

# SOUTHERN BELLE

for the 48K Spectrum and Spectrum +  
Hewson Consultants Ltd 1985

Welcome to the Southern Belle - a realistic simulation of a King Arthur class steam locomotive hauling a passenger train from London to Brighton during the early 1930s.

The task before you is to take a steam locomotive and its train from London (Victoria) to Brighton. You must take the roles of both Fireman and Driver. There are many levels of play and we suggest you read the instructions carefully, then watch the computer demonstration for a few minutes. Study the control settings and then attempt the Training Run. Gradually you will improve your skill and eventually you will be able to take the Southern Belle to Brighton in accordance with the timetable using the coal and water available to the optimum efficiency.

To load the game type LOAD "" and then ENTER, start the tape at the beginning and wait until the main menu appears on the screen. Note that after one minute on the menu screen the computer will automatically select a high speed run showing the whole route. To return to the menu press X.

## GETTING STARTED

### Selecting The Demonstration

Load the program in the usual way. Press key 0 when the main menu appears and then press the ENTER key when the timetable is displayed. The locomotive will pull slowly away from Victoria Station and accelerate past Battersea Power Station. Observe the use of the various controls and study the readings on the gauges. Press CAPS SHIFT X to return to the main menu.

### The High Speed Run

If ENTER is pressed when the main menu appears the program executes a High Speed Run along the entire line in about five minutes. All the main features along the way including Battersea Power Station, Clapham Junction Station and Clayton Tunnel pass in quick succession. To exit press X.

### Starting a Training-Run

Press 1 when the main menu appears and 1 again for the locomotive control menu. This will give you control of the Regulator, Cut Off and Brake only. The remainder of the controls will be worked by the computer. Read the schedule displayed and then press ENTER.

With the locomotive standing at Victoria Station open the Cut Off fully by pressing C four times. Half open the Regulator by pressing R twice. After a few moments the locomotive will pull slowly along the platform and out of the station.

Observe your speed display in the top right hand corner of the screen. When you are traveling faster than four miles per hour press R twice more to open the

regulator fully. The locomotive will then accelerate more rapidly as it climbs the steep incline away from the station on its way over the River Thames and past Battersea Power Station. If you open the regulator too soon the locomotive driving wheels will slip on the running rails leading to a loss of traction. To exit from a Training Run press CAPS SHIFT X.

### Screen Layout

On the left hand side of the screen is the view of the cab, controls and the line ahead. Above this is a green station sign naming the next station or feature that you will encounter. Below is the message area, within which any pertinent information is relayed to you. To the right are three separate sections. The topmost shows the coal and water remaining in the tender and the speed at which you are running. The centre section displays one of three options, a signalling area which shows you a full colour picture of the next signal that you will see, or the gradient and profile for the next 1.25 miles, or the position of the train. Below this is a clock showing the present time to enable you to adhere to the timetable.

### THE CONTROL KEYS

#### Locomotive Control Keys

CONTROL	INCREASE SETTING	DECREASE SETTING
Sound Whistle	W	
Stoke Fire	ENTER	(a shovel symbol appears)
Regulator	R	SYMBOL SHIFT + R
Vacuum Brake	V	SYMBOL SHIFT + V
Cut Off	C	SYMBOL SHIFT + C
Blower	B	SYMBOL SHIFT + B
Injector	I	SYMBOL SHIFT + I
Firedoor	F	SYMBOL SHIFT + F
Damper	D	SYMBOL SHIFT + D

#### Program Control Keys

FUNCTION	KEY
Accelerate to five times normal speed	A
Return to normal speed	SYMBOL SHIFT + A
Switch smoke on	S
Switch smoke off	SYMBOL SHIFT + S
Return to main menu	CAPS SHIFT + X
Hold, wait for ENTER to restart	H
Toggle between signal and gradient	G
Display position of train	P
Display timetable	T
Acknowledge message	SPACE

## Smoke Demonstration Keys

SMOKE LEVEL	KEY
Very light smoke-far too much air	1
Light smoke-too much air	2
Correct smoke	3
Dark smoke-insufficient air	4

## MENUS, MESSAGES AND SPEED LIMITS

### The Main Menu

#### LEVEL SUMMARY

ENTER	High Speed Run - selected automatically after 1 minute
0	Demonstration - non-stop run using first schedule
1	Training Run - identical run and schedule to level 0
2	Easy Run with Speed Limits-non-stop, random schedule
3	Stopping Train and Signalling - stopping schedule
4	Heavy Stopping Train - difficult load and schedule
5	Record Breaking Run - schedule as on 26th July 1903
6	Southern Belle - non-stop run, marked very severely
7	Problem Run - any schedule plus extra problems
L	Load a saved position

### Speed Limits

LIMIT	WHERE LIMIT APPLIES
40mph	Victoria to Clapham Junction
45mph	Balham Junction (Curve after Balham)
60mph	Streatham Common for 1/2 mile
45 mph	Windmill Bridge Junction (1/4 mile past Selhurst)
50 mph	Far end of Redhill Tunnel to Earlswood

### Error Messages

MESSAGE	MEANING
NO WATER, FUSIBLE PLUGS GONE	Water level in the boiler too low
BOILER OVERFILL, CYLINDER DAMAGE	Water level in the boiler too high
OVERRAN STOP SIGNAL	Passing a stop signal in the down position
UNSAFE REVERSING	Allowing the train to run backwards
BLOWBACK, CREW INCAPACITATED	Failure to ensure that the blower is on when the regulator is shut or when in a tunnel
TRAIN DERAILED	Excessive violation of speed limit
CRASHED INTO BRIGHTON STATION	Hit buffers at too high a speed
POOR STOP AT	Failure to stop within 60ft of the end of the platform
SHORT STOP AT	Failure to wait for one minute at a station
ROUGH STOP AT	Using vacuum brake level three or above when the train comes to a halt at a station

NO STOP AT	Failure to stop at a scheduled stopping
NO WHISTLE AT	Failure to sound the whistle before starting off, or before a tunnel or before permanent way working
EM BRAKE AT	Using emergency brake
SPEEDING	Failure to observe the speed limit

### SAVING AND LOADING A POSITION

You may save your current position during a run by pressing T to select the timetable followed by S to start the save sequence. To re-load a saved position select the main menu and press L.

### THE MAIN MENU IN DETAIL

#### Option 0 Computer Demonstration Run

This run demonstrates the various techniques required to drive the locomotive with the computer running all controls on a non-stop run to Brighton. You are advised to study the various settings used to help you learn correct driving methods.

#### Option 1 Training Run

A practice session for the novice driver/fireman to the same schedule as the computer demonstration. You are expected to observe the drivers notices and adhere to the timetable shown initially. You may halt the run at any time to refer to the timetable again. A short beep is sounded to assist you when the computer records a time for the final assessment.

When arriving at Brighton you must bring the train to a halt as near to the far end of the platform as possible. Hitting the buffers will result in the loss of safety marks and doing so at anything above a walking pace will result in a crash.

At the end of the run your performance is assessed with regard to economy, safety and timekeeping. A result of 70% overall is considered to be a pass. The economy assessment is based upon the stocks of coal (measured in hundreds of pounds) and water (measured in hundreds of gallons) left in the tender. Note that the computer is not economical when it runs the demonstration. You should aim to do better. The timetable is shown or it can be replaced by a page of significant events.

#### Option 2 Easy timetable with speed limits

A train on a non-stop schedule to Brighton. Speed limits, including any additional limits in the drivers notices must be observed otherwise safety marks will be lost and the train may derail.

### Option 3 Stopping train and signalling

As option 2 but you must also obey all signals and make the stops required on your timetable.

The purpose of signals is to divide the line into sections so that trains on the same line run at an adequate distance from each other. There are two types of signal used on this line, stop (red with a square end) and distant (yellow with a notched end). Each has two positions, up for clear and down (horizontal) for stop or caution. Stop signals may come singly or in groups.

You must not pass a stop signal in the down (stop) position. To give warning of the condition of the stop signal a distant signal is placed a suitable distance before it. It will be down (caution) if the stop signal to which it refers is down ie at the stop position.

As an additional warning so that you have the maximum time to react the state of the next signal to be passed is reproduced separately in the signal section at the right of the screen (if selected).

The stations at which you are scheduled to stop are shown in capital letters on the timetable. You must attempt to stop within 60ft of the far end of the platform without excessive braking when coming to a halt. Should you pass the end of the platform before coming to a halt a beep will sound and a "no-stop" error will be recorded against your time.

You must arrive at the station in good time to allow at least one minute for your passengers to embark and disembark. The whistle will sound, if it is under computer control, one minute after your arrival or you may use the second hand on the clock. The times recorded for the assessment are the times at which the train comes to a COMPLETE halt and the time it first moves thereafter. The timetable gives the required departure time.

### Option 4 Heavy Stopping Train

A heavily laden train with consequent loss of performance. All the constraints of option 3 apply.

### Option 5 Record Run

On 26th July 1903 the record for a non-stop steam train from London to Brighton was set at 48 minutes 41 seconds. A schedule is supplied to enable you to equal or better that record. All normal speed limits apply.

### Option 6 Southern Belle

This is the world famous pride of the Southern Railway Pullman non-stop train. Any deviations from the timetable are viewed with distaste by the railway management and made apparent in the assessment.

### Option 7 Problem Run

You will be presented with any timetable. All constraints apply plus other problems which will hinder your progress to Brighton.

(See separate file for gradient profile of the route)

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## HISTORICAL NOTES

The London and Brighton Railway company received permission to construct its line in 1837. The line was devised by Sir John Rennie and joined with the line of the London and Croydon Railway at Norwood. This gave a complete route from London Bridge Station to Brighton. In 1846 the two main route owners merged to form the London, Brighton and South Coast Railway (LB&SCR). The company's desire for its own West London Terminus was satisfied with the opening of Victoria Station in 1860, extending the line from a previous terminus at Pimlico.

In 1875 the first examples of "Pullman" luxury coaches were introduced by the company, culminating in an all Pullman non-stop London to Brighton train called the "Southern Belle". It first ran in 1908 and continued until 1972 (running under the name "Brighton Belle" from 1934).

In 1923 the many railway companies of Britain were grouped together into four large ones, the LB&SCR becoming part of the Southern Railway. In 1926 the Southern Railway gave the job of pulling the "Southern Belle" to its powerful and imposing "King Arthur" class locomotives. These continued until the line was electrified in December 1932.

Today the elegance of the "Southern Belle" has disappeared but the many architectural and engineering features of the line remain.

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## SOUTHERN BELLE

### How a Steam Locomotive Works

These notes describe the operation of a steam locomotive with a particular reference to the screen display and controls of Southern Belle. Understanding how a steam locomotive works will help you to master the controls more quickly. The driving force of the locomotive comes from the cylinders where a piston is pushed back and forth by the steam pressure raised in the boiler. Hot gasses from the firebox are drawn through the boiler by a system of tubes, which heat the water to boiling point, converting it into steam. The hot gasses drawn through the boiler then enter the smokebox and escape through the chimney. The performance of the locomotive depends upon the pressure in the boiler, which can be controlled by manipulating the fire.

### WATER GAUGES

These are two vertical tubes in the centre of the cab. They are very important as they give a visual indication of the level of water in the boiler. The bottom of the gauge is one inch above the firebox top, which must be kept covered at all times otherwise the fire will heat the firebox top beyond limits causing special plugs (called fusible plugs) to melt allowing steam into the firebox. This action cools the fire and alerts the train crew.

If too much water is carried in the boiler and the gauge reaches the top, water instead of steam will enter the cylinders causing permanent damage.

Ideally you should attempt to maintain a water level in the top half of the gauge. Should a failure occur, the run will be terminated with the consequential loss of marks.

### STEAM PRESSURE GAUGE

A round dial with a needle pointer, situated in the centre of the cab, graduated from minimum on the left to maximum (200 psi) on the right. The more steam pressure maintained the higher the potential power of the locomotive. However too much pressure will lift the safety valves and release steam thereby reducing pressure to below maximum (shown by two jets of steam issuing from the boiler top). This represents a waste of coal and water and should be avoided to achieve maximum efficiency.

### WHISTLE

The whistle is part of the safety equipment and must always be used before starting away, entering tunnels or approaching sections where permanent way gangs (railway maintenance teams) are working. To conserve steam the whistle should not be used indiscriminately.

As a guide to correct whistle usage, when the computer is controlling the whistle it is blown at the earliest time in each of the circumstances detailed above.

### REGULATOR

A lever situated on the top left of the cab which controls the flow of steam to the cylinders. It has five positions, closed on the right, progressing to fully open on the left. Opening the regulator applies power to the wheels and it must be adjusted when running to suit requirements. Always close the regulator when braking. Open the regulator cautiously when starting away as too much power will cause the wheels to slip (especially in adverse weather conditions). Wheel slip will be apparent from the increase in the speed of the steam exhaust.

### CUT OFF

A wheel control on the bottom left (marked C) which controls the time during each cylinder cycle that steam is allowed into the cylinder. It has five positions, 0% (straight up), 20%, 35%, 55%, and 75% (straight down). For example when the cut off is set to 20%, steam is allowed to enter for just 20% of the cycle. This has the effect that the expansive properties of steam are used more efficiently, by reducing the steam usage significantly for only a small loss of power. You will need to use this control to obtain high efficiency. When starting away it is normal practice to use 75% cut off.

## VACUUM BRAKE

A wheel control situated between the regulator and the cut off (marked V) which has five positions, off (straight up), light braking, medium braking, heavy braking and emergency braking (straight down). The brakes act upon all the carriages and are held off by maintaining a vacuum in a pipe connecting the carriages, braking being achieved by progressive release of the vacuum via the vacuum brake control.

In the event that the communication cord of the train is pulled, emergency braking is automatically applied and will be released as appropriate. Emergency braking must not be used by the driver except in extreme circumstances, as a poor safety rating will result. Avoid using harsh braking to bring the train to a halt at a station for the comfort of your passengers.

## BLOWER

A wheel control situated centre right of the cab (marked B) which is off when pointing straight up. It is essential that at all times gasflow is maintained drawing the gasses from the firebox out through the chimney ensuring that no flames or gasses are allowed to escape into the cab via the firehole doors. Normally this gasflow is supplied by the exhaust of used steam up the chimney when the regulator is open. This gasflow will be interrupted by closing the regulator or by the confines of a tunnel. In these circumstances normal gasflow must be maintained by opening the blower which sends a jet of live steam up the chimney. Failure to use the blower when necessary is dangerous and can lead to an "explosive blowback" into the cab. Use of the blower should be limited to only when necessary due to its cost in the loss of steam.

## INJECTORS

A wheel situated top right of the cab (marked I), which controls the device by which water from the tender is forced into the boiler. It has five positions, off (straight up), progressing to full on (straight down). This is the means by which the level of water in the boiler is maintained.

## DAMPERS

A wheel situated on the bottom right of the cab (marked D) which controls the amount of air provided through the base of the fire (called primary air). It has five positions, closed (straight up) progressing to fully open (straight down). By control of the amount of primary air it is possible to vary the temperature of the fire and thereby the amount of water evaporated into steam. To achieve a hot fire a large amount of primary air is required for combustion. Conversely for a cool fire only a small amount of primary air is required. To help you judge the temperature of your fire a thermometer style temperature gauge is presented in the cab centre. The indication of correct combustion is the colour of your smoke such that black smoke would indicate insufficient air for the temperature of the fire, grey smoke indicates correct air and lighter shades indicate too much air. If too little air is supplied coal combustion will not provide the maximum heat value. If too much air is supplied, heat will

be wasted in heating the excess air. To be efficient you must aim to maintain the correct air supply as far as possible. (Whilst manipulating the fire temperature correct combustion is unlikely). The rate at which coal is consumed increases with the temperature of the fire.

## FIREHOLE DOORS

A pair of steel doors used to confine the fire and to control the flow of air over the fire (secondary air). To achieve optimum temperatures of the fire the level of coal must be maintained in the middle third of the firebox. Coal levels outside these parameters cannot achieve maximum temperatures. You must fully open the firedoors whilst coal is being added (indicated by a shovel at the top right hand corner of the display). Failure to do so will waste coal. In all but the highest level of control the computer will do this for you. For perfect combustion a small amount of secondary air may be required.

The firedoors can also be used to assist in the manipulation of fire temperature for example to raise the temperature of the fire "quickly" keep the firedoors shut, and to lower the temperature "quickly" open wide.

## GRADIENTS

Railway lines are not level and steam railway locomotives are affected by the gradient of the track. The gradient is indicated in the same manner as road gradients, eg 1 in 100. This would indicate a slope up or down of one foot in every 100 feet travelled. A cross section of the gradients of the line together with the positions of the stations and tunnels is shown in the gradient profile included. The exact gradient of the track at any particular time may be displayed in the signalling area.

Vacuum brakes must be used to ensure that the train is never allowed to run backwards on an up gradient.