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The Rise and Fall of the Space Age

Tracing the development of space exploration and its representations in popular culture

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Chapter One

Aims, sources and introduction.

This thesis aims to determine the exact nature of what is known as the space age. It will trace the events which lead up to man's first journey beyond the atmosphere of the earth and the subsequent achievements of the United States and Soviet space programs. It will also examine the aspirations and expectations of the public who supported those programs and the products inspired by or developed as a result of this giant leap.

Many of the long term goals of space exploration were expected to come to fruition by the turn of the millennium. As the thirtieth anniversary of the Apollo moon landing approaches, however, the disparity between 1960s expectations and 1990s reality becomes apparent. This point is illustrated by a comparative study of the progress of state run space programs, the emergence of commercial spaceflight, and the secondary applications of space technology in the late 1990s.

The ultimate aim is to identify the circumstances and motivation of the various groups who endeavoured to extend a human presence beyond this planet and to ask whether those presently involved in space development are capable of inspiring the same awe.

Sources

In researching the technical and historical aspects of space exploration a variety of sources were used. Both NASA and the Russian Space Agency run extensive websites. The NASA site is largely geared toward public relations rather than posting of technical information, hosting a range of interactive pages whereby visitors can sign log books, send their questions to astronauts or book tickets for a family outing to one of the various space centres. However, the site does contain transcripts of the findings and recommendations of certain advisory bodies, including that which investigated the Space Shuttle Challenger disaster.

The Russian Space Agency's site, conversely, is the Internet equivalent of a scientific journal. This site offers loosely translated introductions to specific pages but remains largely geared at those with a prior understanding of the subjects of planetary observation, rocket science etc.

The National Geographic Magazine has, in over a century of publication, consistently reported current events, sometimes of a quite complex scientific nature, in plain, digestible terms. Space exploration, an enduring subject for the magazine, was first addressed in the mid 1950s. Heinz Haber's article of 1956 was invaluable in determining the level of public interest and indeed the hopes and apprehensions that existed before space travel was realised. Tracing similar articles through the years, the gradual change in the tones of those directly involved becomes apparent. While in the 1950s and 1960s, grand terms were used as a matter of course in describing the various activities of space agencies.

By the early 1980s, however, the tones employed had acquired a distinctly self justifying and defensive air.

Tom Wolfe's novel, "The Right Stuff", is essentially a dramatisation of the build up to the formation of NASA and the exploits of the first group of American astronauts, known as the Mercury Seven. It chronicles the details of daily life and the unspoken doctrines of military test pilots, from whom the Mercury Seven were chosen, the astronauts themselves, their wives and families. This work was of benefit in dispelling any myths of the glamour associated with the job of being an astronaut. It was also instructive in its portrayal of the animosity between the chosen astronauts and Air Force pilots, which centred largely on the questioning of NASA's methods and the allocation to such an agency of the task of attaining space travel. Many of the issues raised are in keeping with those of NASA's contemporary critics.

"What Do You Care What Other People Think?" as described on its sleeve, is a "collection of stories, memories and letters from the Nobel Prize-winning physicist, accomplished bongo-player and artist, and includes...an account of the vital role he played in the investigation into the 1986 Challenger Space Shuttle disaster." Feynman is perhaps more famous for his ability to explain complex problems in physics than his ability to solve them. His insights into the larger issues behind the failure of the component, which caused Challenger to explode shortly after lift-off, reveal the disorder that prevailed in the bloated form of NASA which existed in the 1980s.

Many of the items discussed in Chapter Three can be found in any number of books concerning product or interior design in the twentieth century. Two books in particular, however, describe these items within the subject of the space age itself. Philippe Garner's book "Sixties Design" contains a chapter entitled "The Space Age – Science Fact and Science Fiction", which traced the progression of space as inspiration for designed objects. A similar chapter in "The Fifties Sourcebook" named "Suburbia goes Space Age", outlines the same trends in the previous decade. Bevis Hillier's "The Style of the Century" assesses space age styling and individual items within the broader terms of popular culture, prevailing fashions, economics etc. It is especially rich in circumstantial background information and in tracing the path of certain stylistic trends as they filtered through the various layers of consumer society.

"The Twentieth Century" discusses the history of the 20th century in geographically and politically defined areas: Europe, America, the Middle East, the Far East, Africa south of the Sahara and the Communist World. This provided the socio-political context in which to assess the two space faring nations by outlining the rise of the U.S.A to world power and Soviet Russia and its antecedents.

"The History of the Future" a collection of works envisaging life in the 21st century describes in its introduction the power of the magic date of 2000 and the strength of futuristic images associated with it. "In the days when it was still a fair way off, the year 2000 looked rather different from what we now expect it to be. The future promised tasty meals pre-packed in tubes and the delights of climate

controlled clothing..." These stories hold many parallels with the imagined vision of 1990s space age living, with frequent shuttles providing cruising facilities for relaxed day trips to the Moon, colonies on Mars etc. Their significance, therefore, as idealised expressions of humanity's mastery of its own destiny and of metaphors for the consequences for present actions, also applies to the imagined outcome of space exploration.

The Sunday Times Magazine, obligingly produced a special Moon issue in December 1998, which aimed to answer the questions raised by the discovery of water on our natural satellite. Various magazine articles, ranging from FHM's "Death Trap", subtitled "Nightmare in Orbit" relating one sorry tale of woe aboard the Mir space station after another, to Time magazine's special report on Pathfinder's mars landing in 1997, provide factual information in conjunction with reflections of public opinion. Style and fashion magazines "Vogue" and "Marie Claire", set the stage for the couture expressions of designers and the ready to wear 'street' versions of sweeping trends such as the rocket girl chic of 1995 and the dominance of silver in beauty and accessories in recent years.

The websites consulted comprise only of the tip of the metaphorical iceberg of sites concerning extraterrestrial subject matter. The intricacies of lunar property legislation, experimental stargazing musical groups and companies offering official space merchandise are all accessible on the Internet. However, most legitimate organisations offer a selection of recommended sites of possible relevance to visitors, which can be accessed automatically. Those which proved especially informative were news journals and organisations which as in the case

of the Atlantic Monthly, presented archive articles related to present day issues. In the weeks following John Glenn's return to orbit, many such articles were re-released and provided invaluable insight into popular opinion of the period.

Introduction

The space age, like ages past, came about through the development of a new technology but was defined by the effect this had on the lives of its people. There are few alive today whose existence has not been touched in some small way by space and the implications of venturing into it.

From the very early days, those directly involved in the development of space travel drew analogies with the pioneering spirit of explorers past. America, in particular, portrayed space as the new frontier, reminiscent of the Wild West albeit with the obvious oversight of America's native inhabitants.

Scientific advancement represented, to some, the equivalent of the spices that rewarded those adventurers who ventured east to penetrate foreign lands. These advancements would, in turn, enrich the lives of those on the ground with the fruits of new technologies.

The vastness of the universe and the intrinsic division between the voids of space and the earth gave rise to a new perspective on man's place in the universe and his relationship with his fellow man.

These ideas permeated day to day living in many forms. Events in space and the plans of Soviet and American space programmes were widely reported

in the media, with astronauts becoming celebrities long before actual space travel was achieved. Forecasting of future events and lifestyles arose within public commentary, scientific discussion and literature. Space was exploited as inspiration in the realms of popular entertainment, fashion and industrial design.

Consumers and taxpayers enjoyed a sense of inclusion, akin to the camaraderie of a war effort, from the knowledge that they had not only paid for the space programs but had the honour of owning their very own items of space technology in their homes.

In the dawn of man's exploration of space, the imagination of the world focused on the issues raised by the rapid advancement of technology. Almost every aspect of daily life was assessed in terms of the coming space age. Family structures, children's toys, clothing, entertainment, social order, religion etc. were all subject to the formative pressures and liberation of the exploration beyond this planet.

The Space Age came to be defined not only by what was but what could be. The items, which have come to represent the 1950s and 1960s definition of Space Age, were the result of forecast, inspiration and technological development.

It was through forecasting that members of the public found a context in which to evaluate the accomplishments of NASA and the Russian Space Agency. The fact that man-made vehicles could travel past the atmosphere had evident consequences, which held a bearing on day to day living. Improved

weather studies, for example, would mean more time to prepare against the elements – invaluable for agriculture, transport and many other industries.

Furnishings and fashions inspired by space travel created new environments in which people could have their wonderment and belief in the steady march of progress rebound at them. Items which arose as the so called spin-offs of space research provided access to the world of state of the art technology.

In many ways, those who first entered the space age were not the astronauts or cosmonauts (who lived in the no man's land between regimented military life and celebrity) but those who embraced the new ideologies of world peace and a brotherhood of man, while wearing silver miniskirts and sitting in Globe chairs.

The beginnings of practical research into space travel can be seen as early as 1953 with the examination of the possible effects of microgravity on the human body. The launch of artificial satellites in 1957 and the evolution of rocketry paved the way for the first sub-orbital flights of Yuri Gagarin and Alan Shepard in 1961. By 1969 Apollo 11 had reached the perceived zenith of achievement by landing on the moon and returning safely to earth.

Subsequently, public interest began to decline. This first became apparent through the reluctance of the media to televise events such as the launch of Apollo 13. Disinterest quickly grew into disapproval, as possible goals were exhausted and the cost of maintaining the programs proved unpalatable to politicians and taxpayers alike.

The popularity of manned space exploration reached an all time low with the loss of seven lives in 1987, when the Space Shuttle Challenger exploded shortly after takeoff.

In the years following the Challenger disaster, space retreated from the public arena. Although so called spinoffs from space technologies (satellite communications, weather forecasting, new materials etc.) had undoubtedly improved the quality of life obtainable in the western world, many were disappointed by the disparities between the existing world and that suggested at the dawn of the space age. The pageantry and status, which had been thrust upon agencies such as NASA in order to convince a public of their importance, now came to represent the smug, self-righteous face of tax-dollar recipients.

Since then, such agencies have been replaced, restructured, downsized or decommissioned. The approach of space agencies, which now operate in Europe, Japan as well as the former Soviet Bloc, has focussed on economy and the balancing of costs across a variety of projects. By making space exploration affordable, the awe inspired by the achievements of Mars probes and the Hubble telescope is not soured by extortionate cost. The late 1990s are witnessing a new form of space age. Exploration has been augmented by industry and splendour has been replaced by realism.

Krushchev, Kennedy, the Cold War and the Space Race.

From the very early days of research and development into the possibilities and practicalities of space travel, no one issue has attracted more attention than the exact nature of the motives which drove the entire project. Giant leaps for mankind were all very well, but at what cost and to what purpose? Although the actual funding and manpower came from very definite sources, the exploration of space is considered to be a human endeavour. Yet there was a stark contrast between the fleeting sensation of global unity and the intense rivalry of two worlds, two ideologies –two peoples.

It is a testament to the enormity of the undertaking that it was made possible through the visions of a great many people, even though those visions were often in direct opposition with each other. It realised the dreams and the ambitions of a great many people to such an extent that no one group could claim it as their own and no one group's intentions truly reflected the resulting achievements.

However, it is generally accepted that the 1969 Apollo Moon Landing would never have come about had it not been for its significance in determining the military superiority of the United States over the Soviet Union.

> In the 1960s, many of us would have predicted that the moon landings would, within thirty years, have been followed up by still more ambitious enterprises; a permanent lunar base, large orbiting 'space colonies', even an expedition to Mars. But none of these things have happened. The

> Apollo programme was a transient spin-off from the superpower rivalry of the cold war era- not a step toward any long term goal that could inspire sustained public support. (Rees, 1998, p19.)

From the perspective of today's space enthusiast, in terms of the literature concerned with the development and chronology of space flight to date, it seems as if the whole endeavour stemmed from the adventurous spirit of the astronauts, cosmonauts, scientists and all who took part in the great Space Race.

In this light, the idea that the suspicion between the emerging superpowers meant that neither would allow the other to surpass their power, could be interpreted as a healthy rivalry. Indeed the link between the cold war, the arms race and space flight is rarely stated in basic terms, it is either taken as understood or completely omitted. People who were not alive at the height of the space race itself find it easy to relegate such an idea to the conspiracy theory bin. This is the compartment of the popular consciousness put aside for alien abductions, falsified moon landings, clones of major political leaders, Elvis sightings etc.

Some may find it plausible that mankind as a race had so profoundly matured through the horror of World War II that he saw fit to drop all aggression and set out to land a man on the moon for the advancement of human endeavour. It is hard to believe, however, that the period of economic depression following a Great War would be the time to make such a generous monetary investment.

The Kennedy Administration's budget proposals for the fiscal year of 1964 included an increase of $2 billion (bringing the total to $5.7 billion) for the civilian

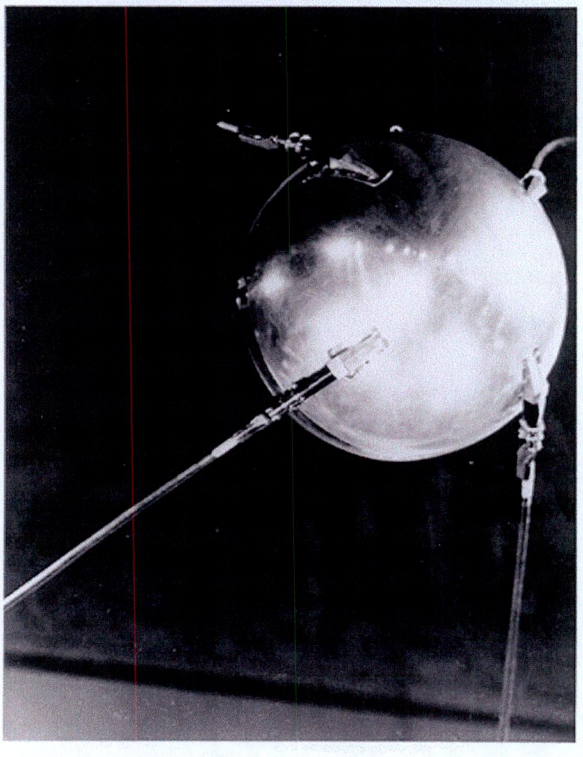
space programme and $1.67 billion for the Defense Department space activities. The nation's representatives in Congress needed to be convinced of the wisdom of such an investment and the extension of human achievement did not seem to make sound financial sense.

> Although it seldom appears in the public record, a major factor in the congressional support for the rapidly expanding NASA budget has been the common expectation that the civilian space program would provide the basic technology to meet the requirements of national security in this new and uncharted environment. (http://www.theatlantic.com/issues/63aug/frye.htm)

The new and uncharted environment of this article was a new order of power in the world. A new division of east and west appeared; the western democratic world, headed by the United States of America and the eastern communist world headed by the United Soviet Socialist Republic. In September 1949 the USSR exploded its first atomic warhead. The atomic bomb had, until that point, been in the sole possession of the USA, and was seen by many as a means to cut short any conflict, the horrific reality of the weapon was such that it might actually constitute a deterrent. Whether it be viewed as true power or the condescension on the self righteous, America could use this weapon to destroy enemies of democracy as is their constitutional pledge. Thus when the direct opponents of democracy acquired atomic capabilities the possibility of an apocalyptic WWIII became very real.

Very quickly, it became apparent that all out military conflict should be avoided at all costs because it was no less than life, as we know it, which was at risk. However, this did not, by any means, signal an end to aggression between

the adversaries and the so called 'arms race' came about from the realisation that neither could allow the other to gain the upper hand. Each side would continually match or better the other's hardware so that the only outcome could be a stalemate.



Early in the 1950s the American Government decided to concentrate on producing atomic explosives in small packages, for tactical use on future battlefields. At the same time, the Russians put major resources into building big rockets that would be able to deliver atomic warheads from Russian soil anywhere on the surface of the globe. The result, by 1957,was dramatic Russian superiority in the field of rocketry. (Bullock, 1971, pp. 53-54)

Fig.1, Sputnik, the world's first artificial satellite.

With Sputnik, the world's first artificial satellite, the Soviet Union showed not only that their knowledge and capabilities were superior to the Americans', but that they now represented a serious military threat. The military implications of space flight; namely the stationing of thermonuclear weapons in orbit, of satellite interceptors to destroy enemy hardware in space, of the use of satellites in aerial reconnaissance and surveillance, were the real motives for the United States' space program.

As the gap between the capabilities of each side diminished, openly menacing statements of superior strength were publicly exchanged in an attempt to prolong the status quo. In early 1962, Soviet Premier Krushchev claimed that his rocket forces were capable of targeting a single fly in space. In response, United States President Kennedy conceded that this might well be the case, however, Krushchev's rocket would find it difficult to target a swarm of 'flies' approaching from many directions simultaneously. (http://www.theatlantic.com/issues/63aug/frye.htm)

Although the political motivation behind the space programs is clear, political leaders needed the support of their people in order to justify such heavy financial investment. The necessary support was gained through the careful balancing of the desires and objectives of two nations and of their respective politicians, scientists and citizens.

> However we may try to break the program down into its elements and to attempt a detailed balancing of debits and credits, the fact remains that the space effort is greater than the sum of its parts. It is a great adventure and a great enterprise, not only for the United States but for all humanity. We have the power and the resources to play a leading role in this effort, and it is inconceivable that we should stand aside. (http://www.theatlantic.com/issues/63aug/jastrow.htm)

In the public arena, where there was strong feeling that space should retain its sanctity through purely peaceful activity, support was gained by appealing to national pride and the collective sense of dramatic adventure. The postwar years of any nation are particularly vulnerable to the promotion of any venture in the name of the people. By appealing to people on very basic terms,

the space programme somewhat paradoxically represented both the superiority of a single nation and an act of a united humanity.

The idea that if we can go to the moon we can accomplish other feats long considered impossible has been firmly implanted in people's minds. Confidence that solutions can be found to such urgent problems as energy shortage, environmental degradations and strife between nations, has been nourished by this spectacular demonstration in space of man's capabilities. (http://nctn.hq.nasa.gov/success/spinoff/)

Fig.2, Buzz Aldrin surveys the Moon, 1969.

A crucial aspect to public approval gave tangible credence to the notion of space exploration improving the lot of mankind. There would be a wealth of information gathered by researchers resulting in the increase in the standard of living of the average citizen. NASA officials, Dr. Robert Jastrow and Dr. Homer E. Newell, in 1963, informed the United States public that they could expect a range of benefits in return for their support. Economic benefits from the application of satellites to communications and weather forecasting; long-range technological benefits accruing to industry; a general stimulus to science and to science education would augment the value of a space program designed to match the military capabilities of the Soviets. (http://www.theatlantic.com/issues/63aug/jastrow.htm)

This promise of security came to finalise the support of the American people. Whereas politicians requested national security as the payback, average citizens were drawn by the promise of future financial security.

Once preliminary backing had been secured, it came down to those who would actually conduct the day to day work of the project to identify and defend their aims and methods. Areas of concern included the moral and philosophical implications of their work. Were the present objectives of a mere section of a single species of the planet, noble enough to be forever seen as the first extraterrestrial actions of Earth? Would science on such a large scale, as in the development of atomic weapons, prove so unwieldy as to result in the death of millions, no matter what the strategic outcome? Was humanity emotionally and intellectually equipped to cope with what was to come?

In the scientific arena assertions were made dispelling the fears of perversions such as the military exploitation of space as science fiction. In this case the scientific community felt they had an ally amidst a particularly troublesome spate of popular fiction which sullied their image. The heated debate surrounding the use of science to develop weapons of mass destruction was also addressed, so that those whose loyalty was uncertain following the bombing of Hiroshima and Nagasaki were assured they were doing the right thing.

> In many ways the [satellite's] purpose will be quite different from what the public expects. The artificial satellite will not be the beginning of a new-weapons development, and it will not be built because its creators are planning a trip to the moon. The satellite program has been initiated as a purely scientific research project designed for the enhancement of knowledge about our own planet.... Space and the atom are the two most exciting promises of modern science. Under the pressures of a world at war, the Atomic Age had an unfortunate start. As yet, fear casts a dark shadow that obscures the untold benefits the atom has in store for us. Space flight, fortunately, will be different. It begins under the auspices of a noble international effort to be carried out in the spirit of peaceful cooperation among scientists of all civilised nations. (Haber, 1956, p.494)

Space Age Style – designers' interpretations of a new era

The first signs of the style invasion (from outer space) were often quite literal. Rockets and spacemen appeared in the patterns of whimsical clothing and textiles, as advances in synthetic fibres and fabric dyeing techniques allowed boldly coloured prints to be manufactured economically. Everyday items, from armchairs to desklamps, were remodelled to resemble the trinkets of galactic explorers. The 'flying saucer powder compact case by Kico was among the many products featuring stylised images of distant asteroids, spiralling galaxies and multicoloured ringed planets.

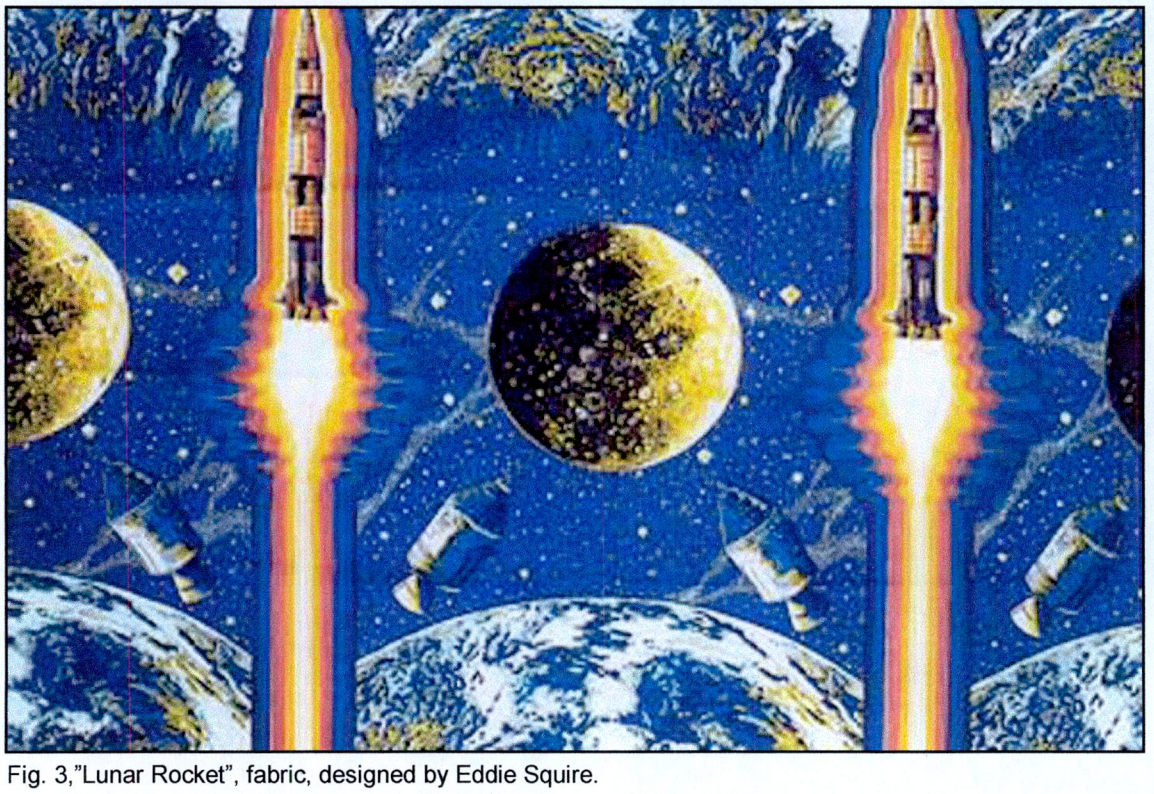


Fig. 3,"Lunar Rocket", fabric, designed by Eddie Squire.

New textile patterns such as 'Space Walk' by Sue Thatcher and 'Lunar Rocket' by Eddie Squires created vibrant montages of realistic images of planets, rockets and stylised flares of colour. Rocket imagery was easily identifiable in car design- - and even in the shape of vacuum cleaners and Thermos flasks. The Oldsmobile Rocket series of automobiles, in particular, captured the mood of futuristic luxury and status associated with new technologies with its charming slogan, "Make a date in the Rocket '88".

Fig.4, Pendant Lamp, Troughton & Young.

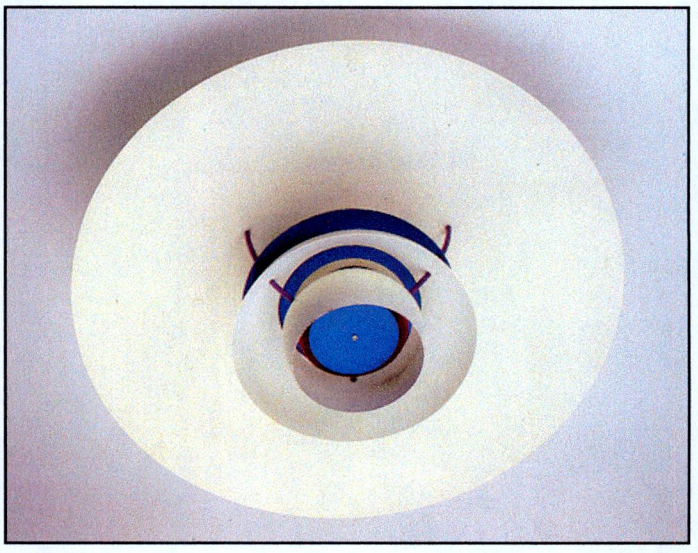


Fig. 5 Pendant Lamp, Poul Henningsen.

Unidentified Flying Objects were sighted not only in the desert outside Los Angeles and hovering above the Whitehouse but also in everyday objects ranging from household radiators to confectionery. Lighting design, through the widespread use of spun metal pendant lamps, mirrored the popular image of the UFOs. By combining direct, diffused and reflected light, items such as the

Troughton and Young or Poul Henninggingsen captured the mysterious and ephemeral qualities that actual UFOs had displayed. (Pearce, 1990, p.86)

The once coveted lustre of Japanese lacquered toys could now be reproduced in vibrant plastics. These were put to good use in all manner of children's toys. Rocket Projectile Space Guns, Space Explorer Space Suits and the invincible Dan Dare's Sparking Ray Gun, all screamed of novelty, while ensuring the annihilation of vicious marauding aliens. Action figure giant, Mattel, produced a figure, which today enjoys cult status. Major Matt Mason, an honest, god-fearing, military hero and exemplary astronaut, fearlessly defended lunar outposts (with his impressive array of vehicles and weaponry) from the aforementioned marauding aliens.

Fig. 6, Space age toys

Of all the imagined alien invasions, which were just about to take place throughout the 1950s, most adversaries of mankind resembled us quite distinctively but for a few strategically placed eyebrows and pointing of the ears. Others had telltale complexions of metallic grey or slimy green. The most sinister of all extraterrestrial nasties were those who could pass among us unnoticed. Although passed off as harmless good fun, it is widely thought that these silent invaders, and the popularity of media depicting them, were symbolic of the growing fear of international spies who threatened the security of entire nations.

In the west, McCarthy's communist witch-hunt give rise to a state of paranoia more pronounced than in any science fiction B movie. Soviet spies were thought to have passed secret military information to the Russians, enabling them to acquire an atomic arsenal with which to threaten the United States. Although the Americans themselves employed highly elaborate means of monitoring the Russians, this was presented as military intelligence- surveillance and reconnaissance. Indeed as the cold war progressed, American spy satellites were the main cause of offence to the Soviet Union.

As film and literary fiction moved on from bug eyed monsters to super sleuths, the distinction had to be made between the good guys and the bad. It was obvious that the viewer would automatically reject the eight-armed slimy character with the glass dome on its head and side with the fresh faced young hero who would save the day. Sympathy of the audience was now ensured by the portrayal of western 'secret agents' as masters of espionage while eastern 'spies' were instruments of treachery.

Secret agents popped up all over the place- Bond, James Bond- being the most famous of these attractive rogues. Bond was in the possession of the most sophisticated gadgetry, the most secret government information and the choicest tailoring in the western hemisphere.

> Bond's adversaries tended to be maverick megalomaniacs, often sponsored by the east. They inhabited futuristic fantasy environments, such as the subterranean lair of Bond's first cinematic adversary, Dr. No, or the chamber in which Goldfinger threatened to slice Bond in half with a laser beam. (Garner, 1996, p.94)

Strewn about these 'fantasy lairs' and, generally, anywhere Bond cared to grace with his stylish presence, were symbols of a lifestyle to which the affluent west aspired. Cocktail bars and curvilinear, moulded furnishings along with state of the art appliances were to be appreciated irrespective of their owners' moral or political status.

The technological breakthrough which was possibly the second most powerful in terms of affecting the lifestyles of its users was the television. This too, however was subject to stylistic redefinition under the reign of the spaceman. In a bid to coax the TV set from its wooden dresser hiding place, Zarach retailed smooth, white plastic 'Globe' televisions.

These televisions, among other items, were highly reminiscent of the helmets of spacemen in various comics and films and, as it turned out, the actual pressure suits worn by astronauts and cosmonauts alike. Eerro Aarnio was perhaps the best known exponent of the soft, white, globular furniture forms which have come to define 1960s space look.

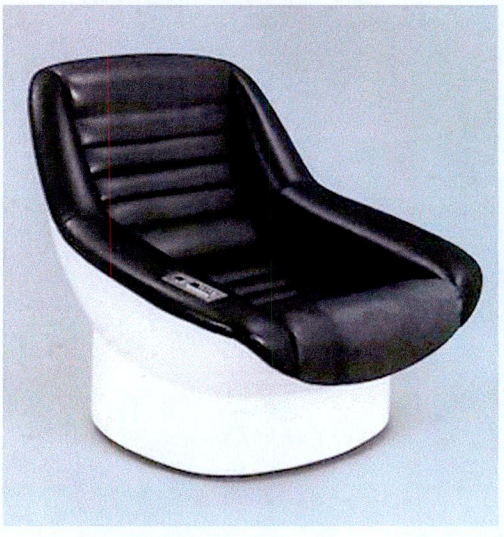
Items such as the Globe chair evoke a strong sense of containment and protection. What you would expect to be quite a harsh and austere cubicle- it's bright white contrasting with striking purple- gives off a rather cocooning effect. It derives its form as much from the passive, strapped in position of a passenger escaping Earth's gravitational field as it does to the shielding, regal status symbol of the high backed throne.

Fig.7, Globe Chair, Eerro Aarnio

Chairs themselves, lounge chairs in particular, enjoyed a renewal, which can also be viewed in terms of the television/space phenomena. While the television replaced the fireplace as the focus of the living room, the seat with the best view replaced the favoured seat by the fire. This seat was often of slightly more luxurious, or at least more imposing design than the others and was likely to be reserved for the 'head of the family'- usually the father.

The Captain's chair, occupied by a certain James T. Kirk, recognised and parodied this new 'viewing chair'. The bridge of Star Trek's Starship Enterprise was focused on a giant viewing screen, which the crew used to view the universe around them.

Fig.8, Alda armchair, Casati & Hybsch.



Like millions of children throughout the western world, the captain's loyal subordinates sat at the very base of the screen following the captain's orders if an enemy vessel needed hailing or a channel needed to be changed.

The 'Elda armchair by Joe Colombo in 1965 was a rich study of a change in the details of status. The heavy authority of the Black Leather Seat was contrasted with the newfangled white curves of the space age. A basic and featureless bulbous mass revealed a plush and sensual form.

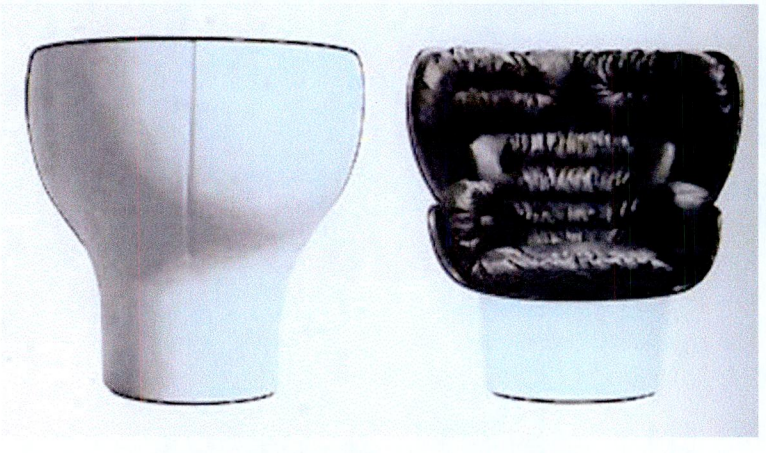


Fig.9, Elda armchair, Joe Colombo.

Andre Courreges, Paco Rabanne and Pierre Cardin were among those who experimented with futuristic, space age clothing. Coureges' spring 1965 collection featured a minimal, pared down look. Using simple, interchangeable items (echoing the modular philosophy) and a predominantly white palette (the

colour of astronauts' ships and suits) he helped to create a fashion context for an emerging era.

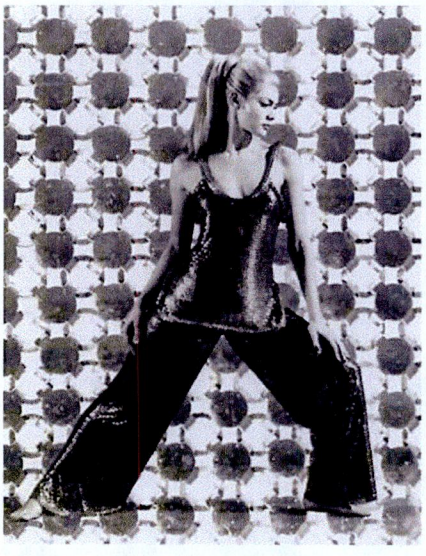


Fig. 10, Metal trouser suit, Paco Rabanne

Fig. 11, Helmet hat, Pierre Cardin

Rabanne's experiments with metal as a clothing fabric contributed to the widespread use of silver- from footwear and makeup to Andy Warhol's first Factory, where the walls were lined with tin foil and the ceiling full of rectangular silver balloons.

Gradually, the initial awe of recent events in space, which gave rise to the superficial application of space related items to household products and decorative wares, mellowed. The practical, social, cultural, international, philosophical and various other implications of what had occurred, began to permeate the thinking of many of those who shaped the items with which we surround ourselves.

Future cities on newly colonised planets would be built from scratch, which raised many questions. How would low gravity affect architecture? Could

pressure suits allow any substantial expression of fashion? To some the prospect of a united Earth Nation of Man, or its equivalent, had subtly military undertones. Would moon dwellers be organised in communities or regiments? Would the moon become a playground for well to do earthlings or might it be a 21st century Van Diemen's land to which we shipped our criminals and other outcasts?

> With living space diminishing, collapsible furniture, pieces which served two purposes, and furniture which could be deflated like balloons or rubber dinghies was as desirable as miniaturisation. Beds which let down from the wall were built into flats. Joe Colombo, whose motto was 'flexibility at all costs', introduced his infinitely extendable Addition seating system made up of slabs of foam, upholstered and pegged to steel junction pieces. (Hillier, 1983, p.184)

Notable examples of inflatable products were featured during a 1967 exhibition in Musee de l'Art Moderne, Paris. Among these were inflatable hangars and a temporary hospital, built by the Garrett Corporation in Arizona. As a follow up to their large PVC pouffe Incandine designed a couch for Christina Smith of Goods and Chattels.

Zanotta Poltrone of Milan, Aubert, Jungmann& Stinco of A.J.S. Aerolande of Paris produced inflatable chairs. Most famous were by Quasar Khanh, transparent and opaque white inflatable furniture and inflatable house in transparent PVC.

Although the overtly spacey items mentioned here have largely disappeared from the home, with the exception of those that enjoy short-lived 'comeback' status, there should be no mistake that the space age has had a profound influence on our lives and surroundings. One of the promises made to the world in the 1950s and 1960s was that of fresh technology. Prosaic items

such as non-stick frying pans (innovative as they were) were instilled with the added prestige of having been developed by Rocket scientists. The vogue for the 'as seen in space' breed of advertising passed within a few years with the result that the origins of many new technologies has gone unnoticed.

Chapter Four

Spinoffs – the secondary applications of space technology.

> The application of NASA technologies by the private sector increases productivity through the development of new products and processes that meet consumer demands; in turn, it helps meet international challenges and aid the U.S. industry to stay globally one step ahead of every scientific and technological innovation. The return benefits (spinoffs) to you the taxpayer, through new industries, new products and services and improves quality of life, represents a substantial dividends on the national investment in aerospace research. (Spinoff http://nctn.gov/success/spinoff/1997/intro.html)

The development of products and services as a direct result of the transfer of developed technologies from space programs to private industry has long represented the tangible reward for the heavy financial investment in space.

The confidence of the investors, in this case the taxpayers of the countries conducting space programs, was first achieved through the assertion that the long term payoffs would amount to nothing less than a lifestyle revolution. Prestige and national pride no doubt played a part in the overall sales pitch, as it were, presented to the public. However, although these elements will secure support for the financing of sporting events and parades, substantial returns are required if sustained support of long term projects such as space exploration is sought. More importantly, perhaps, is the assertion that substantial returns must be seen to be ample and forthcoming.

As it is misleading (and unfavourable) to assess the value of these products and services in terms of profit from the initial investment, their status

has been clearly identified as that of beneficial by-products and as such have come to be known as spinoffs.

Initially independent advertisers largely performed the job of promoting the spinoffs and their association with space research, by emphasising the novelty of state of the art technologies and cashing in on the popularity of astronauts. However, as the novelty dwindled and public financing of programs became an increasingly significant issue, the need for NASA to justify its activities meant that spinoffs represented the buffer used to absorb public disapproval.

As such, the promotion of spinoffs became of strategic plan in NASA's continuing battle for funding. Since 1973, the year after the last Apollo mission to the moon, NASA's own publication, appropriately named 'Spinoff', has aimed to heighten the awareness of the technology, know-how and assistance available for transfer to the private sector, and the public benefit inherent in its utilisation.

> Because they are challenging and demanding, NASA programs generate a great wealth of advanced technology. This bank of technology is a national asset that can be reused to develop commercial products and processes, which benefit the U.S. economy by creating companies and jobs, and as a result contribute to the Gross Domestic Product. According to NASA Associate Administrator Robert E. Whitehead, NASA has helped generate almost one million high-quality jobs, more than $40 billion in annual exports and almost $30 billion in positive balance of trade. (Spinoff http://nctn.gov/success/spinoff/1997/intro.html)

Products emerging in the early years included new materials such as the non-stick Teflon™ (of frying pan fame), fire retardant materials used in the protective garments of firemen and, more recently, volcanologists and even vitreous carbon materials used for prosthetics.

Today the cumulative bank of technology has permeated through a diverse range of industries: health and medicine, transportation, public safety, recreation, environment and resources management, computer technology, industrial productivity and manufacturing technology.

Microcircuitry techniques developed by NASA to control the robot arm used by Space Shuttle astronauts, known as the Remote Manipulator System, was also used by Electrologic of America (ELA) to produce a system which revitalises purposeful movement to muscles incapacitated by spinal cord injury. Using a method known as neuromuscular electrical stimulation, paraplegics and quadriplegics can get a full cardiovascular workout equivalent to jogging three miles three times per week. Using the ELA StimMaster Ergometer former Superman star Christopher Reeve can reverse or prevent secondary symptoms related to paralysis.

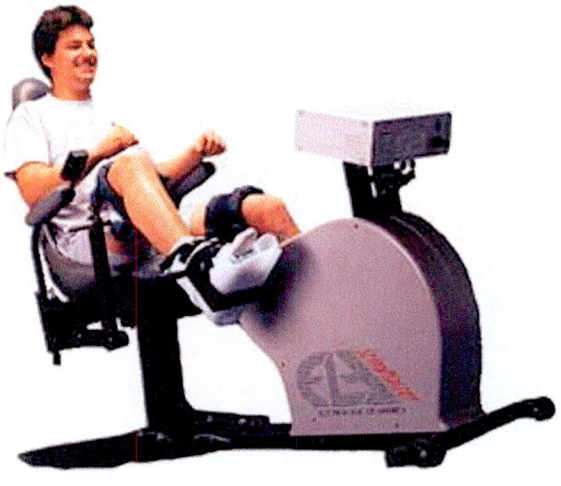


Fig.12, the ELA StimMaster Ergometer.

Several NASA innovations were instrumental in the development of the Boeing 777, the largest twin engine jet plane to be manufactured today. These include wind tunnel testing, computer generated airflow imaging for aerodynamic analysis, strength and durability testing of radial tyres, noise reduction techniques

and the application of lightweight aerospace composites in the plane's construction.

The Space Shuttle Thermal Protection System, (TPS), used to protect NASA's fleet of orbiters from heat damage during re-entry into the earth's atmosphere is also used to insulate drivers from the heat generating areas of stock cars.

Infrared imaging first developed by to observe the plumes from rocket launches, now has diverse applications ranging from environmental monitoring to tumour detection. Infrared cameras are used to see through the dense smoke caused by fires in order to pinpoints hotspots and potential flare-ups. Military applications such as night vision goggles, navigation and flight control systems and civilian weather monitoring, early warning systems, security and surveillance methods all rely on the same imaging technology.

Biofeedback is a stress management technique whereby a person is taught to control tension levels by recognising and responding to external representations of these levels, such as a line on a graph or a musical note. This technique was developed as an aid to astronauts who are subjected to extremely stressful situations and need to remain calm, but has proven popular as a means to combat stress in the greater public. Stress relieving products using biofeedback include computer games and screensavers, which instruct the user in deep breathing, imagery and progressive muscle relaxation exercises.

NASA derived software, capable of constructing highly detailed 3D computer models of complex structures is now used to design and assess new

offices, marine structures, cargo containers, commercial and military aircraft, rail cars and a host of everyday consumer products. By inspecting, modifying and integrating the engineering analysis process, this software enables structural defects to be identified and amended early on in the design process.

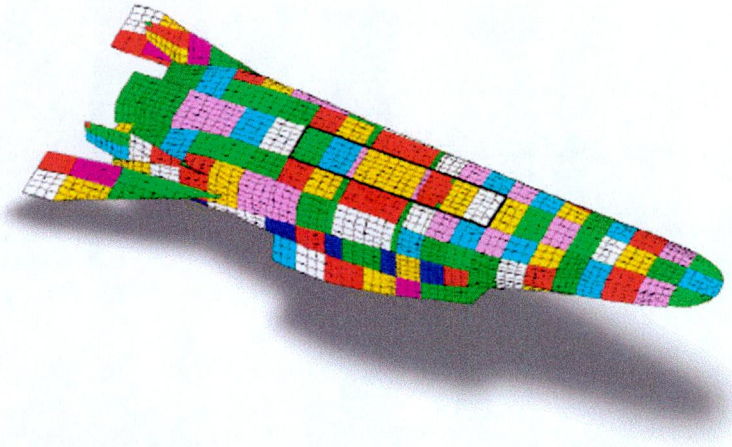


Fig. 83, 3d computer model of aircraft created with NASA derived software: Hyper Sizer.

The field of ergonomics and the collation of anthropometric data in particular owes much of its preliminary research to Air Forces around the world who began to measure the physical make up of their pilots in order to design their cockpits as efficiently as possible. The pool of data built up, the reach envelope of the arms, the width of the fingers, the circumference of the heads of airmen, when collated, provided practical guidelines for the design of aircraft in human terms. Since then, much more sophisticated studies of human posture, movement and strengths etc. have been performed, drawing on a wider cross section of the population. However, studies of human posture in microgravity have provided new data which have lead to new designs of chairs which relieve

the body of back and leg pain as well as muscle fatigue. "A pressure-reducing contour that lessens the devastating effects of gravity. From space-age research, a seating system developed to support a natural stress-free posture... that mimics the absence of gravity." (http://nctn.hq.nasa.gov/success/spinoff/1997/ch2.html)

The technological advancements of the past three decades are immediately apparent from the comparative sophistication of these recent spinoffs and their 1960s predecessors. However the real advancement may be seen as the manner in which the transfer from space technology to commercial application has been implemented. In an effort to control expenditure and maintain contributions to research and development projects, the procedure of NASA innovations simply being handed down or reused by commercial entities has been replaced by a more cooperative and balanced approach.

> Since NASA Commercial Technology: Agenda for Change was written in 1994, NASA has been implementing a new way of doing business through new practices. The Commercial Technology Program has been inviting industry to define and lead joint research and development projects that are relevant to the NASA mission but not driven by specific project requirements, with industry sharing the costs. (http://nctn.hq.nasa.gov/success/spinoff/)

Chapter Five

Sputnik to Sojourner – Public perceptions of the space programs

The conquests of space had inspired shame and joy, on a grand scale, for both sides. The Americans had to endure the defeat of Sputnik reaching orbit before their rockets could muster enough power to escape the earth's gravity. Subsequent failures were dubbed Sit-putnik and Kaput-nik, among other things, by the media. NASA's great show of pomp and circumstance surrounding America's first astronauts, the Mercury Seven, and the rather unfortunately named MISS (Man In Space Soonest) project was thwarted by Yuri Gagarin's historic journey as the first man in space.

After the triumph of Apollo 11 and Americans on the moon it became clear that the Soviets were being left behind-if only in the minds of the global audience. It was that audience, some say, whose indifference was a major factor in the decline and termination of the Apollo programme. Ron Howard's 1995 film "Apollo 13", recounts how public apathy had meant that the launch and address of the three astronauts had not been broadcast on television. Men on the moon no longer held the necessary dramatic value to warrant constant media attention.

As the Strategic Arms Limitation Talks (SALT) proceeded, rivalry was combined with cooperation in a metaphorical gesture of political intent, The Apollo-Soyuz Test Project (1971-1976) involved Russian and American teams

designing, developing and producing the hardware and systems whereby two spacecraft from different traditions could be joined together in space. An atmosphere of a symposium, whereby expertise and related fields of knowledge were exchanged, replaced the secrecy and suspicion of the cold war era.

> As with so many aspects of American national policy, NASA's programs had always reflected the current environment of foreign affairs. Apollo, which had begun as a response from the Kennedy administration to the technological competition initiated by the Soviets in 1957, had been converted by NASA Administrators ... into a means of cooperation with the Soviets. (http://www.hq. nasa.gov/office/pao/History/SP-4209/epilog.htm)

In the aftermath of the 1986 Challenger Shuttle disaster, in which seven astronauts- one of them a schoolteacher-were killed, the capabilities of NASA and the wisdom of manned space exploration itself were questioned. The defect, which caused the explosion (rubber sealing rings), had been detected early in the building of the shuttle. But a bureaucratic myriad of miscommunication within NASA failed to correct the fault.

Popular artists, such as Prince and The Dead Kennedy's' Jello Biafra, voiced their concerns. Prince's song, Sign O' The Times included the line; "It's silly, no? when the rocket blows up, and everybody still wants to fly". Jello Biafra's spoken word performances featured a section called 'Why I'm glad the Space Shuttle blew up'. This less emotional piece referred to the alleged payload of the next scheduled launch of the shuttle, which Biafra claimed contained nuclear waste. NASA's image and that of space travel as a whole were gravely tarnished.

The 1990s saw a fundamental change to the order of world power. With the collapse of the USSR, any lingering concerns of cold war rivalry subsided further. As these concerns had always been a driving force behind Soviet/American space programs, it was clearly time to readdress their purpose.

> The remarkable political events in the last year have reshaped the global political order in unexpected and unparalleled ways. The lessening of East-West tensions immediately inspired visions and hopes for world peace and a subsequent retreat from the threat of a nuclear confrontation between the United States and the USSR. Military expenditures in both nations came under close review, and the words 'peace dividend' signalled a move to redirect governmental budgets into other areas, space development among them. (Woods, & Bernasconi, 1991, p.601)

Within the space community, the debate concerning the use of space and appropriate activities for its exploitation resumed. Many arguments mirrored those first set out in the 1950s and 1960s. Among those in favour of maintaining activity in space argued that the cost of providing life supporting conditions outweighed the advantages of sending people into space, that many of the tasks performed by humans in space could be replaced easily and economically by robots. Britain's astronomer royal remarked recently that robotic and miniaturisation techniques had so weakened the practical case for human space flight that it now seemed like nothing more than a "rather jaded spectator sport". (Rees, 1998,p.19)

Those who supported a sustained human presence in space concurred that automated manless spacecraft were both efficient and economical, but that their real purpose was as probes, gathering information and paving the way for future manned expeditions, which were to be seen as the overall objective of any

space program. The words of Apollo 15 astronaut David R. Scott were often employed to illustrate their perception of space exploration. "As I stand here in the wonders of the unknown...I sort of realise there is a fundamental truth of our nature. Man must explore and this is exploration at its greatest." (http://nctn .hq.nasa.gov/success/spinoff/)

The probes sent out to explore the solar system in greater detail produced startling images of distant planets. On July the fourth, 1997, as America celebrated Independence Day, NASA's Pathfinder Spacecraft reached Mars. Its payload consisted of a 1-ft-tall, 2-ft-long robot car, Sojourner.

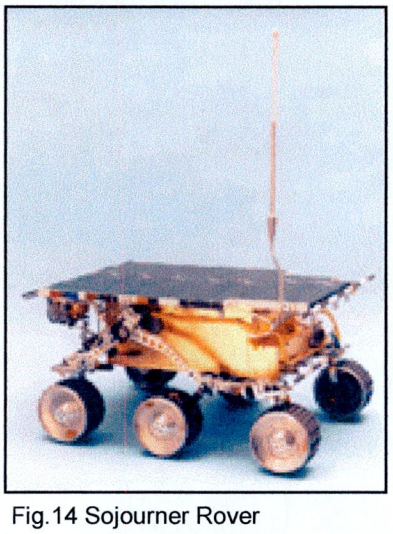


Fig.14 Sojourner Rover

This new triumph was such that United States President Clinton issued a statement declaring: "Our return to Mars today, marks the beginning of a new era in the Nation's space exploration program." (Kluger, 1997, p.32)

The success of probes such as the pathfinder has led to the launch and development of many others. The Mars Global Surveyor along with eight other probes are planned to complete further study of the planet before 2005. Still more probes are planned ranging in destination from the moon to Pluto. NASA administrator Daniel Goldin said that by 2007: "We'll be flying by, orbiting, landing, roving and bringing back samples from every critical planetary body in the solar system." (Kluger, 1997, p.32)

Through emphasising the comparative costs of manless probes, in relation to mammoth schemes such as the Apollo project, the past excesses were acknowledged while newfound responsibility was highlighted.

In the case of manned space flight, however, the Space Shuttle, NASA's primary launch vehicle, was promoted on the basis that it was reusable. In the hope that this quality would itself imply economy (previous vehicles jettisoned several modules before returning to earth) the shuttle's draining of funds was played down as much as possible. Due to the fact that most Shuttle launches cost considerably more per pound of payload than launches aboard throwaway rockets, any technical achievements were overshadowed by the perceived lack of common sense.

Fig. 8, The Space Shuttle

Stories abound of cases like this where NASA lives up to the stereotypical image of incompetent genius: experimental physicists unable to operate videocassette recorders, brain surgeons incapable of remembering their own date of birth etc. One such story tells of a top secret NASA project during the cold war era, which involved the development of a pen that would work in the absence of gravity so that astronauts could write in space. Two million dollars later, a pen was produced. As the rivalry between the superpowers eased, Soviet and American scientists began to share their knowledge. When Soviets were asked

how they had solved the problem of writing in microgravity, they replied – we use pencils.

This story is indicative of the widely held belief that intellectual talent is often highly specific in nature: mathematical aptitude does not necessarily carry over to language abilities or the nebulous quality of common sense. To some intellectual prowess is seen as an automatic disqualification of other abilities.

In NASA's case, this view has lead to the opinion that the ability and desire to produce and develop technology does not automatically indicate an ability to control and assess their budget. Many quietly believe that it is NASA's collective genius and passion, which renders them incapable of managing finances and assessing the appropriateness of their expenditure in human terms.

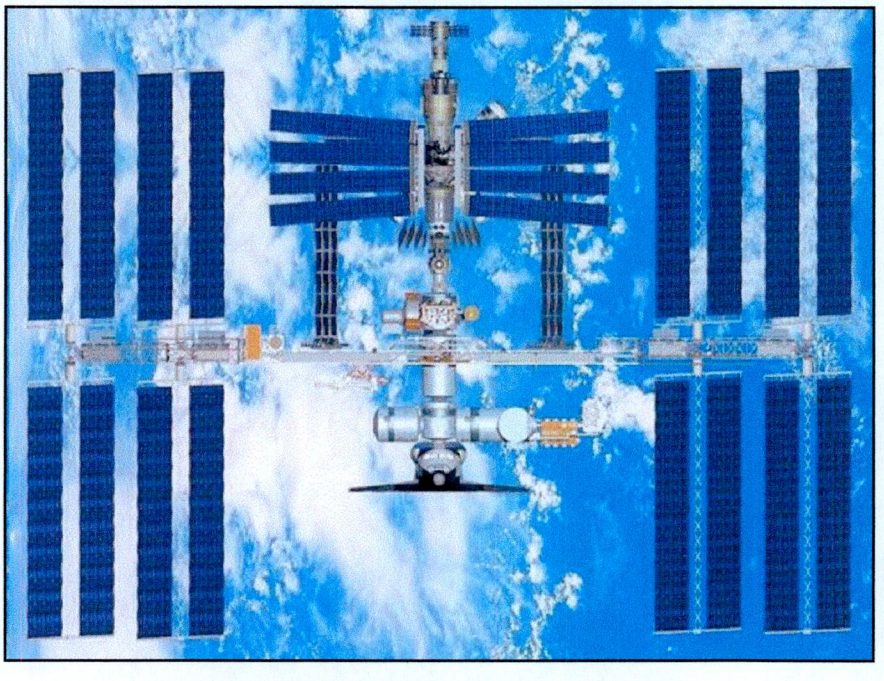


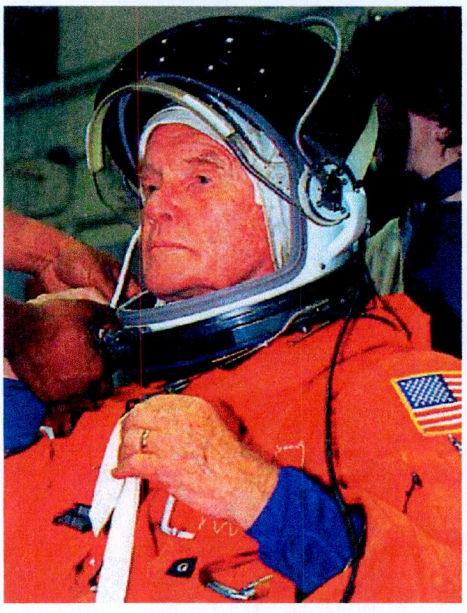
Fig.16, The International Space Station

December 1998 saw the launch of the new International Space Station (ISS). Together with providing a lab wherein various experiments could be performed in microgravity, the main function of the new space station, (as was of previous stations, Mir, Apollo-Soyuz, Skylab and Salyut), is to study the progress of living organisms and materials in space. Again this project drew strong criticism which questioned not only the usual budgetary issues but the wisdom of the entire project as the next step in space research.

> The strongest objection to the station is that it places the cart before the horse. Someday, space stations might be desirable, along with even grander projects in space. Today, with each space shuttle launch costing at least $400 million, it's fiscal lunacy to be building a 475-ton chalet above the atmosphere...No rational planner would use the shuttle for anything other than space-station crew rotation flights—a restive point for NASA, since, by all appearances, the space station is being built primarily to give the shuttle something to do...Instead, NASA's focus should be on developing new systems that cut the cost of access to space. (http://www.Thenewrepublic.com/magazines/tnr/current/trb113098.html)

The movement for free public access to space

The status of astronauts as brave heroes was revived in October of 1998 as Mercury astronaut, John Glenn became the first astronaut to come out of retirement. It had been thirty eight years since Glenn had last been in orbit and his new mission would record the impact of weightlessness on the ageing body. While the data collected would prove invaluable, many saw the true value of Glenn's presence to be that of Public Relations and symbolism. So called 'Weekly Journal of Opinion', the New Republic recorded in November 1998,



> It was not only pleasingly nostalgic but genuinely inspirational to behold John Glenn arcing into orbit again last month, reminding us that neither individual courage nor Kennedy-era dreams need ever end. (http://www.thenewrepublic.com/ magazines/tnr/current/trb113098.html)

Fig. 17, John Glenn.

In the minds of many, those involved in the new developments and ordinary members of the public, the resumption and redirection of space activities harked back to the hopes and convictions held as they first embarked on this

great adventure. Two decades had passed in which little had occurred of which to be proud. The disillusionment and nihilism of the 1970s followed by the material excesses of the1980s, along with the disappointing performance of space travel during those periods drew attentions to the expectations held at the outset.

The image of the astronaut, which had emerged, portrayed men and women chosen for their lack of individuality and their ability to perform routine repetitive tasks without question. The heroic figures of John Glenn and Neil Armstrong had been replaced by the nameless drones who went about the sorry task of continuous repairs on the ailing Mir space station and other dysfunctional space clutter. This disparity was comparable to that between the envisioned impact space development would have on our society and the reality of life in the 1990s.

It had been the prevailing notion of a better life to come, which drew together all proponents of space research. The basis of excitement and support of the public lay not in the achievements and failures since 1957, but in the promise of things to come. The day trips to the Moon, holidays in Mars, cruises around the solar system had never come to be - the instant meals, miniature electronic devices and orbiting communications satellites, which had materialised, had failed to fulfil our expectations.

Within the space community, these promises were not seen as undelivered but simply that circumstances were such that their realisation would take a little longer or that research had proven them impractical. The lunar colony

had not come about because knowledge gained subsequent to its conception had deemed it unsuitable to human habitation.

> The prospects for space are changing so fast. The crowing achievement of Apollo 11, the craft in which I flew with Mike Collins and Neil Armstrong, was landing on the moon... Now the goals are different. We might once have thought about living on the moon, but since our trip we've learnt so much about it, and it doesn't make much sense as a colony for humans. We might consider sending a few workers to install telescopes, supervise mining or communications and scientific experiments. But it's become so easy to travel there now that it would be just as simple to dispatch people from Earth to repair any installations when the need arose...
> Mars is a much better bet. It has a very thin atmosphere, hopefully a good bit of water below the surface, and carbon dioxide at the two poles. The day-and-night cycle is very similar to ours, and it would take humans five or six months to get there or come home, so colonisation makes more sense. (Aldrin, 1998, p82)

While these efforts do indeed point towards the goals of extending human presence beyond this planet, the fact remains that these missions are to be manned by an elite group of trained astronauts and cosmonauts who have undergone vigorous training- not ordinary members of the public. However, all this may soon change.

Lobby groups, such as the ShareSpace Foundation in America, already exist to promote the inclusion of private citizens on future shuttle missions. The purpose of ShareSpace is to use an egalitarian selection process to strengthen and accelerate the growth of commercial space, and at the same time create a highly participatory citizens' space program. These groups base their arguments on the conviction that average American citizens have footed the bill for the U.S. space program on the understanding that they, their children or at least their grandchildren would have the opportunity to reap the rewards by travelling in

space themselves. Nevertheless, these proposed provisions within government run programs are widely perceived simply as a first, token step and would not constitute free access to space for the public at large.

Prohibitive cost is generally accepted to be the main obstacle to accessible space travel for all. Many believe that cheaper, more efficient means of travel are possible but that these will only arise if the incentive exists to achieve them. While cost cutting is a major concern for NASA, this is because lower costs would mean a greater number of missions and less criticism in terms of financial performance, not because they wish to enable the general public to reach space. The focus has now moved toward private enterprise. "While NASA has proven the final frontier can be reached, the challenge for the private sector is to make space flight economical." (http://news.bbc.co.uk/hi/english/sci/tech/newsid_209000/209644.stm

Among the companies actively investigating space as a business venture, many maintain their motives are rooted in the noble quest to expand the horizons of their fellow men. The true driving force behind the realisation of public access to space, however, is commerce. The commercial opportunities of space travel are such that those who produce a viable and cost effective system of providing transport would reap untold rewards.

While this concept is by no means a new one, the last few years have seen the first factual proposals of terrestrial businesses extending their operations beyond the atmosphere. The familiar theme of space tourism has endured and features strongly in many plans set out by prospective developers.

> I believe the future of space lies in adventure tourism... The next generation of space tourism will involve regular 'cycles'- shuttles between Earth and the moon. And that would be a forerunner for a similar programme to Mars. (Aldrin, 1998 p82)

General statements such as this are becoming increasingly focussed as companies worldwide carry out extensive market research to assess the exact nature of the possibilities of extraterrestrial enterprise. Surveys, published by Aviation Week & Space Technology in April 1997, indicated that space tourists from the U.S.A., Japan and Europe would pay as much as $72,000 for a 5 day trip to an orbiting hotel. This was estimated to result in annual revenues of more than $14 billion based on launch costs of $1-2 million per flight.

Figures such as these have lead to serious development of projects that would serve as a destination for such tourists. One such scheme, the Space Island orbiting hotel, is overtly suggestive of a certain spaceship in Stanley Kubrick's "2001-A Space Odyssey". The Space Island Group, based in California, is has plans to build a revolving space hotel, which would be made out of discarded fuel tanks from the space shuttle. The fuel tanks – which normally burn up in the atmosphere – would be linked together to form a ring. If the structure were made to spin, the centrifugal force produced would simulate gravity, drawing hotel guests toward the perimeter of the ring. This kind of revolving structure would have the best of both worlds, offering the familiarity of gravity at its extremities and the feeling of weightlessness towards its centre.

While space tourism retains much of the fanciful and luxurious connotations of the private sector development of space imagined in the 1960's, other business opportunities approached remain decidedly mundane. The famous business dictum that time is money fuels many services, which assert to exchange one for the other. Businesses such as package delivery and high speed transport offer speedy service in return for higher tariffs. Companies such as DHL and Federal Express have seriously investigated the market potential for hypersonic, sub orbital vehicles which can provide New York to Tokyo same day delivery services. Drawing analogies with conventional aviation patterns, the historic model of air mail subsidising passenger transport would transfer to space flight by rocket-mail subsidising passengers on sub-orbital craft capable of travelling from New York to Paris in under one hour.

Groups such as the XAPRIZE Foundation extend this analogy, recalling the capability of competitions (such as the Orteig Competition, which offered $25,000 to the first team of aviators to successfully transverse the Atlantic Ocean) to accelerate the development of aerospace technology. The Foundation is offering a $10 million prize to the first private team to successfully build and launch a craft capable of carrying three individuals on a sub-orbital flight.

Foundation President Peter Diamandis explains this approach as follows: "If you don't want to spend a decade in training or if you aren't qualified to be an astronaut how can you get the chance to fly? We have to develop the private sector. The competition's purpose is to encourage entrepreneurs and rocket scientists to build vehicles that will take us into space."

The mission of XAPRIZE is to create a future in which the general public will personally participate in space travel and its benefits. The XAPRIZE Foundation seeks to do this by:

- Organizing and implementing competitions to accelerate the development of low-cost spaceships for travel, tourism, commerce and access to the resources of space.
- Creating programs which allow the public to understand the benefits of low-cost space travel.
- Providing the public with the opportunity to directly experience the adventure of space travel. (http:www.xprize.org/info/q&a.html.asp?client+42884)

Fig.18, Zegrahm's Space Cruiser.

For those unwilling to wait any longer for technology to catch up with them, there are companies willing to provide them with the opportunity to experience space while it is still exorbitant in cost. For US$98,000, you can book your seat on Zegrahm Space Voyages' Space Cruiser. The company, staffed by ex-NASA officials, is planning a series of commercial flights, which it claims will signify a new direction in the concept of travel – heralding a travel renaissance.

Zegrahm can offer

> All-inclusive 7-day space experience travel programs with passenger flights to space in 2001. Following an exciting astronaut training program, you will embark on a two-stage spaceflight with a SkyLifter™ vehicle elevating the SpaceCruiser™ to rocket firing altitude. The ultimate destination of your space cruiser: astronaut altitude, 100 kilometres above sea level. En route, you'll experience the ultimate view: the spectacular glow of the Earth's curvature. And once in space, the ultimate sensation: weightlessness. Upon return, you'll celebrate these achievements at a gala reception held in your honor. (http://www.incredible-adventures com.dearadv.html)

Mike McDowell, the President of Space Adventures, a company offering similar expeditions, (see figures 19 & 20) acknowledges that although commercial space flights are now available, the ticket price is prohibitive to all but the most eccentric of the wealthy and the most hardened of space enthusiasts. "It is going to stay with people who have disposable income. But there are people looking at ways to open up space to those without $100,000."

(http://news.bbc.co.uk/hi/english/ sci/tech /newsid_209644.stm)

Fig.19, Pathfinder - a true spaceplane

Fig. 20, Roton - The Space Helicopter

This view has lead to much speculation that the ventures of companies like Zegrahm and Space Adventures, while opening space up to non government agency travellers, are merely supplanting one elite group (the enormously wealthy) for another (government astronauts). The proclamation of Zegrahm publicity articles such as this could remain truth in practicality, despite their offers of civilian space travel.

> Years ago, it was simply stated that space was a mission, not a destination. It was the private domain of a select handful of government astronauts, off limits to private sector travel due to exorbitant costs and technology voids (Zegrahm Space Voyages http://www.spacevoyages.com/brochure.html)

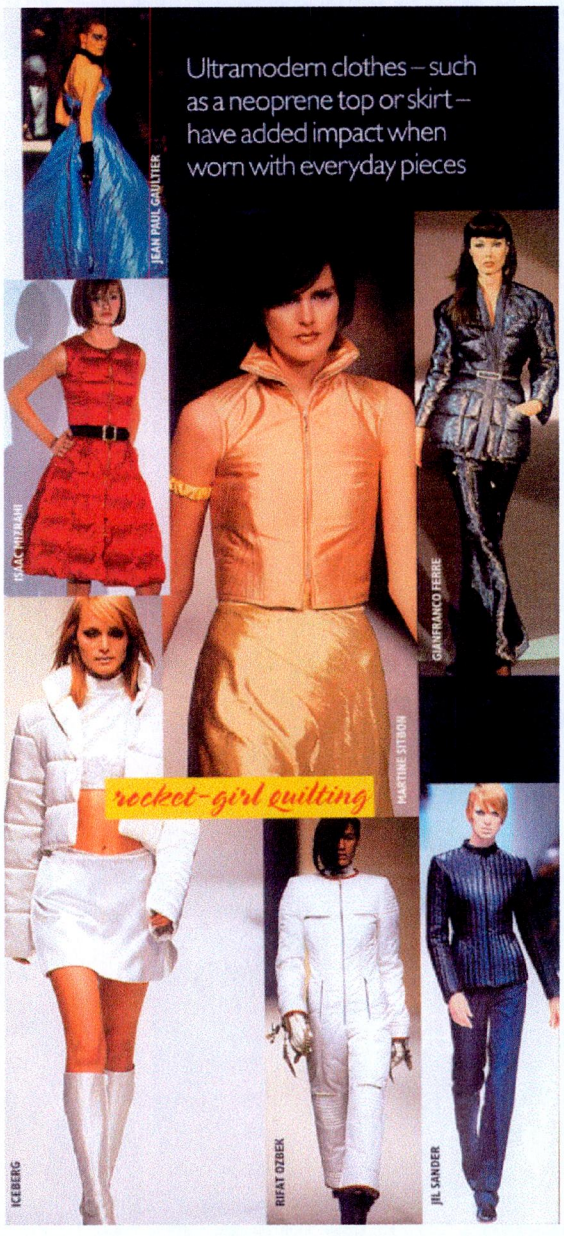
Although there will soon be commercial space travel for the adventure tourist, it will take a little while longer for the 'exorbitant costs and technology voids' to subside so that the private domain of space stretches to include more of society.

Chapter Seven

The Return of Space to Popular Culture in the 1990s

As space gradually returned to the public arena, its influence could be seen filtering and bubbling through fashion and design, film and music.

Fig.21, Vogue Fall/Winter Collections 1995



Fashion in the nineties has experienced every comeback possible and the space age look was no exception. However this was a look which had its roots in future fantasy with the common timeframe given as the year 2000. The curious nature of reviving a style which was itself based on the anticipation of the time in which it was being revived, resulted in a unique and inextricable mishmash of time references and social connotations.

The white and silver of Courreges and Rabanne were coupled with the pared down, sleek lines of

nineties simplicity by designers such as Issey Miyake. Cheap synthetic materials like rubber, nylon and even cellophane were slashed, topstitched or zipped to create interesting textures and shapes. Rifat Ozbek and Jil Sander gave regimental and bulky spacesuit overalls a softer more delicate look with intricate quilting and soft sheen fabrics. The enduring symbol of nineties space age may in future be seen as the 'puffa jacket', a truly modern garment with its waterproof synthetic fabric, heavy synthetic insulation and crisp horizontal quilting reminiscent of astronauts' pressure suits.

Fig.22, Special agents Mulder and Skully of the X-files.

The nineties have also seen the return of space to popular entertainment. The return of Star Trek and its numerous offshoots – Star Trek, Deep Space Nine/ Voyager – and of other 1960s classics such as The Outer Limits was accompanied by the nineties genre of supernatural, extraterrestrial, political conspiracy theories.

The X-files and Dark Skies, amongst other TV shows, centred on the notion that it would be frighteningly easy to withhold information from the public,

the truth in this case being the existence of extraterrestrial life and the evildoings thereof.

Alien and other attacks from outer space featured heavily at the box office with blockbuster after blockbuster featuring brave souls (usually Bruce Willis) defending humanity from some dastardly force. Films such as Independence Day, Men In Black, Contact, Deep Impact and Armageddon have all focused on the possibility of the earth coming into contact with external forces – be they slimy alien invaders, paternal advanced civilisations or catastrophic meteors. The lesson to be learned is that man cannot consider the earth to be an isolated unit, it is part of a wider universe and therefore must take outside events into consideration.

Once again capturing the mood of the times, advertisers claimed to provide the technological and social advancements of space travel on the ground. The leisurely lifestyles anticipated in space could be experienced now, without waiting for reality to catch up. Car manufacturers, luggage makers and airline companies exploited the luxury - safari atmosphere of commercial space travel.

The Mitsubishi Space Wagon was among a new breed of automobile, which focussed on shuttling small parties of people efficiently and comfortably. These people-carriers reflected the concerns of consumers regarding the wisdom of the conventional five-seater car used by one person. These concerns (the comparative value of transporting one or two people and the cost of the vehicle,

its impact on the environment, the existence of more suitable means of transport etc) were in keeping with perceptions of NASA and other space agencies.

Fig.23, The 1999 Mitsubishi Space Gear.

Some product advertisements, such as those for Samsonite suitcases, ironically allude to payloads and transportation capabilities etc. The overall effect of this type of association with space travel is to imply that private industry (and not state agencies) could assess, manage and supply that which was truly effective and desired.

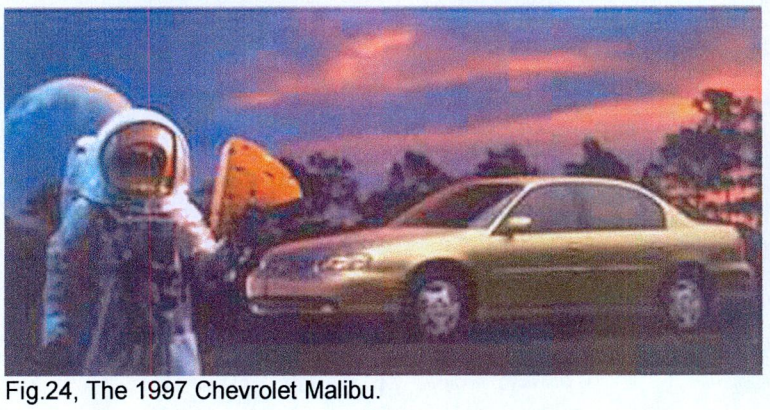
However, the predominant trend in space age advertising in the nineties has been of nostalgic reference to the early days of Apollo and Gemini, and of homage to the heroes who first flew in space.

Edwin 'Buzz' Aldrin, the second man on the moon was back on our TV screens in 1998 endorsing Equitable Life insurance policies. With his much beloved sense of humour (Aldrin, stepping down onto the surface of the moon following Armstrong's one small step, quipped that it may have been one small

step for Armstrong but that it wasn't so easy for a little guy like him) and inimitable charm, Aldrin related his vision of the future.

> Thirty years ago I went to the moon –
> Thirty years from now you can go too… you'll be able to buy spacesuits in sports stores.

The 1997 Chevrolet Malibu saloon was pictured with an astronaut in a late 1960s pressure suit holding a giant slice of Swiss cheese and the moon in the background. The slogan proclaims



"Things we've noticed about Americans:
Going places is a national obsession.
Been there in 1969
◊CASE IN POINT◊
the reliable new Chevy Malibu."

Fig.24, The 1997 Chevrolet Malibu.

The 1999 Peugeot 205 TV campaign features a daydreaming hairdresser in a distinctly 1960s retro salon complete with rows of 'helmet' hairdryers. As the new Peugeot car sweeps by she is transported from the drudgery of her workplace to a futuristic fantasy world where she floats freely wearing a silver Barbarella style spacesuit with one of her hairdryers as a helmet. All this is accompanied by a retro 1960s soundtrack provided by the king of retro – Lenny Kravitz, known for his insistence on using only original 1960s analogue recording equipment in order to capture the sound quality of that time.

Even the overtly cheesy aspects of the first wave of space age culture: the fascinations with digital displays, the outrageous posturing of William Shatner's Captain James T. Kirk, have been invoked by advertisers of consumer items such as Lorus wristwatches by Seiko. Magazine spreads featuring the Lorus Fusion collection show a huge silver wristwatch, with a distinctly low tech red digital display, looming over a silver sequin clad space maiden accompanied by the phrase "...to boldly glow..."

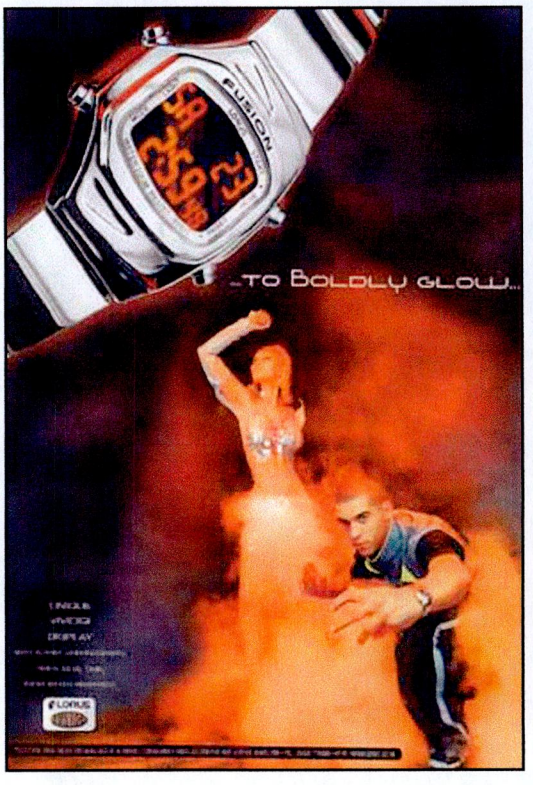


Fig.25, Lorus Wristwatches

The widespread use of space imagery in late 1990s media can be put down to a combination of two shaping forces. It may be that a progressive few are pioneering the revival of1990s revivalism, working the last out of the styles this century had to offer in order to provide a clean slate, as such, for a new millennium. The other element is that of a reappraisal of the possibilities brought about by space travel in its earliest forms. Current activity by private enterprise and state-run agencies is being seen as a second chance to capture the dreams of a space age that never came to be.

Conclusion

If there is any general consensus among the numerous and varied interpretations of space exploration, it is that it never fulfilled its potential. This potential, again, holds different meanings. To some it is that the government and the public became quickly disillusioned and without their support, the space programs were doomed, to others it was merely an expression of two nations locked in mutual distrust which was to serve no real purpose in peaceful times. The changing political climate, public apathy and ruinous costs are just some of the obstacles which have hindered the progress of space exploration, resulting in this apparent underachievement.

Yet, the closing decades of the twentieth century have been profoundly affected by the technological advancements of space research. Communications, medicine, aviation and countless other industries owe a great debt to these programs which, it should not be forgotten, are still in operation today. Therefore, on what basis have the space programs been deemed failures?

Any endeavour, be it a business venture, a change of career or a government program, is assessed in part on its expected performance in the long term – some understanding of its immediate consequences and anticipated outcome is required in order to construct a realistic picture of its value. These projections are, of course, subject to revision based on changing circumstances and unforeseen events.

In the case of space exploration, however, the initial expectations and projections so captured the public imagination that they formed a hardened image, which could not be easily revised. Subsequent changes of circumstance then came to be viewed if not as failure but as backtracking. Anything short of holidays to the moon and orbiting leisure centres fail to hit the mark.

Before any real progress can be made, the ghosts of these expectations must be exorcised. Perhaps the commercial sub-orbital flights due to commence in 2001 and the proposed orbiting hotels will succeed in fulfilling these dreams. Maybe then space can once again represent the extremes of human endeavour.

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