

## VECTIS: Bus operations simulation

by Dave Parker

### VECTIS: Introduction

These instructions refer to versions 3, 4 & 5 of the VECTIS bus operation simulation written by Dave Parker. The programme (and the Spectrum 'emulator' needed to run it) are both 'Freeware', that is you may copy the programmes free of charge and keep them as long as you wish without charge. You may make as many copies for you and your family and friends as you wish. The full license agreement is on the website.

I wrote the bus simulation 'VECTIS' in 1986 for the Sinclair ZX Spectrum computer. These instructions are for version 3.2 onwards; the previous versions are lost in my attic! The differences are mainly related to minor variations in the route map. The simulation is based on part of the Isle of Wight bus system. The routes depicted by the simulation depicts part the network in the late 1970s and early 1980s. Limitations with what could be done with a small computer mean that the spirit of the bus network is retained but route numbers and other aspects retain the spirit of the system but not are not totally accurate.

The user is challenged to run the bus network for a day. The simulator realistically allows for different seasons, times of day, bus sizes, customer behaviour, breakdowns and much more. You control twenty buses (four different sizes) on seven routes, working from 6 depots covering the Sandown, Shanklin, Ventnor, Blackgang and Newport areas. Despite the age of the simulation and the fairly basic graphics (by today's standards) the game is still very playable (even addictive). The action takes place on a single screen where a route map, bus stops, waiting passengers and bus movements are displayed. The screen is therefore very 'busy' and daunting at first but if you spend a few minutes with the instructions it should be reasonably clear. User input is a bit 'clunky' with a slight delay due to the speed of the Spectrum when running a 'basic' programme. You will soon ignore this as the delay allows time to assimilate the latest information being displayed and allows time to formulate your next traffic movement.

Versions 3 and 4 work with three seasons. If you select Winter, don't expect too many customers at the touristy areas such as 'Blackgang'. In Summer, Blackgang will be busy all day (and into the evening as it was floodlit until 10 p.m. in the late 70s and 80s). Simulated response to season and time of day covers the entire network and Blackgang is only an example. Knowledge of the Island will help you run the system effectively. Version 5 is a special 'holiday' edition which simulates the three busiest bank holidays, Easter, Whitsun (now known as Spring Bank holiday) and the busiest of all, August Bank holiday. Whereas versions 3 & 4 simulate busy weekdays, version 5 begins the day with fewer passengers as there is no 'rush hour' it being a holiday. However traffic builds quickly through the morning and you'll have no problem making a profit with the Island 'heaving' with tourists. Seaside areas such as Sandown, Lake, Shanklin and Ventnor will be busy as will the attractions such as Godshill, Blackgang Chine, the Botanic Gardens, Rare Breeds centre, St Lawrence (which had a bird park and a glass centre then). The biggest problem on these holidays will be to avoid losing too many passengers by keeping them waiting. You'll need to keep all your buses running so ensure you ensure you go for the higher maintenance option to avoid starting the day with broken down buses. This will of course add to your operational costs but will hopefully be compensated by high passenger receipts. Route 4 has been extended to the busy Balcggang Chine in version 5.

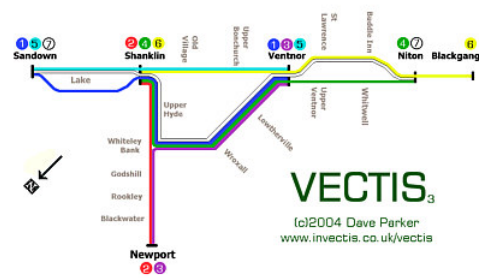
Passenger levels will also change depending on the cost of a ticket and the frequency of the service you run (running more buses will attract extra customers). You'll need all twenty buses during the busy periods of a Summer's day. You can select to improve maintenance to keep more buses on the road but this will add to your fixed costs. Buses come in four sizes (and hence numbers of seats). Bigger buses cost more to run with a greater diesel cost. However when full they are very efficient and cost effective.

That's a brief overview. The detailed instructions below will help you get to know the features of the game. It all looks a bit complicated but the user interface is simple to use once you get the hang of it. The idea of the simulation is to make as much money as possible (which will mean keeping the passengers happy). However don't expect to make as much in the Winter. In fact minimising the loss is a reasonable target in Winter.

The Spectrum computer was advanced for its time but basic by today's standards. Therefore the sound, graphics and limited number of colours may not be what you are used to. However hopefully the game play will make up for the lack of racy graphics. Enjoy yourself and good luck!

Please email me with any feedback on what you think of the simulation. I can make changes to the instructions etc. if they are unclear. This simulation is fairly new on the internet and I'm interested in how easy you found it to set up the simulation, and suggest any changes to the instructions you feel may help simplify it. I am considering a new version which will simulate busy holiday Sunday traffic patterns. I don't have any idea yet when this might be available. If you'd like me to keep you updated with progress, please email me.

### 1. Starting the emulator and simulation



Map of the routes used by the simulation programme, versions 3 & 4 (see below for version 5).

**Windows**



These instructions assume you have downloaded the spectrum emulator and VECTIS programme from the internet. If not, you will need to do this prior to using these instructions.

Click on your desktop icon (like the one to the left) to start the emulator. The emulator application should start up as per the diagram right. The emulator supports different versions of Spectrum. It should work in any version but if you experience problems, select {options} {hardware} and set to 48k. The window will occasionally open using more than the available screen and overlap 'diagonally'. In this event, drag the top of the window so that the window is centred; then reduce the size by clicking the mouse on the bottom right-hand corner and dragging it to make a smaller window. If you close the emulator and open it again, it should remember the new size and open correctly the second time.



Click the {ZX} and {OPEN} tabs and browse to where you stored the Vectis application. After the first time you load it, the emulator will remember the application and you'll just need to select {FILE} and click on the Vectis application as a menu option. The application will load leaving a blank blue screen and the word RUN in the bottom left of your screen. Simply hit the [RETURN] key and VECTIS will be activated.

**Android**

There are now Spectrum emulators available for an Android phone or tablet. Different emulators require varying file formats. I have included two or three file formats of Vectis (depending on the version) which will work from most Android emulators. A good (free) one is "Marvin". Marvin has an option to download from a large database of Spectrum programmes which includes version 3 of Vectis."

**2. Simulator options**



Vectis will now generate data based on the input assumptions you have just made (you don't need to worry about this - the data is used automatically by Vectis during the simulation). This will take a minute or so and a 'please wait' banner will flash to indicate this is in progress. When data generation is complete you will receive a number of game options. The first is which season would you like to simulate; Enter your choice (in lower case - no capitals).

- Enter **s** for **Summer**. The challenge in Summer is to be able transport your passengers effectively. The bus stops will get crowded in some places and passengers will walk or take a taxi if they have to wait too long or the bus is full. Expect some areas to be busy well into the evening. You will have a real problem if many of your buses are out of service (marked **O/S** on the bus data board). To avoid this you might consider improving your maintenance (there will be a chance to do this in a minute). You should hopefully end the day with all passengers picked up and the last bus in a depot with a tidy profit!
- Enter **p** for **Spring**. Spring is less busy than Summer but is still a challenge. Watch out for school traffic on route 1 around Sandown. You will need some of the smaller buses so again, good maintenance could be valuable. You should end the day in profit but you'll not make as much as in Summer.
- Enter **w** for **Winter**. The ultimate challenge to make a profit. You'll still have to pay fixed costs but revenue generating traffic will be sparse so efficient usage of your bus stock will be vital.
- The Bank Holiday special edition (version 5) has a similar interface but the options are **a** for **August**, **w** for **Whitsun** and **e** for **Easter**. Being public holidays there is no early and late 'rush hour' and traffic will build more slowly; however by mid-morning the island will be heaving with tourists and every bus will be needed to keep the queues down, especially at the more touristy areas. Making a profit shouldn't be difficult but avoiding losing passengers will be. Use the earlier quieter period to get the buses where they will be needed once the crowds arrive!



You will now be asked to decide your fare structure. Using the 'u' and 'd' keys, you can change the fare per 'fare stage'. Higher fares will result in lower traffic; lower fares will lead to less revenue. A difficult choice?

- Enter **u** for **up**. This will raise the fares charged. There is an upper limit and the error light will show if reached. If you get to this point, decrease by one 'notch'.
- Enter **d** for **down**. This will decrease the fare charged.
- Enter **s** to **select** the fare displayed, and progress to the next option.



You now need to make some decisions about the quality of your maintenance.

- Enter **q** for **Quality**. High maintenance will ensure all your buses are ready for service - but at a price. Your fixed costs will rise as a result. However in Summer in particular, a full fleet of operational buses is almost essential if you're not going to lose the confidence of your passengers.
- Enter **b** for **Basic**. Basic might be acceptable in the Winter. You'll probably find some of your buses marked as **O/S** (out of service) when the simulation starts. This can be



an issue whatever season if you're unlucky enough to have a number of one size of bus unavailable as that will reduce your flexibility and efficiency.



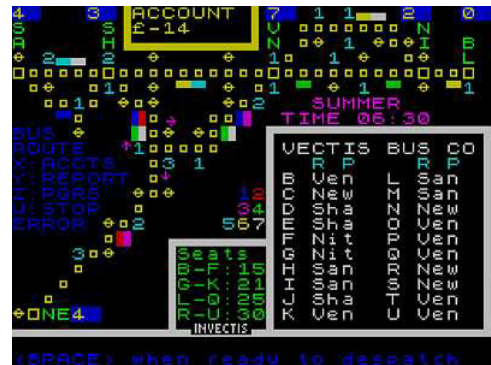
And finally, you can now select when you would like the simulation to start. The default is 06:20. You'll need to get the appropriate buses from their terminus to a starting point for their first 'real' journey when the rush hour begins (although buses never run without being in service, so passengers will still be transported while you are getting buses into position). You may decide you need less time in Winter, or even that the buses are already in suitable locations. You will need to try it out a few times to determine this. So set the clock and you're ready to begin.....

- Enter **f** to move the starting time **forward**,
- Enter **b** to move the starting time **back**,
- Enter **s** to **select**, when you're happy with the time displayed.



### 3. The simulation screen

This screen is where the action takes place (you can click on the image to the right for a larger version). It contains all the information you'll need. Due to restrictions of the original Spectrum (and my programming expertise) I was not able to use multiple screens. Rebuilding the data each time slowed the game down. However once you're used to it, you will find it easy to interpret. The screenshot to the right is for versions 3 and 4. Version 5 is very slightly different with route 4 (green) extended to Blackgang for the public holiday.



1. Your account status. This records the current financial position. Account = ticket receipts less fixed costs and fuel costs.
2. Clock and season. The clock is incremented in two-minute intervals.
3. The route. The small boxes represent the routes. Traffic on the Isle of Wight uses the left of the road so relevant bus stops to the direction of travel are on the left. A more detailed description of the road markings follows later.
4. Bus capacities (number of seats on each bus represented by letters B to U).
5. Route colour codes, 1 for blue, 2 for red etc.
6. Bus indicator panel. For each bus (letters B to U) the board will either contain the first three letters of the terminus where the bus is parked, or details of the route and current passenger load if the bus is in service (more details later).
7. Simulator information panel. At start-up this area will display instructions and hints. The user can select the following information to be displayed:

- Accounts information
- Passenger information
- Statistics for each completed bus journey



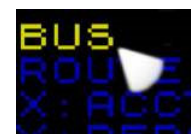
### 4. Game controls

Controlling Vectis is very straightforward. The simulation will run, updating the map and other data until instructed otherwise by the user. The interruption can be in one of two forms:

1. Request to start a bus
2. Select a control option

**Starting a bus:** Press the {SPACE} bar and wait until the 'BUS' indicator in the *status indicator panel* lights up in yellow accompanied by a conformation sound. The simulator is now in pause mode awaiting your input so there's no rush. Study the display and decide which route requires a new service. Each terminus has a blue indicator with the number of buses available. If there's more than one, refer to the capacity chart and select which bus is the optimum size for the number of passengers you might expect to board. Enter the bus identification letter (lower case B, C, D, ....., U). If you change your mind, simply press 'a' and the simulator will restart. Having selected a bus, the 'BUS' panel will return to dark blue and the ROUTE indicator will be highlighted. The bus identifier will be appended to the end of the BUS indicator to remind you. Now you need to select a route. Enter the *route number* required. The route will need to terminate at the terminus where your selected bus is waiting to start. An inappropriate selection will get an error message. Be careful not to use the 'F' keys when entering route numbers as they may cause unwanted changes to the emulator. A confirmation beep should verify the bus has been despatched (and it will appear on the map at the appropriate terminus having collected any waiting passengers). You may now enter another bus letter or 'a' if bus despatch is complete for now. This will restart the simulator.

**Control options:** While the simulator is running (i.e. not while selecting a bus or route), you can choose what to display in the *simulation information panel*, either accounts, passenger, or bus journey data (see the *status indicator panel* section for details); you may change this as often as you like during the simulation. Alternatively, entering 'w' will delete all data from this simulation and restart the simulator (you'll be asked to confirm so you can't do this accidentally). Whichever control option you select, the simulator may take a second or two to respond. The *simulation information panel* will provide conformation of the current status. Vectis will then automatically revert to 'simulator mode' without further user intervention.



BUS 'lights up' to confirm data entry (which bus) is required.



Terminus indicator - in this example, 4 buses are available at the NE (Newport) terminus.

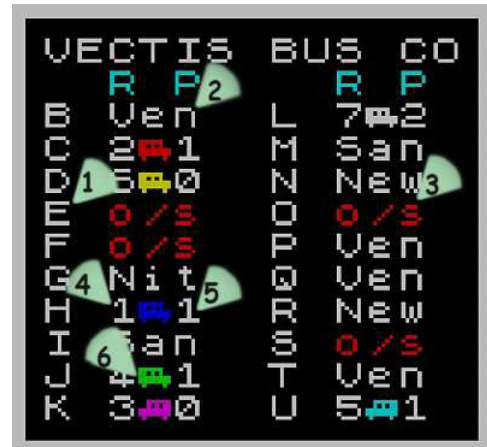


This panel shows the number of

seats in each of the twenty buses.  
There are four sizes of bus from 15 to 30 seats

### 5. Bus indicator panel

1. Bus identification letter (in this case, E)
2. Three letter bus terminus identifier for buses waiting to be assigned a service:
  - SAN = Sandown
  - SHA = Shanklin
  - VEN=Ventnor
  - NIT=Niton
  - BLA=Blackgang
  - NEW=Newport
3. Out of service indicator. This bus will be unavailable for today. The user will have selected 'basic' maintenance; quality maintenance will ensure all buses are in good running order.
4. Route number (bus H is therefore on route 1)
5. Passengers on board. The buses on this panel are all nearly empty.
6. Route colour and direction indicator. The blue bus confirms route 1 and the direction shows the bus is running from left to right. For a small part of the simulator's road markers, route 2 alters direction (near Shanklin). To (hopefully) avoid confusion, the direction indicator maintains the general direction of the entire route.



### 6. Status information panel

1. BUS changes to yellow when Vectis is expecting you to identify a bus to begin service (you signal your intention to despatch a bus by using the space bar and waiting for this indicator to 'light up'. After a few seconds it will flash to remind you input is expected. The clock is on 'hold' (effectively paused) while input is awaited.
2. ROUTE will change to yellow indicating a route number for the selected bus is required (see 8 below).
3. While the bus and route indicators are blue, entering an X will activate the accounts display in the simulator information area. The indicator panel will remain green until another option is selected to replace accounts (i.e. Y or Z)
4. Entering Y activates the bus arrival reports display in the simulator information area. The 'reports' marker will remain green until another option is selected.
5. Entering Z activates the passenger status display in the simulator information area. The 'reports' marker will remain green until another option is selected.
6. Entering W will reset the simulation (you'll get a chance to change your mind so you can't hit the W by mistake and lose everything).
7. This panel lights up to signify a user error
8. After entering a bus (see 1 above) the 'inverse' black on blue bus letter (the E in this case) will be displayed to remind you which bus is awaiting a route designation.



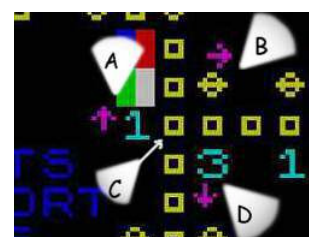
### 7. Route, terminus and bus stop indicators

1. Buses in terminus - this tells you how many buses are available for despatch.
2. This is a bus stop marker where there are no passengers waiting. Traffic on the Isle of Wight uses the left side of the road so this bus stop is for passengers heading to the right of the display.
3. The cyan number replaces the bus stop marker and indicates the number of waiting passengers.
4. The yellow number replaces the cyan marker when the number of waiting passengers reaches 8
5. The white number replaces the yellow marker when the number of waiting passengers reaches 9. The queue is so long no further passengers will join it and passengers may be lost.
6. The red number shows a bus has called but been unable to collect all passengers, as it was full (the bus on route 6 has just called at the stop).
7. A larger square marks a terminus
8. The smaller squares show the route
9. Two letter terminus identifier, i.e. BL=Blackgang
10. Route marker, in this case white and yellow (routes 7 and 4).



This complex junction in the middle of the screen, representing Whiteley Bank has three stops associated with the centre square (C). The magenta arrows show which bus stop is for which route:

- A. The bus stop for passengers going towards Shanklin. In this example the cyan number shows 1 passenger waiting.
- B. The stop for passengers going towards Ventnor; In this example the bus stop indicator shows no passengers are waiting
- C. Stops A, B & C all refer to this square.
- D. The stop for passengers going towards Newport. In this example the cyan number shows 3 passengers waiting.



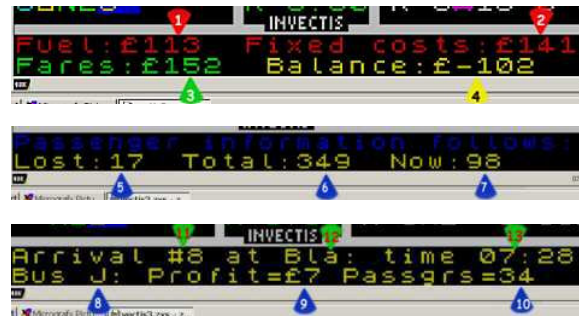


**8. Simulation information panels**

1. **Accounts panel:** Fuel cost to date (will depend on bus size and length of journey)
2. Fixed costs to date (will depend on maintenance arrangements)
3. Fares received (will depend on ticket prices)
4. Balance (the sum of the three amounts above)
5. **Passenger panel:** Passengers lost (as queues get long)
6. Total passengers carried to date
7. Passengers currently on buses in service
8. **Arrival panel (see note\*\*\*):** Bus identifier
9. Profit made by bus (fares - fuel); does not take account of any contribution to fixed costs
10. Total passengers carried on journey (or part of journey)
11. The arrival number (each bus arrival is recorded in the order they arrive)
12. Arrival terminus three letter identifier, e.g. Bla=Blackgang
13. Time of arrival

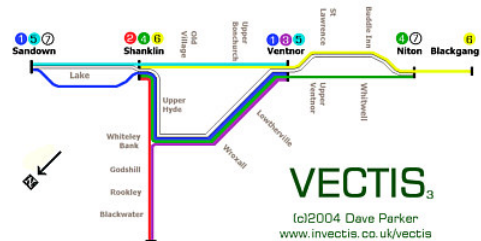
\*\*\* On selecting this report, there may be a delay until the first bus arrives at a terminus.

To activate these displays, see the status information panel section above



**9. The routes**

- Route 1, [BLUE] SANDOWN to VENTNOR**  
via Schools, Lake, Shanklin, Whiteley Bank, Wroxall and Lowtherville
- Route 2, [RED] SHANKLIN to NEWPORT**  
via Upper Hyde, Whiteley Bank, Godshill, Rookley and Blackwater
- Route 3, [MAGENTA] NEWPORT to VENTNOR**  
via Blackwater, Rookley, Godshill, Whiteley Bank, Wroxall and Lowtherville
- Route 4, [GREEN] SHANKLIN to NITON [or BLACKGANG on bank holidays]**  
via Upper Hyde, Whiteley Bank, Wroxall, Lowtherville, Ventnor and Whitwell
- Route 5, [CYAN] SANDOWN to VENTNOR**  
via Lake, Shanklin, Shanklin Old Village and Upper Bonchurch
- Route 6, [YELLOW] SHANKLIN to BLACKGANG**  
via Shanklin Old Village, Upper Bonchurch, Ventnor, Botanic Gardens, St. Lawrence, Buddle Inn and Niton
- Route 7, [WHITE] SANDOWN to NITON**  
via Lake, Shanklin, Shanklin Old Village, Upper Bonchurch, Ventnor, Botanic Gardens, St. Lawrence and Buddle Inn



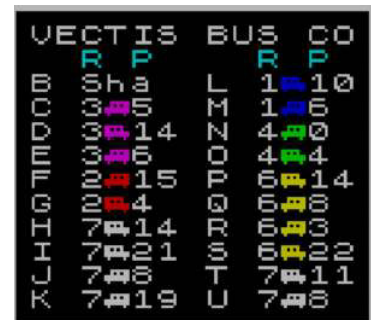
**10. Saving a game**

To save a game, select {ZX} on the menu bar and {save as ...}. You can save the game anywhere on your computer. To load a save game, start the emulator and open this saved file rather than the Vectis application. The file will start from where you left off in 'emulator pause' mode. Click the small arrow (top left of window) to resume.

**11. Hints and tips**

A few hints, tips and answers to common problems.

- i. Print a copy of the route map. This will help you to visualise the routes on the screen.
- ii. Watch the simulator clock. You'll need to have buses in service to meet the hectic rush hour periods. Despatch buses prior to the expected peaks to ensure passengers towards the end of the route are collected before they give up and make alternative travel arrangements.
- iii. Keep an eye on bus stops towards the end of routes (where there is only one route). Otherwise, by the time you notice passenger levels are high, it could take 30 minutes or so for a bus to reach the passengers.
- iv. Use the early quiet period to get buses in place. They may not be in ideal starting positions depending on how you intend running the service.
- v. Organising your fleet can avoid unnecessary journeys and make it easier to keep track of your operation. One way is to assign buses the same route (see inset). You'll need to get the buses into position which will take an hour or so. Version 4 is similar to version 3 except that buses start from different termini making it far easier to get them into the pattern suggested (panel right). This is the main difference between versions 3 and 4.
- vi. The aim of the simulation? Whatever you like, for example.
  - i. Try to maximise profit by the end of a day,
  - ii. Develop a timetable then start again and try and run your fleet to time,
  - iii. Assign each bus to a route (after allowing a journey to get to the start location) and see how efficiently you can run the system.
- vii. Watch out for the direction of buses. The 'red' route (2) doubles back at the top of the screen but the direction indicators do not.
- viii. It is possible to unwittingly make changes to Vectis and save these changes (by hitting an 'F' key by mistake). To avoid this risk, make the Vectis file 'read only'. To do this, browse to the file in Windows Explorer, right click the Vectis file, click properties and 'check' the 'read only' box. Finally 'accept' the change. I have in fact marked the file as read only but on saving and reloading from the internet, this seems to get altered.



Try organising your fleet like this

- ix. Unlike the original Spectrum, the emulator can run at faster speeds! The simulation is normally fast enough, giving time to think. However at busy times (rush hours) you can speed things up in the Z80 processor speed option. Don't speed things up too much or the sound / keyboard response and 'flash rate' will be adversely affected.
- x. Set the emulator to '48K' in {options} / {hardware} for best results.
- xi. If you open another application while the emulator is active, it will automatically go into 'pause mode'. The small arrow on the top left of the emulator window restarts the emulator.
- xii. Take regular breaks or you'll get a stiff neck!
- xiii. If you have any suggestions for tips please email me.

## 12. Versions

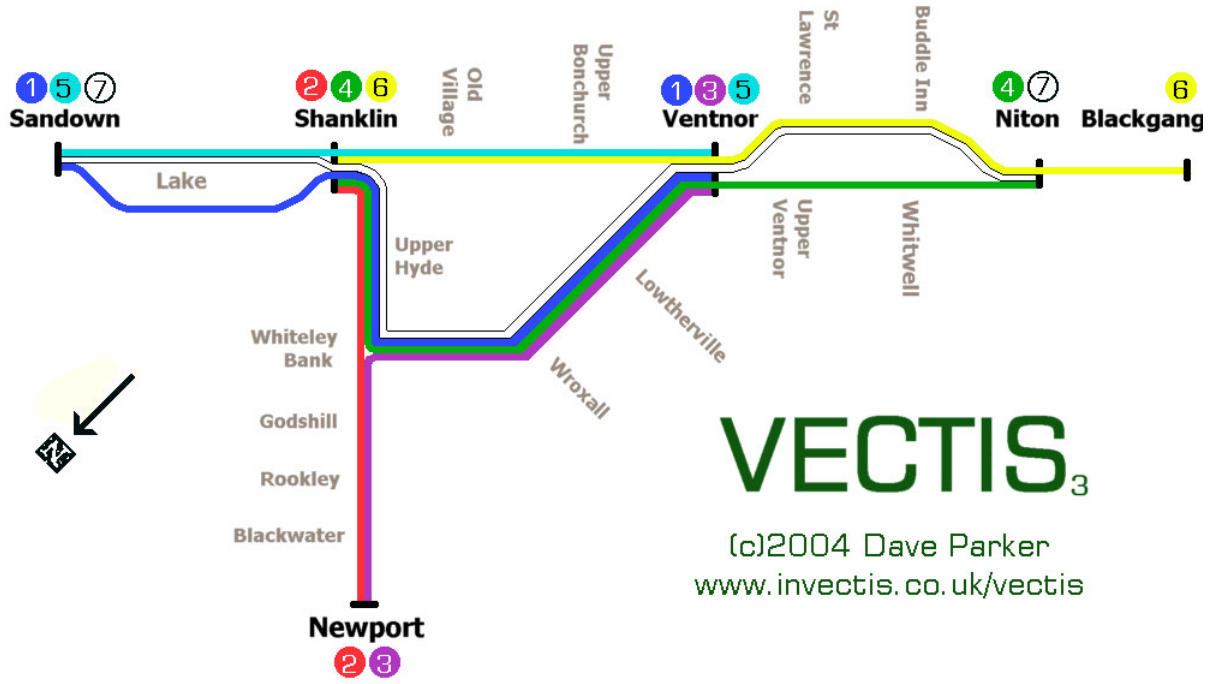
- **Version 3.x** was the first version available for PC emulators published in 2004. It is stable and as far as I am aware, bug free.
- **Version 4.x** was released in 2015 and is similar to version 3. The main difference is the starting termini of the buses. The buses are stored overnight in locations that make it easier to run an efficient service. Version 3 has a greater challenge in getting the buses at the right places before the rush hour. It's a matter of preference which you choose. Other differences from version 3 are slight changes to passenger numbers from some stops / seasons. The last bus can also be earlier as passenger numbers decline slightly earlier.
- **Version 5.0** is a special 'bank holiday' edition. The morning starts quieter as it's a holiday but passengers build up quickly through the morning and most of the day (and evening) is very busy. Route 4 is extended to Blackgang to help with the crowds. Experienced users will find this small change has major implications for how you will run the network (this will only be obvious when should you get 'hooked' and start to really get into running the network efficiently). Version 5 is a challenge if you wish to avoid losing passengers who give up waiting when buses are full and they are unable to board. It is best played after you get used to the gameplay with one of the 'quieter' versions, 3 or 4.

## 13. Credits

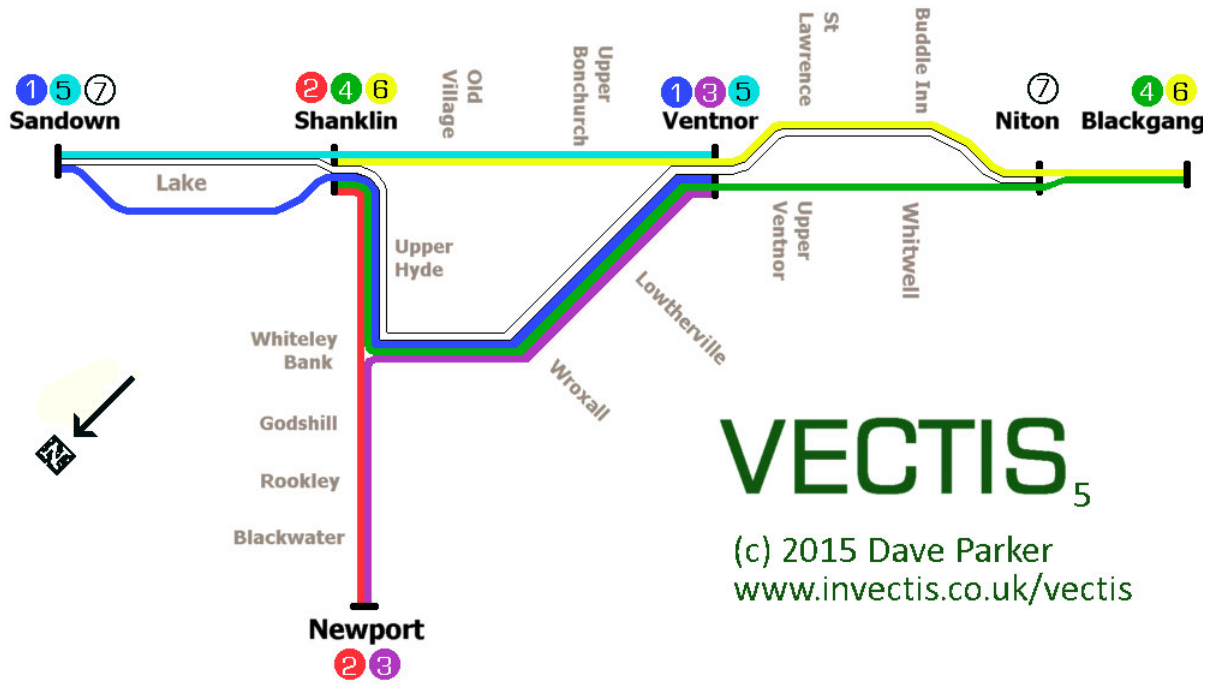
- VECTIS is written by Dave Parker. It was written in 1986 in the Spectrum 'BASIC' language.
- The paper listing of the original programme, printed on over five yards of continuous thermal paper, had to be completely re-typed into my PC as all my storage cassettes have long since been lost! I would like to thank my son Michael Parker, for his help in transcribing the original listing. Also thanks to my grandparents for introducing me to the Isle of Wight many years ago and unwittingly contributing to this simulation.
- The Spectrum 'emulator' was written by Vaggelis Kapartzianis without whom my programme would not work on a PC.

## 14. Full size maps

- The map for versions 3 & 4



- The map for version 5 (Bank Holidays)



These instructions were last updated: February 2015.

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