DTU
Ram pump programme

Computerised ram pump calculators
A short user guide

DTU Ram Pump Programme

Computerised calculator programmes

These programmes are supplied as "Freeware", which means that the DTU reserves no copyright. You can copy and distribute the programmes as much as you like — as long as you do not charge any money for doing so. Please do not change the programme code in any way.

Although every effort has been made to ensure that this software performs correctly and that its documentation is accurate, the DTU accepts no liability whatsoever for errors contained herein or incidental consequences resulting from the use of this material. Disks are checked for viruses before leaving the DTU, but no guarantee of non-infection can be made after the first use.

Hardware requirements

The minimum hardware requirement for these programmes is an IBM compatible PC with an 8088 processor. If you have the minimum requirement, only the DOS programme DOSPUMP will run. Although all three programmes should work on an IBM compatible machine with an 80286 processor running Windows 3, we recommend that the Windows programmes are used on an IBM compatible machine with at least an 80386 SX processor and four megabytes of RAM that is using Microsoft Windows 3.1 (or later versions).

Contents

1. Calculator Installation

There are three programmes on the 720k 3.5" disk inside the cover of this book. Two of them must be installed on a hard disk and run under Microsoft Windows®. The third programme runs under DOS and can be run from the floppy disk drive or installed onto a hard disk.

The two Windows programmes are:

WINPUMP
PUMPDATA

The DOS programme is:

DOSPUMP

You will not need to use both the Windows and the DOS programmes because they do the same thing. If you have a version of Microsoft Windows® on your computer, do not bother to install DOSPUMP as well as the other programmes.

1.1 Installing the Windows ram pump programmes

To install the ram pump programmes that run under Microsoft Windows® insert the disk in the floppy disk drive, then type the letter identifying the drive, followed by a colon (:).

For example:

A:

Then press the [Return] key.

The [Return] key is also called the [Enter] key and often has an arrow on it, like this ◄—┘.

Type **PWIN** followed by the letter identifying the hard disk drive being used, a colon (:) and a backslash (\), and the directory name **DTUPROGS**, which is where the programmes will be installed.

For example:

PWIN C:\DTUPROGS

Then press the [Return] key.

When the programmes have been installed, a message appears advising you that installation is complete and telling you to press any key to continue.

Press the space bar.

The Windows programmes have now been copied to your hard disk, but Microsoft Windows® does not know this. The next stage of installation tells Microsoft Windows® that they are there and installs them as icons at the Microsoft Windows® Programme Manager screen.

To do this, type the letter identifying the hard disk drive where the programmes have been copied, followed by a colon (:).

For example:

C:

Then press the [Return] key.

Type **CD\DTUPROGS** and press [Return] to change to that directory on your PC.

Type **SETUP** and press the [Return] key.

Microsoft Windows® starts and the DTU programme installation window appears. The DTU programme installation window has two buttons:- OK and EXIT.

Use the mouse to click on the OK button to start the installation.

The programmes are installed in a few seconds with progress being shown in the bar above the control buttons. A programme group called DTU programmes is created under Microsoft Windows' Programme Manager, and the DTU Windows programmes are installed there with these icons.

winpump   pumpdata

1.1.1 To run the Windows DTU calculator programmes — WINPUMP and PUMPDATA

Start Microsoft Windows® and click the mouse on the icon for the programme that you want. Click twice quickly (using the left mouse button) to run the chosen programme.

1.2 Installing the DOS DTU ram pump calculator programme — DOSPUMP

To install the ram pump calculator that runs under DOS, insert the disk in the floppy disk drive, then type the letter identifying the drive, followed by a colon (:).

For example:

A:

Then press the [Return] key.

Type **PDOS C:\DTUPROGS**

When the programmes have been installed, a message appears advising you that installation is complete and telling you to press any key to continue.

Press the space bar.

If you do not have a hard disk, the programme can be run from the floppy disk.

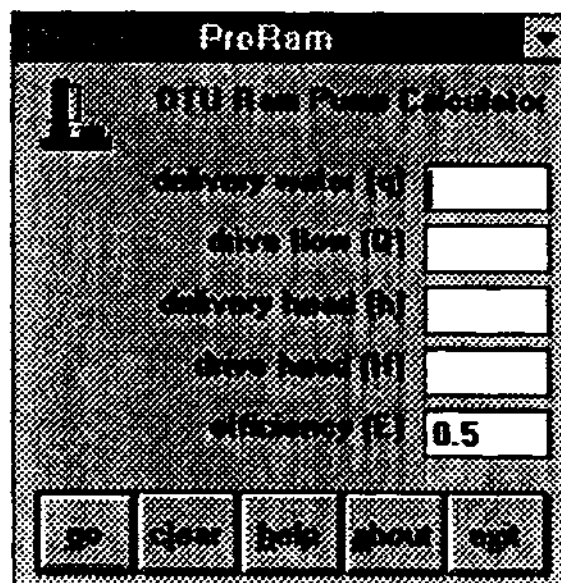# 1.2.1 To run the DOS DTU calculator programme — DOSPUMP

There are two ways to run this programme — from the hard disk or the floppy disk.

| Running from the hard disk	Running from the floppy disk
Type the letter identifying the hard disk drive where the programmes have been copied, followed by a colon (:).	Put the floppy disk into the drive, then type the letter identifying the floppy disk drive, followed by a colon (:).
For example:	For example:
C:	A:
Then press the [Return] key.	Then press the [Return] key.
Type **CD\DTUPROGS** and press [Return] to change to that directory on your PC.	Type **DOSPUMP** and press [Return] to start the programme.
Type **DOSPUMP** and press [Return] to start the programme.	

2. Using the DTU programme WINPUMP

When you click on WINPUMP the ProRam window opens. This window is used to enter variables to work out the equation: $E (Eta) = \dfrac{q\ h}{Q\ H}$.

This is the ProRam window:

Winpump is used by filling in any four of the variables for a ram pump system, (Q,q,H,h, and E) and clicking on the GO button. The missing variable is then provided for you.
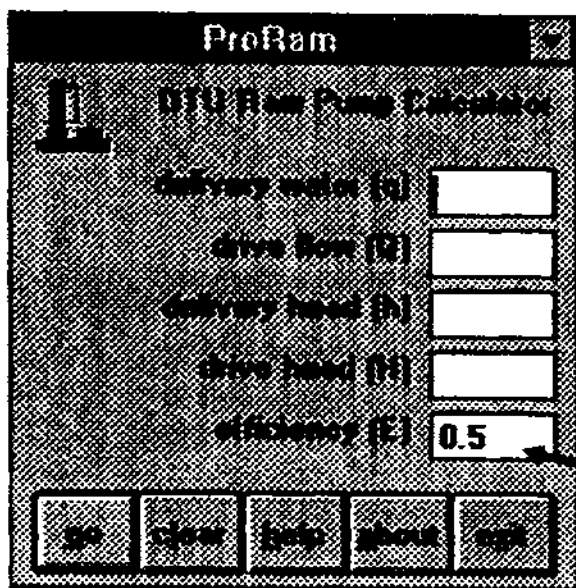
Use this button to "minimise Winpump, but leave it running in the background behind other programmes.

When you have made an entry in one box, press the Tab key to move to the next box (or use the mouse to click on it.

You can change the value given for "efficiency" if you know that your pump has a higher or lower value. The value is expressed as a fraction of 1, so a 75% pump efficiency would be typed in as 0.75.

The buttons each have one letter underlined. Each button makes something happen, and it can be made to do this by either typing the underlined letter, or clicking on it with the mouse.

If you are using more than one pump, always remember to divide the drive flow between them before calculating.

When you have made one calculation and wish to make another, click on the "clear" button. All the values will disappear, except for 0.5, which is the default pump efficiency.

If you want to know the pump efficiency of an existing system, delete the entry for efficiency and fill in the other variables, then click on the GO button.

To leave WINPUMP, click on the "exit" button, of type the letter X.

WINPUMP's usefulness is limited, but it can be very handy for making quick calculations of the effect of changing parts of a system's design. For example, you can quickly find out what difference it would make to the delivery flow if you added a metre to the drive head or reduced the drive flow.

An example is when a system design is actually going to deliver more water than is needed and by varying the entries for drive head and delivery head we can see whether we could save money on the drive pipe, or deliver to a point high enough above the originally planned delivery tank for the excess to be usefully gravity fed to a garden plot.

DOS users will find that the DOSPUMP programme is a very similar calculator to WINPUMP. It looks different because it runs under DOS, but it does the same things.

3 Using the DTU programme PUMPDATA

When you click on PUMPDATA the DTU Ram Pump Data Generator window opens. This window is used to enter variables to work out the equation

$$q = \frac{\eta\, Q\, H}{q\, h}$$

for a wide range of conditions. All possible answers within the ranges given are calculated. The range of results can then be sorted and printed.

This is the DTU Ram Pump Data Generator window:

A range of values for the Drive Head (H), Drive Flow (Q) and Delivery Head (h) are calculated for a particular pump efficiency. If you know the efficiency of the pump in use, begin by changing the efficiency value (which is given as 0.5 or 50% by default).

When the efficiency has been set, the "Drive Head" figures are entered (in Metres).

The "step rate" is the amount by which the value is advanced for each set of recalculations. For example, with a step rate of 1, the Drive Head will be calculated for every value between the minumum of 2 and the maximum of 30 (whole numbers only). If the step rate is changed to five, the minimum number will be advanced in fives to the maximum.

Change the step rate to a bigger figure to reduce the number of calculations carried out if your computer is very slow.

Change the minimum and maximum Drive Head to those available at the site being calculated.

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When the "Drive Head" range has been set, the "Drive flow" figures are entered (in litres per minute).

Drive Flow

step rate	5
minimum	60
maximum	120

The "step rate" is the amount by which the value is advanced for each set of recalculations. For example, with a step rate of 5 as shown, the Drive flow will be calculated in fives from the minumum of 60 to the maximum of 120 litres per minute. If the step rate is changed to 10, the number will advance in tens from the minimum to the maximum.

Change the step rate to a bigger figure to reduce the number of calculations carried out.

Change the minimum and maximum Drive flow to those available at the site being calculated. If a single flow is known, type that flow into both the minimum and the maximum boxes.

When the "Drive flow" range has been set, the "Delivery Head" figures are entered (in metres).

Delivery Head

step rate	10
minimum	10
maximum	100

The "step rate" is the amount by which the value is advanced for each set of recalculations. For example, with a step rate of 10 as shown, the Delivery Head will be calculated in tens from the minumum of 10 to the maximum of 100 metres. If the step rate is changed to 20, the number will advance in twenties from the minimum to the maximum.

Change the step rate to a bigger figure to reduce the number of calculations carried out.

Change the minimum and maximum Delivery Head to those available at the site being calculated.

After setting the Step rates and the maximum and minimum entries for Drive Head (H), Drive Flow (Q) and Delivery Head (h) at a site, click on the "go" button to start making calculations.

Efficiency 0.5

go	find	help	about	exit

Statistics
total calculations   0
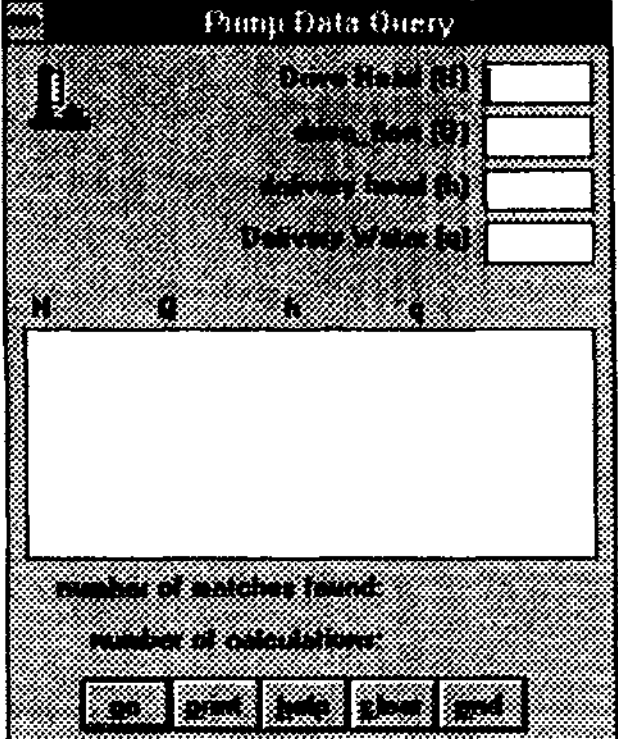Output file = C:\TEMP\pumpdata.txt

The total number of calculations made is shown, and the name of the data file in which these calculations are stored is given

3.1 Looking at the results

When the calculations have been made, they are saved in the file called "pumpdata.txt" on your hard disk. You can look at this using a wordprocessor or other programme if you want to. To look at the calculations in this programme, and to select restricted ranges to look at, click on the "FIND" button to open the PUMP DATA QUERY window.

Asking the calculator a question

A Query is simply a question. You can ask to see the data for a restricted set of variables, or for all. To see all, just click on the GO button without putting anything in the boxes.
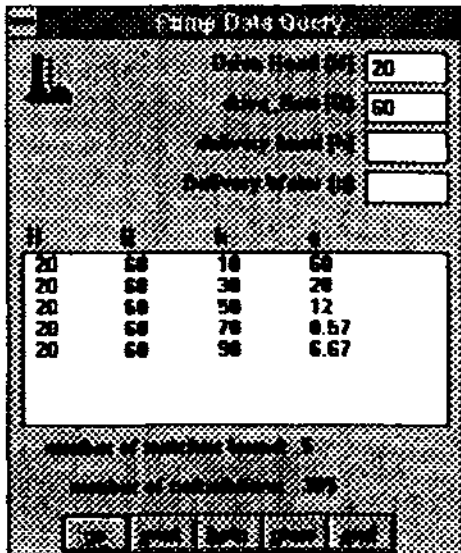
To see a restricted part of the calculations you have just made at the DTU Ram Pump Data Generator window, make at least one entry in the boxes alongside Drive Head, Drive Flow, Delivery Head and Delivery Flow.

For example, if you wanted to see how much drive flow would be needed at a site with a known drive head, delivery head and required delivery flow, type the known values in the boxes and click on the GO button.

EXAMPLE

In this example, a drive head of 20 metres was possible but the drive flow was restricted to 60 litres per minute. We wanted to know how much water could be pumped to a range of heights. The step rate for the delivery head had been given as 20 metres at the DTU Ram Pump Data Generator window, so only five calculations for delivery head were made for its range of between 10 and 100 metres.

Notice how it is possible to generate silly answers if you are not careful. The first calculation in the list shows a Drive Head of 20 metres and a Delivery Head of only 10 metres — gravity feed!

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Printing the result

To print the information you have found, simply click on the PRINT button. Make sure that your printer is attached and turned on, with paper in it before trying to print anything.

It can be useful to print a range of calculations for a particular site before visiting it. For example, you might know that the site must deliver 10 litres a minute before the client will be interested, you might also know the efficiency of the pump to be installed, and the fact that there is plenty of drive water (120 litres a minute or more). You may also know that the delivery head is at least 50 metres. If you then find all possible combinations of drive Head and Delivery Heads of 50 metres or more that give a delivery flow of 10 litres a minute or more, this would be useful to have with you when assessing a site.

Asking another question

If you want to find the answer to another question, click on the CLEAR button to clear your first question and its answers from the window. Then type in the relevant values for your new question and click the mouse on the GO button.

Leaving the PUMPDATA programme

When you have finished making your calculations, click the mouse on the END button to close the DTU PUMPDATA programme.

4 Using the DTU programme DOSPUMP

Refer to section 1.2.1 To run the DOS DTU calculator programme - DOSPUMP to start the programme from your hard disk or from the floppy disk provided.

This is what appears on the DOSPUMP main screen.

```
╔═══════════════ DTU Ram Pump Calculator by ProData ═══════════════╗
║                                                                  ║
║  Q=Drive Flow: q=Delivery Water: H=Drive Head: h=Delivery Head: E=Efficiency ║
║                                                                  ║
║  Which variable to calculate: Q, q, H, h, E, ?=help, X to quit   ║
║                                                                  ║
╚══════════════════════════════════════════════════════════════════╝
```
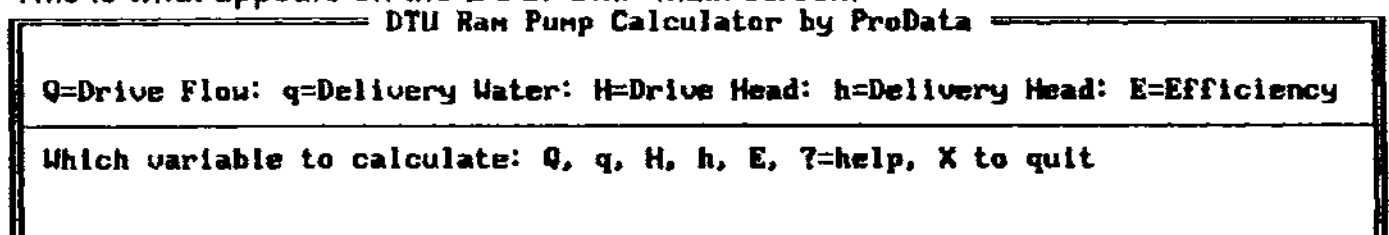
Type which one of the five variables, Q, q, H, h, and E you want to calculate.

☛ *Be careful to type "Q","H" and "E" as upper case letters and "q" and "h" as lower case letters.*

WINPUMP users will find that the DOSPUMP programme is a very similar calculator. Because it runs under DOS its appearance is different, but it does the same things as WINPUMP.

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Whichever variable you select, a window will open asking you to enter a value for the other variables, one at a time. For example, if you type "q", the window shown below opens prompting you to give a value for E (the pump efficiency).

```
╔═══════════════ DTU Ram Pump Calculator by ProData ═══════════════╗
║                                                                  ║
║  Q=Drive Flow: q=Delivery Water: H=Drive Head: h=Delivery Head: E=Efficiency ║
╟──────────────────────────────────────────────────────────────────╢
║  Which variable to calculate: Q, q, H, h, E, ?=help, X to quit   ║
║                                                                  ║
║                                                                  ║
║                      ┌─────────Delivery Water─────────┐          ║
║                      │ enter value for E:             │          ║
║                      │                                │          ║
║                      │                                │          ║
║                      │                                │          ║
║                      │                                │          ║
║                      └────────────────────────────────┘          ║
║                                                                  ║
╚══════════════════════════════════════════════════════════════════╝
```

You are asked for each of the other four variables in turn, and when you have entered them (press [Return] after each entry), the programme displays the missing value lower on the screen. An example is shown below.

```
╔═══════════════ DTU Ram Pump Calculator by ProData ═══════════════╗
║                                                                  ║
║  Q=Drive Flow: q=Delivery Water: H=Drive Head: h=Delivery Head: E=Efficiency ║
╟──────────────────────────────────────────────────────────────────╢
║  Which variable to calculate: Q, q, H, h, E, ?=help, X to quit   ║
║                                                                  ║
║                     ┌────────Delivery Water────────┐             ║
║                     │ enter value for E: 8.6        │            ║
║                     │ enter value for H: 5          │            ║
║                     │ enter value for Q: 98         │            ║
║                     │ enter value for h: 68         │            ║
║                     └───────────────────────────────┘            ║
║                                                                  ║
║                     ┌───────────────────────────────┐            ║
║                     │ the value of q is  4.58        │           ║
║                     └───────────────────────────────┘            ║
║                                                                  ║
║                        Again? (y)es or (n)o:                     ║
╚══════════════════════════════════════════════════════════════════╝
```

When you have entered all the variables, a window at the bottom of the screen a message prompts:

"Again? (y)es or (n)o:"

Type the letter Y to clear the screen and calculate a result for another set of variables.

Type the letter N to close DOSPUMP.   10