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THE HISTORY AND DEVELOPMENT OF THE MICROWAVE OVEN:
AN ANALYSIS OF FUNCTION AND DESIGN.

BY

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Contents.

Introduction.

Chapter 1: A Brief History of Domestic Cookers and the Development of the First Domestic Microwave Oven in the 1960s.

Chapter 2: The 1970s, Booming Commercial Sales and Initial Health Scares.

Chapter 3: From Novelty to Necessity-Penetration of the Microwave Oven into the European Domestic Market, 1980 to 1983.

Chapter 4: Consumer Reaction and Further Development of the Microwave Oven, 1983-1985.

Chapter 5: The Slump in Microwave Oven Retail Sales, 1989 to 1990.

Chapter 6: The Revised Approach by Manufacturers and Food Producers Through Design and Advertising and the Emphasis on Power Output Standardisation by the British Government in the 1990s.

Chapter 7; Future Directions for the Microwave Oven.

Conclusion.

LIST OF ILLUSTRATIONS.

1. 18th century open hearth fire.
2. 19th century enclosed cooking range.
3. 'Radarange' microwave oven by Amana.
4. Belling 'Modernette' electric cooker, 1919.
5. 'Baby Belling', 1929.
6. Compact electric oven by Belling, 1965.
7. Advertisement for 'Radarange' microwave oven, 1968.
8. Front cover of The Book of Microwave Cookery. by Sonia Allison.
9. Inside cover of The Book of Microwave Cookery. by Sonia Allison
10. Turntable on oven base.
11. Wave stirrer.
12. Rotating antennae.
13. Ceiling heating element.
14. Microwave oven by Sharp, 1984.
15. Microwave oven by Miele, 1989.
16. List of microwave publications by David & Charles.
17. UK sales in microwave ovens.
18. List of microwave ovens which failed to heat food to 70C.
19. Adverse publicity.
20. Brother Hi-speed cooker, 1988.
21. Brother Hi-speed cooker, 1990.
22. Hitachi Microgrill designed by Barry Weaver.
23. Hitachi Program 1300 washing machine.
24. Hitachi microwave oven range.
25. Advertisement for Creda Circulaire conventional oven.
26. Hotpoint conventional oven with roast chicken.
27. Hotpoint combination microwave oven showing roast chicken.
28. Variety of microwave food available from Marks & Spencers.
29. Example of packaging showing microwave instructions.
30. Polyester microwave tray.
31. SBS card for packing.
32. 'Home Range' microwave products.
33. New label for microwave oven.
34. Relationship between heat ratings and power outputs.
35. Label for new food packs.

Introduction.

Invention for invention sake is not enough for market integration. An innovative concept may attract manufacturers and consumers alike but in order for it to be mass produced and termed a product it must be justified as an improvement or a satisfactory alternative to what has gone before. Survival in the market place is subject to the influences of demographics, economics, competition, and the constant variable of changing fashions. While its success relies upon the tools of marketing, advertising and the rate of technological progress. The development of the microwave oven has included all of these factors.

The aim of this thesis is to define the hitherto unknown history of the microwave oven whose growing popularity has been likened to that of the colour television. Its development however raises the following questions. Why were they unpopular when first introduced to the domestic kitchen in the 1960s? Why have they never lost their rectangular appearance? When did people start becoming afraid of them? and how has the microwave oven managed to survive public prejudice and adverse publicity over the last two decades?

Its erratic development has been difficult to attain ^{for} as unlike other domestic products which have had a longer period of development and integration into the household, little has been written about the historical evolution of the microwave oven as it only really began in the 1960s. Many of the facts regarding its early development have been acquired from discussion with microwave oven experts. However subsequent development during the 1970s and the 1980s have been detailed by newspapers, the clippings from which have given an indication of consumer reaction and specific problems for this period of development. Selected reports compiled by marketing institutions have provided appropriate statistics for the aforementioned. And finally the research and analysis carried out by consumer journals ^{such as} i.e. Which? and Consumer Choice have been vital for charting the gradual introduction of new technology and features over the past decade influencing microwave oven design and

utility. The following is a summary of these key elements:

Chapter 1 includes a brief account of the development of the first cooking stoves and highlights the increase in emphasis on convenience through design resulting in the creation of the first truly time saving product during the 1950s and 1960s. Also explained are the fundamental factors which influenced the design of the microwave oven.

Chapter 2 explores the development in microwave oven manufacture during the 1970s for commercial use which laid the basis for domestic penetration and explains why housewives were reticent in using them because of radiation fears and limited utility.

Chapter 3 explains the reasons for microwave oven popularity in the 1980s due mainly to economic and demographic factors.

Chapter 4 describes the technical developments that were necessary to overcome the initial problems that consumers were experiencing regarding cooking in the earlier part of the 1980s.

Chapter 5 explains the reasons for the sudden slump in sales that occurred in 1989 including the failure to educate people on *the* correct use microwave technology and the adverse publicity received through official investigation into microwave oven safety.

Chapter 6 discusses the decisions and the approaches decided upon in 1990 by oven and food manufacturers in an attempt to win back public favour. Revisions were made in design, advertising and the development of appropriate food stuffs.

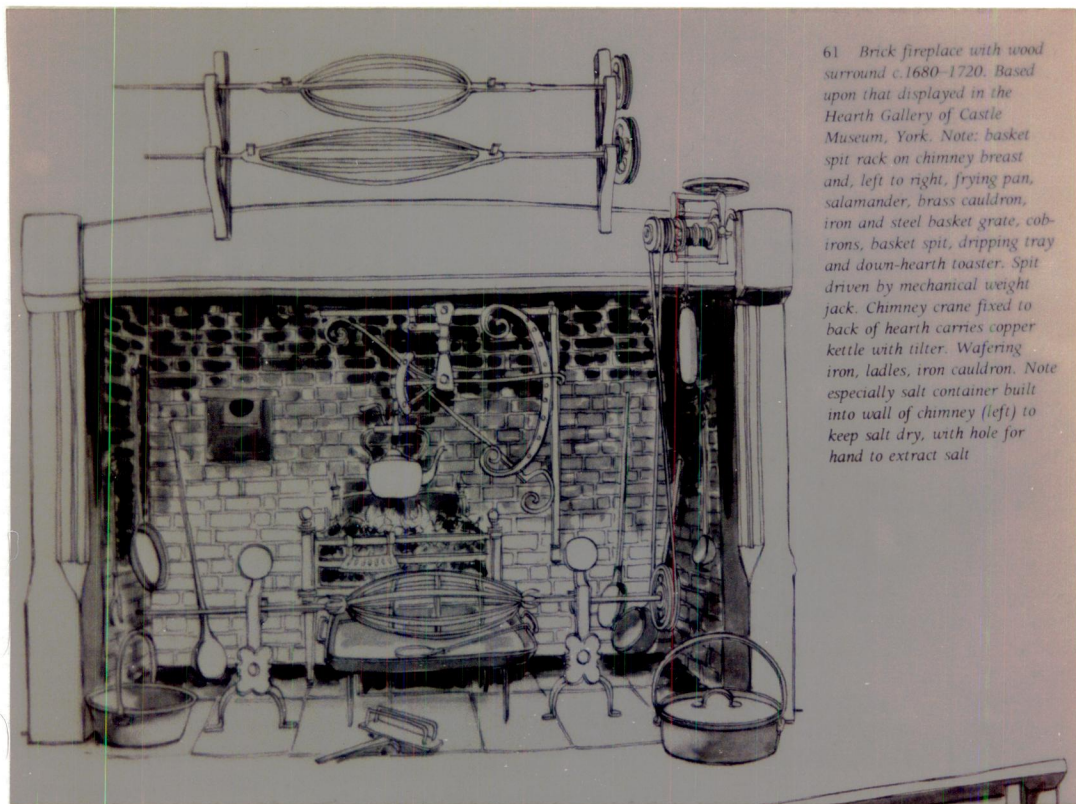
Chapter 7 highlights the future direction of the microwave oven in terms of design and market expansion. Also explained is the latest government supervised labelling system for both ovens and food alike to finally end the inconvenience over incorrect usage.

Chapter 1 A Brief History of Cooking Appliances and the Development of the First Microwave Oven in the 1960s.

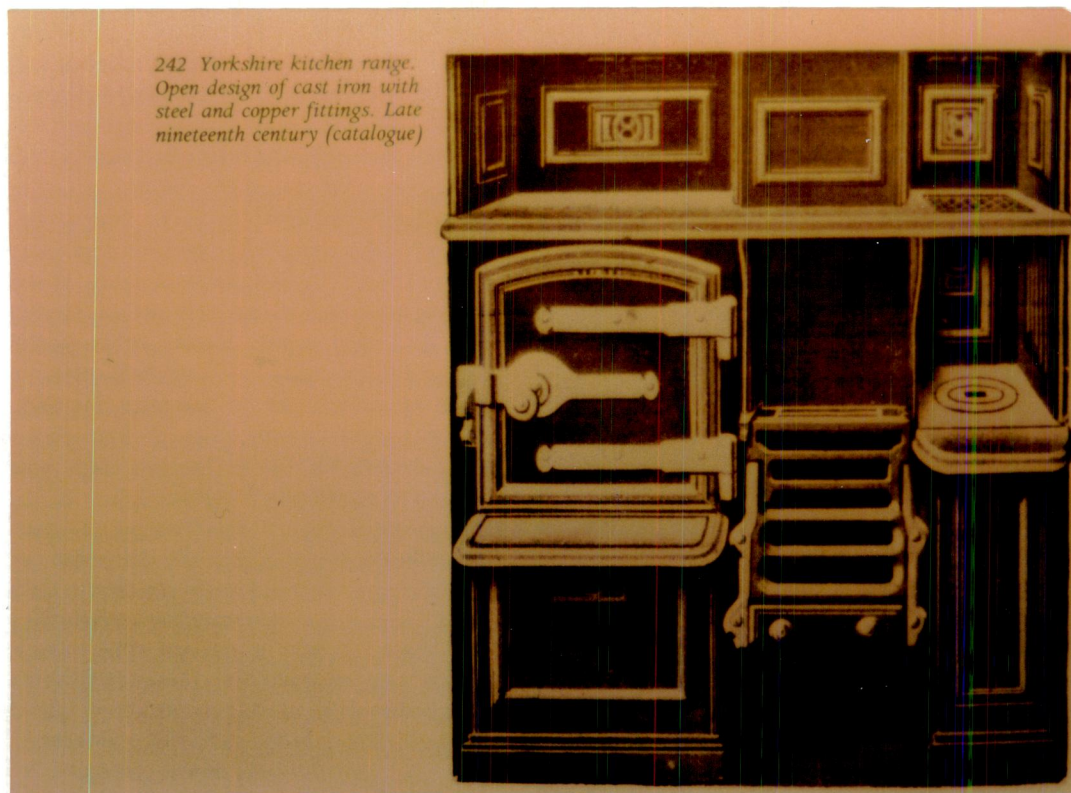
After the second world war the term 'Labour-saving' was used to describe domestic appliances as a method of attracting the thousands of housewives that were demobilised from the factory and office back into the home environment, (5,p.280). However the concept has always been a criterion upon which domestic aids have evolved from as far back as the first fire ranges to modern day cookers. The belief being that if products were produced with an emphasis on efficiency, economy and convenience the result would be the reduction of time, money or space for the consumer.

In Britain during the eighteenth century it was found that if open fires were partially enclosed the draught that was created was better for burning coal. By the nineteenth century the enclosed kitchen range had replaced the open fire. It was understood that the enclosure of fire would be more economical in the conservation of fuel as well as giving better heat control and making it possible to provide an oven and a boiler for hot water, (13, p.21) The enclosed oven, particularly for baking bread made the spit and hanging cooking-pot redundant, (illus. 1 & 2).

With any innovation i.e the break away from convention there is always scepticism. The gas cooker eventually replaced the fire range but was quite slow to do so. Its integration from commercial hotel use to the domestic kitchen was inhibited by consumer prejudice regarding safety and maintenance. A number of accidents had occurred due to the misuse of gas and faulty equipment. The problem had been a lack of education coupled with the phlegmatic rate of technological progress that resulted in the premature introduction to the market of experimental equipment. A second drawback was that the gas cookers were still taking as long to maintain as the coal burning ranges did even though they offered a cleaner method of cooking. It had never occurred to designers that a new technology required an equally revolutionary application of materials but the fact was that the first models were being made from cast iron like the ranges and not the cleaner vitreous enamel



(Illustration 1).



(Illustration 2).

that was to be adopted after the second world war. The importance of convenient cleaning and the saving of time was a major concern for many married women who found themselves having to do housework because of the reduction in servants after the first and second world wars, (5, p.102).

A late developer in its adaptation for cooking, electricity was the last installation of domestic energy prior to that of microwave power. The advantage of using electricity was that it was a cleaner form of cooking due to the lack of gas dirt making burners. However it was this very quality that made people initially distrust electricity and later microwave energy because it wasn't a visible source of energy.

The application of microwave energy for cooking was a development carried out by an American company called Raytheon. Involved in the manufacture of radar transmitter tubes to detect enemy planes during World War II, one of their inventors named Percy L. Spencer, noted that a chocolate bar melted in his pocket while he was testing a radar tube. He then cut a hole in a kettle, inserted an radar tube and by 1949 Raytheon had patented its "Radarange" microwave oven. Designed for restaurants, the early 1953 models were oversized, cost about 3000 dollars and turned out bilious grey meat and limp french fries, (8, p.163). They were gimmicks for about a decade, remaining alien to many consumers.

It was discovered that the very short radio waves (microwaves) produced from the transmitter tube/magnetron created heat on a substance when bombarded from all around with the aid of fans for deflection. The kinetic energy of wave bombardment on a food agitated the water molecules which in turn caused a friction thus producing heat which cooked the food substance. The main advantage was that the heat created was produced in a third of the time capability of either gas or electricity.

In 1961, Raytheon purchased a one-third interest in a company called 'New Japan Radio' and by 1964 a Japanese scientist called Keishi Ogura had developed an improved magnetron. This development

made it possible for Amana Refrigeration, an Iowa concern acquired by Raytheon in 1965, to make a practical, compact microwave oven, (illus.3), that was introduced in 1967 at an affordable 495 dollars.

The appearance of the microwave oven like any other product was based on form, image and aesthetics. The latter were a paralleled response to the development in technology which enabled new features to be incorporated into the oven. These not only increased its versatility but influenced the look of the facia panel the effect of which shall be discussed in Chapters 4 & 6.

The form of the oven was based upon the ease of manufacture and took its proportions and layout from the first electrical compact ovens. In general microwave ovens are rectangular in shape, have a control panel on the right hand side, a glass door which in 95% of ovens past and present opens from right to left. The comparison between microwave ovens and televisions is purely coincidental and other than looking similar because of the orientation of the screen in relation to the controls has no known significance.

The orientation of the control panel and door can be seen from the first compact electric ovens which in turn had been influenced by gas cookers consisting of switches on the right hand side of the oven door. No great theory has to be established as to this layout other than the fact that most people were right-handed and this was the most practical design. We can see this from the Belling 'Modernette' electric cooker built in 1919 and from the 'Baby Belling' built in 1929 which has fewer controls, (illus.4 & 5). *the origin of*

The doors on the first microwave ovens as can be seen from the 'Radarange' by Amana, (see illus.3). were drop down in design. This was directly influenced by the commercial conventional ovens which had this orientation. However for domestic use it was found to be quite hazardous. The doors could drop down quite severely if accidentally opened and not held, hitting a child that maybe



(Illustration 3).



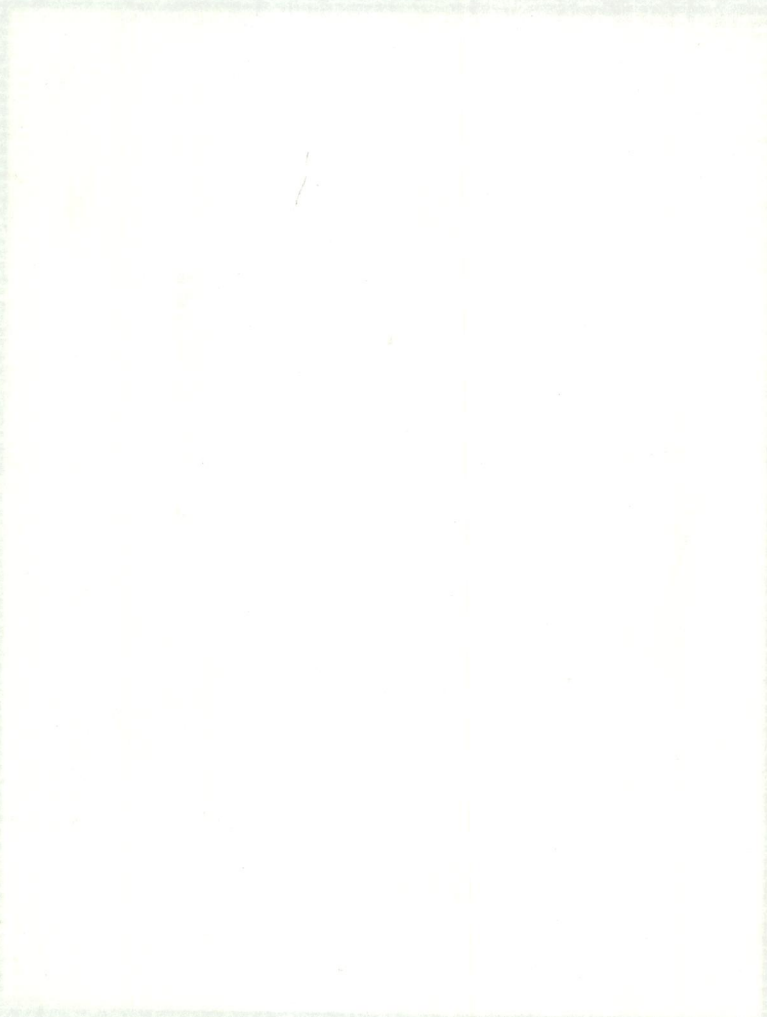
273 'Modernette' Belling electric cooker, 1919. Made of light steel. Hot plate has three heaters and a grill, all with three heat settings. Coiled wire elements exposed. Plate warmer at side. Science Museum, London

(Illustration 4).





(Illustration 5).



standing underneath. Children also could hang from the door which put them in danger of pouring piping hot food over themselves that maybe resting on the door when opened down, (38). Eventually microwave ovens adopted the vertical hinge design which allowed the door to swing from side to side as it is to day. This was certainly more akin to the style of the updated compact ovens exemplified by the Belling model of 1965, (illus.6).

The reason for the glass window door was more indigenous to the method of cooking then as an emulation of conventional oven design. People found microwave technology hard to grasp because firstly as already stated you couldn't see the energy but unlike electricity the microwave unit itself never got hot even though it could heat substances inside it to boiling point. Timers and power ratings were erratic so it was necessary to keep an eye on food to stop it over cooking, (40).

As already stated, the format of the oven was also the result of ease of manufacture in terms of form following function. The magnetron which produces the microwaves is situated behind the controls. The position of the magnetron at the side of the oven cavity is important. The waves that are produced come from the top right hand corner nearest to you and are dispersed around the food as evenly as possible by fans housed on either side of the cavity. To move the controls to the bottom or top would therefore require the magnetron to be positioned in the corresponding areas. Waves from a magnetron in the roof would produce an uneven amount of waves going straight down to the food below on the top surface before reaching the rest of the food substance causing burning while other areas would remain half-cooked if at all. To combat this more fans would be needed resulting in a bigger and costlier oven with a higher risk of uneven cooking, (38), the significance of which we shall be discussing in chapter 5. In fact microwave ovens were manufactured with the controls running across the top of the oven with the magnetron on the roof but were discontinued for these reasons, (illus.3).

If it had been the familiarity of design alone that the



(Illustration 6).



microwave oven needed it would have been an immediate success. But the fact remains that they didn't start getting domestically popular until the latter half of the 1970s and not until a decade later that they were first considered a standard appliance within the home. The technology had yet to be developed so that consumers could achieve conventional cooking results by microwave cooking.

Their expectations in doing so were the responsibility of the advertisements like the one devised by Amana for its Radarange. (illus.7). From the illustration we can see that all the dishes shown were traditional meals; roast beef, bacon, apple-pie etc. However they all required browning or crisping which the microwave oven was incapable of doing at that time. The only information connecting the oven and these meals was their short cooking time. Nothing about preparation was explained or that fact that the different elements would require separate cooking.

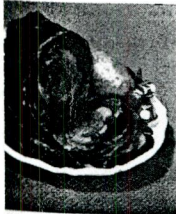
It is ironic in the way the oven's capability in reheating substances was included as an after thought and a secondary utility to cooking, (9, p.163). Yet this was the very characteristic that made it popular for the first time, within the commercial and later the domestic environments which shall now be discussed in Chapter 2.

Radarange MADE BY **Amana** INTRODUCES
MICROWAVE OVEN

Fast Electronic Cooking

a new exciting way to prepare meals for your family!

For an EVENING MEAL



5 lb. roast
well done 37½ min.

Baked potato 4 min.

Frozen
corn 5 min.

Pineapple
upside down
cake 7½ min.

For a HOT LUNCH



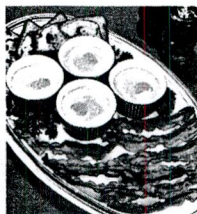
Hamburger
in a bun 60 sec.

Baked beans 6¼ min.

Hot dog
in a bun 60 sec.

Baked
apple 2 min.

For a LATE sleeper BREAKFAST



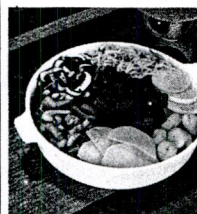
Crisp
bacon 4 min.

Baked
eggs 90 sec.

Hot
cereal 1¼ min.

Hot
chocolate 1½ min.

Fast GOURMET tricks & TREATS



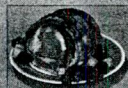
Lobster
tail 2½ min.

Beef
Stroganoff 8 min.

Sukiyaki 4 min.

Veal
Scallopini 15 min.

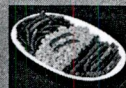
**SOMETHING
NEW!** Freshen
leftovers to almost
original goodness!



A leftover roast is
freshened in minutes
with a "just cooked"
taste and eye-appeal.



Just like fresh cooked
when a casserole is re-
heated in the Radar-
range. And, it is so
delicious.



Garden fresh taste!
Leftover vegetables
take on a sparkling
look when freshened
in the Radar-range.

So delightful your
family will never know

It takes minutes, even
seconds, to freshen leftover
foods. And, they taste and
look almost like the first
time you served it.

(Illustration 7).



Chapter 2: The 1970s- Booming Commercial Sales and Initial Health Scares

This chapter deals with the popularity of the microwave oven for the commercial market which was the impetus for domestic penetration. Also discussed are the first public scares about microwave technology regarding radiation within the home.

The speed with which the microwave could reheat and defrost food was a welcome characteristic of the cooker and was particularly appropriate in the time-pressured environments of commercial catering. It was exploited by fast-food emporiums, restaurants, airlines, trains, hotels and even hospitals, (4, p.75)

The idea was to pre-cook food or purchase ready-made meals, store them and simply reheat them as required. For transport by plane or train, where space was restricted it meant that for long journeys where the provision of a meal was necessary, no cooking appliance was needed except a microwave oven. They were small, compact and fast. For restaurants they were ideal for reheating food that had to be served at various times throughout the evening. This was also the reason for their popularity by hospital and hotel staff who worked through the night when kitchens were closed. It was this ability to cater for the irregularity in eating habits that would become an important asset of utility for the domestic market.

George Foerster the President of Litton Industries, a main runner in the field of domestic appliance manufacture, felt that because microwave ovens were becoming so popular commercially he predicted that there would be one microwave oven for every two homes by 1985. Amana, the industry leader (see Chapter 1), claimed that it could have sold 30% more models if they were only available. Mr. Foerster stated : 'We can't come close to making enough of them.', (20, p.10). Ironically while sales were going up for microwave ovens conventional units were experiencing a decline. Litton Industries alone had invested 8.3 million dollars for advertising in 1974, reflected by volume sales expanding from 40,000 units in 1970 to 1.6 million units by 1976. In the U.K. although figures were considerably lower a definite breakthrough in

the market was under way. Between 1976 and 1977 volume sales doubled from 10,000 units to 20,000 units. In fact the popularity of microwave ovens was being compared to the boom in colour televisions during the 1960s, (20, p.10).

Taking America as an example the emphasis switched from the microwave oven being a necessity in the service area to being an attractive accessory for the domestic market aimed directly at the housewife. This had been attempted in the 1960s but had failed due to the inability to cook food to an acceptable standard. Manufacturers claimed that as a result of newly introduced temperature controls and browning devices a broader range of nutritious, piping-hot meals could be produced. During the mid seventies American commercials were full of 'happy' housewives playing an extra set of tennis and working wives cooking lavish meals, (20, p.10). What was turning the home into such a paradise was the microwave oven or so the advertisement would have us believe. As the microwave was not a cheap item it was important to stress the advantages of ownership in terms of prestige and speed.

Marketing people by the creation of the above image hoped to get across that to use a microwave oven was to be an investment in the families welfare. While also stressing the status of having the most up to date technology vital for the running of a solid home. This type of marketing campaign was employed to reassure the consumer that using a time-saving, convenient oven was in no way undermining the traditional role and domestic responsibility of a housewife. Being a luxury item manufacturers claimed that their ovens used up to 75% less energy because of the speed than the conventional type and were therefore a long-term economical saving. This was misleading because for any significant saving to be made microwave ovens would have to be used exclusively. Because most people used their microwave ovens as reheaters and defrosters, conventional ovens still had to be used for meal making with no improvement in saving energy.

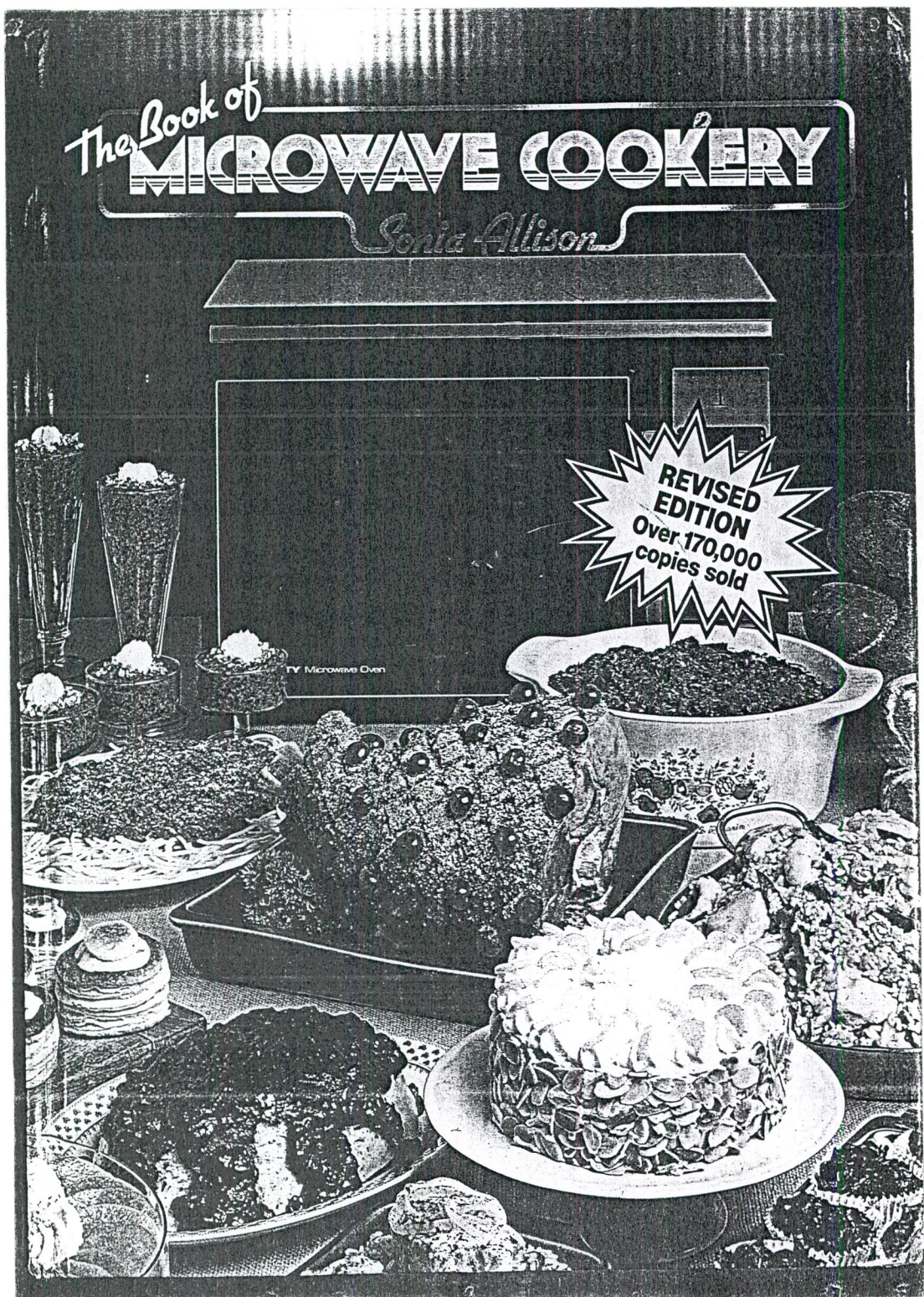
In 1977 Toshiba spent £74,000, on the advertising of a microwave oven. Branded the 'Unfreezer' it was targeted at the

British
English market, (22, p.10). The emphasis was on its defrosting capabilities rather than as an oven. It was clear from American consumer reaction, that the microwave oven was not popular for cooking, so it was thought more prudent to subtly introduce the product into a more traditional market by making genuine claims.

Generally people were not satisfied with the results of any microwave oven because they produced anaemic looking food that was soggy and generally unappetising. The fact ~~was~~ that trying to cook traditional food in an untraditional manner was not having the effect that manufacturers had hoped. The publication of microwave cookery books attempted to promote the oven beyond its accepted role as a 'warming box'. Sonia Allison, the cooking editor of Ideal Homes magazine, wrote her first book in 1978, entitled The Book of Microwave Cookery. The book contained over a hundred recipes and was obviously well researched into using a microwave to its absolute limit despite the lack of features that have since evolved. Whether the recipes were satisfactory is not quite as relevant, for the scope of this thesis, as the marketing platform from which the image of status and versatility were blatantly conveyed through ownership. The front cover showed a microwave oven lavishly adorned with mouth watering examples of culinary artistry, (illus.8). The variety of dinners and deserts showed how versatile the microwave could be. The size of the dishes was obviously geared at family and group catering highlighting that something so compact could produce so much, (1, p.1).

Rich eating by association tends to give the impression of rich living, which in turn infers the ownership of expensive material goods. In illustration 9, a microwave oven practically suffocated by a mound of fish, lobster and crab. The aim of this was a double target attraction. For consumers who were accustomed to eating food of this calibre, the use of a microwave oven served to fortify the status of their eating habits. Conversely, because of class emulation, owning a microwave oven offered a new sophistication at meal times.

The careful presentation that has just been examined is a

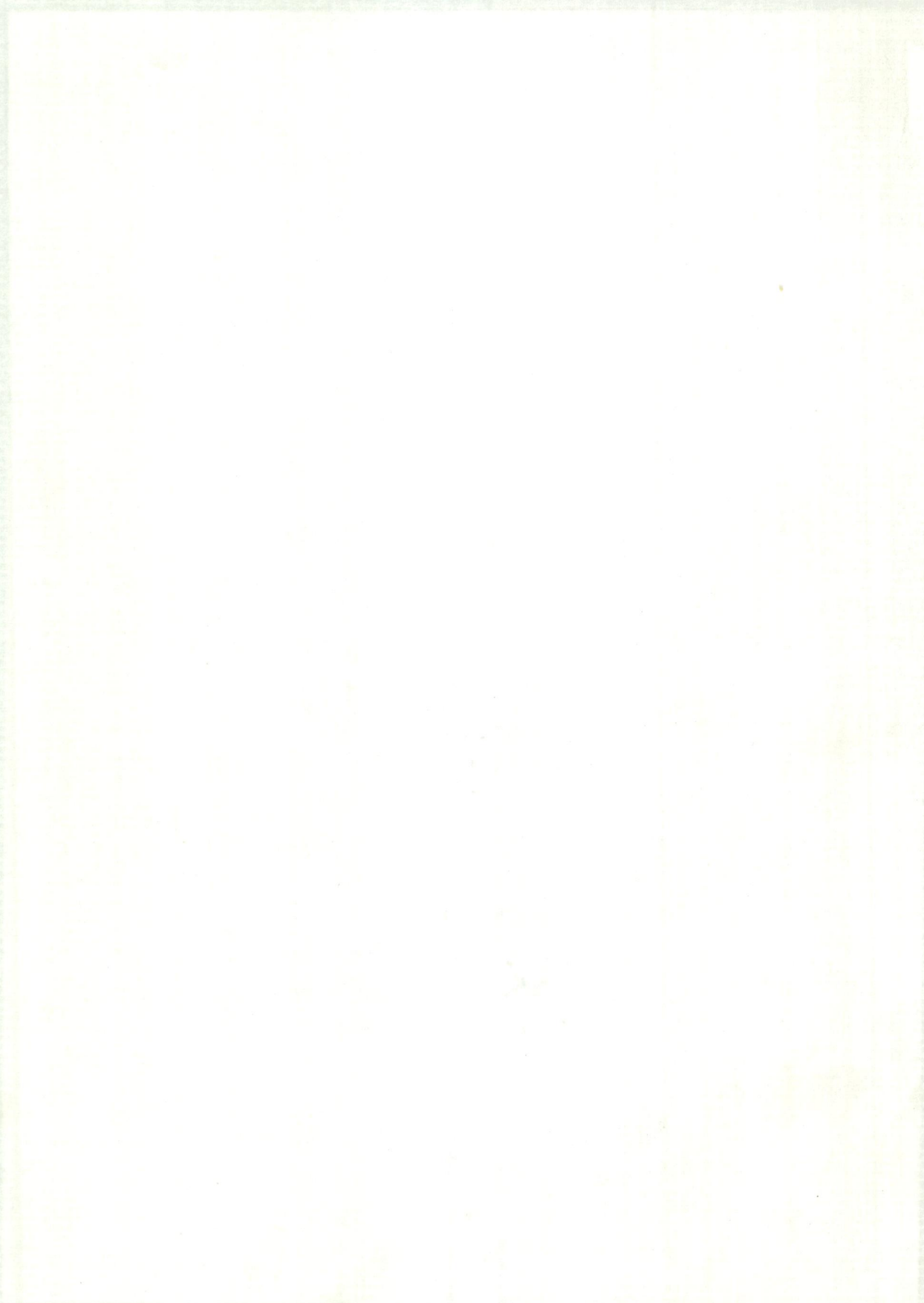


(Illustration 8).





(Illustration 9).



perfect example of indepth marketing that originated in America during the fifties. The purpose of which was to play on consumers sociopschycological fears rather than their practical needs, (11, p.57). In other words, whether people wished to cook in this way was irrelevant to the social implications of microwave oven ownership. What is very important to note is that neither imagery suggests the ovens' most popular function as a reheater and defroster. In negating these aspects it satisfied the needs of the manufacturers in dispelling the image of a limited heating unit while creating the false need in the consumer for superfluous utility.

In 1984 Sonia Allison wrote a second book called New Complete Microwave Cookery. In her introduction she stated that her first book, published in 1978, was written when 'domestic microwaves were few and far between', (2, p.1). This confirms the importance and necessity of such careful promotion but raises the question as to why so few people had them in the first place, even as defrosters? The answer lay in the bad publicity that microwaves had received in America due to fears of radiation and their relative high cost making them inaccessible to the mass market.

The Consumers' Union in America felt that tests carried out on microwave ovens regarding potential hazards should have been done well in advance of consumer use. The tests that they did revealed that microwaves were escaping through the door seals and elsewhere, (20, p.10). Because at that time there were no guidelines it was impossible to recommend any models as not being potentially hazardous.

Within the following years the U.S. Bureau of Radiological Health (BHR), introduced a set of standards based upon their own research. They confirmed that microwaves were a non-ionising form of radiation which meant that they could not damage cells by interfering with cell division as X-ray or nuclear radiation could. The only effect a microwave could have was thermal, the effect of heat on body tissue, (19, p.9). They specified the emission of one millilitre of leakage per square centimetre before sale and a limit

of five millilitres was permitted after sale, allowing for deterioration during its lifetime. BRH pointed out that because cooking time was so short it limited the time of exposure and the risk of injury. They were confident that microwave technology was safe and stated that no evidence had been found indicating that anyone had been harmed by radiation from a microwave oven.

The Consumers Union however was concerned with leakages because of the body's response in dissipating heat. For example the lense of the eye has no blood circulation to dissipate heat and this is a crucial area of exposure because people go up close to the oven to see what is going on inside. They were not convinced by the findings of the BRH and the wrangle over safety eventually became public knowledge. With the mention of radiation, people became sceptical and anxious. Manufacturers now had to assess their product in terms of safety as well as convenience. Two developments in design helped support their campaigns in reassuring consumers. The first was the inclusion of a cut-off device which basically stopped the production of microwaves if the door was opened while the oven was switched on. And secondly, federal law imposed the implementation of a three stage interlocking sealing on all doors. Even with these precautions people jovially regarded microwave cooking as 'nuking', a term used describing the effect of radiation from nuclear weapons which appeared for the first time in The Daily Telegraph magazine on April 13th 1973.

Even though the stories of radiation were exaggerated the fact remained that even without such bad publicity microwave ovens ~~as stated~~ were expensive. Essentially they were only good for reheating and defrosting food. Their limited function brought into question their validity as another necessary appliance that would take up more kitchen space. Most importantly was that middle class families who had the money to buy microwave ovens did not have any great need for saving time because the majority of women did not go out to work and the rest of the family were coming in at set times. But it was the change in these factors that was partially responsible for the boom of the microwave oven in the 1980s which we shall now discuss in Chapter 3.

Chapter 3: From Novelty to Necessity-Penetration in the European Market of the Microwave Oven, 1980-1983.

Having established the history of the microwave oven we shall now discuss the reasons for its success in the 1980s. Its popularity was the result of the following factors: economics, demographics, the changing role of women and technological development. The last factor shall be treated in chapter 4.

Let us first look at the economic influence on the microwave oven market. Taking Ireland as an example we can see ^{what} ~~how~~ the effect ^{of joining} of the European Community (EC) had ~~an influence~~ on the national economy. Ireland, a predominantly agricultural country joined the EC in 1972 and availed of the Common Agricultural Policy during the late seventies, (6, p.102). Before this, farmers were having difficulty in selling milk in Ireland at a profit. The EC offered to pay for surplus milk that could be used to satisfy European demands. The farmers in turn were paid in the form of grants. With this impetus farmers began to produce milk that was over the expected quotas. The EC could not pay and this resulted in the controversial milk 'lakes' and butter 'mountains' in the early eighties which should have been processed for the Third World but was left to waste. Before the plan backfired, the input and subsequent creation of wealth resulted in a considerable increase in disposable income. This was felt in all other countries who had taken part in similar schemes. The higher rate of spending led to an equivalent increase in wages. General high inflation resulted in an improved standard of living because of competitive pricing.

When people have money, they wish to invest it as well as spend it. Property went up in value and people were buying houses more than ever before while improving their own homes in the hope that it would increase their value. To counter the demand in house ownership more houses were built with the reduction in land available for further development. The result was that houses got smaller but more expensive.

On a commercial level rents became higher so the utility of office and shop space had to be financially lucrative. Microfilm was one answer to this problem as rooms full of records and assorted data could be put on compact roles of film. This left space free for practical use. The effect on households was the increase in fitted kitchens and smaller appliances. For a single household the microwave oven was ideal being small and quick to use. The factor of speed was more attributable to the demographic changes than to the economy.

Lifestyles altered in the eighties because of the rise of young professionals and the changing role of women. First there was the emergence of the 'Yuppies' i.e. Young Upwardly Mobile Professional Persons. Wealth unless inherited was usually associated with middle-age, experience and steady promotion in some sort of profession. In the eighties a new generation of young adults in their twenties were gaining a professional and fiscal stability that had never been seen before. Their work places were typified by the pressure and status found in advertising, marketing, law, medicine and stock exchange brokerage. Young, talented and energetic they were well paid for their high standard of achievement. Because of their high salaries and limited leisure time in which to spend their earnings standards of living were high. Wealth was conveyed by appearance and social behaviour. Office dressing became trendy as did eating habits. Dining out regularly became common place and was practical because there was not enough time to cook and prepare food. The microwave oven for this reason became very popular but it also resulted in a higher demand for higher quality results.

The second reason for increased microwave oven ownership was the changing role of married mothers. Although motherhood and homemaking is the well publicised foreground of domestic bliss the fact remains that through the decades the number of women in the labour force has risen. This can be explained by the increased life expectancy of women and the effective development of birth control. In America between 1975-80 the birth rate sank to an all time low of 1.8% while women in the workplace had reached a record

51.2%, (7, p.214). These statistics also revealed that the majority of younger women from between 22-27 years, continued to work after marriage and having their first children. In 1984 only 11% of American women fitted the 'traditional' description of housewife, i.e. married women not in the labour force, with children under 18. A 1986 survey estimated that there were nearly 52 million working women, an increase of 200% since the end of World War II, (7, p.102).

The chief reasons why women worked were the need of extra income, sustaining living standards and for enjoyment. For certain families one wage was not adequate for rearing a family and as the male was traditionally the bread winner it became accepted that women would work as well if required. Many young couples found that after marriage their standards of living dropped with the loss of one salary so, many women chose to keep working. The element of choice which was a 1980s' phenomenon, never occurred to many women who wished to pursue a career than to become employed solely as a source of income. What emerged from the eighties was a breed of 'Superwomen'. Women who could resourcefully divide their time between husband, home, children and career. The image of the ultimate all round woman was typified by Joan Collins et al in television soap operas like Dallas and Dynasty and best selling novels including Superwoman by Shirley Conran and A Woman of Substance by Barbara Taylor Bradford. Women were represented as being clever and cunning in the work place while domestically adept in the satisfaction of family needs. While seeming glamorous it put pressure on women in their day to day lives to be good at every thing, simultaneously.

Trying to do so much together reduced the time available to carry out any one task satisfactorily. The element of convenience became an essential factor in such circumstances which was exemplified by the push on labour saving devices in particular the microwave oven. ?

Ann Oakley in her book Housewife. asked the question "Who am

I?" to forty mothers half of whom worked the other half who stayed at home. The question had to be asked ten times and below are two examples of how it was answered.

A. Working mothers.

I am Catherine Prince.
I am a woman.
I am a mother.
I am a wife.
I am a socialist.
I am involved with other people.
I am lazy.
I am reasonably contented.
I am unambitious.
I am interested in the world
at large.

B. Non-working mothers.

I am a housewife.
I am going to the shop.
I am a mother.
I am a good housewife.
I am a hard worker.
I am a wife.
I am a good cleaner.
I am a good washer.
I am always working.
I am a mother of four
children.

(10, p.97).

From the answers compiled in column A, it was suggested that housework was instrumental and not a main constituent of daily life and bearing in mind her alternative role as breadwinner it greatly seemed to reduce her time for cooking. As a result it was commonly perceived that employed housewives were more likely to use time-saving products than nonemployed wives. This was not realistic considering the time commitments of nonemployed mothers other daily activities evident in column B. Therefore while circumstances in cooking and time management may have differed the element of convenience was vital to both, (23, p.27 & 28).

Although the general consumer market seemed to need the saving of time that the microwave offered its domestic penetration would depend on it becoming a more attractive proposition regarding utility than had been experienced by users in the seventies. The attempt of technological developments to do this shall now be discussed in Chapter 4.

Chapter 4: Consumer Reaction and Further Development of the Microwave Oven, 1983-1985.

This chapter deals with the types of problems that were experienced by microwave oven users and the attempt by manufacturers through design to solve them.

The following problems became apparent. The technology was basic but its appropriate application was often ambiguous resulting in food that was unevenly cooked. When used correctly the appearance and texture of certain foods was disappointing. Microwave ovens were not cheap and with limited functionality, there was the risk that consumers would tire of them as an expensive novelty. For these reasons product development was vital if manufacturers were to lose the neoteric image of the microwave oven that had evolved over the last two decades. The aim was to standardise their product within the kitchen by making it more attainable and user friendly. The answer lay in the production of ovens that would suit all pockets and needs through the development of functionality and versatility.

Which?, the British consumer magazine carried out a survey of 280 of its subscribers who owned microwave ovens. The report was printed in January of 1983 and concluded that :

Those who had bought ovens as defrosters and reheaters were generally pleased with them and were surprised with their versatility. Those who'd hoped to do more cooking in them tended to be disappointed.

(17, p.408).

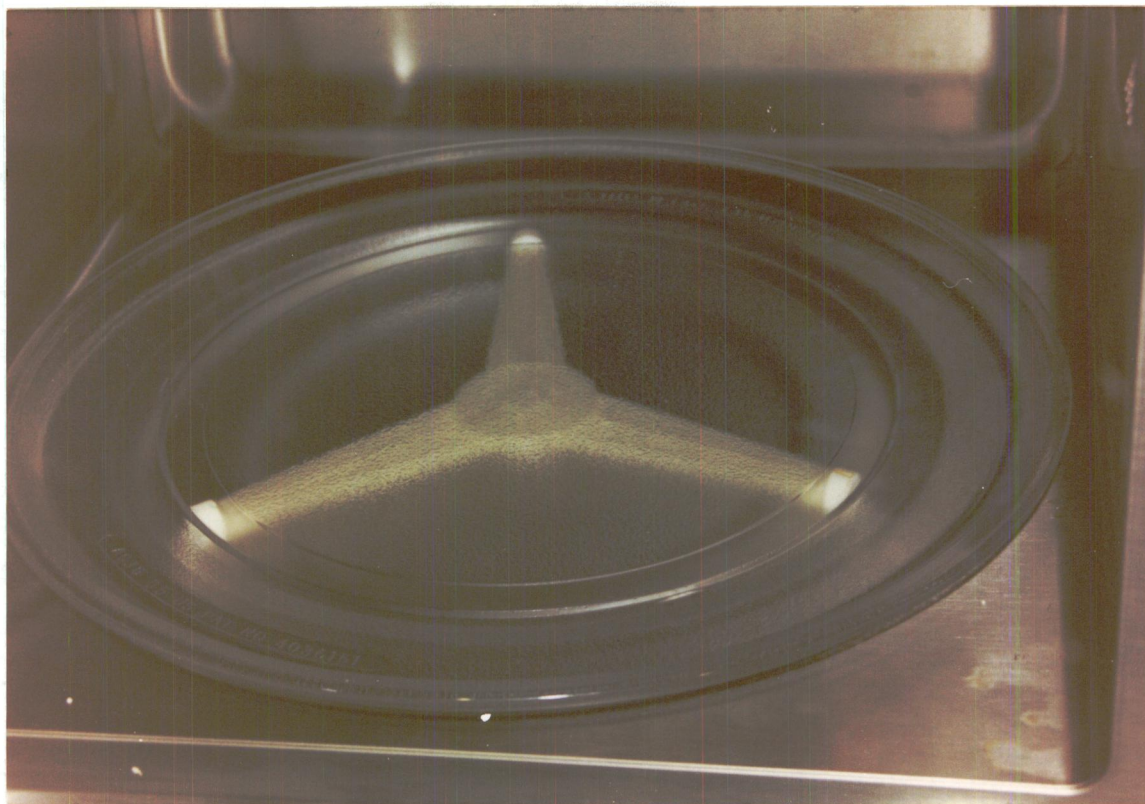
The main advantages undoubtedly were the compensations in time-reduced defrosting. Liquids heated and reheated very well. And providing that ovenware was microwaveable, washing up was reduced because vegetables and casseroles could be cooked and served in the same dish. The disadvantages with using a microwave oven were that some foods were reheated and defrosted unevenly, the importance of which we shall be discussing in the next chapter. The greatest problem was that although the surface of a food might be hot the centre would be cold and at times still frozen. Other

problems lay in not knowing how long to cook food. As a minute in a microwave can be the difference between a heated bread roll and a solidified lump of dough. Getting preferred results was often by trial and error. The same can be said for conventional cooking but because the time scale was so much shorter it was harder to be accurate.

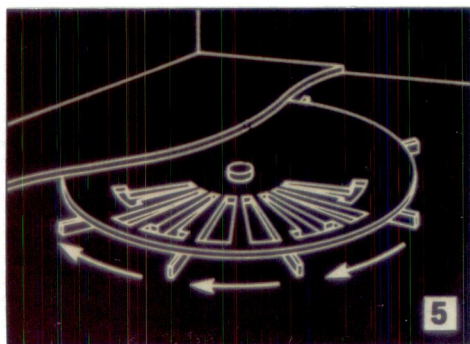
Because the oven didn't heat up when in use it wasn't expected that food receptacles would either. People commonly burnt their fingers when taking something from the microwave because they didn't realise there was a need to wear gloves. Finally, there were many complaints about the anaemic appearance to certain foods, making them rather unappetising. The verb to cook means to prepare something by heat. But people have been conditioned by fire, gas and electricity to actively take part in this process by use of the visual, olfactory and tactile senses. The microwave does not however rely on these fundamental aspects of cooking in the same way which led to the confusion and disappointment of use.

Approximately three years later, Which? magazine in December 1985, carried out a similar survey. It highlighted the new developments by manufacturers in an aim to reduce the above problems, regarding food appearance and cooking times as well as attracting new custom, (16, p.544). Clarity of use was not a priority.

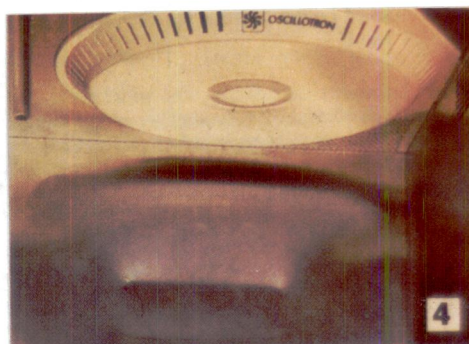
It was discovered that even distribution of microwaves from the magnetron resulted in even cooking, reheating and defrosting. Fans that were positioned in the side wall of the oven cavity were standard elements of microwave oven design since their initial development. However their ability to evenly deflect microwaves over a surface for even penetration was not satisfactory. In order for food to be cooked properly it would be necessary to stir or turn the food during cooking which was akin to the inconvenience of conventional cooking. Three aids were designed in an attempt to solve this problem. The first was the turntable, (illus.10) which was a flat circular plate positioned on the oven floor. When the microwave was turned on the table rotated thus exposing more of the



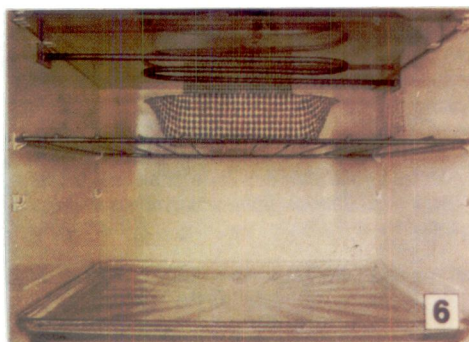
(Illustration 10).



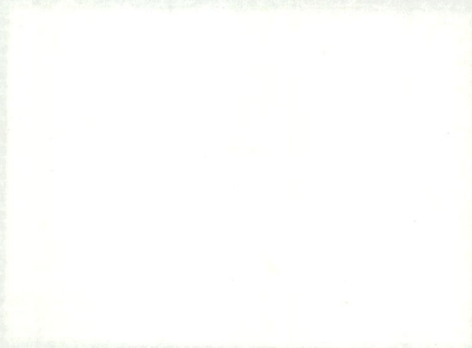
(Illustration 11).



(Illustration 12).



(Illustration 13).



food surface to the cooking waves than if stationary. A similar principle to the way a rotisserie is used in a conventional oven.

The second feature was known as a wave stirrer, (illus.11). This was a set of blades (a fan), positioned on the roof of the cooking cavity which turned slowly when the appliance was switched on. Again it was to help deflect the microwaves evenly around the foodstuff. The third development, was the rotating antennae, (illus.12). which was identical to the above in principle but was situated in the floor of the oven.

Neither feature was particularly effective. As the turntable worked well with the standard fans already mentioned the latter devices became redundant. They were classic examples of marketing design. While theoretically sound, there was no proof that they were in fact an improvement. First time buyers could only rely on the claims that manufacturers were making, highlighting the one important role of marketing which was to allay fear and scepticism by myth and conjecture as demonstrated by the Radrange advertisement of 1968.

A further development that was introduced was a heating element in the ceiling of the oven, (illus.13). Its function was to improve the appearance of the food. Food didn't brown or crisp when microwaved because there was no external heat to absorb moisture. The principle was to cook food mostly by microwave energy and to complete the task by using the heating element, essentially a grill, to brown the food. It generally browned well but as the majority of people tended to use their microwave as a defroster and reheater it was rendered an added extra rather than as a standard design component. A further development was made in this area by the discovery of what became known as susceptor material. A type of ceramic, it could absorb microwaves and heat up to approximately 190C providing enough external heat with which to dry out food to make it brown or crisp, (25, p.9). Although unsuccessful when first applied as a thin coating to packing cartons it was later successfully incorporated onto the turntable. As the capacity of the microwave oven is considerably less than

that of a conventional oven the surface area was increased by the incorporation of a shelf. However cooking times had to be lengthened due to the increase in quantity.

However the attention that was paid ^{to} ~~in~~ improving the quality of cooking was inversely proportionate to the consideration of consumer education regarding utility. This was evident in what became known as electronic wizardry, (28, p.544). These were a group of features that were designed to take the guess work out of cooking times. An electronic memory had the capability of storing instructions to cook a dish at a certain power for a given time. It meant that for chosen food products you could put them in the microwave, switch it on and the oven would do the rest. Autocook was similar. In this instance all that was required was the weight and food type to be programmed in. The microwave oven then scanned the food and cooked it as was necessary. Finally automatic cooking was designed to cook a food automatically at a preset time. (16, p.546). It was trying to cater for people who wanted to have something to eat the minute they came home. Because microwaving is so quick anyway unless people are incredibly lazy it could not really be justified unless cooking something like a turkey which was not common. In fact it was more time consuming to programme the oven than wait a couple of minutes in cooking on the spot.

The incorporation of these features revolutionised the appearance of the microwave control panel. Buttons were flush to the surface and the introduction of L.E.D. (light emitting diode) displays made the oven look trendy, high-tech and sophisticated embodying the aspirations of the 'yuppy' sector of the market. Although the features were on higher priced models the use of touch buttons and light emitting screens were adopted for less functional microwave ovens, making them more attractive. Up until this, dials and switches had dominated the microwave oven facia, (illus.14). The facia panel also altered due to the introduction of graphics and general time settings in the hope of lessening the ambiguity of correct cooking times, (illus.15). What is also evident is the redundancy of the handle on the door replaced by a push button control on the control panel. It was found that the handle



(Illustration 14).



(Illustration 15).



suggested to young children a cabinet in which to hide things which could damage the oven if accidentally switched on. The concealed opening mechanism was less conspicuous.

Microwave oven size was very important in expanding the market. It was discovered that one size of oven was not ideal for all users. As a result the compact oven became popular for single households as standard sized models were directed at the family market.

As mentioned in Chapter 1 the layout of the microwave oven was partially influenced by gas and electric cookers. The same can be said for the aforementioned features. In away their innovation was based upon a reverse psychology. In order for the microwave ovens to be accepted it had to emulate as best it could the function of conventional ovens. The irony being that it simultaneously had to negate it because of its slow nature. In this way it wisely blunted the edge of a technological progression into the highly conditioned and traditional environment of the domestic kitchen. It reduced the obstacle of inhibition. The problem for manufacturers was always going to be the marriage of this new technology with convention. To develop microwave energy as a sole entity would result in its isolation and eventual alienation from normal kitchen practice. In a market that was seeking the path of integration and order, compromise was more profitable.

This was typified by the introduction of the combination oven. This offered microwave energy separately or simultaneously with convection heat as used in a conventional oven. The idea was that it would be a perfect marriage between the latest and traditional in cooking technology. However the introduction of a multi-functional product, with sometimes three different heat sources, if including a grill only served to augment the frustration experienced by the complexity of use. They were expensive and not commonly bought. Concentration on sales growth only became evident after 1988.

The publication of microwave cookbooks like Sonia Allison's New Complete Microwave Cookery which we referred to in Chapter 2 was part of a new fashion by authors and publishers alike to try and profit from the sudden boom in microwave ovens sales. An example can be seen from the microwave booklist (illus.16), by the publishing company David & Charles, (2, p.310) who were intent on churning out as many different types of microwave cookery books as there were ways of eating.

Theoretically with multi-functional products and the claims of versatility from the above publications there should have been no reason for the sudden slump in sales that occurred in 1989 which shall now be discussed in Chapter 5.

Microwave cookbooks
from David & Charles

THE COMBINATION OVEN COOKBOOK

Val Collins & Rosemary Moon

At last – a book for the oven which contains
the best of both worlds in one cooker

**THE BEGINNER'S GUIDE TO
MICROWAVE COOKERY**

Val Collins

Over 150,000 beginners have already
used this book

**THE COMPLETE MICROWAVE
COOKBOOK**

Val Collins

The most luxurious and desirable book for
microwave cooks yet published

MICROWAVE BAKING

Val Collins

Cakes and breads, savouries and scones,
pizzas and puddings

**THE MICROWAVE FRUIT &
VEGETABLE COOKBOOK**

Val Collins

The easy way to natural flavours and
nutrition

THE MICROWAVE FISH COOKBOOK

Val Collins

Simply a superior flavour and texture

**THE MICROWAVE WHOLEFOOD
COOKBOOK**

Val Collins

Wholefoods and the microwave – a perfect
partnership for healthy eating

**MICROWAVE COOKERY
CORDON BLEU STYLE**

Val Collins

Harness your microwave's speed and
convenience for dishes of the highest
standard

MICROWAVE/FOOD PROCESSOR

**Text by Sue Spitler · Edited by
Margaret Weale**

The twice-as-fast cookbook

**THE SLIMMER'S MICROWAVE
COOKBOOK**

Margaret Weale

The practical way to control your waistline
and enjoy good food

THE BOOK OF MICROWAVE COOKERY
Sonia Allison

A handsomely produced basic cookbook
with helpful tips

(Illustration 16).

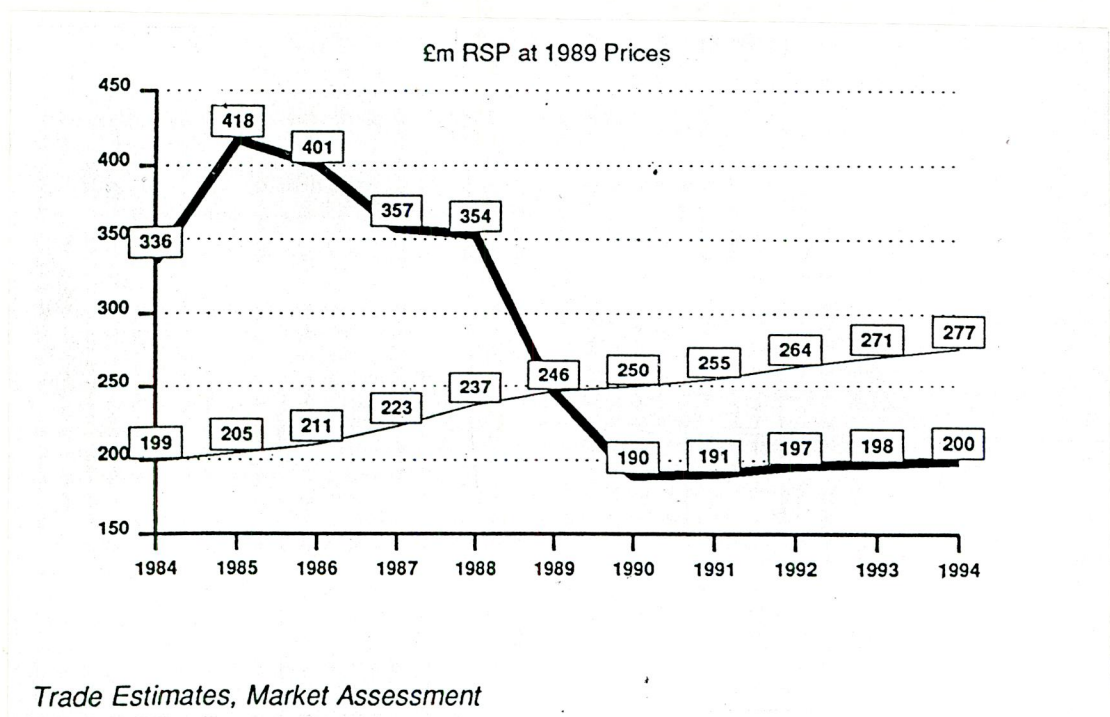


Chapter 5: The Slump in Microwave Oven Retail Sales, 1989-1990.

The decline in microwave sales that occurred between 1989 and 1990 was dependant upon four sets of factors. The first was the unpredictability of economic trends, the second involved the bad publicity that the microwave oven received after safety investigations, the third was the lack of consumer education on how to use a microwave oven properly and finally the lack of appropriate food stuffs.

Regarding economics, the effect of ^{a depression in} world trade ^{brought in} by Japan and America had a knock-on effect for British and European microwave sales because of the reduction in disposable income and the diminishing property market. National economic difficulties resulted in higher inflation with the effect of increasing interest and mortgage rates. Generally, people had less money to spend and sales opportunities for microwave ovens as well as the white goods market suffered a set back. The financial reality was echoed in the fact that fewer new houses were being bought and the need for new appliances diminished. In fact while the retail sale price ^{in U.K.} (RSP) value for microwave ovens had grown to 26% between 1984 and 1988, it had fallen by 25% in 1989 alone. (29, p.150), (illus.17). Although manufacturers had in no way predicted such a reduction in volume sales it was expected that a stabilisation of the market would occur because the volume of sales had reached its estimated peak.

However not all market sectors, that is A1, B1 and C1 class groups experienced a drop in income and those consumers who could still afford to buy a microwave were reticent in doing so due to the adverse publicity that had emerged about their safety in the United States. It had been reported that a number of people had suffered from food poisoning as a result of eating microwaved food. Prompted by American investigations and pressure from the Consumers Association the British Government in 1989 ordered an in-depth study into the possible dangers of using microwave technology. It was carried out by the Agricultural and Food Research Council on behalf of the Ministry of Agricultural, Fisheries and Food. Who in



UK Sales

(Illustration 17).



June of 1989 set up a Microwave Working Party bringing together key bodies (oven manufactureres, food manufacturers,retailers and consumer organizations), in a forum for sharing expertise and developing co-ordinated responses to emerging scientific data on the performance of microwave ovens, (27, p.6).

It was discovered that harmful bacteria, usually listeria was not being killed in food during microwave cooking. The most common bacterium found was listeria which was cause for grave concern because of its ability to cause still-births and death to infected newborn babies aswell as the elderly or infirm whose immune systems maybe weak. It was found that listeria had the ability to multiply and grow more vibrant at refrigeration as low as 4C, (19, p.10).

The problem with microwaves is that they only penetrated to the depth of two centimetres from the food surface. The waves themselves do not actually kill the bacteria, what actually kills them is the heat generated by the water molecules becoming agitated. So in order to eradicate listeria and other bacteria it is necessary to have food frozen solid right up to the point of use or to cook food thoroughly to avoid the minimum temperature of 4C.

It was found that the presence of listeria in shop bought food was due to the way in which frozen food from the supermarket would experience some degree of thawing due to the heat from supermarket lighting and handling. The discovery of listeria in cooked food was due to the uneven cooking that resulted in what became known as 'cold spots'. These are areas within a well heated food that remain semi-cooked, either harbouring already living bacteria or providing a breeding ground for new growth. We mentioned in Chapter 4 that the turntable was developed for even cooking, but its relevancy regarding safety was not known at that time by consumers, and it was not a standard part on smaller, cheaper ovens.

It was obvious why people had cause for concern but the reasons that led to their anxiety was a culmination of ignorance and apathy on the part of manufacturers and food producers.

Investigations carried out revealed where the problems lay. It was discovered that in order for bacteria to be killed, foodstuffs had to be cooked to a minimum of 70C. The production of this temperature was dependant upon power and time but because the wattage of microwave ovens varied one cooking time would not suffice all foods. In order for something to reach the required temperature in a 600 watt, with a cooking time of one minute, a 500 watt oven for the same foodstuff would be a third of the time slower, (39). But tests not only showed that the power rating of any particular model was lessened after a period of continuous use which was relevant to the use of domestic ovens commercially. But also that models of apparently similar wattage varied in power output.

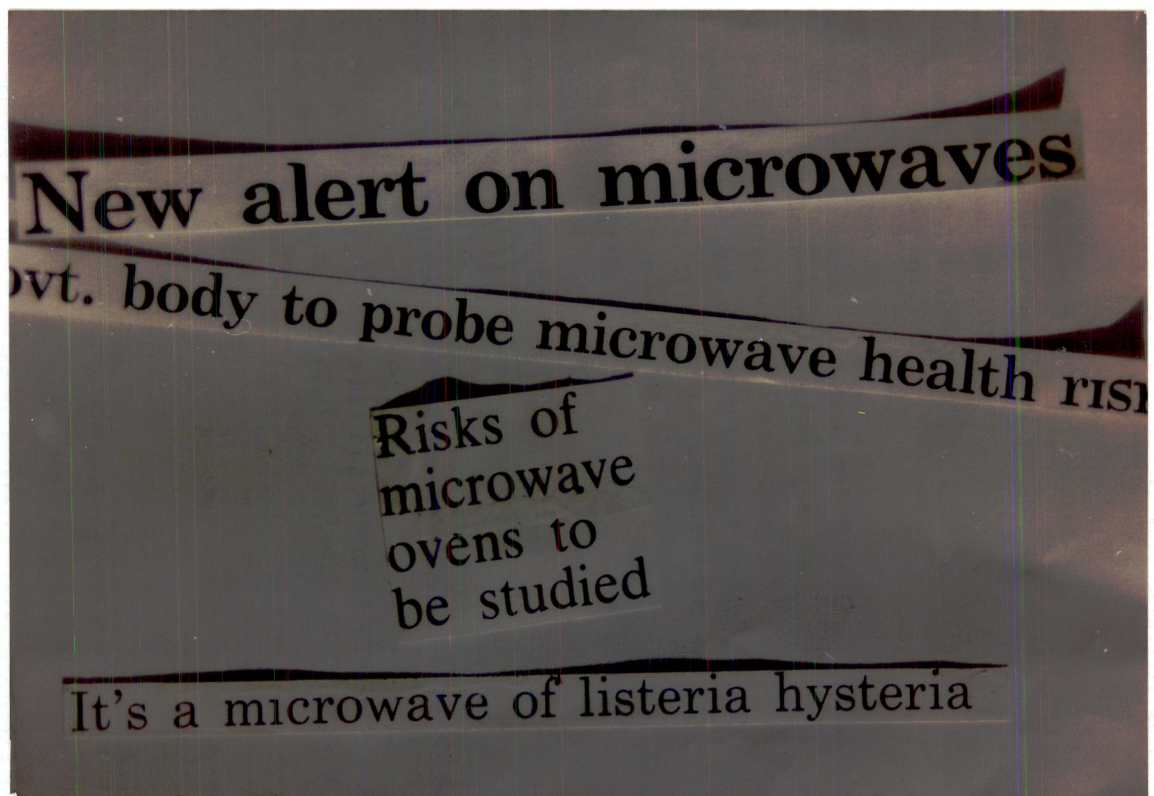
The food manufacturers should have been responsible for clearly marking on their food products the importance of the time adaptation for wattage variance as well as the manufacturers making the public aware of the effect of shortened cooking times. But in general microwave instructions were lacking on many food products. Food manufacturers were also responsible for cold spots because of inappropriate packing. It was discovered that containers with sharp corners were unsuitable for even cooking because the food in the corners was less likely to be bombarded by waves than in the middle. If oven manufacturers had incorporated turn tables as a feature in all models this would not have been such a concern. With the variability of two factors that essentially were required to remain constants for safe cooking, consumers had a right to be anxious.

It should also be noted that not all the ovens tested failed to heat food to over 70C. The failure rate came mostly from the cheaper brand models. The names and numbers of which were released on the December 4th, 1989 by AMDEA (Association of Manufacturers of Domestic Electrical Appliances) again from pressure from the Consumer Association, (illus.18). This coupled with the above evidence from research, caused newspapers to become peppered with headlines as can be seen from, (illus.19). This did not do much to support favourable public opinion of the microwave oven.

Microwaves that failed the 70°C cooking test

■ Boots 500.	■ Goldstar ER350.	■ Philips AYM734.	■ Sanyo EM2714.
■ Brother 1200PW.	■ Goldstar ER535.	■ Proline M3030.	■ Sharp R7A50.
■ Brother J200DB.	■ Hoover H6312.	■ Russell Hobbs 850.	■ Sharp R8H50.
■ Electrolux NF4061.	■ Matsui 260TC.	■ Samsung RE570D.	■ Toshiba ER9610.
■ Electrolux NF4065.	■ Moulinex 059.	■ Samsung RE576D.	■ Toshiba ER9630.

(Illustration 18).



(Illustration 19).



However in a report of a meeting held by the British Agricultural Committee in the House of Commons on February 6th 1990 the following was discovered. As the research entailed testing a large number of microwave ovens, the AFRC borrowed these from manufacturers, rather than purchasing them, and MAFF agreed not to name the models used in its eventual report. It was felt that such an arrangement would save money without giving unnecessary hostages to fortune. As far as the AFRC was concerned the main object of the tests was to measure power variability and not assess the efficiency of individual models.

When the Minister of Agriculture received the AFRC report, with this apparently damning evidence of erratic performance by microwave ovens, he was placed under immediate pressure as already stated from the Consumers Association, who threatened to disclose the reports findings unless MAFF did so itself. The Minister accordingly published the report on the day he received it without naming the ovens used in the study. The Minister withheld the names of the models which had 'failed' the AFRC test until the manufacturers concerned had prepared supplementary instructions for those using their ovens. In the resulting confusion, the seriousness of the threat to food safety was greatly exaggerated by the media. This was guaranteed to maximise public misunderstanding of the nature of the research and in that sense did consumers a grave disservice. The fault however was not with the AFRC but with MAFF for not buying the ovens they were using in their study and giving themselves subsequent flexibility in publishing their findings, (27, p.10)

An article in the Financial Times in December 1989, (18, p.11) explained the immediate response by manufacturers and retailers to fend off the the recent bad publicity just before the peak time of Christmas sales. It appeared that the two groups were vying for readers attention. The retailers were advertising a range of microwave ovens at a competitive price range in the hope of selling off their stock as quickly as possible before the risk of misuse became widely acknowledged.

Manufacturers on the other hand were trying to support the safety of their products by publishing check lists to ensure correct use. The timing of this was in essence the real crux of the slump. Adverse publicity and economics only served to justify why consumers refused to buy microwave ovens at the same rate they had done in the earlier part of the decade. The microwave technology that had been developed by 1985, made it feasible to produce conventional food in a traditional looking manner. But the production of innovative features was investment in a premature direction. The development of technology to improve cooking results seemed to be superfluous when people couldn't cook satisfactorily with the technology already available. The features that were developed were commendable but only served to increase the ambiguity of basic utility. Their money would have been more wisely invested in a 'prevention better than cure' campaign. These lists should have come as an after sales service and not as a desperate attempt to rally consumer support after damning publicity.

A final problem was that there was not enough suitable microwaveable convenience food available. Freezing food has always been associated with convenience because of its advantage in keeping small or large quantities of food fresh for long or short periods of time. The development of ready-made meals both frozen and shelf-stable reduced time in preparation. The problem with frozen meals however was the time lost in waiting for them to defrost. The microwave oven became an asset for this reason. For both type of product cooking was still slow as both relied on conventional cooking methods for heating, i.e. boiling water or oven heat. When people tried putting the conventional food packaging into a microwave oven they had disastrous results. One problem was that the containers were not designed for microwave use. The plastic containers often melted from the hot food inside. It was also discovered that food stuff of unequal proportions did not cook evenly, (26, p.22). A report in the Financial Times stated:

British food processors need to overcome a few technical problems and their own reticence to take

profitable advantage of the recent rapid growth in household use of microwave ovens.

(25, p.9).

Further comment criticised the slow response in putting microwave instructions on packets that were suitable for this type of cooking. Both food and oven manufacturers understood that for a new method of cooking, new products would have to be developed in a way that would make use of microwave cooking to its full advantage. Chapter 6 explains how this was attempted.

Chapter 6: Revised Approach by Manufacturers and Food Producers Through Design and Advertising and the Emphasis on Power Output Standardisation by the British Government in the 1990s.

To counter the decline in sales it was vital that consumers be coaxed back into feeling comfortable and confident about the product that had undoubtedly been advantageous to their lifestyle. People were aware of the risks but the hype of the media seemed to outweigh the positive characteristics of using a microwave oven for defrosting and reheating and blunt their interest in experimenting with it as a cooker. Manufacturers, food producers and packaging companies set out on a campaign to change this as a direct response to the problems discussed in the last chapter.

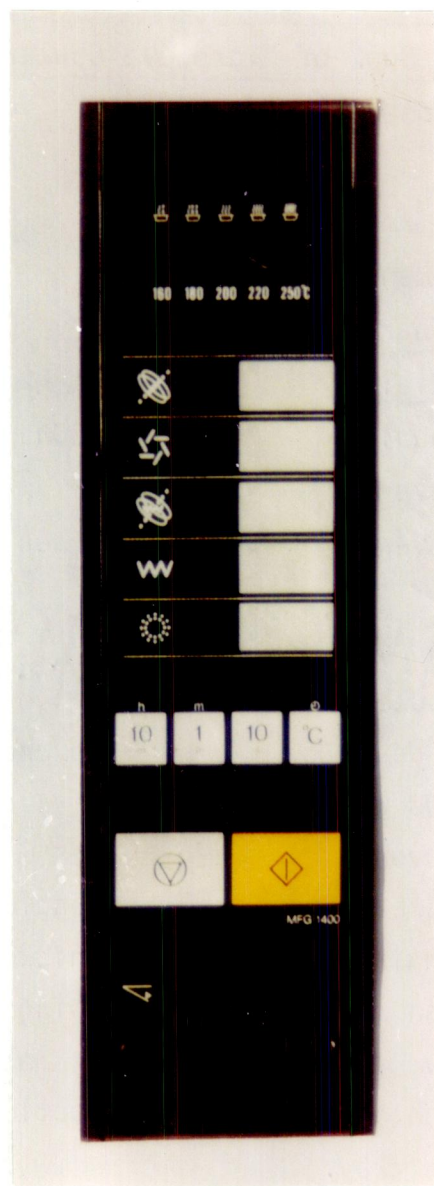
Here we shall explain first how microwave oven manufacturers implemented design changes to attract customers by restyling and simplifying the control panel and the subsequent implication through advertising of these modifications. Second, packaging companies who concentrated on redesigning appropriate food containers and materials in alliance with the development of microwave food by food producers. And third, the standardisation of similar powered ovens to the accordance of the International Standard, IEC 705.

What was paramount to the re-launch of the microwave was that owners would feel safe and in control. The market now was aware of the advantages and the disadvantages of use so careful consideration was put on the replacement sales market as well as first time buyers, (30, p.5.5). The microwave of the 1990s had to appear as doing its job better, safer and simpler than before.

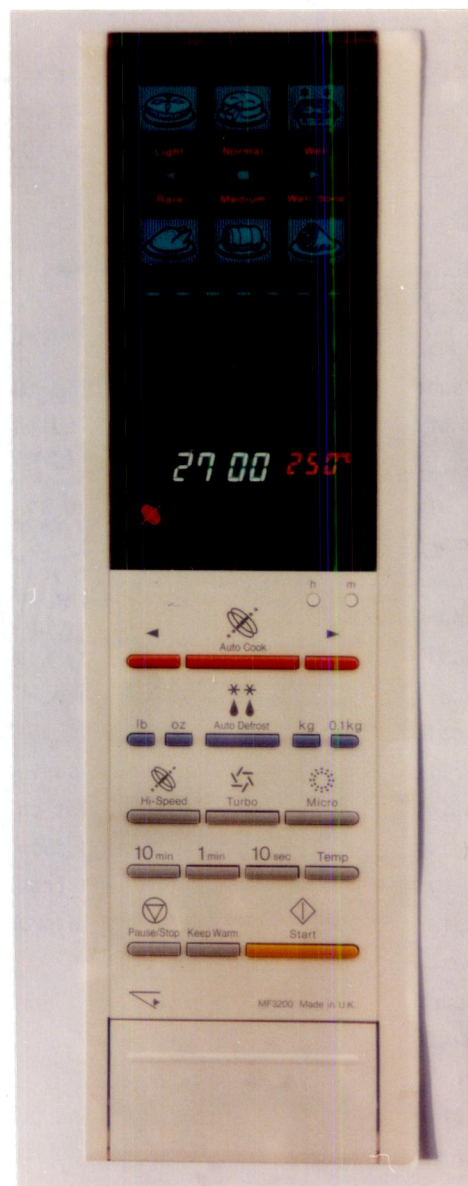
As regards simplicity the first emphasis was on the alteration of the control panel. We mentioned before that it had become more high-tech in appearance due to the incorporation of electronic devices. The job now for designers was to simplify the manner in which it could be used without disregarding any features. It was the task of most manufacturers but we shall take the work done by Brother Ltd. as an example.

In 1988 Brother launched their Hi-Speed cooker which in essence was a combination oven, (illus.20). In 1990 they re-launched it and by comparison to the first model we can see the design revisions that were made, (illus.21). From the illustrations we see that the touch pads of the first oven were replaced by horizontal buttons. In doing this the L.E.D display was enlarged because the button were taking up less space. This allowed for a greater amount of graphics and symbols to be shown as an easier method of understanding what the oven was doing visually at any particular time. Most notable about the arrangement was that the basic controls e.g. on/off and door release buttons are in the same place with the same colour codes and symbols. The reason behind this new layout had to be one of ergonomics and the effect on utility. Touch pads have no moving parts and are easy to clean. However they have minimal tactile quality so visual feed back is essential and requires them to be much larger than other types of controls, (12, p.235). But as a result the visual access to displayed information as from the L.E.D panel which was altering with every operation, was reduced. Hence the decrease in the control size allowed for the increase of the display area.

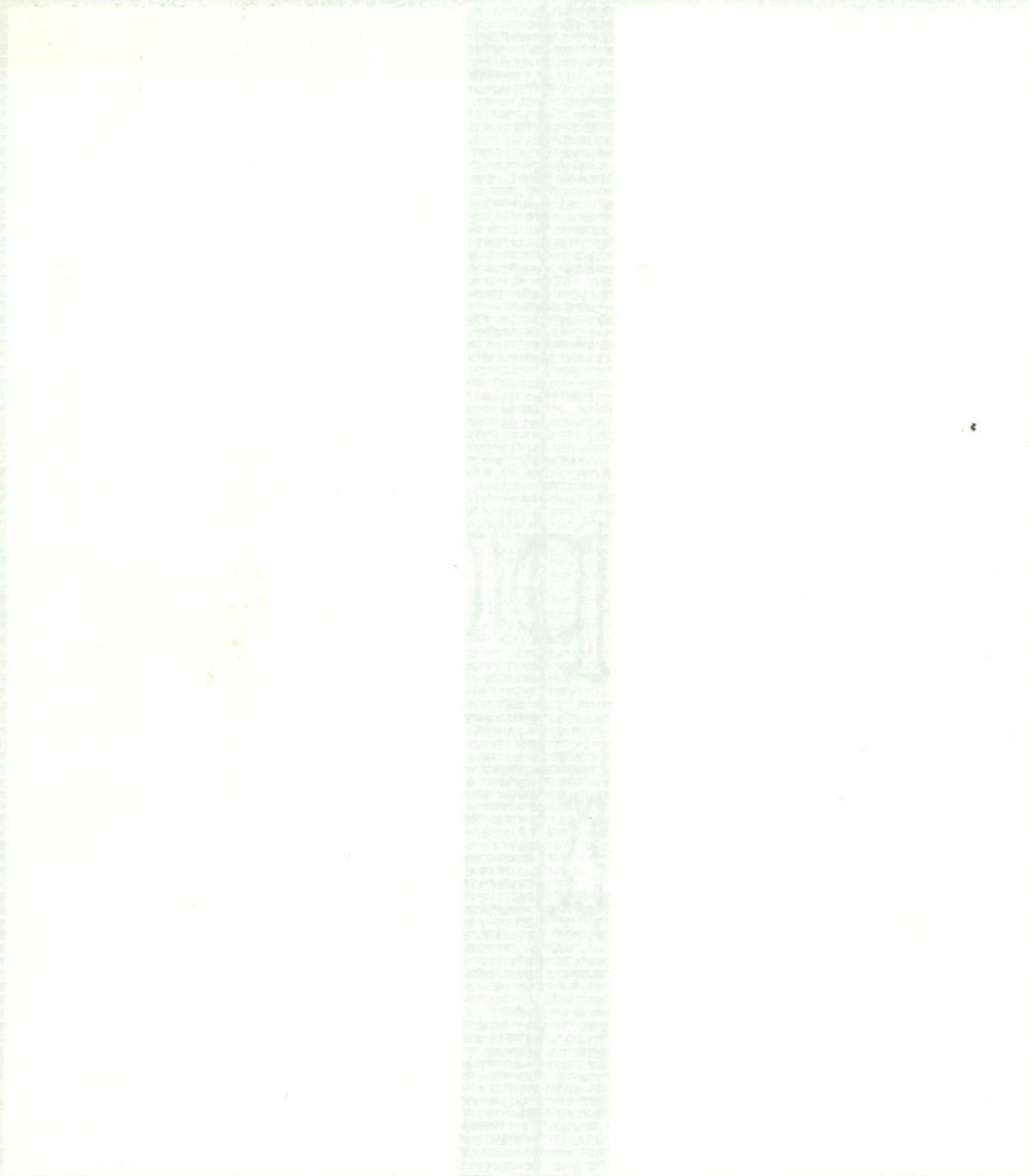
The effect of the overall design was a much neater looking panel which by association seemed to lessen the confusion felt by the incorporation of various features. Barry Weaver epitomised the need for simplicity and organisation in his design for the Hitachi Microgrill 700 model, (illus.22). Two significant features set it apart from any previous designs. First was the manner in which the black window continued into the electronic display area relieving the monotony of a white plastic box. And second was the treatment of the control buttons which were a refined pill shape in aesthetically pleasing combinations of colour and graphics. Mike Jones of Design magazine described it 'the overall form and styling make a thing of beauty out of what has been previously sold as a thing of utility', (21, p.14). It was this approach of refined design that had as much to do with fashion as it did in helping the microwave oven integrate into the kitchen environment which had become increasingly co-ordinated. What is important about Weavers' design was that it was the first time that the microwave oven was



(Illustration 20).



(Illustration 21).





(Illustration 22).

in many cases of a copper alloy

with the following characteristics:

and is resistant to corrosion and

has the latest technology in

design and layout. From that

energy-efficient washing machine

and design has been constructed in

quality control. The result is a

design and easy-to-use interface

is suitable for extra pieces of

the tracks.

made a reference point for the styling of other products. Hitachi transferred the pill shaped buttons onto their Program 1300 washing machine, (illus.23).

It is evident that Hitachi were confident in exploiting the untapped markets of microwave oven sales which allowed them to develop their product to a far greater extent than their competitors. In 1989 advertising figures dropped on average by 50% by nearly all leading manufacturers due to the slump in sales. Hitachi however went from a £102 million pound investment in 1986 to spending £341 million pounds by 1989, approximately a 200% increase, (31, p.28).

Their approach regarding design and development was not only typified by Weavers' design in isolation but was part of an equally well devised product range, (illus.24). In Chapter 4 we stated that the electronic features of autocook and pre-programming were found on higher priced ovens. Hitachi by careful feature selection and combination produced a range of microwave ovens from basic microwave technology, the Micro 800 Dial Control, to ovens that offered at least one feature e.g. a halogen grill or memory for cooking times of two favourite recipes and finally to the 4-Way Combination oven that essentially had every possible feature available. But in designing the mid-range the differentiation between ovens was subtle. The Touch MicroGrill had the power to work out automatically cooking times by weighing the food stuff to be cooked or defrosted as well as having a grill option to brown the food. The MicroGrill however was the same but without the electronics. But the Micro 800 Autocook had the same function as both these ovens except was lacking a grill, (32, p.7). This cross-fertilisation of utility had a dual purpose. For the manufacturers it offered access to a greater cross-section of the market in terms of need and fiscal limitations. With the result for consumers that they could choose a microwave suited to their particular needs without paying for any extras they wouldn't use.

It was hoped that these features would be an impetus for greater utility and satisfaction of use. The communication of



(Illustration 23).



(Illustration 24).



which relied upon promotion by Hitachi and all microwave oven manufacturers. For the first time the emphasis was not put on speed. The reasons being that speed as a marketing priority and nothing else had been the root of past problems and in the 1990s it was a well known fact that microwaving food was quicker than conventional cooking.

The most notable aspect of brochures was the emphasis put on ease of use. Zanussi claimed that their Studio Combination Model was 'sophisticated, yet designed to be very easy and flexible to use', (37, p.22). Hitachi described their range as 'A simple pleasure', (35, p.3), while Brother made the claim that their Hi-Speed cooker 'could do the thinking as well as the doing', (33, p.2).

With the concern of 'Green' living in the 1990s, eating properly was high in the mind of many customers. In the 1980s cooking had to be convenient and trendy, a new decade was pushing convenience with tradition and nutrition. Hitachi had the most to say about this in their brochure explaining that 'Microwave cooking opens the door to a wholesome and healthy way of enjoying food', (35, p.3).

What is also interesting is how the microwave was presented coming into the 1990s compared with that of the 1960s in terms of social change. From the advertisement for the 'Radarange' it was clear that the microwave oven was aimed at the non-working house wife. The absence of a woman in contemporary advertising neither appropriated by assumption the use by women or negated that of men. The concept of adding hours to one's day was obviously meant to be advantageous to either sex of any age group. The product therefore becomes both ageless and sexless. This was an example of where lack of image was just as effective as specific reference. Conversely, when Creda advertised their Circulaire conventional oven, (34, p.9) with the addition of microwave technology in the same brochure as their microwave ovens they showed a sophisticated female, clad in a cocktail dress caressing the controls, (illus.25). It seems that although the microwave oven was not



(Illustration 25).



fussy about its user, the conventional oven appeared to be most comfortable by tradition in the hands of a woman. Which implied that although the microwave could produce traditional results it in itself could never claim tradition. Yet its intention to do so was evident in the manner in which support food imagery was used to link it with the conventional oven. In Hotpoint's catalogue of appliances a roast chicken is positioned in both types of oven, (36, pp.4 & 5), being for the microwave the symbol of versatility, achievement and convention.(illus.26 & 27).

Apart from direct literature promotion, the use of other media vehicles was adopted. The approach was typified by a group of Irish manufacturers and distributors who formed themselves into an ad-hoc group. The intention was to promote the concept of microwave cookery and increase the Irish penetration levels of 15% which optimistically left a vast untapped market full of sales potential. The greater Dublin area was targeted with the 98FM Classical Hits radio station being the chosen medium. Through out the month of July over 300 15-second commercials were aired between the hours of 7am-7pm on the station. Additionally 20 microwave ovens supplied by Sharp, Panasonic, Whirlpool, Moulinex, Brother, Tricity, Ariston, Sanyo, Electrolux and Zanussi were given away as competition prizes during the mid-morning show. On top of which individual members of the group added further impetus to the campaign by supplementing it with newspaper advertising, (14, p.4).

The food companies responded with a great enthusiasm after the scare with increased, clearly visible and easy to follow instructions on all their food. Marks & Spencers who had been developing their microwave food range were probably the first company to realise the importance of the need for specific food types necessary for microwave cooking and subsequently gave over a whole microwave section in their food stores and put where relevant microwave details on their standard products, (illus.28 & 29).

But it was not only ready meals that Marks & Spencers and other food producers were interested in supplying. Development had gone into the feasibility of producing starters, desserts and snacks



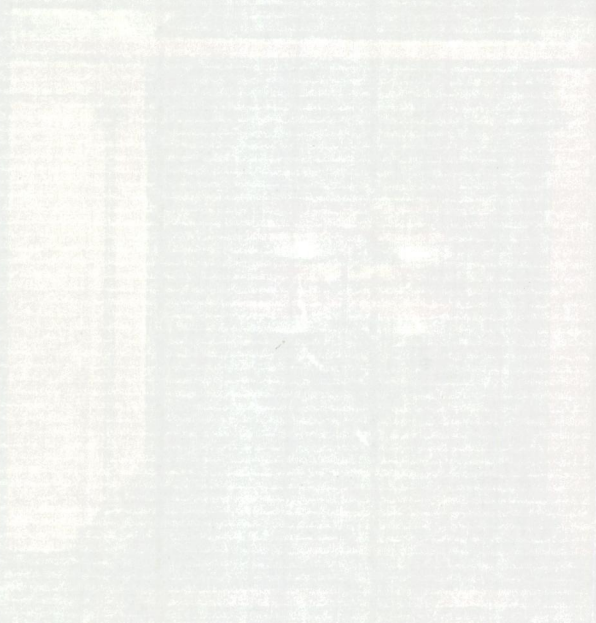
6162 B-P NOUVELLE DOUBLE OVEN

(Illustration 26).



6670 B-P COMBINATION MICROWAVE OVEN

(Illustration 27).



100% COTTON COLORED LUXE OVEN

100% COTTON COLORED LUXE OVEN



100% COTTON COLORED LUXE OVEN



(Illustration 28).



(Illustration 29).



COLLEGE



which were either ambient (shelf-stable), frozen or chilled. Evidence of how food and packaging companies worked together was seen in the development of appropriate materials to package these food stuffs.

The most popular material for microwaving was found to be polyester which could be easily formed into trays, coated onto cartons and used in film form itself either as a lidding material for the tray or as a bag, (illus.30). It is a heat resistant material which does not melt from the use of susceptors or the heat created from within the food stuff and is therefore not hot to the touch, (3, p.235). Another material included the SBS (solid bleached sulphate) Board, covered with approximately 42 gsm of the heat resistant polyester already mentioned which was ideal for cheesecakes and other desserts, (illus.31), (24, p.31).

In Japan a company called house Foods wanted to develop dry products that were non-frozen and were therefore distributable at room temperatures. The task however as in creating a container that was not only heat-resistant but also comfortable to handle when removed from the microwave oven. Great efforts by the the development team finally resulted in the design made from polypropylene foam which was heat-resistant and could withstand temperatures of 130-140C. Paper was also chosen as a packing material and was ultised for chocolate and fruit cake packaging while the foam was adopted for chinese rice stews and noodle dishes. Having created suitable packaging material the company's aim was to develop a range of products that were specifically designed for microwaving using the above containers. What evolved was the 'Range Gourmet' line of food products, (illus.32). By simply adding water and cooking straight away, foods like steamed bread, cake or boiled rice could be ready to eat in three to seven minutes, (8, p.25)

In 1990 there were approximately 799 models of microwave oven alone in use in the UK, some old, some new some incorporating a turntable, some not, each configured slightly differently and each competing in a fast growing market. Until September 1st 1990,

2
6

(Illustration 30).



(Illustration 31).

COMMISSION





(Illustration 32).



CO

there was no standardisation of the declared power output of these ovens hence the already mentioned disparity in temperatures. Partially due to the furore of December 1989 it was decided by the British Agricultural Committee that new models of microwave ovens were to be rated for power output according to a single method, the International Standard IEC 705. Both AMDEA and non-AMDEA oven manufacturers were persuaded to join the IEC 705 power rating system. This represented a positive step in the right direction, if not a definitive solution, (27, p.9).

Unfortunately because this thesis has been completed in 1992 the period for sales and market assessment regarding this campaign is too short for the feasibility in supplying relevant figures. However indications of how successful or otherwise this campaign has been for those involved can be estimated from the final chapter.

Chapter 7:Future Directions for the Microwave Oven.

This chapter aims to pinpoint the present state of the microwave oven in terms of design, correct food packaging, new markets and the new labelling system for both ovens and food alike as a definitive method of eradicating the ambiguity albeit greatly reduced in recent years, over cooking times for ready-meals.

Regarding design, the microwave oven has come as far as is possible or necessary in versatility. It is now feasible as explained in Chapter 5 to microwave traditional food and achieve traditional results because of the emulative nature of development regarding conventional cooking methods of gas and electricity. However now that it has reached this level of utility its integration into the kitchen is undergoing a role reversal. In design terms there is an emerging emphasis on conventional ovens having the extra utility of microwave energy as opposed to the consideration of the microwave unit replacing the conventional oven. This cross-fertilisation of identity can be exemplified by the Microwave Circulaire Combination oven designed by Creda which is advertised alongside their Circulaire Conventional Fan oven as a small oven combined. In the past a conventional combination oven implied the division of a cooker between a large main oven and a smaller oven with grill. However the latter seems set to be replaced by a microwave combination oven. It is a very practical development for the conventional oven but tends to make the family microwave oven as a separate unit becoming redundant.

However this is not to say that independent units will become obsolete. The development in consumer markets has led to a growing number of microwave ovens being used as the main cooking appliance by the elderly, disabled and the blind. It reduces the risk of accidents because of the lack of contact with hot surfaces and because of the successful development of ready-meals the normal cooking preparations are not required. Another tell tale sign is the increased number of built-in microwaves on offer especially by Hotpoint who produce no free-standing models.

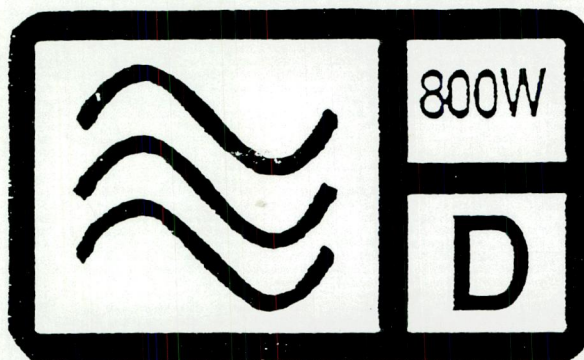
The expertise of the Japanese can be seen yet again with their latest packaging developments. A recent innovation has been a microwave container with a whistling indicator. The pack is made from a composite of plastic and paper and can be used for rice, stews and curries, (24, p.32).

Ready-meals which have already received quite a bit attention already through out this thesis brings us to the most important innovation regarding the compatibility between microwave ovens and food packs. It is a new voluntary scheme for ovens and food packs which is being introduced this year, 1992. It has been developed ironically by MAFF in partnership with food manufacturers, retailers and consumer organisations. It is hoped this voluntary system will fundamentally change the way in which microwave ovens and microwaveable foods are labelled. This will significantly increase the possibility of achieving a satisfactory result first time round in heating ready-meals which has emerged as the primary utility of the microwave oven after reheating and defrosting. It will also simplify the microwave heating guidelines on many food packs.

The new system is based upon evidence that the quantity of power delivered to a water load is similar to that delivered to a food load of the same mass. However this does not apply when the water and food loads are of a significantly different mass. It is this reason that it is inappropriate to use the ovens power output (based upon a 1000g load of water) to generate workable heating guidelines for small food loads such as a single portion ready meals. Since most single portioned ready meals are around 350g in weight, this is the mass of water which has been selected as the basis for the categorisation system, (28, p.3).

The following is an explanation of what the system is and how it works. From 1992 the front of most domestic microwave ovens will display a label which will tie in with a new label on food packs. Matching the information from both labels will give the heating time needed. The oven label (illus.33), will show three

the microwave
symbol



800W

the power
output (watts)

D

the heating
category for
small packs

(Illustration 33).

Heating Category	Power output into 350g water (Watts)
E	741 - 800
D	681 - 740
C	621 - 680
B	561 - 620
A	500 - 560

(Illustration 34).



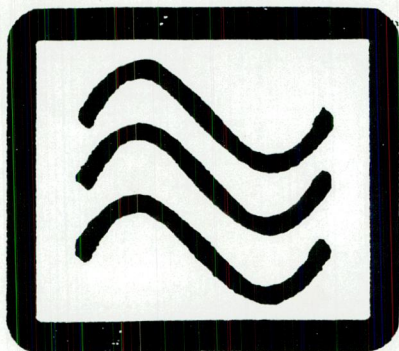
important pieces of information. First the microwave symbol, which shows that the oven has been labelled in compliance with the new scheme. Second, the power output in watts which is based on the International Standard IEC 705, with appropriate wattage of 500W, 600W, 700W or 800W. Third is the heating category which is represented by the letters A, B, C, D or E. The relationship between these two categories can be seen from (illus.34) So a 'B' oven will heat up small portions of food faster than an 'A' oven because of its higher wattage.

In turn microwave foods will be marked in the following manner. They shall include the microwave symbol (illus.35) showing suitability. And a table showing the times required for cooking, corresponding to the aforementioned information, (see illus.34).

So if you have a 'B' type oven the food will be cooked for 6 minutes. If however the oven is categorised as a 'C' then you will chose a time mid-way between 'B' and 'D' rated ovens, in this case $5\frac{1}{2}$ minutes. 'A' ovens if not quoted will require a little longer than 'B' ovens because of their lower power rating while an 'E' oven if not quoted will require slightly less time than a 'D' oven in this case $4\frac{1}{2}$ minutes. Although at first reading this may seem complicated it is in fact a very straight forward method of symbol identification and application of clear corresponding data.

Consumer research has shown encouraging results when consumers have been presented with the system described above and asked to comment on it. Nevertheless it has to be acknowledged that those involved who will operate the system i.e. food and oven manufacturers, retailers and consumers will need to be carefully and thoroughly informed if it is to be effective. Hopefully this will provide a clean slate from which manufacturers can prove that they have learnt their lesson in the promotion innovation without education.

It is hoped that by September 1992 most new ovens will carry the new label and that all microwaveable food packs will incorporate the intended label with heating instructions by 1993.



TO MICROWAVE

For ovens marked with a heating category, select appropriate time(s) for your oven. For other ovens, refer to timings given for oven wattage. When using ovens of different power, heating time must be increased or decreased accordingly.

ALWAYS CHECK THAT THE FOOD IS PIPING HOT BEFORE SERVING.

HEATING CATEGORY		OR OVEN WATTAGE	
B	D	650W	750W
6	5	5	4

MINUTES

(Illustration 35).



Conclusion.

In documenting and analysing the history of the microwave oven up to the present day it is evident that the main problems have been its functional development in trying to emulate conventional cooking and general consumer nescience regarding the correct use of microwave energy. In trying to apply a new technology to an old system of practice requires training and though not impossible is not easy, demanding compromise from both parts. In the case of the microwave oven the battle was to penetrate consumer bias towards traditional methods of food preparation and people's natural instinct about how food should look and feel. On the other hand consumers were being expected to turn their hand successfully to a method of cooking that relied upon an invisible heat source, and putting food into a rectangular unit that neither got hot itself or allowed access to food during the cooking process. Yet the disparity between both methods of cooking and the clear need for an understanding of utility was never explained by the manufacturers.

Instead marketing and advertising supplied the consumer with images of what could be produced rather than emphasising how it was achieved. The 'Radarange' advertisement in the 1960s was over ambitious in content in view of the oven's meagre capabilities. At least in the 1970s the recipes created by Sonia Allison et al were more realistic and were devised to get around what the microwave could not achieve. By the 1980s technical innovation peaked making the claims of the 'Radarange' microwave oven feasible. Unfortunately it did not improve people's knowledge and comprehension about microwave cooking principles. If it had it may have prevented the food poisoning that occurred and the subsequent research into their safety that highlighted the threat of cold spots.

However because these problems were a threat to the individuals health and not just a matter of practical inconvenience, they can not be excused. Nor can the fact that the research done regarding their safety was carried out by independent sources and not by the manufacturers themselves. If in the 1980s

manufacturers were not aware of the possibility of cold spots then they should have had the foresight for their own insurance to consider research into the ovens safety and effect on food. If however they were aware of the risks but failed to execute any practical scheme of prevention before they became so popular it has undoubtedly been to their own detriment. The number of poisoning incidents that actually occurred although unknown are guaranteed to be disproportionate to the amount of money invested in attracting new custom after the slump in sales in 1989 and the profits that were lost with in that year alone.

However if it had not been for the factors of demography and design, the set backs that resulted from the above would have been sufficient to make the microwave oven obsolete. The growing numbers of working mothers and the general shift in eating habits greatly relied upon the speed that the microwave oven offered in reheating and defrosting. Design in its capacity improved the user friendliness of the machines, reduced the risks of uneven cooking by the introduction of turntables and autocook features, helped integrate the microwave oven into the co-ordinated environment of the kitchen making it less alien and in 1990 Barry Weaver showed that the microwave oven could be a 'designer' product.

Unlike other products whose development and history surrounds the perfecting of one particular function e.g. the vacuum cleaner or washing machine, the microwave oven has had a punctuated history of popularity because of the change on emphasis in its role as either a defroster, reheater or cooker. In the 1960s it was presented as a cooker and was regarded as a gimmick. In the 1970s it was its ability to defrost and reheat food that made it commercially attractive and led to its re-introduction into the domestic market i.e. Toshiba's Unfreezer model from 1974. By the 1980s thanks to the progress of design all three features were practical as they are today. But the reality is that the microwave oven in the 1990s is still essentially being used as a warming box and not as a cooker. First, the labelling system described in Chapter 7 has been formulated solely for ready-meals that are pre-cooked and require only to be heated up. Second, the

popularity of the microwave oven with the elderly and disabled is because they do not have to cook and third, despite all the features that have been developed it is not being designed or developed to replace conventional ovens.

To say that it has been a success would be misleading if viewing it on its achievement in being the revolutionary speedy cooker that would forever do away with the drudge of conventional cooking. Despite the view of many during the 1960s and 1970s that the microwave oven was an anomalous and anachronistic novelty, its very presence within the homes of this decade is proof that by adaptation to social change and development under public and officious scrutiny, its history has been that of survival.

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