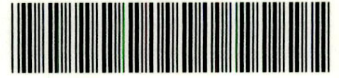


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National College of Art and Design
Faculty of Design
Department of Industrial Design

Shimano and Campagnolo

**An Examination of the Design Process
in the Bicycle Component Industry.**

by

James Keegan

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and Design and Complementary Studies in Candidacy
for the Degree of Bachelor of Design
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Introduction

This thesis will concentrate on the two bicycle component firms, Campagnolo and Shimano, and will examine how the process of design is used within each. It will discuss the effect the discipline has had upon components, both past and present, and will illustrate the effects of the Japanese "shockwave" which revitalized a stagnant industry.

For over 80 years, the bicycle component industry has remained relatively stable and conservative. Dominated mainly by four European firms: Campagnolo (Italy), Weinmann (Switzerland), Mavic and Sachs-Huret (France) each was content with their own market share. The general component leader has been Campagnolo who have built a reputation for racing excellence - comparable to Aston Martin or Rolls Royce in Britain. However in the mid 1980s this situation changed drastically when the Japanese firm, Shimano, entered the market. If you own a bicycle bought ^{made?} in the last ten years, the chances are that all the component parts (brakes, gears, etc..) are made by the Japanese firm. Through innovative design and ruthless marketing, Shimano had in a matter of six years captured an enormous eighty five percent of the market share. This resulted in a near-panic situation for the other firms and forced a radical examination of their design policies, most notably Campagnolo. It has only been in the past two years that the Italian company has begun to recover and claw back some of its lost market.

Being a keen cyclist and having gained work experience in bicycle shops helped guide the choice of subject matter for this work. A student exchange with the Politecnico of Milan has greatly helped understand the thinking behind the Italian design process. This combined with first hand experience of the majority of equipment discussed has proved invaluable in the completion of this thesis.

Campagnolo is a family owned business in Vicenza, near Milan. They have always catered for the racing specialist with little emphasis placed on the lower end of the market, until recently. Their products and design philosophy stem from a craft base, in which the human hand is largely present. Superior quality, durability and finish have always guaranteed sales, but this changed with Shimano's arrival. In contrast, their philosophy and design policy has always

catered for all sections of the market except for the top amateur and professional. It was 1984 when they first addressed this area, previously catered for by Campagnolo and Mavic, and they met with phenomenal success. Shimano provided components at a lower price which not only competed with Campagnolo on a technical level, but also offered a new aesthetic. The age-old argument of "utility plus beauty" can be applied to both firms in varying degrees. But it is not the purpose of this thesis to provide an answer to that debate, nor is it a summation of the history of bicycle component design. Rather it will provide an insight into the design behind the components produced by these two companies. As well as the relevant aspects discussed, there are also broader design issues which have been highlighted by the thesis itself:

- The role of innovation. How "radical" can a product become before it is rejected by the market. This innovation can either be in the presentation, or the technical side, and is especially applicable in the bicycle component industry. Because of the high degree of competition between the companies, this aspect of design is very important, due to the need for product differentiation.
- The resolution of the conflict between utility and beauty. This is one of the fundamental debates in the area of product design. How much personal artistic style can be contained in a product or component when the constraints of industrial production are considered.
- The debate about form and function. Are products which have more features considered better by consumers in general? For example, take the common jug kettle. Some proponents of Formal Geometry consider the addition of water level indicators as unnecessary and destructive to the overall design of the kettle. How relevant is the argument of form and function in design today?

These broader issues will be highlighted and discussed in the thesis. The aspects which are more directly relevant to the work itself are detailed below. Chapter one deals with the background to the industry. It places both firms in context and gives a history of each. It also gives brief details of the important products which have brought about the change in the industry's hierarchy.

Chapter two is concerned with the different cultures of Italy and Japan, and how they have affected design within each company? Why has cycling gained so much importance in Italy and to what extent does this influence Campagnolo's design policies? How much impact has the past had upon present design policies? Why does Shimano constantly update its product range?

In chapter three the products are assessed and analyzed from a technical viewpoint. How important is innovation in this type of design? What were the influential products in the market? What is compromised in the search for greater efficiency and weight reduction?

Chapter four contains a case study which compares and contrasts two recent groupsets from both firms. Each are aimed at the same section of the market and possess similar features. The areas of performance, weight, finish and cost will be assessed.

In chapter five the aspects of style, aesthetics and form are discussed. How does the argument, "form follows function" apply to Campagnolo and Shimano? How do the production processes affect the final "look" of the component? How much emotional content is present in their designs? Where did the visual style originate in each case?

The final chapter examines marketing and advertising in relation to each company. How important is market research, and to what extent does each company use it? How does advertising work for each company? Are the philosophies of Shimano and Campagnolo present in the components?

The major source of illustration for this work were cycling journals which provided a plentiful supply of pictures and reference. The Black Papers on Design, edited by Avril Blake, was also consulted throughout the thesis for opinion and general art theory. The full list of sources, which is not covered in the text below, is detailed in the bibliography.

For chapter one, Penny Sparke's Italian Design provided historical and contextual information. Contributions of a similar nature were obtained from an editorial article: Retro (1994), Graham Vicker's All muscle - No fat (1994) and Christopher Drake's Refreshing the Parts (1993). In chapter two, Penny Sparke's Italian Design and Andrea Branzi's The Hot House provided cultural information

about the Italian design society. Form follows Fashion (1991) by Emma Platt and Penny Sparke's Japanese Design, helped in understanding the Japanese approach to design.

In chapters three and four, Steve Hume's On trial (1988), Alan Peiper's Smart Operator (1993), David Ramsden's Fingerclicking Good (1994), and Hilary Stone's Looking back on '95 (1995) provided illustrative and technical information.

For chapter five, E. DeGarmo's Materials and Processes in Manufacturing was consulted for the above named area. Smart Operator (1993) by Alan Peiper provided illustrative reference, and general aesthetic opinion was offered by the cyclists of St Tiernans Cycling Club. For the last chapter, the various cycling journals detailed in the bibliography were consulted for illustrative material.

Chapter 1

An Introduction to the World of Bicycle Components

Italy is a country steeped in cycling tradition, and tradition is a key word in understanding the component firm Campagnolo, founded 1895. The firm's story is typically Italian: Tullio Campagnolo was racing across the Croce d'Une pass in the Dolomites at the head of a race. He was in the lead when he punctured. His hands were so cold that he could not undo the wing nut which held on the wheel of his bicycle - he lost the race! In response to this disaster he invented the "quick release" (glossary), and with it the legendary company icon which Campagnolo still use today. This innovation, plus a development of the "derailleur" - the mechanism which changes the gears on bicycle, soon established the company at the top of the industry (Figure 1).

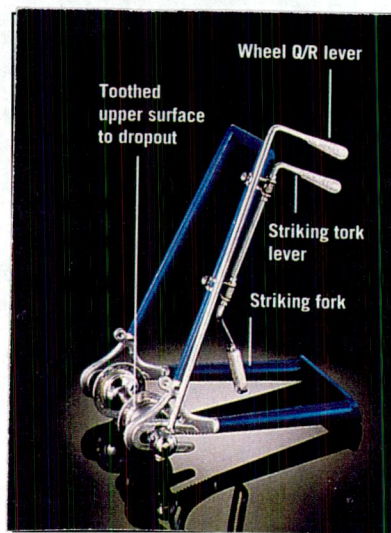


Figure 1: The original Campagnolo gear with two levers (1930s).

Today this is still the impression that many cyclists have; they know that the name means quality, however this reflected in the price. The products go through rigorous testing, and the beautiful forms take a lot of machining and careful polishing. The attention to detail that Tullio first initiated is strongly present in the company today. The firm is still family based in Vicenza, near Milan; it has remained so since its inception. Because of this, the company has been able to grow but stay intimate in terms of staff morale. This is a key aspect in their approach to product design. Both people working on the floor and

designers take great pride in their work (figure 2).

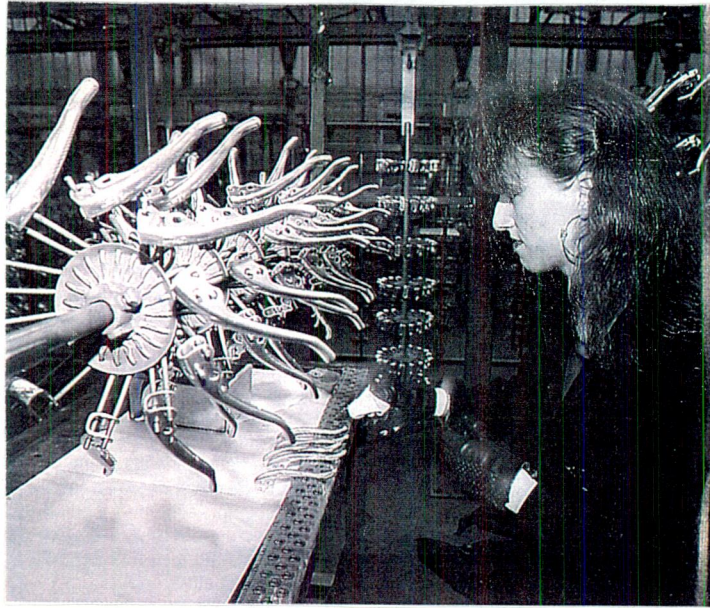


Figure 2: Human input is common at Campagnolo.

In this respect there are similarities with the Japanese firm Shimano. But there, the likeness ends - almost everything that Shimano does is in contrast to the Italian firm's approach, from design policy to marketing and aesthetics. And the firm have succeeded in an area where there is no room for "empty design flourishes and stylish conceits", (Vickers, 1994, p.26). The company was started in 1921 by Shozobura Shimano in Sakai, near Osaka. At the time his products had nothing to do with bicycles, but in the 1930s he began to produce

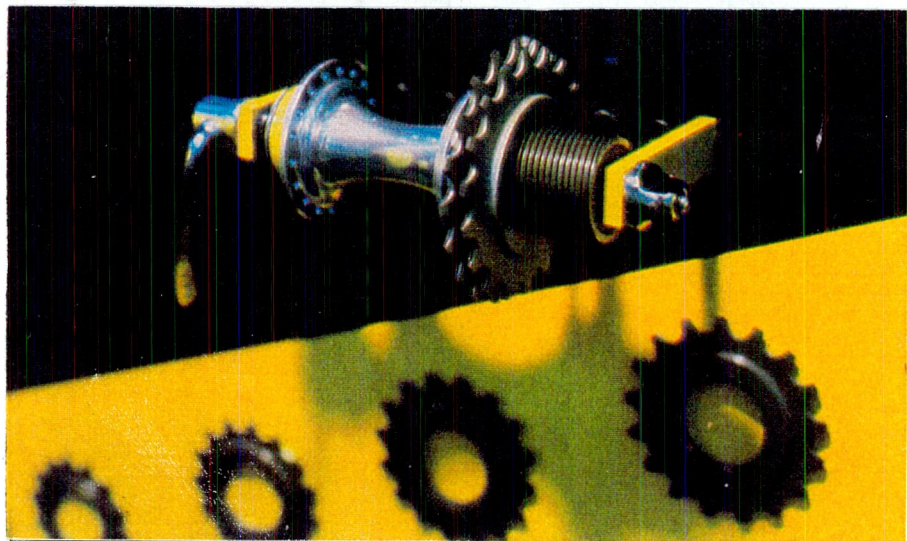


Figure 3: Illustration of a modern Cassette or Freewheel.



Freewheels (Figure 3).

This is a mechanism located in the sprockets of the back wheel - it enables pedalling as well as coasting. However he found that he could not compete with other, cheaper Western models. He then devised a new way of heat treating the component which resulted in a better product, and was an instant success. His obsessive desire to match and then better his rivals gave the company its strength in Asia. This competitive ambition established itself as the axiom upon which the company now operates. But to break into the Western market, Shimano concentrated heavily on research and development. They used design to find a niche in the world market, and eventually placed a stranglehold upon it. The term, "useful and agreeable objects" (Black, 1983, p.62) which Sir Misha Black has used is applicable to both Shimano and Campagnolo, but it was Shimano who leaped ahead with a series of brilliant innovations in the early 1980s. These will be discussed further in chapter four. Initially the Japanese company identified problems with braking and gearing. The designers at Sakai came up a series of brilliantly simple solutions: SLR (Shimano Linear Response) and SIS (Shimano Index System). These systems provided crisper and more responsive braking, combined with more efficient gearing. Other innovations placed the Japanese far ahead of its rivals, such as Hyperdrive and STI (Shimano Total Integration). These products effectively placed the Eastern company at the top of the industry, and will be examined in greater depth later. It was at this time (c.1985), that Shimano launched a new range of road and off-road groupsets. Dura Ace (Figure 4), Ultegra (Figure 5), 105 (Figure 6), and Exage 300 (Figure 7) were the road racing groupsets.

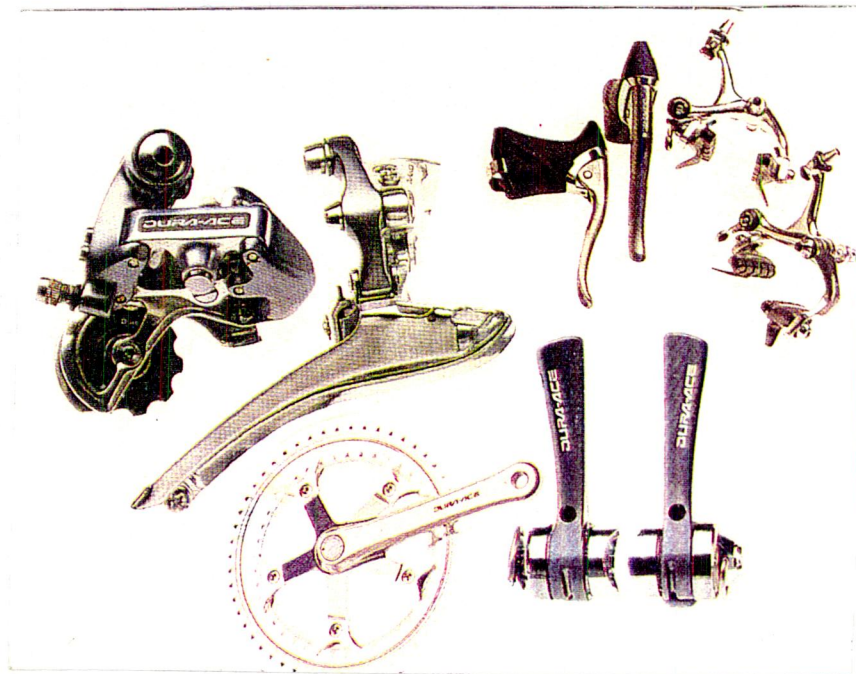
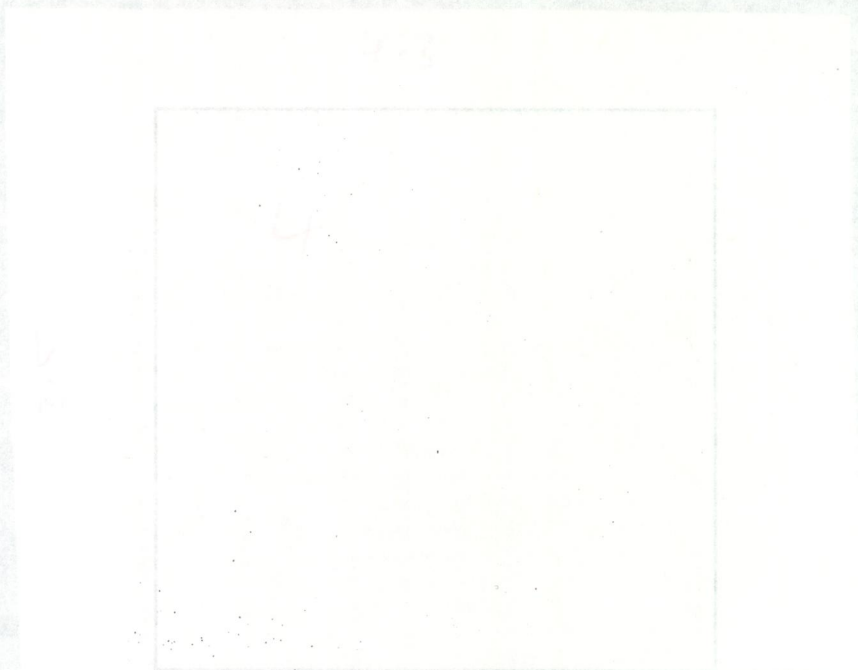


Figure 4
Shimano's Dura Ace groupset.



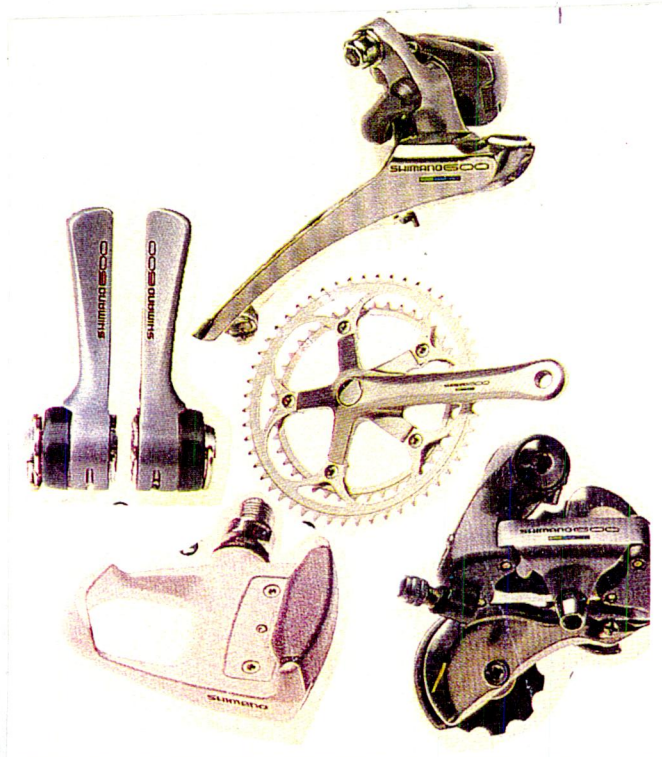


Figure 5: Ultegra groupset from Shimano.

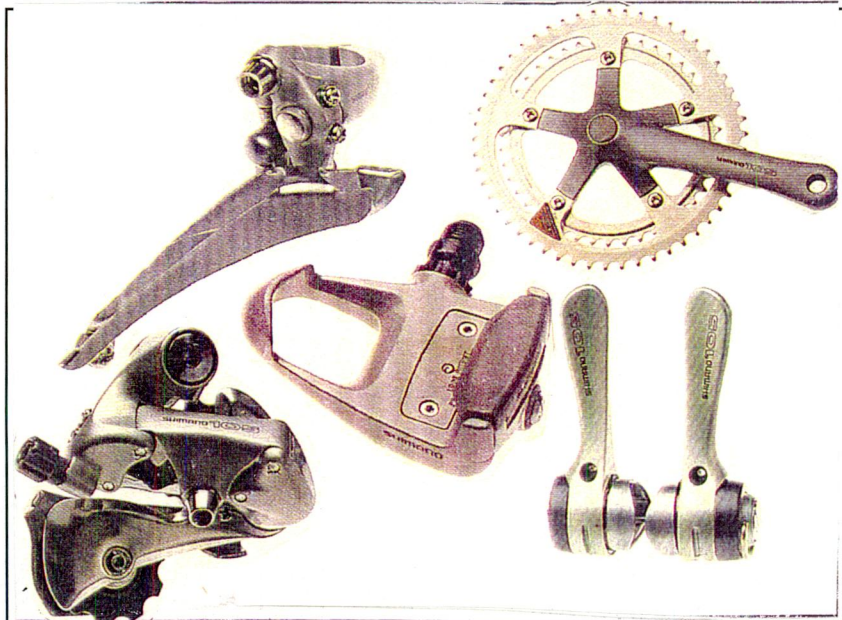


Figure 6: Shimano 105 groupset.

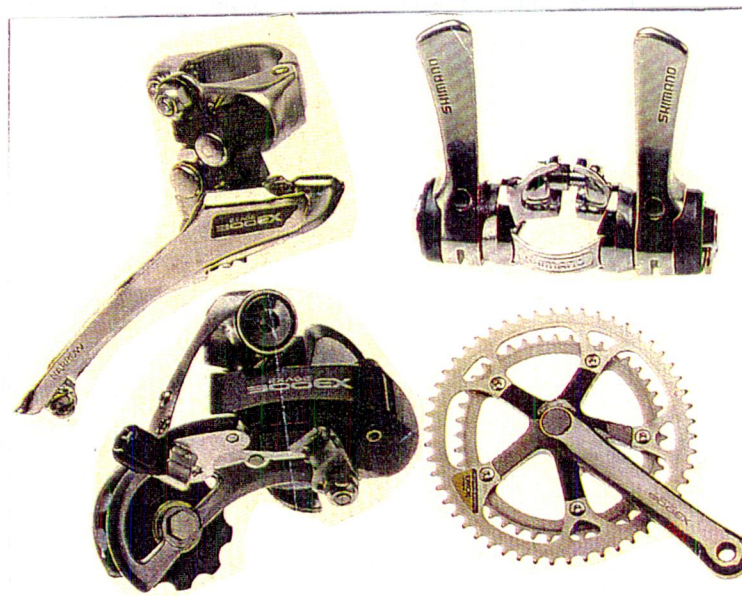
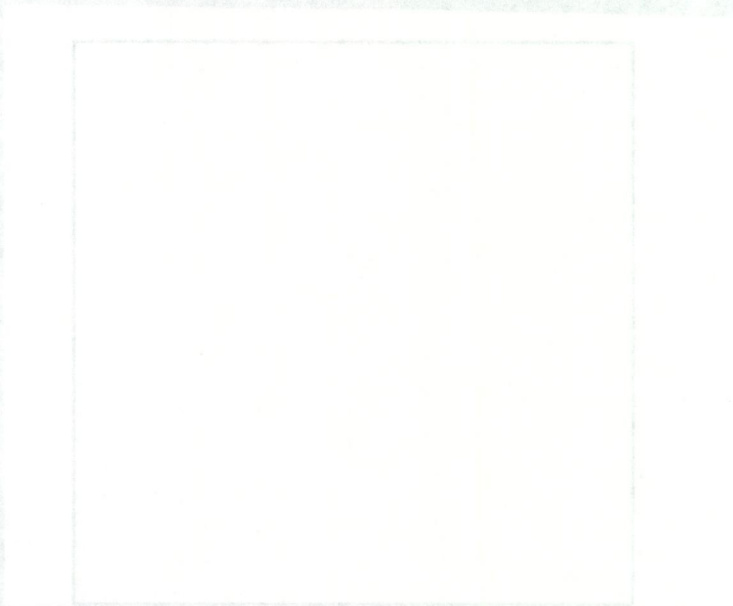


Figure 7: Shimano Exage 300 groupset.



In the early 1980s, the Japanese realised the potential of the mountain bike market. The off-road bike had become enormously successful in America, and its popularity was spreading to Europe. Campagnolo, in contrast, apparently resisted the oncoming change and continued to produce with the professional road-racer in mind. Within the same year, the mountain bike arrived on European shores and immediately becoming a huge hit with all sections of the market. Shimano bathed in success and the Italian firm continued to fall even flounder. However Campagnolo also produced top quality rims for wheels, and shared the top market position with the French company, Mavic. This is an area in which Shimano had no product line. The Italians had guaranteed sales, because the wheel industry was big business at this time, and still is. It was this brand loyalty, and the wishes of amateur cyclists trying to emulate the great "championi del mondo" which kept the factory in Vicenza busy. Campagnolo were still able "to express the living, vigorous aspects of that society" (Black, 1983, p.62) in their designs, something which the Japanese were finding difficulty. "That society" in this context refers to the cycling society of Italy, which epitomizes the racing world today. One of the greatest cyclists of all time, Fausto Coppi, was sponsored by Campagnolo (Figure 8). In 1950, he used a revised version of their original Deraillleur, when he won the famous Paris-Roubaix confirming him as number one in the world, (Figure 9). Campagnolo used this attention to launch their new Gran Sport

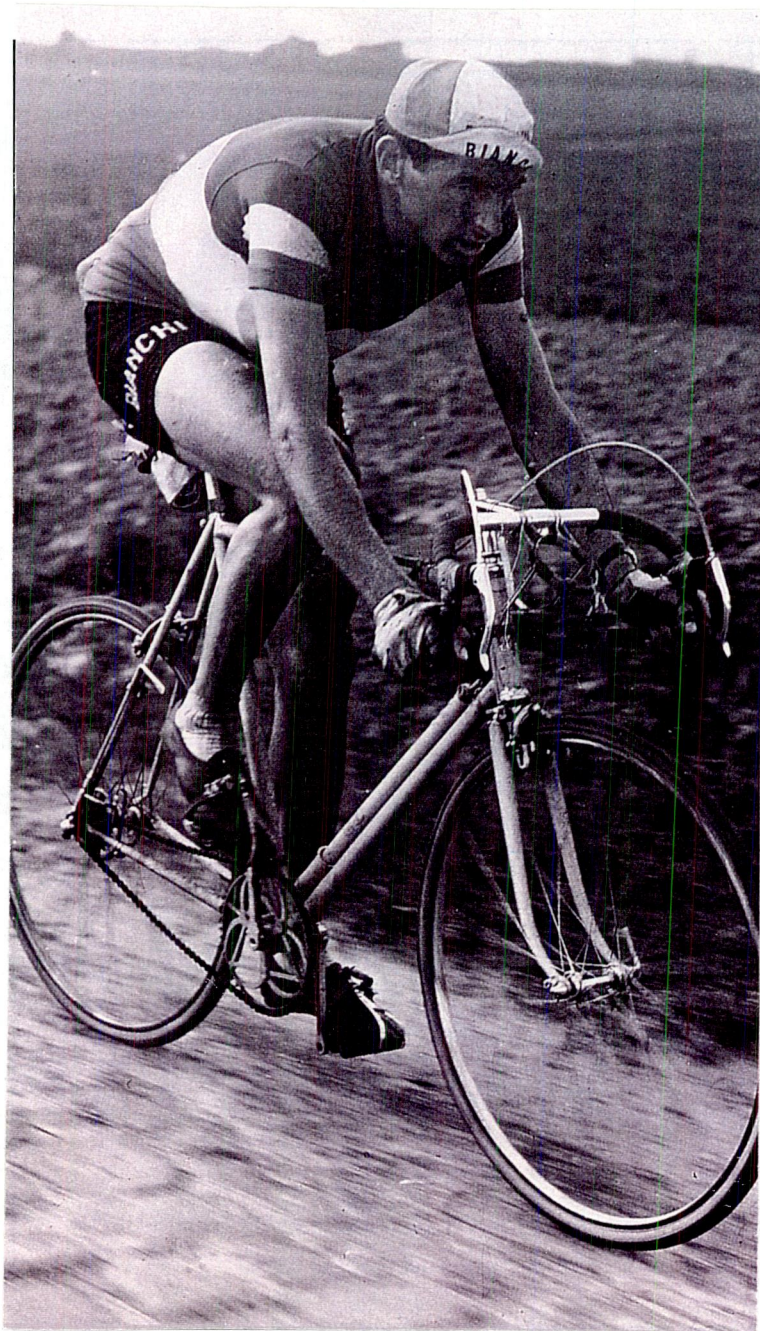


Figure 9: Fausto Coppi, riding a Campagnolo equipped Bianchi in the 1950 Paris-Roubaix.

Parallelogram Derailleur. Today, this is the design upon which every Derailleur



operates. However, when the gear Coppi used is examined, one wonders how it can be operated easily. Evidently, Ergonomics did not play a big part in Campagnolo's design policy at this time. But, the introduction of the Gran Sport gear solved the majority of the problems experienced by the original Deraillleur, and re-established Campagnolo at the fore front of the industry.

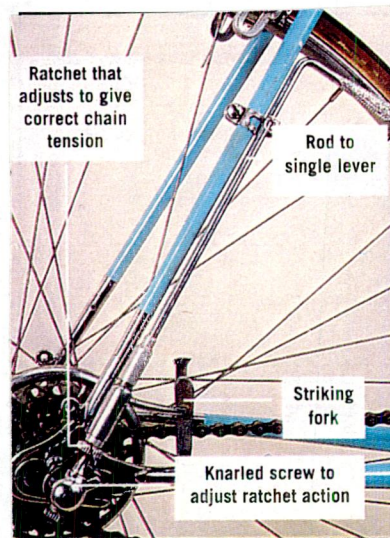


Figure 8: The revised Paris-Roubaix gear used by Coppi.

Chapter 2

An Examination of Two Cultures in the Context of Component Design

To help understand the design policy of each company, the cultural and social contexts of each country will be examined. Examining Italy the country is synonymous with art and design. Home of the great Roman Civilisation and Renaissance, its accolades form an endless list of achievement. There, the debate about design has always been very prominent from the past to the present day. The emotional content within Italian design is very high, and it is this passion which vitalizes Campagnolo's products.

Cycling has always been very important in Italy, it holds a high place in national pride. With the increase of leisure activities in the 1800s, the working and middle classes began to enjoy sports which were hitherto aristocratic. The bicycle was one such product which became very popular, and there was no shortage of manufacturers to provide the necessary equipment. In 1890, the Touring Club Italiano had over twenty thousand members (Sparke, 1988, p.35). It was this social factor which greatly helped place Campagnolo at the top of the component industry, a position it would occupy for over the next eighty years. It is quite simple to trace the company's product identity. Italy's experience, particularly after the second World War, of a design dichotomy serves to illustrate the diversity that is contained in the Italian profession today. Two approaches have emerged: one in which the traditional values and styles are celebrated; the other where new technologies and processes are embraced. From the 1920s the debate about balance between artistic style and the constraints of industrial production has been very active. Up until recently, Campagnolo have relied on the safer craft approach of using tried and tested designs, and not being prepared to experiment or innovate.

In contrast, Shimano were prepared to invest heavily in research and development, and their subsequent innovations revolutionized the cycling world. One aspect of the company's success has been through their initial policy of imitation and improvement. But the development of a design approach behind the Japanese company is similar to the Italian story. The division between craft values and industrial production is also present in Japan. However, unlike Campagnolo, Shimano have embraced the latter category. Because of the nature of this type of product design and the effects of fashion, design is usually ephemeral in Japan.

This is illustrated by Shimano's continual revision of their groupsets, both racing and mountain bike. They acknowledge the consumer's desire for innovation, even if it is purely cosmetic. Each year there is a new product from the Japanese, which either solves or promises a solution to last year's problem. But, apart from their success Shimano's components are lacking in identity. This stems from the transient nature of their design culture which often looks to capture the ideals of the Western world. In many respects they lack the design theories, reference and paragons which have been so much part of Italian life. It is only within the past few years that the Japanese components have tried to capture the "living, vigorous aspects" of which Sir Misha Black has spoken. These aspects in this context, refer to the racing world of Italy and the many cycling stars it has produced. However with the new model of Dura Ace, which will be discussed in chapter five, we see an attempt by Shimano to design using their own culture for inspiration. They are no longer looking solely to the West for example and instruction.

One reason for Shimano's success is the realisation that the bicycle industry is more leisure based than racing, this is reflected in their design approach. From the highly priced Dura Ace to the bottom of the range RSX, Shimano offers something for everybody in a variety of styles. This is something that Campagnolo have not done until recently. Before 1991, it appeared the Italian firm did not realise that sub £300 bicycles existed. Their failure to capture a sufficient share in the mountain bike market is a result of entering too big and too fast. They expected that their brand loyalty and name would be enough to secure sales. However this market did not thrive on elegance and fluidity. It did not fit the sleek, "speedy" forms which the components possessed (Figure 10); Shimano's more "muscular" looking products were suited to the demanding terrain (Figure 11). Campagnolo's answer to this failure is in referring to Miguel Indurain, the Spanish cycling star. He has won the last five Tour De Frances riding a Campagnolo equipped racing bicycle. This is what the Italian firm does best.

Culturally, the Japanese have a very strong work ethic and are prepared to embrace new technologies. This trait is no more apparent in Shimano with their continual pursuit of research and development. The origin of the company's design policy is not hard to fathom. One look at modern Tokyo shows a place of

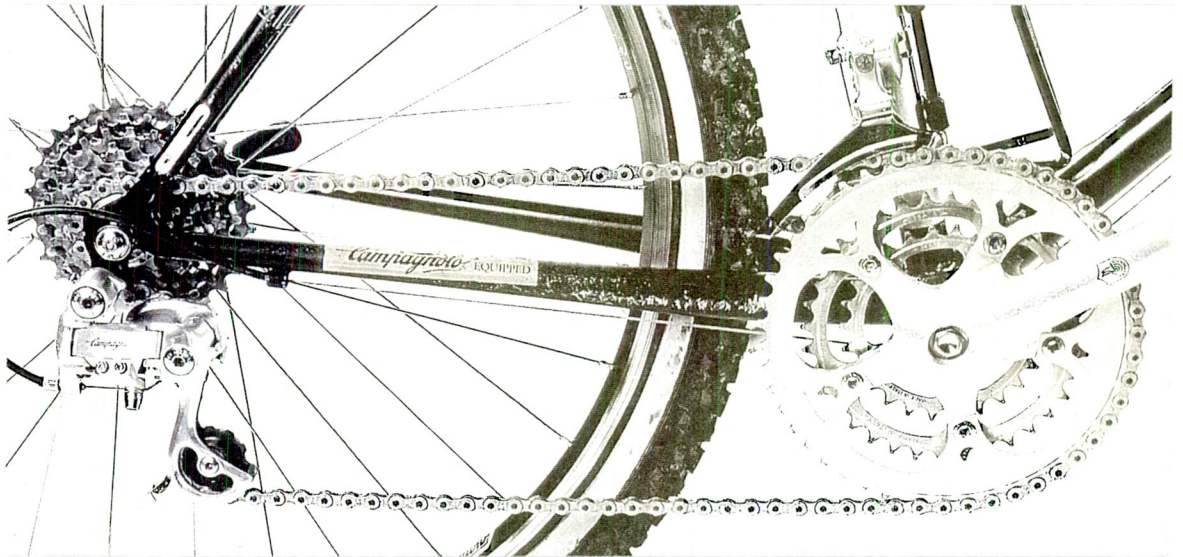


Figure 10: The streamlined forms of Campagnolo's Centaur Mountain Bike groupset.



Figure 11: Shimano's muscular XT Derailleur.

continual change, where the consumer economy responds to dynamic fashion. In Japan, design is strongly led by fashion. Examining other areas of product design: the electronics industry show a similar design approach to Shimano. It is one of continual change, where new products are coupled with vigorous marketing campaigns. Shimano have exploited this trend ruthlessly, realising the effect of consumer lifestyles upon product sales. With a masterstroke of design and management, they have kept the public's desire for newer, brighter and better components vibrant.

This transient policy is in contrast to Campagnolo, who produce their components over a longer time period. They prefer to let their products develop slowly, and are more hesitant to invest in research and development. Of course, this is not to say that Italian industry is purely traditional, quite the contrary.

Design in Italy is extremely varied both culturally and technically. From fashion to art and products, people can recognise a vigorous flare, the "Italian line". It was mass production which helped lift Italy from the devastation of the Second World War. The Fordian concept, which has been completely adopted by the Asian countries, greatly helped the Italian bicycle industry. However, another concept, popularised by Raymond Lowey also influenced the Italian's approach to styling. To Campagnolo, the art of "streamlining" presents a beautiful solution to the problem of reconciling utility and beauty. Its aesthetic is ideal in symbolising the dynamism of the bicycle, the chainset representing the heart of this machine (Figure 12). But the streamlined aesthetic is also derived from the production techniques, such as casting and moulding. After the war these processes had become more widespread and available in the industry. The Italian government encouraged industry by paying grants; materials such as steel and other alloys became more widely available. With these resources, the designers at Vicenza can produce simple, yet expressive forms. They can reach back into their own past, where they find plentiful amounts of art and design reference. This wealth of culture helps Campagnolo express the "living, vigorous aspects" (Black, 1983, p.62) of their bicycle components.



Figure 12: Campagnolo's beautifully contoured Record drivetrain.

Chapter 3
Innovation and Design

Bicycle Components in the 1980s

When moving to conquer the bicycle component market in the late 1980s Shimano's primary concern was research/development and market response. Their "no fear" approach to the market has been risky, but has proved highly successful. Their ability to stand back and look at the problem in a fresh light has helped lead to the success which they now enjoy.

Having identified problems in the area of braking and gear changing, Shimano produced two products which greatly improved the performance of these two areas. SLR (Shimano Linear Response) is a system which incorporated into the brake lever (glossary). When combined with the special SLR brake cable provides more responsive and progressive braking. A simple spring ensures that the lever returns to its original position. This spring alleviates the problem of the brake feeling stiff and unresponsive. The SIS (Shimano Index System) was another watershed in the Japanese design offensive. Helped enormously by the company's policy of extensive discussion of the components with the users; in this case it was the professional cyclists themselves. Many of them complained of the chain being "off-line" and sluggish when changing gear. At this time (c.1984) everybody used the friction gear levers - moving the lever back and forth changed the gear. Shimano's designers assessed the problem and came up with a simple, but effective answer. They incorporated a stepped ratchet at the pivot of the lever, which resulted in a push / pull "click" action. Now when moved, each click of the lever corresponded to a change in gear. The result was highly successful and the majority of the cycling world changed to the Japanese indexed system. The form and ergonomic feel of the levers was also altered, changed from the traditional smooth, flowing shapes of earlier models to a more functional engineered form (Figure 13). This reinforced the idea that these components were mechanical and performed their functional well. The public were immediately won over and Shimano made the correct decision to integrate this technology into their entire range. This is one of the key differences with Campagnolo - originally any innovation which the Italian firm made tended to stay with the top components. As a result, the majority of the public had no access to this technology. This meant that Campagnolo's components are seen as being exclusive, and largely out

of the reach of the common cyclist.

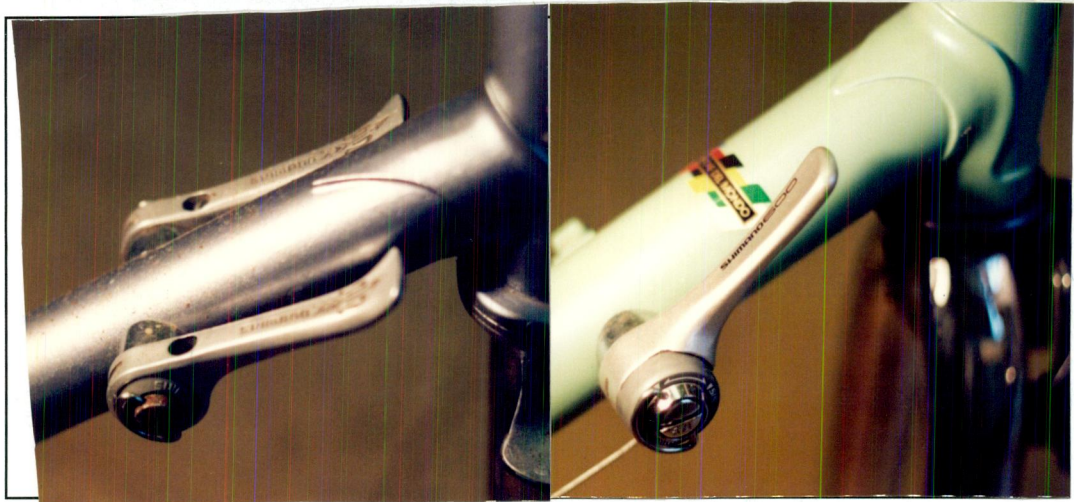


Figure 13: The left picture shows the flowing forms of the older model, the right shows the recent, more engineered "look" of Shimano.

Approximately one year after SIS and SLR, Shimano introduced the Hyperglide system. Responding to continuing demands from customers for greater efficiency, the Japanese design team came up with an improved drive system for the bicycle. Complaints of the chain slipping on the cog teeth while under pressure led to another simple solution. Shimano changed the design of the teeth on both the cassette and the chainset (glossary), and introduced a newer slimline chain. The new design incorporated grooves in the sides of the teeth and placed small stubs on the inside of the chainset (Figure 14). These greatly helped the modified chain to engage a new gear more smoothly.

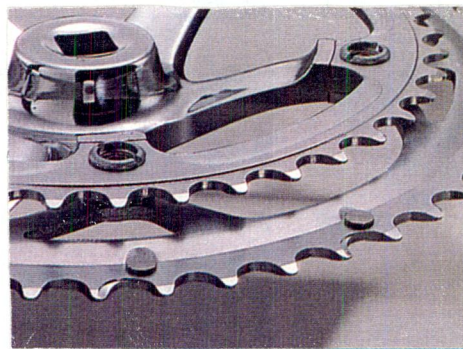


Figure 14: Detail of the chainset, showing the "stubs" on the inside of the chainring.



At this time the case may be argued that Shimano's design approach was solely based on an engineering level, and that they did not possess the finished "look" of Campagnolo. This may be true and will be discussed further in chapter five. But as regards the market, the truth was plain to see: the Italian firm was being continually pushed to the periphery of the industry. Campagnolo was becoming increasingly less technically relevant and influential.

However, they did try to respond to the Japanese "shockwave". They designed a new gear lever called the Synchro (Figure 15). Its design is more complicated and features two shifters instead of the usual one. The large lever acts normally changing the gear, while the small shifter allows for fine tuning and perfect alignment of the chain. Although it works as well it is no match for the much simpler Japanese design. In an industry where weight reduction and simplicity are important issues, Campagnolo's Synchro lever has not had much success. However, even though this design failed, it was a sign that the Italian firm was prepared to change their inert design policy in favour of one which catered for everybody. The case of the Falcon Triumph, sold by Falcon cycles, epitomised the problems faced by Campagnolo. In the late 1980s this bicycle, which was normally fitted with a Campagnolo Triumph groupset (Figure 16) changed to the more efficient Shimano 600EX.



Figure 15: Elevation and Side view of Campagnolo's Synchro lever.

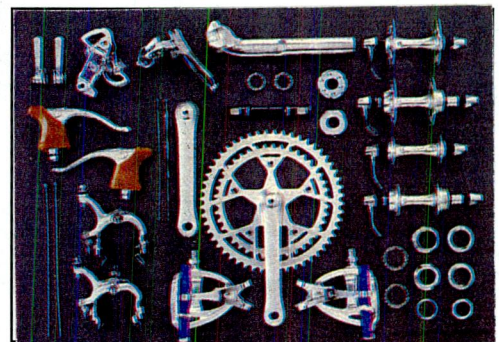


Figure 16: The Triomphe groupset from Campagnolo, illustrating the less vibrant styling of the early 1980s.

One reviewer of the new machine, Steve Hume from Cycle Logical said "The Campagnolo Triumph components were marvellous, and it seems a shame to

change them." (Hume, 1988, p.46). The results of the change was a cheaper, more efficient bicycle. Improved sales justified Falcon's decision and compounded Campagnolo's problems.

However, it was not all despair for the Italian firm. Their design team was, and still is, succeeding in the area of wheel design. This is an area in which Shimano have no product line and present no threat. The French company, Mavic, provide major competition, but this is the area in which Campagnolo produce their most innovative products. These wheels and rims will be discussed further on in the chapter.

Mountain Bike Components

A lot of the innovations already discussed originate with Shimano's mountain bike division. The "off- road" groupsets, called the Deore series account for half of Shimano's component sales. It consists mainly of five groups: XTR, XT, LX, STX and Alivio, catering for all from top level to the everyday cyclist. The STI system, discussed in the next section, originated with another of their mountain bike products called Rapidfire (Figure 17).



Figure 17: The Rapidfire gear shifter with an analog display.

These gear shifters are a good example of the company's ability to step back and analyze the fundamentals of a design problem. In this case it was the problem of moving the hand to change gear. When installed the lever unit is located just below the handlebars joined to the brake body, and consists of two buttons. One button changes to a higher gear, the other to a lower. It can be easily accessed by



the thumb without having to move the hand from its position on the handlebars. By using buttons instead of levers, changing can be made by just using the thumb, instead of the necessary finger and thumb action in other models. Ergonomically, the design is positive because of the accessibility for small and large handed people. This feature first appeared on the top of the range XTR, but is now available on all models. Rapidfire are themselves a development of the old style handlebar mounted levers. These were just ordinary gear shifters turned on their side and placed on top of the bars. As the system became more widely available, Shimano offered revised units with an analog display. This gives a visual indication of what gear the bicycle was in. This design proved very popular in the lower sections of the market; the more features that a design has, the better it is in the eyes of the public. This is one of the more fundamental issues that affects product design in general. Consumers perceive that they are getting a better product, even if the feature is purely cosmetic. This is the case with the gear indicator on the Rapidfire lever. It does not add to the performance of the product and increases the weight. However this statement must be viewed in the light of which market the product is aimed at. If it is for the professional, the indicator is unnecessary and could be viewed as being "kitsch". If the user is an everyday cyclist, then he or she may look at this addition as being useful.

Campagnolo's venture into the mountain bike market was not successful, but it was not from a lack of quality. The reason was because their components lacked the innovation which present in the Japanese products. Now, there is almost a situation where the concept of creation of new ideas is being readily associated with Shimano. In the mountain biking field, the combined words of Campagnolo and innovation seem alien together. Their lack of success is also compounded by the fact that their products are expensive, there is no such thing as a cheap Campagnolo "off-road" component. They have failed to secure the same amount of sales they had in the racing bicycle market. Public interest is generally low and for once their elegant style proved to be unhealthy. Shimano has been correct in realising that the image of the mountain bike is very different to its racing brother. Its very name, "mountain bike" implies a rougher terrain where Shimano's "chunkier" components are more readily accepted. The Italian products

are generally only used by the professional teams. They are the only people who can afford the quality components, which must be replaced on a regular basis in the punishing world of "off-road" competition. Because of the lack of interest from the lower markets, Campagnolo have tended to shy away from production in this area. The result is almost total domination of the market by Shimano, and their continuing rise appears unstoppable.

Bicycle Components in the 1990s

But the product which has confirmed Shimano's presiding position is STI, released in 1991 (Figure 18). Shimano Total Integration is a system whereby

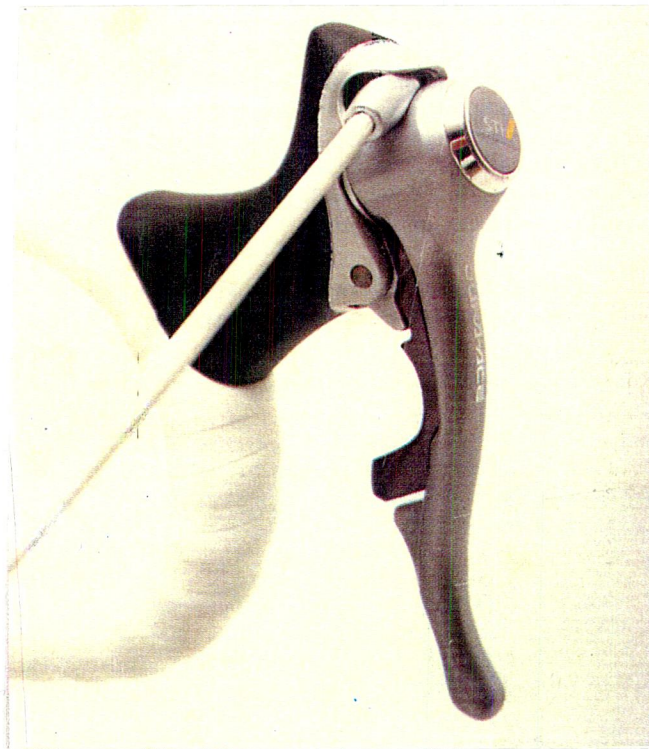


Figure 18: The original STI lever from Shimano.

braking and gear changing are combined into one component, hence the name. The system is extremely functional and efficient (Figure 19). But it is very simple and has revolutionized the cycling world. The unit consists of a conventional brake with two levers. Pulling the lever produces a normal braking response, but when it is tilted inwards the gear changes. The larger lever moves the chain to a



higher gear, the smaller to a lower gear. In typical Japanese fashion, Shimano stormed the market place catching Campagnolo completely unawares. This brilliant system demonstrates Shimano's dedication to innovation and customer satisfaction. The fact that now the hands can remain on the handlebars has advantages for both the everyday cyclist and top amateur. It is a lot safer in traffic, all attention can now be placed on the road. For the amateur and professional in a race situation, the ability to change gear without your "opponent" noticing is a huge advantage. STI technology has now filtered down to the cheapest Japanese groupset, providing excellent value for money.

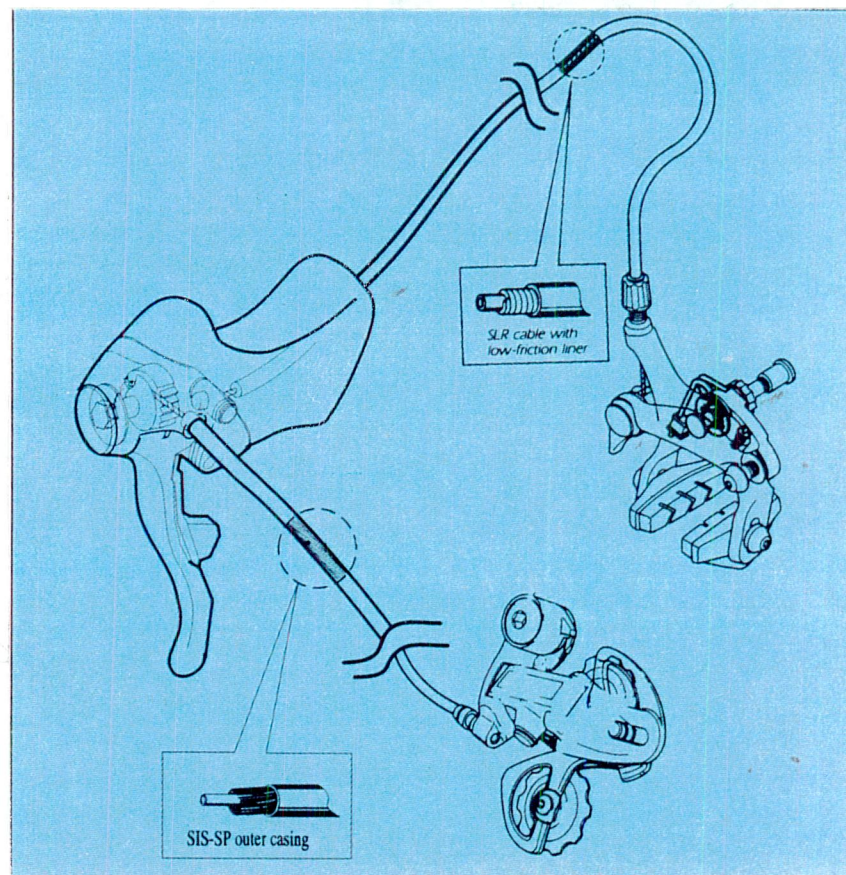


Figure 19: The schematic illustrates the internal workings of the STI system.

Twinned with this development is the dual pivot brake calliper (glossary). As the name suggests this brake pivots on two bolts, which results in greater stopping power and safety (Figure 20). This is welcome in all the markets, whether professional or the everyday user.



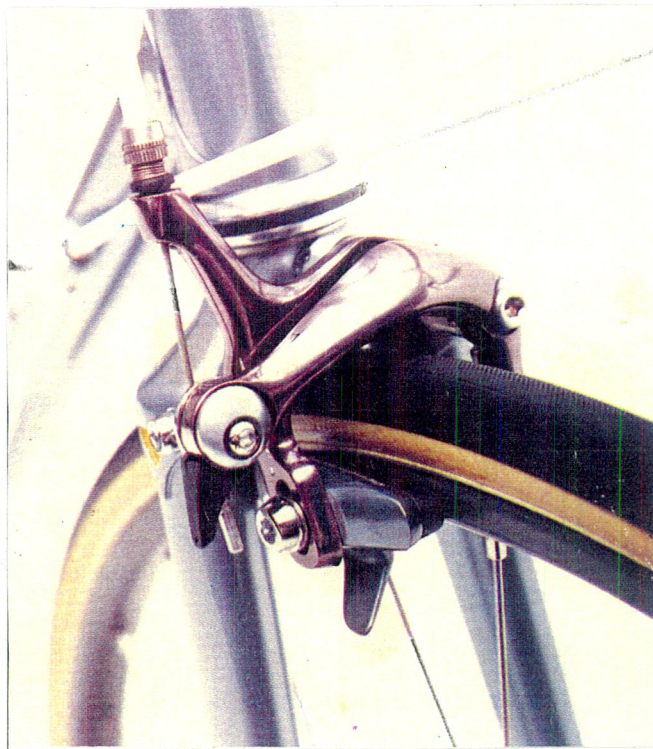


Figure 20: The calliper pivots on two bolts, one in the centre, the other at the right. The centre bolt is hidden by the front Arm.

To counteract this, Campagnolo were forced to respond to the continual output of Japanese innovation. In 1992, the Italian company launched their Ergopower lever (Figure 21), which is a direct response to Shimano's STI lever.



Figure 21: The Campagnolo Record Ergopower lever.



Figure 22: Racing bicycle with levers fitted.



It works along the same principle as the Japanese lever, but now there is an added button lever on the inside of the hood, (glossary). This is used to downshift to a lower gear, so the large front lever is solely for braking. The physical attributes are nearly identical to the Japanese model, with the exception of one. There is a possibility to change down through all the gears in one go, by a prolonged press of the button. Whether the inclusion of this facility in the design is useful or not is questionable, but this idea recalls the previous debate concerning the visual display on the Rapidfire lever. However, there is one major disadvantage of the system when compared with STI: the changing action on the Ergopower lever is a lot stiffer. But the 1993 revised version saw the introduction of a carbon housing and ball bearings which have greatly improved the shifting of the lever. More recently in last year's version of their top group "Record", Campagnolo have used Titanium metal, instead of the habitual steel (Figure 23). This is a change in their design policy which up until now, has only seen the use of steels. To accompany the Ergopower lever, they have also designed their own version of the dual pivot brake calliper and applied the mystical "Italian line" to it (Figure 24).

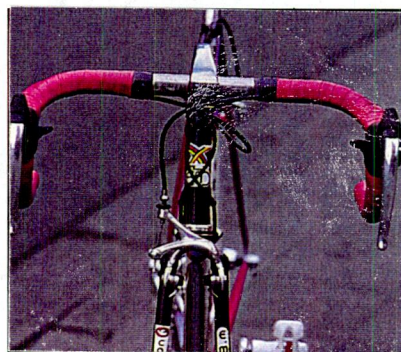


Figure 24: The Dual pivot brake calliper from Campagnolo.

As regards performance, there are no weaknesses in either quality and efficiency. "The Record Dual pivot brakes are the best in the business" (Peiper, August 1993, p.82).

But Ergopower was not the only design in the earlier 1990s. EXA Drive (Figure 25) is the alternative to Shimano's Hyperglide transmission system. EXA



CAMPAGNOLO INVITES CHAMPIONS TO LIGHTEN UP!



Campagnolo has reached a major goal in weight reduction on several key components. This was accomplished in conjunction with increasing both the efficiency and the overall rigidity of the parts. Thanks to the information gained from aerospace technology and the use of advanced materials such as CARBON and TITANIUM, Campagnolo groups stand out as the ultimate components available to cyclists throughout the world. The shifting effort for the front and rear derailleur has been reduced in all groups; some models by as much as 50%. Various techniques to assure substantial improvements in operational smoothness include the BB system (specially designed sealed bearings), teflon coated parts and bushings, and substituting

stainless steel for traditional steel, all in the interest of reducing friction. The integrated EXA-DRIVE system guarantees maximum performance of the drivetrain, insuring faster, more precise, and quieter shifts that improve chainring and sprocket life. Our 1996 groups all have major weight reductions. Minimization achieved by regarding no limits in applying the most advanced modern technology!

Campagnolo

THE TRADITION CONTINUES!

Agent for U.K.: Select Cycle Components - Plot 2
Cedars Lodge - Cotgrave Road - Owthorpe NG12 3GE
England - Tel. (01949)81770 - Fax (01949)81771



Figure 23: Advertisement featuring the new materials, Titanium and Carbon Fibre in Campagnolo's components.



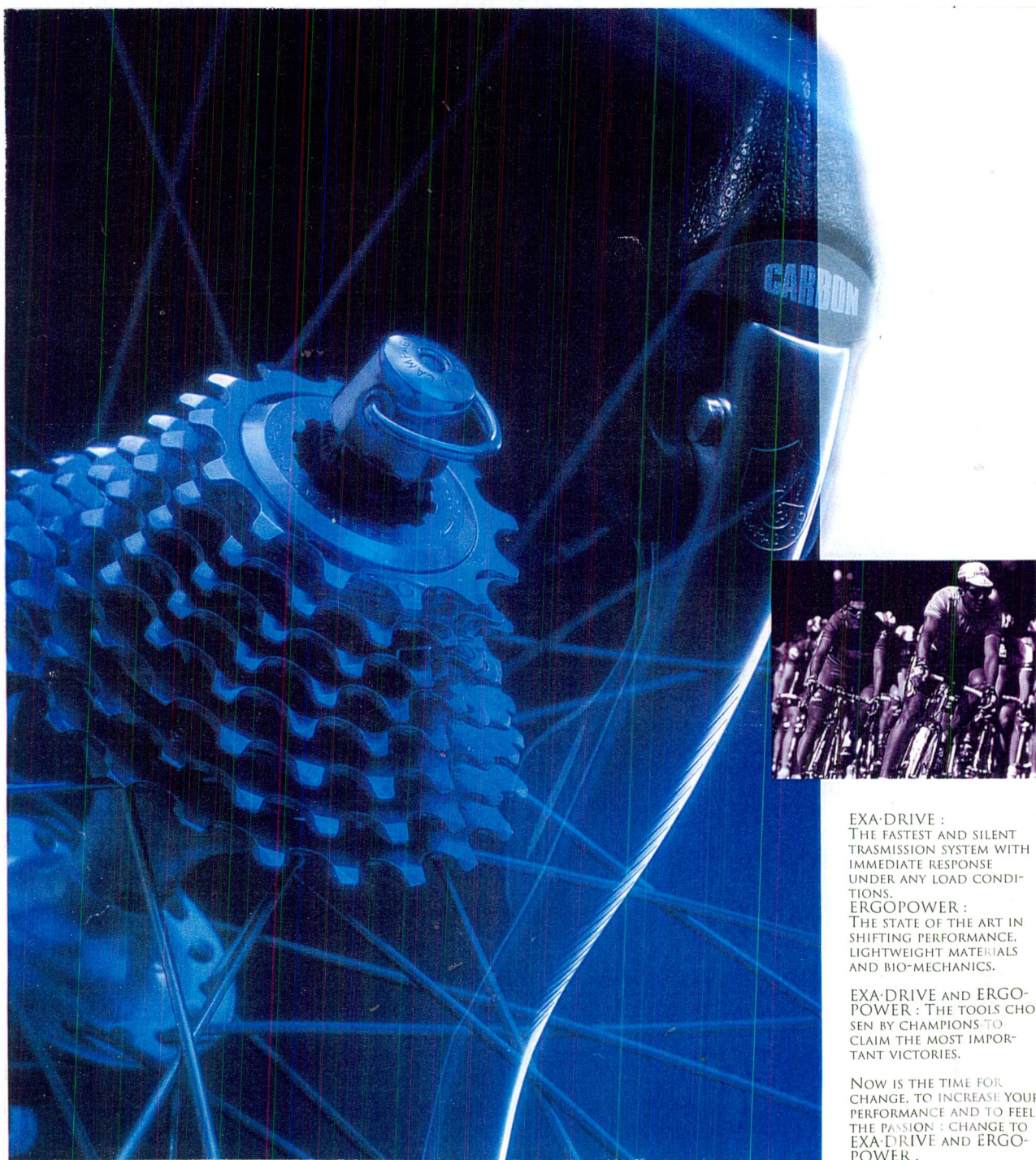
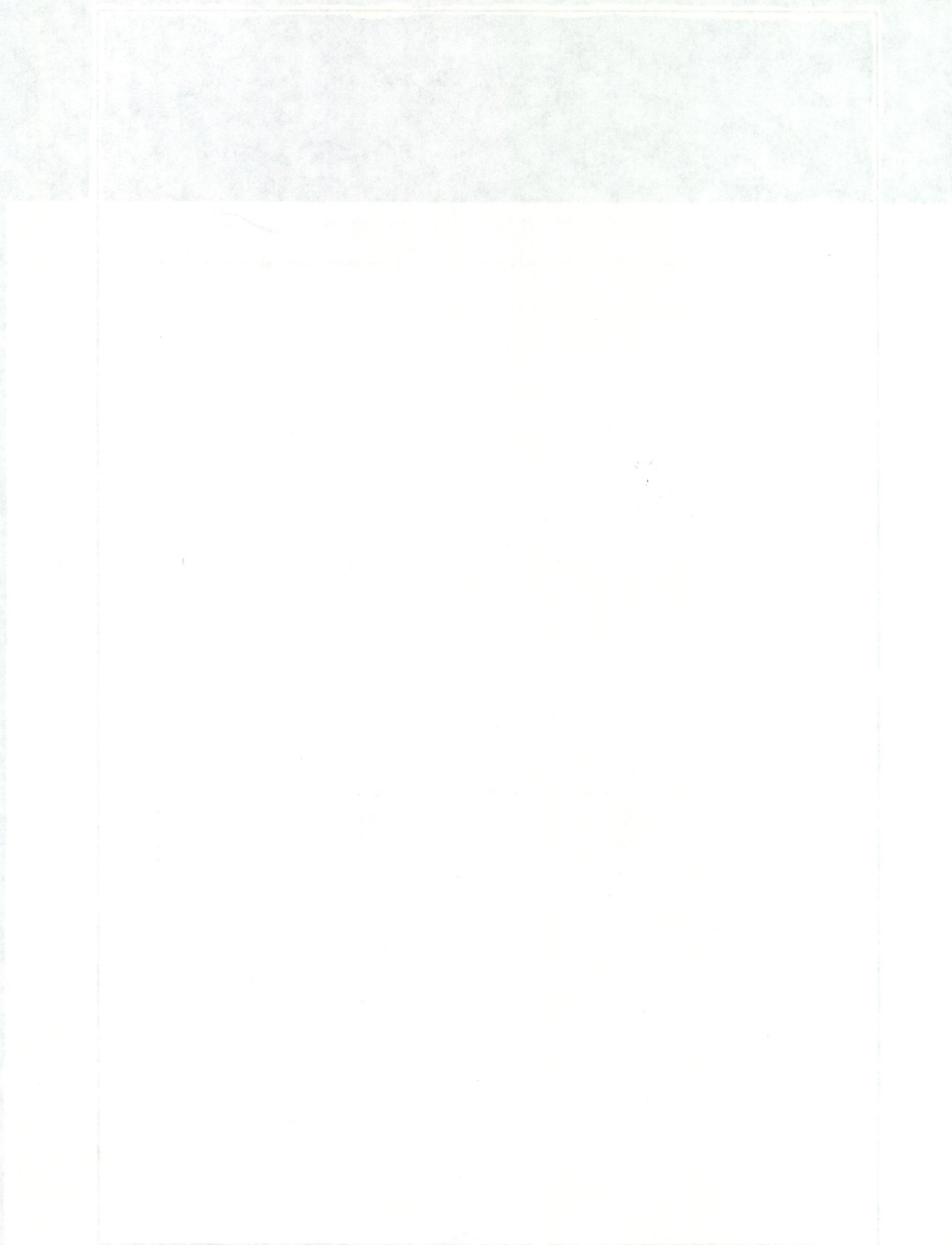


Figure 25: Advertisement, showing the bevelled edges of the Exa Drive system.



Drive is basically a copy of the Japanese version, Campagnolo have wisely swallowed their pride and not tried vainly to produce a revolutionary alternative. But what the Italian firm has done is to increase the range of different cassettes available (glossary). This means that there is a greater range of gears so that all markets, whether racing, touring or recreational, can choose the gearing ratio they want (figure 26). This development is beneficial for consumers, who previously have had no choice with the Italian components. The fact that these cassettes are interchangeable from everyday use to racing situations is another boon for the user. This modularity aspect is one of the major advantages which Campagnolo have over Shimano. With the Japanese firm, it is impossible to change a Dura Ace cassette for a 105 because they are not compatible. However, a Campagnolo Stratos derailleur will work with a Record cassette. This is an intelligent policy which is beginning to reap rewards with their present product line.

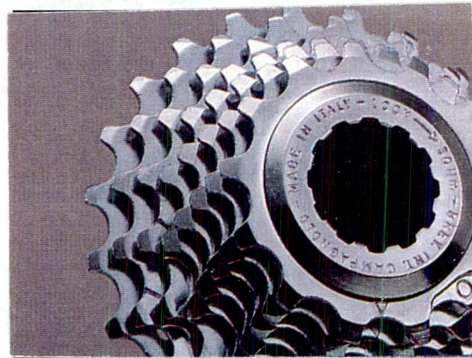


Figure 26: A Campagnolo Cassette body separated from the wheel hub.

There is one area of product innovation which Campagnolo can claim credit to. This is in the area of wheel and rim design. It was the Italian firm who first designed the Disc wheel back in the early 1980s (Figure 27).

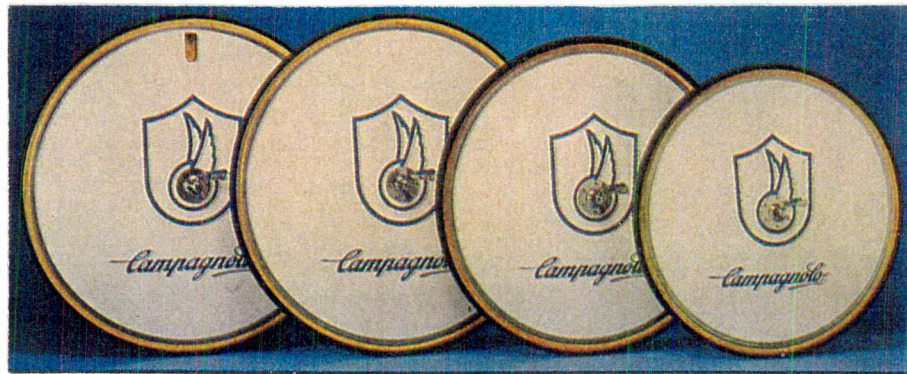


Figure 27: The original Disc wheels featuring the Campagnolo company logo.



Figure 28: Mid priced Shamal Deep Section rim from Campagnolo.

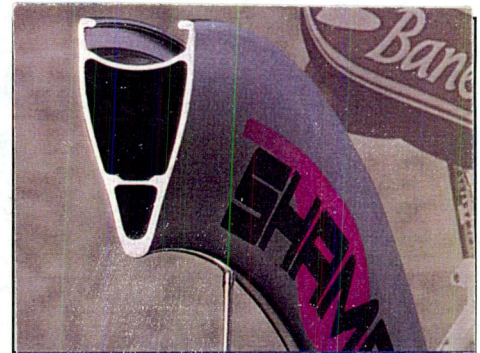


Figure 29: Cross-section of the Shamal rim, illustrating the increased aerodynamic profile.

This was a revolutionary product which had an enormous effect on the professional racing scene, they have become a familiar sight in time-trials. These events, where the cyclist race on their own against the clock, are very dependant upon aerodynamics. If used on a day with or no cross winds, the disc acts as a blade slicing through the air improving performance. Campagnolo's successor to the Disc wheel in the 1990s is the Deep Section Rim (Figure 28). These combine the aerodynamic advantages of the disc with the qualities of the standard wheel. Launched in the early 1990s, these wheels have proved to be very popular in the market place. Initially three models were available: Bora, Shamal and Vento. Technically these wheels are a breakthrough, they are lighter and more rigid, but more importantly they offer a greater aerodynamic profile (Figure 29). In typical Italian fashion every detail has been examined including the spokes. Their profile has been redesigned to an oval section to reduce wind turbulence. Again, the "features" issue is prominent: whether the new profiled spokes would really make

a difference to the amateur or enthusiast is questionable. But for the consumer, these spokes are innovative and different. The wheels are an example of good design, in which Italian style is present in a well engineered and efficient product. Last year, the wheels were revised and were changed from twenty to sixteen spoke, decreasing weight and increasing performance. A new budget model, Zonda, was introduced which has proved highly successful. Campagnolo are now bringing more quality to a wider market at a cheaper price.

The Italian company have recognised the success of Shimano's continuous design policy, and have for the second time in a few years redesigned their entire range of components. However, they have retained the modularity of their components. The new groupsets: Record, Chorus, Athena, Veloce, Stratos and Mirage mark a new beginning in Campagnolo's history. For the first time they are producing groupsets aimed at all sections of the market. They can now compete with Shimano's newer arrivals: RX 100 and RSX, which target the lower sections of the market. RX 100 is a cheaper version of 105 and offers the same features at a lower price. As a result, weight and material finish are compromised. RSX is a different group to its older brother and is a perfect example of Shimano's ephemeral product line. It is a clear response to a changing market where the recreational aspect is continually becoming more popular. This is due to the emphasis placed on pollution free transport and other green issues. The "high powered" racing and mountain bikes are not as popular as they used to be. This change in market trends is encouraging to see, and it is good that manufacturer's are prepared to invest in these areas.

The RSX groupset is neither racing or off-road, rather it is a combination using the STI road brakes (Figure 30) and mountain bike transmission (Figure 31). As a groupset it functions well considering the cost compromises which must be made.

However, finish and materials suffer as a result of sacrifices made to achieve the lower price. Examining the cheaply pressed inner chainring, suggests that the chain will not run smoothly for too long (Figure 32). Price-wise, RSX is

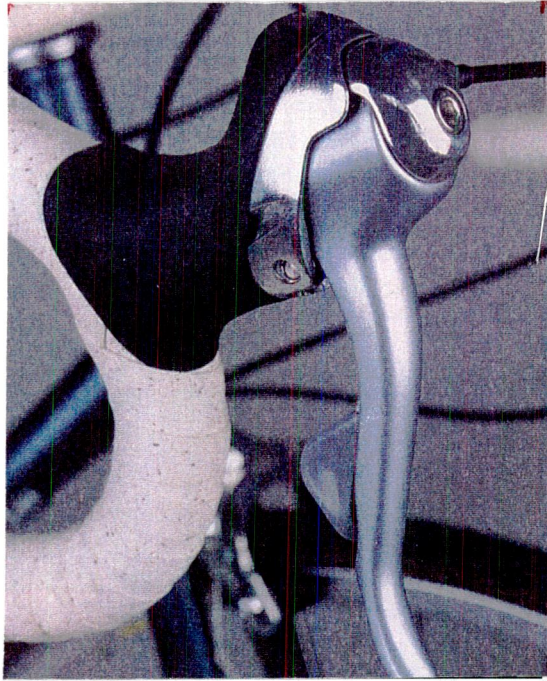


Figure 30: The road set-up of the RSX brake-set.

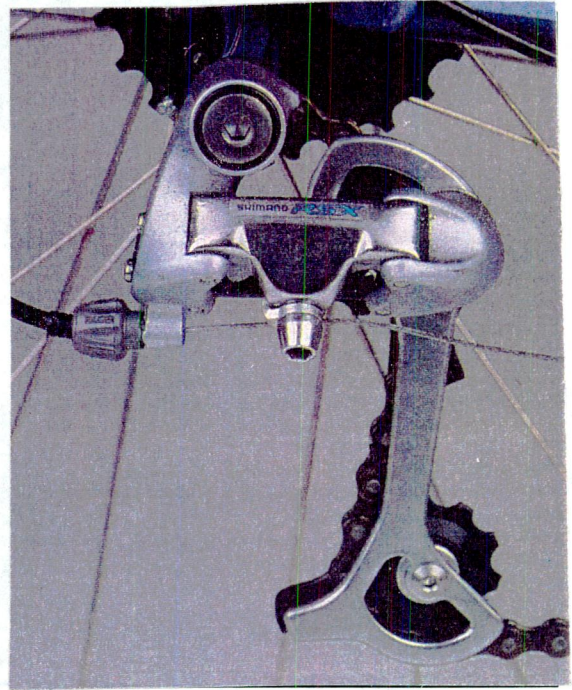


Figure 31: The RSX Mountain Bike Derailleur

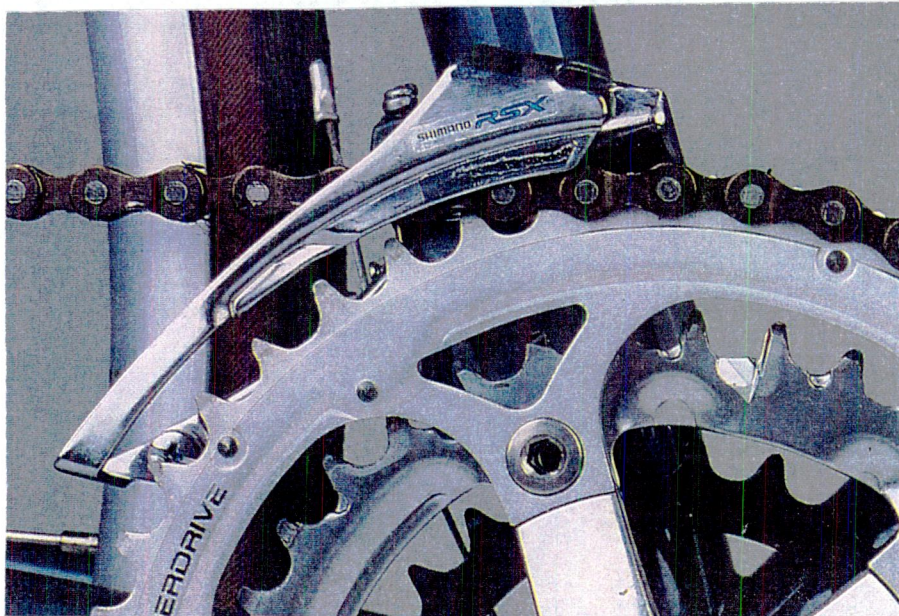


Figure 32: Part of the RSX chainset, showing the Stainless Steel bolt, the Hyperdrive stubs and the badly worn chainring.

excellent value for money and provides a good investment for the consumer more interested in touring and recreational cycling. But although this groupset is well thought out and satisfies a need in the market, it is not doing as well as Shimano might have expected. The problem lies in the fact that many manufacturers have fitted it to their mid range racing bicycles. They have not realised that this

product is primarily leisure based.

At this level it struggles against Campagnolo's bottom of the range "Stratos", which is approximately the same price, about £200. The reason is because quality is still first-rate, although the Italian firm has made sacrifices with weight and finish. When combined with the classic Italian racing angles and close gear ratios, this groupset becomes the best option at this price level (Figures 34 and 35).

Apart from the success of its older brother "Veloce", Mirage has been the Italian firm's first major breakthrough for years. "Mirage has transformed our opinion of Campagnolo...it is a modestly priced groupset that performed at least as well as, and in some areas better than Shimano RSX" (Stone, December 1995, p.12) says Hilary Stone, technical editor of Cycling Plus. Unless Shimano alter their design specification for this area of the market, RSX may be running on borrowed time.

Component Failures

RSX is not Shimano's only design mistake; they also introduced a system called Biopace in the early 1980s, see figure 59. Shimano redesigned the chainset, and introduced oval chainrings instead of the traditional circular pattern. The concept behind the system is when the chainset rotates the diameter of the chainring changes because of the oval shape. This has the effect of making the pedal revolution more efficient, but whether this translates into improved cycling performance is questionable. But in a market where cosmetic innovation is widespread, this product was initially a success. However its popularity soon waned as people returned to the traditional circular shape. This illustrates another broader design issue: although the market desires product innovation, it will reject that which it sees as going "too far". For instance, many of today's components could be manufactured with plastics. But Shimano have wisely accepted the general public appreciation for the quality steel aesthetic, first started by Campagnolo in the late nineteenth century. Eventually, Biopace was withdrawn from the marketplace because of a drop in sales. Another more serious reason was because of complaints from cyclists of injured knees after using the system. As a designed product Biopace failed, and it is doubtful whether the oval shape improved performance.

Campagnolo too, have had their fair share of design failure also. Since the mid 1980s there has been extensive development in the area of pedal design. In racing circles today, about ninety five percent of cyclists use clipless pedals. This pedal, which was patented by the "Look" company from France, is a simple solution to securing the feet to the pedal body. This is almost a necessity, either when touring or racing, because it greatly improves pedalling efficiency. Its operation is quite simple: a small plate or "cleat" is attached to the bottom of the cycling shoe. On the back of the pedal there is a small hooked plate which is hinged. When the shoe is placed on the pedal, the back plate hinges open and engages the specially shaped cleat. The shoe is now secure in the pedal and a simple twist of the foot releases the mechanism. However, Campagnolo tried to design around Look's solution instead of buying the patent as Shimano had. The result was released with the Record Corsa Delta groupset (Figure 34).

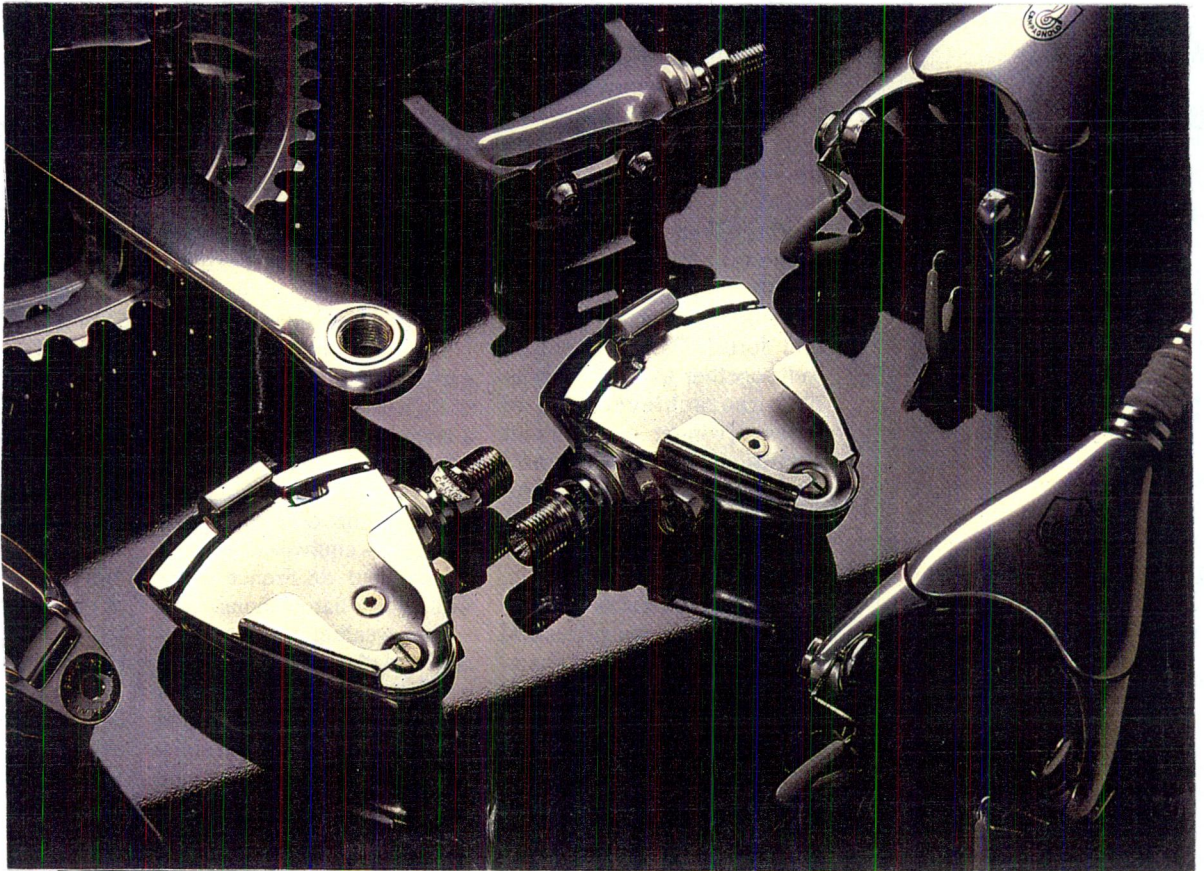


Figure 33: Campagnolo's Record Corsa Delta groupset. In the centre are the Clipless pedals, and on the right are the Delta brake callipers.

As usual, quality and finish is exemplary, but the usual performance and efficiency are missing. Using the pedals demonstrated that the clip system did not work properly. It is difficult to locate the pedal and the mechanism is very stiff and unresponsive. Because of the low sales the pedals were abandoned and the Look patent wisely bought. With the same groupset Campagnolo also produced the "Delta" brake calliper. This was the initial response to Shimano's dual pivot component. However, the callipers failed on a technical and functional level. Trying to maintain them and make quick adjustments is nearly impossible. Their lack of success is also due to the prohibitive cost. In fact, the callipers are more like pieces of jewellery with their highly polished and detailed finish. However, these two designs are among the last of Campagnolo's failures, and the 1990s has seen a much more successful design policy. "Veloce" was the first groupset to herald the company's resurgence and was aimed at the lower end of the market. In 1992 when it was first released, it stormed the market taking everybody by storm, including Shimano. It featured all of the new innovations, including



Ergopower and EXA Drive, but more importantly it brought Campagnolo's quality



Figure 34: The Stratos Ergopower lever, which can be uncomfortable in certain positions.



Figure 35: The Mirage single pivot callipers.

to a much wider market. This market share has been further increased with the introduction of "Mirage", which realistically brought the legendary Italian components to the low level enthusiast or everyday cyclist. The groupsets at this level from both Shimano and Campagnolo contain advantages and disadvantages. One negative design aspect of the Italian lever is the hood construction (glossary). Although it is longer wearing it can be uncomfortable. This is because of the material which is used in the hood, a tough rubber. Because of the angular sides and pouted top, it can be unaccommodating in certain positions, (Figure 34). Another negative point is that the brake calliper is only a single pivot, (Figure 35).

Although this would not make much difference to the amateur or enthusiast, the decrease in braking power would be noticed by the high level amateur or professional. This being said, Veloce is aimed at the former group; however the market expects to receive the new Italian technology as it has done in Shimano's lower groups. Apart from this, Campagnolo has been able to keep the cost down while not greatly affecting performance by using of cheaper materials and production processes.

While the Italian firm has been busy, Shimano have continued with their policy of innovation and improvement. They have recently revised their SPD pedal (Figure 36). This was the Japanese answer to the Look clipless pedal, and

unlike Campagnolo's Deltas work perfectly. They were first marketed with their mountain bike division but quickly spread to the racing section of the industry. They provide a lighter alternative to the standard clipless pedal, and have the large advantage of possessing a clip on both sides of the pedal. "Shimano's two new SPD pedals have set new standards for performance" (Stone, December 1995, p.12). Sealed mechanisms have been another policy which the Japanese have embarked on. They have realised the obvious advantages of keeping the moving parts out of sight. Keeping grit and dirt away from the mechanism produces a more hassle free and user friendly product. The easier it is to use and clean, the greater the perception that it is a good piece of design. Shimano first used this idea in the bottom bracket (glossary), and then incorporated it into the headset (glossary) (Figure 37). This is an illustration of the ability of the Japanese to spot a problem and apply the solution in the right places.



Figure 36: The racing version of the SPD pedal by Shimano.

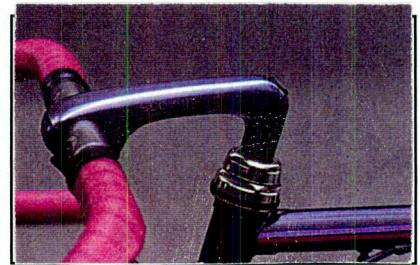


Figure 37: A picture of a Shimano sealed Headset.

Even though innovation and intelligent design are of paramount importance in this area, their effect is nullified if aesthetics and styling are wrong. The next chapter will examine two of the lower priced groupsets from each company on the aspects of technological and aesthetic detail.

Chapter 4
Shimano and Campagnolo

Brakes

This chapter deals solely with two equivalent, but differently designed groupsets: Campagnolo Stratos and Shimano RX 100. Each part of the group will be compared from braking to gear changing, and will examine the features which have now passed down to these components. Practical experience of the featured components has helped greatly in the completion of this chapter.

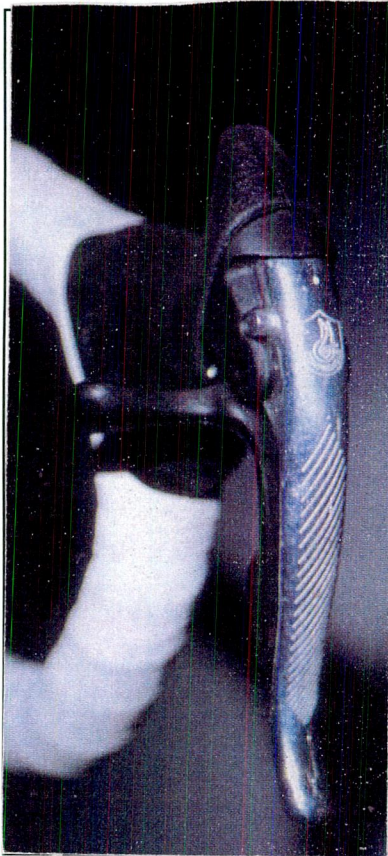


Figure 38: The Stratos Ergopower lever featuring the plastic gear shifter. Note the clean aesthetic lines of the lever.

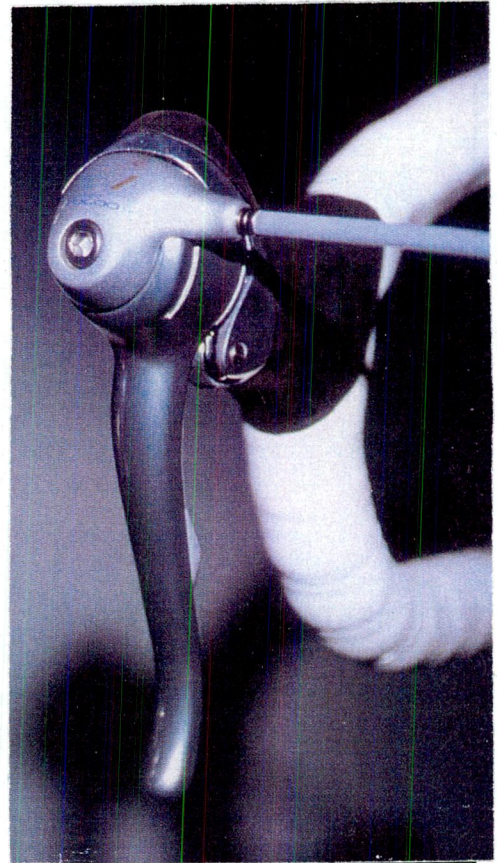
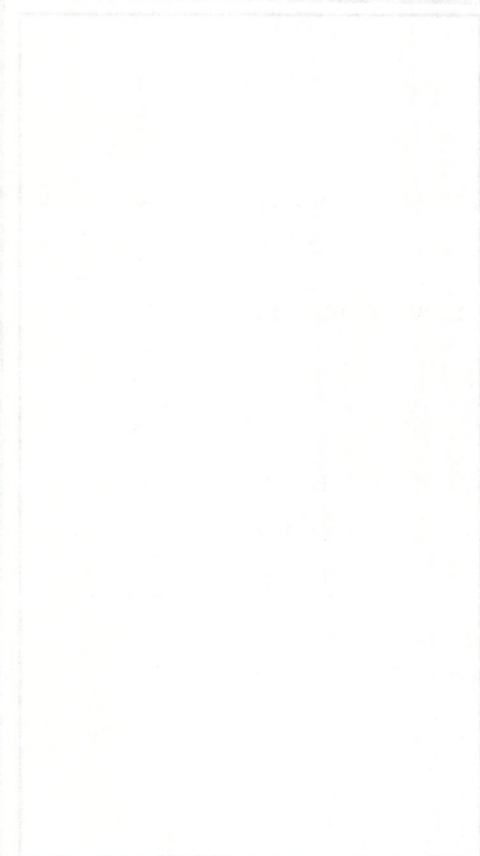


Figure 39: The RX 100 STI lever. The lever is very bulky and is cluttered aesthetically.

The numerous advantages of STI and Ergopower are quite apparent. Braking and gear changing can be controlled from one place; there is no need to take your eye off the road or change position to change gears. For the racing cyclist the possibility of changing onto the "big ring" without your adversary noticing is a real advantage. Both levers have the same physical capabilities with the option to downshift eight cogs at once is sacrificed by Campagnolo, for the



benefit of price. In their model (Figure 38), the button and lever are now joined in a wishbone arrangement. However, Campagnolo's policy of using new materials has not worked quite as well in this case. For the "wishbone" material they use a resin plastic, which is not stiff enough for the shifting action when changing gear. However the lever in general is quite comfortable, except for a small ridge which is at the bottom of the hood. This flaw, although minor, could be alleviated by using a softer compound rubber. Aesthetically the lever is superior to the STI version which when assembled is a maze of protruding wire. Routing all the cables underneath the handlebar tape is an intelligent stylistic idea. The design is not as complicated and the line is more simple. The use of slanted lines across the face of the lever subtly reinforces the racing dynamic. Technically the RX 100 lever (Figure 39) is superior, the shifting action is much lighter and easier to use than the Italian version. For the amateur racer, the possibility of changing gear while braking is not available in Stratos. This is an added extra for the everyday cyclist, and is a useful feature for the amateur when cornering in a race for example. The compound of rubber used in the hood is also softer and provides a comfortable grip, if not a little chunky. Aesthetically, this "chunkiness" detracts from the style of the lever, it leaves the component looking heavy.



Figure 40: The Stratos brake calliper. Note the simple, elegant lines and the use of the alloy Barrel Adjustor.



Figure 41: Dual pivot brake calliper of RX 100.

As with Campagnolo's Veloce, the brake callipers for Stratos (Figure 40) have the same single pivot system. The technology is taking longer to filter down; this is an advantage which Shimano have over the Italian company. However the loss in performance is minimal for the consumer at which this group is aimed at. The callipers disguise the sacrifices that have had to be made for price, and are finished neatly. The clean lines and large chrome bolt heads add to give a simple, yet stylish appearance, which is in keeping with the elegant designs of the company. In contrast, Dual pivot technology is available with RX 100 (Figure 41). The use of plastic is common to both groupsets and certain similarities can be made. Where the Italian firm suffers with their use of plastic in technical terms, Shimano's polished look is compromised by using the material. The use of black plastic for the barrel adjusters (glossary) does not fit in as well as the alloy used in the Stratos model.

The differences in aesthetic policy become most apparent when the chainsets are looked at. Simplicity and clean lines are produced by the casting

techniques in the Stratos model (Figure 42). The finish is obtained by painting with Nytech, the same finish that is used on the Veloce groupset. The chainset body is smooth and streamlined and is a stark contrast to the Japanese version (Figure 43). In this case the machined chainrings look out of place with the polished crank arms (glossary). The angular shape and heavy lines appear alien to the rest of the groupset.

Gears

Both rear derailleurs (glossary) work equally well, but differ aesthetically. Shimano (Figure 44), take a more slimline approach, elongating the form and keeping the swing arm (glossary) angular. Campagnolo stick to their elegant shape placing the adjustment screws (glossary) on the face of the derailleur, (Figure 45). "The use of alloy barrel adjusters adds to the overall appearance" (Ramsden, May 1994, p.37).

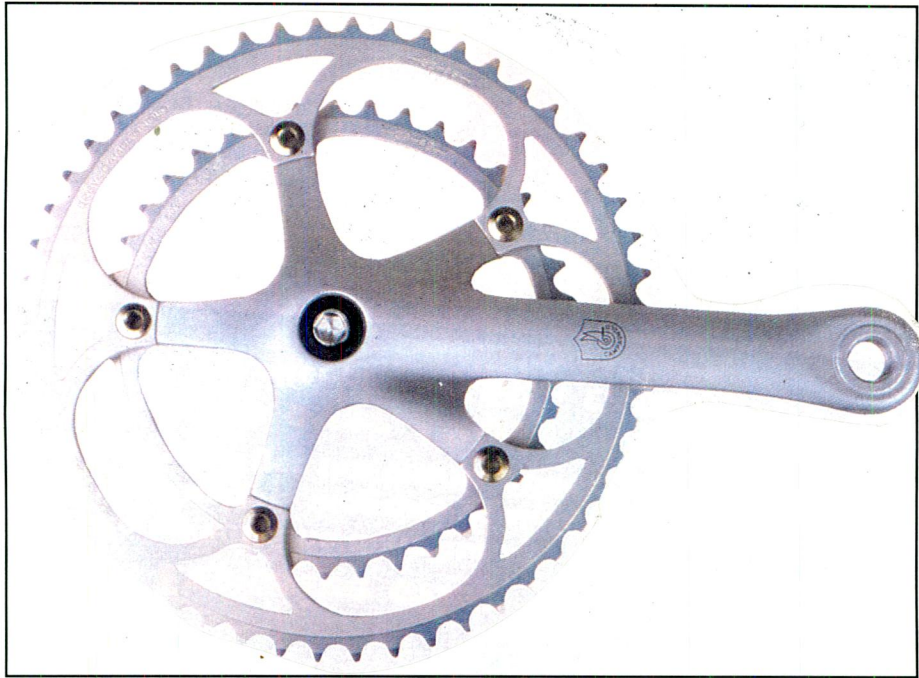


Figure 42: The elegant and fluid forms of the Stratos chainset.

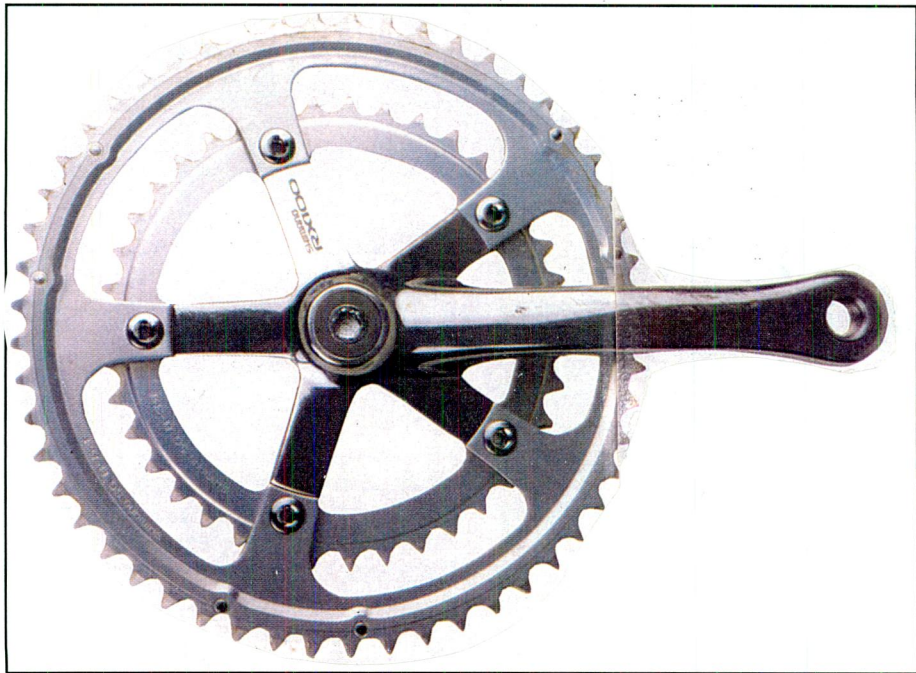


Figure 43: The more angular RX 100 chainset. The highly polished Crank does not fit aesthetically with the machined chainrings.

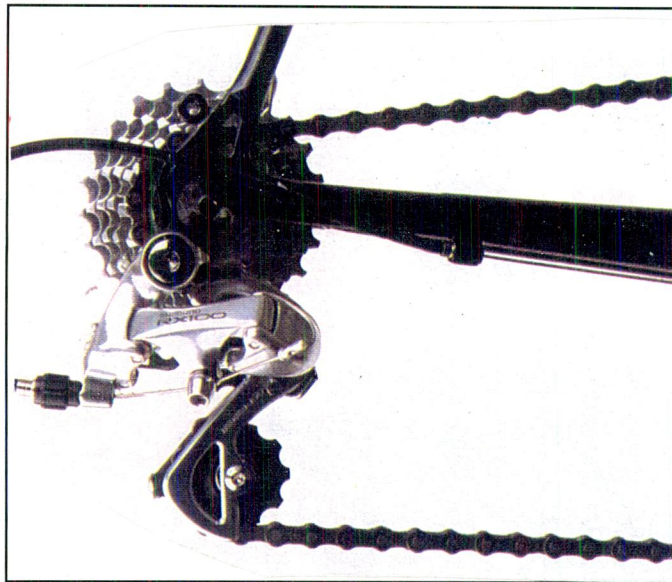


Figure 44: The RX 100 Derailleur from Shimano.

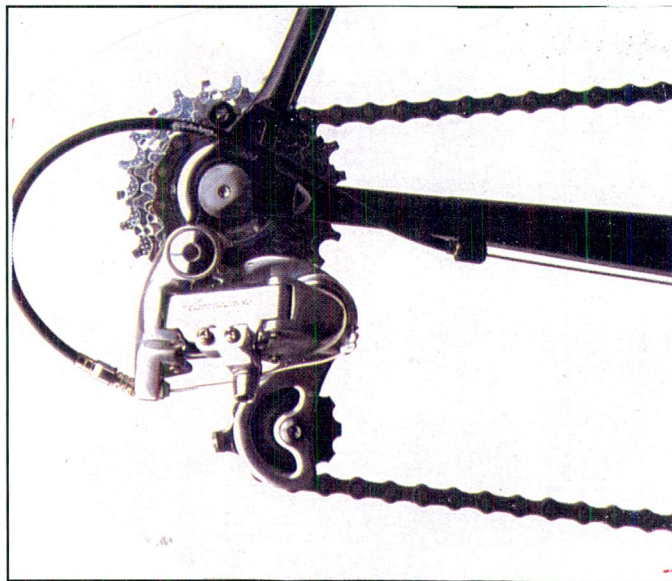


Figure 45: Shimano's RX 100 chainset.

In design terms, both groupsets have advantages and disadvantages aesthetically and technically. While Shimano appear to have the technical edge, they lose out aesthetically to the superior Campagnolo Stratos. The aesthetic policies of both firms is discussed in the next chapter.



Chapter 5

Aesthetic Policy, Materials and Production

Style

The "look" of the component is instrumental in how much it sells. This is especially the case in the bicycle industry, which relies so heavily on the aspect of style. With Campagnolo the whole personality of the range has been defined by the top groupset, Record.

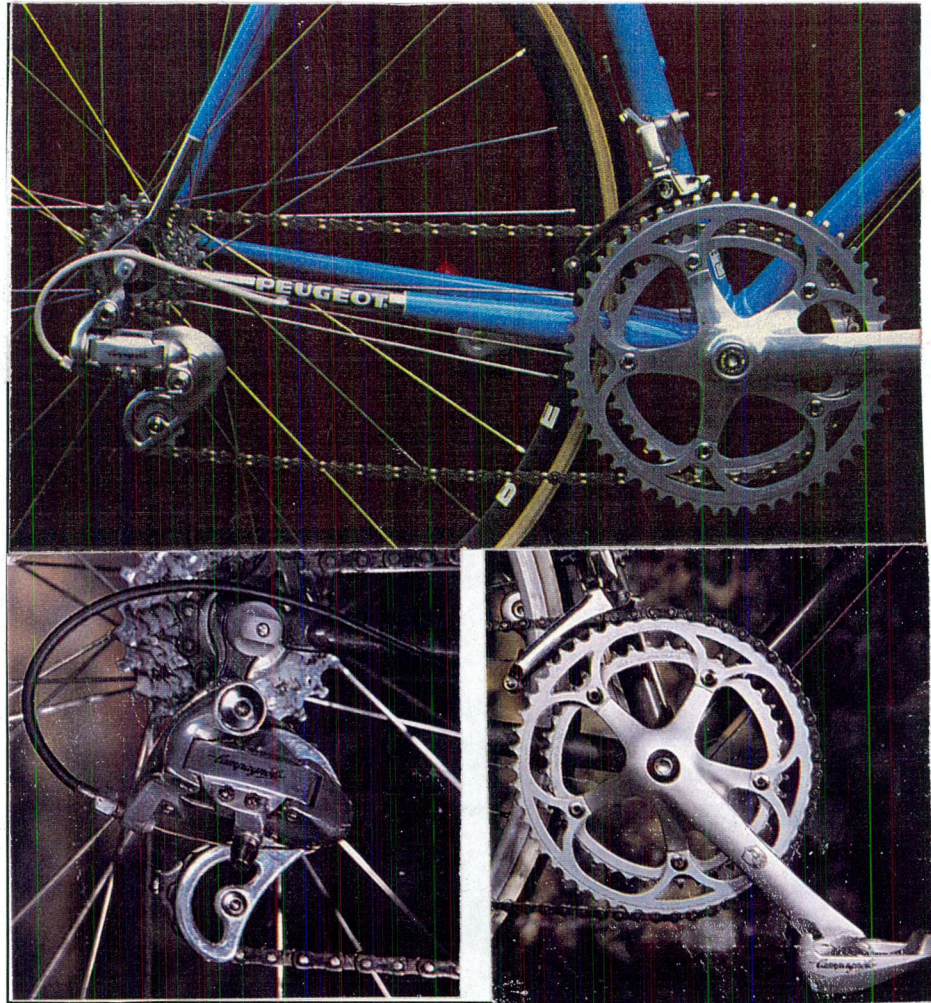
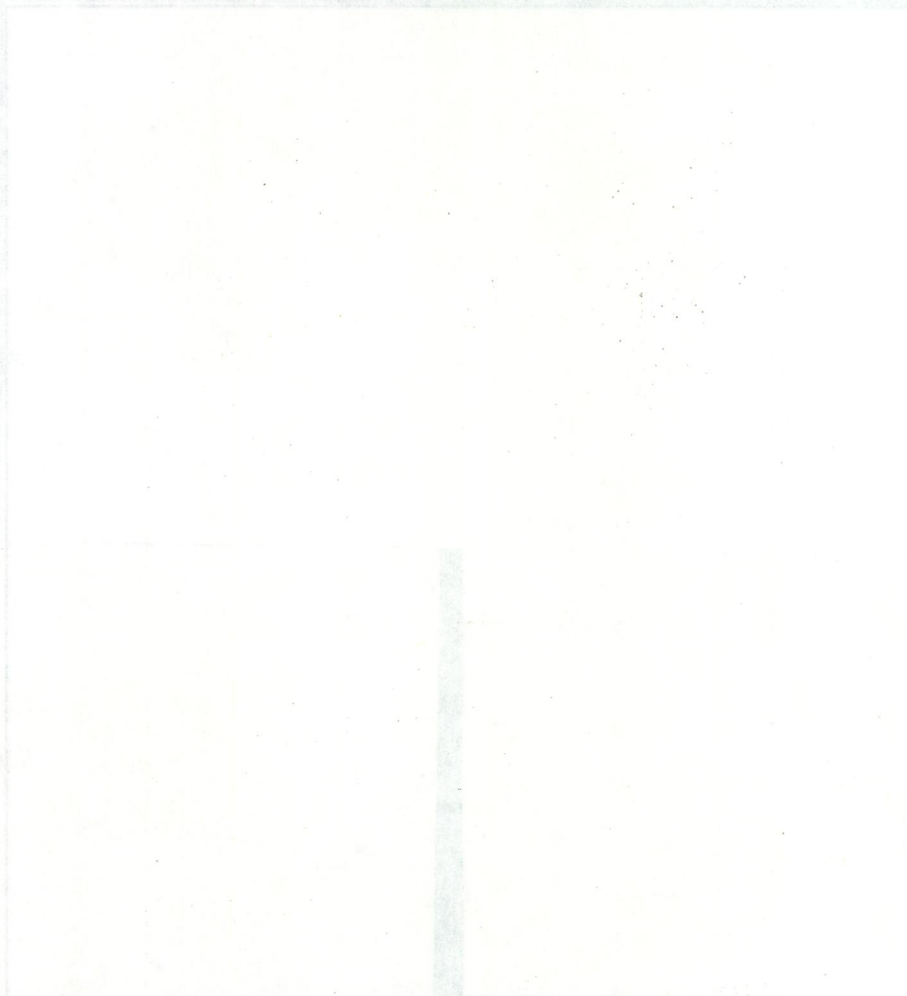


Figure 46: The top picture shows the Chorus Drivetrain. Below, details of the more recent, but similar Stratos Drivetrain.

The elegant, smooth and streamlined shapes have been applied to each subsequent model from the Chorus to Stratos (Figure 46). For years there has been general consensus among the cycling community that the Italian components are the best looking. Of course, aesthetics are a matter of personal taste, but the above general statement can be related to a lot of Italian products, for example the styling of Ferrari cars.



The area of styling has always been a problem for Shimano. Even though their products are extremely well engineered, they still have an raw "look". As mentioned in chapter two, Shimano have tackled this problem with their revision of Dura Ace (Figure 47).



Figure 47: The new Dura Ace. The top picture shows a detail of the Front Derailleur and Chainset. The lower shows the new Drivetrain.

Their objective was to capture the "living, vigorous aspects" which Campagnolo had been achieving for decades. So when the Giro D'Italia, the equivalent of the Tour De France, was taking place the Japanese company was there with a camera. Etsuyoshi Watatai, of the company's marketing division, explains their actions: "The employee was sent because it was important for us to understand the

European approach to competition cycling. Among the images that he took was one that impressed him particularly, an image of a cyclist's leg - all muscle, no fat." (Vickers, April 1994, p.97). The Japanese firm also decided to look to their own past and culture for inspiration, something which has always been a part of Campagnolo's design policy. Shimano found two other images which expressed Japan, but also their company. One was an aggressive image of a Samurai warrior, the other was his highly polished and engraved sword. These three images combined to suggest a new visual style for Dura Ace, which up to now had been quite bland and functional, see figure 4. Now, aesthetically, the Japanese had an original look, which was not an imitation of a European style.

But Campagnolo had been doing this for years, they have had a plentiful source of cultural reference. Aesthetically, their designs are very simple and display clear and uncluttered thinking; the Italian chainset is a good example of this. If a cyclist is observed during a time trial, an individual race against the clock, the pedal revolution becomes constant and rhythmical. The chainset which is at the heart of the bicycle, almost resembles the pistons of an engine (Figure 49). Bicycle and cyclist come together to form a near perfect machine. This is where Campagnolo is so successful, their ability to harmoniously combine utility and beauty. Their designers have an ability to create well engineered objects which contain natural aesthetic detail. This is part of the mystique that is contained in Campagnolo's products and Italian design in general. A comparison of Shimano's STI and Campagnolo's Ergopower provides a good example of difference in aesthetic detail (Figure 49). The lack of protruding cables is a major advantage stylistically. The mechanism housing at the front of the lever is ugly and looks out of place when compared with the clean Italian version. It appears that what has happened is that Campagnolo have taken STI's raw technology and refined the appearance of the lever.

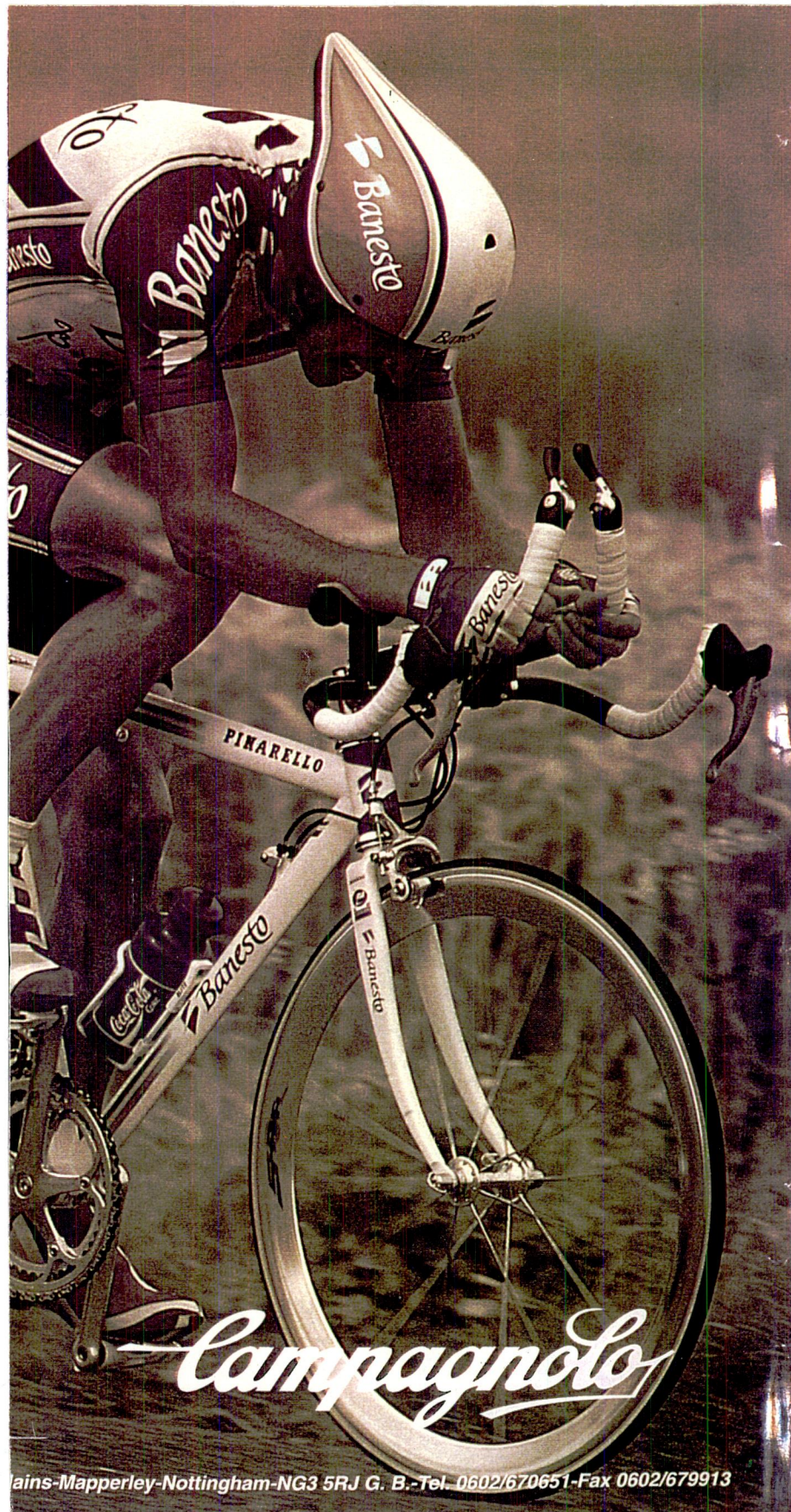


Figure 48: Miguel Indurain powers through a Time Trial on a Campagnolo equipped racing bicycle.



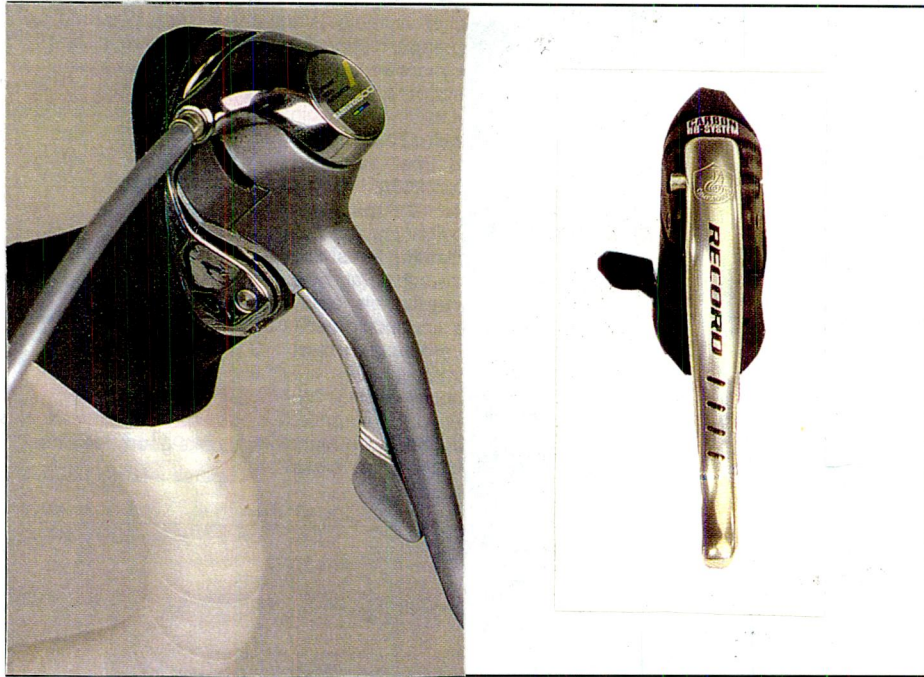


Figure 49: On the left is the Ultegra STI lever, on the right is the Record Ergopower from Campagnolo, which has a simpler appearance.

Materials and Production

The selection of materials and production processes has a large effect on the overall appearance of the component. For example, the extensive use of casting by Campagnolo allows their designers the freedom of form which results in such beautiful products. But the price reflects the amount of polishing and finishing that must be done. One of the methods which Shimano have used to keep the price down is material choice and finishing. Using forging to produce a large majority of their components, they avoid the expensive casting processes of the Italian firm. This is an area where the Japanese excel; they realise the importance of material choice and production processes. The Japanese designers also possess an excellent working knowledge of each. They plan for manufacture, and where some of the processes are actually dearer than Campagnolo's, these costs are more than offset by the huge quantity of products which they produce. Product finishing is very cost effective when analyzed. A lot of groupsets are anodised, for example: the Ultegra chainset (Figure 50).

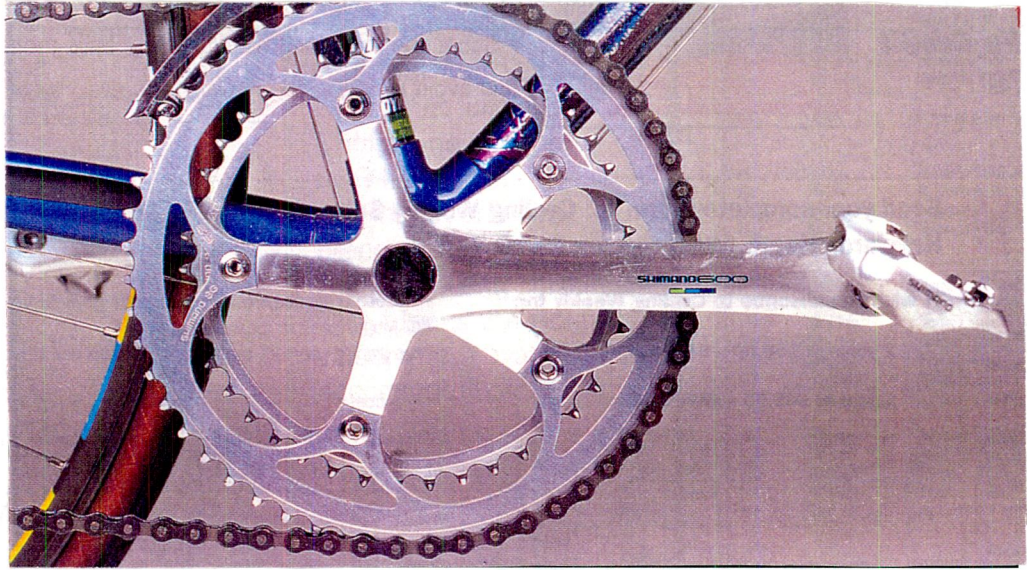


Figure 50: The Anodised finish of the Ultegra chainset.

The process, which gives the group a distinct hue, is relatively cheap and versatile, while providing a corrosion resistant finish. "Because the coating is integral to the part, the metal can be subjected to quite severe forging..operations without destroying the coating " (DeGarmo, 1988, p.982). Shimano also use a lot of durable paint to finish surfaces, most notably in the Ultegra group. Campagnolo too, have also incorporated this type of cost effective finish in their design policy for the cheaper groupsets.

Form differentiation is also used by Shimano to aesthetically separate their ranges of designs, for example: the shapes of the RX 100 (Figure 51), and the Dura Ace derailleur (Figure 52), are very different.

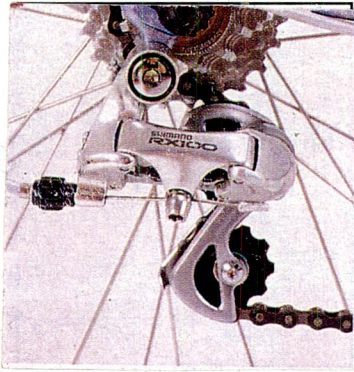


Figure 51: The aesthetically softer RX 100 Derailleur.

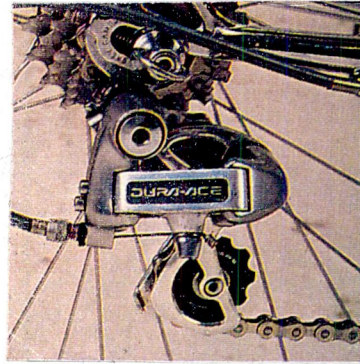


Figure 52: The refined and muscular Dura Ace Derailleur.

This policy is not used by Campagnolo, whose products are all quite similar in appearance. The Italian's traditional use of only steel and other similar alloys has been abandoned. Aesthetically, there are no great differences with the new materials that are used (Titanium, Carbon and plastics resins); the main benefits are of a technical nature. Because their production processes are different to Shimano's, almost a case of craft versus mass production, they achieve a distinctive look and finish. Campagnolo's components have generally always looked the same and continue to do so. But one problem the groupsets have is their similarity with each other. Confusion arises as to the model, whether it is an Athena or Chorus derailleur. To help avoid this and continue the trend in portraying the company's progressive policy, Campagnolo have now printed the names of each group on the different components. They are anxious not to appear lethargic in a market where the consumer now has greater power to control the direction the market is going. This is one of the broader design issues which the thesis raises, and is illustrated by Shimano's shifting design policy to a more leisure based product. Increased consumer reaction to environmental concerns and green issues is producing a reaction from manufacturers. Another example of this phenomena is the use of "ozone friendly" gases in refrigerator design today.

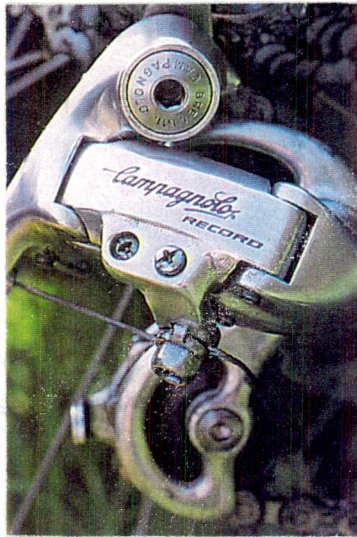


Figure 53: The elegant Campagnolo Record Derailleur.

The freedom of form that the designers at Vicenza enjoy is not as apparent in the Japanese components. The phrase "form follows function" is more applicable to the designers at Shimano. Two Japanese components illustrate this: the Dura Ace rear Derailleur (Figure 52) and brake Calliper (Figure 54). The Campagnolo Record Derailleur (Figure 53) and Calliper (Figure 55) are also included to provide a useful comparison.

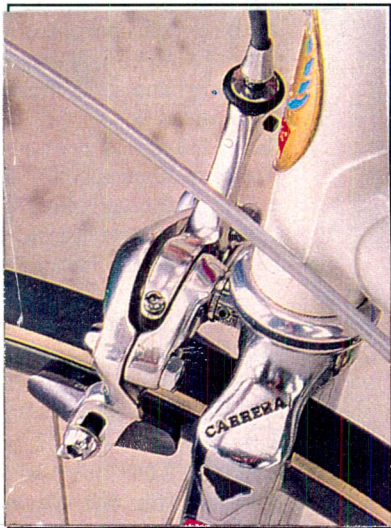


Figure 54: The beautifully polished, but bulky and complicated Dura Ace Calliper.



Figure 55: The more refined and aesthetically clear Record Calliper.

The components from Shimano show their allegiance to the Japanese use of engineering and their ability to solve problems logically. The first Derailleur is very functional, it is "all muscle - no fat" and presents a contrast to the Italian component. Aesthetically, the surfaces are strong and the lines are hard and angular. The metal is not as highly polished as some of their other products, but the lettering is reminiscent to the engraved pattern on the Samurai sword. Examining the calliper, it does not look as simple as the Italian version, although they both work on the same principle. It certainly does not have the same streamlined quality, looking a lot more complicated and heavy. The detailing is excellent on both components, for example: the lettering, the adjustment screws (glossary), and the surfaces which are clearly defined and polished beautifully.



Figure 56: The Shimano Ultegra Hub.

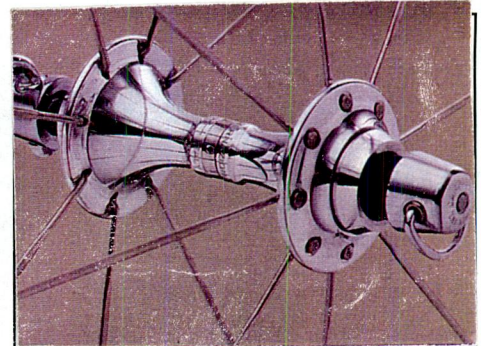


Figure 57: The Campagnolo Shamal Hub.

The hubs are another area of importance aesthetically, they are at the centre of attention of the wheel. Campagnolo have always had a reputation for producing quality hubs, simplicity is a key feature fitting into their elegant design policy. "It is as if they use better quality metals because the finish is so lovely, especially the hubs which shine like no other." (Peiper, August 1993, p.81). The two hubs pictured illustrate the differences in the companies design policies. Shimano

choose to use plastics and aluminium (Figure 56), while Campagnolo use the traditional chromed steel finish (Figure 57). The Japanese company uses anodising to finish the hub, the other component is highly polished and lacquered. Thus, the Ultegra model is very functional and cheaper than the Italian version, while it may not achieve the same visual status. Nonetheless many people prefer Shimano and vice - versa, and in the final analysis it is a matter of personal taste. However it is in the lower end of the market where the majority of sales occur, and it is here where decisions about the aesthetics are important. In this light, part of the reason for the failure of Shimano's latest group, RSX, occur with the chosen aesthetic. But because of the concessions to price, the materials and the aesthetics suffer. In the chainset, only the outer chainring is made from the usual aluminium alloy. The inner ring is made of steel and looks awful after a relatively short period. Technically, the finish will tarnish and wear quickly resulting in a shorter product life. Shimano have tried to improve the "look" of the chainset by using polished stainless steel bolts. To a certain extent, they have succeeded in enhancing the visual appeal of the product. This component illustrates the influence small details can have upon the aesthetic of a product, see previous figure 32.

Campagnolo, realising the problems encountered by Shimano with the policy of price reduction, have made the changes to their groupsets beneath the surface. The result is that performance, efficiency and weight are inevitably affected, but the chainset still retains the elegant Italian line".

Chapter 6
Marketing and Advertising

Shimano

One of the problems in the late 1980s which Campagnolo faced was created by the marketing prowess of the Japanese company. Originally they relied on a small amount of magazine advertising, and sponsorship of some of the large racing teams. But brand loyalty and word of mouth was the traditional method of selling their components. While Campagnolo continued to gracefully produce their top range products, Shimano prepared an intensive marketing operation. After a successful advertising campaign in both America and Europe, they began sponsorship of all the major racing teams. At this time, Campagnolo had begun, rather foolishly, to reduce its sponsorship of the major events, continuing to see Shimano as presenting no threat. However, this view quickly changed as the professionals began to use the top level Japanese components. When they had secured a large share in the racing market, Shimano concentrated on the everyday consumer. The conversion of the professional cyclists to their products proved to be a huge benefit. The consumers wanted to use what the pros had; the Japanese components were cheaper and innovative and quickly Shimano were inundated with orders which they could not supply. Other manufacturers, apart from Falcon Cycles, started to make the change from Campagnolo, including the well known Raleigh. In the catalogue for one of their models, Triathlon, all of the new innovations (SIS, SLR, etc..) are clearly marked (Figure 58).

The advertisement presents this bicycle as being at the top of the market: "This is the bicycle which the professionals use, it has all the technical features they use. You can have these too if you buy this bicycle." These are the sentiments which are clearly displayed.



Figure 58: The Raleigh Triathlon.

In 1990, about eighty percent of the top cyclists were using the Japanese components, and this was being reflected in the marketplace as well. The advertisement, shown in figure 59, firmly establishes the company with the racing arena and success. Shimano are anxious to portray the concrete dedication which the professionals have for the sport; in the same way the Japanese company are equally dedicated towards the perfection of their products.

Campagnolo

Campagnolo initiated their own magazine campaign in 1992. Figure 60 illustrates one of the adverts which accompanied the launch of their new range of groupsets, in this case Veloce. The simple, streamlined shapes of the components are enhanced by the subtle lighting and the pastel colours of the advertisement. The products are placed on their own as if on exhibition. This has the effect of displaying the simplicity of the components. Conversely, a different approach is taken for the launch of the Ergopower lever (Figure 61). The statement, "it took dozens of workers to assemble each part", emphasizes the company's commitment



to quality and excellence. Dozens of workers demonstrates the human element, which is not present in the machine manufactured Japanese products.

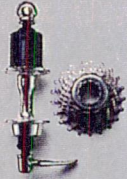
In the advertisement for the deep section wheels (glossary), there is a return to the pastel shades and subtle lighting of the components (Figure 62). The three wheels are illustrated, representing the three markets from the high level to the enthusiasts and amateurs.

Figure 63 illustrates the new direction which the market is taking. The picture depicts a cyclist with her Japanese equipped commuter bicycle. This is the market which the RSX groupset is aimed at, it is more leisure based and "green". Notice the use of the dynamo instead of battery powered lights. RSX is not the only product aimed at this market, they have also produced a seven speed hub gear for the European market. Called the Nexus hub (Figure 64), this design is unusually heavy and contrasts the "low weight, high speed" Dura Ace. All the working parts are contained in the hub, providing a trouble-free product. The Gear Lever is a simple handlebar shifter with an analog display, reminiscent of the Rapidfire gear shifter, (Figure 65). Trying to associate themselves more closely with nature and the new environmental concerns, Shimano are producing components which are virtually maintenance free and "earth-friendly". Responding to the market and changing their design approach, it appears that Shimano are changing gear again.

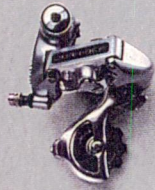
What would Freud think?

Some old fossil in little round glasses
is hardly qualified to pass judgement.

Unless he rides six hours



a day in crappy weather. And mows



his legs more than

his lawn. And has no home address

from January through



November. And hasn't enjoyed a bowl

of ice cream since his 6th birthday.



Face it. If they

can't understand the psychology,

they'll never understand the sacrifice.

SHIMANO®

For a free brochure, call 1-800-833-5540, Dept. S112.

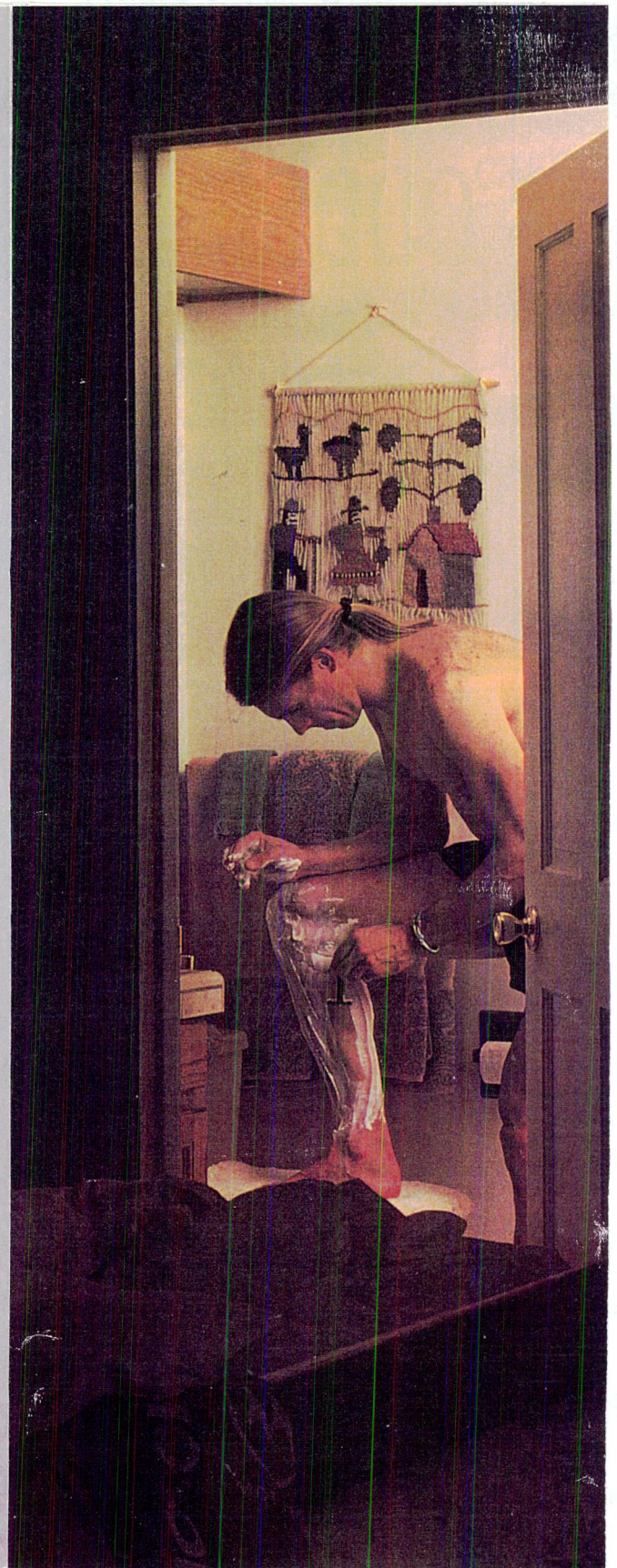


Figure 59: The Dura Ace Advertisement.



THERE IS ALWAYS A LEADER

A black and white advertisement for Campagnolo Veloce. The background is dark. Various bicycle components are arranged in a dynamic, overlapping fashion. These include a large chainring, a crank arm, a rear cassette, a front derailleur, a rear derailleur, a handlebar, a seatpost, and a saddle. The Campagnolo logo is prominently displayed in the center, written in a stylized, cursive font. The overall composition suggests speed and precision.

Campagnolo

Campagnolo SRL - Via della Chimica 4 - 36100 Vicenza - Italy - Tel. 0444/564933 - Fax 0444/565062

HE WHO ATTACKS, LEADS
THE CHALLENGE.
THE CHALLENGE FOR THE
LEAD IS ALWAYS THE
HARDEST.


EXPERIENCED CYCLISTS
CHOOSE CAMPAGNOLO
TO BE THE LEADER.
THUS, RECORD, CHORUS,
ATHENA AND VELOCE
GROUPS WERE BORN.

FOR 60 YEARS,
CAMPAGNOLO THE LEADER.

Figure 60: The Campagnolo Veloce Advertisement.



THE CAMPAGNOLO ERGOPOWER LEVER



UPSHIFTING IS DONE AT A RATE OF ONE OR TWO SPROCKETS AT A TIME. THE PRESETTING MECHANISM, COMPATIBLE WITH BOTH TRIPLE AND DOUBLE CRANKSETS, ALLOWS THE FRONT DERAILLEUR CAGE TO BE ALIGNED WITH THE CHAIN IN ALL POSITIONS.

YOU CAN DOWNSHIFT BY AS MANY AS EIGHT GEARS IN ONE MOVEMENT. THANKS TO THE ERGONOMICS OF THE CONTROL, SHIFTING IS POSSIBLE IN A SPRINT AND UNDER LOAD. ALL CABLES RUN UNDERNEATH THE HANDLEBAR TAPE TO GIVE THE HANDLEBARS A CLEAN PROFILE.

THE ERGOPOWER BRAKE LEVER HAS "PROGRESSIVE POWER" OPERATION. LEVERAGE TO THE CALIPER INCREASES THE FURTHER THE BRAKE LEVER IS DEPRESSED - GIVING YOU MAXIMUM BRAKING CONTROL.

IT TOOK A TEAM
OF ENGINEERS AND TWO YEARS
OF RESEARCH, DESIGN AND
ERGONOMIC TESTING
TO CREATE THE CAMPAGNOLO
ERGOPOWER LEVER

IT TOOK DOZENS
OF WORKERS TO ASSEMBLE
EVERY PART

IT WILL TAKE YOU
ONE RIDE TO UNDERSTAND

THE SOUL OF CAMPAGNOLO

Campagnolo

PRECISION COMPONENTS CRAFTED WITH CAMPAGNOLO EXPERIENCE FOR LONG-TERM RELIABILITY. THE INTERNAL SHIFTING MECHANISM PIVOTS ON PRECISION BALL BEARINGS FOR SMOOTH MOVEMENT AND OPTIMUM PERFORMANCE.

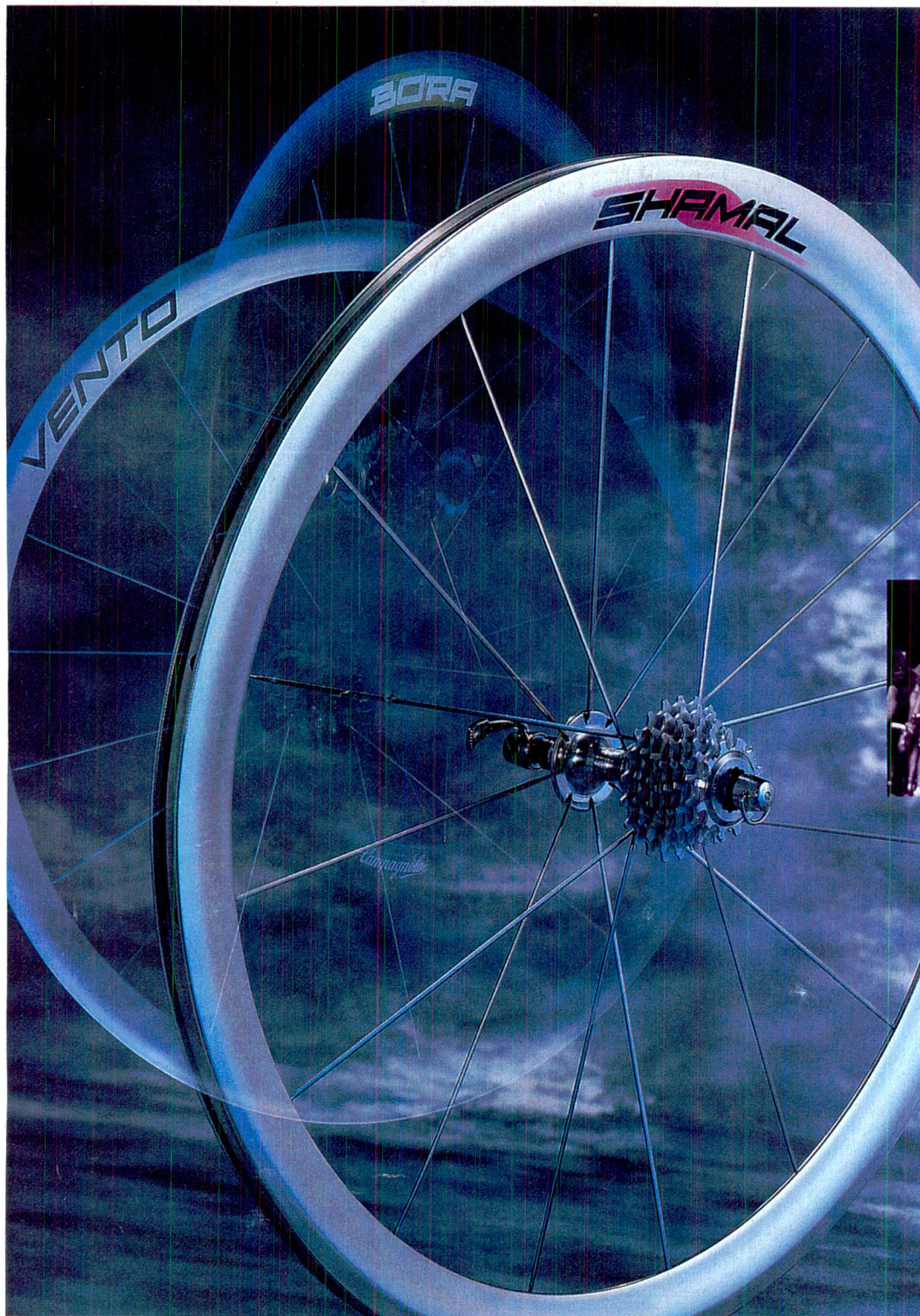
FOR INCREASED SAFETY, THE BRAKE LEVER OPERATES INDEPENDENTLY FROM THE SHIFTING MECHANISM AND HAS AN ADJUSTABLE REACH. THE BRAKE LEVER PROTECTS THE SHIFTING MECHANISM IN ALL RIDING CONDITIONS.

ERGOPOWER LEVERS WILL FUNCTION WITH ALL EIGHT-SPEED CAMPAGNOLO CASSETTE SYSTEMS AND BRAKESETS. THE ERGOPOWER LEVER IS EASILY INSTALLED, EASY TO USE AND THE CABLES ARE SIMPLE TO REPLACE.

Figure 61: The Campagnolo Ergopower Advertisement.



SHAMAL, VENTO & BORA: THE CHOICE TO FLY



SHAMAL: A SYNONYM FOR PERFECTION, LIGHT WEIGHT, AERODYNAMICS AND PERFORMANCE.
VENTO: PERFORMANCE AND TECHNOLOGY FOR THE EVERYDAY CHAMP.
BORA: WHEN LIGHT WEIGHT, PERFORMANCE AND EFFICIENCY ARE TAKEN TO THE EXTREME.

SHAMAL, VENTO AND BORA: THE INSTRUMENTS FOR YOUR FLIGHT TO VICTORY.

NOW IT'S YOUR CHOICE TO IMPROVE YOUR PERFORMANCE: FLY SHAMAL, VENTO AND BORA.

Figure 62: The Deep Section wheel rim Advertisement.



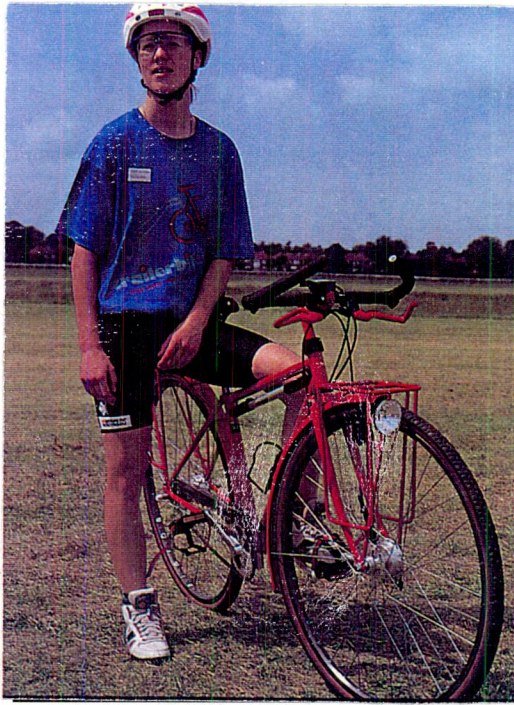


Figure 63: Picture of a touring cyclist on her Shimano equipped bicycle.

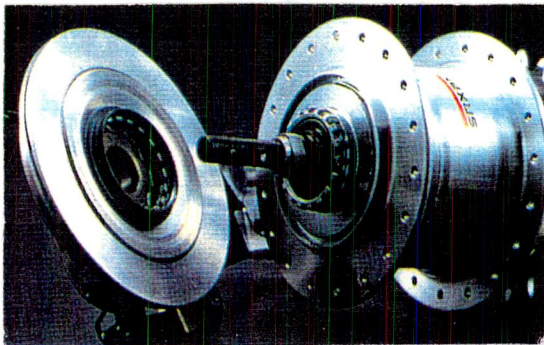


Figure 64: Shimano's Nexus hub.

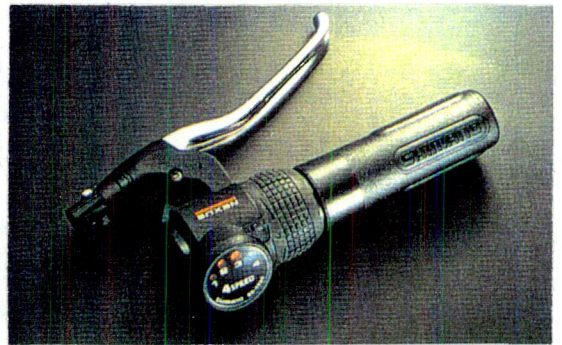
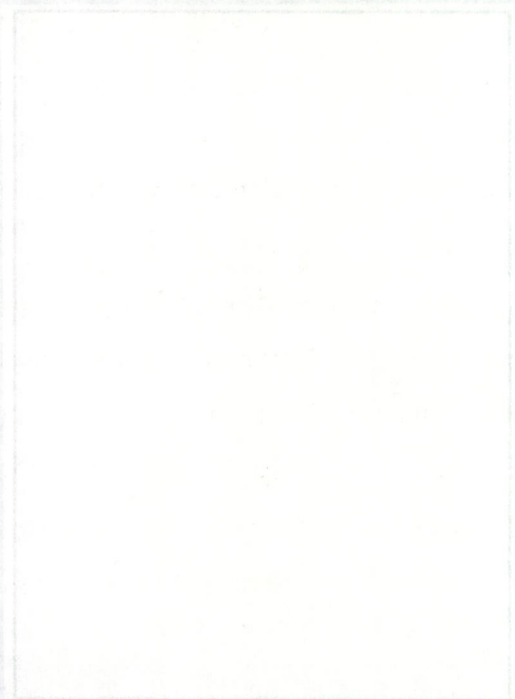


Figure 65: The Nexus gear shifter.



The effect which Shimano has had on the bicycle component industry is clearly evident. Shimano's ingenious mixture of technology and design has revitalized an area of design which was effectively stagnant. Through their use of materials and finishes, they have achieved their own particular aesthetic while also producing products of the highest technical standard. Their design practises have illicit responses from the other cycling firms, who must now produce increasingly innovative components. However the point must be made, just as it has been illustrated by Campagnolo, that total domination and the lack of competition cannot be beneficial. Already the market is showing signs of returning to the European manufacturers, most notably Campagnolo. The comparison of the Italian "Stratos" and the Japanese "RX 100", illustrates the increasing importance of the mass market for bicycle components.

But perhaps, the real winner of this war is the consumer. One wonders, why people pay so much for Dura Ace or Record, when they can buy either RX 100 or Stratos for a fraction of the price. And at nearly twenty five percent cheaper than RX 100, Campagnolo Stratos provides excellent value for money. This is why the Italian firm has managed to reclaim part of its lost market. While it appears that Shimano may have initially had the technical edge, their "useful and agreeable objects" are only now beginning to express the "living, vigorous aspects" (Black, 1983, p.62) which Campagnolo have for so long represented.

Shimano's "Nexus" hub represents the new, even greater market of the leisure bicycle. This component is relatively heavy and does not suggest the high speeds of its older brother: Dura Ace. It is encouraging to see a manufacturer attempting to promote the bicycle to a larger, and increasingly environmentally conscious audience. If Campagnolo are to profit from these market developments, they must either lead, or continue to follow Shimano. But the future of these two companies looks bright; it is a picture of more people using bicycles, whether they are equipped with Japanese or Italian components is unclear. Only time will tell.

Appendix A

Appendix A: Glossary of Terms:

Adjustment Screws: These screws, when turned, control the horizontal movement of the derailleur.

Barrel Adjustors: The tension of the derailleur can be fine tuned, by turning the adjustor nut.

Bottom Bracket: The central axle of the bicycle, around which the pedals rotate.

Brake Calliper: The pivoted arms of the brake which clamp the wheel.

Cassette (Freewheel): The cluster of sprockets at the hub of the back wheel.

Chainset: This is the component made up of the crank-arms and the chain rings.

Headset: The component fitted with ball bearings, which allows the handlebars to rotate.

Hood: This is the cover for the brake lever, usually made from rubber.

Quick Release: This is the mechanism which holds the wheel on. It consists of a normal axle with a lever. When turned, the lever releases the grip on the forks of the bicycle and the wheel is free to remove.

Rear Derailleur: The component responsible for changing gears. It operates on the principle of the parallelogram; a wire attached to the gear lever controls the horizontal position of the derailleur.

Swingarm: The part of the derailleur through which the chain passes. It is spring-loaded to account for the change in the position of the chain.

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