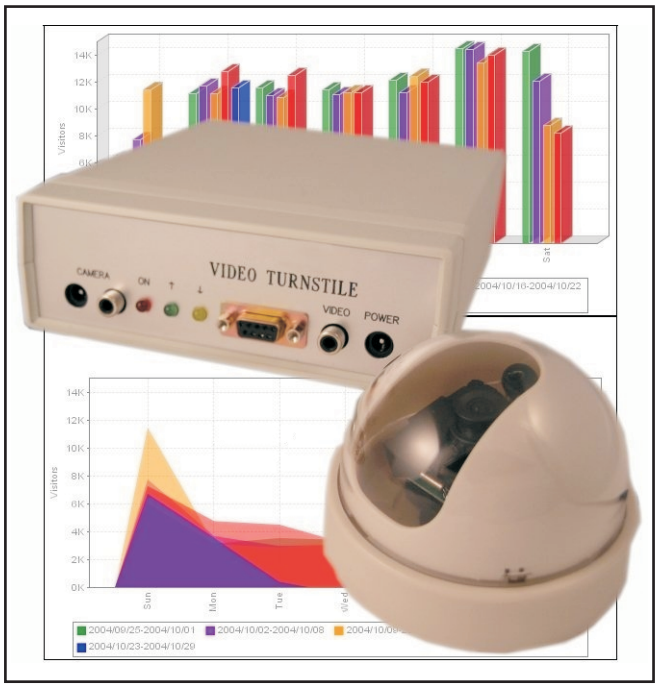
Video Turnstile User Manual



Manual Code: VT-2.04

Issue Date: June 2007

Table of Contents

Chapter 1: Introduction

The Video Turnstile system counts people entering and leaving retail outlets, banks, galleries, museums and other premises. It is designed to be easily installed and in most cases will require minimal set-up procedures. The system comprises one or more CCTV cameras each associated with a Video Turnstile (VT) detection module. The VT module may be held in a rack with several other modules, or it may be a boxed unit.

Each VT module produces two count totals: one for people going up the video picture and one for people going down. In other words, a count of people going in and a count of people going out.

The VT detection modules pass their counts to a VT Logger. The Logger can accept counts from up to 16 non-logging detection modules. At regular intervals the Video Turnstile software, running on a PC, collects the counts from the VT Loggers and saves them in a text file.

You can fine-tune your system through software, configuring each people counter according to its environment.

Video Tally Systems

Video Tally systems are slightly different. You won't have any VT Loggers: the count is instead collected by software running on the PC every 5 minutes. However, you use VT Setup to configure the counting parameters in the same way. For more on the similarities and differences between the two systems see Chapter 5, Using Video Tally

1.1 Identifying your Video Turnstile System

There are two types of Video Turnstile system: one with boxed modules and one with rack mounted modules. These two types of system work in a similar manner and so this Manual covers both of them.

The **boxed modules** are designed for small installations monitoring just a few doorways. The simplest set up is when just one doorway is being watched. In this case your boxed unit can both detect people and log counts. It is thus called a **Logging Video Turnstile** or **LVT**.

A Boxed Video Turnstile Unit
A boxed unit which detects people and logs counts is called an LVT. A boxed unit which just detects people is called a VT.

Each LVT can also log counts from up to 15 non-logging boxes (VTs). So for two doorways you would connect your LVT to a boxed unit which detects people but doesn't save the count. Use the ribbon cable to link the two units via the large sockets on the back panels.

A **rack-based system** is for larger installations monitoring many doorways. Each rack holds a Logger module and up to 16 non-logging modules called VTms.

A Video Turnstile Rack holding a Logger and three non-logging modules

This rest of this Manuals tells you how to:

- Install the Video Turnstile units, cameras and software (Chapter 2)
- Use the VT Setup software to configure the system (Chapter 3)
- Use the VTCollect, VTRealTime and VTViewLog software to collect and display data (Chapter 4)
- Use VT Tally (Chapter 5)
- Deal with any problems (Chapter 6)

Chapter 2: Installing Video Turnstile

When installing the Video Turnstile units and cameras, it helps to have a television monitor or a frame grabber available. This lets you check that the picture produced by the camera corresponds to our installation suggestions. You will also need to use the VT Setup software to send instructions to the units. This is covered in the next chapter.

2.1 Installing the Video Turnstile Software

Insert the CD-ROM labelled into the Video Turnstile into the CD drive. Windows should automatically start the installation program. If it doesn't, run the setup.exe program on the CD.

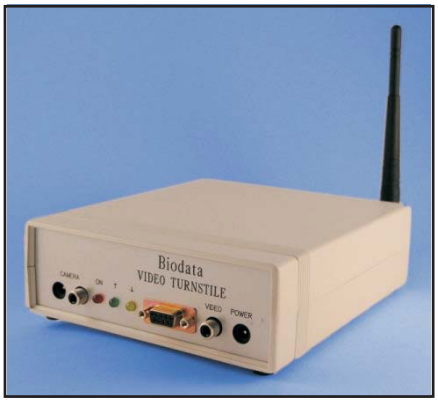
The software is normally installed into the:
`c:\program files\windmill software\videoturnstile\`
folder (where `c:` is the drive on which Windows is running). Two other folders are created,
`c:\videotunstile\setups\` for details of the program settings
`c:\videoturnstile\data\` for your data files

At the end of installation the Configuration program—ConfIML—runs and registers your system. Click the Save button. You should not need to use this program again.

2.2 Installing with an Ethernet or Wi-Fi Network

One way to think of a Wi-fi network is as an Ethernet network without the Ethernet cables. Both types of network consist of a base station (or router) and a network adaptor for each PC and Video Turnstile Logger on the network.

The procedure for installing eLVTs (Ethernet) or wLVTs (Wi-Fi) is detailed below.



A boxed wLVT, which communicates with the PC over a Wi-Fi network.

1. At the PC, **install the Device Installer** from the Video Turnstile CD. (The Device Installer software allows you to check and change the IP addresses of your Loggers or LVTs.)

2. **Set the Address for the eLVT or wLVT**.

   i. Arm yourself with the necessary information from your network manager, namely
      - IP address for the LVT
      - Subnet mask
      - If appropriate, Gateway address

   ii. Connect your LVT to a network enabled PC. You can use a crossover cable to make a direct connection, or connect through a hub via normal UTP Ethernet cables.

   iii. Allow 10 seconds for the LVT to boot-up.

   iv. Run Device Installer and click the Search button to find devices on the network. The Installer should find the eLVT at its default address: 169.254.117.220. If the **IP address is shown in black** then your LVT and PC have a full network connection on the same sub-net and you should have more icons available on the menu bar: Configure, Upgrade, Telnet, Web.
   If the IP address is shown in Red, or you get a *No network interface is available* or *No Devices were found* message, then see point viii and onward below.

v. You may want to change the IP address of the LVT for use on your main network. You can do this by selecting an existing IP address and then clicking the Assign IP button. After setting a new IP address into the device, it will need to reboot. This takes around 10 seconds.

vi. Click the Update button to set other parameters.

vii. If you are having trouble with VT Setup and VTcollect not communicating with your LVT, you may want to check the Local Port and Port 1 baud rate settings.

viii. If the eLVT device is found but the IP address is shown in RED then the eLVT is on a different sub-net to your PC. You should change one or the other to get them to match. See below for details.

ix. If, on clicking Search (point iv), the response is: **No network interface is available** then
- check the network cable is plugged into the PC ethernet port
- check your LAN icon on the task bar does not show a red cross.

x. If, on clicking Search (point iv), the response is: **No Devices were found** then the possibilities are:
- The LVT has been given a default gateway IP address, and will only respond on a network where that gateway is present. Try restoring the LVT to the network and running Device Installer from a PC also on that network.
- The LVT Ethernet circuit is not functioning correctly. Contact your supplier or Biodata Ltd about service or a replacement.

For Wi-Fi networks make sure that the Device Installer (used to set the IP address) is the latest version. You can download this from
`http://www.videoturnstile.com/users/program/WiPort_DeviceInstaller.zip`

2.2.1 Changing the IP Address and Sub-Net Mask of an eLVT or wLVT

1. Check the existing IP address of the LVT as above. If a device is found, then click on the IP address to select it from the list.
2. Click Assign IP, and enter the new IP address and sub-net mask for this LVT. After completing the operations to assign the IP address, the program will search again, and should find the device at its new address.

2.2.2 Restoring Default Settings for Local Port and Port 1 Baud Rate

1. Click on the IP address to select one device from the list.
2. Click **Configure**
3. Click the **Ports** tab
4. Select Port #1 and click **Edit Settings...**
5. Click the **Advanced** tab to get a list of all the settings
   - Baud Rate
     This is a drop down list box and you should select the 9600 value
   - Local Port
     Enter the value of 10001
   - Other settings
     - Stop Bits - 1
     - Parity - none
     - Flow Control - none
     - Password Required - default value is no
     - Accept Passive Connection - yes
   - Port 2 (if available) is not used
6. Click [OK] to save port settings
7. Click [OK] to save configuration

2.2.3 Checking and Changing the IP Settings for your PC

1. From the start menu: Select Control Panel and then Network Connections
2. Select Local Area Network
3. Select Internet Protocol
4. Select Properties - Note you are strongly advised to record the existing property settings in case you need to return to them (e.g. to restore internet access)
5. For setting up the eLVT, you must use a fixed IP address
6. Is **Use the following IP address** selected ?
   - Yes
     The IP address of your PC is shown as a 4 part number. The sub-net mask is also displayed also as a 4 part number. Where the sub-net value is 255 the IP address parts must match for two

network devices to be able to communicate. Where the sub-net mask is 0, any value in that part of the IP address is acceptable.

- No
  Select Use the following IP address
  Enter an IP address which is the same as the one shown for the eLVT in Device Installer for the first 3 parts of the IP address, and a different value (0-255) for the last part.
  Set the sub-net mask to: 255.255.0.0
  Click [OK]

7. Click [OK] when you leave the Local Area Connection Properties to save the changes.

2.3 Installing with an RS232 Connection

If your Logger connects to the PC over RS232 it will have an RS232 plug with 9-pins. It will be clearly labelled on the rack-based Logger, and on the back panel of a boxed Logger (LVT).

Use the RS232 cable provided to connect the Logger to the PC's COM port.

For pin connections see Section 2.8.2.

Note: *The 9-way socket on the front of the boxed unit lets you connect to an external device. Use the plug on the back panel to connect to the computer.*

2.4 Installing with an RS485 Connection

An RS485 plug has 9-pins. It will be clearly labelled on the frame-based Logger and on the back panel of a boxed Logger (LVT).

RS485 is suitable when the Logger is far from the computer and when several boxes or frames are on one cable. You will have an RS485 output kit which includes an RS232-RS485 converter (a Microlink 800 adaptor) for connection to a PC.

1. Plug the Microlink 800 adaptor into the PC's COM port.

2. Connect the RS485 cable to the Logger and the Microlink 800 adaptor.

You would usually use the 12 V DC plug-top adaptor supplied to power the Microlink 800 adaptor. In some situations, if you have a local LVT unit, you can use power from its power supply. See Section 2.8.3 for details of this and pin connections.

You may also find Section 6.7 useful, *Problems Connecting RS485 Units*.

2.5 Connecting Boxed Units Together

At the back of each boxed unit is a 37-way D socket. Use the ribbon cables provided to connect the LVT to the VTs in a "daisy-chain": LVT—VT—VT—VT, etc. Each LVT can log counts from up to 15 Vts.

2.6 Checking the Video Equipment

1. Connect the video out on the VT unit to the video in on the TV screen.
2. Connect the video lead between the VT unit and the camera, then connect the power to the VT unit.
3. Check the lights on the VT unit come on, and the up and down lights go off.
4. Tune the channel to view the audiovisual channel, which is the channel used to watch the video.
5. Check the picture from the camera.
6. If more than one camera repeat to check them all. Ideally also check all the VT units.

2.7 Positioning the Camera

First temporarily fix the cameras and check the detection zone markers on the TV screen. For cameras covering two entrances which are close together, make sure the zone does not overlap or people may be counted twice.

We normally supply cameras with a 3.6 mm focal length lens. This is suitable when the distance between the floor and the camera is two to three metres. However, we can supply lenses for other floor-to-camera distances.

Lens Focal Length (mm)	Floor—Camera Height (m)
2.9	2.0–3.5
3.6	2.5–4.5
4.6	3.0–5.0
6.0	4.0–6.5
8.0	5.0–8.0

Mount the camera looking directly down.

For focal lengths other than 3.6 mm, change the camera height setting in the VT Setup software (Section 3.9.2). This will affect the size of the counting zone and detection parameters, so do this first before positioning the camera.

2.7.1 Positioning Cameras Next to Single Doors

For an entrance the width of a single door, consider these factors when siting the camera.

1. Does the door open **into** the zone detected by the Video Turnstile counters? If so it is important that the door does not completely cross the counting zone. You therefore need to mount the camera some distance inside from the door frame. This distance is typically 0.5 to 1 metre.

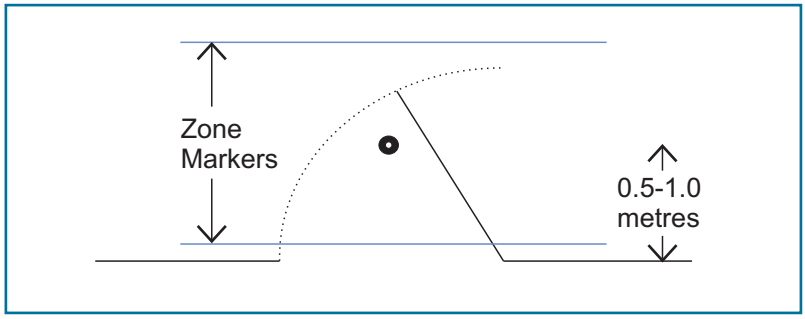
Example of zone lines in the video picture.

2. The counting zone should be reasonably well illuminated so that a good video picture can be provided by the camera. You should also consider the lighting changes when:

    i. The door opens. This may mean additional illumination from outside areas, or changes in reflected light according to door position.

    ii. A person enters or leaves through the door. The person may block out sources of normal illumination, or reflect additional light back to the camera. A shadow may also be associated with the person crossing the zone. The detection unit will normally

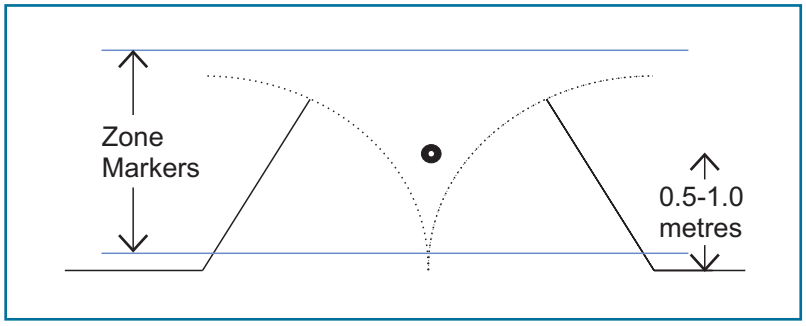
cope with changes to ambient light levels associated with people crossing the zone.



Typical camera placement for a single door entrance, where the door opens into the counting zone.

2.7.2 Positioning Cameras Next to Double Doors

For a double-width entrance mount the camera in the centre of the doorway, some distance in from the line of the closed doors. Consider also the previous guidance for a single door-width entrance.



Typical camera placement for a double-door entrance, where the doors open into the counting zone.

2.7.3 Positioning Cameras in Corridors and Wide Entrances

For transit areas that are wider than a double-doorway, mount several CCTV cameras in a line across the ceiling with the field of view of each camera overlapping with its neighbours. Consider also the following points.

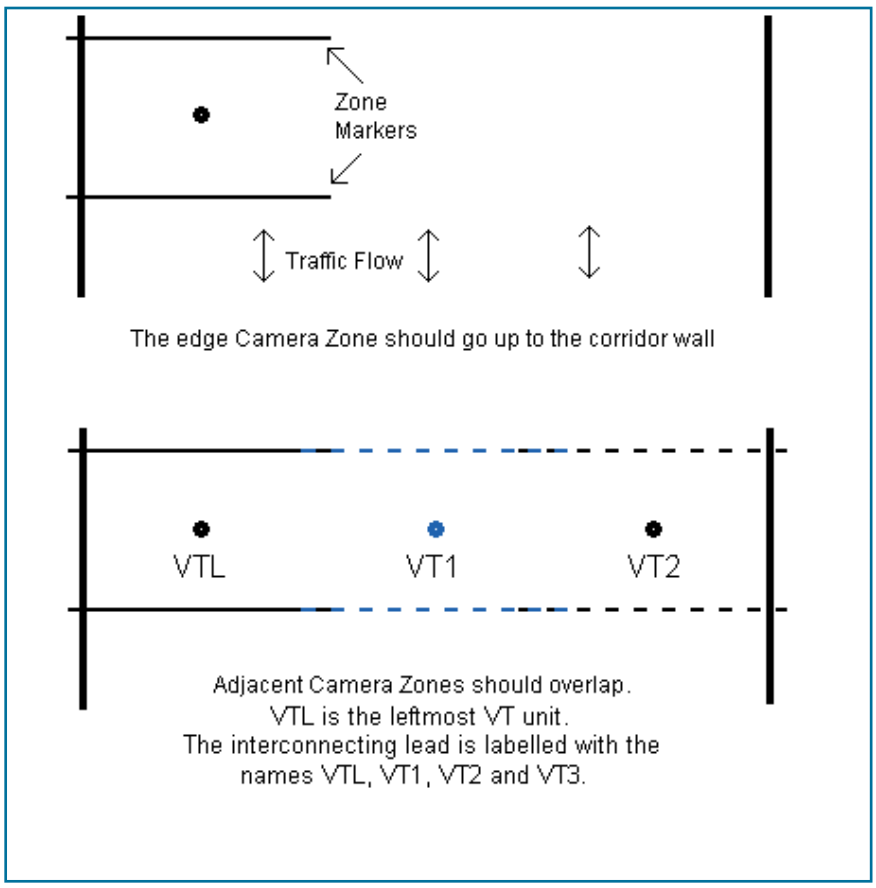
1. The counting zone should be located where people are moving along the corridor: a point where people stop to talk, look at exhibits, advertising or route signposts, is not really appropriate.

2. Ideally, start by temporarily fixing the cameras: you will probably need to move them after viewing the overlap of their counting zones.

3. The best position for the cameras is not necessarily evenly spaced across the corridor. The cameras at the edge of the corridor may need to be closer to the edges of the wall than equidistant spacing might suggest.

4. People going through the overlapping zones between adjacent cameras must be picked-up by both cameras, and be at the edge of each camera's counting zone. The VT detection units tell each other of the presence of a person at the edge of the zone they are monitoring. This means that the system handles a person being in the view of two cameras at once, and can pick up people crossing the zone diagonally.

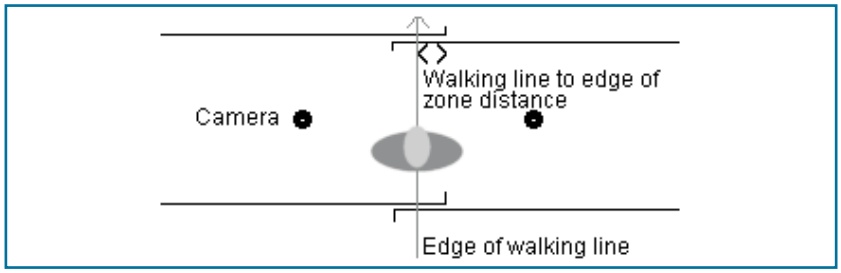
5. The cameras must be mounted in a line across the corridor spaced so that the counting zones overlap by about 10% at each end—see the figure below and the Fine Tuning Camera Placement notes.



Fine Tuning Camera Placement in Corridors

To optimise the overlap between the zones from adjacent cameras, follow these steps.

1. Connect the Video output from the leftmost VT unit to a TV, so that you can see the camera image and the counting zone markers. Use the VT Setup software to adjust the counting zone edges.
2. Mark the edges of the counting zone on the floor using something easily removable like masking tape. A T-shaped piece of tape to show the end and direction of the line is useful.
3. Connect the output of the adjacent camera and its VT unit to the TV.
4. Position the second camera so that its counting zone markers are on top of those of the first camera with an overlap of roughly a third of a metre. Use the VT Setup software to adjust the size and position of the counting zone.
5. Repeat for the other cameras



The ends of the zone lines from the two cameras should be on top of one another, so the counting zones are level and overlapping.

6. Use the VT Setup software to set up counting across wide entrances (Section 3.10.3).
7. Check that someone following the walking line is detected only once.

2.8 Connections

2.8.1 Camera Sockets

Power Out Jack Socket
Inner +12 V
Outer 0 V
Camera Phono Socket

2.8.2 9-Way D Plug Pin Out on Logger

	RS232	RS485
1		Transmit-
2	Receive Data	Receive+
3	Transmit Data	Receive-
4		
5	0V	0V
6		Transmit+
7		
8		
9	+12V	+12V

Notes: This is to connect a serial Logger to the PC's COM port. On a boxed Logger which communicates over RS232, the plug is on the back panel.

2.8.3 RS485 Logger to Microlink 800 Adaptor

When you are using RS485 connections, use the Microlink 800 to connect to the computer's COM (RS232) port.

Logger 9-Pin Plug	ML800 Adaptor
6	1
1	2
2	3
3	4
5	5

Note: When the flat side of the adaptor is on top, and the "curly" side underneath, pin 0 is to the left and pin 7 to the right. See the photo on the next page.

Microlink 800 RS485 to RS232 Adaptor.

Powering the Microlink 800 Adaptor

You would usually use the 12 V DC plug-top adaptor supplied to power the Microlink 800.

In some situations, if you have a local LVT unit, you can use power from its power supply as follows.

Logger 9-Pin Plug	ML800 Adaptor
5 (0 V)	6
9 (+12 V)	7

Note: Only connect 12 V DC wires from one logging unit. All other sections of the RS485 should have 5 wire connections.

2.8.4 9-Way D Socket

1 Video out
2 For factory test use only (5 V output)
3 For factory test use only (5 V output)
4 For factory test use only (5 V output)
5 UP 12 V ⊓⊔ low for count
6 0 V
7 12 V power out
8 Not connected
9 DOWN 12 V ⊓⊔ low for count

Notes: This socket lets you connect to external devices.

2.8.5 37-Way D Socket on Back of Boxed Units

Each boxed unit has a 37-way D socket on its back panel. Use this to connect boxed units together with a ribbon cable.

2.8.6 Video Output

The Video Output socket (labelled "Video" on a boxed unit") is for you to attach a television monitor. You can then view the CCTV camera picture and its counting zone markers.

A rack-based system has four Video Outputs. Use VT Setup software to choose which one to use with which module.

2.8.7 Power In on Boxed Units

The 12 V Power In socket on a boxed Video Turnstile unit provides power enough for any linked units and cameras. You only need connect a power supply to one unit.

2.8.8 Busy Light

The busy light is on the back panel of a boxed Logger, and on the Logger module in a rack-based system. It comes on when the software talks to that Logger and remains on until the software talks to another Logger. If you only have one Logger then the light will remain permanently on. This is useful for diagnosing problems. If you remove the power supply from the unit and then reconnect it, the Busy light will be off. If it goes on when you talk to the unit then you can see to which one you are talking and confirm that the software has found it.

2.8.9 Count Up/Down Lights

The Up or Down lights on the VT front panel flash to show that a person has been counted.

2.8.10 Meters and Alarms

Meters are available to monitor occupancy or how long a person spends in a specific area. If you have an external meter you will also have a special module to connect it to the system. This connector can also monitor alarm conditions. For example, with an occupancy meter you could set an alarm signal when a certain number of people were in the building.

2.9 Adding new Units or Upgrade Chips

When you add a new unit, or upgrade chips, the Loggers default to address 0 and the non-logging VT units to address 16. In both cases you may need to alter the address to match your configuration. (If you only have one Logger in your system you can leave it at address 0.) Use the VT Setup program to change addresses (Section 3.6.1).

VT address 16 is special. The logger will only accept counts from VT addresses 0-15 (16 possible units with 32 channels, in and out on each unit). VT address 16 is therefore not counted by the logger. This means that a new unit or chip when plugged into a system cannot modify the existing data from what might be an existing VT unit in the system. However, you do need to change the address of any VT unit at address 16.

The procedure when adding units is to add one at a time and use the VT Setup software to change the logger and VT address to the next values (0 up) before trying to add another unit.

Chapter 3: Sending Instructions to the Video Turnstile Units

3.1 Introducing the Video Turnstile Software

The first program you will use is called VT Setup. This opens up a communication link between the logger and the PC, and lets you send instructions to the Video Turnstile unit. After telling the VT units what to do you can use VT Collect to gather and display data.

For users of VTupload version 6.44 or earlier:
If you are converting from an existing Video Turnstile setup run VTimport to transfer your earlier setup and data to the new version.

3.1.1 Collecting Data for the First Time

1. Install the software (Chapter 2 gives details).
2. Run VT Setup (Sections 3.2–3.17) to program the VT units.
3. Run VTCollect to automatically collect people counts and perform calculations on the data (Section 4.1).
4. If desired run the VTrealTime and VTviewLog software to display live and historic data (Section 4.2).

In subsequent sessions, unless you specify otherwise, everything will be done automatically.

3.2 Using VT Setup to Program the VT Units

With VT Setup you can:

- Change the settings of each counting zone: position, size, entry points, exit points and so on.
- Adjust settings for different situations: crowds, people size, shadows, etc.
- Set the interval over which the VT Logger is to save people counts—number of people per hour or per half-hour for example
- Check counting accuracy
- Schedule data collection

3.3 Starting VT Setup

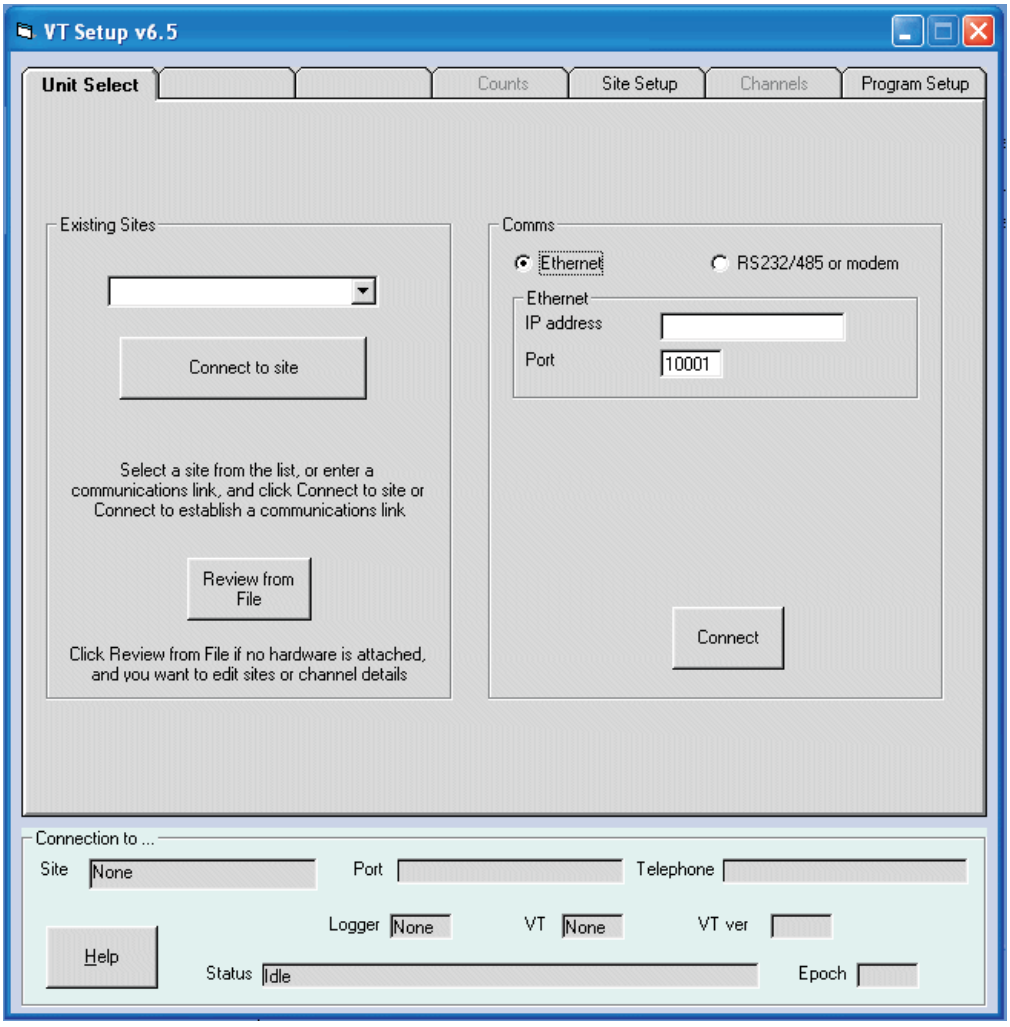
1. Make sure your Video Turnstile units are connected and switched on.
2. From the Windows Start menu, choose the Windmill 6.0 program group then select VT Setup.
3. Start with the Unit Select tab and choose the **communications link** between the VT Loggers and the PC: Ethernet for instance. (For Wi-Fi choose Ethernet.) Fill in the other sections such as IP Address. See Section 3.4 for full details. You can skip this step in future sessions and just connect to a site as in point 5 below.
4. Use the Site Setup tab to **create a site** (Section 3.5). Again, you can skip this step in future sessions and just connect to a site as in point 5 below.
5. Select this site in the Unit Select tab. The choices you now make in VT Setup will apply to the Video Turnstile modules of this site.
6. If necessary, use the Logger Setup tab to change the addresses of the l**ogging units**, and the VT Setup tab to change the addresses of the **non-logging units** (Section 3.6.1).
7. Use the Logger Setup tab to set the **epoch length** (Section 3.6.2). This is the interval over which counts are totalled, counts per hour for example.
8. Use the VT Setup tab to **view the counting zone on a monitor**, set the **height of the camera** above the floor, the **position and size of the counting zone**, the **video format**, whether **wide entrances** are to be monitored and so on (Sections 3.10.3–3.11.8).

9. Use the Channels tab to **name the individual people counters** (Section 3.7).
10. Use the VT Setup tab to **check the counting accuracy** (Section 3.12).
11. Schedule data collection with the Program Setup tab (Section 3.14).

3.4 Choosing Communications

The first time you use VT Setup, follow these steps.

1. Choose the Unit Select tab.



VT Setup has a row of tabs across the top. These take you to screens which let you connect to, and configure, your VT modules.

2. Select how the Video Turnstile Loggers are connected to the PC: by an Ethernet link or by a serial link (RS232, RS485 or modem). For Wi-Fi networks select Ethernet.

3. For Ethernet and Wi-Fi links enter the IP address and Port. The default IP address is 169.254.117.220. For more on IP addresses see Chapter 2.

4. For RS232 or RS485 links, enter the number of the COM port to which the Logger is connected.

5. For a modem link enter the number of the COM port to which the modem is connected. Also enter the modem's dial-up number. Include only figures: not spaces, modem pause commas, etc. Remember to allow for additional dialling numbers, such as those required for external lines.

6. Click the Connect button. This closes any existing communications link and opens a new one using the port or IP address specified.

If you cannot establish communications, check the:

- wiring at the RS485 adaptor (if using)
- specified COM port
- Ethernet communications (Section 6.3)
- Logger addresses (Section 3.6.1)

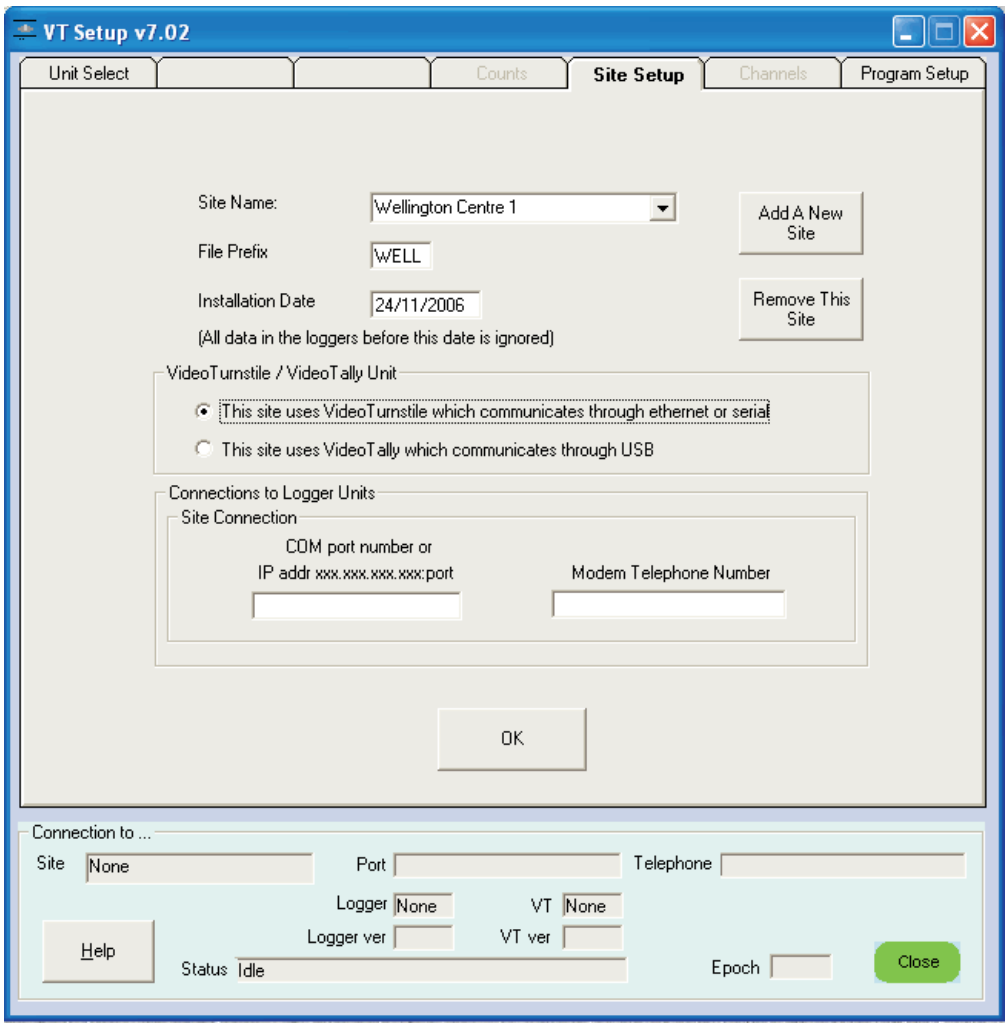
One you have created a site you can skip this step: when you load the site the correct communications link will be opened.

3.5 Creating a Video Turnstile Site

You need to create at least one site from which to download data. A site is a collection of Video Turnstile Loggers. For instance, you could specify a site to be all Loggers connected to one COM port, or all Loggers dialled from one telephone number.

1. Choose your communications link, as detailed previously.

2. Select the Site Setup tab.



3. Enter a meaningful name such as "Oxford Branch" or "Bakery Line 4". This tells the user exactly which area they are dealing with, so make sure you enter a clear definition.

4. Insert a short prefix to identify the files from this site. This alphanumeric identifier can tie together more than one site, so that the data for all sites with an identical File Prefix will be collected as a single overall site. As an example, a school may have three sites with the names Classrooms, Kitchen and Boiler House. At these three locations there are loggers gathering data. If the File Prefix is S1, then all logged data will be sent to the same file under directory name S1.

5. You can set the date from which VT Collect will scan for data. This Installation Date defaults to today's date, but you can change it if you wish.

6. Choose whether you are using the Video Turnstile or Video Tally system. Video Turnstile communicates over Ethernet, Wi-Fi, RS232, RS485 or modem.

7. If using Video Turnstile enter the correct COM port (RS232, RS485, modem links) or IP address (Ethernet or Wi-Fi links).

8. If using a modem to transfer data, enter the modem's dial-up number. Include only figures: not spaces, modem pause commas, etc. Remember to allow for additional dialling numbers, such as those required for external lines.

Click OK and VT Setup creates the site, storing the details in a text file called sites.ini. Return to the Unit Select tab and your site will be shown.

To create another site select the Add a New Site button.

You can now tell the Loggers and their counting modules how to behave. Return to the Unit Select tab, choose one of the sites you have created and click the Connect to Site button.

3.5.1 Editing Site Details without Being Connected to the Loggers

If you wish you can edit the site details, and some other information, without the PC being connected to the Loggers.

1. In the Unit Select tab click the Review from File button.

2. You can now edit the Site details, the counting channel names (Section 3.12.6) and various program settings (Sections 3.14–3.35).

3.6 Changing a Logger's Settings

A Video Turnstile Logger collects and stores counts from up to 16 non-logging modules.

1. To enable the software to distinguish between modules they must have a **unique address of between 0 and 15**. See Section 3.6.1for details of changing addresses.

2. The VT Logger stores the people counts at regular intervals. See Section 3.6.2 for details of changing the interval.

3. If you have purchased a Dwell Meter, see Section 3.6.3 for how to change the logging interval and visit time.

4. See Section 3.6.4 for how to reset the Logger's clock to the correct time.

3.6.1 Setting the Addresses of Video Turnstile Modules

If you have purchased a rack of units, they should be appropriately addressed and you can ignore this section. If, on the other hand, you have bought **loose items** then all non-logging units will be set to **address 16**. This is so that you can add them to any existing system without a conflict of addresses. In this case though, you need to **use VT Setup to give them a proper address in the range 0–15**.

Note also that all Loggers default to address 0 following a reset, whilst non-logging units (VTs) default to address 16. A reset occurs, for example, if you have left the Logger off for several days and its battery has gone flat.

When adding modules, add one at a time. Use the VT Setup software to change the address to the next values (0 up) before trying to add another module.

1. If you haven't yet done so, in the Unit Select tab choose the site containing your Logger and click the Connect to site button.
2. Go to the Logger Setup tab. The address of the first VT Logger at this site is shown. Look at the drop-down list and make sure each Logger has a unique address from 0-29. If some have the same address then select one of the duplicates and click the Change button.
3. You can now check and change the addresses of the non-logging modules connected to this Logger. Select the VT Setup tab.
4. The VT Setup program tries to contact VT units with addresses in the range 0-16. Those that respond are shown in the Select VT Unit list. To change one of these addresses select it from the list and click the Change Address button. (To check you have the correct VT module, click the *Flash Up/Down on this VT* button. The module's count lights will flash three times.)

When choosing an address, the physical position of the VT Unit doesn't matter (unless you are monitoring wide entrances). Each non-logging unit has one camera attached, which monitors a doorway or part of a wider entrance. By identifying a unit you are also identifying its attached camera and therefore the doorway being watched.

With wide entrances several cameras are mounted in a row. Make sure the VT units connected to these cameras have consecutive addresses.

A non-logging unit may have the same address as the VT Logger.

Remember, units with address 16 will be ignored by the Logger. To collect data from such a unit you must change its address to one under 16 that is not being used by any other of the Logger's units.

3.6.2 Changing the Length of the Logging Epoch

The VT Logger saves its people counts at regular intervals: every hour or every day for example. This interval is called an epoch. A Logger can store 900 epochs of data before the oldest readings are overwritten.

To set the duration of the logging epoch:

1. If you haven't yet done so, in the Unit Select tab choose the site containing your Logger and click the Connect to site button.
2. Go to the Logger Setup tab and select a Logger from the Unit Address list.
3. Type your logging interval into the Epoch Length box and click the Change button.
4. Update the clock by pressing the Reset button. This ensures that the number of seconds to the end of the epoch is calculated correctly (shown as the *Time to next* value).

The counters recording exits will have even epoch numbers and the counters recording entries odd epoch numbers.

Note: *If you wish, you can set different epoch lengths for each logging unit. However, the VT Collect software will collect the same number of epochs per day from each unit. This means that if you set VT Collect to log hourly counts, but some units are set to log counts each half-hour, then the half-hours are added together. If units are logging counts every two hours, but VT Setup is logging counts each hour, then VT Collect will show every other hour's count to be 0.*

3.6.3 Changing Dwell Meter Settings

The optional Dwell Meter records how long people spend in an area and how often that area was visited. You can choose the length of time over which to record visits, and have differing logging epochs. For example, you could count the number of people visiting a zone every 2 seconds for the first 24 seconds, then every 10 seconds for the next 2 minutes.

A Dwell Meter has 24 epochs, split into 0–11 and 12–23. You enter an epoch length for the first 12 epochs, and a multiplier for the next 12. To achieve the example given above, you'd enter 2 seconds as the length of epochs 1–11, and a multiplier of 5 for epochs 12–23

1. Select the Unit Select tab, choose a site on which to work and click the Connect to site button.
2. Go to the Logger Setup tab and select a Logger from the Unit Address list.
3. Choose the Dwell Epochs button.
4. Enter the basic epoch length and the epoch multiplier.

Note: *Also make sure that Dwell is enabled in the Settings tab, Section 3.11.6*

3.6.4 Updating the Logging Video Turnstile Unit's Clock

To begin with the LVT's clock will probably be wrong. You can adjust it in the Logger Setup tab.

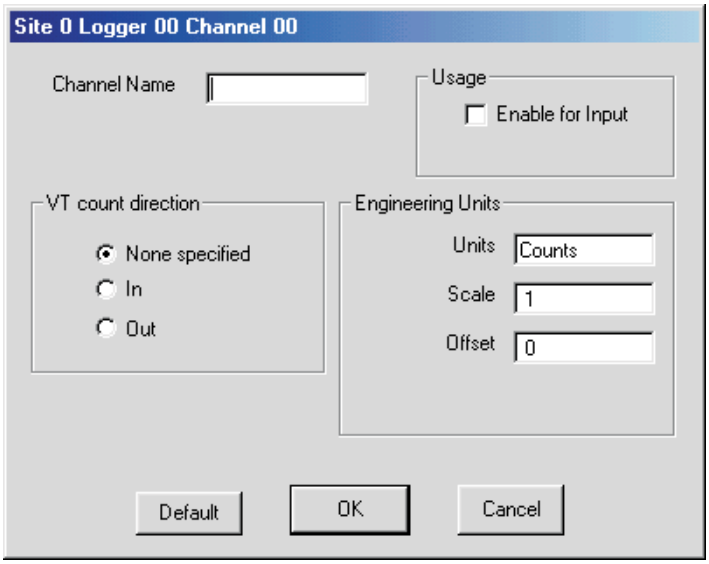
1. If you haven't yet done so, in the Unit Select tab connect to a site.
2. Go to the Logger Setup tab and select a Logger from the Unit Address List.
3. Click the Reset button. The time and date are updated to match those of the computer.

3.7 Giving Each People Counter a Name

A VT Logger collects counts from up to 16 non-logging modules. This means that each Logger handles up to 32 counting channels: 16 counting people entering and 16 counting people leaving.

At first the counters are called 00000, 00001, 00002, etc. However, you can rename them to something that reflects their function—Front_Door for instance. This helps prevent confusion about which doorway is being monitored.

1. Go to the Channels tab.
2. Select a Site.
3. Select a Logger from the Logger Number list.
4. Click the counter you wish to rename.



5. Type your new counter name into the Channel Name box. Each VT unit has two counter channels: one for counting entries and one for counting exits. We recommend giving the two channels the same name as when you press OK, the word IN or OUT will be appended to the channel name you chose.

6. Make sure the Enable for Input box is checked for each counter you plan to use.

7. Choose whether this counter is to count people going in or going out.

8. You can rename the units of the counts. Initially the values are shown as "Counts", but you could change this to something else—"Visitors" for example.

9. You can adjust the scale factor for counts which are constantly under or over. For example, if a VT count is 5% short of the actual count then set a counting scale factor of 1.05 to add 5% to the logged values. Keep the offset setting at 0 as this is not used in counting applications. (See also Sections 3.12–3.15, on checking and correcting count accuracy.)

10. Click OK. Continue for the rest of the counters connected to this Logging Video Turnstile unit.

11. Press Accept Changes before moving on to any other Loggers in the drop-down list.

You can also create calculated channels here. These let you perform calculations on the count data and store the results in the logged data file. Section 3.13 refers.

3.8 Selecting a VT Module

Each non-logging VT module monitors one CCTV camera and counts people going in and out. It regularly passes the counts to its VT Logger, which saves the counts. You specify counting and camera settings (counting zone position, people sizes, etc) for individual modules, rather than for the site as a whole. To change a module's settings first select it in VT Setup as follows.

1. If you haven't yet done so, in the Unit Select tab connect to a site.
2. Go to the Logger Setup tab and choose the controlling Logger.
3. Select the VT Setup tab. More tabs appear.
4. Identify the VT module and choose its address in the Select VT tab.
5. Check you have the correct VT module: click the *Flash Up/Down on this VT* button. The module's count up/down lights flash three times.
6. If you are working with a VT module that is not the first in the list then the software needs to read its present settings. You can do this in two ways: either click the Tune button, or move to the Settings tab and click button 1 *Read settings from module*. This might take a few moments. When you do this your VT module stops counting and its count lights flash.
7. You are now ready to configure your module.

3.9 Configuring Cameras and Viewing Entrances

It helps when you are setting up the Video Turnstile system to connect the CCTV camera to a television or a frame grabber. This lets you view the counting zone and verify that people are being counted correctly. See Section 3.9.1 for details.

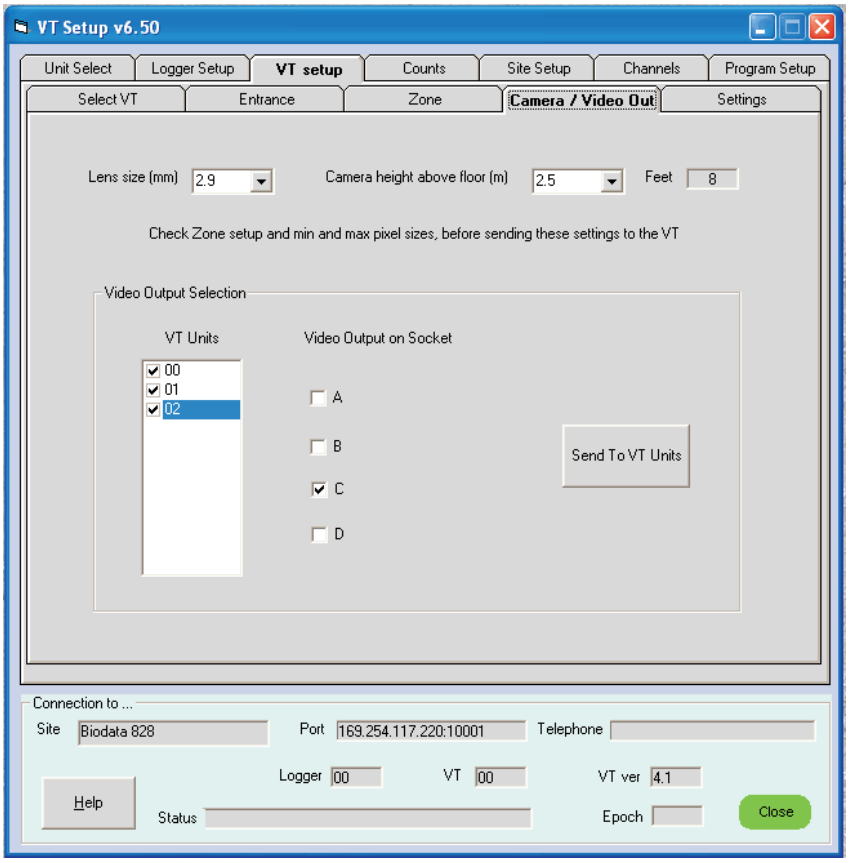
The height of the camera above the floor, and the lens size, affects the size of people in the picture. See Section 3.9.2 for details of entering the correct height and lens size.

Make sure your video format matches that in use: CCIR, PAL, EIA or NTSC. Section 3.9.3 gives details.

3.9.1 Viewing an Entrance on a Television Monitor

1. Select the VT module to which the camera is connected, as detailed in Section 3.8.

2. Select the Camera/Video Out tab. Make sure your selected VT module is ticked to show that it is connected to a video output. You can view up to four video pictures at once (and thus up to four monitors showing four different entrances). In each rack system there is a module with four video outputs: A, B, C and D. Connect the appropriate video output to your monitor.



3. Click the Send to VT Units button.

Section 2.6 gives details of which leads to connect to where.

3.9.2 Setting the Height of the Camera

A person viewed in a camera two metres above the floor will appear around three times as large as when the camera is three metres above the floor. This means that you need to set each camera's settings to suit its location.

By default the system assumes a camera 3 m above the floor with a 3.6 mm lens. If this is not correct then change this setting before altering other counting settings.

If you find that people are not being counted you could change the setting to a greater distance, which will in effect increase the sensitivity. Double-counting indicates that a nearer setting would be better. (See also Sections 3.12–3.15, on checking and correcting count accuracy.)

1. Select the VT module to which the camera is connected, as discussed in Section 3.8.
2. In the VT Setup tab, click the Tune button. The software reads the VT module's settings, which might take a few moments. When you do this the selected VT unit stops counting and its count lights flash.
3. Enter the correct lens size and the height of the camera above the floor. VT Setup changes its other settings—counting zone position, size of people, etc—to suit the new camera position. Some of the new settings are shown in the *Suggested* grid. You can edit these here if you wish. Section 3.11 gives details.
4. Click the Apply to VT button or Send Settings to Module.

Note: *You can also see the camera height and lens size in the Camera/Video Out tab.*

3.9.3 Setting the Video Format: CCIR, PAL, EIA or NTSC

Two frame rates are used for different camera types: 50 frames per second for the European CCIR (or PAL for colour) and 60 frames per second for EIA (or NTSC for colour).

1. Select the VT module to which the camera is connected, as detailed in Section 3.8.
2. Select the Zone tab.
3. Select the TV format.
4. Click the Apply to VT button or Send Settings to Module.

Because of the different number of lines in the picture for the two formats, the counting zone size will change when a different format is selected. If you have previously set the position and size of the zone, the size of people, the following-on settings etc, you will now need to adjust them.

3.10 Positioning the Counting Zone

You configure the counting zone of each entrance individually. You can set the size of the zone and where people enter and exit.

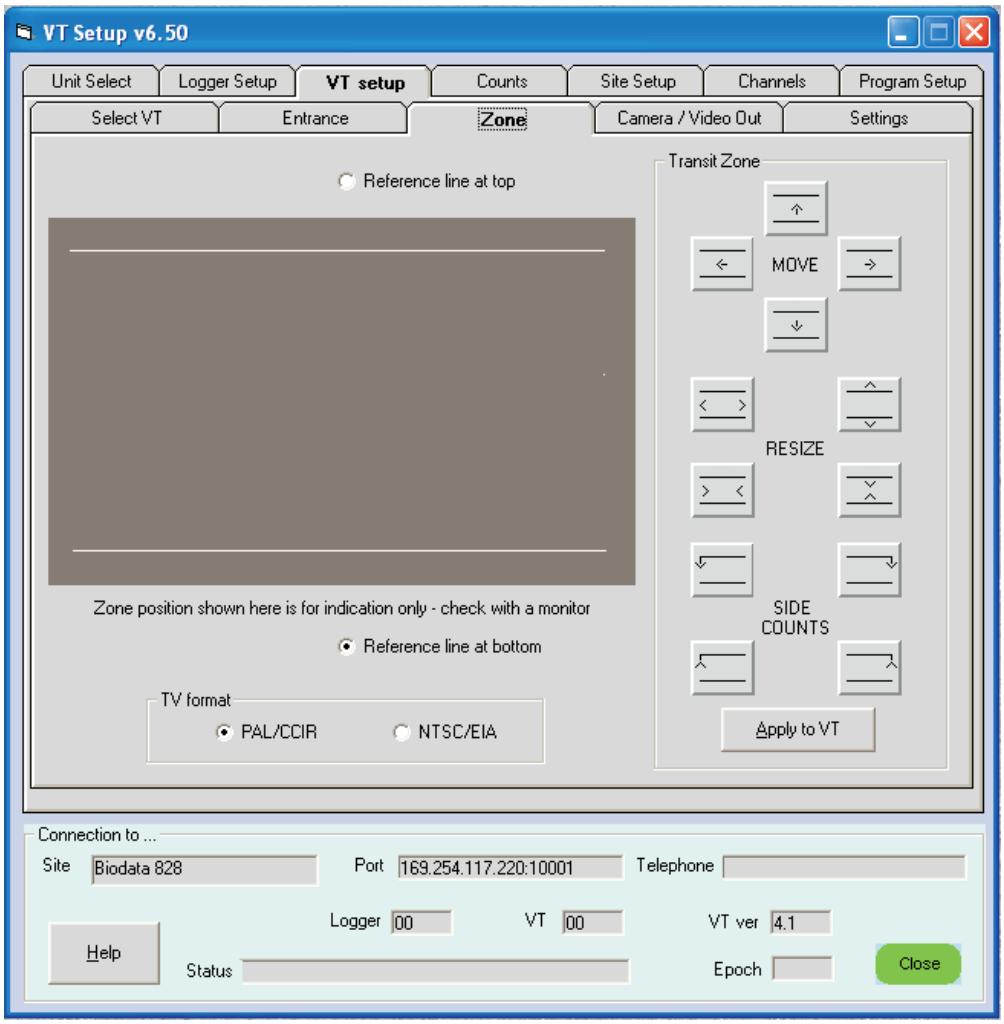
3.10.1 Positioning the Counting Zone

When changing the position and size of the counting zone you might like to connect the VT module to a TV Monitor so you can see the exact location of the zone (Section 3.9). If you need to, change the camera height and video format before adjusting the counting zone.

This table shows the default zone widths for different lenses and camera heights. You can change these by up to 25%.

Focal Length	2.9 mm	3.6 mm	4.6 mm	6.0 mm	8.0 mm
Height					
2 m	1.66 m				
2.5 m	2.07 m	1.67 m			
3 m	2.48 m	2.00 m	1.57 m		
3.5 m	2.90 m	2.33 m	1.83 m		
4 m		2.67 m	2.09 m	1.60 m	
4.5 m		3.00 m	2.35 m	1.80 m	
5 m			2.61 m	2.00 m	1.50 m
5.5 m				2.20 m	1.65 m
6 m				2.40 m	1.80 m
6.5 m				2.60 m	1.95 m
7 m					2.10 m
7.5 m					2.25 m
8 m					2.40 m

1. Select the correct VT module, as detailed in Section 3.8.
2. Select the Zone tab.
3. Choose whether the Reference line is to be at the top or the bottom. The reference line is the one which the visitor must cross to be counted, for example the line of a doorway or the start of a stairway.



4. Use the Move and Resize buttons to change the size and position of the counting zone. Check that:
   - The markers cover the full width of the region where people transit
   - The general direction of movement is up and down the screen on the video from the VT module
   - The lines are far enough apart so that people do not cover both markers simultaneously. (Red and green lines show the size of a person.)

5. Click the Side Counts buttons to display the side exit lines. See the next section for details.

6. Click the Apply to VT button or Send Settings to Module.

7. To find out the actual width of the zone in metres or feet, go to the SelectVT tab and click the Tune button.

3.10.2 Turning Left or Right after Entering

There are many situations where people coming through a doorway have a tendency to turn sharply left or right in order to reach some particular attraction. To cater for this VT can count people who cross the reference line and exit through one of the side lines.

In this case you need to make sure that the counting zone discussed in the previous section is slightly wider than the width of the entrance. This allows a person walking on the side of an entrance to be counted as a whole person.

To count people turning left or right:

1. Select the correct VT module (Section 3.8).
2. Select the Zone tab.
3. Choose whether the Reference line is to be at the top or the bottom. The reference line is the one which the visitor must cross to be counted.
4. Click the Side Counts buttons to display side exit lines. If the Reference line is at the bottom people will be counted if they enter through the bottom line and exit through the top line or the side lines. The side lines won't quite reach the Reference line, as a visitor must at least get into the zone before being counted. For example, if you were monitoring the top of an escalator then visitors would cross the bottom Reference line as they stepped off the escalator, and would then fan-out: going forward or to either side.
5. Click the Apply to VT button or Send Settings to Module.

3.10.3 Counting through Wide Entrances

For entrances that are wider than a double-doorway, you need to mount several CCTV cameras in a line across the ceiling. Each camera is attached to one Video Turnstile unit, and you need to tell VT Setup which Video Turnstile units are covering the wide entrance.

1. Select the VT Setup tab.
2. From the Select VT tab, choose one of the VT units that is monitoring a wide entrance. When you do this the selected VT unit stops counting and its count lights go on. When you are working with a VT unit which is not the first in the list, then move to the Settings tab and click button 1, *Read settings from module*. This may take a few moments.
3. Select the Entrance tab and choose "Part of a wide entrance".

4. The units monitoring a wide entrance must have consecutive addresses. Choose whether your selected unit has its counting zone Left Edge linked to the unit at the next lower address, or the zone Right Edge linked with the unit at the next higher address, or both.

5. Click the Apply to VT button or Send Settings to Module.

For more on positioning cameras across wide entrances see Section 2.7.3.

3.11 Changing the People Detection Settings

The Video Turnstile system is very flexible. You configure each entrance individually, optimising counting accuracy for each situation.

1. Select the VT module which is monitoring your entrance, as detailed in Section 3.8.

2. Either click the Tune button in the Select VT tab, or select the Settings tab. (You can change many settings from both of these places.)

Checking Accuracy
The system also provides tools to check counting accuracy and fine tune the system. This is covered in Section 3.12. If you are not sure of the setttings to choose: check the counting accuracy then make any suggested changes.

How the System Detects People
The Video Turnstile system works by detecting change against a stored background.

The detection software sees the counting zone as a grid 32 pixels wide and 16 pixels long. An object passing through the zone is a “blob” of pixels. Depending on your settings in VT Setup, the software decides whether the blob is one person, more than one person or an object like a pram or shopping trolley.

3.11.1 Setting the Size of a Person

There are three settings governing the size of a person in the picture: the minimum width, the typical width and the typical area.

A person will not be counted unless they exceed the minimum width.

The typical width is used to decide if an object is one or two people.

The area of objects crossing the counting zone is continuously variable. The pixel "blob" may be one person, two people side-by-side, one person following another , a person pushing a pram, etc. Two people side-by-side would be a wide, thin are. Two people following one another would be a long narrow area. The typical area is used with the typical width to decide how many people the object represents.

1. In the Settings list, alter the MinDetect, Typical Width and Typical Area. You might like to start with the default settings and only make changes when you are testing the system (Section 3.12).

   Minimum Person Width (MinDetect)
   - Set the minimum person size to match the minimum size of an adult or child to be counted.
   - If the minimum size is too small then small objects and animals may cause counts.
   - If the minimum size is too big then children, small adults or adults wearing clothes that closely match the background colour may not be counted.

   Typical Person Width
   - This should be bigger than the minimum person size (MinDetect).

   Typical Area
   - Where the camera gives a view of a good-sized area, people have typical areas of 40-80 pixels.
   - If the camera is mounted on a low ceiling, people will look very large in the picture and their typical areas will be bigger.

2. Click the Apply to VT button or Send Settings to Module.

3. If you wish to set other VT units to this setting go to the Settings tab and click button 5, *Copy settings to higher address numbers*.

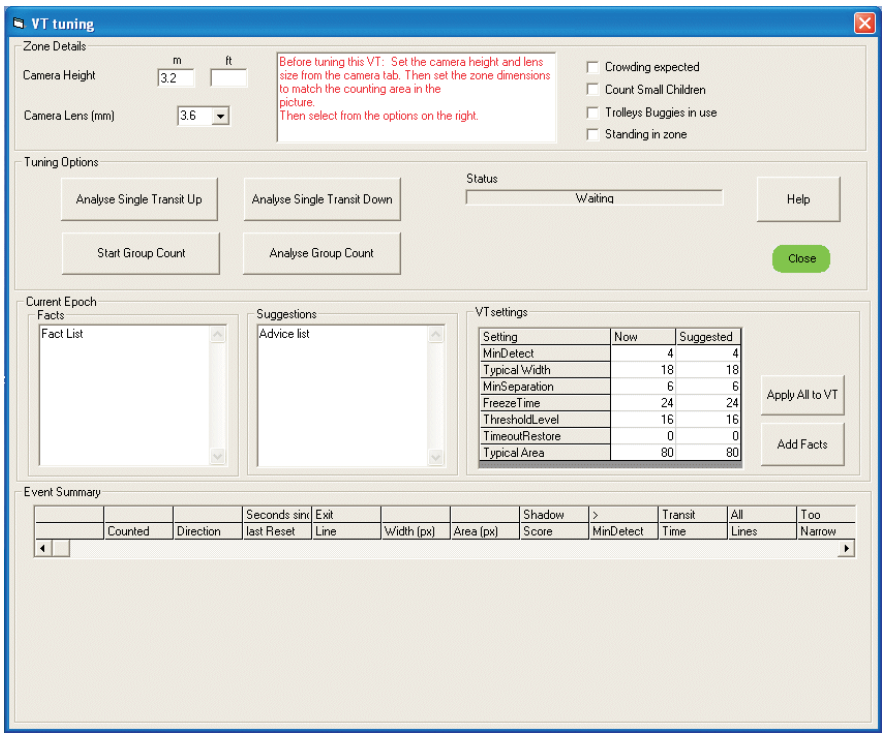
Note: Changing the height of the camera above the floor in software will also alter the size of the person detected. Between 2 and 3 metres above the floor, the area of screen taken up by a 1.8 m tall person changes considerably. A person viewed in a camera 2 metres above the floor will appear around 3 times as large as when the camera is 3 metres above the floor.

3.11.2 Counting in Crowded Situations

Depending on your situation, you can set a VT module to count more or less conservatively when it comes to one person following another. In a very crowded situation, where people are packed closely together, you can set the VT to allow only a little time between people. In a less crowded situation a more conservative option is better since it prevents

false detections of shopping trolleys and the like. The system defaults to the conservative option, to change this to crowd counting follow these steps.

1. In the Settings list, set the TimeoutRestore value to 1. This enables close following. (If you expect shopping trolleys or lots of children's buggies, leave the TimeoutRestore value at 0.)



VT Tuning: Go to the SelectVT tab and click the Tune button. This screen helps you check the accuracy of counting.

2. Click the Apply to VT button.

3. If you wish to set other VT units to count crowds then go to the Settings tab and click button 5, *Copy settings to higher address numbers*.

Note: *See also Setting the Gap Between People (Section 3.11.3) , Diagonal Splitting (Section 3.11.6), BlobMidSplit (Section 3.11.6) and Double Counting (Section 3.11.6). These let you fine tune the system to count crowds.*

3.11.3 Setting the Gap Between People

For two people walking side by side to be seen as two people, by default the gap between them needs to be greater than 8 pixels. You can change this to suit your situation. Reducing the gap, for example, for crowded situations.

1. In the Settings list, alter the MinSeparation entry to change the minimum gap between two people side-by-side. Where people tend to be close together you could reduce the minimum gap by half.
2. Click the Apply to VT button or Send Settings to Module.
3. If you wish to set other VT units to this setting go to the Settings tab and click button 5, *Copy settings to higher address numbers*.

Note: *See also Double Probability (Section 3.11.6).*

3.11.4 Changing the Length of Time a Person can Stand Still and be Counted

The Video Turnstile system detects people moving through a counting zone. It may be, though, that people enter the counting zone and then stand still. If they stand still for long enough, Video Turnstile will consider them to be part of the background. By default a person can stand still for up to 24 seconds and still be counted. You can change this to 8, 16, 24, 30, 32 or 40 seconds. Use a longer time for areas where people tend to queue or linger.

1. In the Settings list, type into the suggested FreezeTime box.
2. Click the Apply to VT button or Send Settings to Module.
3. If you wish to set other VT units to this setting go to the Settings tab and click button 5, *Copy settings to higher address numbers*.

3.11.5 Adjusting for Moving between Light and Dark Areas

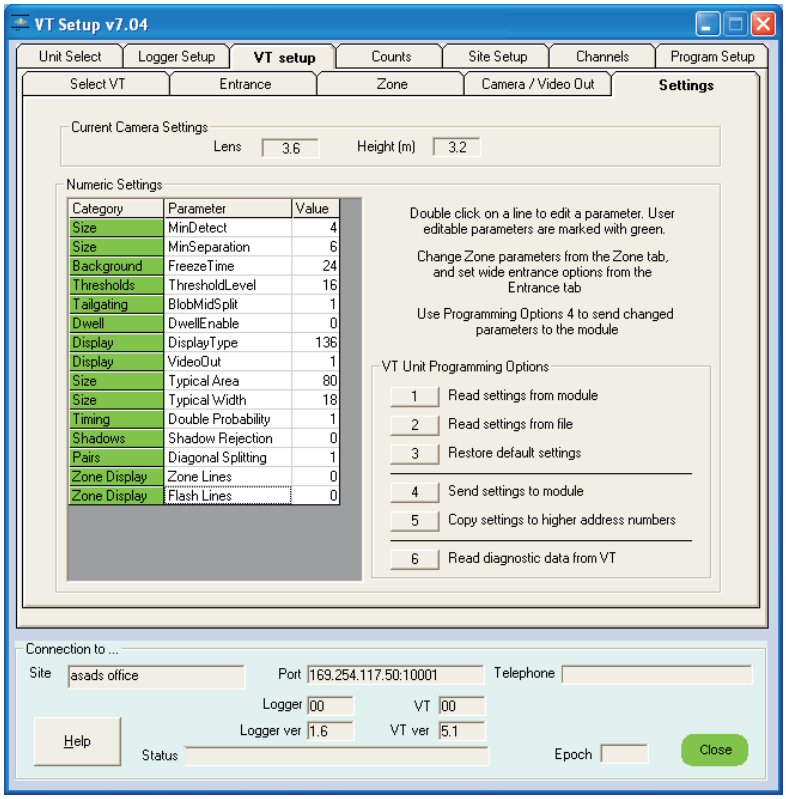
If people going in one direction are less easily counted this is usually because of different lighting conditions on the two sides of the zone. You can adjust for this.

1. In the Settings list, alter the ThresholdLevel. To help detection against darker backgrounds, reduce this by 4. Levels down to 8 are acceptable.
2. Click the Apply to VT button or Send Settings to Module.
3. You may now need to compensate for wider perceived width. To do this edit the Typical Width entry.
4. If you wish to set other VT units to this setting go to the Settings tab and click button 5, *Copy settings to higher address numbers*.

3.11.6 Changing other Settings

The Settings screen shows the configuration of the currently selected VT unit. There are 15 settings you can change here. For many of these you can also use the Tune button on the VT Setup tab to make changes. To change settings:

1. Go to the Settings tab and click button 1, *Read settings from module*.



2. Double-click a green entry in the Numeric Settings grid.
3. Make selections in the dialogue box which appears, and click OK.
4. Click button 4, *Send settings to module*.

MinDetect (Person Size)

Sets the minimum number of pixels to be counted as a person. This can be between 1 and 16.

Typical Width (Person Size)

The typical width is used to decide if an object is one or two people.

Typical Area (Person Size)

The typical area is the space occupied on the screen by typical person (in pixels squared).

MinSeparation (Person Size and Crowds)

The gap, in pixels, needed between two people walking side-by-side for them to be seen as two people. A larger gap gives a conservative count, a smaller gap is better for crowds.

Double Probability (Person Size and Crowds)

Use this setting to predict whether a large is object is one or two people. If people tend to walk very close together, set the Double Probability to 1 to tell the software to count two people. Otherwise, if it is more likely to be one big person, then set the Double Probability to 0.

Diagonal Splitting (Crowds)

There are times when two close-together people may be regarded as one person. They then move far enough apart to be distinguished as two objects. If both objects are more than half the typical area, they are counted as two people. If one of the areas is small it is ignored. If both are of an intermediate size the Diagonal Splitting factor comes into play. Set to 1 to enable close following, counting two people (useful in crowded situations). Set to 0 to disable splitting into two people, counting as one person (useful with cameras on low ceilings). (If the two areas separate by more than 3 pixels then they will be counted as two people, whatever your Diagonal Splitting setting.)

BlobMidSplit (Tailgating and Crowds)

When two people are following one another closely it is sometimes not possible to see the gap between them. This may be because the gap is bridged by shadows or perhaps a swinging arm or leg. The BobMidSplit looks for this and splits them into two different areas of pixels (in a similar way to Diagonal Splitting). Set to 1 to enable splitting (when counting crowds for instance), or 0 to disable.

FreezeTime (Background)

Sets the time in seconds for which the background is frozen when a person is present. See Section 3.11.4 for details.

ThresholdLevel (Background and contrast)

The ThresholdLevel determines the contrast required between person and background. To help detection against darker backgrounds, reduce the level by 4. Levels down to 8 are acceptable (Section 3.11.5).

DwellEnable (Dwell Meter)

If you have purchased the Dwell Meter, select 1 to enable it. Otherwise leave the setting at 0.

Shadow Rejection

If you think the software counting shadows, then set the Shadow Rejection to 1. (When you test the accuracy of the system, as in Section 3.12, it will tell you if it thinks shadows are causing a problem.

Display Type (Zone Display)

When recording, enter 136 to show flashing lines on the picture whenever anyone is counted. Enter 8 to hide the flashing lines.

Video Out

Set to 1 to turn the video out signal on, and 0 to turn it off.

Zone Lines (Zone Display)

Set to 1 to hide the zone marker lines on the television, and 0 to show them.

Flash Lines

Set to 1 to show flashing lines on the television whenever anyone is counted. Set to 0 to hide the flashing lines.

3.11.7 Settings Summary

For Crowded Situations, consider changing these settings

Timeout Restore to 1 (Section 3.11.2),
MinSeparation to 3 (Section 3.11.3),
Diagonal Splitting to 1 (Section 3.11.6),
BlobMidSplit to 1 (Section 3.11.6),
Double Probability to 1 (Section 3.11.6).

For Person Size, change these settings

MinDetect (Section 3.11.1),
Typical Width (Section 3.11.1),
Typical Area (Section 3.11.1).

For Queuing and Waiting, change these settings

Lengthen the FreezeTime (Section 3.11.4),
Diagonal Splitting to 1 (Section 3.11.6),
BlobMidSplit to 1 (Section 3.11.6),

For Dark Entrances, reduce this setting

ThresholdLevel (Section 3.11.5).

For Rapid Lighting Changes, change these settings

Doors opening, for example, may cause changes to the light. If so consider reducing the Freeze Time (Section 3.11.4) and increasing the ThresholdLevel (Section 3.11.5).

For People Entering at One Point then Widely Dispersing

On an escalator, for example, people may step off at a narrow point then disperse in all directions. Turn on the side exit lines (Section 3.10.1) and the splitting options—Diagonal Splitting and BlobMidSplit (Section 3.11.6).

For Cameras Mounted on Low Ceilings

In this case people look very large in the picture. They may seem to break up and so you should turn off Diagonal Splitting (set to 0). Also turn off Double Probability and maybe BlobMidSplit (Section 3.11.6).

3.11.8 Copying Settings to Other Video Turnstile Units

You can copy most of the settings you have specified for your first VT unit to all the other units.

1. Select the VT Setup tab and go to the Settings tab. The settings you have specified are displayed in a grid. See Section 3.11.6 for details of these.

2. Click Button 5, *Copy settings to higher address numbers*. The settings you enter in this screen and elsewhere are copied to all the VT units with higher address numbers.

3. The video out settings and the names of the counters will not be copied.

3.12 Checking the Accuracy of Counting

Video Turnstile helps you check how accurately people are being counted in each counting zone. It also makes suggestions for which settings to adjust to improve accuracy.

First check the accuracy for one person going through one doorway, as detailed in Section 3.12.1. When you are happy with the performance check that groups of people are counted accurately (Section 3.12.3).

Once satisfied with the counting accuracy you can schedule the times to collect data. See Section 3.14 for details.

3.12.1 Checking the Counting Accuracy: Individuals

Send a person through the counting zone and follow the steps below to make sure that the individual is counted properly. When you've done that send the person through the other way and check again. Do this for a few different people, one or two at a time. Finally monitor 50 or a 100 transits of one or two people.

1. Connect a monitor, hand-held TV or frame grabber (Section 3.9).

2. Send a person through the counting zone. Check that the individual causes one, and not two, counts—watch the count lights on the VT or the flashing zone lines.

3. From the Select VT tab click the Tune button. The VT Tuning screen appears (page 3.19) and the diagnostic time is set to zero. (The diagnostic time gives an indication of how long ago an event occurred. It is not absolutely accurate but designed to let you see when events occurred relative to each other)

4. Depending on the direction the person walked, click the Analyse Single Transit Up or Analyse Single Transit Down button. You are asked some questions about the person, so that the system can make recommendations of settings to use.

- Was the person going up screen or down screen?
- Were they an adult, a large adult, a small adult or a child?

This helps the software determine the expected range of person size.

5. At the bottom of the screen the software shows a list of the 10 most recent events. It marks in green the one it considers to be the transit of the person. Other events might include shadows or a door opening. This lets you see exactly what the system is detecting as a person.

6. The software makes some recommendations in the Suggested column of the VT settings grid. To accept these Click the Apply to VT button or Send Settings to Module. You can edit the suggestions if you wish.

7. After adjusting your settings, send a person through the other way and repeat points 4-6 above. Do this a few times for each direction, sending one or two people through each time. Make sure that the system is counting correctly with no double-counts and that two people side-by-side are not counted as one.

8. If people going in one direction are less easily counted this is usually because of different lighting conditions on the two sides of the zone. Try lowering the value of the ThresholdLevel to help detection against darker backgrounds (Section 3.11.5).

9. See the table below for help identifying the cause of poor counting. You might also find the *What to do if the System is Under- or Over-Counting* Section useful.

3.12.2 Identifying the Cause of Poor Counts: Decoding the Event Summary

Parameter:	*Value:*	*Meaning:*
Direction	0 or 1	Whether the person is going up or down the screen. 0 is down-screen and 1 is up-screen.
Seconds since last Reset		The approximate number of seconds since you clicked the Tune button

Exit Line	0	An object going up-screen and exiting at the top reference line. See Section 3.10.1 to change.
	7	An object going down-screen and exiting at the bottom reference line.
	1-6	The object has disappeared without crossing the reference line and will not be counted. This may be because of a shadow or a light reflection. Make sure that people passing through have enough contrast throughout the zone.
Width	1-32	The width of an object in pixels. (1 pixel is 1/32 of the zone width.) Compare this to the MinDetect and Typical Width values in the VT settings table and alter these if necessary.
Area		The area a person occupies in pixels squared. Check the Typical Area value is correct.
Shadow Score	0-4	This is a probability score relating to shadow detection, where 0 is definitely not a shadow and 4 is very likely a shadow. If the score is greater than 0, the system tightens detection criteria in its Suggestions list to avoid counting shadows.
> MinDetect	0 or 1	1 indicates that the object was greater than the minimum person size and eligible for counting. 0 indicates it wasn't and will not be counted.
Transit Time	0 or 1	Indicates the time the object took to pass through the zone. 1 = OK, 0 indicates that the object passed through quickly and could possibly be a shadow.
All Lines	0 or 1	0 indicates that both reference lines in the zone have been triggered simultaneously by a single object, which can indicate a shadow. Make sure that the zone is large enough that a single large person does not fill it from top to bottom. Alter the zone size or possibly the camera height.
Too Narrow	0 or 1	0 indicates that the object in the zone is considered to be too narrow to be a valid count, and is likely to be a shadow. If this is incorrect alter the minimum person size (MinDetect).
Sequential Consistency	0 or 1	0 indicates that object's size has changed as it passed through the zone. False readings from this may occur if the camera is placed to count on stairs, where the person gets nearer the camera as they go up the stairs and vice versa.

2*Min Detect	0 or 1	0 indicates that the object is smaller than the system expects an adult to be (an average adult should be more than twice the minimum person size). If the object is smaller than this it may be considered a small child, or other object not to be counted. The width of objects are only measured on the middle line.
Shimmer	0 or 1	0 indicates that the object is all dark with no lighter patches, and may be a shadow. 1 indicates that the object has both light and dark areas.
Pos	0 or 1	0 indicates that the object is not brighter than the background, which may indicate a shadow. 1 indicates that the object is brighter than the background.
End line commit	0 or 1	0 indicates that the object has stopped on the exit reference line.
Split	0 or 1	The object has split into two parts as it passed through the zone. This may occur on the overlap if the VT unit is monitoring a wide entrance or corridor.

3.12.3 Checking the Counting Accuracy: Groups

Proceed as for the checks on individuals but this time run the check with a number of people going through the zone: fifty or a hundred for example. Manually count the people and check this against the electronic count. Keep a note of the direction they were going, and what percentage were in wheelchairs or pushchairs or were children.

1. In the VT Tuning screen click the Start Group Count button.
2. Manually count at least 10 people passing through the zone. You can count in one direction or both.
3. Click the Analyse Group Count and enter the number that you have manually counted. You'll also be asked whether they were going up or down screen—if you don't know leave this blank.
4. VT Setup fills in its Event Summary table and shows the percentages of single counts, double counts and no counts for Up and Down directions.
   - Based on the manual counts, it shows the accuracy of the count test as a percentage.
   - Based on the accuracy percentages, the advice section suggests possible adjustments to improve accuracy.

5. To send the suggested settings to the VT unit, Click the Apply to VT button or Send Settings to Module.

Note: *If you make a mistake when entering your manual counts, click the Change Group Facts button.*

3.12.4 What to do if the System is Under- or Over-Counting

Video Turnstile is a conservative system and by default tends to under-count rather than over-count. During validation, if you find the system is under-counting then…

1. Consider increasing the sensitivity of the people detection by adjusting the camera height. Do this first before trying any other fixes as this controls the size of a typical person in the picture. A person viewed in a camera 2 metres above the floor will appear around 3 times as large as when the camera is 3 metres above the floor.
2. If you find two people walking side-by-side are being counted as one, check the minimum gap between people (MinSeparation settting, Section 3.11.3).
3. If you find small people are not being counted, decrease the minimum width that is detected as a person (MinDetect setting, Section 3.11.1).
4. If you find large people are not being counted, increase the Typical Area or Typical Width (Section 3.11.1).
5. If you find that crowds of people are not being counted correctly, adjust the TimeoutRestore (Section 3.11.2), Double Probability, BlobMidSplit, and Diagonal Splitting settings (Section 3.11.6).
6. If a person pushing a pram, for example, is being counted as two people, adjust the TimeoutRestore setting (Section 3.11.2).
7. If you find that people are leaving the counting zone without being counted, adjust the turn left and right settings (Section 3.10.2) , or whether the person is going up or down screen (Section 3.12).
8. If a person stays inside the zone and is therefore not counted, lengthen the freeze time (Section 3.11.4).
9. If you find poor counting from dark to light areas or delayed count registration from light to dark, reduce the Threshold_limit by 4 (Section 3.11.5). Do not decrease by more than 1 step because it will become more sensitive to artefacts. You may now need to compensate for wider perceived width of a person.

10. If you have checked the counting accuracy and tried the preceding steps and the count remains inaccurate, you can scale the count up or down. Go to the Channels tab and enter an appropriate scale factor. If it consistently misses 5% of people for example, you can compensate for this by entering a scale factor of 1.05 (to the nearest 2 decimal places).

3.12.5 Unexpected Counts: Checking the Raw Count Data

When you are using VTCollect to download counts, you might at times find it useful to see the raw data. This can provide useful clues about problems to do with unexpected counts or folders found in the data directories and their files. You can collect the raw counts from **all** the VT Loggers attached to the selected site. The counts from all epochs for all channels will be stored in an ASCII text file. (You wouldn't normally use this method to download data, but it is sometimes useful when setting-up the system.)

Getting the raw count data

1. Go to the Counts tab.
2. Click the Log all data epochs to file button. The data will be uploaded from the Logger to the file shown in the box beside the button.

The data file is given the name `setpLVT\LVT_x_ddmmyy.wl`, where x is the number of the LVT unit and ddmmyy is today's date. The name is shown in the File Name box. This is for information only: you can't edit the name there.

The file is stored in the site directory, according to the site's file prefix (as set in Section 3.5). For example, if the file prefix is abc then the file will be in

```
c:\videoturnstile\data\abc\setupLVT\LVT_x_ddmmyy.wl
```

If you have not specified a file prefix then the file will be under the direct directory

```
c:\videoturnstile\data\direct\setupLVT\LVT_x_ddmmyy.wl
```

The raw data thus saved are accumulating counts—the Video Turnstile counters are not reset to 0 at the end of each epoch. This allows the two logging processes—one local at the VT Logger and one at VT Collect software to computer disk—to proceed without interfering with each other. This means that if 10 people entered during the first epoch, and 6 during the second, at the end of the second epoch the channel would show 16.

Things to look for in the raw data file

Continuous good data
The first record in the raw counts file will be the most recently recorded epoch.
Your data epochs should then be at one epoch length apart as you go down the file.
There may be times when additional epochs are recorded, when the internal clock has been reset from the PC (done every time after a data upload with VTcollect).

Times when the logger was reset
If the Logger module's settings are disrupted, possibly by an electrical transient or by the internal battery going flat, the time in the logger reverts to 1/1/1970 and resumes from there until a new clock value is sent from the PC.
In between sections of good data values you may get sections where the date reverts to 1970, and these indicate when the Logger was reset.

Times when the logger was powered down
The Logger will not record epochs when the power is off, but the internal battery will hold the correct date-time for several days, so the unit will normally resume logging epochs when the power is restored.

Every other Epoch is 0
The VT Collect software's number of epochs per day is different to the VT hardware.

If you can't fix the problem then please contact your supplier for advice or see the Users' area of the Video Turnstile web site at http://www.videoturnstile.com/users/

3.12.6 Viewing the Updating People Counts

You can see the current counts of all the Video Turnstile units.

1. Select the Counts tab. VT Setup contacts all the units attached to the current communication link.

2. Select a Video Turnstile unit from the Unit Address list. The channels are shown as UP for IN counts (where a person moves from bottom to top of the picture) and DOWN for OUT counts (where a person moves from top to bottom of the picture).

Note: *You can also use VTrealTime to do this, as detailed in the next chapter.*

3.13 Performing Calculations

You can perform calculations on the count data and store the results in the logged data file. You can thus group data from individual VT counters. For example, if you have several cameras monitoring the width of a corridor, you can add together the up-corridor counters for the total people entering, and the down-corridor counters for total people leaving. You could also combine the people going in through several entrances to get the total visitors to a store.

When you haven't defined any calculations, the stored data file might look like this.

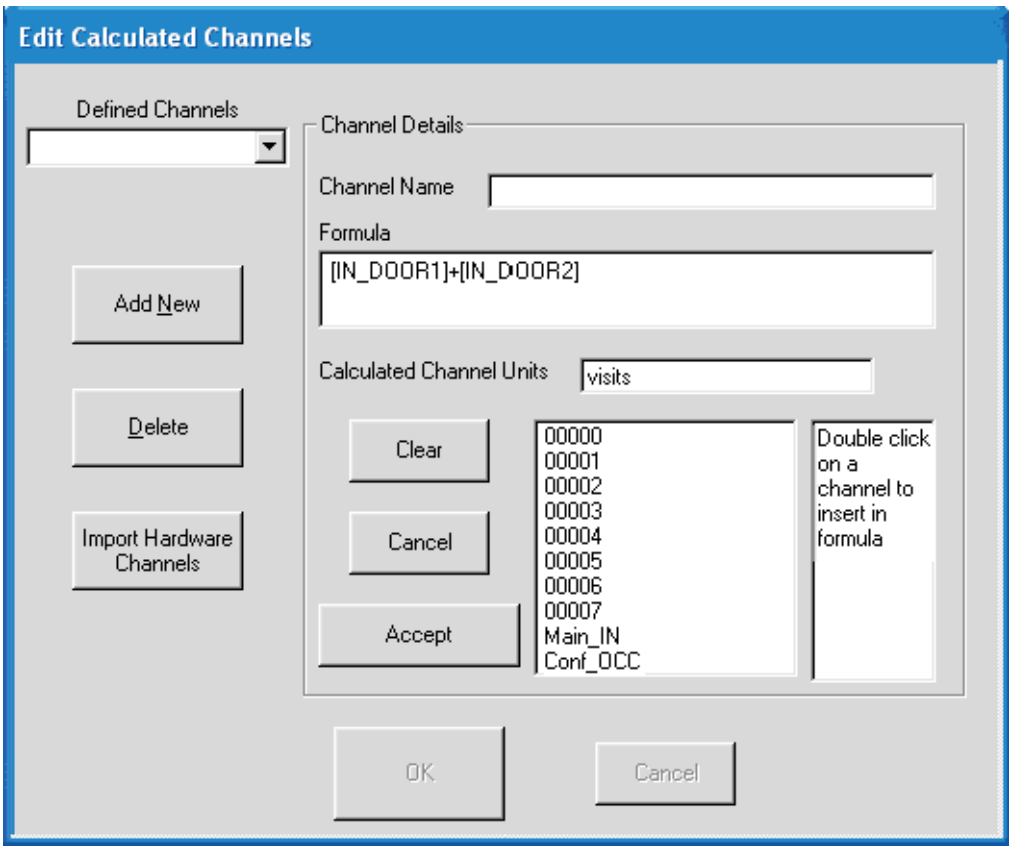
```
Windmill VT Collect -
File opened at: 00:00:00
File closed at: 23:59:59

Time       D1_IN   D1_OUT  D2_IN   D2_OUT
Secs       counts  counts  counts  counts
01:00:00   0       0       0       0
02:00:00   0       0       0       0
03:00:00   0       0       0       0
04:00:00   0       0       0       0
05:00:00   0       0       0       0
06:00:00   0       0       0       0
07:00:00   0       0       0       0
08:00:00   3       1       15      0
09:00:00   52      53      1       0
10:00:00   8       7       0       0
11:00:00   12      11      0       0
12:00:00   18      21      6       8
13:00:00   21      22      8       7
```

The data from each counter channel is stored in its own column. VT Setup sees your calculations as more channels of data. If calculating total visitors from several entrances, for example, you might create a calculated channel called All_In which added together totals from D1_IN and D2_IN. Daily and weekly totals for this channel will be calculated.

Note: to perform calculations make sure the "Additional Reports" box is checked in the Program Setup tab.

3.13.1 Defining Calculations

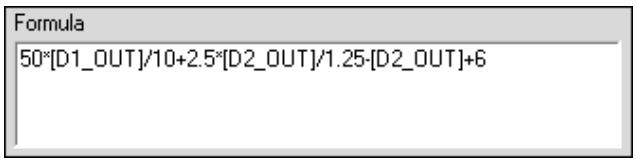
1. Select the Channels tab and click the Edit Calculated Channels button.



2. Press the Add New button. The Channel Details area appears.
3. Type a name for the channel into the Channel Name box.
4. Construct a formula for calculating the new value. Double-click a count channel to add it to the formula.
5. Press Accept to save the new calculated channel.
6. Repeat for as many calculated channels as you need, then press OK.

Typically in Video Turnstile applications the formula will be a simple sum of count channels, as in the example above. For the formula to work count inputs need to be enclosed in square brackets. This is done automatically if you double click a channel in the list.

More complicated formulae can be constructed if required. The Operators / * – + are supported.



The formula shown above involves two channels called D1_OUT and D2_OUT. The order of operations is: / * – +, so the above formula is evaluated as:

(50*([D1_OUT]/10))+(2.5*(([D2_OUT]/1.25)-[D2_OUT]))+6

Deleting Calculated Channels

To delete a calculated channel, select it from the Defined Channels list and press the Delete button. If you are part way through creating a new channel, and have not yet pressed the Accept button, you can just press the Cancel button. The Clear button removes the formula, leaving you with a blank box, but does not remove the channel.

Saving Calculated Channels

When you have created as many calculated channels as you need, press OK. VT Setup updates the calculated channels file. If no file yet exists it will ask you to give the new file a name.

Turning Off Calculations

If you wish to temporarily turn off calculations, but don't wish to delete all the ones you have entered, you can do so. Select the Program Setup tab. If the Additional Reports box is not ticked, your calculated channel settings will be ignored. When the Additional Reports box is ticked, daily and weekly totals are created according to your calculated channel definitions.

The Results of the Calculation

When a complete set of data for a particular day has been read from the VT loggers, the calculated channels file is processed and the calculation results appended to the file. Weekly files containing the daily totals are also prepared.

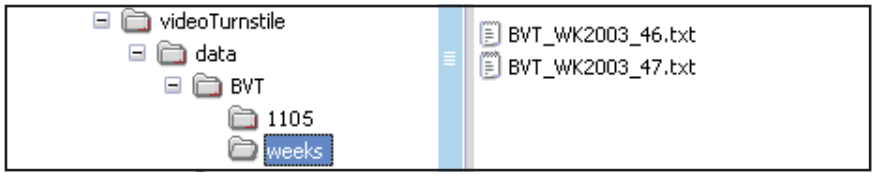
Depending on your default folder (Section 3.15), the final directory structure will be something like this:

```
c:\videoturnstile\data\site code\mmyy\
c:\videoturnstile\data\site code\weeks\
```

The mmyy directory is named according to the month and year, for example 1105 for November 2005. It holds the raw data files in the format

[SITE CODE]_DAYddmmyy.txt
Where [SITE CODE] is the file prefix you entered (page 3.7).

1. The weeks directory holds the weekly totals data files for this site in the format
   [SITE CODE]_WKyyyy_ww.txt
   Where:
   yyyy is the year,
   ww is the number of that week (between 01 and 53)



3.14 Scheduling Data Collection

There are two ways to schedule data collection.

1. Continually run VTCollect and schedule various times of day when it will collect data. See below for details.

2. Set VT Collect to run and collect data daily, weekly or monthly.

The program subtracts the previous count from the current count, so if running daily would show just the counts for that day.

You can also collect data at unscheduled times. Click the Load All Epochs to File button from the VT Setup Counts tab.

3.14.1 Continually Running VT Collect and Collecting Data Several Times a Day

From the Program Setup tab select Schedules. This lets you set the times of day when VT Collect will collect data from all the Video Turnstile loggers. This assumes that the program is running continuously and will be available to perform data collection. See Chapter 4 for details of continuously running VT Collect as an application or Windows service.

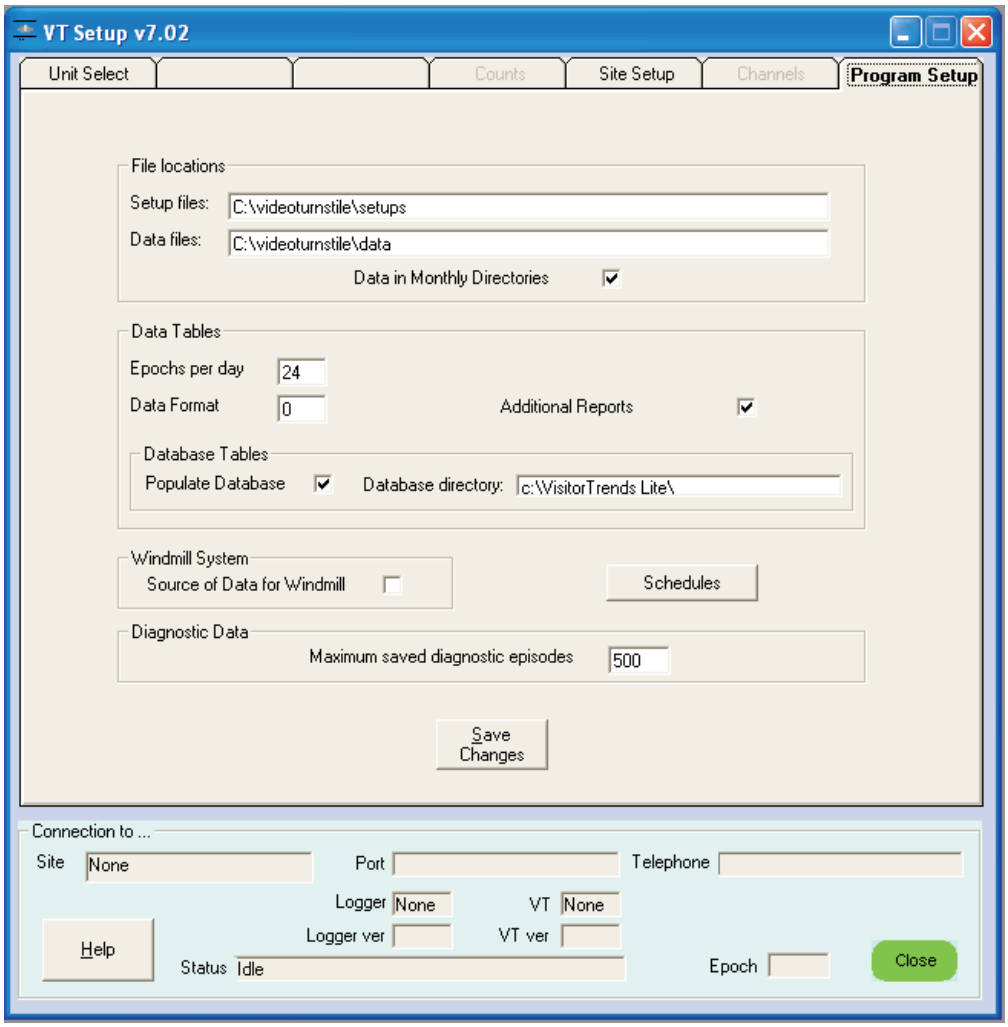
When deciding the time of day to start VT Collect and download data, consider these factors.

- **Epoch length**: With hourly epochs (Section 3.4.7), 37 days of data would be stored before the first was overwritten. With epochs of 15 minutes, only 9 days of data would be stored.
- **Patterns of use of the host computer**: If the host PC is being used during working hours as a user's main PC, the schedule for download should be set to a time during lunch time or evening when the PC is not in use. This is especially important when large numbers of sites are used which will mean longer periods of potentially slow PC performance.
- **Telephone line use**: If a telephone line being used for dialling a logger, then favour the scheduling of downloads when the line is less likely to be used for voice calls.
- **Likelihood of communications failures**: When using telephone lines when voice calls may also be made, ensure that the scheduled task repeat is sympathetic to this and repeat a dial-out more frequently than would otherwise be necessary.
- **Network traffic**: If TCP/IP network is being used, it is good practice to favour times of low network traffic for data transfers.

3.15 Changing Default Folders

When you use Video Turnstile you will create two types of files, those which hold data and those which hold the Video Turnstile programs' settings. You can choose which folders are to store these files. We recommend using
`c:\videoturnstile\setups\` and
`c:\videoturnstile\data\`
where `c:\` is the drive on which you installed the Video Turnstile software.

If you do wish to change this select the Program Setup tab.



Erase the current file locations and enter two new folders (directories). If you want to save each month's data in its own sub-folder, make sure the Data in Monthly Directories box is ticked. The sub-folders will be named according to the month and year. For example:

`c:\videoturnstile\data\0707` for July 2007
`c:\videoturnstile\data\0807` for August 2007 etc.

This tab also lets you:

- Turn off calculated channels (Section 6.)
- Specify whether data should be made available to the other Windmill programs such as Windmill Chart (not generally needed)
- Specify VT Setup's epochs per day (Section 3.16)
- Change the data format. However, you should leave this at 0 as this indicates integer data
- Select how much diagnostic data to save.
- Schedule data collection
- In future versions you will be able to populate a Visitor Trends database. This is charting software which we offer for free.

Note: What this dialogue is actually doing is editing the VT Setup `.ini` *file. Notes on the ini file are in Section 3.15.1 below.*

3.15.1 The vtupload.ini File

The starting data in this file is:

```
[VT]
setup directory=C:\videoturnstile\setups\
data directory=C:\videoturnstile\data\
data format=0
rem if you change readings per day then backup
rem existing data files
rem the first valid day in the VT logger will
rem overwrite the existing file with a
rem partial set of data
readings per day=24
demo=0
monthly directories=true
reports=false
windmill handler=0
```

Notes on the ini File

- These setup and data directories are created when you install VT Setup. You can change them to more suitable directories.
- Data format=0 is for integer data (or 0.0 for one decimal place, but this is not suitable for counting people)
- Readings per day is the number of time epochs in a 24 hour period—so 24 for hourly, 48 for half hourly counts etc.

- Monthly Directories=true sets a flag so that subdirectories created from the month and year (MMYY e.g. 0103) will be used to save the data files. If the right hand side of the expression is not true (e.g. false or 0) or the entry is not included then monthly subdirectories will not be used.
- Calculated channels are enabled if reports=true. If a calculated channel file exists then these definitions are used. Otherwise the sum of odd channels and the sum of even channels and daily totals are calculated. If reports=false then no calculations are performed.
- Windmill handler determines whether data will be made available to the other Windmill programs (Logger, Chart, etc.). If windmill handler=0 then no data is provided to them.

You can either edit the VT Setup.ini file directly, in Notepad for example, or use VT Setup to do so (by selecting the Program Setup tab). If editing directly please make a backup copy before so doing.

3.16 Setting VT Collect's Epochs per Day

Counts are saved in epochs. If there are 24 epochs in a day then the total counts each hour are logged. To change the number of epochs VT Collect logs in a day, select the Program Setup tab.

The epoch times for each VT logging unit may be different (set with the Logger Setup tab, Section 3.4.7). VT Collect compares the actual epoch time with its epoch per day setting. If the epoch time is shorter than the epochs per day setting—for example if the epoch time is 30 minutes but there are 24 epochs per day in VT Collect—then the epochs are added together. So two VT unit epochs will be combined into one VT Setup epoch. Similarly, if the VT unit's epoch is 120 minutes and there are 24 epochs per day in VT Collect, then every other one of the 24 epochs will be 0.

3.17 Closing VT Setup

To use the changed set-up, you need to:

1. Close VT Setup.
2. Close any Imblkbrd device handlers that are on the Windows toolbar.

Chapter 4: Collecting and Displaying Counts

Use the VT Collect software to gather the people counts from all the Video Turnstile Loggers. This runs at regular intervals. It subtracts the previous count from the current count, so if running hourly would show just the counts for that hour. You can choose how often VT Collect is to run.

Once configured VT Collect runs automatically and collects the people counts from all the LVT units. It saves the counts a text file. You can open this file in almost any report generator or analysis software.

4.1 Collecting Data

You can either run VT Collect as a normal Windows application, or as a Windows service. A Windows service is an application that starts when Windows begins and runs in the background as long as Windows is running.The data is saved in an ASCII text file in

`c:\videoturnstile\data\0707` for July 2007
`c:\videoturnstile\data\0807` for August 2007 etc.

You can change the folders it uses with the VT Setup program.

4.1.1 Running VT Collect continually as a Windows service

You can set VT Collect to start with Windows and run continuously in the background. This lets you collect data one or more times a day.

1. Go to Windows Control Panel.

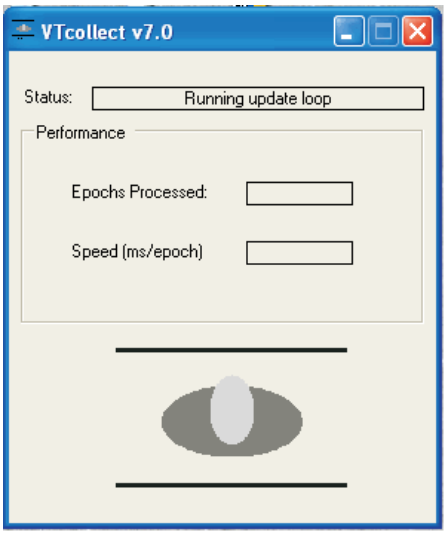
2. Select Administrative Tools.
3. Select Services.
4. Scroll down the list until you see Vtcollect service. Double-click or right-click to start and specify automatic start-up.
5. Should you wish to change, first stop the service then use UNINSTALL Vtcollect service.

Data will be collected according to your schedule in VT Setup (Section 3.14).

We recommend using the Windows Service method if possible, as this removes the possibility of someone inadvertantly closing VTCollect and you failing to collect data.

4.1.2 Running VT Collect as an Application

If you don't want VT Collect to run permanently in the background, you can schedule it to run and collect data daily, weekly or monthly. You can also run it from the Start menu when necessary.



Collecting Data Daily, Weekly or Monthly
Use Windows Task Manager or Scheduled Tasks (depending on your version of Windows) to schedule automatic data collection. For example, in Windows 98 you will find Scheduled Tasks in:
Start > Programs > Accessories > System Tools > Scheduled Tasks.
Look for the VT Collect program and click the Next button. Choose whether to collect data daily, weekly or monthly. Select the time for collection. Set VTCollect to run once then close after 23 hours. This

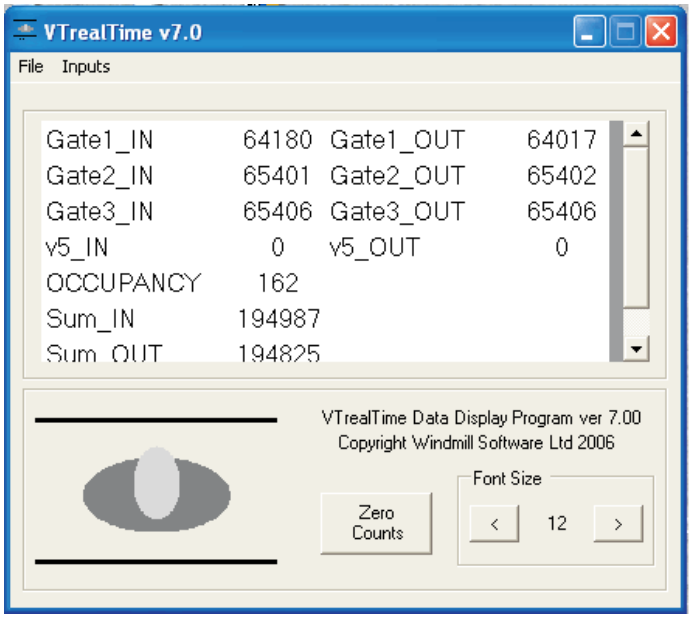
means that if the computer crashes then VTCollect will restart when you restart Windows.

The command to initiate a download is the path of the VT Collect application (vtcollect.exe). For example:

```
C:\Program Files\Windmill Software\Videoturnstile\vtcollect.exe
```

4.2 Viewing Live Counts

Use VTrealTime to check that the VT logging unit is collecting count data from all its connected VT units. (A VT Logging unit stores counts from itself and up to three other non-logging VT units.)VTrealTime shows a live display of each count, so when a person goes through one of your entrances the program shows the updated total. It doesn't, however, save any data.



Here VTrealTime is showing the in and out counts for four entrances (Gates 1 to 3 and v5). It is also showing some calculated channels: Sum_In, Sum_Out and OCCUPANCY.

It's easy to use VTrealTime

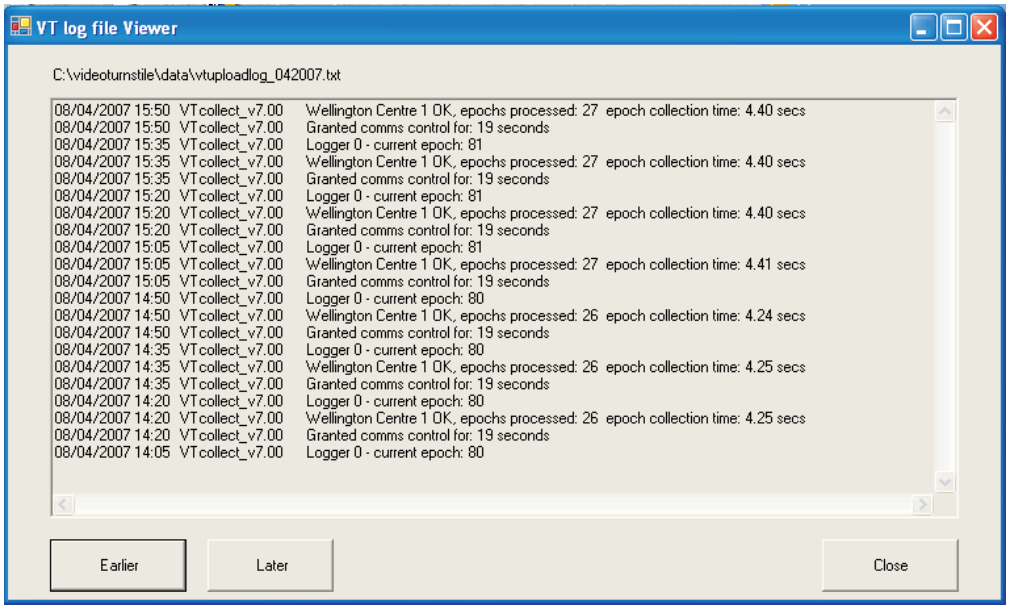
1. Run the program from the Start menu or its desktop icon.
2. Click Inputs to change which counters and calculated channels are displayed.
3. To reset all counts to zero click the Zero Counts button. (This only resets the count in VTrealTime. It does not affect the logged count collected by VT Collect or stored in the VT Loggers.)

4. To change the size of display text click the Font Size arrows.

VTrealTime will show the incrementing counts from the Video Turnstile units.

4.3 Viewing the Collection Log

You can see the times that VT Collect logged data. Run the VTviewLog program.



Chapter 5: Using Video Tally

You use Video Tally in much the same way as the Video Turnstile system, however there are some differences.

Unlike Video Turnstile, Video Tally connects to the PC over USB. All the sections in this Manual about Ethernet, Wi-Fi, RS232 and RS485 therefore don't apply.

You use the VT Setup software to configure the counting zone much as described for Video Turnstile. The Video Tally system, though, has no Logger units. You won't therefore see the Logger tab in VT Setup. Another difference in VT Setup is that the VT tab becomes the Video Tally tab.

Every 5 minutes the VTTally software collects counts and updates the data file, so there is no need to schedule data collection as described for Video Turnstile.

You can run the VTTally software as a Windows Service or as a Windows application, as described for the VTCollect software in Chapter 4. We recommend using the Windows Service method if possible, as this removes the possibility of someone inadvertantly closing VTTally and you failing to collect data.

Chapter 6: Fault Finding

Here are the solutions to potential problems with the Video Turnstile system.

6.1 No Counts are Recorded and the Up and Down Lights on the VT Unit Flash Regularly

This indicates that there is no video signal going into the Video Turnstile unit. Although the lights flash briefly, the counts are not incremented. You need to determine why there is no video signal.

1. Check the cable connections between the VT unit and the camera.
2. Check with a multi-meter that 12 V DC is available at the camera end of the cable.
3. If you have more than one LVT or VT unit, swap the connection to the VT with another camera that is working.

6.2 A VT Module is Missing

If an VT Logger module, in a group of modules, suddenly disappears then the address of that module has probably been changed. This may be due to an electrical transient, in which case the address has probably been reset to 16.

Use VT Setup to find which module has lost its address. You may need to disconnect all the LVT modules and reconnect them one at a time to identify the correct one. Having found it you can use VT Setup to re-enter the address of the module.

1. In the VT Setup software, go to the Logger Setup tab and select a Logger.
2. Select the VT Setup tab. The software searches for modules connected to this Logger and displays them in a drop-down list.
3. It may be that you have previously defined a module's channels, but the system is unable to find the module. Perhaps because the VT Logger is not able to communicate or has been reset and taken a different address. In this case they will be listed in the Missing Units list. Click the Retry Connection button to try and locate them.
4. To change a unit's address see Section 3.6.1.

If you still have missing units, remove the power lead, unplug the units and then reconnect one-by-one.

6.3 You cannot get Reliable Communications with an VT Logger over Ethernet

Check with Hyperterminal that you can talk to the module (see Section 6.3.1 for details). Follow the steps to *Request the Hardware Type*. Did you get back the correct reply?

No: You need to check the setup of the Device Installer virtual COM port and the Ethernet connection.

1. Use the Device Installer program to check the setup.
2. Use the Search button to get a list of LVT units (and any other devices) on your local network.
3. “Ping” the LVT unit to confirm that there is a network connection to it: click the Ping button and enter the IP address of the LVT unit you want to check.

The response time for communications with a locally connected LVT unit will typically be 0 msecs.

Yes: Wait 10 seconds then repeat the steps to Request the Hardware Type.
Did you still get back the correct reply? If not your LAN is probably routing your messages out to a WAN, as well as to the LVT. Check the GATEWAY setting with your network manager.

6.3.1 Using Hyperterminal to talk to a LVT

Load the Windows Hyperterminal program
`(c:/program files/accessories/hypterterminal/hypertrm.exe)`
and set up the communications as follows:

Connect To tab
- Connect using:
  - Direct to COMx
    (where x is the port number to which your LVT is connected.)
- Configure ...:
  - Bits per second 9600
  - Data bits 8
  - Parity None
  - Stop Bits 1
  - Flow Control None

Settings tab
- Ascii Setup ...:
  - Ascii Sending
    - Echo characters typed locally - Checked
    - others as default
  - Ascii Receiving
    - Default settings

You should now be able to communicate with a module over the serial link created. To **request the hardware type** you need to know the address of the module with which you are trying to communicate. The default address for a single LVT module is 0. (You can check and change the module address using the VT Setup program)

Using Hyperterminal to read the hardware type for a module with address x you need to type:

```
*x DCO HT
```

(and press Enter)

the reply will be:

```
x: ML825
```

(possibly followed by another letter)

e.g. for address 0

you send `*0 DCO HT`

and get back `0: ML825`

You will not get a reply if:

- There is no communications link between the PC and the LVT—check the cable(s).
- You have sent the wrong address—check with VT Setup.
- The LVT is not powered.

6.4 Connection is Forcefully Rejected Error

This message might occur when your VT units are on an Ethernet network. It means that either the eLVT has lost its factory settings, particularly the local port and internal baud rate, or that the eLVT is on a different sub-net to the PC.

Run the Device Installer software and click the Search button to find devices on the network. The Installer should find the eLVT at its default address: 169.254.117.220. Check the Local Port and Port 1 Baud Rate settings. If the IP address is shown in RED then the eLVT is on a different sub-net to your PC. Change one or the other to get them to match: click the IP address, click Assign IP and enter the new IP address and sub-net mask for this eLVT.

6.5 No Route to Host Error

This error occurs on Ethernet systems either because there is no physical connection between a Logging unit and the PC, or because there is no network enabled on your PC. Check

- the cabling
- that the Logging unit is powered up
- that the local area connection settings on your PC are correct

6.6 Ethernet drops out after a few seconds

This is often due to the network having internet access. Requests to eLVT units are also routed out to the internet, and after a few seconds an Error 404 is returned which disrupts the messages between the PC and the eLVTs.

6.7 Problems Connecting RS485 Units

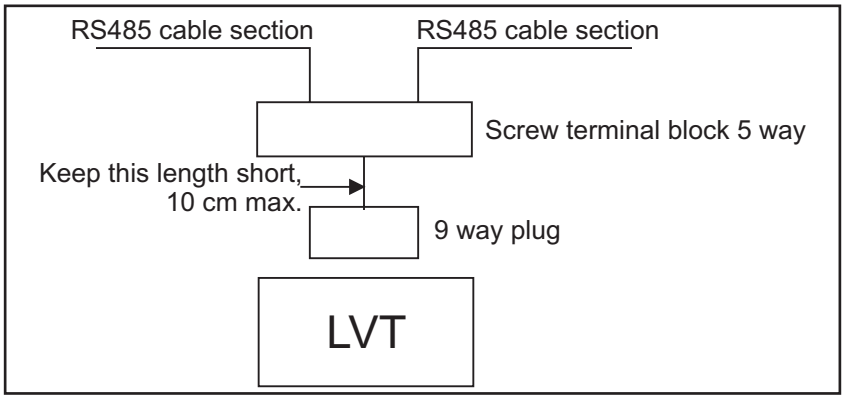
Here are some tips on connecting LVT units using RS485 cables.

1. Try to arrange a local RS485 connection from your PC. Bring the LVT modules one-by-one to this local connection.

2. Use VT Setup (Section 3.6) to change the address of each LVT module in turn. LVT modules are sent out with default address 0. If you connect the LVT to your RS485 link, and power up the LVT, VT Setup should find it at address 0. You will need each LVT on an RS485 connection to have a different address. Start from 1 and work up. It is best to leave address 0 free so that you can add a new LVT to your system and find it while all the others remain connected.

3. If you do not arrange a local connection, check each LVT in turn. That is, go to the nearest LVT to the PC with only a single section of cable between the PC and LVT, and disconnect the rest of the LVTs.

   Check the continuity of the cable by twisting the Tx^+ and Tx^-, and the Rx^+ and Rx^- wires at one end of the cable section and using a multimeter to check continuity at the other.



You can then check continuity of a new length of RS485 cable and attach it to the 5-way screw terminal block.

4. RS485 cable should be 2 twisted pairs + screen. Use:
   1 pair for Tx pair
   1 pair for Rx pair
   and screen for signal ground.

6.8 Power Supply Problems

The plug-top power supplies for boxed units supply 12 VDC 1.25 A. For rack systems the power module supplies 12 VDC 5 A.

You can check power supplies by:

1. Using a multi-meter
   Check the voltage at the 2.1 mm in-line socket output from the power supply. (You can remove the Rack system power supply module to do this check.)

2. Swapping Supplies
   If you have more than one plug-top supply, try swapping two over. The problem should move with the supply unit. If not you may have a problem with the VT unit itself.

6.9 Can the Software Contact the Logger?

When the software talks to a Logger module, the module's busy light comes on. It remains on until the software talks to another Logger. The busy light is on the back panel of a boxed Logger, and on the Logger module's front panel in a rack-based system. If you only have one Logger then the light will remain permanently on.

The busy light is useful for diagnosing problems. If you remove the power supply from the unit and then reconnect it, the busy light will be off. If it goes on when you talk to the unit then you can see to which one you are talking and confirm that the software has found it.

6.10 Checking the Counting Accuracy and Dealing with Unexpected Counts

Use the VT Setup software to check counts and adjust the system accordingly. See Sections 3.12—3.12.5 for details.

Index