make a selection by double clicking. Two presses of the EPD switch within this time are a double click. (Recommended value = 400 mS)

### Switch Bleep

The EPD will beep every time the switch is pressed and if the switch has been held for longer than the Long Press Time.

### Dose Alarm

Dose alarm may be adjusted from the EPD Dose alarm display.

(10 $\mu$ , 50 $\mu$ , 100 $\mu$ , 500 $\mu$ , 1m, 5m, 10m, 50m, 100m, 500m, 1 Sv)

(1m, 5m, 10m, 50m, 100m, 500m, 1, 5, 10, 50, 100 rem )

(0.001, 0.005, 0.010, 0.05, 0.1, 0.5, 1, 5, 10, 50, 100 cGy)

**Rate Alarm**

Rate alarm threshold may be adjusted from the EPD Rate alarm threshold display.

(10 $\mu$ , 50 $\mu$ , 100 $\mu$ , 500 $\mu$ , 1m, 5m, 10m, 50m, 100m, 500m, 1 Sv/h)

(1m, 5m, 10m, 50m, 100m, 500m, 1, 5, 10, 50, 100 rem/h)

(0.001, 0.005, 0.010, 0.050, 0.100, 0.500, 1, 5, 10, 50, 100 cGy/h)

**EPD may be switched on from button**

(Introduced at version 7 EPD software) Used to prevent users switching EPDs on by a long button press.

Note: To prevent a user switching the unit off from the button, disable the Power On Off Selection from the Display set-up screen.

Blank Page



# Batch Write

---

## The Batch Write Window

### Creating a Batch Write File

The easiest way to create a batch write file is to

- Set up one EPD with the settings required
- Read it
- Open the Batch Write Window
- Check the boxes of the functions to be performed (only check the ADS Data if you know the ADS password)
- Click the Create Batch button
- Ensure the data is as required
- Click the Save button and save the file

### Performing a Batch Write

- Insert an EPD (This initialises the underlying values in EasyEPD2 )
- Open the Batch Write Window
- Create a Batch Write file or Open an Existing one
- Click the Batch Write Button
- Remove the EPD and re-insert it
- Repeat for all the EPDs to be written waiting for the prompt 'Insert Next EPD'

- Click Finish
- Ensure that the EPDs are set up as required.

**Warning**

- It is vital that you check EPDs after a batch write to ensure that all the parameters have been written correctly.
- Only use a batch file created with the current version of this application.
- The best way to create a batch file is to set one EPD up as required and then create the batch file from the data in that EPD.
- EPD writes and reads encompass several parameters which EasyEPD2 may display on more than one window. Batch write check boxes only select certain parameters so you must always check that the parameter you want written is in the Batch File. (For example in older versions of EasyEPD2: The Comms set up check box does not add the General Control to the list and thus the Teledosimetry settings are not written. To write the Teledosimetry settings you would need to also check the Events Set-up check box as this includes General Control. Now corrected in EasyEPD version 2.2)

# Error Handling

---

## Communications Errors

Retries are built into the dll protocol, however should an error occur then a window will display the cause of the error.

Errors are grouped into three areas:

DLL errors – Primarily involved with the link to the EPD, the message protocols and the message lengths.

EPD errors – Where the EPD is unable to respond to the applications message for some reason. E.G.: Attempting to write an ADS value with an incorrect ADS password.

Other errors – Primarily internal errors or timeouts within the DLL.

---

## Errors

Many fields have limits applied to them and if a value outside the limit is written in an edit box then the value is displayed in red.

Blank Page

# Glossary of Terms

**ADS**

Approved Dosimetry Service.

**AN.**

Albedo Neutron - The fraction of incident radiation reflected by the body.

**Baseline**

A snapshot of the counter values. Used to calculate the counts received since the last counts clear by subtracting the snapshot from the present count values.

**BC**

Beta Compensating

**DDE**

Deep Dose Equivalent

**DLL**

Dynamic Link Library

**EasyEPD2**

A program for reading and writing a single Electronic Personal Dosemeter.

**EPD**

Electronic Personal Dosemeter.

**EPD-N**

A version of the EPD Mk2 which measures and displays Gamma dose and Neutron Dose Equivalents.

**EPD-N2**

A version of the EPD Mk2 which measures and displays Gamma dose and Neutron Dose Equivalents (Fast Neutron and Albedo Neutron).

**FB**

Full Beta

**FN**

Fast Neutron

**HG**

Hard Gamma

**Hp07**

Personal Dose Equivalent at a depth of 0.07mm of soft tissue, Hp(0.07).

**Hp10**

Personal Dose Equivalent at a depth of 10mm of soft tissue, Hp(10).

**HpG**

Personal Dose Equivalent Hp(10) due to photons.

**HpN**

Personal Dose Equivalent Hp(10) due to neutrons.

**Ir**

Infra-red

**IrDA**

Infrared Data Association

**NC**

Neutron Compensating

**NU**

Neutron

**PC**

Personal Computer

**PTB**

The Physikalisch-Technische Bundesanstalt (PTB), Braunschweig and Berlin, is the national institute of natural and engineering sciences and the highest technical authority for metrology and physical safety engineering of the Federal Republic of Germany.

**SDE**

Shallow Dose Equivalent

**SG**

Soft Gamma

**Blank Page**



# Index

## A

Abuse 39, 74  
 Access Administration 18–20, 22–23  
 Access Control 12, 15, 18–22  
 ADS 12, 44, 51, 61–62, 89, 91  
 Alarms 12, 22, 29, 35, 37, 43, 46, 49, 51, 62, 73–75, 86

## B

Backlight 78  
 Baud Rate 85

## C

calibration 9, 12, 38, 47, 50, 63–70, 78  
 Chirp 83  
 Clear 22, 39, 41–43, 49, 51–52, 53, 67  
 communications 7, 12, 14, 16–17, 26, 50, 74, 84, 91  
 Configuration 7, 12  
 Count Down 82  
 Counts 38–39, 42–43, 50, 62, 64  
 CRC 39, 50

## D

Date 13, 25, 33, 37, 53–54, 59, 78  
 DDE 9, 37, 55, 57  
 Default 16–17, 44, 64, 67, 70, 85  
 De-Issue 44  
 detector 39, 43–44, 50, 64, 66, 69, 82–83  
 Display 10, 12–13, 29, 44, 67, 83, 86–87, 90–91  
 Dose 8–10, 12, 22, 29, 35–44, 49, 51, 53–57, 59–62, 64–67, 69, 80–86

## E

EPD-N 9–10, 33, 36, 38, 41, 46–47, 60, 64–66, 70, 76, 78–80, 83  
 EPD-N2 9–10, 33, 36, 38, 41, 46–47, 60, 78–80, 67–70, 73, 76, 78–80, 83  
 Events 12, 52, 53, 80, 82, 90

## H

Hp07 9, 37, 49, 53, 54, 57  
 Hp10 9, 37, 49, 53, 54, 57, 83

## I

Ir 7–84  
 Issue 12, 20, 35, 37, 43–44, 46, 51, 61–62, 83–84

## K

Knock 39

## L

Logging 15–16, 22, 33, 83

## O

Off Display 78  
 On/Off 44, 46  
 One minute logging 83  
 Over-range 39

## P

Password 12, 18–21, 62, 64–65, 67–68, 70, 89, 91  
 Peak 37, 42  
 Profile 8, 12, 53–56, 80–84

## Q

Quality 38–42, 61

## R

Rate 22, 37, 39, 41, 43, 49, 54, 56–57, 65–66, 69, 83, 85, 87  
 reset 37, 39, 45, 51, 53, 67, 76, 82  
 Return 20, 22–23, 36, 44, 49, 70, 82, 84

## S

Scratch Pad 71–72  
 SDE 9, 37, 55, 57  
 set up 7, 12, 15, 18–20, 25–27, 33, 53, 59, 73–75, 89–90  
 Special Total Dose Store 12, 59–60  
 Status 12, 14, 35, 39, 43–44, 45, 62, 64, 67  
 switch 12, 78, 83, 86

## T

Test 43–44, 46–48, 50, 75, 80, 82–83  
 Thresholds 22, 37, 40–41, 43, 50, 64  
 Time 8–9, 16–17, 22, 25, 29, 37–39, 45, 49, 52, 53–56, 59, 64–66, 69, 74–75, 78, 81–82, 84, 86  
 Tool Bar 8, 12, 22  
 Total Dose 10, 12, 37, 42–43, 59–60

**W**

Wearer Display 79

Wearer Id 36, 43, 62, 79

Wearer Name 36, 43–44, 51, 61, 79

Write 7, 9, 12, 31, 33, 43–44, 59, 62, 66, 69, 71–72,  
75, 78, 82, 89–91