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Looking ahead The August issue of DESIGN will include a feature on Carnaby Street describing the people behind the 'pop revolution', the first of a two part study of design methods by J.C. Jones, and an article on computer typesetting

Addresses of manufacturers in this issue are on page 80

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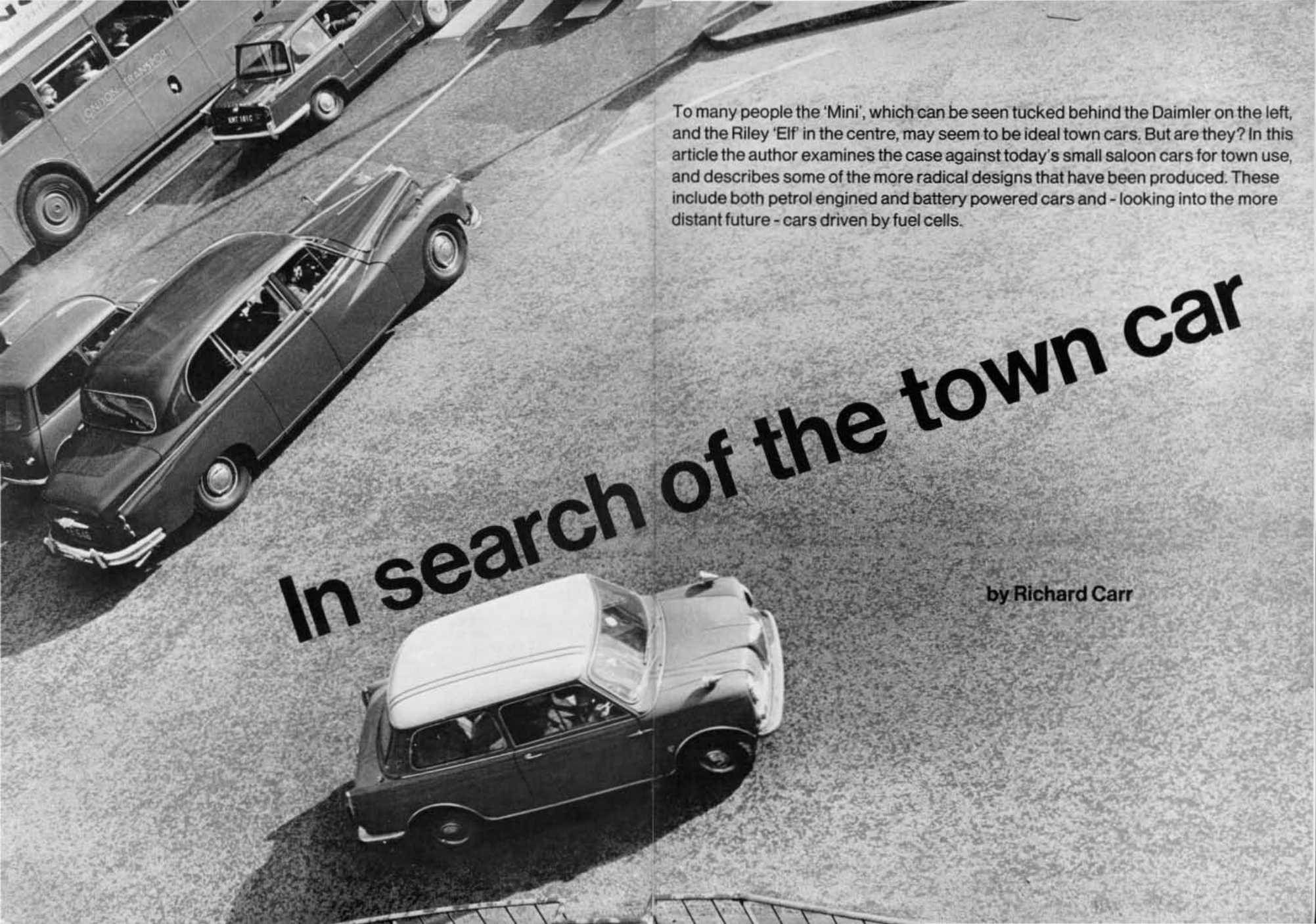


To many people the 'Mini', which can be seen tucked behind the Daimler on the left, and the Riley 'Elf' in the centre, may seem to be ideal town cars. But are they? In this article the author examines the case against today's small saloon cars for town use, and describes some of the more radical designs that have been produced. These include both petrol engined and battery powered cars and - looking into the more distant future - cars driven by fuel cells.

In search of the town car

by Richard Carr

Three saloons versus an idea

1

1 *The Mini. Disadvantages as a town car are its over-specified engine, and the difficulty of getting in and out. Main advantages are its size – it is only 10 ft long – and its ease of manoeuvre.*

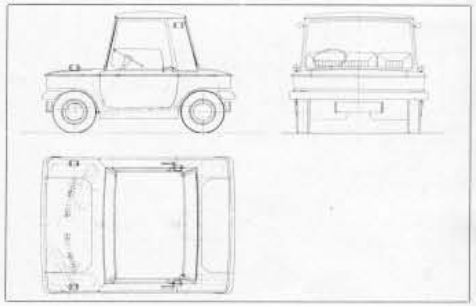
2

2 *Trojan bubble car. Disadvantages include lack of passenger and luggage space, and the clumsy door. But it is cheap to run and – being 8 ft 10 inches long – very easy to park.*

3

3 *Reliant 325. More acceptable than most three wheelers, but too long (11 ft 3 inches) and too low. Its body, however, uses glass fibre, a particularly suitable material for town cars.*

4



4 *Three views of Eric Roberts' town sedan. Its main features are the short length, small turning circle, good interior dimensions and luggage space under the bonnet.*

In the boardroom or managing director's office of nearly every motor car company in Britain (and in most designers' offices, too) you will find a number of drawings of way-out motor cars, and among them there will almost certainly be someone's vision of a town car – small, compact and usually looking quite unlike any car that you can see on the road today. Sometimes it will have four wheels, sometimes only three; sometimes a distinguishable front and rear, sometimes an all-embracing curvaceous body so that there's no telling where the engine is. But whatever its particular form, each drawing is yet another example of the search that is going on – however haphazardly – to find a solution to motorised transport that will both fulfil a particular need and be different from the vehicles we have today.

Besides appealing to the engineer and designer in a way that may have its origin in the deeper layers of the unconscious, the search for a town car is beginning to have a social significance, too. If we confine ourselves to Britain alone, the forecasts about the growing car population are enough to give rise to serious thought about what cars should be like: if Professor Buchanan is right in his report, *Traffic in Towns*, we may have reached the saturation point of 30 million cars (0·4 car per head of the population) by the year 2000 – a little more than three times the number of cars on the roads today. At the same time, these cars will have to be accommodated within Britain's environment and this means (as Christopher Brunner has argued in his paper, *Cities – Living with the Motor Vehicle*) to a large extent within towns. Otherwise, the present fabric of towns will have to be altered beyond recognition, or suburbs will spread indefinitely as they do between Portland in Maine and Norfolk, Virginia, "a region of 50 million people in which all distinctions between town, suburbs and country are increasingly blurred." Indeed, the pressure on towns will be all the greater because, as the figures given show, 30 million cars represents a very large number of two-car families in which one car, at least, will be used by the wife for taking children to school, getting in shopping and perhaps paying a number of social calls. Already, a survey in Central London by the Electricity Council has shown that, of all the cars entering the area, more than 18 per cent were on a shopping excursion, while statistics based on national surveys suggest that 80 per cent of *all* the cars on the roads do less than 20 miles a day, and that this mileage is decreasing.

Two assumptions and one certainty

The need for a town car, therefore, is based on the assumptions that we will still have towns in the foreseeable future and that, despite various planning proposals, access to the towns will still be available to the motor car; and on the certainty (barring a revolution in ideas or a nuclear war) that most people will have a car at their disposal within the next 30 years. This being so, the first question to ask is whether the present type of car now available (the *Mini*, for example) really is suitable for town use and, if not, what kind of vehicle is needed instead. Or, to put it another way, why talk about town cars if we already have them?

Underlying this question there is, of course, the implicit suggestion that a town car may not be quite the same as some other sort of car, and indeed this is becoming increasingly true. The town car is affected by the uses to which it is put and by the fact that towns are demanding increased manoeuvrability in return for an ever decreasing amount of space in which to park.

Incidentally, there are some other facts to be taken into account, too: the Noise Abatement Act of 1960 can be used to suppress noisy vehicles, while the growing resentment against vehicle fumes which, at their worst, can turn the atmosphere of a city like Los Angeles into almost perpetual smog, may eventually lead to effective action being taken against uncontrolled exhaust under the provisions of the 1956 Clean Air Act. Both noise and fumes are unpleasant under any circumstances, of course; but it is in cities that their presence is felt most of all. And, if the town car is also the second car, the amount of capital investment it represents, and its running costs, become particularly important.

The beginning of a brief

The picture of the town car is now beginning to emerge. Its dimensions should be kept to a minimum, although it must be able to carry one or two adults plus children and luggage; the disposition of its wheels should give maximum manoeuvrability; mechanically, it should be as quiet as possible; and, if it really *is* a town car, certain restrictions can be put on its range of use and its speed (and in this sense, it could be radically different from other cars). Other considerations which must be taken into account include the need to design a vehicle which does not suffer the minor dents and scratches that make cars used for pottering about in look so shabby (by giving it all round bumpers?), controls which really are simple (a fully automatic gear box, for example) and big windows to overcome the feeling one gets of being cooped up in a box – even if it is on wheels.

Having to some extent stated the designer's brief, what is the position today? First, the cars which might qualify for town use. These obviously include bubble cars and three-wheelers, on the one hand, and *Minis* and other small saloon cars on the other. Nearly all of them can be penalised for being too small or too low (like the Trojan, 2, the Reliant three-wheeler, 3, and the even smaller Messerschmitt), or too inconvenient for the user (like the *Mini*, 1, which makes one bend double to get into it. They are also too long, as are the bigger – but still 'small' – saloon cars. Just how inadequate they are can be demonstrated by comparing them with other town cars which are either on the drawing board or have actually been built.

Turning fiction into fact

First, the town cars which exist only as drawings or small models. Of these, there are a good many, not only pinned up in company boardrooms or lying on shelves in designers' offices, but also as student projects carried out as part of a college's syllabus. In America, for example, work on town cars has been undertaken at the institute of design at Illinois Institute of Technology, at the art school of the Society of Arts and Crafts in Detroit, at Parsons School of Design and at Auburn University (see, for example, January's issue of *Industrial Design*); in Germany, similar studies have been carried out at the Hochschule für Gestaltung at Ulm (in particular); and in Britain, seminars and now a programme of research are in progress at the Hornsey College of Art, while work has also been done at the Royal College of Art. Encouragement has come from other sources too – the *Weekend Telegraph*, for example, held a city car competition whose winners were announced last October. But of all the town cars so far mooted, one of the most interesting is that designed by Eric Roberts, who has been

looking at the problem of town cars over the last few years.

Mr Robert's present town car (which he calls a town sedan), 4, has evolved from a version designed three years ago, and contains most of the principles mentioned in this article. The sedan is designed to park in either the conventional manner or nose- or tail-on to the kerb, has a turning circle of 13 ft, can pivot on its rear axle, and is only 7 ft 5 inches long. It has an unconventional mechanical layout, with gearbox, differential and drive assembly at the front, and the engine at the rear, and seats three people or one person and a lot of luggage. Large windows and a low waist line provide exceptional vision, and the bumpers are designed to absorb impact without damage to the coachwork. Finally, a locker under the bonnet allows luggage to be loaded from the pavement when the car is parked nose-on. But despite the fact that the car has been shown to a number of motor car manufacturers, there seems little chance (at least, at the moment) of its being put into production.

The second group of town cars comprises all those which have reached the prototype stage, and includes some which have already gone into limited production. The group, however, must be divided into two parts, the first containing cars with conventional internal combustion engines, the second those with unconventional engines based on electric power (at least, these engines are unconventional in the sense that they are applied to cars; there are, of course, a good many electrically powered vehicles on the road already). For reasons that will become apparent, the internal combustion engined cars will be considered first.

The conventionally powered town cars range from the extremely small, to cars which are as large as current small saloon cars. The smallest of all, however, is probably that designed by Stuart Smith, 5, which can be lifted and pushed along like a wheelbarrow and is powered by a 2 stroke engine with automatic transmission. The car is, in fact, a development of Mr Smith's go-kart, which won a gold medal at the Milan *Triennale* in 1965. The advantage of the car is that it can be stored upright (rather like a deck chair) and sells for around £200, while its disadvantages are that it is only really suitable for one person, is extremely low down and offers scanty protection from the weather. In its basic conception, it is like a smaller version of the *Mini-Moke*.

If Mr Smith's car can be faulted on its weather protection, so can the next one up in size, except that it does raise the point that the design of the town car is made easier if the car is intended for a sunny clime (which alters the designer's brief). This car is the Italian *Urbanina*, 6 and 7, designed by the Marchese Piergirolamo and Narciso Cristiani, who hope to put it on the Italian market at around £150.

Of all the town cars under consideration, the *Urbanina* is the most revolutionary in appearance and construction, and certainly looks as if it would fit easily into a lunar landscape.

Six prototypes for a petrol powered town car

5

5 *The Smith car, which has a two stroke engine and automatic transmission. Main disadvantages: too low, too small, and too open to the weather. But it can be parked end-on against a wall.*

6

6 *The* Urbanina. *A car for sunny climes! The chief disadvantage of its turret-like design is the wasted space, which makes it a vehicle for only two people with very little luggage.*

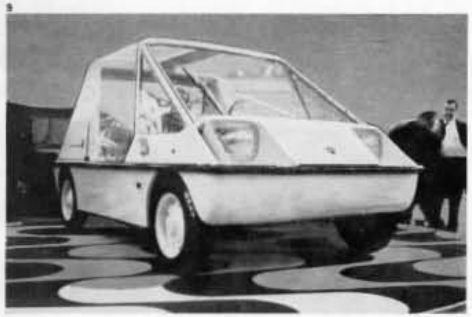
7

7 *The* Urbanina *comes in four parts, of which three – the chassis, seat platform and cowling for the sides and wings of the car – are shown here. The fourth part, the body, can be left off in good weather.*

8

8 *The* Ze-Ze, *which is powered by a 500 cc air cooled engine, seats two and can turn in its own length. Like the* Reliant, 3, *its body is in glass fibre. And like the* Trojan, 2, *the* Ze-Ze *opens at the front.*

9



9 *The* Aruanda. *This car, which uses a Fiat 500 chassis, is the result of a town car study, and provides plenty of interior space as well as exceptional visibility.*

10

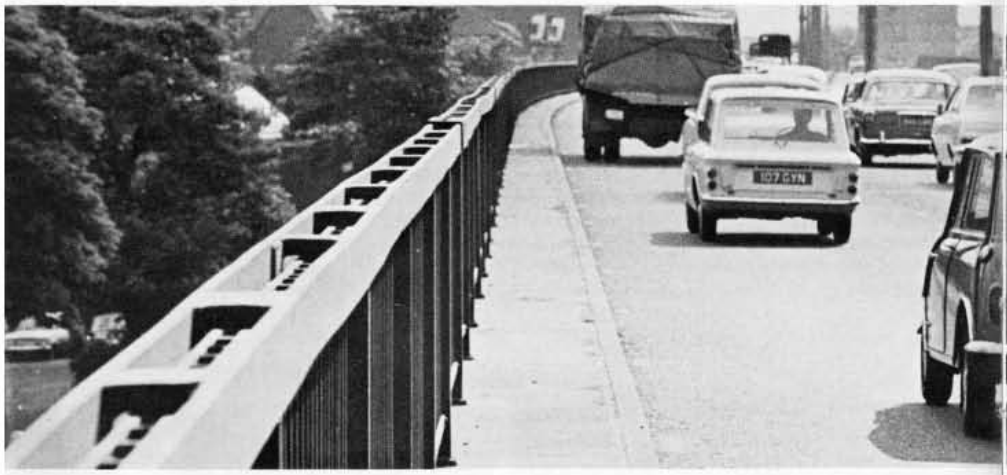
10 *Autonova's* FAM. *Its design is aimed at providing a flexible interior space for four people and luggage, with a short length, 11 ft 6 inches, and higher manoeuvrability. It also provides exceptional visibility.*

11

11 *The control layout on the* FAM *has been reduced to bare essentials, and the shape of the steering wheel has been made possible by a 280° steering lock. The wheel incorporates a number of control buttons.*

12

12 *The* PT, *a prospective Russian taxi, which has a transverse engine mounted at the rear, and two sliding doors. It has a 6 ft 3 inches wheel base, and provides room for three passengers and luggage.*



It consists of a four-wheeled chassis which supports the engine, controls and a circular sub-frame on which is mounted a separate platform carrying two seats. These units are then partly concealed under a cowling which serves as the sides and wings of the car, and also contains the lights. Finally, there is the body of the car, itself circular, which remains an optional fitting. The car is powered by 175 cc engine giving it a top speed of just under 50 mph, and is 6 ft 4 inches long and just over 4 ft wide. But its most radical feature is that the body revolves on a circular track, thus allowing entry or exit from any angle.

Both Mr Smith's car and the *Urbanina* can be criticised for the small amount of accommodation they offer, though the design of the *Urbanina* has the considerable advantage of retaining passenger space while keeping down length (it is about 4 ft shorter than a *Mini*) by putting the engine underneath the passengers and giving the car adequate height. But at the same time, the *Urbanina* could give even more passenger (and luggage) space if it did not have a round body which wastes space at the front, rear and corners of the car. If all the floor area of the car is to be utilised, it seems that a more conventional body shape is necessary, which brings us to two further solutions.

The first is called the *Ze-Ze*, **8**, and was produced by Simona and Basano of Turin. It has a 500 cc air cooled engine and a glass fibre body which cuts down weight and maintenance. Using glass fibre enables the builders to dispense with doors: to get out, you simply lift up the roof, which hinges above the front wheel arch – a method of entry and exit which is fine, except in wet weather.

The second car is the *Aruanda*, **9**, built by the Italian company Fissore, but designed as the result of a city transport study by a Brazilian student, Ari de Rocha. The *Aruanda* is based on a Fiat 500 chassis which will carry a 400 cc flat twin four-stroke engine. The body is built up of flat, steel panels, with sliding *Perspex* sheet doors, and seats three abreast with excellent visibility through a huge sloping windscreen. A sizeable luggage compartment is reached through the rear window. In a sense this car, which is based on a normal production saloon chassis, illustrates some of the characteristics which make a town car different from the small cars in production today.

A car for different needs

Another town car based on an internal combustion engine is the *FAM*, **10** and **11**, designed by Studio Autonova – a group consisting of Michael Conrad, Pio Manzoni and Bernard Busch – which arose out of post-graduate work undertaken at the Hochschule fur Gestaltung at Ulm. The *FAM* is 11 ft 6 inches long, and 5 ft 3 inches wide and is powered by a four cylinder, four-stroke 1,281 cc engine, with automatic transmission. Its interior provides ample room for 4–5 passengers and luggage, and is designed to be adaptable to a number of different needs, while the height provides easy access and allows large windows which give excellent visibility and create a feeling of spaciousness. Like Mr Roberts' sedan, the *FAM* has been offered to a number of manufacturers, but although a certain amount of interest has been shown, there are still no plans for production.

The last vehicle using a petrol engine that I want to mention is not strictly a town car: but, as it is the experimental taxi now under development in Russia, it nevertheless illustrates the fresh approach which can be given to vehicles designed primarily for town use.

The taxi, called the *PT*, **12**, has a monocoque construction and a transverse engine placed at the rear (as if it were a *Mini* back to front). The petrol tank is located immediately in front of the engine, and a luggage compartment is placed above the tank, with access from the passenger compartment. This is designed for three passengers, but there is room for a fourth in a retractable seat fixed to the partition which separates the passengers from the driver. When this extra seat is not in use, however, the passenger compartment can easily accommodate a pram (or other luggage), which is easy to load as the taxi is fitted with wide, sliding doors. Other refinements include retractable headlights below the front number plates, an adjustable seat for the driver, and good visibility.

As all the town cars so far mentioned have internal combustion engines, they do not necessarily avoid the problems of noise and fumes, while the bigger ones – the sedan, the *Aruanda*, and the *FAM* – have the added disadvantage that they are over specified, ie, they have larger engines giving a greater speed (and higher fuel consumption) than is really necessary, and would probably involve a capital outlay not very much less than that required for an all-purpose small saloon. For these reasons – on a long term basis – they do not look so promising as the electric cars under development.

Early electric vehicles

Despite what many people may think, the electric car is neither a particularly new nor a fanciful idea: Radcliffe Ward built the first electric carriage in 1886; a bus followed in 1888, and electric cabs in 1897; Jenatzy's *La Jamais Contente* established a new world land speed record of 65·83 mph in 1899; and the Duke of Westminster's Kreiger electric brougham of 1904 was followed by the Partridge Wilson brougham which was first made in 1936. This two-seater had a maximum speed of just over 30 mph and a range (before recharging the batteries) of 60 miles. One is still used every day in Nottingham. In addition, there are more than 35,000 electric vehicles on the roads today – milk floats, bakery delivery vans and, of course, that famous representative of an equally famous store which made its film debut in *Help!*

Making large electric vehicles is comparatively easy, as

there is plenty of storage space for batteries: the real problem is designing a town car in which all space is at a premium. Attempts to do this, however, are being made by the Electricity Council, which has already had two *Mini Travellers* converted to test out different power systems, and is now considering designing a town car from scratch (which is the right thing to do, as electric cars raise completely different power/weight considerations to conventional vehicles). The same problem is being tackled by various private firms, including Peel Engineering Ltd whose car is shown in 14, and (if reports are correct) Tube Investments, Telearchics Ltd, Smiths Electric, and Austin Parkinson Cowen. The one I wish to consider in detail, however, is the *Scamp*, 15, designed and made by Scottish Aviation Ltd under the direction of Dr W. G. Watson and his project leader, Mr J. Chalmers.

Price determines the brief

Dr Watson initiated the design programme some two years ago because he felt that, for local use, present saloon cars require too much capital outlay and take up too much space, and that in the future increased affluence will lead to a demand for a second car, while social attitudes will lead to much stiffer legislation against fumes and noise. "What I wanted," he says, "was a quiet, fumeless, highly manoeuvrable and easily parkable car – and something that would undercut the *Mini* by, say, £150. In fact, the price I was aiming at – £330 to £350 – determined the brief." These considerations led Dr Watson to investigate the possibilities of an electrically powered car – "I was fairly convinced that an electric engine would give markedly improved mileage for the price of a gallon of petrol" – though it did mean that the car would be unquestionably a 'second car' in performance and range.

The designers of the *Scamp* adopted a conventional layout for engine, controls, passenger space, etc, but only after many unconventional ideas – three-wheeled versions, a diamond shaped chassis, a body without doors, à la *Ze-Ze*, etc – had been tried out and rejected. The only *un*conventional thing about the *Scamp* is its motive power (four 48V batteries which supply two motors, one to drive each of the rear wheels through a chain drive), its size (the Scamp is 7 ft long, 3 ft 10 inches wide and has a turning circle of 16 ft 6 inches), and its performance. It has a maximum speed of about 35 mph, cruising speed of 30 mph and range of 15–25 miles, depending on conditions and the number of stops. Indeed, because the range is so limited, the *Scamp* is described as a 'known journey vehicle': only if it had a range of about 60 miles (which is what London taxis average a day) would the designers call it a 'town car'. Twelve *Scamps* are now being supplied to regional electricity boards for trials, and full production of the car is expected to begin early next year.

The stumbling block of the *Scamp*, and other electric town cars, is its short range. The Electricity Council has tried to overcome this problem by fitting one of its *Mini Travellers* with a silicon controlled rectifier or *Thrysistor* control, which regulates the drain imposed on the batteries and allows a recharge to build up during braking. As a result, the *Mini Traveller* has a range of 36-8 miles when driven non-stop at an average speed of 30 mph, though the range drops to 16 miles if four stops per mile are introduced. The disadvantage of the *Thrysistor* control, however, is its cost (about £150 extra). In Dr Watson's view, the increased mileage could be gained (at little extra cost) if the batteries could be tapped systematically, so that they were all used evenly throughout a journey and without any one of them being called on for extra duty (eg, for starting, as happens if the batteries are linked in a series).

The development of an integrated battery system of this kind is a problem for battery and contactor manufacturers; but there is no reason why it should not be solved in the reasonably near future. In the meantime, the problem of short range could be partly overcome by providing facilities for cars to be charged during the day – perhaps while standing at a parking bay. If this were done, a commuter could safely use his electric car for a journey of up to 15 miles each way.

There is, however, another possible way out for the electric car designer, and this is in the development of zinc air batteries and – eventually – fuel cells. The fuel cell is a kind of battery which, instead of needing to be recharged at regular intervals, is continuously fed with fuel, and although there are still problems of weight, volume and cost, some people, at least, believe they will be satisfactorily overcome. The companies at present working on fuel cells include General Electric Co, Pratt and Whitney, and Allis Chalmers in the States; Brown Boveri in Switzerland and Varta in Germany; and the Chloride Electric Co, Energy Conversion Ltd and Shell Research Ltd in Britain.

A battery for the future?

Finally, the zinc air battery. This is based on cells in which one of the conventional electrodes is replaced by an air electrode which reacts with oxygen. These cells have the advantage that the entire mass of reacting material need not be initially charged into the cells, since fresh oxygen from the air is continuously brought to the air electrode by convection or fan, and thus, when an air cell is drained at a modest rate in the five- to eight-hour range, a large weight saving in batteries can be obtained. Compared with conventional batteries, the zinc air battery has a high energy potential which could give the *Scamp*, for example, a range of more than 60 miles for the same amount of battery space. "Once the zinc air battery becomes available," Dr Watson says, "then I really will have created a town car."

Fuel cells, batteries (and the zinc air battery is not the only development in the pipeline), new layouts for engines and controls, the use of really light materials (like glass fibre) for the bodywork and a proper assessment of passenger requirements can all be brought into the development of the truly town car. But as the illustrations in this article show, there is a clear need for more attention to be paid to its visual qualities as well. Two of the most promising cars as far as appearance is concerned are the *FAM* and the Russian taxi, the first of which was designed by engineers trained in industrial design at Ulm, and the second by the department of industrial design for transport attached to the Russian Institute of Technical Aesthetics (an organisation which has some similarities to the CoID). The only other design (apart from Stuart Smith's car) produced by an industrial designer is Ogle's fuel cell car; and as Ogle's has already done some work for the Electricity Council, one can only hope that the council will continue to use industrial designers if it goes ahead with the development of an electric car, and that private firms will follow suit. Meanwhile, the Ministry of Transport's working group on *Cars for Cities* should, by the end of the year, have published its report, which may provide some useful guidelines. And by 1970, I think it safe to say, the town car – probably electrically propelled – will be a common sight in all our major cities.

Electric cars — present and future

13

13 *AC's battery powered invalid carriage is, perhaps, the forerunner of the electric car. But it is only suitable for one person and does not use its dimensions as efficiently as the Scamp.*

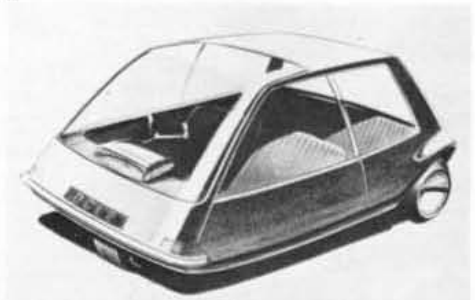
14

14 *The same limitations apply to Peel's electric version of its petrol three-wheeler, which can seat two only with difficulty. A second rear wheel has been added to the electric car.*

15

15 *Scottish Aviation's Scamp is designed for two adults plus children or luggage. At present its drawback is its limited range – 15–25 miles. Batteries under development may, however, solve this problem.*

16



16 *An idea for a town car powered by a rear-engined motor driven by a fuel cell. The car was designed by Ogle Design Ltd, which has also worked on an electric taxi for the Electricity Council.*