A New Power in Personal Transport

It is December 31, 1984, and Sir Clive Sinclair has approached you to join forces with him to launch the revolutionary new C5 personal transport device. A radical way of transporting people, it is a three-wheeled, electrically operated vehicle in which a single person sits and steers from the recumbent position. (I.e., they are seated with legs extended.) The vehicle is very sexy: its low-slung lines and cool white shell make it look like a one-man space vehicle hovering over the ground. Sir Clive boasts that it has an extremely low wind-resistance ratio, an extremely low road-resistance ratio, state-of-the-art battery technology, and a patented design for the vehicle body. A veritable who's who of British automotive engineering, including designers from Lotus engineering, have participated in the vehicle's creation.

The details that Sir Clive provides you are very much the same as those reported eleven days later in the Times of London:

> Sir Clive Sinclair launched his electrically powered "beetle" car yesterday, describing it as "a cultural shock for the motorist". It is on sale for £399 at electricity board showrooms and by mail order; to be followed within days at chain stores. Production capacity for two hundred thousand vehicles a year will be available at Hoover's Merthyr Tydfil factory by June. Sir Clive said that he had planned a more conventional electric car, but decided to take advantage of legislation introduced in 1983 for electrically assisted cycles. The C5 can be driven by 14 year-olds without a driving licence, insurance or helmet; it is not subject to road tax, does not need the Department of Transport approval and parking regulations do not apply ...
>
> There are more sophisticated Sinclair vehicles to come. The next is expected to appear in about two years. It will also be powered by a conventional lead acid

> battery. The third vehicle, at the planning stage, will use a new electricity source under development by a European battery maker. ...
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> The C5 is arguably the most controversial newcomer to Britain's roads since Sir Alec Issigonis's Mini pioneered a new breed of small car. Like the first Mini, the Sinclair is being labelled a toy. Controversial it may be, but toy it is not.

(Source: "The most controversial newcomer since the Mini pioneered a new breed Sinclair electric pedal car on the road for £399" Times, January 11, 1985)

The Financial Proposition

Sir Clive is asking you for a £3M investment. In return, he will make you an equity owner in the company. The exact ownership level is to be determined. The £3M investment will be used to launch a massive advertising campaign to drive widespread product adoption.

To date, Sir Clive has put in around £8.4M of his own money, and is the sole owner of the company. In addition to significant capitalization provided by the recent commercial successes of Sinclair Research, which commercialized the first pocket calculator, the first home computer, and the first mini television, Sir Clive has secured a strategic alliance agreement with Hoover Corporation. They have devoted a production facility in Merthyr Tydfil, South Wales, to the C5.

The Opportunity

On 26 March 1980, the Government abolished motor tax for electric vehicles.[1] Department of Transport figures for 1978 showed that there were 17.6M licensed vehicles in the UK, including 14M cars and 1.2M mopeds and motorcycles. 2.4M households had a second car.

There were 175,000 electric vehicles in use, of which 45,000 were road-going: 90 per cent of them were milk floats. Then the very telling information - 93 per cent of all cars travel less than 60 miles per day; the average daily distance per car is 13 miles; virtually all journeys by pedal cycle and moped are less than six miles.

The Transport and Road Research Laboratory (TRRL) gave comparative figures for primary energy consumption of vehicles in the following ratios - lead-acid electric vehicle (111): petrol car (100): diesel vehicle (55). However, continued the report, for urban driving the electric vehicle is twice as efficient as the petrol car, and better electric vehicles and batteries will further improve its efficiency.

There were clear advantages for electric vehicles. During the day they would provide an environmentally acceptable method of transport, and when the batteries were being charged

[1] This passage is taken from Rodney Dale's 1985 book, "The Sinclair Story".

(normally during the night) they would be using off-peak power. We have already seen that the British government sponsored £5.5M of electric vehicle research in the ten-year period ending in 1983; by contrast the US government allocated £71.5M for the ten-year period ending in 1986. Although there was a great deal of interest in promoting electric vehicles, the submissions to the government committees concentrated on public and commercial transport and made no mention of personal transport.

The 1983 legislation had been written so that vehicle designers would have as much freedom as possible; notwithstanding this, the design that Sinclair Vehicles produced was a complete surprise to the Department of Transport. The regulations to be met by law are fairly short and simple. The cycle - as it's called technically - has to weigh no more than 60kg including the battery; as it was, the design of the C5 was so honed that it was possible to fit two batteries without exceeding the 60kg weight limit. The motor must not be rated at more than 250W. The vehicle has to meet British Standard regulations for cycle braking. It has to have an on/off switch biased towards off, it has to have a plate stating who the manufacturer is, and it has to be "electrically assisted", so it must have pedals. Under those conditions, the vehicle can be operated by anyone over the age of 14, with no licence, no insurance, and no crash helmet.

The Sinclair is Unveiled

Although Sir Clive Sinclair is a household name in 1980s Britain (see page 8 for biographical information on Sir Clive), you are asked to be an investor in his company with little more than concept drawings and a few numbers as a guide. You have told him that you will meet him at the product launch, and then after the product launch, the two of you will sit down and discuss a position.

On the morning of 10 January 1985, the snow on the ground is beginning to thaw as you trudge up the hill from Alexandra Palace station to the hall where the launch is to take place. While it is a relatively still and quiet winter's day outside, the hall is buzzing with activity inside: people milling around collecting press packs from girls dressed in grey with touches of yellow, the theme colours of the occasion; many of the men are wearing pullovers in shades of grey and yellow as well. You troop into the arena, and take our places on tiered seating which remind you of a dolphinarium. Even as you sit there, hardened journalists are subbing their press handouts. Sinclair Vehicles and Sinclair Research staff are moving about nervously; the atmosphere is awash with adrenalin.

Clive Sinclair speaks: "Good morning ladies and gentlemen; thank you very much for coming to this press conference today. It is of course a world first the world's first press conference held in a plastic bag... I'm going to start in a rather unusual fashion by telling you what we are not announcing today, because there have been some fairly confusing leaks. We are not announcing a conventional car. Sinclair Vehicles Ltd is dedicated to the development and production of a full range of electric cars, but today we have an electric vehicle, the

first stage on the road to the electric car... There have been several reports that the vehicle is made of fibreglass; in fact it's not: the body is the world's largest, mass-produced injection moulding. It's astonishingly light, and astonishingly strong, moulded in the ICI wonder plastic polypropylene which has absolutely marvellous properties for a vehicle... enormously tough, enormously durable, obviously completely free from rust. The pigmentation is in the material itself, so no matter how scraped or scratched or bumped it gets it's never going to lose its colour, never going to deteriorate... Another fallacy is that the vehicle is powered by a washing machine motor. True, the Italian company that makes these motors does make washing machine motors but they also make torpedo motors. This lightweight, highly efficient motor is specially developed for our vehicle... Another (very understandable) fallacy is that on a low-speed vehicle, wind resistance doesn't matter... the truth is that if you're designing a vehicle efficiently and of course we are concerned with the ultimate in efficiency wind resistance matters an enormous amount. A cyclist travelling at 20 mph is using 90% of his energy overcoming wind resistance. The reason people have come to the conclusion that it doesn't matter up to 30 mph in a car is that cars have such appalling road resistance. But the C5 doesn't; we've gone to tremendous lengths to get the road resistance very low, and having achieved that on an ordinary flat road, the wind resistance became dominant so we put a great deal of effort into achieving a very low drag factor... Almost everything has been designed and tooled from scratch for us the lights, batteries, motors, electronic control system. Because of our work at Sinclair Research, the electronic control system is very advanced and we have a custom chip that monitors everything and controls everything get into the vehicle and you don't have to think about it; it's all done for you...

We were very concerned right from the start with safety. For that reason we asked the Department of Transport who we should talk to and brought in all the best advice we could. We've gone to great lengths to make the vehicle very visible both in daylight and at night, and to make it tough. We're very much of the view that by encouraging people to be on three wheels rather than two we will be adding considerably to safety on the road...

Now, before I hand over to the managing director of Sinclair Vehicles, Barrie Wills, I'd just like to introduce the vehicles to you."

Music which is deemed suitable for such occasions blares out. Further down the arena are six cardboard boxes in which something appears to be happening. The fronts of the boxes are covered with translucent paper, and six lights come-on; then six C5s burst through, driven by six grey and yellow girls. They drive right round the arena and line up side-by-side on the finishing mark. It is a solemn moment.

Barrie Wills recounts his introduction to Clive Sinclair, his initial scepticism, and how he was won over to the electric vehicle.

Wills went on to explain the constitution of Sinclair Vehicles "similar to Sinclair Research, a small, high-calibre team of people, principally product development and marketing oriented with a very heavy dependence on the resources and expertise of sub-contractors".

"We're developing a family of traffic-compatible, quiet, economic and pollution-free ve-

hicles for the end of the Nineties. You're seeing the baby of the family today, the C5, a completely new form of practical personal transport designed to meet the new legislation for electrically-assisted cycles." Wills outlined the legislation as it applied to the development of the C5. "Using a package that was designed around the seating position of a Ford Capri, we developed it for production, laying down standards well in excess of the legislative requirement, imposing upon ourselves a system of testing based upon the United States automotive self-certification patent."

Then came a video film which took us through the development, testing and manufacture of C5s. "The Prescott hill climb circuit was used to test both hill climbing performance and brake descent. Parts of the track were flooded and many of the tests were conducted in sleet and snow." Just like the weather outside that day. "Accessories to make the C5 an all-weather vehicle have been designed and are seen here... Waterproof side screens fit on front and rear wheel arches and are attached to the body shell by Velcro. The protective cape and hood is also attached by Velcro at the front and sides of the vehicles. Subsequent to this stage, a fashion designer has developed the cape principle into an attractive weathercheater, which is a cross between a ski jacket and a mountaineering anorak. This includes a clever form of apron which encloses the cockpit area while allowing freedom of arm movement for signalling."

Back to Barry Wills "... The last thing we needed to produce C5 was a vehicle manufacturer. The manufacture and assembly is far closer to that of a domestic appliance than it is to a vehicle, and after a very exhaustive review, we chose Hoover's Merthyr Tydfil plant for the assembly. They have put together a dedicated assembly facility which was progressively equipped, manned and commissioned during 1984." He showed slides of the facility. "... Since 1 November 1984, an excess of 2000 and the count at 10.30 this morning was 2507 saleable vehicles have been built in preparation for the market launch today. We expect to produce in excess of 100,000 units in 1985, creating some 200 new jobs at Warwick and at Merthyr Tydfil.

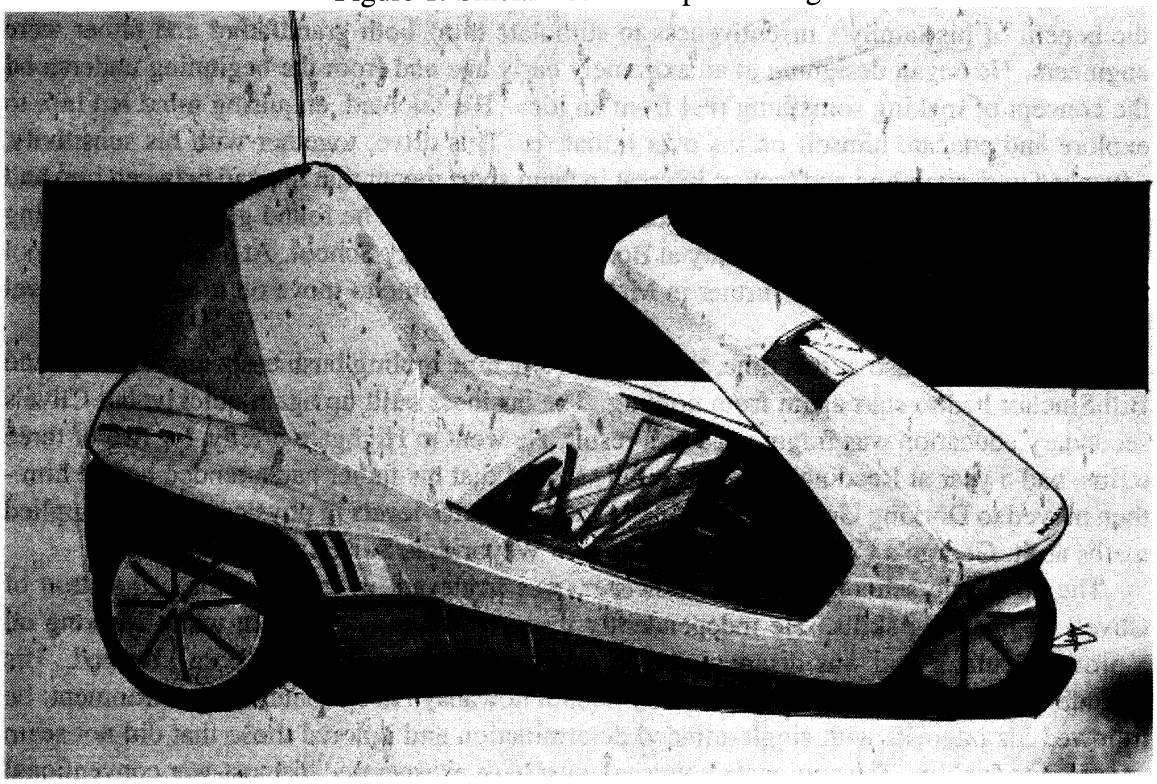
"The C5 is the subject of a massive three-month, £3M mail-order launch advertising campaign under the theme of 'A new power in personal transport'. The first press advertising will appear tomorrow, and the first TV commercial tonight. We going to show you that TV commercial now."

Intimate, persuasive voice: "Imagine a vehicle that can drive you five miles for a penny; a vehicle that needs no petrol, just a battery; and that takes the press of a button to start, the squeeze of a lever to stop. That needs no licence, no road tax, and you can drive it whether you're 14 or 40. A vehicle that costs just £399. The Sinclair C5 is a new power in personal transport. The Sinclair C5. £399. Want to buy one? Want to see one? Or simply want to read all about it? Just dial 100 and ask for Freephone C5 now."

Barrie Wills continues: "Mail-order maximises initial quality awareness through the reinvestment of higher sales margins directly into advertising. This provides the best possible platform for retail introduction, which we anticipate in the UK before the summer using retail chains such as white goods stores, supermarkets, do-it-yourself stores, and department stores.

Our marketing plans are made possible by a series of major innovations in the after-market. These dispense with the need for a conventional car dealer and service workshop infrastructure. C5 servicing is franchised to Hoover: 19 Hoover service offices nationwide, employing over 400 service engineers, have been equipped to undertake vehicle maintenance on a door-to-door basis. 300 Sinclair battery centres have been established using Comet Group stores and service shops and selected Woolworth stores. These are already equipped to provide initial and replacement batteries, installation kits and additional battery chargers, and to handle any customer warranty problems on behalf of the battery manufacturer, Oldham. During the mail-order phase, door-to-door delivery is being handled by United Parcels from three strategically located warehouses... C5 heralds a revolution in personal transport. We need now to pay tribute to all those who have contributed to making it all possible: Lotus Cars, Hoover plc, Oldham Batteries, Woolworth, ICI, the 80 suppliers of components, the suppliers of services and equipment, the Electricity Council, the Welsh Office, the Department of Transport, British Aerospace, Motor Industries Research Association, the Transport and Road Research Laboratory, the Royal Society for the Prevention of Accidents and the UK Safety Organisation, and the University of Warwick. Above all my team at Sinclair Vehicles the best team of people I've ever worked with. Together, we are also a new power in personal transport. Thank you."

Figure 1: Sinclair C5 Concept Drawing



A Biographical information for Sir Clive Sinclair

Born in 1940, Sir Clive is the chair of British MENSA association.

Living near Richmond in Surrey as a child he enjoyed a comfortable middle class existence at home, but being precocious and being the eldest child, related better to adults than to other children. The Sinclair parents eschewed conventional, polite social reserve preferring direct, confrontational exchanges and set this pattern for their children. This unusually honest communication perhaps intensified the sense of isolation that Clive sometimes felt as a child in the company of other children.

He certainly enjoyed home much more than school life. In the summer holidays he had the benefit of his family's inventiveness to stimulate him: both grandfather and father were engineers. He began designing at an extremely early age and from the beginning understood the concept of making something real from an idea. His talented, enquiring mind led him to explore and educate himself on his own initiative. This drive, together with his sensitivity, advanced understanding and lack of interest in team sport meant that the gap between him and his peers tended to widen rather than decrease at school. This he found generally stultifying even though he found aspects to enjoy at Boxgrove Preparatory School. At aged ten the school found it could teach Clive no further in Maths and it was time to move on to secondary level education.

Unfortunately, also at this time, the family's machine tooling business went bankrupt and Bill Sinclair had to start again from nothing. The business built up again quickly, but Clive's secondary education was fragmented as a result. He went to Highgate briefly, for two or three terms, had a year at Reading - a minor public school that his father had attended before him - then moved to Dorking Grammar. He finally took A- and S-levels in physics, pure and applied maths at St. George's College, a public school in Weybridge, Surrey.

The academic school education, however, was irrelevant in terms of the acquisition of Clive's engineering skills. He independently invented the binary system while working on a proto-calculator and was disappointed to discover that it had already been invented. His attitude to learning is accepted as perfectly natural nowadays in a Montessori environment: he followed his interests with single-minded determination and ignored those that did not seem appropriate for him. The approach, however, must have exasperated his post-war conventional teachers in the English system of the time.

In 1961 he registered Sinclair Radionics Ltd as a company, having spent some time designing a pocket transistor radio and finding backing, whereupon the backer withdrew. Clive had to find work quickly, which he did with United Trade Press as a technical editor. He spent a year in this role and used it wisely to make links with manufacturers. He began to operate his company from his one room in London, but quickly moved to two rooms in Islington. The long-standing link with Cambridge came about from Clive's meeting Tim Eiloart through Mensa. He needed a base to assemble components and deal with mail order administration. Cambridge Consultants Ltd, run by Eiloart, provided this service. No sooner had the

advertising appeared than the company was swamped by demand and the business began to snowball.

Sinclair Radionics lasted until 1979, with various products and company spin-offs. Beginning with a mini-amplifier, the company quickly earned a name for design, quality and pioneering ideas. The overall vision was to produce in bulk and to sell cheaply. This risky but potentially profitable 'stack 'em high, sell 'em cheap' approach has made fortunes before, but carries with it the risk of bankruptcy. In the early days one strategy essential to this policy for Sinclair Radionics was production in kit form.

Miniaturisation, at which Clive proved himself so talented, was also a key idea. In 1972 Clive marketed the world's first pocket calculator, by 1976 the world's first digital wristwatch and in 1977 came the first pocket TV.

In January 1980 Clive demonstrated the Sinclair ZX80 home computer at an exhibition in Wembley. For this product there was a choice between a cheaper kit and the ready assembled computer, which still cost less than £100.

By September more than 20,000 had been sold; Sinclair Research had had to cope with another rapid expansion and had established a base in the United States.

Manufacturing was contracted out, but efficient quality management earned the product a justified name for reliability. The bugs in the first computer's system were mostly ironed out with the follow-on product, the ZX81 again selling at less than £100. By 1982 company turnover was £30million, compared to £4.65million in the previous year. The ZX Spectrum was launched in April 1982 and changed the face of leisure in the home.

He studied for a diploma at King's College, Cambridge and was a Visiting Fellow of Robinson College, 1982-85: just over the road from his impressive house on Madingley Road, Cambridge. He was also Visiting Professor for the Department of Electronic Engineering, Imperial College of Science and Technology, London from 1984 onwards, which he defines as 'a proper job' lecturing students.

B Biographical Information for Barry Wills

Barrie Wills had a long history in the automotive business in Britain. Wills had taken part in building a factory for Leyland National in the late 1960s to manufacture the first bus to be built on car-assembly principles. He joined Reliant in 1972 when that company was at a crossroads investing a lot of money in a new product, again an almost greenfield project. He was De Lorean Motor's longest serving employee before the company folded. Barry Wills was hired as the general manager of Sinclair Automotive in October 1982.