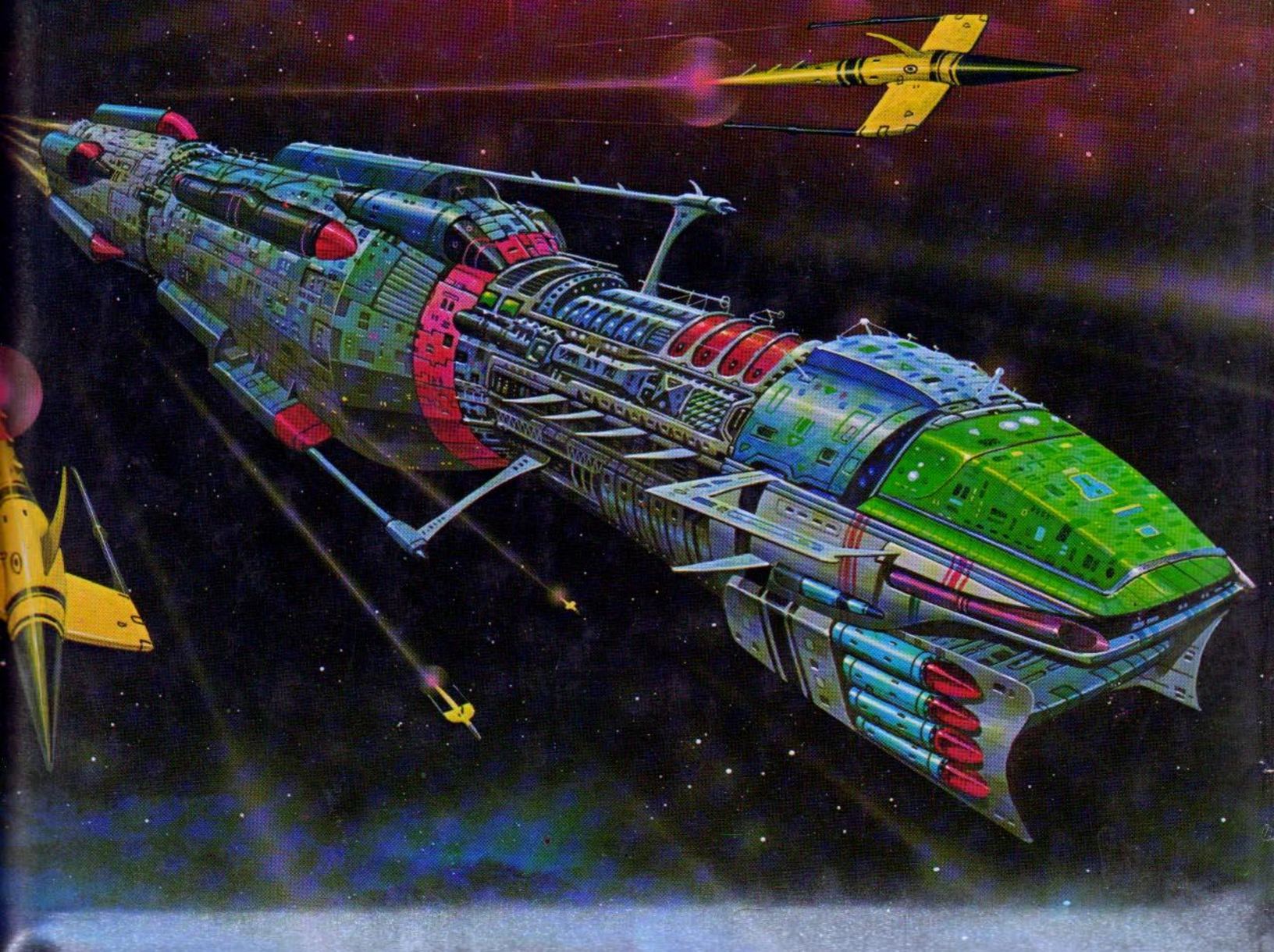
TERRAN TRADE AUTHORITY HANDBOOK

SPACECRAFT 2000 to 2100 AD

Stewart Cowley



SPACECRAFT 2000 to 2100 AD

Here at last is the comprehensive, all-color guide to the major spacecraft of the last century, 2,000-2,100 AD, the time of the great advances in space technology that followed the first, hesitant steps of the late 1900s.

Primarily an identification manual, it examines the forty major types of craft operating during the period, including those of the inhabited systems of Alpha and Proxima Centauri, giving details of their development and operational history, and charts of their technical specifications. The book is divided into sections covering Military, Civil and Commercial, and Special Function, and the craft range from sleek interceptors through specialised research vessels to private yachts, while there is also a small section of unidentified space vehicles discovered under various circumstances, and still shrouded with mystery.

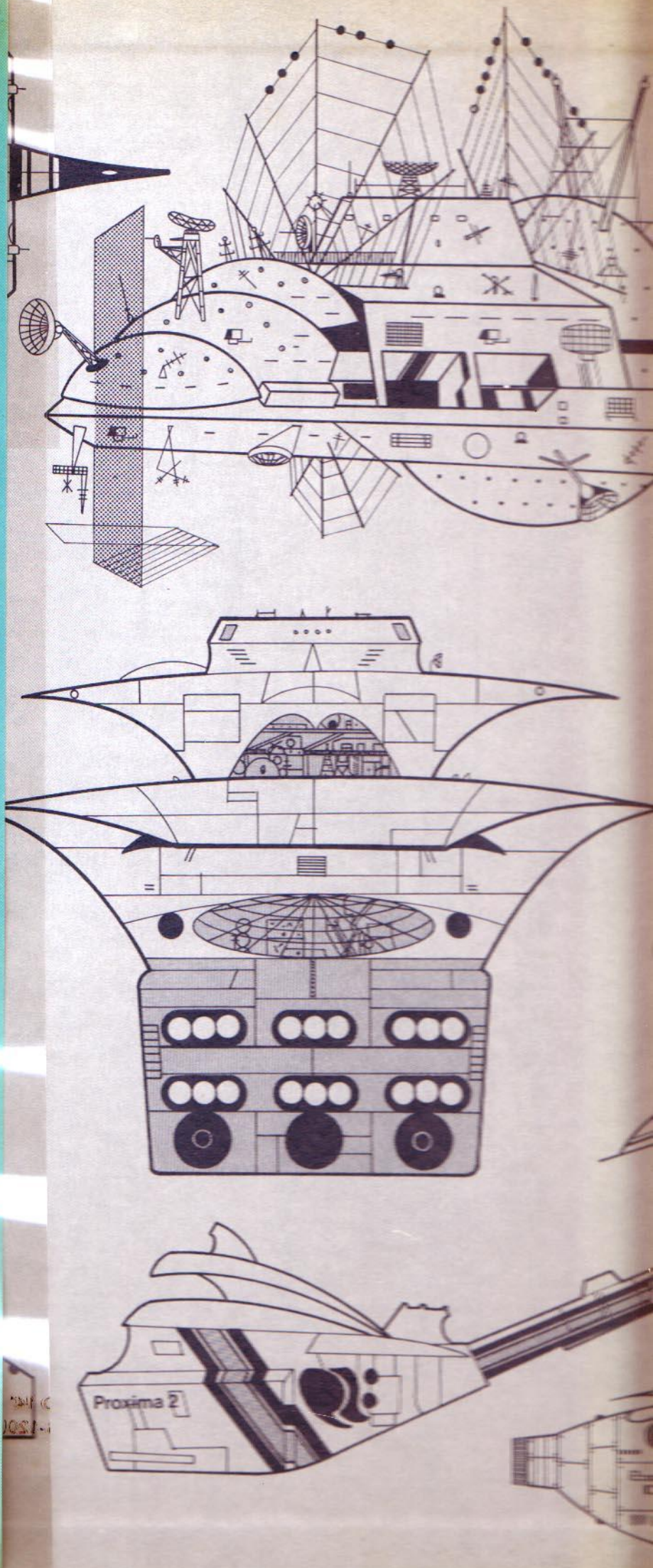
The individual stories of these craft are set against the historical background which created them. New industrial techniques and resources led to more advanced ships which opened the door to further possibilities in an accelerating spiral of development.

Contact with other inhabitants of our galaxy in 2036 AD led to an era of war and peace, industry and innovation, during which the greatest advances in space engineering ever made produced a fascinating array of hardware.

Here then, is the story of Man's journey to the stars and the means by which it was made.

Jacket Illustrations:
front:
Consolidated Aerospace X-800B experimental prototype on its maiden voyage to Proxima Centauri in 2099. Shown here escorted by a flight of Proxima Shark Interceptors. Illustration by Angus McKie.

back:
ACM 115 Minnow



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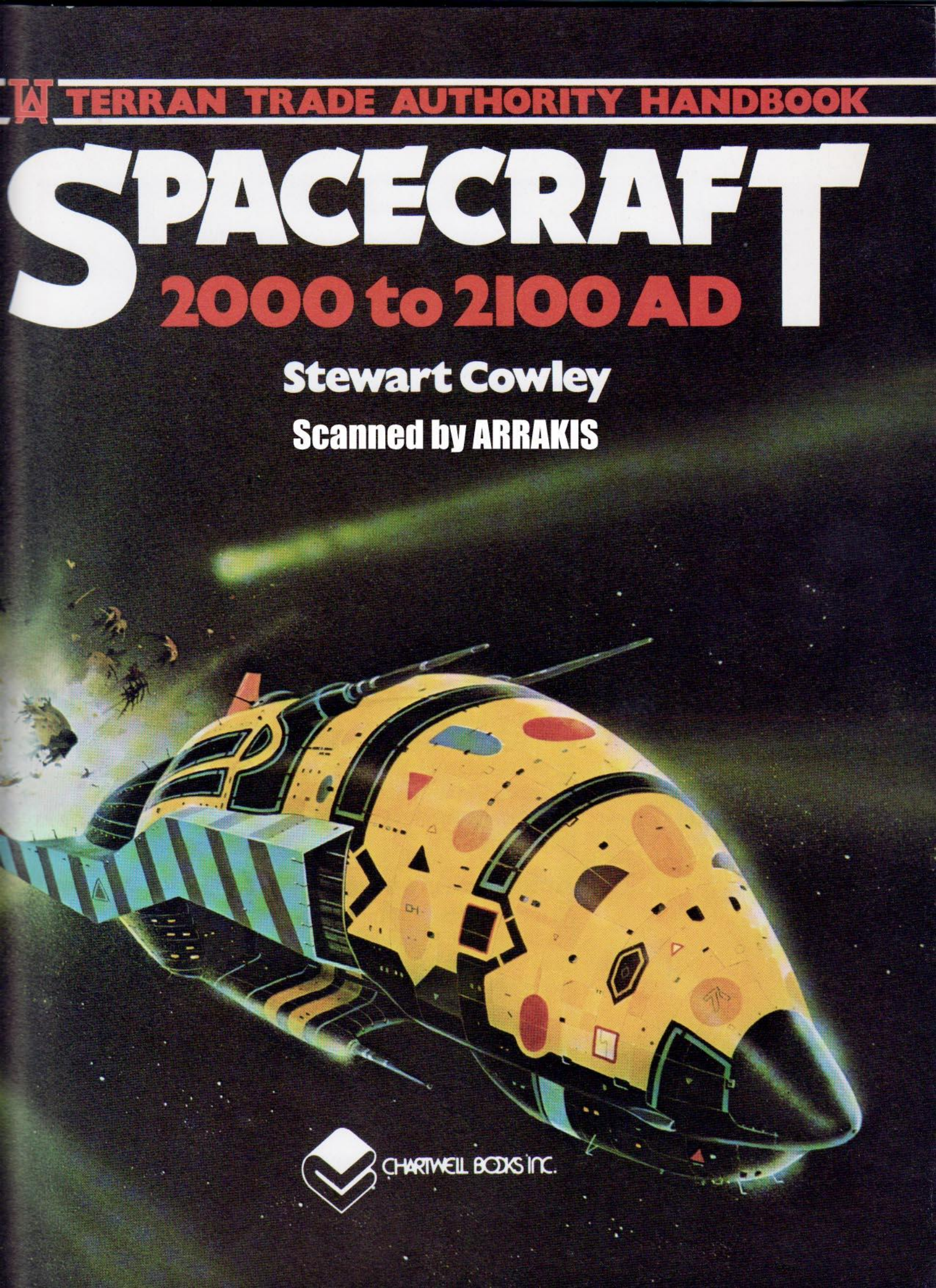

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The Terran Trade Authority

The TTA, formerly the World Trade Authority, was founded in 1999 AD as a subsidiary of the World Council, charged with the task of administering all international trade. Four years later the Commercial Technology Division of the World Community Research Council was absorbed into the WTA structure, including the fabrication yards of the Space Research Centre.

Following the Trade Agreement with Alpha Centauri the name was changed to the Terran Trade Authority and its responsibility was extended to cover interstellar commerce. To meet the growing demand for more extensive spacecraft manufacturing facilities, the TTA undertook the construction of the great Mars Shipyards which were completed in 2046, although ships were coming off the slips as early as 2038.

Primarily an administrative body, the TTA is nevertheless also a major manufacturing concern producing a wide range of specialized products from medical and scientific research equipment to the energy-absorbent Defence Shields of which it is the sole supplier.

Acknowledgment

All the illustrations in this book were supplied by J.S. Artists Ltd., and the publishers would like to take this opportunity to thank them for their co-operation and enthusiastic assistance in its preparation.

Contents

		Page
The Terran Trade Authority		4
Introduction		6
Key Historical Dates		7
Military: Terran		
CAM 117	Gunship	8
SSF 21D	Cutlass	10
	Sentinel Major	12
CAM 130	Cyclops	14
TDA 107C	Partisan	16
AAF 212	Hornet	18
AAF 311	Warhawk	20
	Skybase	22
Military: Alphan		
ACM 113	Fatboy	24
ACM 115	Minnow	26
ACM 118	Manta	28
ACM 128	Stingray	30
ACM 122	Behemoth	32
Military: Proximan		
K4	Interceptor	34
K13	Shark	36
K7	Piranha	38
	Tarantula	40
	Moray Eel	42
K9	Goblin	44
	Mobas	46
Civil & Commercial: Terran		
TTA	Colonial III	48
MRT 114	Mule	50
	Martian Queen	52
	Interstellar Queen	54
	Miami Spaceport	60
	Nomad Industrial Complex	62
	Skymaster 28	64
	Avery-Frost Orion	66
PTVM	Railbus	68
Civil & Commercial: Alphan		
	Starblade	70
AC3	Stag Beetle	72
Civil & Commercial: Proximan		
PCI 191	Gourmet	74
C89F	Whale	31
K34	Bee	76
Special Function		
	Astrolab	78
	Voyager II/ Connestoga	80
Unidentified Alien		
The City Ships of Alpha		82
Object # 1 Barnard's Star		84
Object # 2 and # 3		86
Object # 4 Proxima Centauri		90
Object # 5 Sirius		92
Object # 6 Lalande 21185		94

Introduction

The twenty-first century will be remembered as one of the most significant periods of human history. Those qualities of direction, purpose and unity which are the essential ingredients for real progress had gradually been dissipated in a fragmented world. Humanity had become preoccupied with the minutiae of daily living and men of broader vision were finding themselves an unheeded minority. Man needed a quest to fire his imagination and extend his abilities. For a while he found one in his early attempts to explore the vastness of space, but the exhilaration was soon replaced by a growing resentment of the massive costs and minimal returns. Instead of being a spring-board to escape a shrinking world, space became another weapon in mankind's civil war.

Paradoxically, the strain of meeting the demands imposed by space programmes and the difficulties of sustaining enthusiasm led to a renewal of effort, for it was soon realized that real progress could only be made by a sharing of objectives and the means by which they could be achieved. By the end of the twentieth century the eastern and western blocs were co-operating in an expanding range of projects, thereby avoiding the wasteful process of duplication and parallel research that had been previously inevitable. In 1990 the World Community Research Council was formed to manage and co-ordinate these activities, and to allocate funds contributed by its member nations. With the admission of the Third World War Bloc sixteen years later the Council became the largest research establishment on the Earth, operating a number of major stations such as the North African Space Research Centre. Within a short time the investment made in space technology began to reap dividends. During the early years of the last century extensive facilities on our moon were established and industrial bases began to show a return. Most significant were the host of new materials and techniques which provided a basis for a rapid acceleration in the growth of industrial technology. For example, vacuum mills in free-fall were able to produce large quantities of valuable new alloys and uni-directional stress components, many of which were responsible for major advances in the development of new space-craft. These, together with the earlier successes in the field of nuclear engineering, led in turn to the building of further facilities on Mars.

Another important point had been reached because the creation of the bases required men to work on their construction and maintenance. In turn these men required support for the long periods of time they would be away from Earth, so their families accompanied them. It was then but a short step to the provision of regular access to and from the home planet, and though expensive, space travel had become an everyday reality.

By today's standards, these early craft appear amusingly primitive and even dangerous, consisting of little more than a hollow tube with engines at the back and elementary controls at the front. It is almost inconceivable that people can have subjected themselves willingly to the discomfort and risks that space travel presented at that time. It is impossible to catalogue here all the thousands of individual developments and discoveries which led to our present skills in astro-engineering, but a few examples stand out as revolutionary.

Although the principles of nuclear drive systems had been put into practice as far back as the late 1980s, the work done by the McKinley Corporation, who produce the Ion Ultradrive engine, transformed them into highly efficient and economical power sources, and many of today's ships are equipped with engines that are virtually identical to those introduced in 2013. More important still was the invention of the Warp Generator by Henri deVass fourteen years later. This device creates a distortion of distance and time in a way which 'folds up' space. Point A meets point B and an object at either point can transfer to the other. When the generator is shut down, space 'unfolds' and the object has arrived. Journeys that would otherwise take years can be made in a matter of weeks and although, in theory, the transition can be made almost instantaneously there is a number of complications which prevented this. Time is required to build up sufficient power to satisfy the enormous energy requirements of the generators prior to a 'jump' and also to replenish reserves afterwards. In addition, ships have to move under conventional power to and from specified warp zones to avoid the possibility of either drawing other objects into the jump or of collision when emerging.

Nevertheless, the deVass Generator opened the road to the stars and led to our first contact with an alien intelligence.

In 2036, a manned survey ship made contact with the inhabitants of Alpha Centauri, 4.3 light years away, and this meeting led to a happy and rewarding association. In 2045 the Trade and Technology Exchange Agreement was signed with the Alpha Centaurians, and one of the most important benefits we gained was the acquisition of anti-gravity techniques. These were successfully brought together in 2045 by Dr Hans Berger in his Gravity-Resist Projector, and the form of spacecraft was transformed overnight. Now ships of very large proportions could safely be landed under most gravitational conditions, the Colonial III being a good example of this application.

The next major influence on spacecraft design was due to more unfortunate circumstances. In 2047 one of our survey ships was approaching Proxima Centauri, an inhabited system with which Alpha had a long

history of conflict and antagonism, when it was attacked and destroyed. Soon afterwards Alpha was subjected to the worst thermonuclear attack it had ever experienced, this being followed by the destruction of one of our spaceliners with a full complement of passengers. The Proxima War had begun. It was to last for twenty years, during which time a wide range of military ships was produced by all three Star Systems. The state of war always accelerates technological development and the hideous cost in lives and resources was at least to some small degree offset by the considerable advances made in the field of space travel. Navigational systems, hull design and materials, power units and communications all reached new levels of sophistication as a result of the long period of heavy investment and intensive research.

Ships designed during this era feature strongly in this book. Until the war, space travel was still a fairly limited activity and this was reflected in the comparatively small number of different types of spacecraft. The space war bred dozens of new craft, many of which were adapted for peaceful roles afterwards due to the exigencies of the reconstruction. As a result there is now a wide variety of ships to be seen in the spacelanes and although mainly commercial or military in function, by the end of the century the first purpose-built personal transport vessels were making their appearance. In contrast to these diminutive new members of the spacecraft family are the gigantic settler ships already taking Man further still, to new worlds uncountable miles away.

The accomplishments of the twenty-first century are only the beginning of man's adventure in space, but for many people, this era with its setbacks, successes and optimistic gambles will always be the golden age of spaceflight.

Key Historical Dates

1987 – Introduction of nuclear powered engines: ion and plasma systems.

1990 – Foundation of the World Community Research Council.

1998 – WCRC North African Space Research Centres now operational.

1999 – World Trade Authority formed to co-ordinate international commerce.

2004 – The first spacefreighter, Colonial I, enters service.

2005 – Work starts on Lunar Station.

2011 – Lunar Station operational.

2012 – Work starts on Mars Station.

2014 – Introduction of the McKinley Ion Ultradrive in Colonial II.

2015 – Martian Queen makes first commercial passenger flight to Mars.

2018 – First shipment of new alloys from Lunar industry.

2027 – Warp Generator perfected by Henri deVass.

2036 – Manned survey ship makes contact with Alpha Centaurians.

2038 – Language barrier broken.

2039 – Trade & Technology Exchange Agreement signed with Alpha.

– World Trade Authority becomes the Terran Trade Authority.

2041 – First orbital industrial centre off Jupiter completed.

2042 – First Engergy Absorbent Defence Shield (EADS) produced by the TTA.

2045 – Dr. Hans Berger introduces the Gravity-Resist Generator.

2046 – Mars Shipyards completed.

2047 – Pathfinder IX Survey Ship destroyed by Proxima Centauri.

– Alpha Centauri attacked.

2048 – Interstellar Queen destroyed by Proxima Centauri.

– War declared.

2049 – Terran Defence Authority formed.

2052 – Battle for Mars.

2060 – Invasion of Proxima Centauri.

2068 – Peace Treaty negotiated.

2073 – First jet tube opened on Earth, between Europe and America.

2078 – First settler ship leaves for Arcturus.

2090 – Second settler ship.

2096 – Starblade introduced as first Alpha spaceliner.

MILITARY/TERRAN

CAM 117 GUNSHIP

Often described as 'the last of the Dreadnoughts', the CAM 117 dates from the prewar period and was very quickly overtaken by the rapid advance of military technology. In common with most warships of this vintage, it was designed as a purely defensive craft and its range was thus very limited.

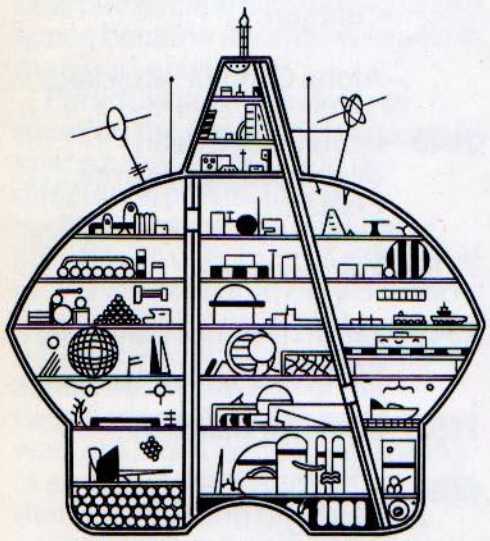
It was extremely fast for its day and its top speed would not disgrace many of today's military ships, but this performance was only achieved at the expense of range. During prewar Defence Force Manoeuvres there were instances of inexperienced crews maintaining maximum battle speed for a few seconds too long and disappearing helplessly into space with empty tanks. Furthermore, the sight of these massive war machines slinking back to their bases under tow was not uncommon. They were popularly dubbed the 'Nuclear Kites'.

Whatever their shortcomings in operational range their armament was powerful even by today's standards. The main weapon carried was a massive particle accelerator which accounted for almost a third of the ship's mass. Secondary armament was fitted in the form of various laser projectors and nuclear missile launchers.

Protective armour was kept to a minimum as the original view was that the extremely high battle speed attainable would reduce the chance of a hit. As warships in general became faster this concept soon proved optimistic and the CAM 117s which saw action were forced to rely on their heavy firepower to keep out of danger.

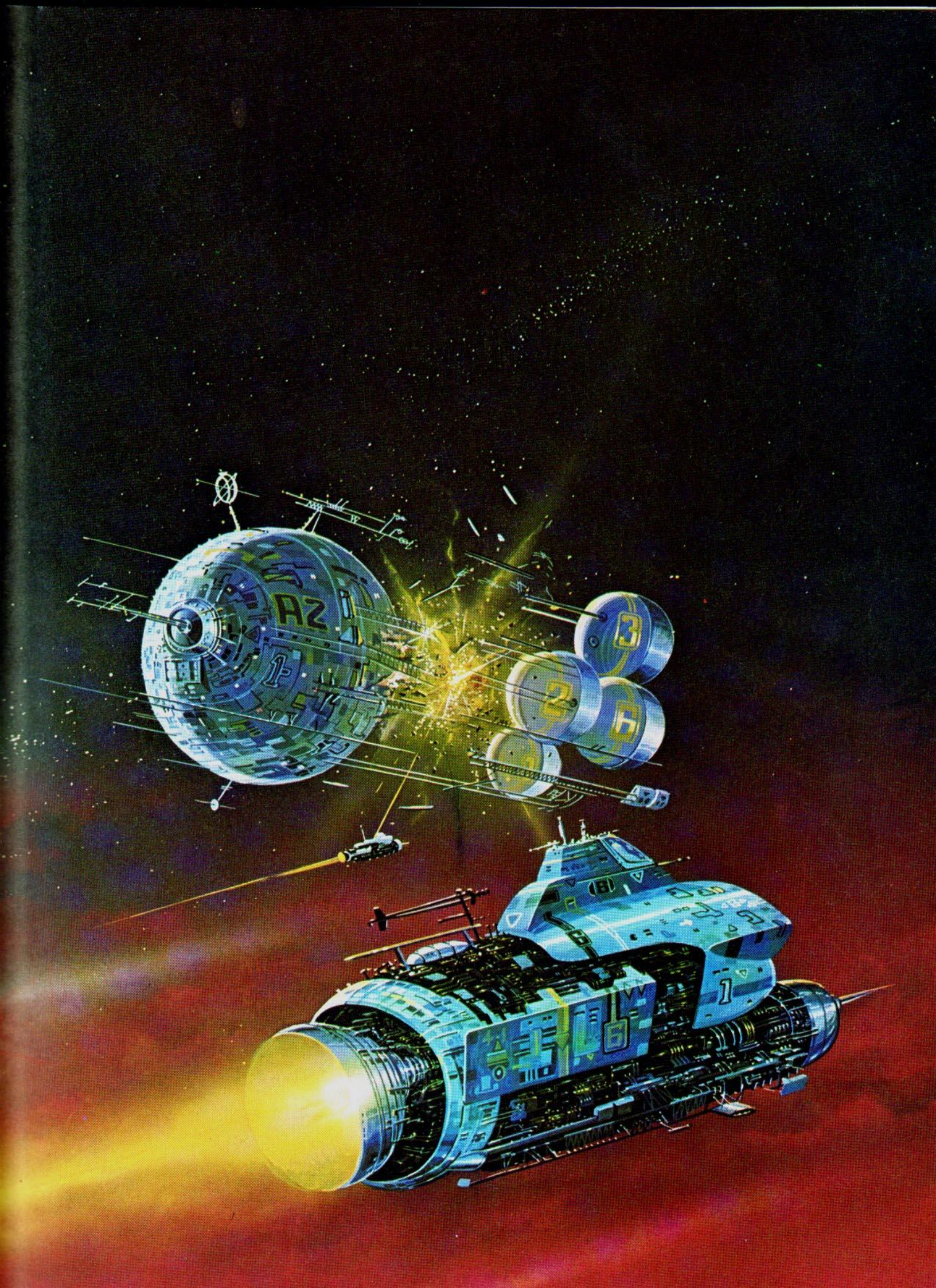
Like so many other craft which were technologically outdated, these ships were thrown into action in the Battle for Mars in the desperate attempt to halt the Proxima offensive. They did succeed in holding the enemy advance until our front-line squadrons could regroup but at a terrible price. In the running fights against modern ships the unfortunate 'Kites' were forced to operate at their maximum speeds for far longer periods than had originally been allowed for. Of the twenty-eight Gunships which fought in this action no less than nineteen were picked off at leisure as they drifted in space unable to reach their bases. The rest were either destroyed in action or simply worn out by constantly having to operate at maximum performance.

One example still exists in the War Museum but it is only a shell and even the outer hull is in need of restoration.



Only a small proportion of the Gunship consisted of crew accommodation. Most areas were equipment bays.

Specification	
Manufacturer	Consolidated Aerospace
Classification	Local Defence Ship
Main Drive	Nuclear/hydrogen CANE IV Super Nova 6 million lbs thrust
Armament	One NA 117 Particle Accelerator 6 various laserguns Various nuclear missile launchers
Defence	14 mm Plastisteel cladding
Personnel	9 officers 35 human crew 12 Mechtecks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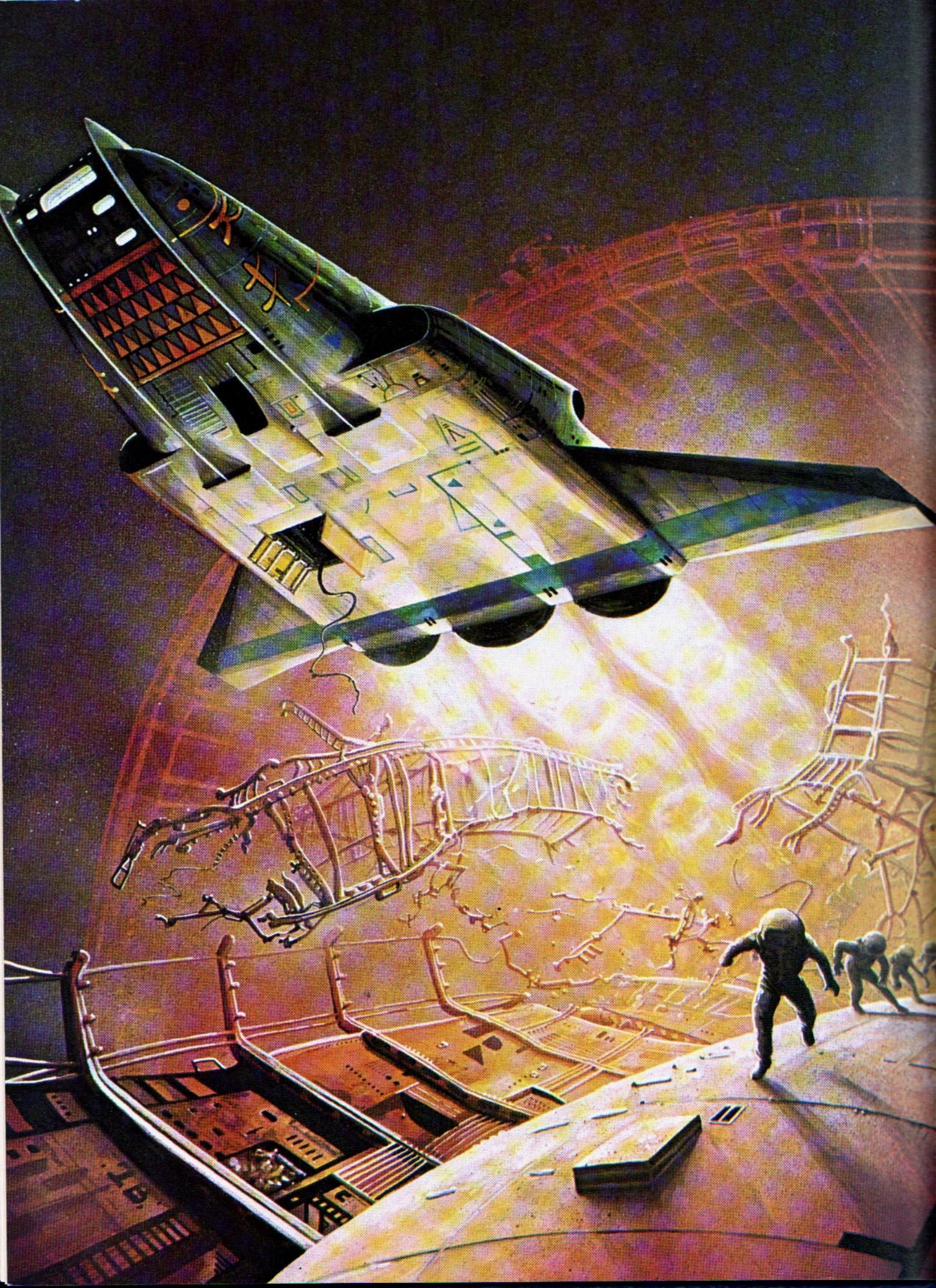


SSF 21D CUTLASS

Possibly the best remembered ship of the war, the Cutlass won its laurels during the fiercely fought Battle for Mars in 2052 when the Proxima battlefleet broke through the Sentinel Line. Although of fairly simple construction it proved itself to be efficient and robust, with a legendary ability to absorb punishment.

The first Cutlass was built as long ago as 2023, being intended as a Federal Law Enforcement Authority patrol cruiser, and continued in production, virtually unchanged, up to 2048. The outbreak of war interrupted their manufacture for over a year, until the newly formed Terran Defence Authority elected to employ an uprated version as the basis for the Defence Force.

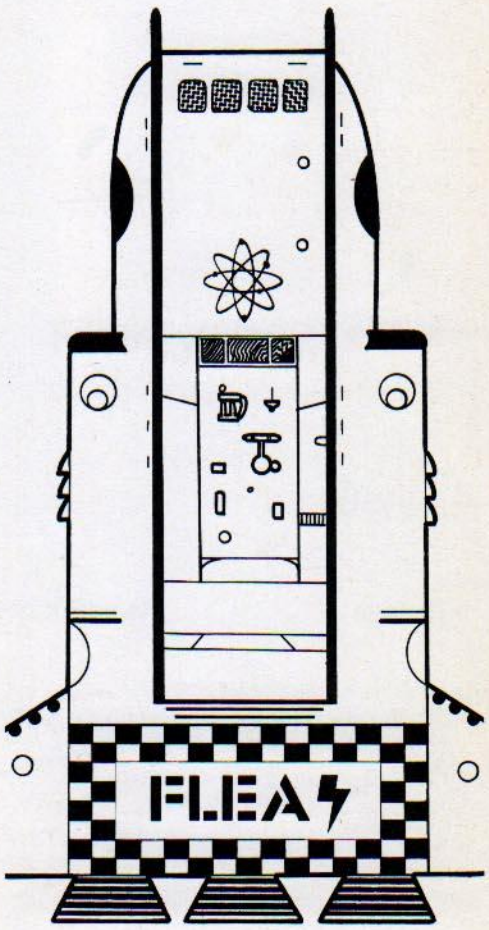
The production facilities were already in existence and the comparatively uncomplicated design enabled a high manufacturing speed which made the Cutlass a natural choice for a stop-gap fighter. In fact the massive demand for interstellar warships and the impressive way in which the Cutlass acquitted itself in the Battle for Mars resulted in it remaining in production for the greater part of the war, and certainly until Proxima had lost its long-range fighting potential.

Whereas the early Law Enforcement models were fitted with two nuclear powered solid-fuel engines and one liquid-hydrogen cruise unit, the military variant was uprated with two Avery high-thrust hydrogen drives and an Ion Ultradrive low-thrust engine for long-range cruising. An interesting feature of the Avery high-thrust units was the variable choke venturi tubes, which contracted and expanded with great rapidity to produce a pulsed jet of extremely high velocity by creating an intermittent back pressure. Although very effective, this could only be employed for brief periods as the tubes burned out quickly and had to be replaced.

The payload compartments originally intended to store rescue and emergency repair equipment were adapted as nuclear weapon bays and as housings for the OPA 8 Particle Accelerator and laserlances.

Major Sven Erikson, a Defence Force Commander, earned himself and his Cutlass a place in the history tapes during the Battle for Mars. The illustration here depicts his best known exploit. His fuelling bay was hit by a Proxima warhead and he launched under maximum drive before refuelling was completed, destroying two enemy ships and allowing the rest of the squadron to get into space to repel the attack. His Cutlass, R2, is shown with the markings of the 3rd Mars Interceptors, with whom he was serving in Syrtis Major.

After the war the Cutlass continued in service although no more were commissioned, and it is a testimony to their durability that over eighty are still fully operational. Some of these have been leased to the Law Enforcement Authority as local patrol ships and can frequently be seen on patrol around the Solar System. It is interesting to note that in the current vogue for unusual private spacecraft, a number of replicas of the Cutlass have been produced from the original plans, though fitted with modern equipment.



Specification	
Manufacturer	Various
Classification	Local Defence Interceptor
Main Drive	2 Avery Sunburst high high-output engines total 1,500,000 lbs thrust 1 McKinley Ion Ultradrive
Personnel	3 human crew
Armament	Assorted nuclear weapons 1 OPA 8 Particle Accelerator 2 laserlances
Defence	High-density Plastisteel armour 14 cm thick WCRC Type MM 26C Defence Shield

SENTINEL MAJOR

Within eighteen months it became obvious that the Proxima hostilities were going to be considerably more than a brief trial of strength between neighbouring solar systems.

Although Proxima Centauri had no equivalent to our warp drive or the Alpha Potential Mass Drive it was recognised that it would be only a matter of time before they either developed a similar system or duplicated one of ours. The defence of our own solar system had therefore to be considered, and this raised a major question, as it had been agreed that the greatest allocation of resources had to be made to the development and supply of offensive craft. The enormous cost of producing a single warship meant that building and maintaining an effective battle fleet would leave very little over for home defence, itself requiring massive investment.

The solution finally agreed was a three-tiered defensive system. The Perimeter from Pluto's orbit outwards was seeded with static nuclear mines which were cheaply and easily manufactured and would be a serious threat to craft emerging from a warp jump. They were designed to home in on mass of the order of a warp generator and would take advantage of the short period that any such vessel required to replenish its power banks after jump.

The second line of defence was provided by the Sentinels. The best known of these craft are undoubtedly the Sentinel Majors, whose massive, squat shape and huge main venturi tube are unmistakable.

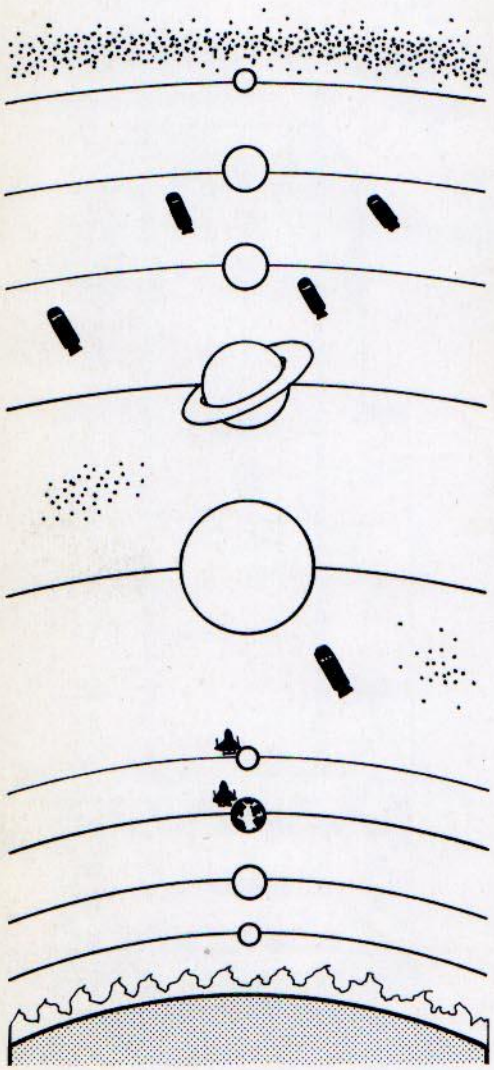
Only one in five of these ships was manned, the others being no more than powered weapon packs fitted with sophisticated detection and response gear. The fifth vessel of each flight was the manned command centre, which co-ordinated the operations of the weapon carriers.

The Sentinel was fitted with a very large conventional nuclear propulsion system based on liquid hydrogen and oxygen, producing about 5 million lbs potential thrust. This facility allowed it a high degree of tactical mobility, but its drawback was rapid fuel consumption, almost 1 ton per second. Against this it was reasoned that the armament would be effective enough to ensure that combat would be resolved speedily and would protect the ship when mobility was reduced.

The armament itself consisted of a variety of weapons from nuclear general purpose rockets and particle accelerator beams to high intensity lasers. The Sentinel Major was a formidable obstacle, and proved its worth during the Proxima attack on Mars in 2052 when over one third of the attacking force was destroyed before ever reaching target.

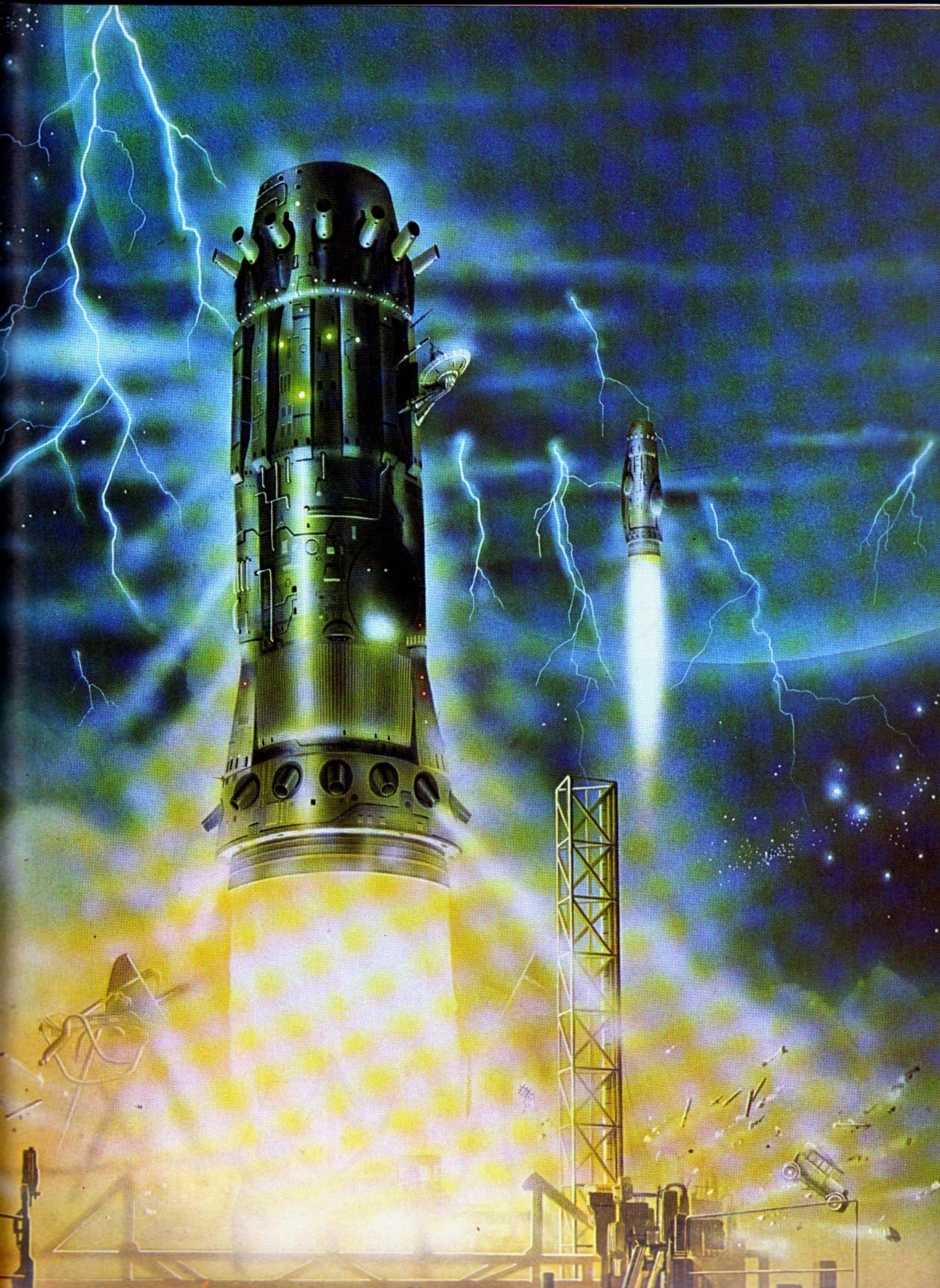
The third line of defence was of course the planet-based interceptor squadrons, which maintained constant patrols around each defence area.

There is still a large number of Sentinels in active service on the Perimeter, while others have been converted into navigation beacons and research data collectors.



Terran defence system. The outer perimeter was seeded with nuclear mines, Sentinel Majors were stationed between the planetary orbits and interceptor squadrons operated from surface bases.

Specification	
Manufacturer	Various
Classification	Short Range Defence Ship
Main Drive	Consolidated Aerospace nuclear/chemical unit CA 7M 5 million lbs thrust potential
Secondary Drive	24 Fixed Vector CA 17T hydrogen jets each 1700 lbs thrust
Personnel	Command Ship only – 7 human technical officers
Armamant	8 general purpose nuclear rockets 4 'Scatterpack' nuclear rockets 4 OPA 8 Particle Accelerators 8 laserlances 2 sonic accelerators
Defence	WCRC Type MM 26A Defence Shield



MILITARY/TERRAN

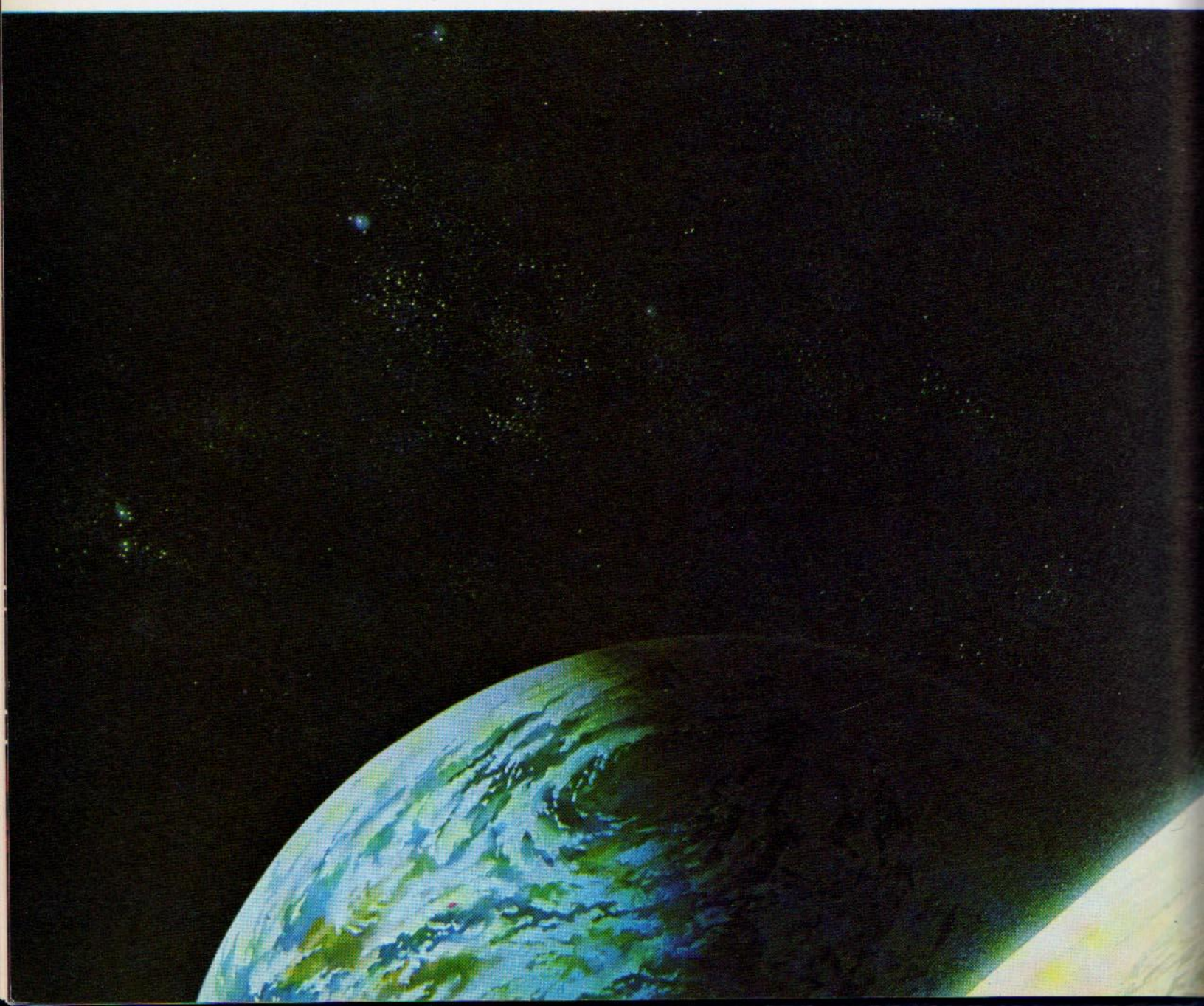
CAM 130 CYCLOPS

The combat history of this long-obsolete ship was brief by any standard and was eclipsed early in the War by the increasingly sophisticated detection systems employed by both sides.

The design was approved in 2033 after early indications that intelligent life existed in Alpha Centauri and within reach of our Solar System. At that time it was not known what attitude the peoples of Alpha Centauri would adopt towards us, and the Cyclops was introduced as a precautionary measure. We had no long-range ships capable of delivering maximum-effect nuclear weapons to surface targets, and it was this gap which the Cyclops was intended to fill. Little more than a mobile launch platform for the powerful 'Vulcan's Hammer' nuclear missile, the Cyclops was not popular with flight crews, being considered by them something of a 'sitting duck'.

The ship's warp generator was situated in a housing which encased the main hull and was vulnerable to any damage. A hit sustained from even low-power secondary armament could therefore prevent the unfortunate crew from 'jumping' clear of the battle zone, and as the ship's main drive was less efficient than that of most current interceptors the chance of survival was slim. Another drawback was that as the ship was little more than a piloted rocket it was severely limited in manoeuvrability when passing through an atmosphere, which it would do when launching its payload. This also happened to be the point at which it was likely to be subjected to fire from both the surface and other spacecraft. It is not therefore surprising that personnel allocated to these ships were less than enthusiastic.

Despite their early obsolescence they did see action for two brief periods of the war. The first was in the desperate Battle for Mars when every available craft was thrown into the fight. The warhead of the missile usually carried was replaced



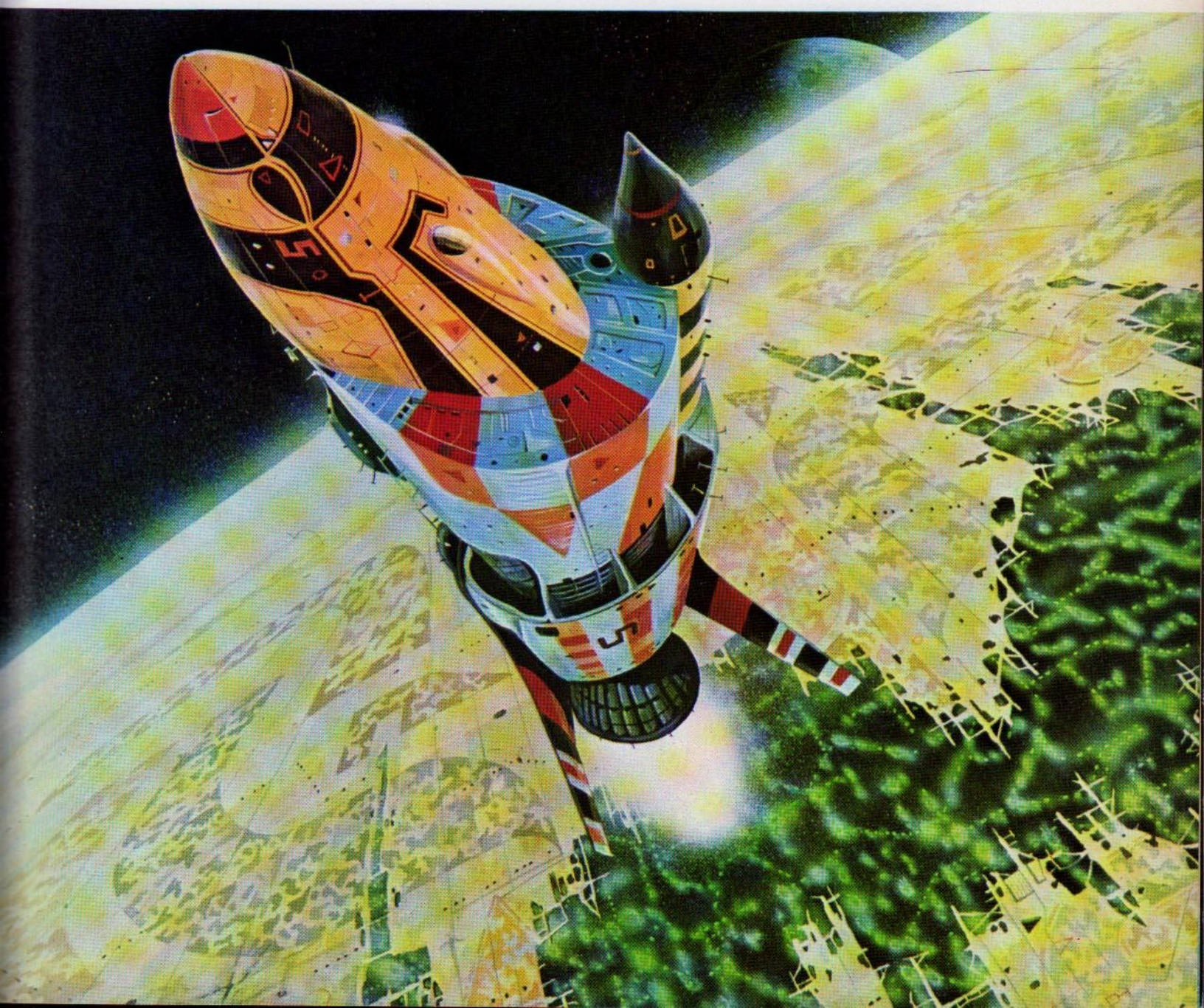
by an improvised 'scatter' pack which on detonation released a barrage of small nuclear rockets. Primitive but effective, this device helped to halt the Proxima onslaught, but at the cost of twenty-three ships destroyed.

The second period was during the closing months of the war, when Cyclops were used in the final offensive against the Proxima Homeworlds. By this time the enemy's capacity for retaliation was very limited and although two or three of these ships ended their days there none were lost in action.

Outdated before the war had even begun, the Cyclops was withdrawn immediately peace was declared and was not even placed on the reserve list. One example still exists but is owned by a private collector and is not on public display.

Specification

Manufacturer	Consolidated Aerospace
Classification	Long-range Missile Carrier
Main Drive	Nuclear/chemical CACE 43 Skymaster 850,000 lbs thrust
Personnel	4 human crew
Armament	Vulcan's Hammer space to surface missile
Defence	14 mm Plastisteel WCRC Type 18A Defence Shield



MILITARY/TERRAN

TDA 107C PARTISAN

From about 2053 the pattern of warfare began to change. For a number of reasons the large-scale multiship confrontations of the earlier period of the War could no longer be risked by any of the conbatants as losses had been severe on both sides. Gradually fighting resolved itself into smaller scale attacks and counter attacks. Battle fleets became tightly co-ordinated strike units and the requirement shifted from massively armed and armoured battle cruisers to smaller, faster vessels with powerful weapons at the cost of less protective armour and equipment.

One of the first examples of this new breed was the TDA 107C Partisan, which is still one of the smallest warp-drive ships ever produced. It consisted of little more than a DeVass generator in an unarmoured shell with weapons fitted into the gaps, and a light-thrust hydrogen drive unit stuck on the back.

To pilot these ships required a special kind of courage as the crew lay in cramped positions surrounded by the fuel storage tanks along each side of the hull and the reactor perched above and behind them; but uncomfortable as they may have been, they proved effective and enjoyed considerable success in bringing the War close to the enemy's home.

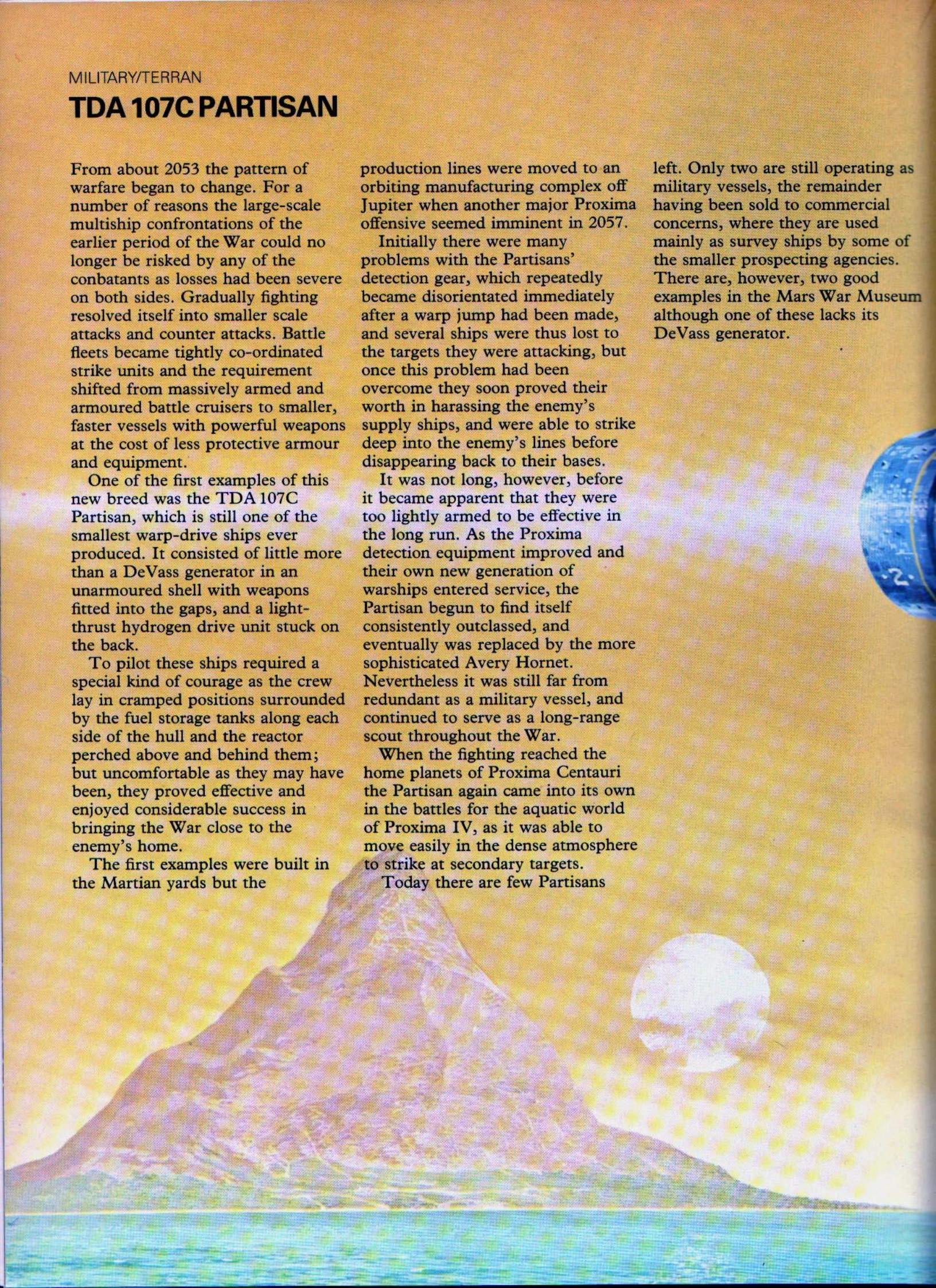
The first examples were built in the Martian yards but the production lines were moved to an orbiting manufacturing complex off Jupiter when another major Proxima offensive seemed imminent in 2057.

Initially there were many problems with the Partisans' detection gear, which repeatedly became disorientated immediately after a warp jump had been made, and several ships were thus lost to the targets they were attacking, but once this problem had been overcome they soon proved their worth in harassing the enemy's supply ships, and were able to strike deep into the enemy's lines before disappearing back to their bases.

It was not long, however, before it became apparent that they were too lightly armed to be effective in the long run. As the Proxima detection equipment improved and their own new generation of warships entered service, the Partisan begun to find itself consistently outclassed, and eventually was replaced by the more sophisticated Avery Hornet. Nevertheless it was still far from redundant as a military vessel, and continued to serve as a long-range scout throughout the War.

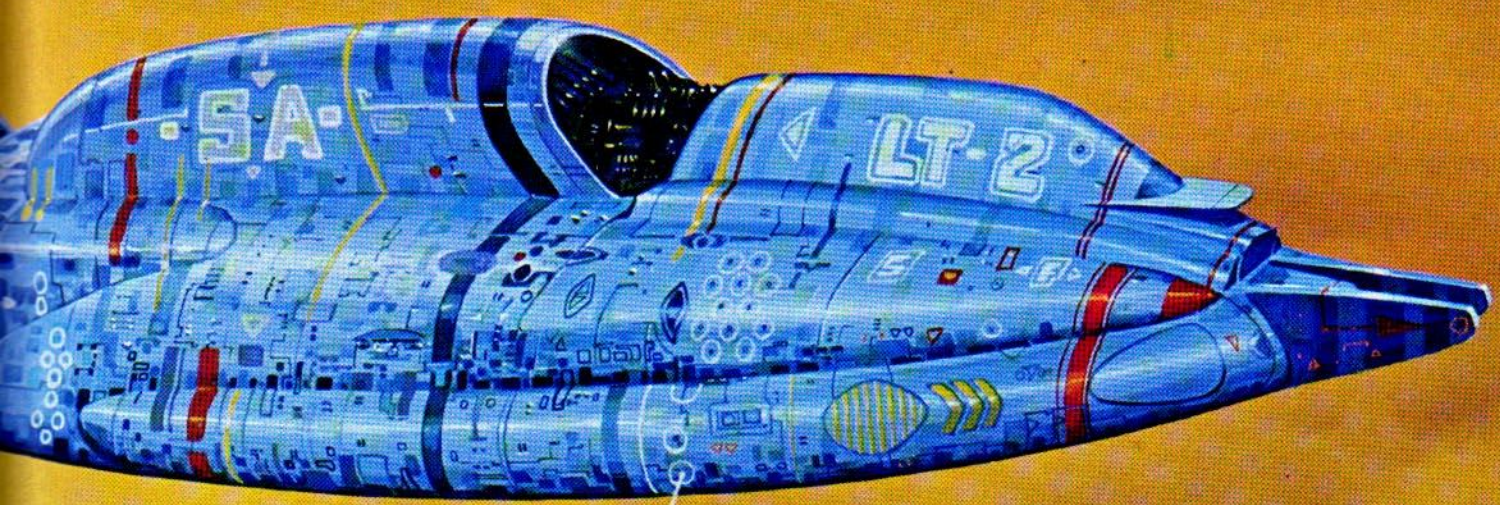
When the fighting reached the home planets of Proxima Centauri the Partisan again came into its own in the battles for the aquatic world of Proxima IV, as it was able to move easily in the dense atmosphere to strike at secondary targets.

Today there are few Partisans left. Only two are still operating as military vessels, the remainder having been sold to commercial concerns, where they are used mainly as survey ships by some of the smaller prospecting agencies. There are, however, two good examples in the Mars War Museum although one of these lacks its DeVass generator.



Specification

Manufacturer	Various
Classification	Long-range Armed Scoutship
Main Drive	DeVass Warp Generator Class VII Consolidated Aerospace nuclear/hydrogen drive CA 125M 1,250,000 lbs thrust
Personnel	2 human crew
Armament	53 OPA 8 Particle Accelerators
Defence	WCRC Type MM22 Defence Shield

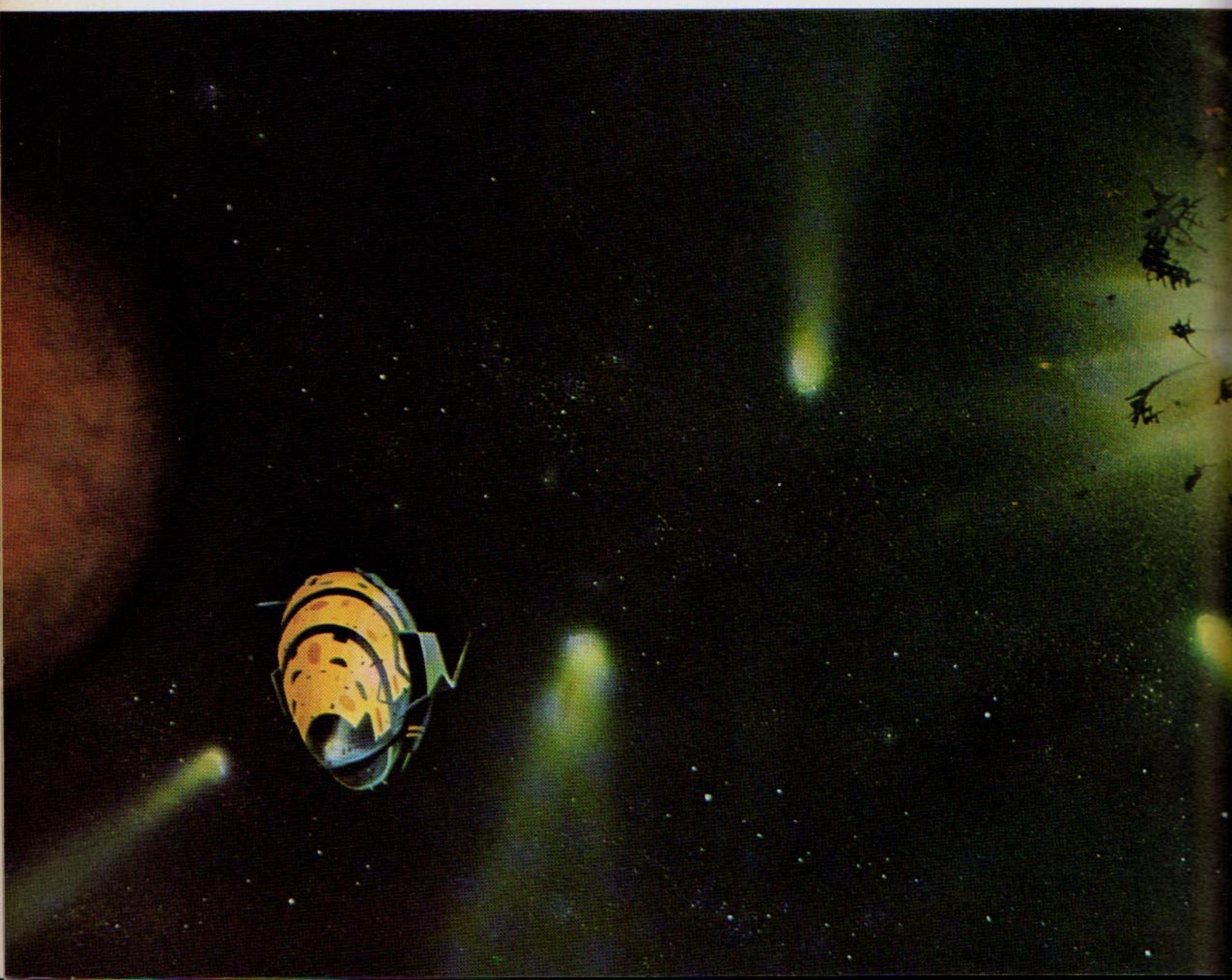


MILITARY/TERRAN

AAF 212 HORNET

By the time that the TDA 107 Partisan was finding itself outclassed by the new generation of enemy interceptors such as the Shark, Avery Astronautics were already testing the prototype for a replacement. Although they had not been asked to tender for such a contract they had seen the need coming and had decided to initiate a development programme as early as 2055. Terran Defence Authority representatives were invited to a display a year later and within a week the first order was placed, the Avery Hornet going into full production. The first squadron went into action in mid 2057 against a strong Proxima seek-and-destroy patrol and was an instant success, destroying four enemy ships against the loss of one Hornet. The Hornet was fast and highly manoeuvrable and, unlike the Partisan, carried a hard-hitting weapon pack. Additionally, the Hornet's armour was not only of a higher quality than that of its predecessor but also borrowed from the enemy's K4 Interceptor the idea of articulated platelets to give flexibility to the hull.

Extremely popular with the front-line flight crews, the Hornets did much to boost morale at a time when the enemy seemed to be gaining in technological superiority. The introduction by the Proximans of the new Shark interceptor had dramatically increased their defensive and offensive ability and the appearance of the Hornet came as an unpleasant surprise. Although the enemy ship was certainly the faster of the two, the Hornet's superior armament earned the ship among enemy crews the nickname 'Sklathill', which roughly translates as dangerous fish or water creature. Rather ironically, the high degree of technological sophistication on both sides allowed a minor design aspect of the Hornet to give the ship an important advantage. The two upper laserlances were mounted at a pronounced angle to the directional line of the hull, permitting the ship making an attack to begin its escape turn fractionally before firing. To appreciate the significance of this manoeuvre it is necessary to remember that attacks of this kind were executed in fractions of a second.

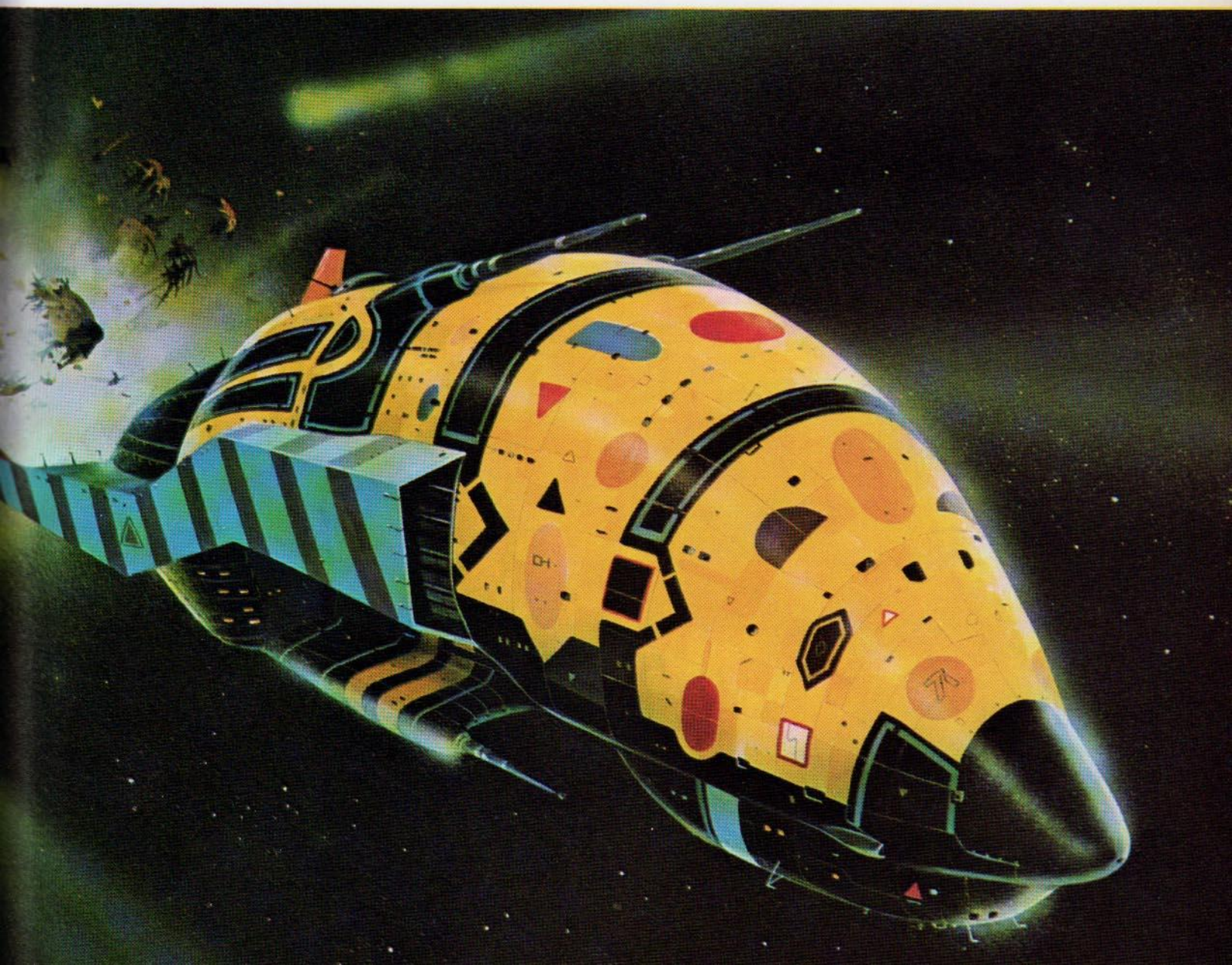


The Hornet was able to attack in any of the three following ways: firstly, by making the conventional direct line approach; secondly, by starting a direct line approach but changing course almost immediately to bring the upper armament to bear; and thirdly, by attacking along an oblique line. The result was that the target's plotting computers had to calculate three sets of probabilities instead of only one, and the milliseconds of delay thus incurred were often enough for a Hornet to make a successful attack unscathed.

As a deep space interceptor the Hornet was equalled but never surpassed by any equivalent enemy ship, and it remained a Status One warship throughout the War.

Still in limited production today, it is standard equipment for all second-line defence units and can often be seen on patrol.

Specification	
Manufacturer	Avery Astronautics
Classification	Long-range Interceptor
Main Drive	DeVass Warp Generator Class VII Avery Javelin nuclear/hydrogen drive 21 million lbs thrust
Personnel	2 human crew
Armament	4 Hardbeam laserlances Assorted nuclear weapons
Defence	High density Plastisteel 18 cm thick in articulated platelets WCRC Type MM 26D Defence Shield



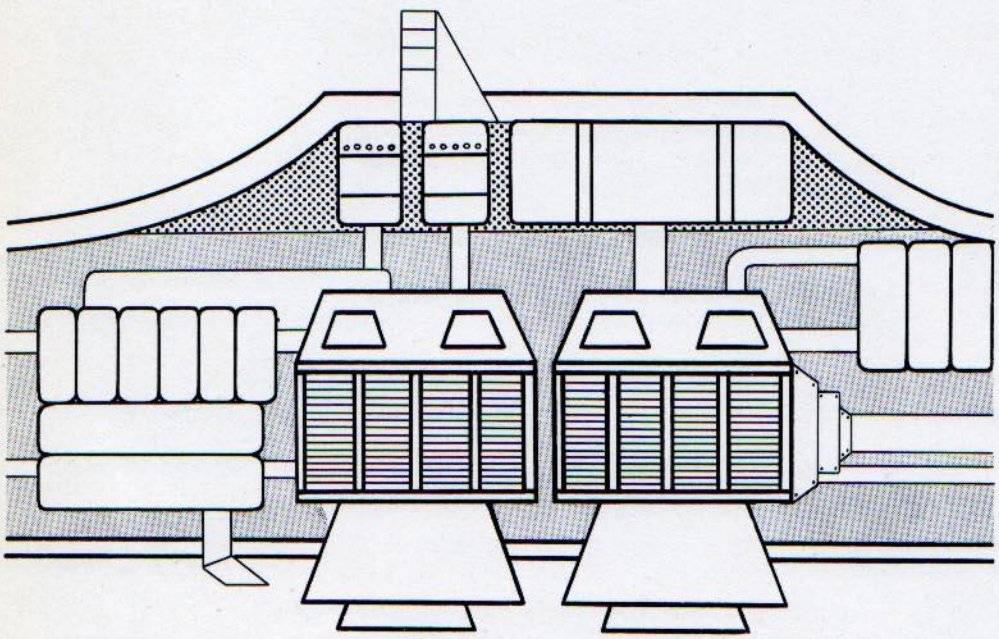
AAF 311 WARHAWK

The Warhawk was not a spacecraft in the strictest sense of the word but was designed to operate in an atmosphere. Given refuelling facilities, however, it was quite capable of space flight and so falls within the scope of this book.

This distinctive delta-winged ship was provided as standard equipment to all surface forces and came under their direct authority. As a multirole combat craft it was deployed in all theatres of the land war and proved itself an invaluable workhorse.

Specification

Manufacturer	Avery Astronautics
Classification	General Support Ship
Main Drive	2 liquid fuel rockets 350,000 lbs thrust 2 vertically-mounted Avery jet turbines
Personnel	4 human crew
Armament	Various
Defence	5 cm Plastisteel armour



Section through the wing section showing vertical thrust unit.

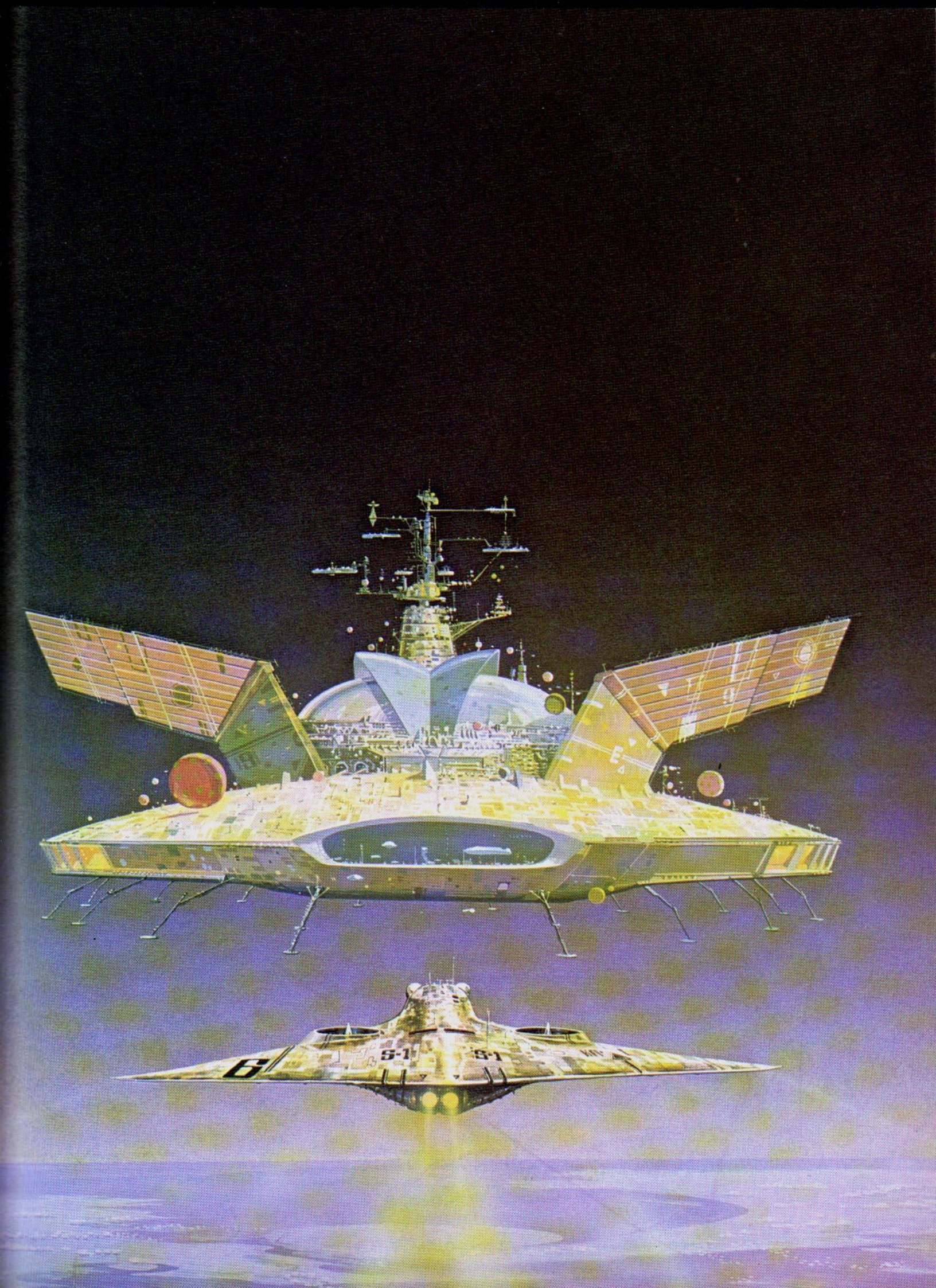
Among the tasks it was required to perform were long-range observation and scouting, tactical troop transport, evacuation of wounded and supply. It was, however, as a medium-range offensive weapon that it excelled and its contribution to the successful conclusion of the war is hard to overstate. The provision of two huge vertical-thrust turbines in addition to its more conventional engines enabled it to carry a formidable array and quantity of ordnance at speeds low enough to allow accurate strikes against localized targets.

They also provided the facility for the ship to make approaches at extremely low levels, thereby avoiding many of the hazards experienced by ships attacking at more usual heights and speeds. These factors allied with the ability to operate from small front-line bases made the Warhawk a formidable piece of equipment.

As the war on Proxima's homeworlds progressed it became possible to establish low-orbit bases such as the kind known as a 'Birdsnest' shown here. These heavily protected substations were fitted with Berger Gravity Resist systems and could not only maintain a very low orbit but were also able to make surface landings to act as either mobile supply and maintenance depots or defensive strongpoints.

The introduction of these bases provided increased range potential for the Warhawks and allowed them to make long-range nuclear strikes at key targets. They were never entirely effective in this role, however, as they were forced to operate at higher altitudes than was safe with their comparatively low maximum speed.

There are many detachments serving with the Defence Authority today as their great flexibility has been hard to improve on. A civil version is also produced and is known as the Cranefly.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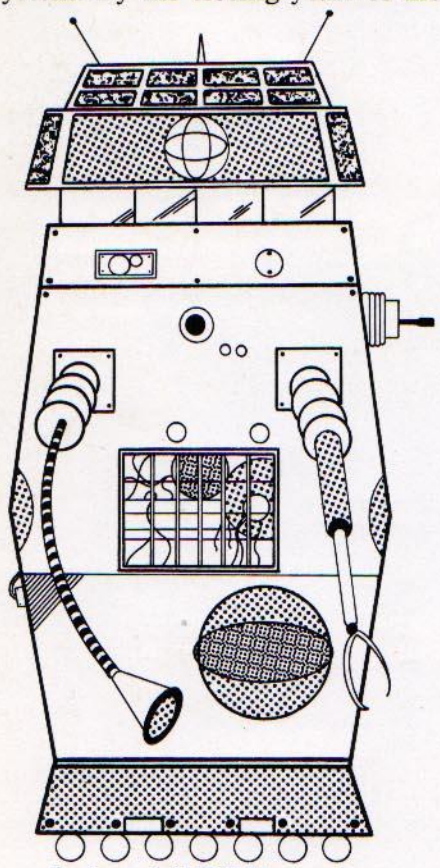
MILITARY/TERRAN

SKYBASE

Until recent years Skybases were a common sight for all travellers in deep space, but the great elliptical tubes with their four external service docks are now fairly rare. Originally conceived as temporary depots for government exploration teams, they gained a new significance in the Proxima Wars. Throughout this period they were produced in high volume as they had the advantage of being comparatively cheap and quick to manufacture, and were turned out by the tens from local shipyards as little more than shells. They were then ferried to their various sites under power supplied by Consolidated Engineering's Pluspak 7 add-on thrust pods, which were then removed for re-use once the base was in position.

Probably 80% of these constructions were fitted out as supply and repair depots, and within a few years constituted a wide and efficient interstellar system. By the closing years of the war any damaged or depleted ship could find refuge within a fairly short period of time. Although very vulnerable to attack due to their lack of any effective defence system Skybases could be replaced quickly and economically, and were a welcome sight to many a ship's captain.



Early model MR III Mechtech.

Those not equipped as maintenance depots provided facilities for rest centres, hospitals and regional command posts, and were home at one time or another to practically every Spacer on active service. Their physical similarity to an artefact from an antiquated communication system led to their widely used nickname of 'Letterboxes'.

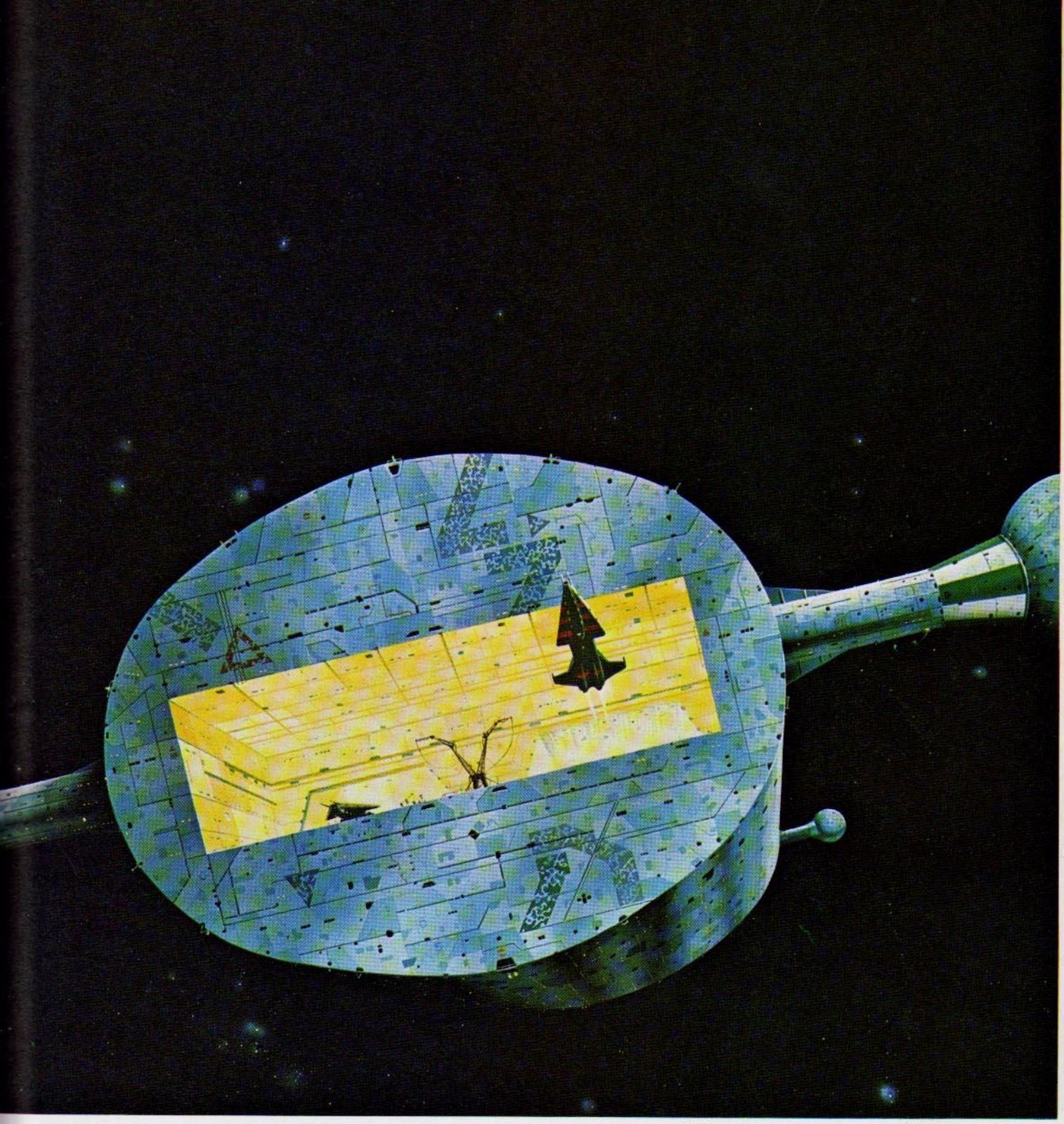
The first Skybases were constructed of real metals and probably no more than two or three of these still exist. There is certainly one example in perfect working order in the Galactic War Museum off Jupiter and another, rather more dilapidated, in the Centaurian system. These models were soon replaced by those formed from the more familiar Plastalloy in the search for greater durability.

All bases except those near habitable worlds or with specialized functions were without human personnel and relied entirely upon a crew of Mechtecks or Roboserves. There was one amusing incident reported in which a meteorite strike had damaged the central control of a Skybase and a patrol ship was unable to dock due to the entry being obstructed by the entire complement of Mechtecks executing a slow waltz.

After the war a huge number of Skybases was dismantled for materials, which were by then in short supply. Nevertheless, there are many still of operational status, particularly in the region of the trade perimeter, and a large number which have been sold and adapted for local commercial use.

The illustration depicts a prewar, real-metal Skybase which differs from later versions only in that power was drawn from solar collectors situated in the side facing the nearest sun, whereas subsequent bases were fitted with all round bands of highly sensitive Photomax Transducers.

Incidentally the illustration also shown Panther pursuit ships of the Federal Law Enforcement Authority (or 'The Flea' to use its popular name) and an Avery C14 Transporter, taking on fuel, both models now long obsolete.



	Specification
Manufacture	Produced by every major manufacturer to government specifications
Classification	Free-space General Purpose Depot
Main Drive	None
Secondary Drive	Standard pattern correction jets
Personnel	Usually a variable complement of Mechteck units
Auxiliary Craft	4 Drone maintenance tractors
Defence	WCRC Type 9D Meteorite Deflector Shield

ACM 113 FATBOY

Despite its name, the ACM 113, as it was officially titled, was a formidable craft and remained one of Alpha Centauri's standard interceptors throughout the war. Its flight speed was unremarkable even by earlier standards and to our eyes this ship looks a most unlikely vessel, but what it lacked in straight line performance it more than made up for in manoeuvrability and strength.

It was seeing this ship perform in Alpha One's atmosphere that led our first representatives there to realize that their hosts had the technology to produce an anti-gravity device. Even to this day, having been assisted by the Alpha Centaurians themselves in developing a similar device, we have been unable to duplicate the performance of the Fatboy.

This bulbous craft has been constantly improved over a considerable period of time and it is not known when the first version was flown. Several vintages were employed during the war but all shared a similar appearance and were easily identified. Due to their restricted operational range they served only as defensive ships and as a result saw little action during the last few years of the war. Two or three squadrons were shipped to Proxima for use as ground support craft but for some reason did not perform so well in the atmospheres of Proxima Centauri's home planets, and they sustained heavy losses before being withdrawn. Although obviously perfectly at home on their own worlds they appear to be highly sensitive to gravitational conditions and have not produced comparable performances elsewhere.

Without doubt the most heavily-armoured ship of its size, the Fatboy could withstand the most extraordinary amount of punishment. Probably 40% of its mass was Plastisteel armour built up in layers. Between each layer was a unique system of cellular energy-absorbent material which meant that the damage could be progressively contained with the minimum contribution to the inert mass. The Alpha Centaurians had never developed the technology for generating an energy-absorbent field as we had, with the result that they were further advanced than we in the field of physical armour. When we exchanged our expertise in generated protective fields for their knowledge of gravity-resist, they equipped Fatboy with a field system in addition to the Plastisteel armoured hull. The result was a ship that could survive most attacks and could only be destroyed through a sustained barrage of hits.

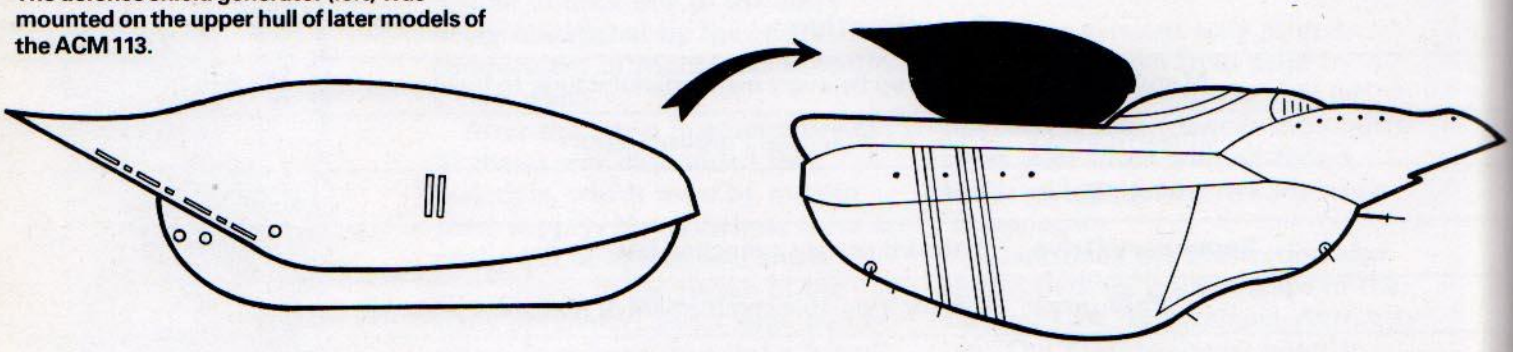
One of these dual-protected ships appears in the foreground of the accompanying illustration and is distinguishable from the earlier models shown by two lozenge-shaped generators on the upper surface of the hull.

Fatboy is still Alpha's main defence ship but the armour specification has been reduced. This, together with the installation of modern high output power plants, has contributed to an improvement in the speed of this distinctive craft.

Specification

Nationality	Alpha Centauri
Classification	Short Range Defence Ship
Main Drive	Nuclear/hydrogen drive Thrust potential unknown
Personnel	6 crew
Armament	Various but usually laserguns and assorted rocket launchers
Defence	Energy absorbent field generators Layered Plastisteel and honeycomb armour

The defence shield generator (left) was mounted on the upper hull of later models of the ACM 113.



ACM 115 MINNOW

The long history of antagonism between the two Centauri systems had led the Alpha worlds to develop a highly effective and integrated military system. Each warship produced fulfilled a specific function in relation to the others and, although individually somewhat less advanced than many of our craft, corporately they represented an extremely efficient fighting force. Provided that its component parts were up to strength, the weaknesses of one ship were generally compensated for by the strengths of another.

In accordance with this system, Alpha's Strike Force was equipped with three main types of ship. The heavily armoured Fatboy was conceived as the central unit capable of maintaining a steady advance against strategic objectives or a central defensive core. Individual tactical and surface targets were the responsibility of the heavily armed ACM 118 weapon carriers, which would leapfrog the Fatboy squadrons, strike fast and retreat behind the armoured line. The third type of ship envisaged was a small, fast craft with prolonged cruising ability whose functions included scouting, tactical support, rapid interception and raiding. This role was the responsibility of the ACM 115 Minnow.

As was true of most ships operated by Alpha Centauri during the first half of the war, the design dated from much earlier. The armament with which the Minnow was equipped proved inadequate once the use of defence shields became widespread, and it proved difficult to uprate them significantly. Additionally, the trend towards multirole ships gradually reduced the effectiveness of Alpha's military structure and the Minnow suffered badly in the transition, as it was neither armed nor protected sufficiently to be competitive.

Minnows saw little action during the latter part of the war until fighting had reached the Proxima Homeworld. The surface war here made the agility, speed and range of this craft indispensable to the ground forces and Minnows were widely used in support in much the same way as they had been earlier.

They differed from earlier versions in that they were now fitted with defence shield generators mounted on the upper hull, and carried more powerful laser armaments.

After the war many of these ships were broken up, although a large number were adapted as guided targets for gunnery exercises. It is understood that a few still exist but their whereabouts is uncertain.

Specification	
Nationality	Alpha Centauri
Classification	Long-range Interceptor Scoutship
Main Drive	Nuclear/hydrogen pulse drive Output not known
Personnel	2 crew
Armament	Various laserguns
Defence	Synthetic steel. Later variant also equipped with defence shield

ACM 118 MANTA

The third component in Alpha's traditional military spaceforce was the Manta weapons-carrier, which provided the main offensive 'muscle'. Its disc-like shape was designed to create sufficient lift to supplement the gravity-resist generators, allowing the maximum payload to be carried at atmospheric levels. In some models the generators were dispensed with altogether to enable the ship to carry the giant air to surface Buster missiles used in the final offensive against Proxima. Only six of these variants were produced, however, as they were unstable and would have been too vulnerable if the Proximans' ability to retaliate had not been exhausted by that time.

All Alpha spacecraft, military or otherwise, were planned, designed and manufactured by a single governmental body which also was responsible for their licensing and allocation. Because of Alpha's natural shortage of raw materials the making and distribution of spacecraft were rigidly controlled and commercial concerns needing ships had to be satisfied with the government's allocation.

The ACM 118 owed its existence to the enterprise of a single mining concern which needed heavy-duty atmospheric/space vehicles in excess of its quota. Their engineering division succeeded in devising a design utilizing a powerful manned rocket used for manoeuvring asteroids in their mining activities. The aerofoil disc was adapted from sections of redundant storage tanks and the entire craft was constructed from existing materials.

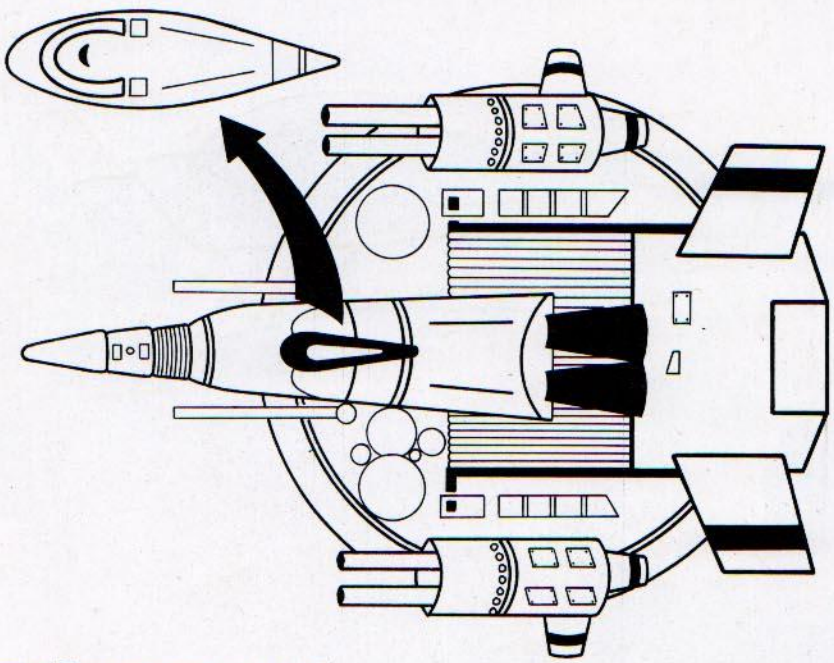
Permission was sought from the government to construct three of these ships at the company's expense using reclaimed materials, but the ministry was so impressed by the ship's performance in the flight demonstration that they held further trials for the Defence Authority, which had been looking for a new weapons carrier.

Eventually it was agreed that the government should take over manufacture itself in exchange for an improved allocation of existing craft at favourable terms to the originators, and after various modifications and improvements the new missile-ship went into production.

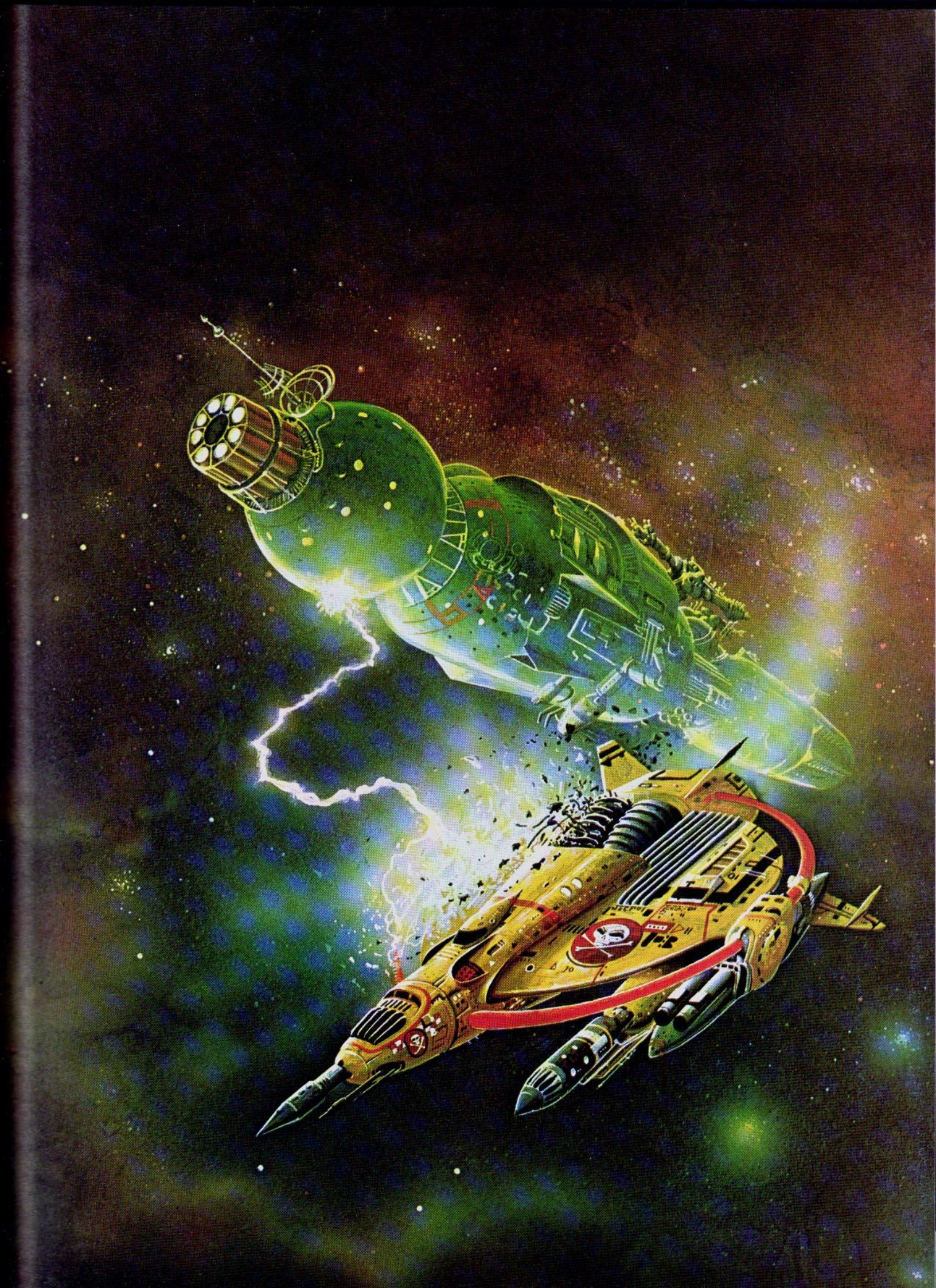
It proved to be a great success and in fact its performance exceeded the original specifications on which the Authority had been basing its research. Of the three warships in the structure the Manta was the most advanced and has outlived its stablemates by a considerable margin. Even today Mantas comprise about a third of Alpha's surface attack fleet and there are no immediate plans to replace them.

A number were supplied to our own forces during the war in exchange for munitions and equipment and are still serving with our Seventeenth Strike Fleet, notably the famous Sixth 'Death's Head' Squadron which won acclaim during the final offensive.

Specification	
Nationality	Alpha Centauri
Classification	Mid-range Weapons Carrier
Main Drive	2 Nuclear/hydrogen engines each 600,000 lbs thrust
Personnel	4 crew
Armament	Various nuclear missiles
Defence	Energy-absorbent field by external ring-mounted generator



The Control Compartment was a self contained module capable of sustaining life for about 200 hours when released in an emergency.



MILITARY/ALPHAN

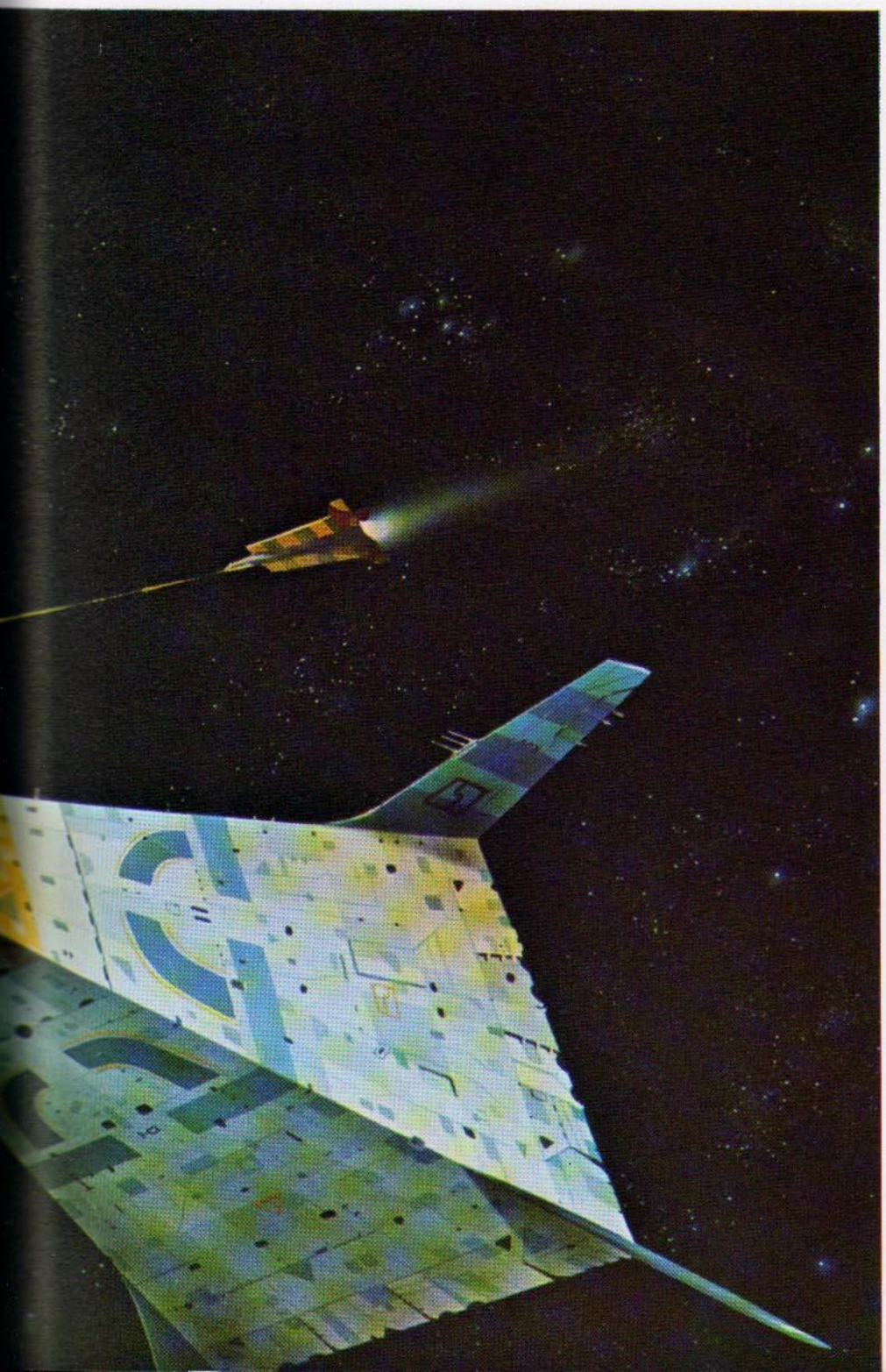
ACM 128 STINGRAY

These efficient-looking fighting machines represented Alpha's second generation of military interceptors and like many ships of this period were multirole weapons able to carry out a variety of functions. Although they operated extensively in deep space they are perhaps best known for their aggressive performance as atmospheric warships in the fight for the Proxima Homeworlds. In deep space they were no better equipped than other ships of their kind but proved extremely agile and stable in moderately dense atmospheres. Their large wing surface gave them the ability to operate in a broad speed range and this coupled with their economical use of fuel and manoeuvrability made them a dangerous adversary. These characteristics and their armament also made them suitable for ground attack, a role they increasingly adopted as the Proximans' control of airspace diminished.

Still in production, the Stingray was another example of the war period designs which have withstood the test of time.

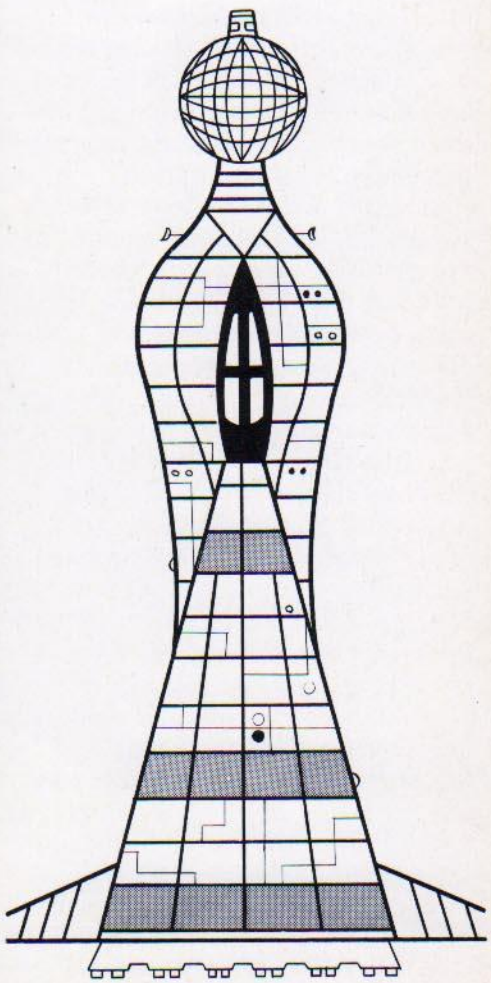
C89F WHALE

Specification	
Nationality	Alpha Centauri
Classification	Long-range Dual-Environment Interceptor
Main Drive	Ion drive (although those intended for atmospheric operation were refitted with chemical thrust engines)
Personnel	2 crew
Armament	Nuclear pellet and rocket launchers
Defence	50 cm armour Defence field generator



The Whale, as depicted here under attack from a flight of Alpha Stingrays, was Proxima's most widely used space freighter and was introduced about midway through the war. It was a medium-capacity ship with very long range potential and was fitted out in a variety of ways.

The largest number were freight carriers and were almost identical to those operated commercially by Proxima today. Others were employed as fuellers, troopships or even sensor stations and appeared in most theatres of war. The distinctive forward globe was a free hydrogen collector/synthesizer which was added to later ships as a means of extending their range and appeared only on those non-warp ships intended for local operation.



ACM 122 BEHEMOTH

The Behemoth was the Alpha Centaurians' equivalent to the Colonial freighter and was of comparable size and capacity. It is the largest ship in their fleet even today and was produced to accommodate the increase in traffic which resulted from the 2039 Trade Agreement. It was equipped with the gravity-resist facility which allowed ships of this size to make surface landings and the generators were housed in four external pods.

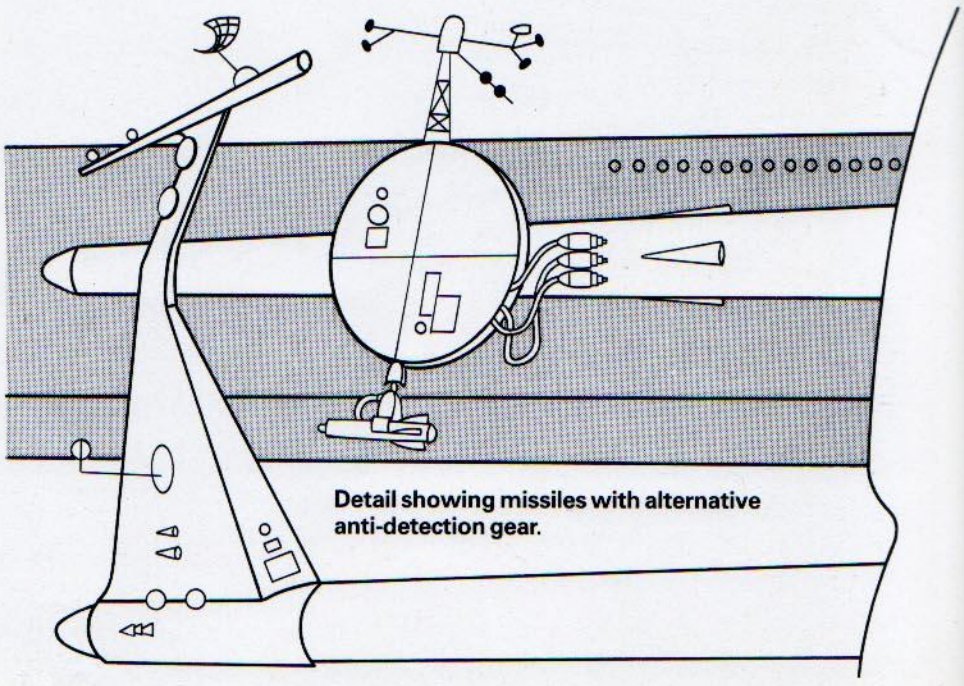
During the war most of these craft were commandeered by the military and refitted as supply and fuelling ships and, later on, as troopships. Unlike the Quartermaster, the military version of our Colonial, the Behemoth was equipped with a considerable armament and was intended to serve as a gunship in addition to its other duties. The desire of the Alpha Centaurians to maximize the functions of this vessel is quite understandable in view of the prodigious cost of producing a ship of this kind, but in fact it reduced its efficiency in most respects. The many weapon bays, accompanying control systems and military standard defence shield generators occupied a considerable amount of the available cargo space, thereby reducing the craft's payload. The extra power these facilities demanded also reduced both its performance and its range. The cost of uprating the main drive system to meet the requirements of an effective combat ship would have negated the point of the exercise so the original engines were retained. This compromise made it more of a liability than an asset as a warship, for it proved unwise to commit it to combat without the support of interceptors more usefully employed elsewhere.

An additional disadvantage was the external mounting of the gravity resist generators. Though making sense when the Behemoth was acting as a transporter, they were dangerously exposed to enemy fire and proved a major weakness in this respect. It was not uncommon for these giant ships to find themselves unable to return to their surface bases until repairs to the generators could be effected.

Their lack of success and the number of ships put out of action soon led the Alphas to reserve those remaining for their original task of transportation and supply. Towards the end of the war, the Proximans' control of the air was reduced sufficiently to allow the Behemoth to operate further forward and its armament proved of some value. The illustration here shows an example of this, depicting a troop convoy of these massive ships breaching a line of enemy Watchtowers on Proxima II without the attendance of escorts. Even so they were employed this far forward only because the low gravity of this world would allow them to land even if their gravity-resist generators had been damaged.

After the war the Behemoth reverted to its earlier role and can still occasionally be seen in the spacelanes. However, production ceased some years ago and it is understood that Alpha Centauri has developed a new high-capacity freighter along the lines of the Colonial III.

Specification	
Nationality	Alpha Centauri
Classification	High Capacity Freighter
Main Drive	Nuclear/hydrogen ion drive 3 million lbs thrust
Secondary Drive	Nuclear/liquid chemical directional thrust engines
Personnel	32 crew 1000 labour units similar to Mechteck
Armament	Assorted nuclear missile and laserguns
Defence	Military standard defence shields



Detail showing missiles with alternative anti-detection gear.


TRIMSON GRONDAG II

K4 INTERCEPTOR

The K4 Interceptor was popularly known as the 'Toad' with good reason. Although a squat, brutish vessel with a multitude of bulges befitting its nickname, it proved a dangerous adversary for the first half of the War.

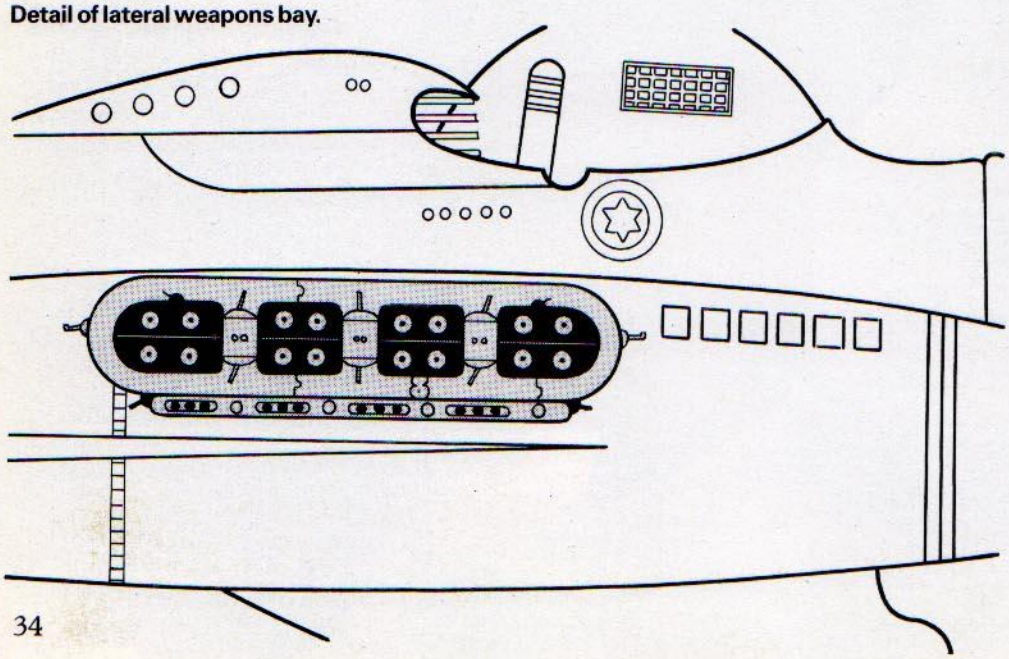
During these years the 'Toad' was Proxima's primary interceptor ship and was produced in high volume. Although less manoeuvrable than most of our ships of the same class and even than many larger types, its inferior mobility and speed were compensated for by powerful weaponry and massive protective armour.

This was a formula much favoured by the Proxima General Staff and it was the design basis of a variety of craft produced during the war. Particular features of the 'Toad's' armour were its flexibility and the density of the material used. There were several reports of 'Toads' surviving close-proximity nuclear blasts, being hurled out into space intact and eventually rejoining the action apparently little the worse for wear.

They were designed well before the Proxima research teams succeeded in producing warp generators and could not be adapted to carry them. As a result they were used primarily as defence vessels or for attacks on Alpha Centauri, operating in packs of twenty.

Specification	
Nationality	Proxima Centauri
Manufacturer	Various
Classification	Local Defence Interceptor
Main Drive	Liquid hydrogen nuclear Thrust potential 1 million lbs approx
Personnel	6 crew
Armament	Assorted nuclear rockets Sonic accelerators for ground attack Various laser and nuclear pellet launchers
Armour	Synthetic steel 48 cm thick in flexible platelets

Detail of lateral weapons bay.



In the first offensive against Proxima considerable losses were inflicted on our forces long before they had approached within what was thought to be combat range. It was some time before it was realized how far the patrol and supply network of these ships extended, as Proxima had established deep space penetration before either of us was aware of the other's existence.

Apart from its defensive capacity the role originally intended for the K4 was to spearhead any offensive against Alpha Centauri. As the War progressed it was often used as a ground attack craft but it proved unstable in the thinner atmosphere of the Alpha worlds and many were lost.

The 'Toads' were one of the few craft to have fought on both sides in any number, as nearly 200 were captured after the deep space patrols were cut off and their supply depots destroyed. Most of these were subsequently handed over to the Alpha Centaurians who had suffered the greatest losses at the outbreak of War and urgently needed ships to contain Proxima until replacements could be manufactured. Although the Alphas continued to use them they were far from ideal due to the anatomical differences between the two species and interior adaptation was never really effective. As our joint offensives took the pressure off their home defence, the captured ships were gradually withdrawn and dismantled. The principal components such as drive units and weapon systems were then incorporated into new Alpha hulls and many of the early Stingrays were equipped in this way.

Proxima's security forces still employ downrated K4s for local patrol work and our military possesses several wartime ships which are used mainly for weapon testing and as tugs. A very fine example in its original crimson livery is also to be seen in the Mars War Museum.

K13 SHARK

This extraordinary warship came as a complete surprise to the Alpha Centaurian and Terran Military Authorities and demonstrated that Proximan technology had reached an unexpectedly advanced level. The first that was known of these ships was their interception of a patrol of our Partisans heading off a convoy of enemy supply ships. The following extract from a flight recorder salvaged later gives a vivid impression of our first contact with the Shark.

Navigator There are low-mass objects on the screen, sir, Vector Beta 229 to 230 approaching very fast.

Captain Ships?

Navigator Closing too fast. They're hot though [emitting radiation].

Intership Communicator Flight disperse; let them through.

Navigator Bit big for that mass rating. They could...

Intership Communicator Stand by to evade unidentified objects Vectors 228 and 9.

Captain There they are. That's odd.

Navigator What?

Captain (SHOUT) Max Shield! I think... (end)

One crew survived that action but their report did not contain enough information to identify the nature of the attacking ship. All that was obvious was that the Proximans had suddenly acquired a very fast and manoeuvrable weapon.

These sleek warships began appearing in considerable numbers from early 2056 onwards and the characteristic flare of light from their plasma drive system became an all too familiar sight to our hard pressed crews.

Although the system of accelerating hydrogen plasma through an electro-magnetic field was not unusual, the Proximans had obviously found a way of generating considerably more thrust than was thought to be possible with this type of propulsion.

The ship itself was extremely light, armour being minimized in favour of performance, which at least made them easy to destroy if they could be hit. The first Sharks suffered from lack of range as their fuel capacity was limited, but this was improved in later versions by the addition of the two hydrogen collectors extending backwards from their 'wings'. Although these devices could not replace the gas reserve at the same rate as it was consumed, they were able to extend the ships' range by about 30%.

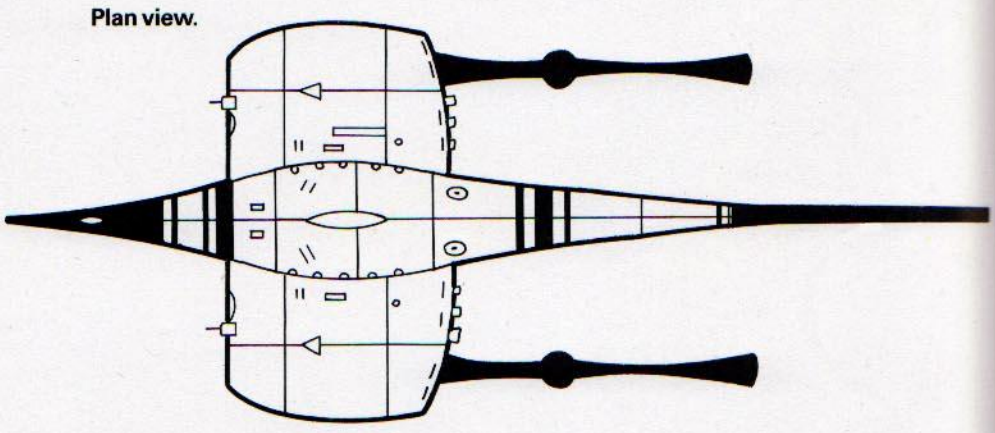
The armament carried was effective against our Partisan, but later proved to be inadequate once the Hornet had reached our battle squadrons.

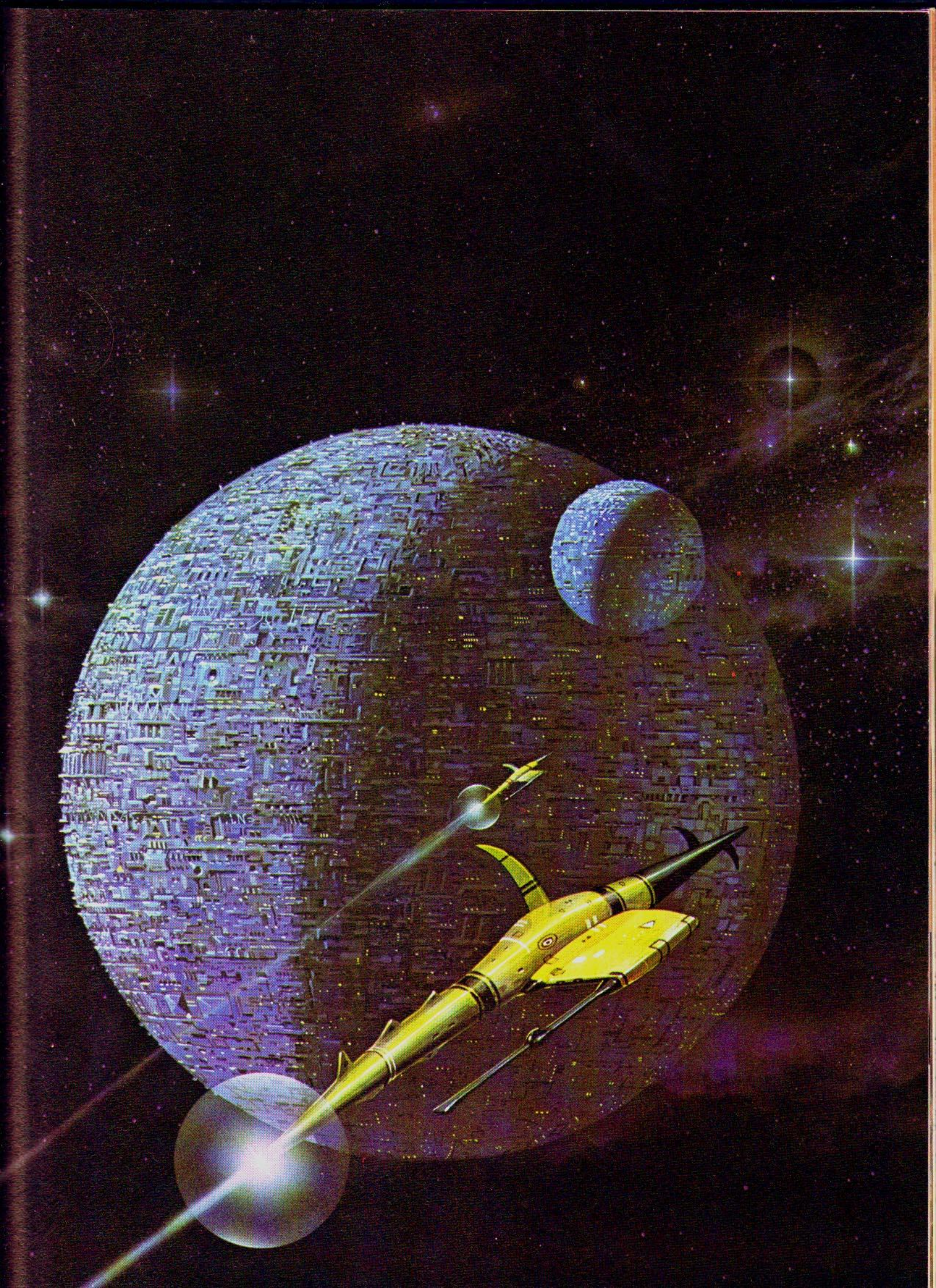
A feature of these remarkable ships was the curious array of fins and projections which gave rise to their codename and which formed part of one of the most sophisticated navigation and direction systems of the War. Invariably, the Shark was able to take the initiative before being spotted by our crews and it was not until we were able to establish a chain of front-line surveillance stations that this situation was reversed.

Incidentally the illustration here also shows one of the eight strategic command stations through which Proxima co-ordinated all their military operations.

Specification	
Nationality	Proxima Centauri
Classification	Mid-range Interceptor
Main Drive	Nuclear/hydrogen plasma drive Precise thrust unknown
Personnel	3 crew
Armament	2 laserguns, 1 nuclear pellet gun
Armour	Plastisteel 7 cm thick

Plan view.





K7 PIRANHA

The smallest combat craft of the Proxima Wars was, without doubt, the one-man atmospheric fighter dubbed the Piranha. Fast and highly manoeuvrable, it proved an extremely difficult target, the only compensation being that it carried very limited armament.

Although conceived as a ground attack weapon, it was later deployed in a variety of roles, being first encountered during the Battle for Mars in 2052. Its small size enabled it to be transported by warp-equipped freighter to the area of operations. There it would operate from the mother ship, but was vulnerable to attack from better equipped deep-space interceptors until it had reached atmospheric levels. Once there, it was far more effective, and during the Battle for Mars Piranhas succeeded in tying up a considerable number of our Vulcans which should have been concentrating on the enemy troopships and nuclear weapon carriers.

While their extremely small size gave them some advantages, it also meant that they were unable to operate for long before needing to refuel. To do so they once again had to run the gauntlet of our deep-space interceptors to reach the mother ships, which were themselves extremely vulnerable. A great number of Piranhas were captured intact because their supply bases had been destroyed and they had simply ran dry.

Once the war had reached the Proxima Homeworlds themselves, it was a different matter, as they were operating continually in atmosphere from permanent and protected bases.

The greatest advantage of this type of craft was the fact that it could be produced in great numbers at a fraction of the cost of more conventionally sized warships.

As even the most advanced defence shield is limited in the amount of energy it can absorb at any one time, the survival of a warship depends very much on its ability to avoid contact, either through evasive action or by destroying its attacker.

The Piranha made both courses of action difficult. Though unable to withstand much damage and limited in firepower, it was no easier a target than any other type and could attack in sufficient numbers for its corporate volume of fire seriously to damage the target.

Piranhas continued to be a threat throughout the conquest of Proxima as after the successful campaign to destroy their main bases they were able to operate in small packs from

easily concealed field depots scattered throughout the battle zones.

After the war, hundreds of them, stripped of their military hardware, were shipped back and made available to the public. In spite of their short operational range and limited capacity they provided a fairly cheap form of private transport until manufacturers could re-equip for civil development and production. Many are still in use but they are rapidly becoming collector's items as good examples are increasingly difficult to find.

Specification	
Nationality	Proxima Centauri
Classification	Atmospheric Interceptor
Main Drive	Nuclear/hydrogen 600,000 lbs thrust
Personnel	One crew
Armament	One laser gun, particle accelerator or nuclear pellet gun
Defence	7 mm plastic armour

TARANTULA (early model)

During the final stages of the Proxima Wars, the allied forces suffered greater losses than at any other time during the conflict. In space there had been room for manoeuvre, but on the surface of Proxima II, the last enemy stronghold, this was not the case. In the bitter, localized ground fighting which characterized this stage of the war our forces had to contend with a number of defensive weapons previously unknown, one of the most fearsome being the Tarantula.

Virtually undetectable in their screened silos, these sinister scarlet-painted craft would wait until overrun by our advancing ground forces before blowing off their camouflages covers and erupting from beneath the surface with the shriek of jetstream. They were heavily armoured and carried the most frightening and indiscriminate weapon of the War. Housed in each of the legs were multiple sub-atomic particle oscillators (SAPO) able to project an omni-directional field which disrupted the relationships between atomic components.

All matter within an effective range of 5–600 metres was instantly and entirely dispersed, leaving a circle of boiling gases, and occasionally particle collision would set off a chain of nuclear reactions which not only devastated a wider area but destroyed the Tarantula as well.

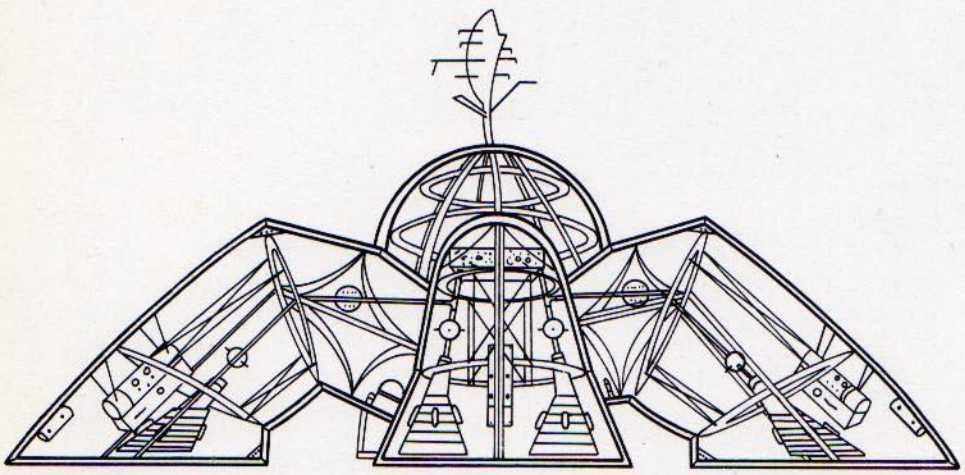
It was a crude but effective instrument of war which prolonged and almost reversed the course of events, but it had a fundamental weakness in that the enormous power consumption of the oscillators would completely drain the reserves, leaving the craft immobile and virtually defenceless.

Hideous losses in men and equipment were sustained before our Forward Tactical Research Units succeeded in finding a counter to the Tarantula's threat. They devised a method of projecting electronic 'ghost' images simulating attacking ground forces which would trigger the Tarantula's receptors. Once the craft had ejected from its lair and was trying to identify its target it was vulnerable and could be dealt with by conventional medium-range weapons.

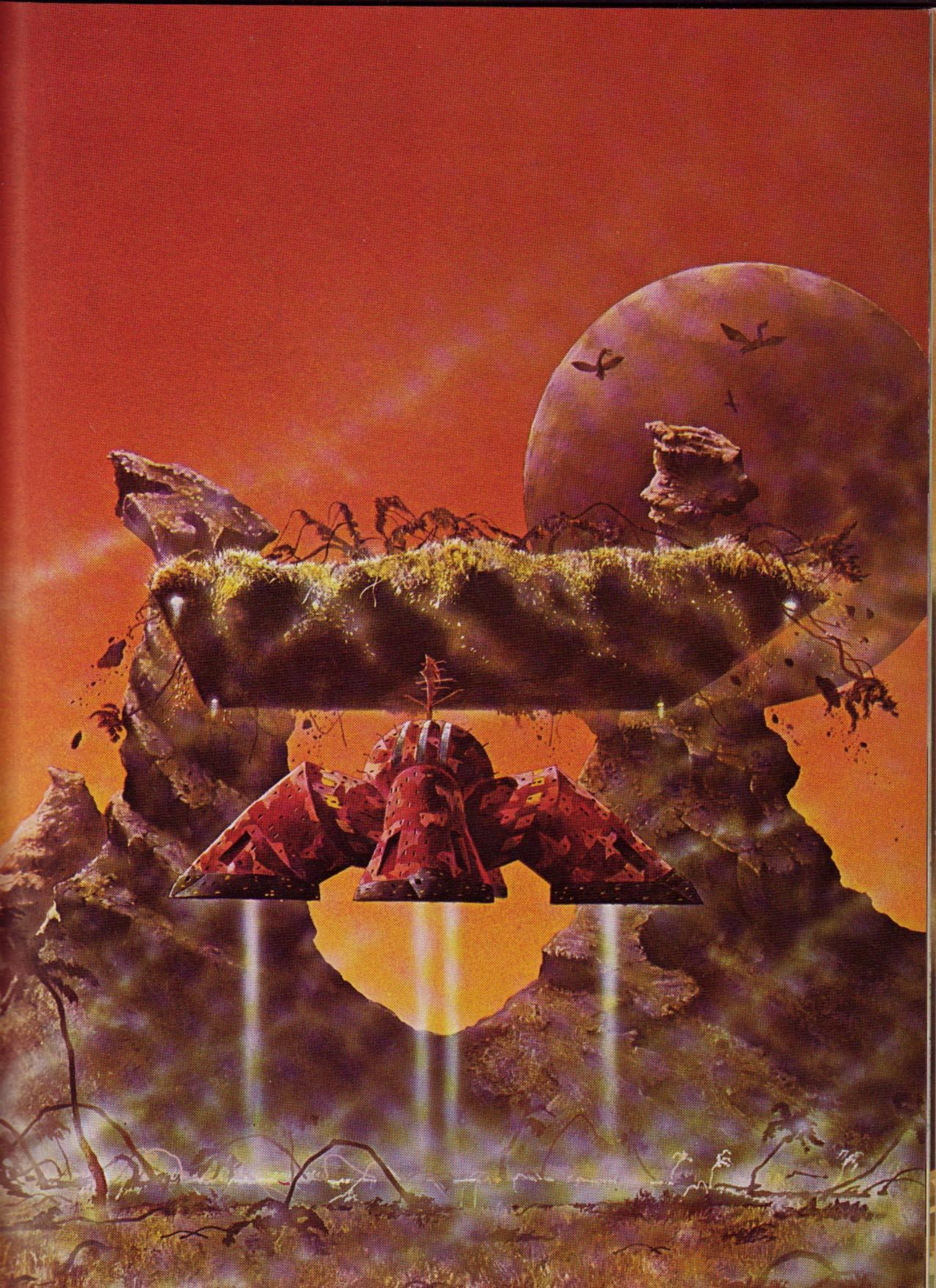
As the War drew to a close, the Tarantula appeared in a variety of forms, although the basic construction remained unchanged. Whereas the early model was fully armoured and carried a crew, later models became progressively less sophisticated and eventually were constructed as little more than an unarmoured frame containing the control module, propulsion units and the oscillators. These models were unmanned and were guided by automatic systems activated either externally or independently through the machines' own sensors. Many casualties were reported for some time after hostilities were over as a result of the accidental triggering of forgotten machines.

Specification

Nationality	Proxima Centaurian
Classification	Limited-range Defence Craft
Main Drive	Compressed atmosphere jets fed by central nuclear pressurization unit similar to TTA model PA 12
Directional Drive	Conventional chemical thrust units in variable mountings
Personnel	6 crew (early models) Later models adapted to remote control
Main Armament	Four conventional SAPO field generators
Secondary Armament	Four sonic-wave accelerator beams
Defence	High-density plastic armour, average 25 cm thick



Late model lacking defensive armour.



MORAY EEL

The Proxima War was a long time in the winning, and fighting was never more intense than in its closing years. The enemy was forced back to its home planets and the emphasis shifted from space to surface warfare, always the least subtle of the many forms of combat. The fight for domination of Proxima's soil was no exception. The enemy was desperate in the face of increasing numerical superiority and began to resort to progressively indiscriminate weapons, the Moray Eel, like the Tarantula, being one of these. In an attempt to reverse the steady advance of our forces the Proximans decided to risk their own planetary resources by employing more and more thermo-nuclear weapons. They already had the warheads, but few vehicles designed to carry them, and as a result they began to adapt other craft for the task. The Moray Eel started life as a freight carrier plying within the Proxima system and was produced in quite large numbers during the early part of the century. By the beginning of the war, however, production had ceased as the design became obsolete, though several hundred serviceable ships were available for conversion to warhead carriers. Well able to carry a weapon of considerable size, they were stripped, refitted with modern guidance systems, and were sited at scores of strategic points throughout the Proxima system.

The fact that they were a stopgap improvization prevented them from becoming the danger they could have been, as their lack of defensive equipment resulted in many being destroyed before reaching their targets. Most of them were sited in hastily constructed positions, such as the one illustrated here, housed among the pylons of a large bridge, and a large number were overrun or destroyed before they could be launched.

Even if they were successfully launched, their outdated drive units were unable to produce the kind of performance that would allow them to evade interception and they never constituted a serious threat to the Allied advance.

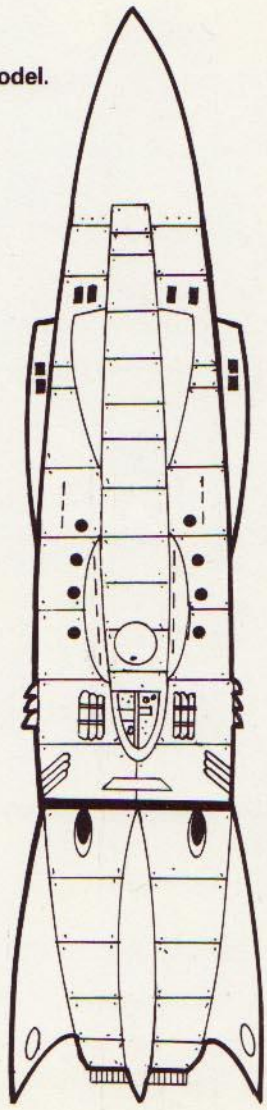
Had the launch vehicle been better suited to the task, a sufficient number of the massive warheads could have found their way to their targets for the war to have been indefinitely prolonged.

It is a measure of the enemy's desperation that if most of these weapons had been delivered, they would have left little of his homeland to fight for.

Specification

Nationality	Proxima Centauri
Classification	Drone Missile
Main Drive	Uncertain, probably thermo-chemical
Personnel	None
Armament	Thermonuclear warhead
Defence	None

Side view of commercial model.



MILITARY/PROXIMAN

K9 GOBLIN

The war started for Alpha Centauri in late 2048 when the night of Alpha One suddenly erupted in a fury of light and heat. Whole cities disappeared in seconds with nothing but black and lethal columns of gas to mark their passing. The attacking force had been detected some hours earlier but Alpha, though realizing the significance of the fleet of ships, could not mobilize enough ships in time to even slow it down. Surface defences reacted quickly, managing to destroy a number of the enemy ships, but the evacuation of strategic targets had begun too late. Within hours of the first sighting the missiles hit.

Four years later the Proximans attempted the same exercise, but this time the target was Mars. In a lightning dash, a massive battlefleet struck through the outer defences of our solar system intent on destroying the great manufacturing plants supplying our forces. This time, however, it was a different story because, unlike our unfortunate allies, we were already in a state of war. Our Sentinel Majors and local defence interceptors were armed and in readiness for just this eventuality.

Nevertheless, it was a furious and close-run struggle. The Proxima ships were, for the most part, more modern and better equipped than the Status Two ships we retained for local defence. It was only the courage and determination of the crews and back-up teams that prevented a repetition of Alpha's disaster. Although our losses were high, enough time was bought for our front-line squadrons to counterattack. Inevitably, some of the enemy's missiles got through and there are still areas of Mars which will be unapproachable for a considerable time.

The primary ground-effect missile used on both these occasions was the Medusa, a 'dirty' thermonuclear device producing intense radioactive fall-out which remains active for many hundreds of years. In size and destructive potential the Medusa was only slightly larger than the one carried by our Cyclops, but possessed a much more sophisticated guidance system, while its own generated defence field made it difficult to neutralize.

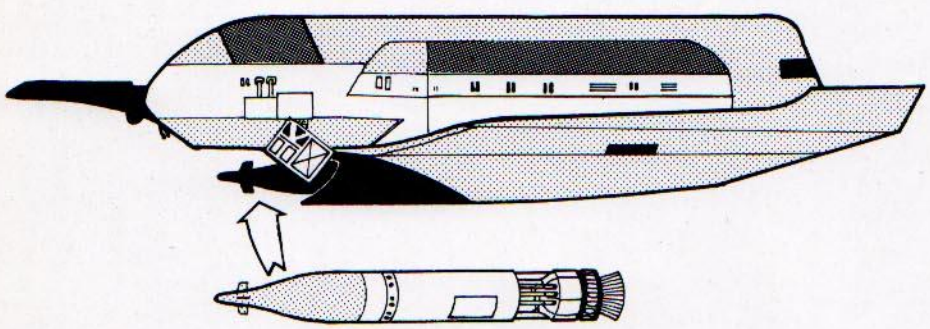
It was carried by one of Proxima Centauri's most sophisticated fighting machines, a long range planetary strike ship with a performance matching many contemporary interceptors. It was justifiably the pride of the Proximan fleet and fought in all theatres of the war in a variety of roles. As many of the enemy's ships were not equipped with warp drive due to its late adoption, many Goblins were adapted to mount an interceptor in place of the usual missile. When the Goblin emerged from warp at its jump target the interceptor was released to give support to the missile ships. Although this made it even more difficult for the Allies to seek and destroy the Medusa carriers, it at least meant one less missile to neutralize.

The Goblin was also one of the first warships to utilize the properties of the warp generator by creating a distortion of light reflected from the hull surface to form a ghost image of the ship slightly behind the real craft. This often fooled an attacker's gunnery computer long enough for the approach to fail.

After the war, all the Goblins were impounded by the Allies and served with the peace-keeping forces for some years.

Specification

Nationality	Proxima Centauri
Classification	Long-range Missile Carrier
Main Drive	Nuclear/plasma drive, 4 units Total 5 million lbs thrust
Personnel	6 crew
Armament	1 Medusa computer controlled missile Various laserguns
Defence	Generator defence shield 14 mm armour



The distinctive nose of the Goblin (in black) housed the warp generator and defence shield generators and was missing from most post war commercial models.

MOBAS

The Mobile Armoured Strongpoint, to give this strange little craft its full title, is essentially a surface ship but is included here because of the many examples that could be found in a variety of situations throughout post-war space. Very large quantities were produced by the Proximans as part of their domestic defence arrangements, many of them subsequently falling into the Allies' hands. During the Reconstruction they proved useful in a number of roles, particularly on Alpha, which had suffered badly from surface bombardments rendering large numbers homeless. They were large enough to accommodate several people comfortably once the interior had been re-equipped with the accoutrements of civilian life and did in fact become very popular. They are naturally durable structures, and plenty are still in private ownership as second homes dotted around the planets of all systems. All those used in this way were stripped of their anti-gravity generators but many others were left intact and are still used as mobile accommodation for commercial operations such as mining or agriculture. Four or five can be seen floating in space far out on the Perimeter, where they are employed as automated data-collection stations or navigational beacons.

Their original function was obviously far more sinister, as they constituted an important part of the planet-wide network of defences. There were, of course, extensive fixed installations and defensive structures but the great mobility of modern warfare too often rendered such constructions useless.

Warfare, even by the middle of the twenty-first century, had become an extremely fluid affair with actions ranging to and fro over the whole planetary surface. Fixed strongpoints still had a place protecting individual targets such as cities or industrial installations, but were almost without effect otherwise as fighting consisted of a constant running action rather than clearly defined battles as such.

The Mobas could be moved from site to site without difficulty and be deployed as easily as any other mobile war machine. It was, however, essentially a defensive weapon and could not achieve the speed and manoeuvrability necessary in an offensive craft. Instead it was extremely heavily armoured, with a defensive skin made up of several layers of different materials such as plastisteels, lead and ceramics, in addition to an outer coating of a rubberized plastic material.

The most usual method of application was in close co-operation with conventional armoured units such as those equipped with the PMSV VII Heavy Tank shown here.

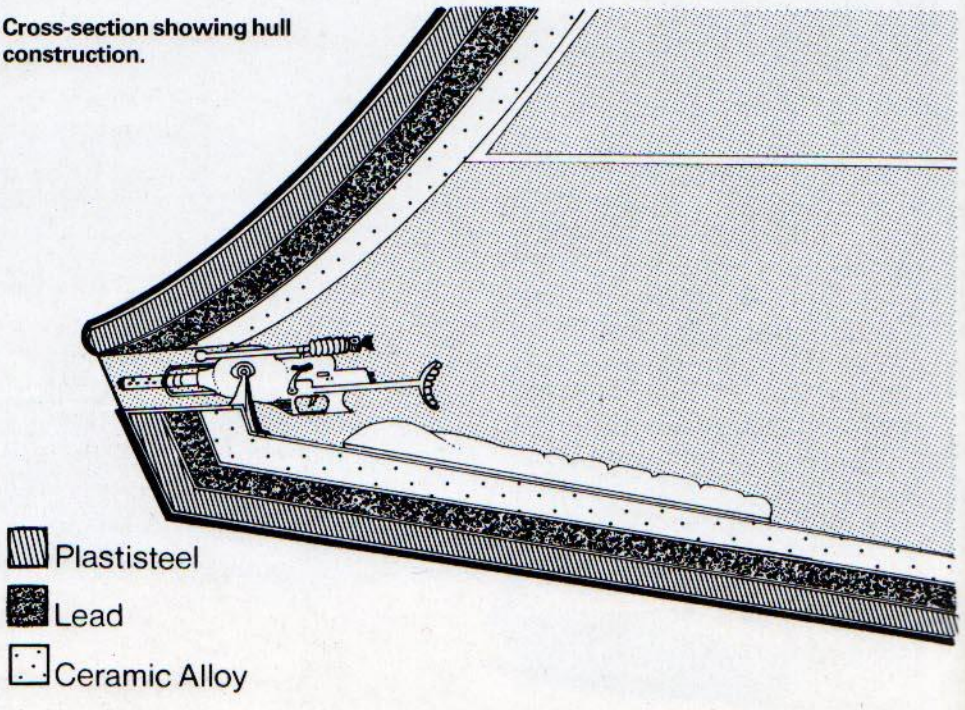
During an attack the Mobas detachments would follow the advancing mechanized units to consolidate their position and to provide additional covering fire when required. The armour would then withdraw behind the defensive line to regroup and replenish its supplies. The same principle would apply in retreat with the tanks counterattacking to allow the Mobas' to withdraw to their new positions.

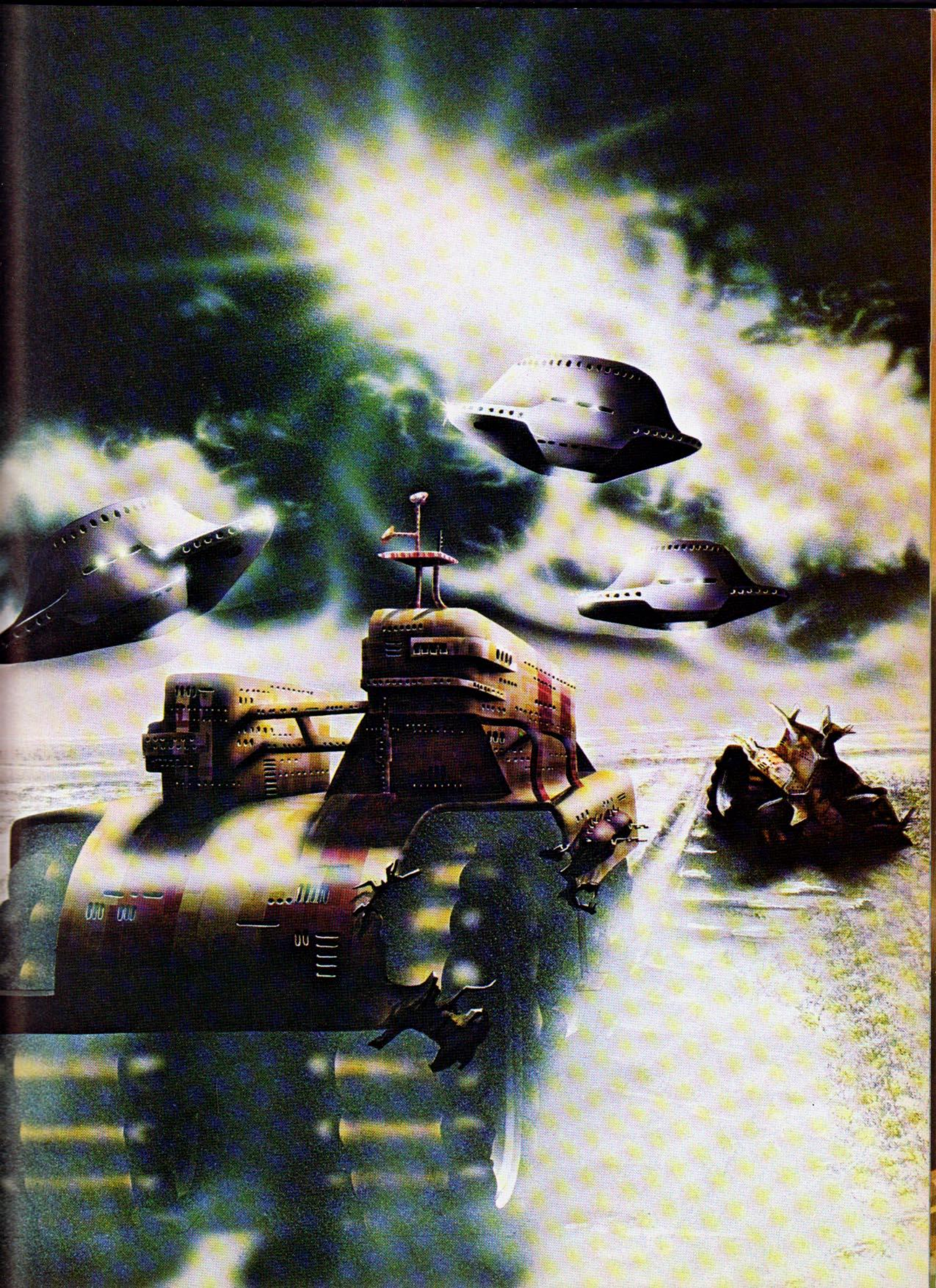
Both the Mobas and the PMSV VII are now obsolete in military terms but a few of both exist in Proxima's security arsenal.

Specification

Nationality	Proxima Centauri
Classification	Military Defence Vehicle
Main Drive	Anti-gravity lifters Gimbal-mounted chemical jets
Personnel	Up to 20 military crew
Armament	Various nuclear and laser weapons
Defence	Approx. 40 cm thick layered armour

Cross-section showing hull construction.





TTA COLONIAL III

The Colonial was the first of the high-capacity freighters and in its life has undergone a number of major changes.

The early models bore no more than a passing resemblance to the one which is so familiar to us today. The Colonial I was first built in 2004 and was manufactured in the great TTA yards in North Africa with the specific task of transporting the massive amounts of equipment and materials required for the construction of the Lunar Research Station.

In order to make the passage through Earth's atmosphere the hull of the world's biggest spacecraft was equipped with a mass of wing surface and booster rocket packs and looked very different from the clean smooth lines of its descendants. Apart from the enormous cost of operating a ship of this size from surface bases, it was a difficult craft to control until free of Earth's atmosphere; and if launching was dangerous, landing was a spaceman's nightmare. One out of every three landings resulted in damage to the ship of varying degrees of severity and this fact allied with the prodigious consumption of fuel led to a major redesign. From this emerged a sleeker looking vessel lacking the untidy array of projections carried by its forebear and one which required a completely revised mode of operation. It was to operate entirely in space, thereby avoiding the need for the huge kerosene/oxygen thrust engines which consumed fifty tons of fuel every second. Instead the McKinley ion drive, which had been perfected a year earlier in 2013, was fitted, this being sufficient to provide escape from lunar gravity and place the Colonial in a free-fall around the Earth.

Cargo transfer to and from orbit was then effected by the AAT 181 loaders specially designed by Avery Astronautics. These ships were essentially container barges linked to form a complete hull, sandwiched between a power section and a manned control module. Once the containers were delivered the fore and aft sections locked together for the return journey. The success of Avery's tender was at least in part due to the ingenuity of their designers in providing an additional function in the containers themselves, for with little additional work they could be interconnected in a number of ways to form a habitable structure. They could be used to form living or working facilities either in space or on the surface and there are plenty of these structures still to be seen.

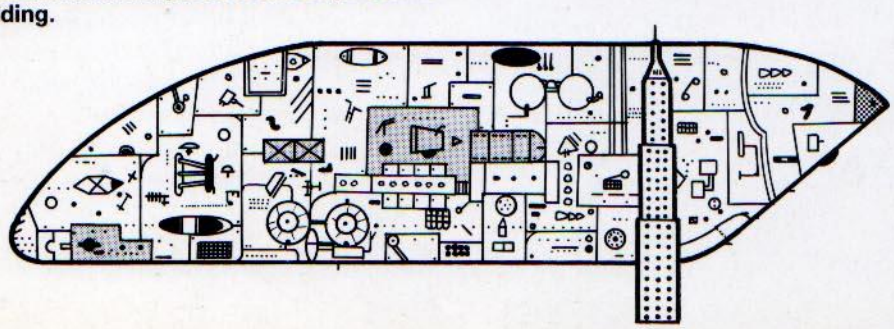
The successful application in 2045 by Dr Hans Berger of the principles of gravity-resist was probably the single most important benefit gained from our association with the Alpha Centaurians. It certainly transformed the physical appearance of every subsequent spacecraft beyond anything previously conceived, and the Colonial III was the first to be equipped with gravity-resist equipment. Fitted with Berger generators a ship of almost any size or shape could land safely in most gravitational conditions and the bulk of the Colonial III could thus be increased dramatically.

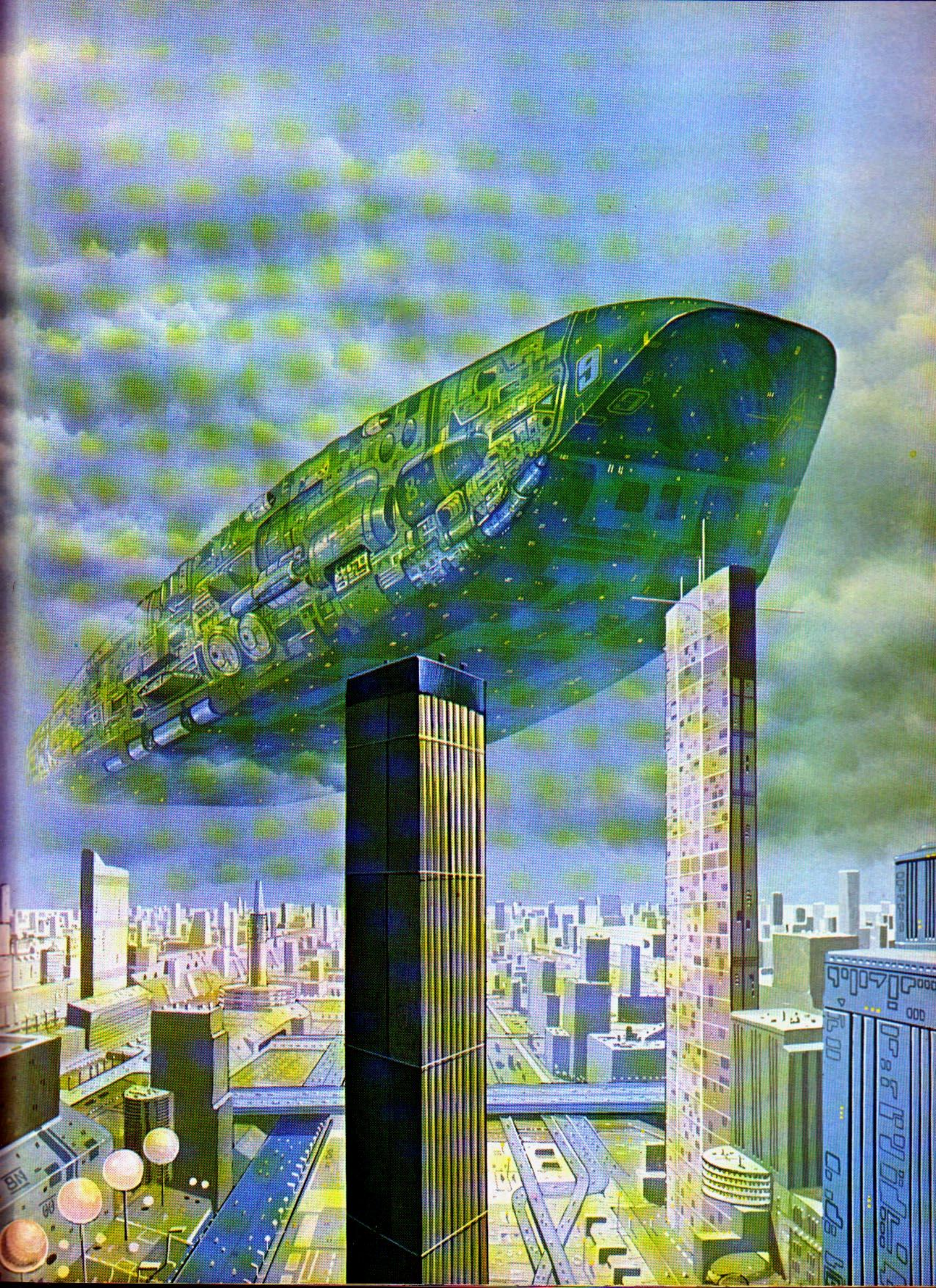
The Colonial series has been in service longer than any other space-freighter and its contribution to our expansion into space is immeasurable. Although no examples of earlier versions exist, the Colonial III and its military variant, the Quartermaster, remain the freighters most usually seen in the spacelanes.

Specification

Manufacturer	TTA/Avery Astronautics
Classification	Class II High-capacity Freighter 750,000 cubic dekometers
Main Drive	McKinley Ion Drive Model C.2 Units WCRC Bowman fast-breeder reactor Mk IV
Auxiliary Drive	Avery Mistrale chemical thrust unit WCRC David fast-breeder reactor type C.3
Personnel	8 officers 20 human crew 1200 mobile Mechteck labour units
Service Craft	20 Avery AAT 181 loading tugs 3 Consolidated Aerospace Scout space to surface flyers 16 Avery Midget maintenance lighters
Armament	None
Defence	WCRC Type 17D Meteorite Deflector Shield

The Colonial III compared to the Empire State Building.





MRT 114 MULE

This industrious little craft is the most recent in a long line of working ships and can be seen in various guises throughout the Solar System and beyond. Wherever there is industry, the Mule Multirole tug is to be found busily carrying out a wide range of functions. The basic design has scarcely changed in the last forty or fifty years as there seems to be little to be done to improve it. The modifications that distinguish the various models have mostly been concerned with improvements to its ancilliary equipment or power system. Probably the most familiar version is the one which can be seen in all the older orbital spaceports and transfer stations, where tugs are employed to assist the docking of liners and freighters. The newer stations are of course equipped with automatic docking facilities but even these usually have their contingent of Mules for maintenance, loading and emergency work. These models are easily identified by the large external pod beneath the main hull, housing the powerful directional electromagnet used to manoeuvre the docking vessel.

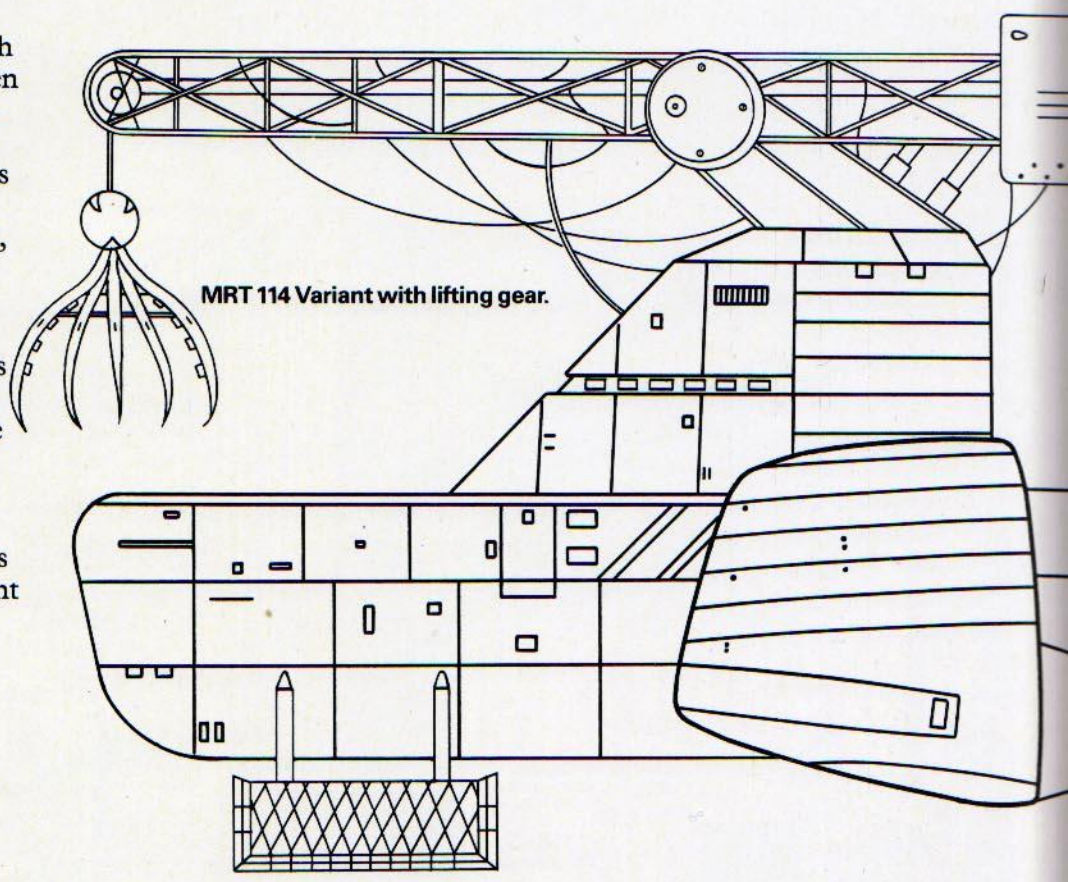
The best places to see the Mule's many variants are undoubtedly the fabrication yards, particularly those orbiting Mars. Here they can be observed executing most of the functions for which they can be equipped and our illustration shows two gantry tugs manhandling a giant spar section for a new orbital manufacturing complex.

The lower half of the central pylon is fixed and contains the bridge and control centre of the ship, the gantry turret forming the upper part. On those models equipped with photowelding and cutting lasers the layout is almost identical, but without the articulated jib. The laser projectors are mounted on slender stalks projecting from the rotating band, here carrying the main hydraulic pistons. Cable- or pipe-laying tugs are again almost identical but are easily distinguished by the large drum mounted above the bridge, giving the ship a markedly top-heavy appearance. The two plates projecting from beneath the ship are electromagnet grips and are used for either carrying less bulky loads or for anchoring the vessel to a surface.

Other versions are sometimes difficult to identify as modifications are not readily apparent, such as fuellers or those designed for handling fissionable materials where heat or radiation resistant hulls are used.

Specification

Manufacturer	Avery Astronautics
Classification	Multirole Tug
Main Drive	Nuclear/liquid fuel WCRC David fast breeder D6 reactor housed in main hull supplying 3 engines, one mounted in each outrigger and one hull-mounted
Personnel	3 human crew



MRT 114 Variant with lifting gear.

MARTIAN QUEEN

In early 2015, fare-paying passengers stepped aboard the first purpose-built interplanetary spaceliner to a fanfare of publicity which was to make the name of Martian Queen a household word. Representatives from every region of the World Community had gathered in the departure lounge of Miami Spaceport to take part in this historic inaugural flight to Mars. Speeches, toasts and a holographic presentation of the ship's development were beamed to every part of the globe, until eventually the crowd of passengers boarded the buses to take them across the apron to where the great ship lay.

Little of her could actually be seen as she was cocooned by sonic filter screens which also covered the launching ramp, but her size was staggeringly apparent. Finally the passengers were aboard and settled into their luxuriously appointed cabins. The sound of her engines became audible even through the screens, as she moved ponderously up the ramp, to emerge in a thundrous roar of engines at full thrust. Within minutes she was out of sight and a new era had begun.

The Martian Queen was the first of the Queen ships operated by Trans-Galactic Spacelines. A total of eight entered service, although five of these flew either as ships licenced to other spacelines or were commissioned for military use.

During this period private space-travel was an expensive luxury and those fortunate enough to afford the experience expected value for money. The early Queen liners were correspondingly sumptuous, each interior being designed and built by world-renowned artists and craftsmen. However, as technology advanced and the demand for cheaper and more widely available services grew, so the Martian Queens became outdated and eventually were either withdrawn from service entirely or refitted for greater carrying capacity. Their successors, the Galaxy Queens, represented a very different breed of vessel and perhaps made a much greater contribution to interplanetary travel by bringing this facility to a far wider range of people than had previously been possible. Families who had been transported to the Martian Industrial Centres could now hope to see friends and relations they thought had been left behind on Earth for ever. In fact the new accessibility allowed the growth of the many secondary industries now to be found on Mars.

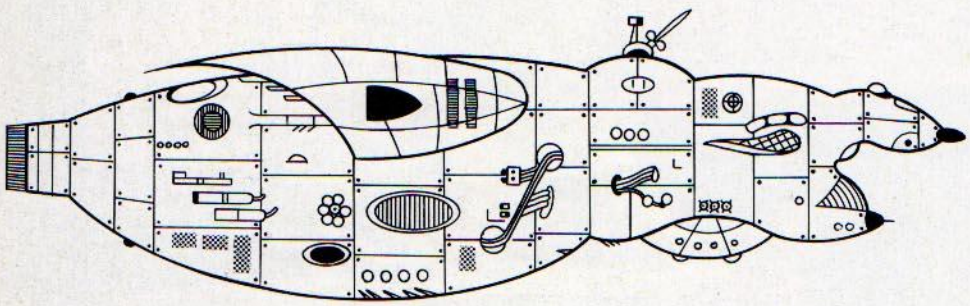
Nevertheless, the disappearance of the Martian Queens is to be regretted as it is unlikely that we shall ever see their kind again. Unfortunately, none of these majestic liners has survived, as even those which were refitted have long been withdrawn and dismantled. Some idea of what it must have been like to travel in them can be gained from visiting the First Class Dining Lounge at Miami Spaceport, which has been constructed as a replica of the Pleasure Deck of the first Martian Queen.

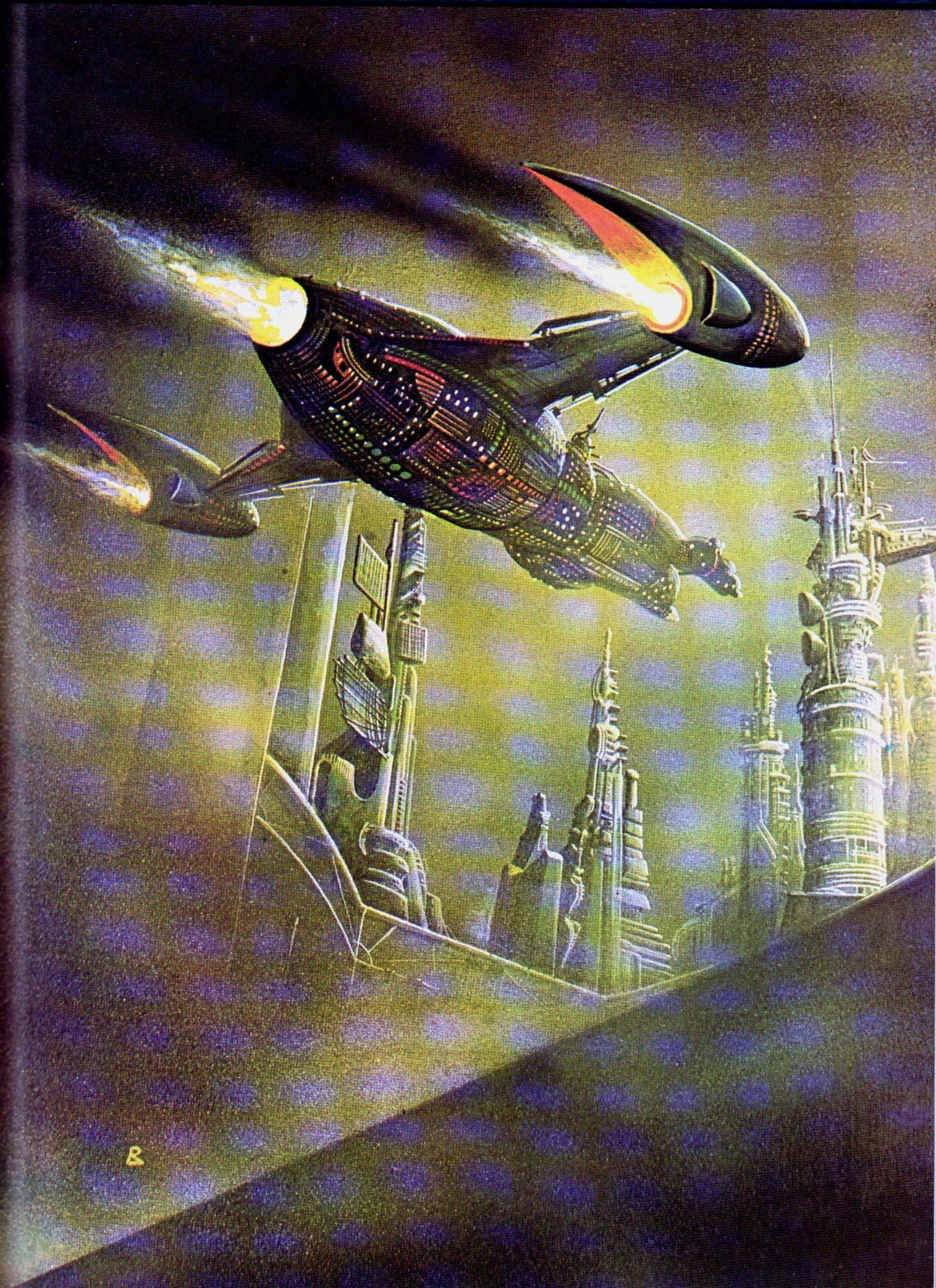
When standing there it is easy to imagine the impact that momentous inaugural flight must have made on the crowds thronging the apron – particularly as among them there would have been many able to remember a time before Man had ever launched himself into Space.

Specification

Manufacturer	Avery Astronautics, licensed by Trans-Galactic Spacelines
Classification	Spaceliner
Main Drive	3 Avery Meteor directional thrust engines each 350,000 lbs thrust WCRC Bowman fast-breeder reactor Mark 1C
Auxiliary Drive	2 Avery Harmony solid fuel each 80,000 lbs thrust
Personnel	8 flight officers 2 technicians 12 cabin crew

Side view of prototype.



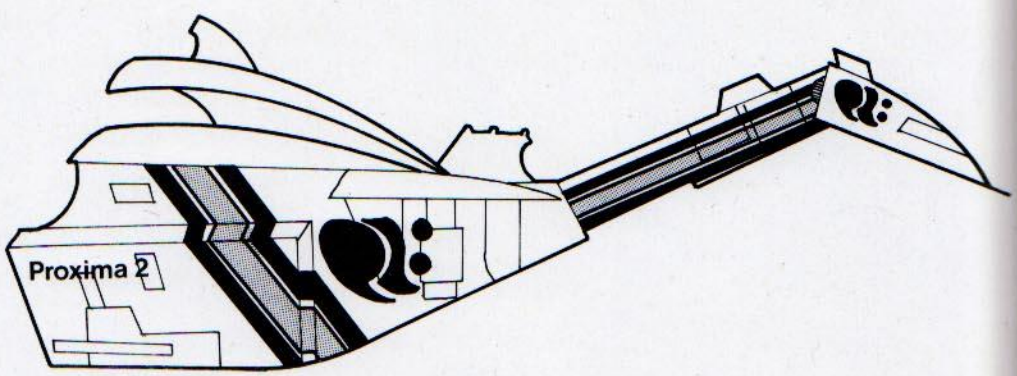


INTERSTELLAR QUEEN

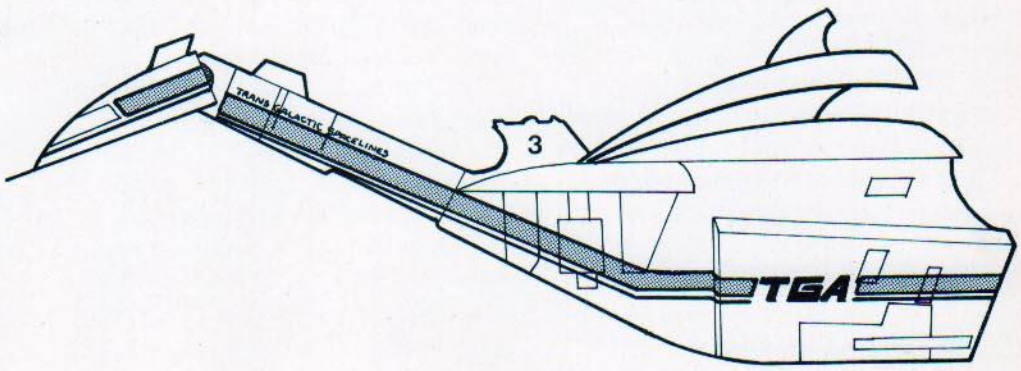
Anyone who has visited a major spaceport will have seen the distinctive and elegant shape of the world's most advanced spaceliner poised for its next journey into deep space. The Interstellar Queen is the most recent of the Queen Line ships and the only one designed to operate between the stars. It was introduced in 2046 to meet the growing demand for access to Alpha Centauri, following the Trade Agreement signed with the inhabitants of the double star system in 2039. Though highly regarded by both crew and passengers it was soon apparent that its carrying capacity was too limited for the ship to be commercially successful, and work then started on the development of a far larger sister ship.

Before this project had passed beyond the initial design stages, fate intervened to postpone further progress until 2063. In late 2047 a Pathfinder IX survey ship operating near the red dwarf of Proxima Centauri was attacked and destroyed by a military patrol from that system. A few weeks later, an Interstellar Queen emerged from warp to start the run into one of the Alpha Centauri worlds, only to be completely obliterated in a further, unprovoked nuclear attack. The war which was to involve three solar systems for fifteen years had begun.

	Specification
Manufacturer	Avery Astronautics
Classification	Long-range Spaceliner
Main Drive Mk I	2 McKinley Ion drive units 1,200,000 lbs thrust
Mk II	3 McKinley Argosy Ion Ultradrive 2 million lbs thrust
Auxiliary Drive	Mk I and II Avery Mistrale nuclear/chemical engines
Personnel Mk I	5 flight officers 2 technicians 75 cabin crew
Mk II	6 flight officers 2 technicians 30 cabin crew
Capacity Mk I	280 passengers
Mk II	600 passengers
Defence	WCRC Type 17b Meteorite Deflector Shield

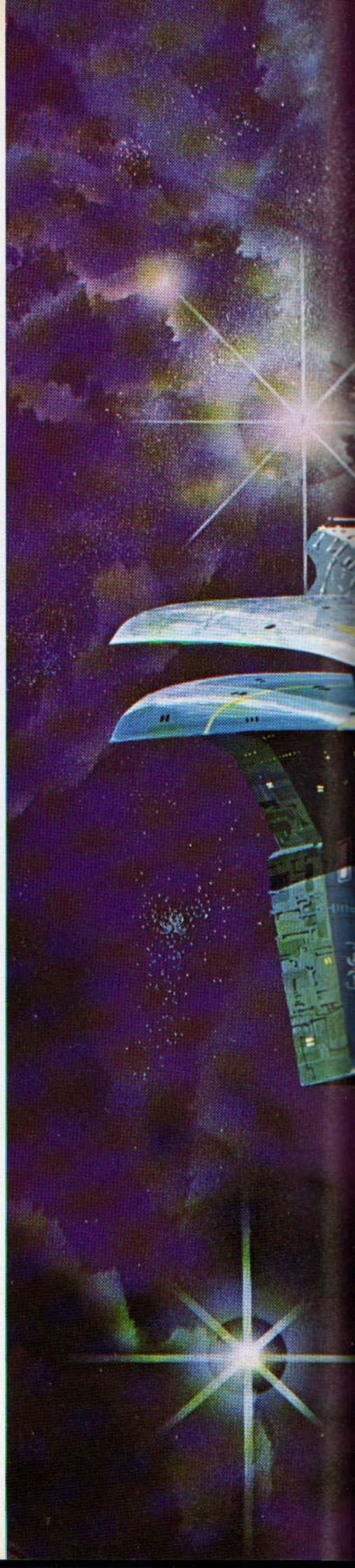


The Interstellar Queen has served with most major space lines.

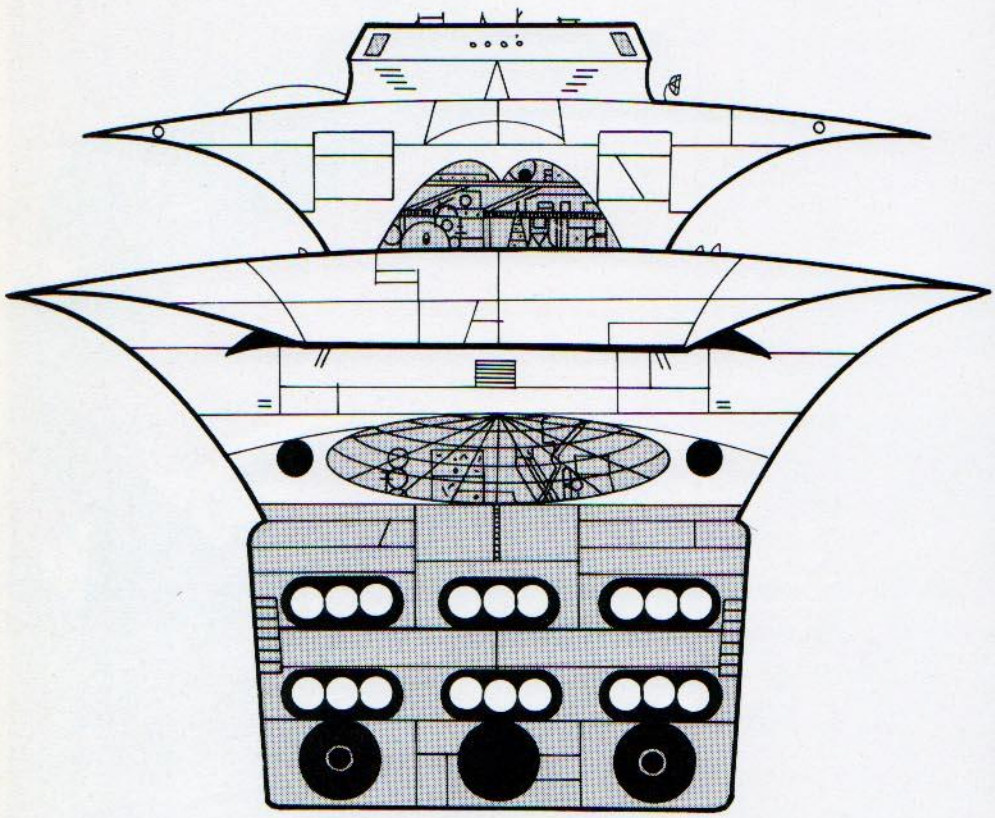


INTERSTELLAR QUEEN

ANGUS MCKIE



Rear view of the Interstellar Queen.



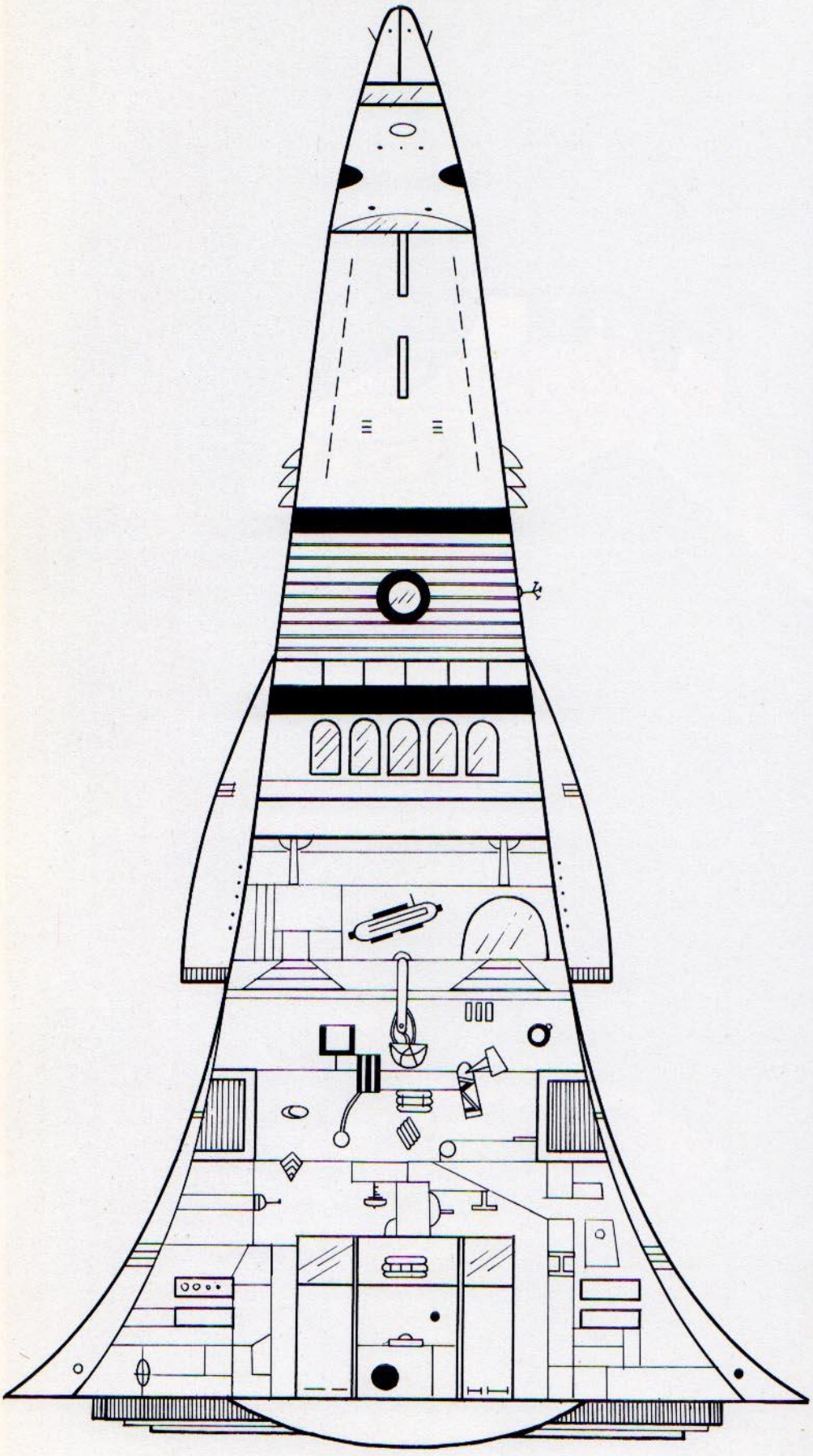
Although two or three of the Interstellar Queens were operating during the war period, the remainder were laid up until hostilities had ceased. They then continued to operate on all runs until their new sister entered service in 2071.

The Interstellar Queen Mark II was a very much larger vessel, though retaining the unmistakeable family resemblance of these liners, and was designed with cabins for up to 600 passengers, with extensive leisure facilities. Most of the Mark I's were then refitted to operate within our Solar System as, without having to accommodate the massive power demands of the DeVass generators, they could be operated economically.

Although less sophisticated and with fewer leisure facilities than her big sister, the Mark I is one of the most beautiful ships produced. Her clean, sleek lines are a perfect example of the successful marriage between technology and aesthetics and will set an example for many generations of astronautical engineers to come.

INTERSTELLAR QUEEN

Plan view of Interstellar Queen.



ANGUS MCKIE

MIAMI SPACEPORT

No book dealing with civil spacecraft would be complete without some mention of the Miami Spaceport. The largest commercial landing complex in existence, 'EmEss', as it is more usually called, is the heart of all civil and commercial traffic in known space.

The port area now occupies most of the southern tip of North America's Florida from Fort Myers to West Palm Beach and south to Miami, with the exception of the West Coast road to the Everglades National Park. It is divided into a number of regions, each being identified with a specific aspect of commercial space travel. The largest individual region consists almost entirely of manufacturing and servicing sites and includes a number of static test fields, each of several square miles.

Most manufacturers operate facilities in this area and there are few modern ships that have not spent some time there in the course of their production or development. The remaining regions are traffic handling sites for the various space routes.

Each site consists of arrival and departure lounges, termini for surface or atmosphere transportation, transfer points, fuelling and service bays, warehousing and the many other facilities demanded by spacetravel today. The largest of these sites is near Miami itself and, being responsible for handling most of the domestic traffic, is also the oldest.

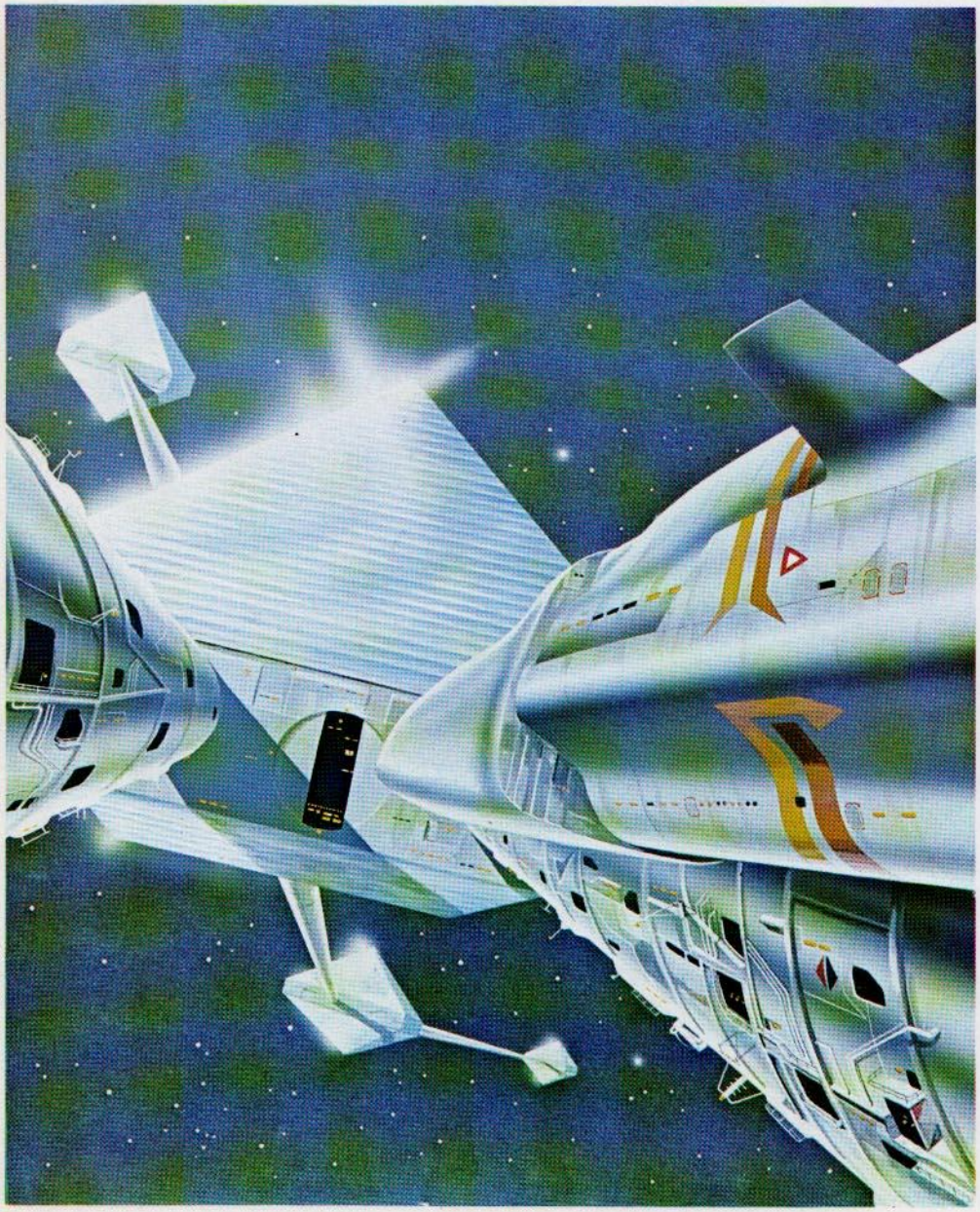
It is here that the port's best-known landmark is to be found. The new central control building has been constructed on the exact spot from which the first Martian Queen took off on her historic journey, while the nearby First Class Passenger Restaurant is a reconstruction of the Leisure Deck of that ship.

The Control Centre itself co-ordinates the movements of all commercial traffic in known space and is connected to plotting stations along every trade route both domestic and interstellar.

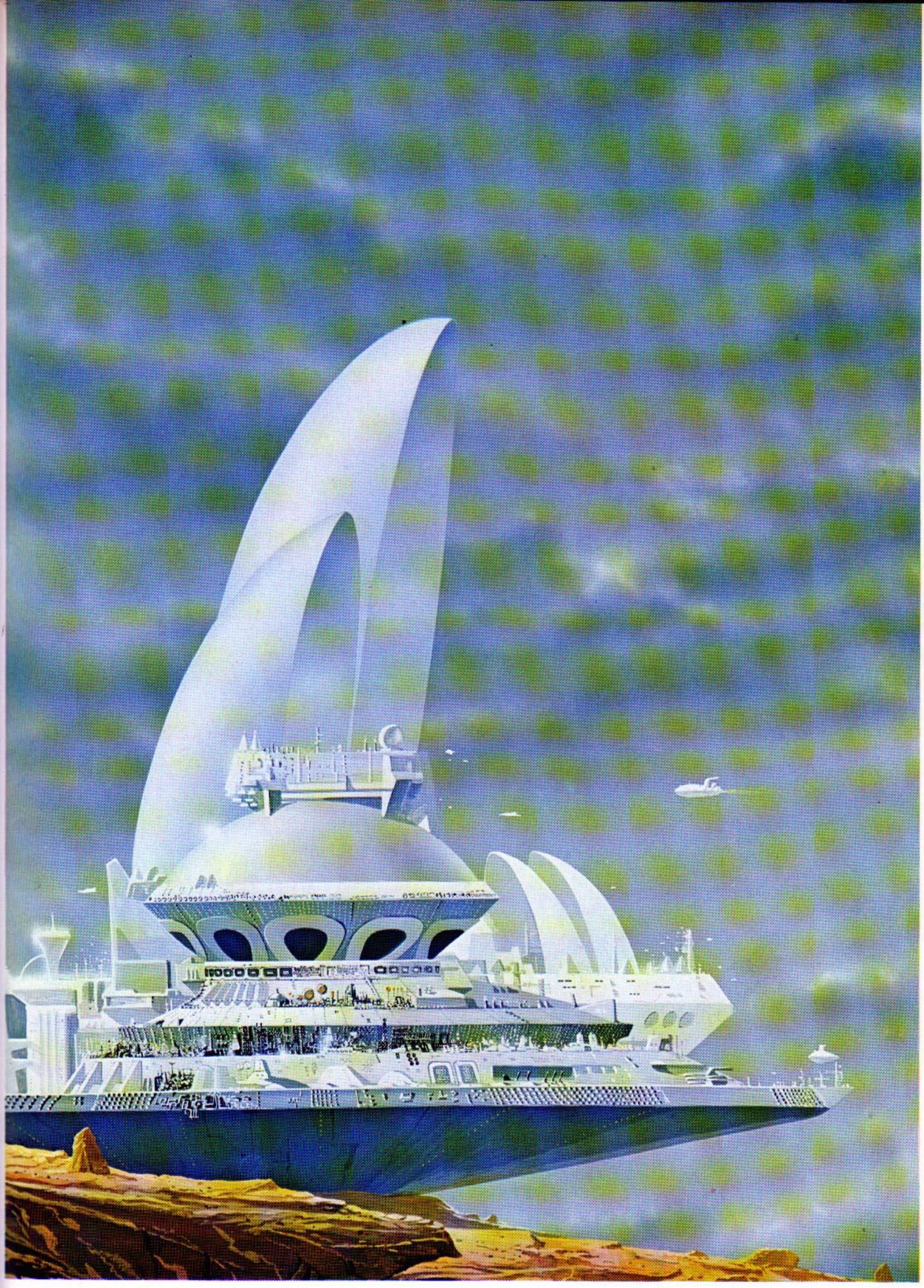
The distinctive communication shells are capable of transmitting to and receiving from every vessel in space and can immediately pinpoint any craft emerging from incoming warp jump.

In addition to the surface facilities of the port, there are three orbiting terminals. Two of these are transfer stations for non-terran destinations, the third being a depot for the transfer of dangerous cargoes. All three are equipped with quarantine hospitals. As can be seen from the illustration (*left*), these consist of docking and service areas linked by tubular arms containing transport lines, accommodation, leisure areas and the many other facilities required by modern spacetravel.

The Miami complex is well worth a visit even if you do not intend to travel, as the entertainment facilities here are probably the finest available. Among the best known are The Museum of Contemporary Arts, The Galactic Technology Museum, The Ethnology Study Centre, and the new Las Vegas Theatre Complex which features the best in entertainment from all three systems.



ANGUS MCKIE



NOMAD INDUSTRIAL COMPLEX

The space-sited industrial complex falls into two principal categories: orbital and free-space. The former is not a spacecraft in the accepted sense and so does not qualify for discussion here, but the free-space complex is classified as a ship in that it is navigated from one point to another under its own power. No two examples are the same due to the great diversity of their applications, but most of them, certainly those built in the last forty years, have in common the basic hulls built by Consolidated Aerospace in the Martian Yards.

As a result there is an overall similarity in the appearance of these enormous constructions which distinguishes them from both earlier examples and their orbital brethren.

The first industrial complex of any kind became operational in 2041 and its success resulted in further examples being built. The production of a mobile system arose from the desire to manufacture a complex which would utilize the radiation emitted by Jupiter. As it was impossible to construct one on site due to the punitive costs of shielding the entire operation, it was decided to build it in the existing yards and move the completed complex into orbit. Although this does not really qualify it as a free-space system it at least paved the way.

Self-driven units were developed as the means whereby an industrial complex could seek its own power sources either by moving to and from various radiation sources or by 'farming' hydrogen-rich areas of space. The installation of drive units and navigational systems provided a further facility in that a long-term manufacturing contract with any part of the Solar System could be fulfilled on site.

The early centres differed radically from the more recent examples in that the habitable portion of the construction was in its core with the industrial installations forming the outer surface. This proved inadequate for many reasons such as limited servicing access and susceptibility to damage from external sources. The next and current generation were constructed with the two functions reversed and units like the Nomad were built with the secondary facilities in the outer hull surrounding the primary system.

Unfortunately, these gigantic factories suffered badly during the war and none of the earlier units survives. The remains of one can be seen moving out of our planetary system but little idea of its original form can be gained due to the extent of the damage and subsequent salvage works.

A detailed close-up of one of these first examples is shown here as a comparison with the more modern Nomad shown in the smaller illustration. An impression of its size can be drawn from the Interstellar Queen coming alongside.

JIM BURNS

Specification	
Manufacturer	Consolidated Aerospace Hulls
Classification	Mobile Industrial Complex
Main Drive	4 McKinley Gargantua Ion drive units each 3 million lbs thrust 8 McKinley Ion Ultradrive units
Personnel	Various
Defence	WCRC Type X8 Industrial Shielding System

SKYMASTER 28

Badger Engineering has earned itself a fine reputation as one of the most inventive and industrious of the many small outfits catering for the shipbuilding trade. Based in England, Earth, Badger started by manufacturing electronic packs which were modular units designed as plug-in replacements for damaged or obsolete circuitry. Before long they were providing complete kits to update or modify existing craft, and had started to undertake the repair and renovation of the hulls themselves. As interest in out-of-production ships grew, they found themselves increasingly involved in the restoration of obsolete or rare models and this now accounts for over half their business.

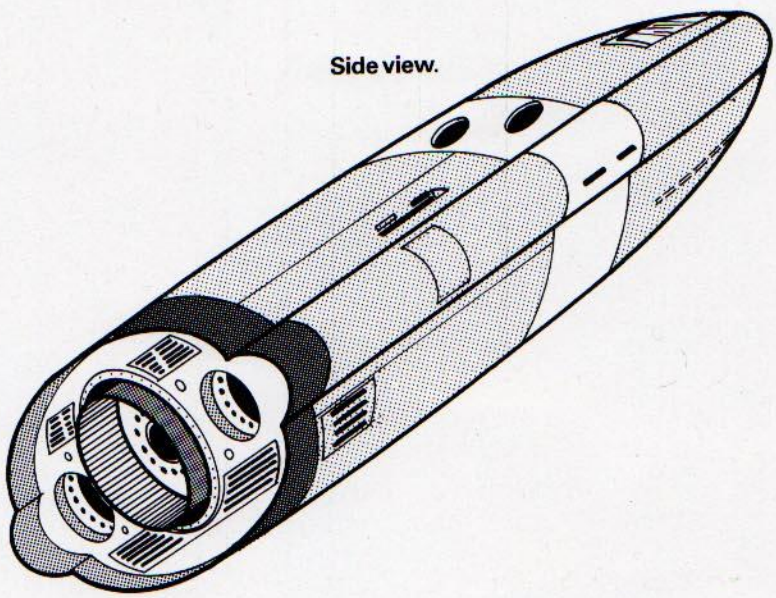
With their considerable experience in this field and the obvious demand for unusual private ships, the next step for them was to produce and market their own. Their close associations with the Terran Trade Authority, a major client, resulted in the opportunity to purchase the last twenty of Consolidated's SCF 28 freighters, which were due to be replaced.

As a freighter the SCF 28 had been overtaken by new techniques in transport and shipping, but was economical to run and had ample hull-space for Badger's purpose. In addition it possessed one other valuable attribute in that it was a famous ship.

During the invasion of Proxima the Terran Defence Force had used SCF 28s as personnel carriers and the sturdy little ships became a familiar sight as they scurried to and fro ferrying supplies and reinforcements in and wounded men out, often under heavy fire. Their moment of glory came when a strong Proximan counterattack cut off our forward command base in the battle for Kelorth, the Proximan capital. Two groups of SCFs went in, the first as a decoy and the second to evacuate the staff. The operation succeeded but twenty-two of the thirty ships were destroyed.

Badger Engineering renovated and completely refitted the hulls, with up-dated engines and their own electronic packs. The interior fittings were then made to the individual customer's specifications, and the Skymaster 28 was an instant success – so much so that Badger received enough orders to justify manufacturing completely new ships from the original plans.

Although eighteen were produced in this way the licence fee paid to Consolidated for the manufacturing rights made the Skymaster an expensive craft, and Badger began to look elsewhere for a successor. They found it in the SSF 21D Cutlass, one of the best-known ships of the early days of the war, and the manufacturing rights were bought outright from the Defence Authority. Five replicas of this famous ship have been produced and the order books are full, but it is a different machine from the Skymaster 28. The latter is slower and more sedate but is still in demand because of its low running costs and large cabin area.



Side view.

Specification

Manufacturer	Badger Engineering under licence from Consolidated Aerospace
Classification	Private Cruiser
Main Drive	Avery Stardriver PNH VII 130,000 lbs thrust
Secondary Drive	McKinley Megacruise ion drive 75,000 lbs thrust
Capacity	2-12 humans
Defence	TTA Civil AM 6Y Defence Shield

AVERY-FROST ORION

Spaceracing became popular towards the end of the century once the economy had recovered sufficiently from the war effort for private ownership of spacecraft to be possible. The first race held was sponsored by the Confederation of Shipbuilders with a view to stimulating public demand for such craft. The entrants were teams representing most of the important manufacturers and the ships themselves were all prototypes of potential production models. The race was intended as a showcase for all the makers but as the market at the time was extremely limited the spirit of competition was fierce.

The course was designed to show off the performance of the ships in both space and atmospheric conditions and ran from Miami Spaceport, round the moon and back to Earth. Public holovid screens were set up in centres all round the World and Mars and the whole course was covered by camera ships. The race was rather unspectacular in comparison with later ones as the ships were all built to production specifications, but after the Austerity it was a welcome relief and generated a great deal of excitement.

The winner was the Keeble-Springer Dart, which as a result was one of the four craft to go into production.

In subsequent years the nature of the races gradually changed as personalities and privately-entered craft became more significant than the manufacturers' teams. Increasingly the craft became more competitive, and machines built specifically as racers began to dominate the field. The famous exception to this trend was the Avery-Frost Orion which, although basically a production craft, in racing trim was a consistent winner for a number of years.

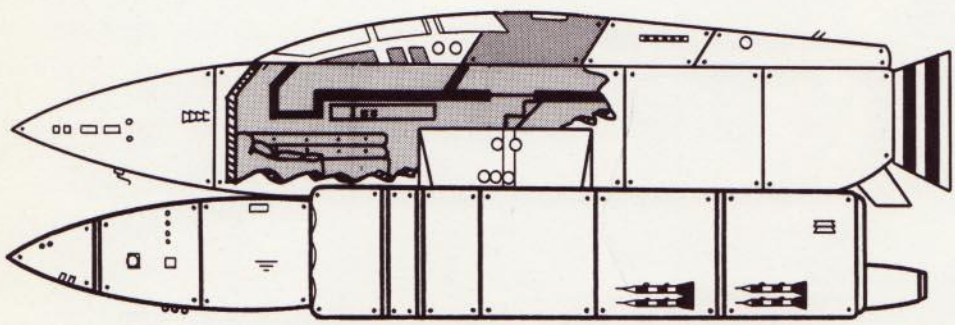
Without doubt one of the most popular private craft even today, the Orion was designed by René Lenain of R. Frost Engineering and produced by Avery Astronautics in the old North African Yards.

The main difference between the racing and production versions was in the method of propulsion, the former being fitted with a liquid bipropellent system using oxygen and hydrogen to generate about 240,000 lbs thrust. Range was drastically cut in favour of maximum speed, and this configuration was obviously unsuitable for private use as the operating costs were prohibitively high. A purchaser of an Orion had a wide range of thrust-pack options to choose from, the most popular being the dual system specified here, which represented a good compromise between performance and range.

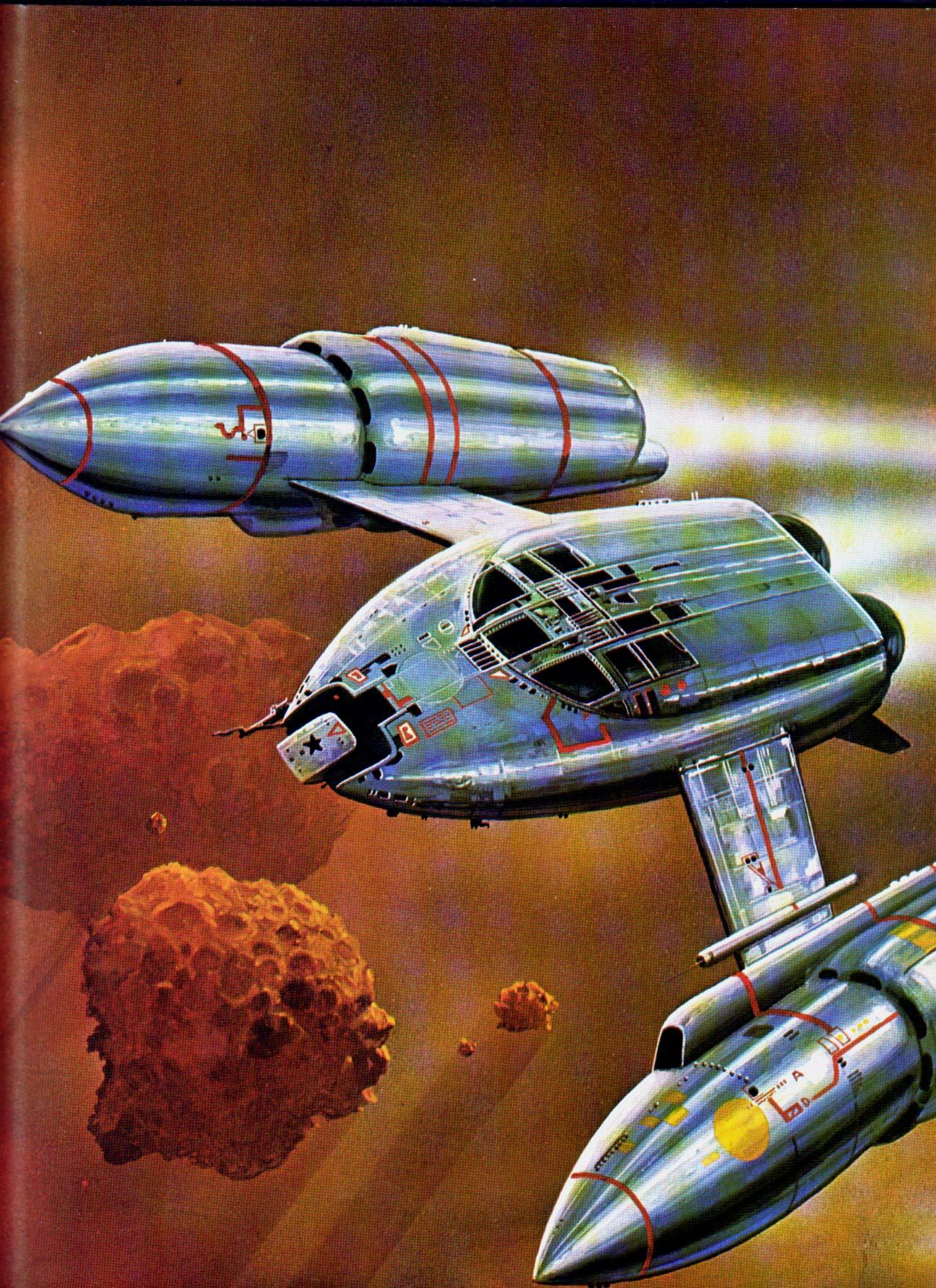
The racing scene is now mainly the preserve of specialist concerns and private teams and few of the purpose-built craft are suitable for general production. There are, however, many smaller club events where the Orion is still a common and successful entry.

Specification

Manufacturer	Avery Astronautics/R. Frost Engineering
Classification	Private Cruiser
Main Drive	Avery Stardriver PNH IV nuclear/hydrogen 110,000 lbs thrust
Secondary Drive	McKinley Megacruise ion drive 75,000 lbs thrust
Capacity	1-6 humans
Defence	TTA CNIL AM 4 S Defence Shield



Section showing the layout of the passenger compartment.



PTVM RAILBUS

When the first intercontinental subsurface transport route was in its early planning stages, the Terran Trade Authority was casting its cost-conscious eye around for space vehicles that could be adapted for use in such a system. The tubeways were to contain a vacuum to avoid the air resistance that the high speeds envisaged would otherwise have entailed. It made sense to look at vehicles that were already equipped to function in that kind of environment. One of the first to be considered was their own PTV Shuttlebus, which they had introduced in 2045 to ferry personnel to and from orbital stations of various kinds. The Shuttlebus was a compact little ship designed to carry twenty-eight passengers in addition to its two-man crew, and the basic frame was simple and strong enough to tolerate the modifications necessary to adapt it for tube travel.

The design for the system was worked out with this vehicle in mind and was based on a three-tracked system with each track enclosing a linear magnetic accelerator chain to provide enough power to move the vehicle at fifteen hundred miles per hour. Modifications to the vehicle itself were relatively simple to make. The two stubby lateral wings of the original bus were removed and replaced with traveller arms which required no further bracing as the hull was already stressed for a similar loading at these points. A third arm was then fitted to a new mounting on the upper surface.

Apart from revising the electronic circuitry the only other significant change made was to remove the small reactor and drive units which were now redundant, and thus extend the cabin area. With suitable space for the stowage of luggage, this meant that the PTVM (Public Transport Vehicle Magnetic) Railbus, as it now became, could carry a total of thirty-eight people including the two crew members.

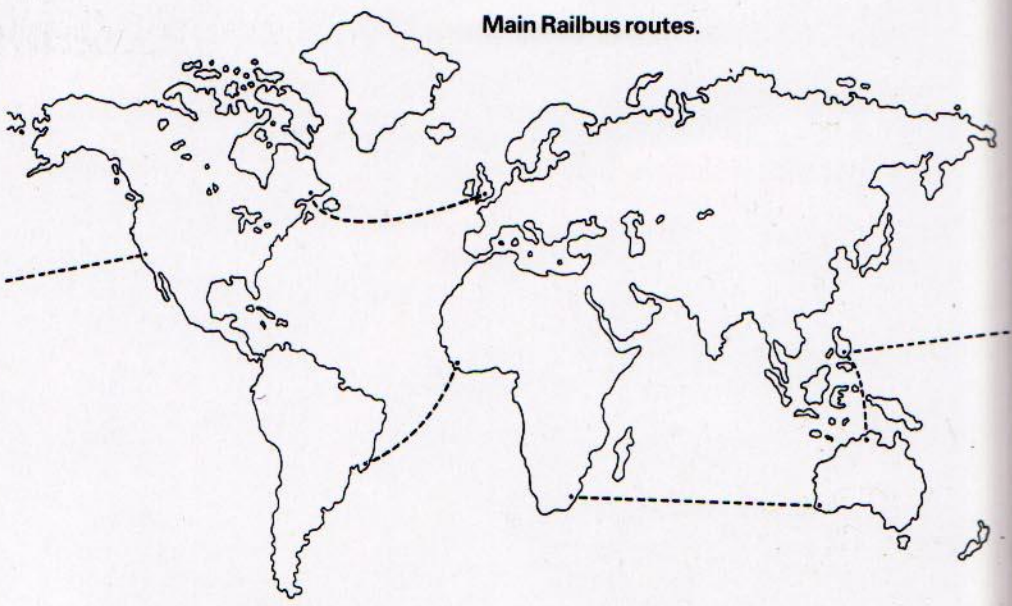
Although there was no longer any need for a navigator, his place was taken by a cabin officer to look after the passengers.

The first tube was not opened between Europe and America until 2073 as work had been interrupted by the war, but by 2085 there were lines snaking across the seabed from Sierra Leone to Rio de Janeiro, Panama and San Francisco to Tokyo via Honolulu, and Tokyo to Darwin. In 2098 the route from Perth to Durban was opened, and work was underway for many of the overland routes.

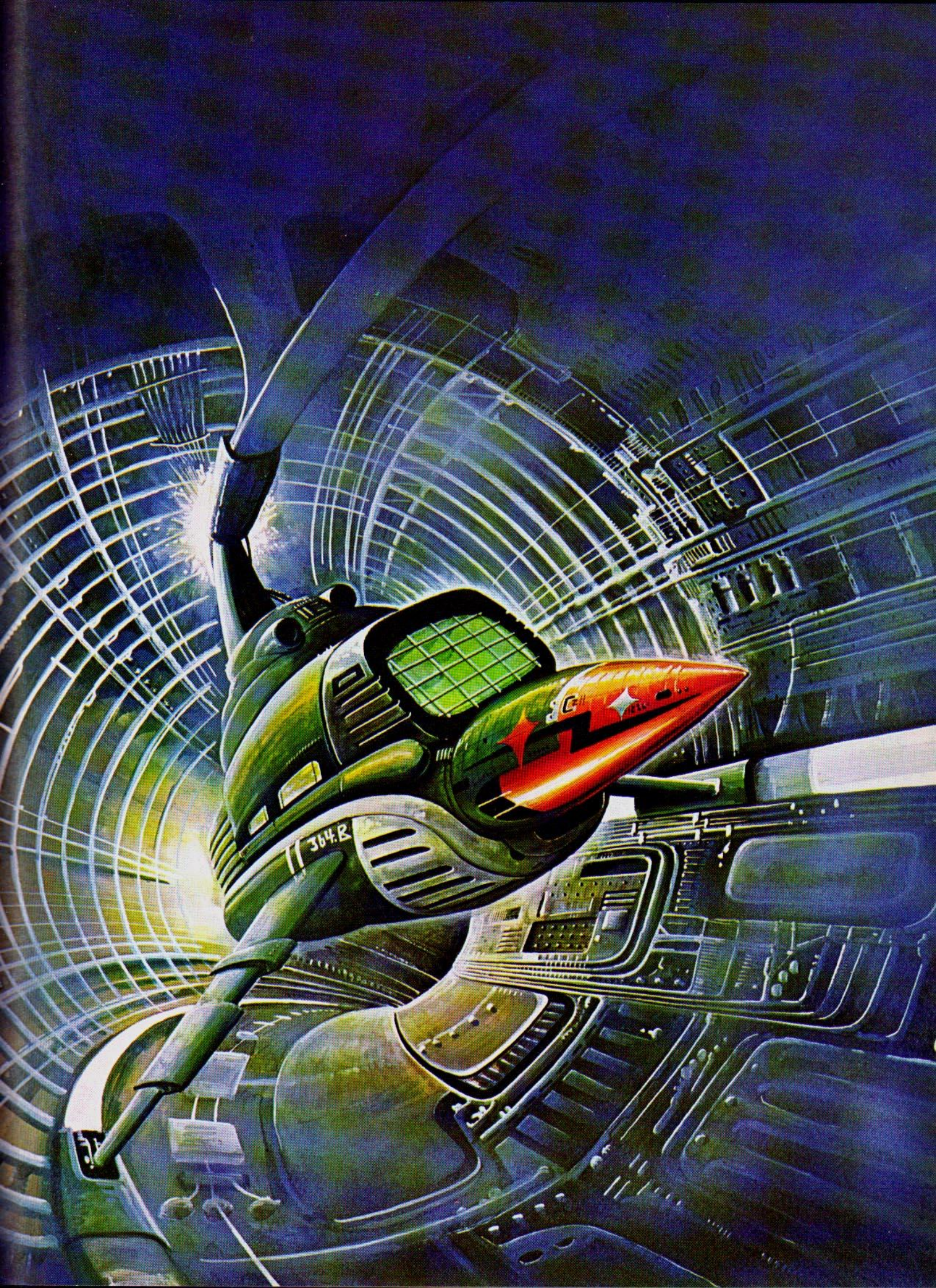
Although a larger bus is scheduled to go into service soon it will be a very long time before the PTVM Railbus goes out of service. Over 3,500 are currently operating and once the new buses take over the intercontinental routes, these will be transferred to the many local runs planned for the near future. Far from becoming extinct, this long-serving vehicle is still produced at the rate of twenty-five to thirty a year and it is hoped that construction will soon start on a Martian system using the same vehicles. Another long term possibility is the sale of a complete route to Alpha Centauri for testing, and if this goes ahead the PTVM Railbus will cross the space where its forebear worked, if only as cargo in a warp freighter.

Specification

Manufacturer	Terran Trade Authority
Classification	Tubeway Bus
Main Drive	Internal: Complementary field generator External: Linear magnetic accelerator
Secondary	Emergency solid fuel retro jets
Personnel	2 crew 36 passengers



Main Railbus routes.



STARBLADE

The newest and to many people most beautiful spacecraft to enter commercial service is Alpha Centauri's passenger liner, Starblade. This striking and original design represents the first step in Alpha's drive to expand her interests in the travel industry. Until recent years the passenger transportation market has been dominated by Terran ships such as the ubiquitous Interstellar Queen. The rapid growth in the volume of tourist traffic to the exotic Alpha One has always been encouraged by the Alpha Centaurians as a means of supplementing their limited industrial export revenue.

In the past their investment programme has been geared towards providing suitable facilities and attractions within their system to stimulate the development of the tourist industry. Once the pattern of growth appeared to be firmly established, they directed their attention to the possibility of providing the means by which the tourist travelled to and from their planets.

Considerable funds were allocated to the design and development of a craft suitable for this purpose and the result was the Starblade. The entire programme had been cloaked in utmost secrecy and even the prototypes' test flights were conducted under maximum security.

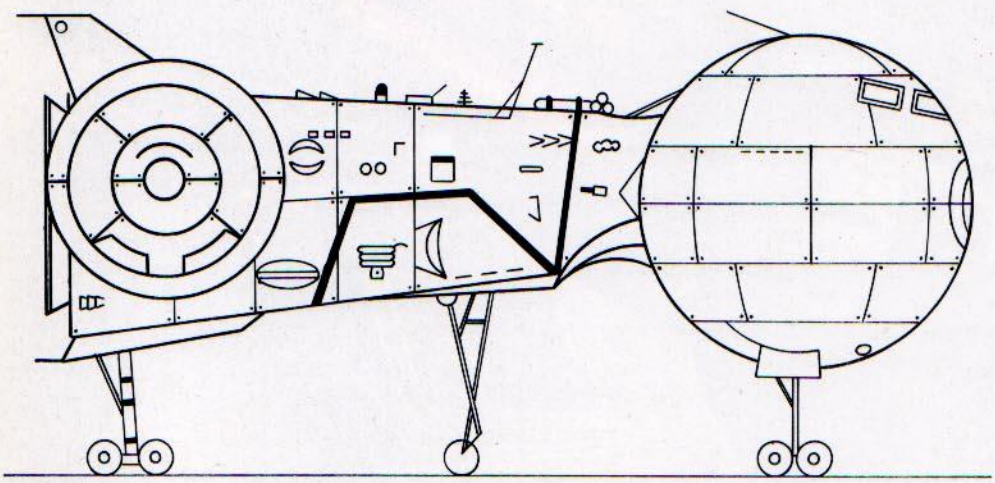
The first Starblade to enter service in 2096 did so in the greatest blaze of publicity the worlds have ever known, and there can be few people who would not recognize this glittering vessel.

Advertising superlatives aside, the Starblade is undoubtedly one of the most advanced ships of its kind and possesses many features which set standards for all subsequent spacecraft.

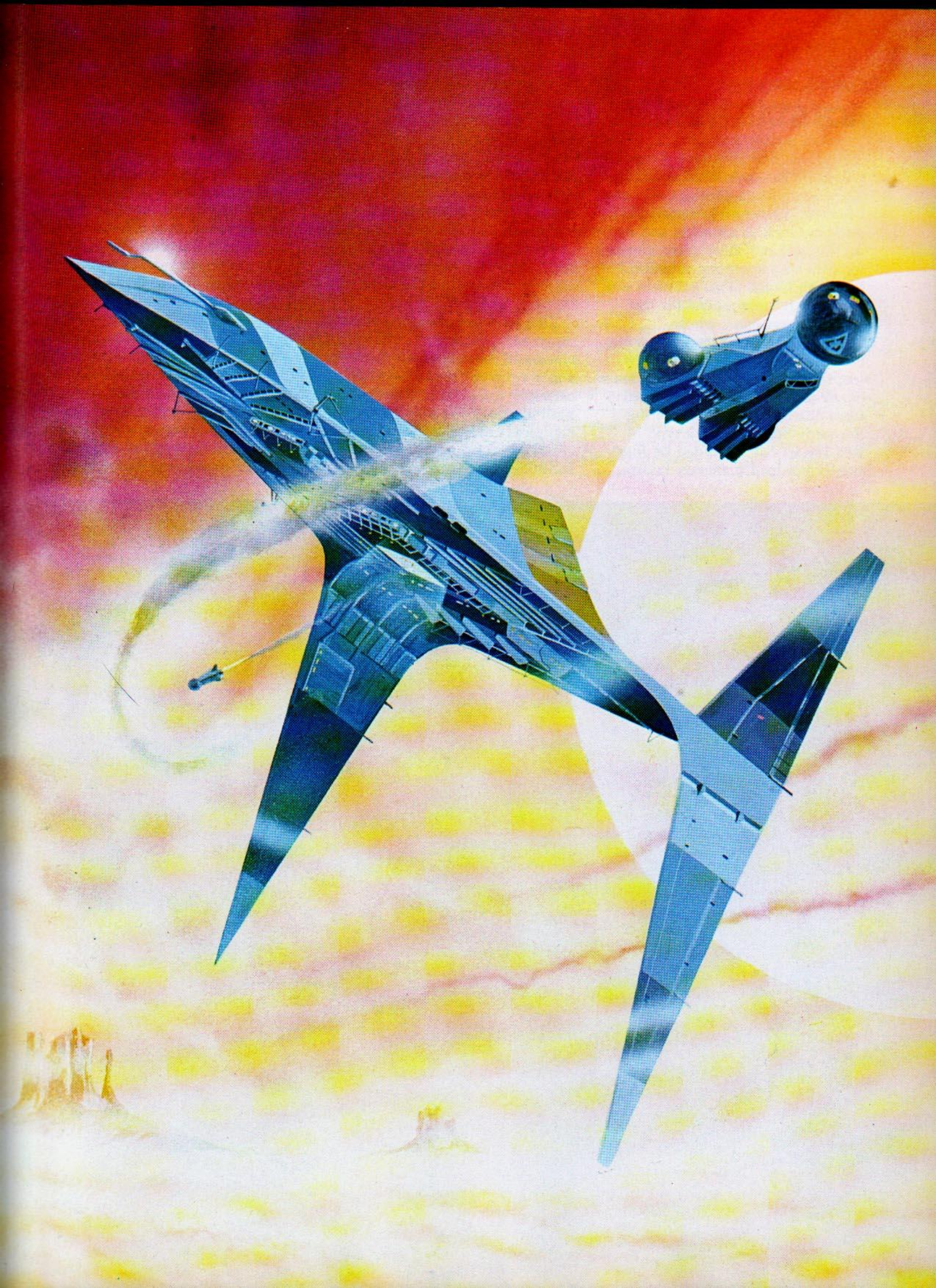
Although its passenger accommodation offered an extremely high degree of comfort there was nothing revolutionary about it. The real innovations were not visible to the casual spectator and lay in the ship's warp guidance system. Until now, a ship emerging from a jump could never be sure of its exact position, and to be safe, jumps were always calculated within acceptable margins. This meant that re-entries always left an appreciable amount of space to be crossed under conventional power. The journey time was also increased by the need for vessels to recharge their power banks after the enormous drainage that resulted from such a jump. The Starblade possessed a warp monitoring system sophisticated enough for the ship to emerge from a jump so close to the destination that the minimum of charge time was required to provide enough energy to reach the target point. Once there, of course, there was sufficient time to complete the recharging necessary for the return journey. This reduced travel time by almost sixty per cent and the saving in conventional fuels meant that the Starblade could undertake more voyages in a given time with lower running costs than any of her competitors. This distinctive and elegant craft was the forerunner of today's latest spaceliners and is still the mainstay of Alpha's passenger fleet

Specification

Nationality	Alpha Centauri
Classification	Spaceliner
Main Drive	Nuclear/hydrogen ion drive
Personnel	4 flight crew 4 technicians 65 cabin crew
Service Vehicles	2 Airbus Loaders
Defence	Double standard anti-particle shield



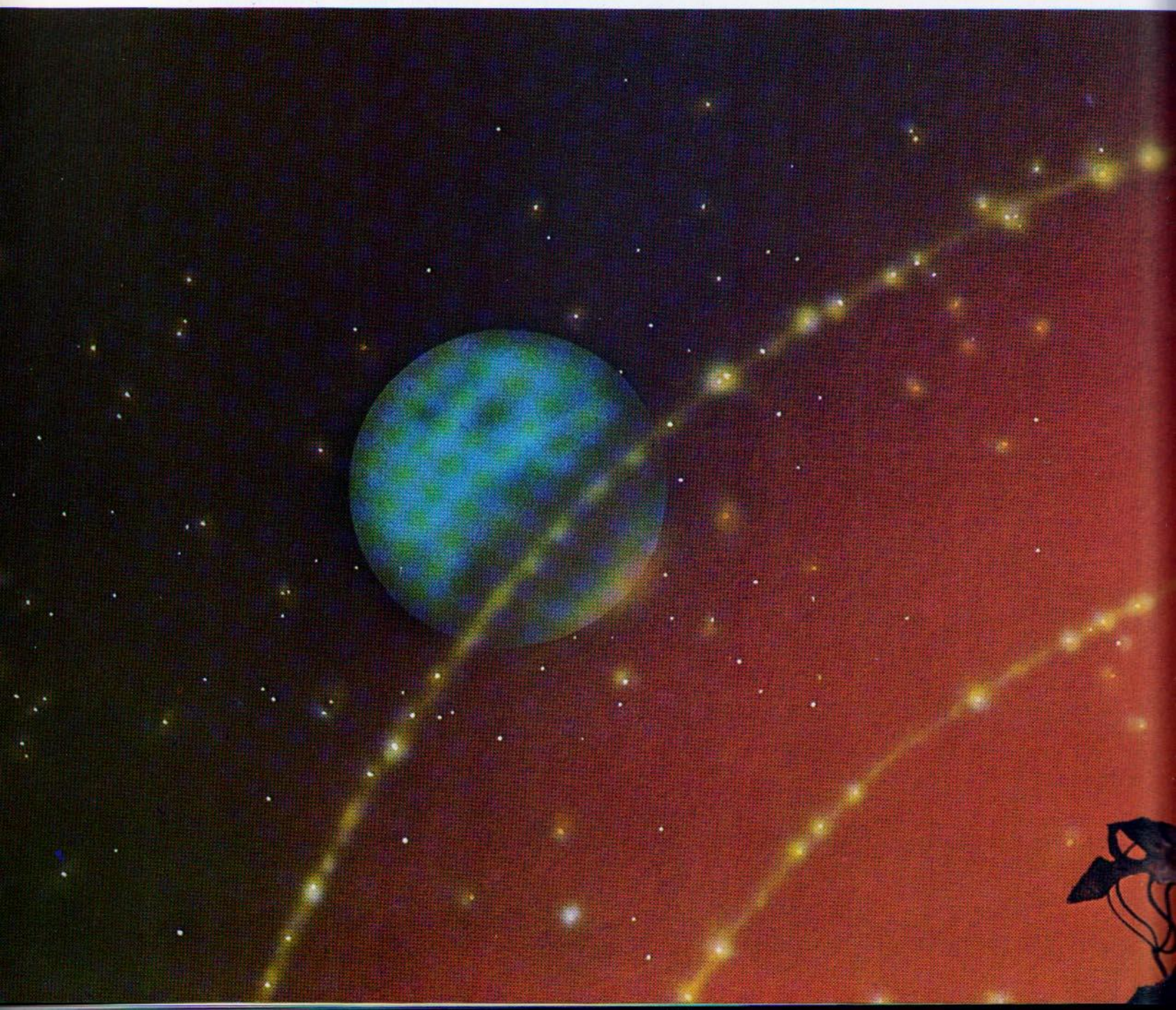
One of the smallest ships equipped with gravity-resist, the Starblade Shuttle was built specifically for the new spacelines. Four of these ships were carried as standard equipment.



AC3 STAG BEETLE

When the Proxima Wars ended in 2063, there was a shortage of many materials, particularly fissionable elements such as uranium and its derivatives, and those rarer elements for which no synthetic substitute had been found. This problem was particularly pronounced for the Alpha Centaurians, whose indigenous mineral resources were unusually poor, though until the war they had enjoyed an abundance of the necessary materials mined from one of the planets orbiting Barnards Star. This is a type M Red Dwarf Star attended by four tightly grouped planetary bodies, one of which was extraordinarily rich in valuable minerals and also held captive a dual ring of heavy metal satellites. In the course of one of Proxima Centauri's last large scale offensives this planet was entirely desolated and is still virtually unapproachable.

The AC3 was designed to break down and process the orbiting chunks of matter, of which there was fortunately a vast number, certainly sufficient to satisfy the basic needs of the manufacturing complexes at home until a way could be found to restore the facilities on the mother planet – something, incidentally, which has still to be achieved. The active section of this strange looking vehicle was the 'head' with its characteristic 'antlers'. Three of these antennae are the field projectors for the Disassembler system, and operate when the ship is positioned with a suitable satellite in the area between the antlers. These projectors then transmit the field which breaks down and separates the various elements of which the object is composed. The other two projections are collectors for absorbing and refining the ores before passing them back to the storage holds. The bulk of the ship is little more than a vast barge which can be detached when full and exchanged for an empty one. The full hulls are then locked



together in groups of four or six and transported by a warp or potential mass type tug to their destination.

No main drive of any kind is fitted to the AC3 as none is really necessary, small directional jets being sufficient for positioning and the short passages from target to target. The AC3 is probably one of the most impressive and efficient pieces of ore recovery and processing equipment in existence, and thus it is understandable that the Alpha Centaurians have consistently declined to make its technology available as part of any trade agreement.

Although these craft are not available for purchase, they can be leased with Alpha Crew and technicians in quantities of two or more and are operating with several of the larger mining concerns. Many of these teams are working our own asteroid belt as their efficiency, speed and low operating cost make the extraction of small amounts of ore commercially viable. AC3s can be observed at work quite easily from passenger liners passing through the belt to Jupiter. There is also a contingent attached to the Research Authority and the barges sometimes arrive back at Mars base.

Specification

Manufacturer	A.C. Trade Commission
Nationality	Alpha Centauri
Classification	Ore Extractor/Processor
Main Drive	None
Secondary Drive	Conventional nuclear/hydrogen navigational jets
Personnel	8 Alpha Centaurian crew technicians
Defence	Anti-radiation and Meteorite Deflector Shield

PC1 191 GOURMET

Though certainly not one of the most beautiful objects to be seen in space, the Gourmet is a product of Proxima's post-war industrial development programme, and as its name suggests, is an extremely efficient and discriminating piece of ore processing equipment. As an independent and self-transporting device it is usually classified as a spacecraft, but it functions primarily as a mining tool operating on fixed sites.

The war had left Proxima's industry in a shambles and the widespread use of ground-effect nuclear weapons by both sides had rendered many of her own planetary mines unusable.

Alpha Centauri had for many decades depended on off-planet sources for her supply of minerals as her own were relatively poor, and Proxima was forced to follow her example until the means could be found by which her existing mines could be reopened. The Gourmet was one of the first examples of the equipment evolved to exploit the enormous amount of mineral-rich materials to be found in free space.

It was revolutionary in concept and incorporated a number of innovations demonstrating a high degree of technological sophistication. The machine was constructed to carry out two separate tasks at once so that mining and processing became a single integrated function.

The ship operated by identifying and locking onto a suitable 'target' which could be of any size from a small asteroid to an area of planetary surface. The forward section, which was a high-output directional furnace, would then begin to reduce all the matter beneath the main body of the machine to a liquid state. Within the hull itself was a mass simulator developed from an Alpha gravity-resistor. The fields were reversed and the small gravitational forces would draw the liquids into analyzer filters which separated the various elements. These could then be synthesized immediately into a variety of alloys, shaped and deposited for collection by conventional freighters.

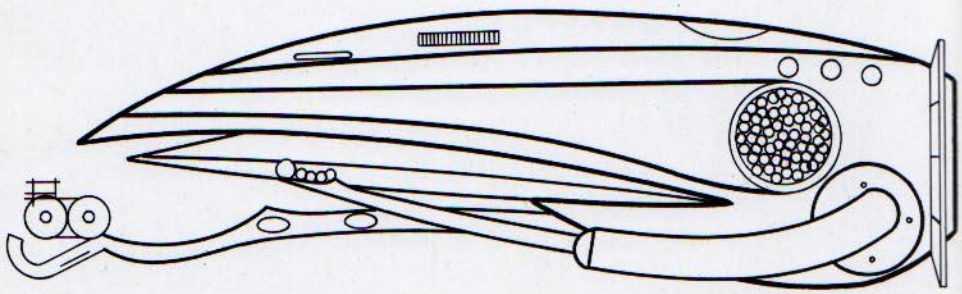
The crew's quarters were situated in two modules above the stern of the ship which also served as the control centres, and although there was room for up to thirty personnel, most of these vessels operated with crews of seven or eight.

The early models were not regarded favourably by the Alpha and Terran Trade Authorities as their method of working resulted in a considerable amount of highly radioactive waste being scattered through their area of operations. This problem was eventually overcome and all models currently working are 'clean'.

The TTA has purchased a large number of Gourmets since their introduction. Most of these are working in our own asteroid belt, either in the Nationalized fields or under private lease.

Specification

Nationality	Proxima Centauri
Classification	Mining/Ore Processing Ship
Main Drive	Hydrogen pulse drive Approx. 2,800,000 lbs thrust
Personnel	6-30 crew



Blast head of the PCl 191.

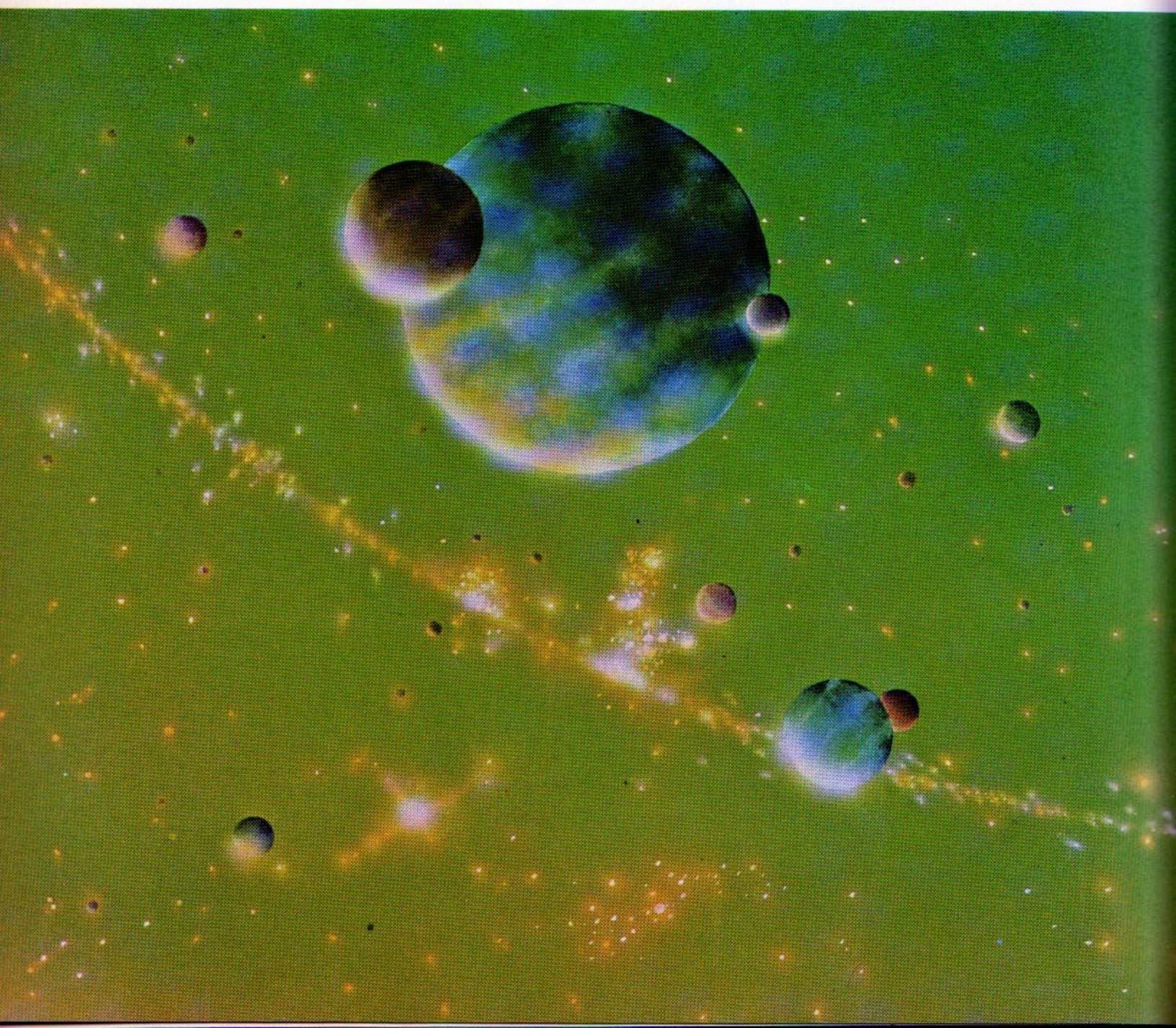
K34 BEE

Roughly the equivalent of our own Mule, the K 34 is a general-purpose service vehicle which can be found operating in a wide variety of roles and situations. In terms of usual applications the Mule is generally considered to be the superior piece of equipment, but the Bee does have certain individual advantages. It is larger than its Terran equivalent and is equipped with an extremely sophisticated computerized control system which allows a fine degree of remote guidance. This suits it for use in environments which are too hostile for organic life-forms such as those with excessive temperature ranges or high radiation levels.

The Proximans are somewhat more advanced in terms of electrical engineering than we are, and the K 34 is representative of their proficiency in this field. Apart from providing energy for the craft's equipment, the highly efficient solar collector/transducers in the distinctive dishlike receptors are able to generate an arc of sufficient strength for a low-output plasma drive engine. This enables the Bee to operate almost indefinitely, having to return only for the servicing and replacement of its mechanical components.

There are, of course, deficiencies. In the case of the Bee one major weakness is the limit of the power that can be developed by this means. Although adequate in terms of its mechanical functioning, the thrust potential of its drive system sometimes proves to be insufficient for many tasks. As a result there are occasions when three or four craft have to be used where one conventionally powered ship would suffice.

This method of power generation also automatically excludes them from working for any useful period of time in 'dark' environments such as the blind side of planets or satellites. But this is only the case if



there is no light source within easy reach as recharging time is remarkably swift. The Proximans themselves have used Bees in most situations simply by employing enough of them to work in relays, but this is becoming rarer. We have been supplying the Proximans with an increasing number of Mules for these jobs as the latter are cheaper to manufacture than the more complex Bees. In return we have been purchasing their equipment for use in a number of areas such as the orbiting industrial regions round Jupiter where the high level of radiation makes conditions difficult for manned working ships.

The Alpha Centaurians also operate a larger number of these machines, particularly in their mining operations near Barnards Star, and they can often be seen working in conjunction with the Alpha's Stag Beetle processors.

Although prototypes were being tested as early as 2042, Proxima's military shipbuilding programme was given priority in the years immediately preceding the war and no production line was established until after hostilities had ceased. Clearance was given to manufacture almost immediately as part of the Proximans' recovery programme, and the Bee made a significant contribution in terms of both export earnings and the redevelopment of domestic industries.

Specification

Nationality	Proxima Centauri
Classification	General-purpose Service Craft
Main Drive	Photoelectric plasma drive 150,000 lbs thrust
Personnel	None. Computer guidance
Defence	Radiation shielding

SPECIAL FUNCTION

ASTROLAB

The Astrolabs, of which there are nearly thirty, are often mistakenly identified by the casual observer as fuelling stations. This is an understandable error as they were an adaptation of the fuel supply ships developed during the war and which are still to be found along the spacelanes.

Large numbers of these supply ships were manufactured to service the huge battlefleets of the Proxima Wars, their job being to collect free hydrogen and other gases from space, process them, and store them until required.

After the war many of them became redundant and were thus available for other uses. Some were bought by commercial concerns to generate private liquid gas supplies or simply to provide storage facilities, and a number were allocated to the Research Council, which was short of funds and needed ships desperately. They were ideal for conversion into mobile research stations and could be modified fairly easily for this purpose. They had the added advantage of enjoying a high degree of independence, being naturally self-sufficient in terms of fuel supply. Whereas the original ships possessed a storage globe at either end, the Astrolabs retain only one, the other having been converted into living quarters able to accommodate up to two hundred personnel. Most of the central factory section was then reconstructed to provide laboratories and research facilities. Probably the most distinctive of the Astrolabs are those used for plotting radio emissions, which have been totally encased in a delicate tracery of antennae and receivers. They are an extraordinarily beautiful sight but are rarely seen as they operate far out on the Perimeter.

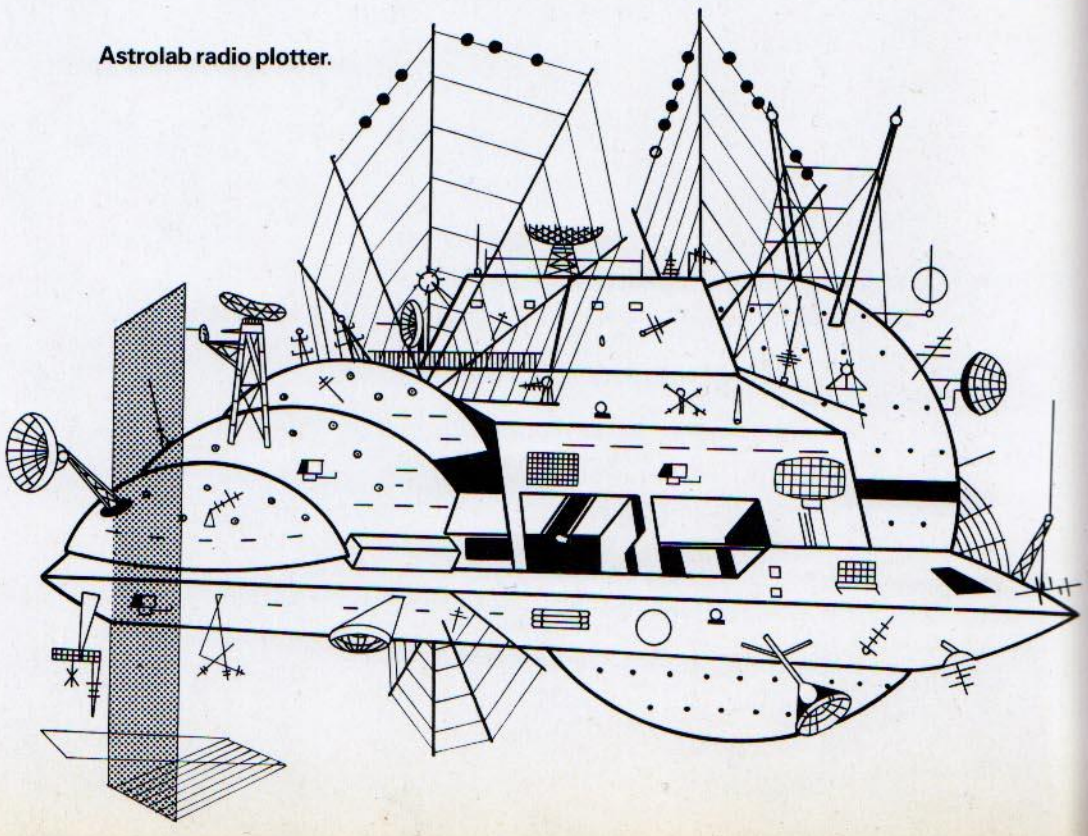
The illustration shows one of the more usual units working in the rings of Saturn. This type can occasionally be seen by travellers within our Solar System.

Motive power is provided by one of three nuclear piles coupled to fairly small ion drive engines for extended cruising potential rather than rapid acceleration. Only five of the Research Council's twenty-eight Astrolabs have been equipped with warp generators for interstellar research, including the three radio emission labs.

Specification

Manufacturer	Various. Conversions primarily by Consolidated Aerospace
Classification	Class II Mobile Laboratory
Main Drive	McKinley Ion Ultradrive Model E WCRC Bowman III reactors
Auxiliary Drive	Consolidated CA 6 WCRC David reactor type C4
Personnel	12 flight crew Up to 180 laboratory personnel
Service Craft	2 MRT 114 Mule tugs 4 Avery Midget maintenance lighters 2 Consolidated Scout flyers
Defence	WCRC type 17F Meteorite Deflector Shield

Astrolab radio plotter.



SPECIAL FUNCTION

VOYAGER II/CONNESTOGA

One of the two largest types of true spacecraft in the known universe, the Voyager is undoubtedly also one of the most rarely seen. Though it is familiar enough from the extensive media coverage these ships have received, few people have seen them at first hand. The maiden voyages of the two ships already launched took them far outside the Solar System and no-one alive today is likely to see them return, for they were the first settler ships Man has sent to the stars.

Within two years of Henri DeVass' demonstration of his prototype Warp Generator in 2027 the first Pathfinder survey ships were on their way to Alpha Centauri, Vega and Arcturus. The result of the Alpha probe is common knowledge and contact with its inhabitants was followed up as soon as its transmissions were received in 2035.

Pathfinder Vega found nothing, but the Arcturus probe signalled from forty-one light years away that it had found two habitable worlds, one of which was very close to Earth's conditions. The advance party verified the suitability of the new world and in 2078 the first Voyager left with 1,200 passengers, their personal goods and the equipment they would need to colonize the distant planet.

Voyager II left twelve years later, but this time accompanied by a Connestoga (the further of the ships illustrated), the massive freighter from which the basic design for Voyager was taken.

The third Voyager has been built and is at present being prepared for the long journey to commence in two years time.

For those who have seen these enormous ships they are a truly unforgettable sight, only equalled by the vast industrial complexes orbiting Mars and Jupiter. The Consolidated Connestogas can be seen plying between the Solar System and the two Centauri systems but even these voyages are fairly infrequent as the ships are prohibitively expensive to operate with less than a full load. They were first built during the closing years of the Proxima Wars to transport the huge amount of men and materials required for the invasion of Proxima's home planets, and were mothballed after the Conquest. As trade between the three stars gradually increased they were returned to active service, but because private enterprise cannot afford to operate these vessels on a permanent basis they are leased to

individual concerns by the Terran Trade Authority. There are eight Connestogas under TTA control, the remaining five being retained in reserve by the Terran Defence Authority, and although not in use they are regularly serviced and maintained.

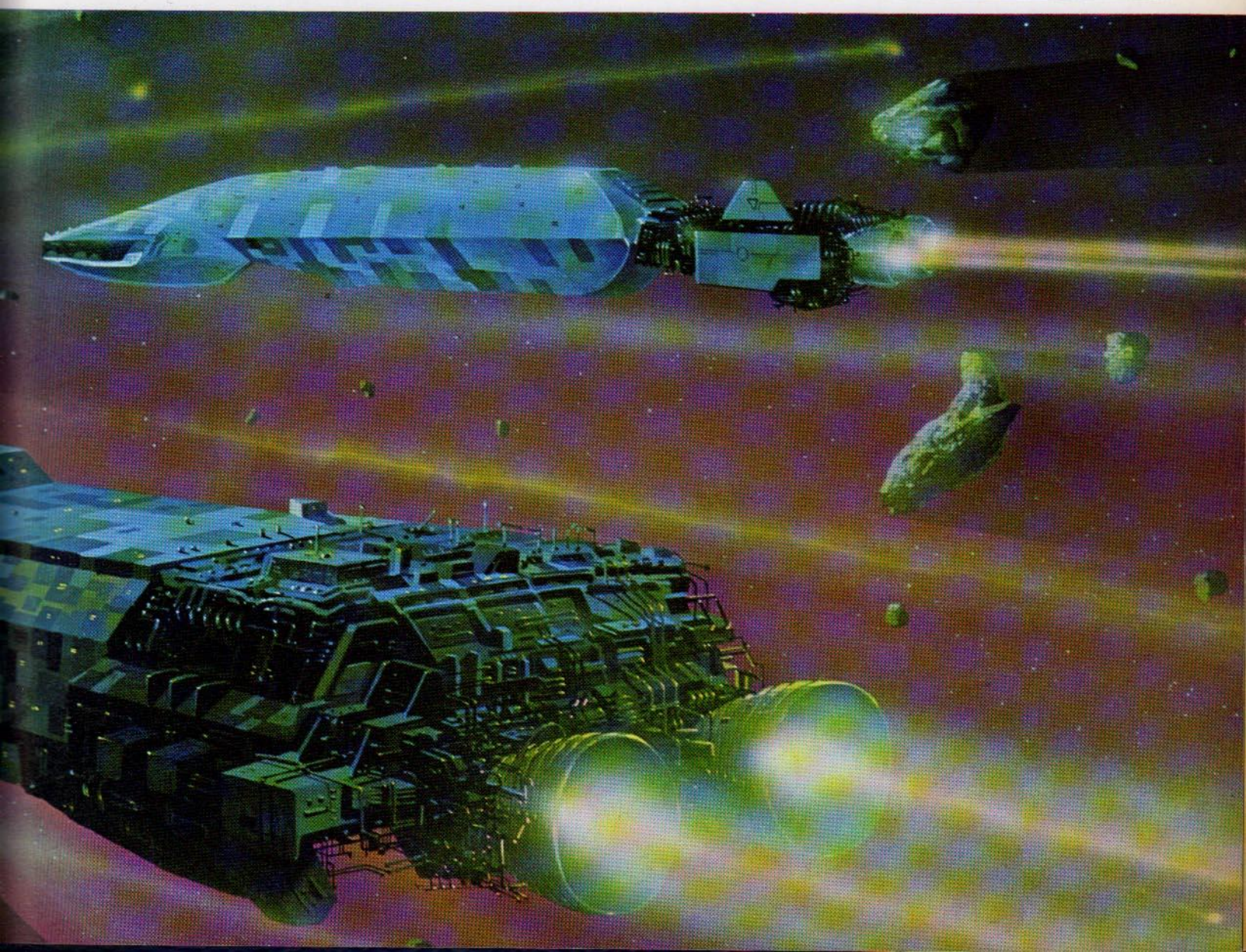
The Connestoga and Voyager types shared identical engines, warp systems and navigational controls, differing only in hull construction. The Voyager was naturally the more complex in this respect as it had to provide accommodation and facilities for large numbers of colonists isolated in space for considerable periods of time. Both Voyagers have taken nearly eight years to reach Arcturus, as it proved necessary to make more than one warp jump, with long intervals to recharge the generators.

The third Voyager will be accompanied by two Connestogas, one of which will take up a station at a half-way point to provide booster charging facilities, thereby reducing the delay between jumps for future ships.

It is hoped that the next ship using this station will be the first of many Connestogas to return laden with the riches of the New World to replenish the resources of the old.

Specification

Manufacturer	Consolidated Aerospace hulls and drive units. Voyager fitted out by various contractors
Classification	Voyager – Colonizer Ship Connestoga – Super Freighter
Main Drive	McKinley Juggernaut ion drive with integral piles. 2 units
Auxiliary Drive	Consolidated Nova IIb 8,000,000 lbs thrust
Personnel	Voyager – 40 flight crew 300 Mechteck and Roboserve units Connestoga – 26 flight crew 1,800 Mechteck labour units
Special Craft	Voyager – 4 Avery AAT 181 tugs 3 Consolidated Scout flyers 18 Avery Midget maintenance lighters Connestoga – 25 Avery AAT 181 tugs 3 Consolidated Scout flyers 12 Avery Midget maintenance lighters
Defence	WCRC Type 17A Meteorite Shield



THE CITY SHIPS OF ALPHA

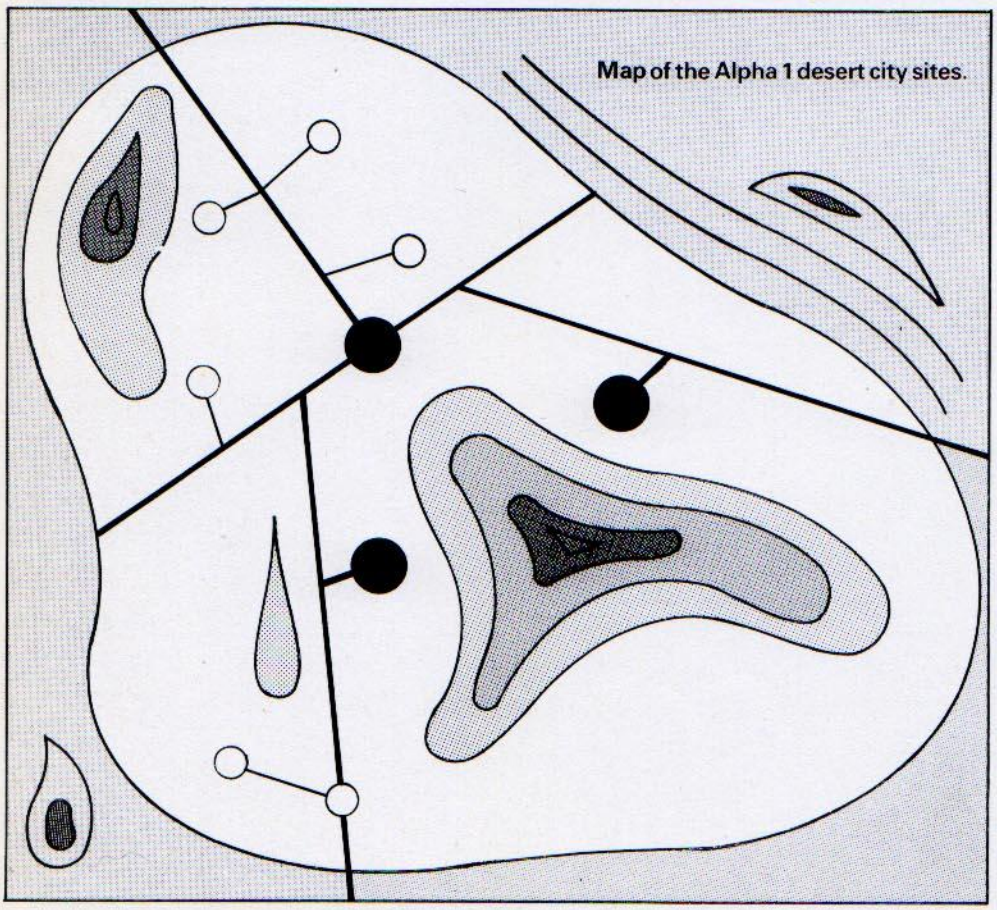
The first travellers to Alpha Centauri after the signing of the Trade Agreement in 2039 were scientific teams dispatched to work with their new colleagues in the exchange of knowledge which was to be so fruitful for both parties. Whereas the diplomatic missions had remained within the confines of Alpha's capital, Ergotha, the scientists were able to travel freely in the company of their opposite numbers. It was during their early explorations, made to familiarize themselves with the culture of their hosts, that they first saw what must stand as the greatest technological marvels of known space: the City Ships of Alpha.

It is impossible to convey the overwhelming impact that these extraordinary constructions have on those who have seen them first hand. Situated in the vast, bleak desert region of Alpha One, they dominate the horizon until the curvature of the surface hides them from view.

The Alpha Centaurians themselves are uncertain of their exact age and origin as they have been there throughout recorded history and are shrouded in myth and legend.

Three of these megalithic structures exist and are obviously inhabited, but there has never been any communication with their occupants as far as the Alpha Centaurians are aware. Attempts to communicate have always failed, while landings on their upper surfaces have proved impossible as a protective field diverts any object making an approach. It is believed that the citizens of these strange edifices have never participated in the evolution of other life-forms on the planet and have always remained within the perimeters of this otherwise lifeless region.

The most remarkable and almost inconceivable aspect of the cities is that they are capable of flight. Every few years one or more of them rises silently from the huge pedestal on which it rests and moves through the thin atmosphere to a similar stone column in another area of the desert. These columns are scattered throughout the district, though never less than a thousand miles apart, and there seems no reason why one should differ from another. The Alpha scientists have tried to identify a pattern in these movements, but no consistencies can be found either in the journeys of the cities or in the siting of the columns. One thing which is certain is that they represent a level of technological knowledge that we can only guess at. Their means of propulsion, for example, obviously depends on a gravity-resist process of some kind but how the enormous power this would require is generated cannot be explained. It seems to be a natural law that conversion of energy must always result in a by-product, whether heat, light or converted matter. The by-product from such a level of energy must be correspondingly great, but what it is or where it goes is another question. Seismographic surveys have established that the columns consist of solid masonry, while their temperature, with that of the air surrounding the City, fails to show any untoward variation.

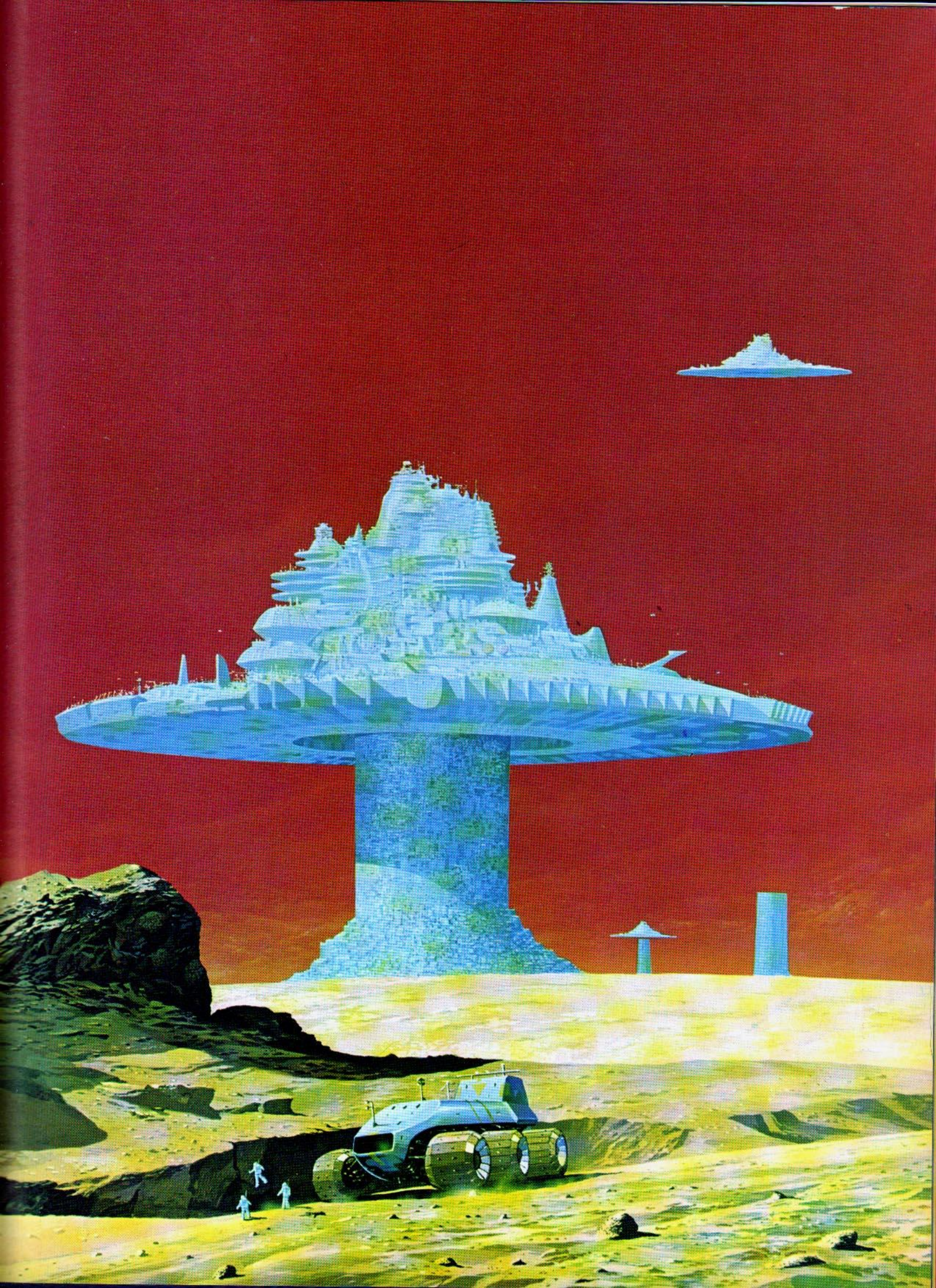


Map of the Alpha 1 desert city sites.

Popular hypotheses abound; they are even, perhaps inevitably, regarded as the seats of deities and are the focus of a number of religious factions.

Another view widely held is that the inhabitants are the ancestors of the humanoid races and are now quietly observing the evolution of their progeny. Only time, and probably a great deal of it, will tell whether we shall eventually be allowed contact with whatever intelligence has shaped these objects.

Meanwhile they exist as awe-inspiring enigmas that have a profound and somewhat humbling effect on all who see them. Not surprisingly, of the visitors who have made the journey to the desert, a great number return to contemplate the City Ships again.



UNIDENTIFIED ALIEN

OBJECT#1 BARNARD'S STAR

By the middle of the 21st century Man was forced to recognize that the great void of space held more intelligent life than had ever been considered likely. More astonishing still is the fact that all the evidence we now have indicates not only that such beings appear to be physiologically quite similar to us, but also that they are likely to share a comparable degree of technological development.

Why this should be the case is probably one of the most widely debated issues of our time, several theories having been advanced. Most of these fall into one of two camps: the most popular hypothesis is that Man's ancestors originated on one planet somewhere in deep space and spread throughout the Galaxy if not the Universe, gradually colonizing all habitable planets. In the case of Earth it is suggested that the colonization took place sometime in her pre-history. However, this view does not explain the startling similarity between the previously isolated technologies.

The second view attempts to explain both phenomena by suggesting that similar worlds experienced similar evolutionary patterns in similar environments with a common starting point. In

explaining the comparable levels of development, it is argued that the evolutionary time-scales for such planets could have shared a mutual starting point when conditions stabilized after the 'Big Bang' which created the Universe.

Whatever the explanation, the fact remains that we have already encountered two life forms closely allied to ours in the Proxima and Alpha Centauri systems.

In addition there is unrefutable evidence that there are others. This much is indicated for instance by the object found by an Alpha survey team on a small planet in the Barnard's Star group. It is a complete ship and appears to be undamaged, though there is no sign of any crew it might have had.

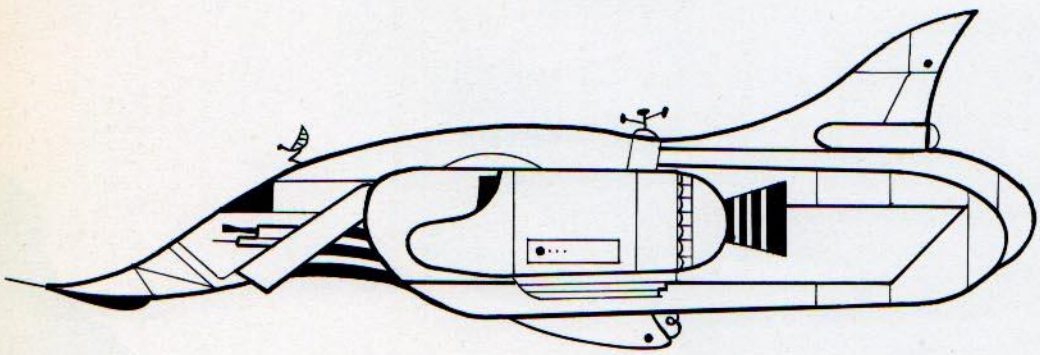
Although visually clearly defined in every detail it is semi-transparent and solid objects can pass through it. Instruments indicate that the precise space the object occupies is measurably denser than the surrounding atmosphere, unlike a holographic projection. There also appears to be a variety of radio emissions emanating from it, but attempts to identify the signals have been unsuccessful. The image is constant in all atmospheric conditions and has remained unchanged since its discovery over seventy years ago.

It was closely guarded for many years while attempts to study it were in progress but it is now open to public view and features on many tour operators' itineraries.

UNIDENTIFIED ALIEN

OBJECT # 2 and # 3

As an Interstellar Queen was moving out from Earth and preparing for a warp jump to Alpha in 2093, the ship's communication equipment recorded an incoming signal on a wide range of frequencies. Captain Kingswood, the Chief Officer, delayed the jump thinking the signal was a late instruction from Miami, but was unable to decode it. Finally, assuming it to be one of the many stray signals often picked up in space, he recommenced the countdown for the jump, but a few seconds later the navigational computer spotted a mass of material closing with the ship and reported it as artificial. Once again the jump was postponed and the liner moved out of the path of the object to make a visual identification. Within a few minutes the recognizable shape of a spacecraft surrounded by debris came into sight, and its description and course were signalled to Miami. The liner was then instructed to proceed and a security patrol ship was dispatched to investigate.



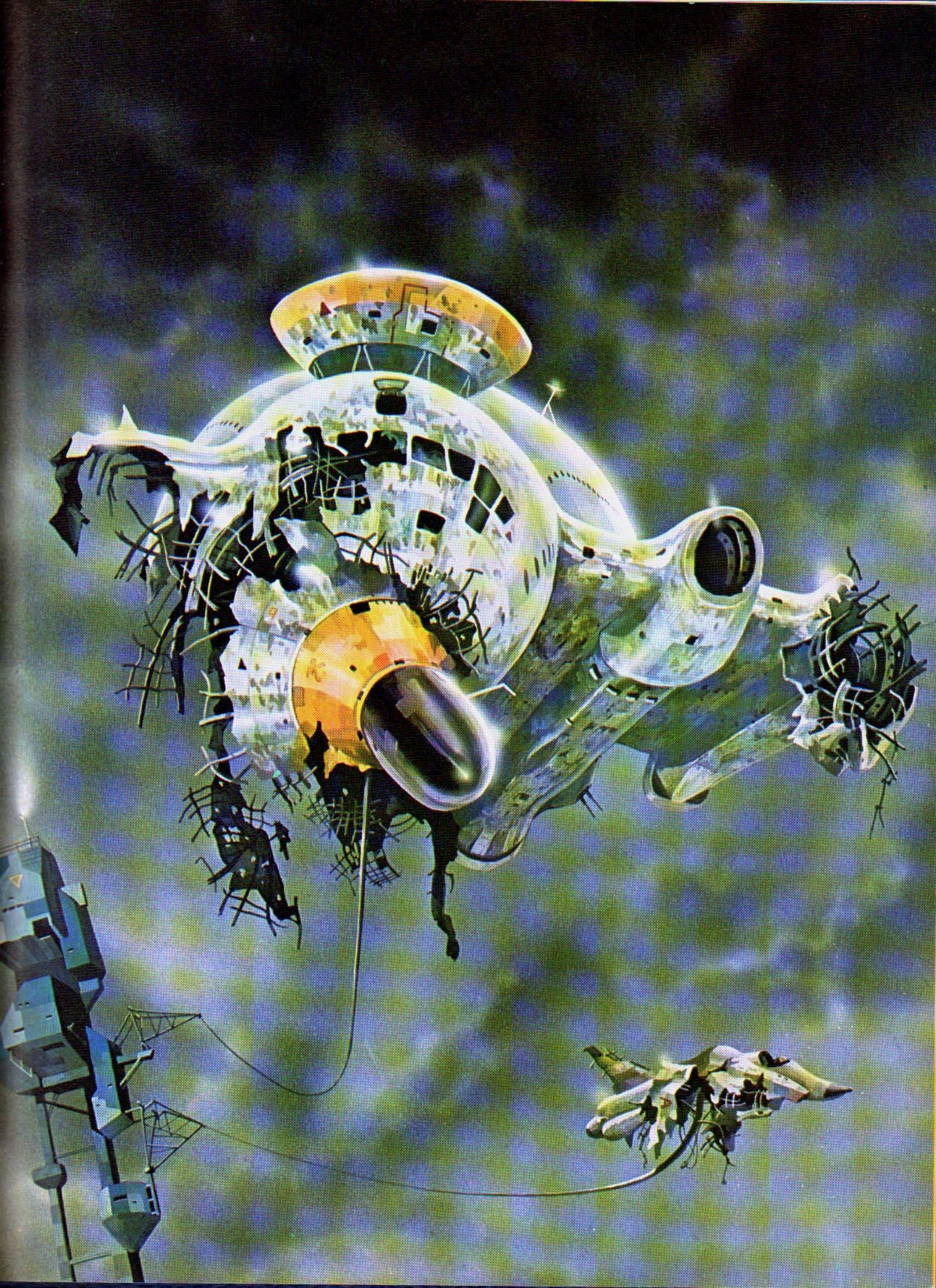
The Baker F332 Banshee of the type found in the alien wreck.

The debris was moving quite slowly and the ship was able to move alongside the largest piece and bring it to a halt. It was quite clearly the nose section of a medium-sized craft of fairly unsophisticated design and looked like the remains of a freighter of some kind. Although the patrol crew were unfamiliar with this type they assumed it to be a piece of wreckage left over from the Proxima War such as still occasionally turned up in the spacelanes. They attached lines and towed it back to their Skybase depot to await the arrival of the Wreck Inspectors.

Meanwhile the repeated signals being transmitted by the wreck were interfering with the security station's own signalling gear, and after the transmission had been recorded for the Inspectors a crew boarded the hulk to try and shut down its source. Once inside they found a second badly damaged but fairly complete craft. It was a single-seat ship and the fact that it was fastened to the interior indicated that it was part of whatever cargo the larger craft had been carrying.

The Wreck Inspectors eventually arrived and immediately established that the large forward section belonged to no known craft, and a research team was sent for.

Evidence that other sentient life forms exist in the universe has come to light on a number of occasions and has generated much speculation and interest. This wreck, however, was something extraordinary because the smaller ship inside was of known terrestrial origin. It was, in fact, not a spacecraft but a conventional jet-turbine powered military aircraft of American manufacture dating from the late twentieth century. It had been obsolete for over one hundred years and could never have operated in space under any circumstances, so how it came to be part of an alien ship's cargo remains a disturbing mystery. The picture became even



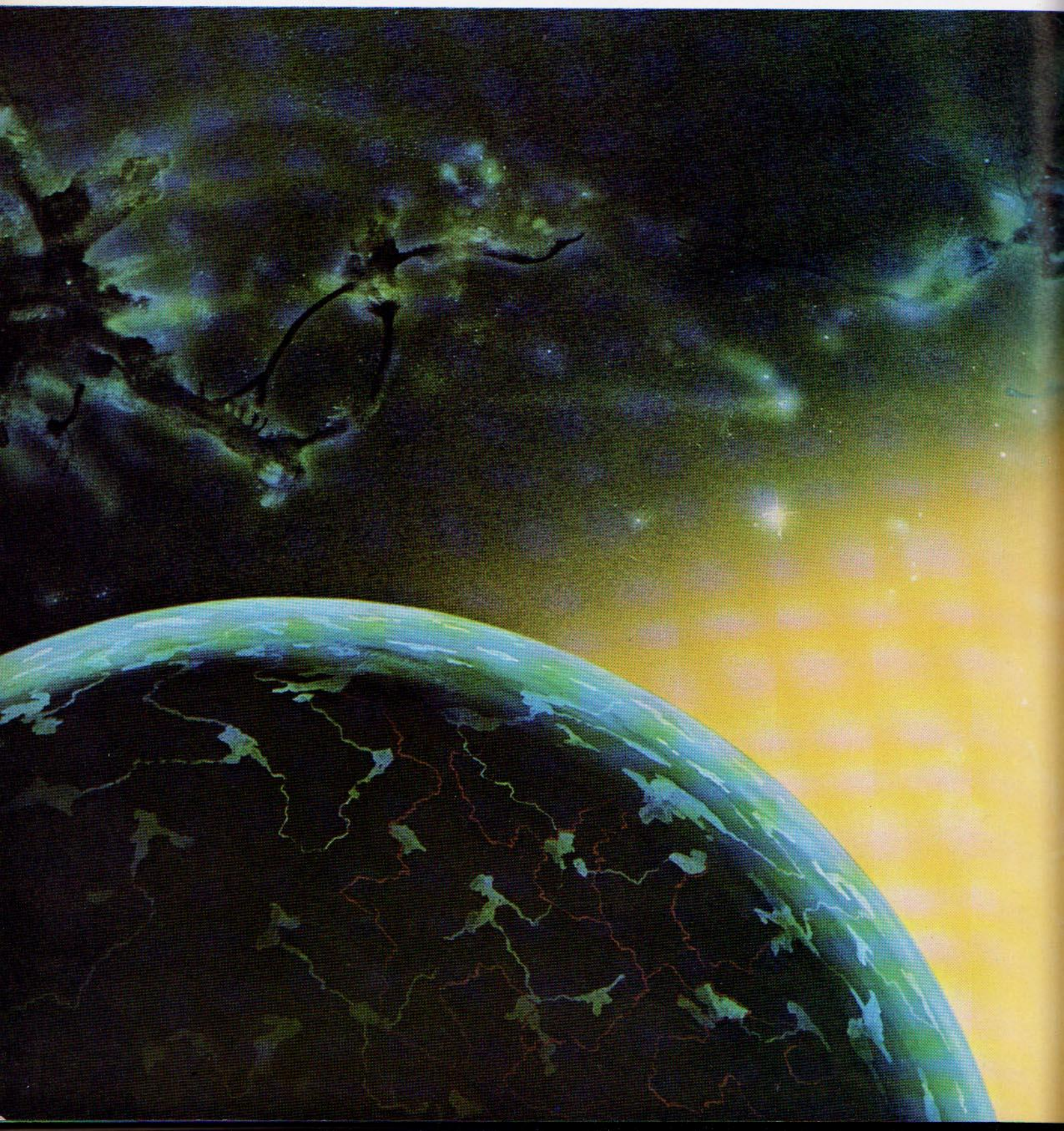
more worrying to the military authorities when the serial numbers on the jet identified it as one which had disappeared without trace over the Caribbean Sea in 1983.

The only conclusion that could be drawn was that the spacecraft had somehow descended, captured the American plane and escaped without being detected, flying through the Earth's atmosphere, as the wreckage indicated that the original ship possessed wing surfaces, the remaining stub of which housed a turbine engine which would only operate in a relatively dense medium.

How a vessel of this size could intrude and avoid registering on any of the many surveillance systems based both in space and on the surface remains a question occupying many minds.

There are certainly no clues to be found in the wreck to indicate that the ship was equipped with a means of disguising its presence. An intriguing suggestion is that many of the unaccountable disappearances of various kinds that have occurred in the past may have shared this common cause.

How the stranger came to grief itself was also a mystery until almost a year later when a further piece of unknown debris drifted into our



system. Initially no relationship between the two was seen, as the latter object was considerably older and had been drifting in space for about two hundred years. It was of about the same size but contained little equipment of any kind and was hardly more than a battered metallic shell. Again no information as to its origin could be extracted, but in the course of the investigation several fragments of a nature and age identical to the first wreck came to light. Similarly pieces of debris found amongst that of the previous discovery matched the fabric of the later one, so it appears that a mid-space collision occurred.

It is perhaps of some comfort to those concerned about the apparent ability of the alien to become invisible to human detection equipment that their technology, advanced though it may have been, was not infallible.

The older wreckage was emitting highly dangerous radiation and, after the research teams had finished, was destroyed. The other fragment, together with the small jet plane it contained, are open to public view at the Mars Museum of Modern Sciences.

UNIDENTIFIED ALIEN

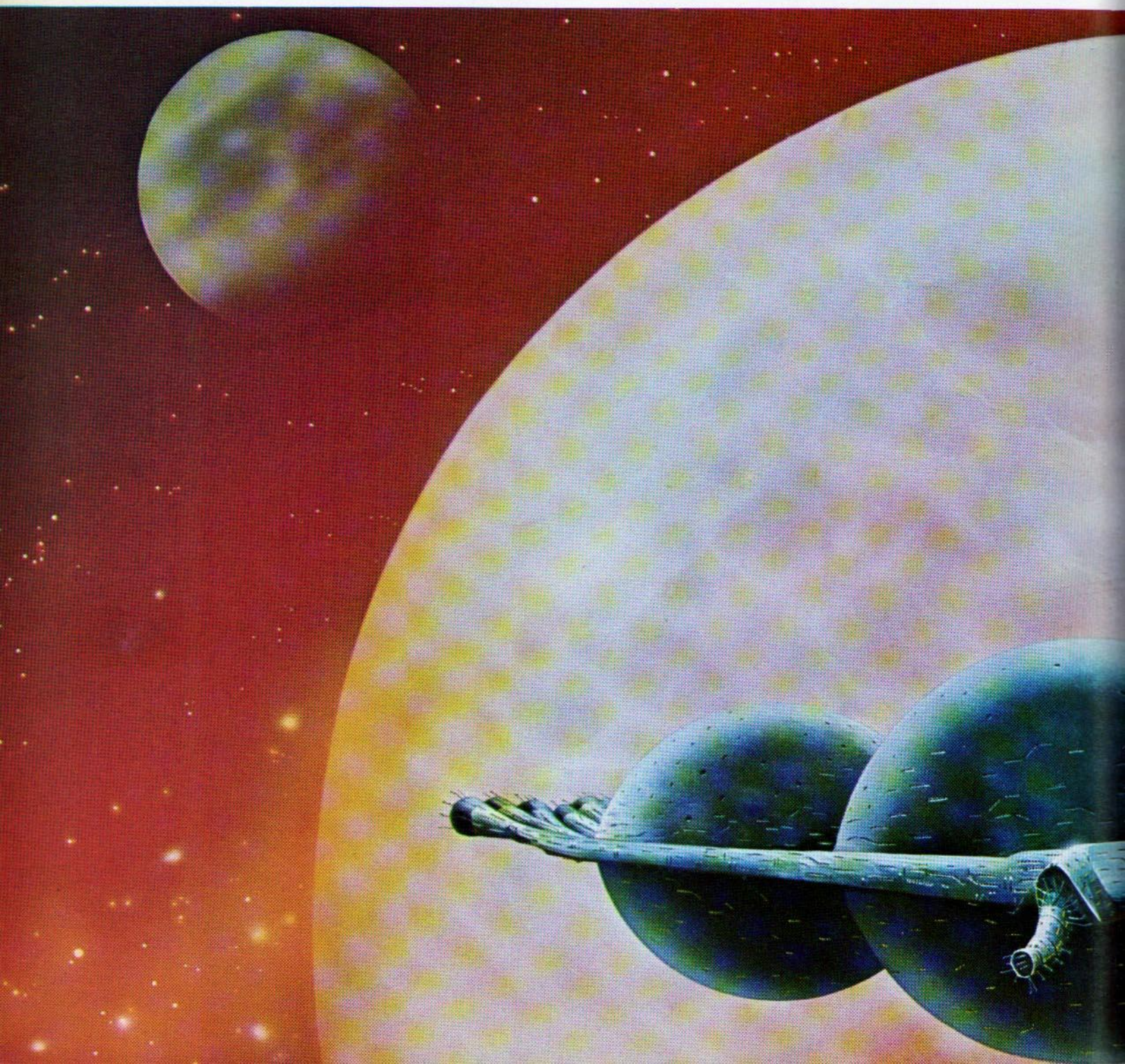
OBJECT # 4 PROXIMA CENTAURI

Early in 2088 a Perimeter Beacon near the Proxima system signalled the approach of an artificial object which refused to acknowledge requests for identification, and two security ships were dispatched to investigate.

Within a few hours they had made visual contact and it was immediately apparent that the stranger did not originate from known space. It was an enormous construction which dwarfed the Proximan craft and was obviously designed to carry living beings of some kind. That parts of the interior were illuminated could be seen through the hundreds of apertures in the hull, but none of the Proximan's various signals were answered in any way. It was decided that the alien vessel was either empty or disabled as its course would take it into the sun.

Assistance was called for and when it arrived lines were attached and the craft towed into a stationary orbit round Proxima One.

It was certainly a bizarre object, made more so by its prodigious size, and unlike any spacecraft ever seen. Scientific teams from all three systems set up temporary research stations to study it and to attempt communication with any passengers it may have had. When all attempts failed it was decided to force entry, upon which the craft was found to be entirely deserted. That it had been equipped for life forms of some kind was easily determined



from the nature of the internal fittings and equipment, but whatever these beings were like, it is doubtful that they were humanoid.

Although it has been possible to identify many of the craft's features, much remains a mystery even after nearly twenty years of study. It is known, for instance, that the basic power source was nuclear fission, and that the equipment operated on similar principles to that in current use. Also, the two massive spheres forming part of the hull contained plant life of some kind, as the presence of organic debris in them indicates. These spheres were fed with a rich oxygenated atmosphere distributed throughout the ship via a network of ducts. The implication is that this represented their required atmosphere and therefore that they, like we, were a carbon-based life-form. The hull itself appears to be organic in composition and is formed by an atrophied cellular structure. This suggests that the outer body of the ship was itself a living organism at some time. Whether this was before or during its function as a spacecraft has not been established.

One further conclusion generally accepted by the investigating teams is that the entire structure was originally attached to something else. There is a number of projections with fittings of various kinds which appear to have no obvious function other than to connect with another body of similar construction. This view is reinforced by the fact that the hull carries no engines or any other possible source of motive power. If this is the case then the complete assembly must have been an awe-inspiring sight, particularly as this portion would probably have been no more than a smaller appendage of the main body.

UNIDENTIFIED ALIEN

OBJECT # 5 SIRIUS

The beautiful planet of Sirius with its dense low-lying cloud layer is a source of fascination to scientist and layman alike. It possesses an oxygen-rich atmosphere and a plant ecology which are not so different from our own, but no sign of animal life has yet been detected.

Despite its superficially favourable environment it is, in fact, suitable for colonization as it possesses certain extraordinary qualities which have baffled scientific teams since the planet was first investigated.

Its dominant characteristic is that the planet emits sound waves in a range of frequencies. As a result the entire surface is in a state of agitation in sympathy with the various vibrations. Some of the frequencies are within audible range, producing a continuous and unsettling discord. The effect together with some of the threshold wavelengths is to make it impossible to tolerate exposure for any significant length of time.

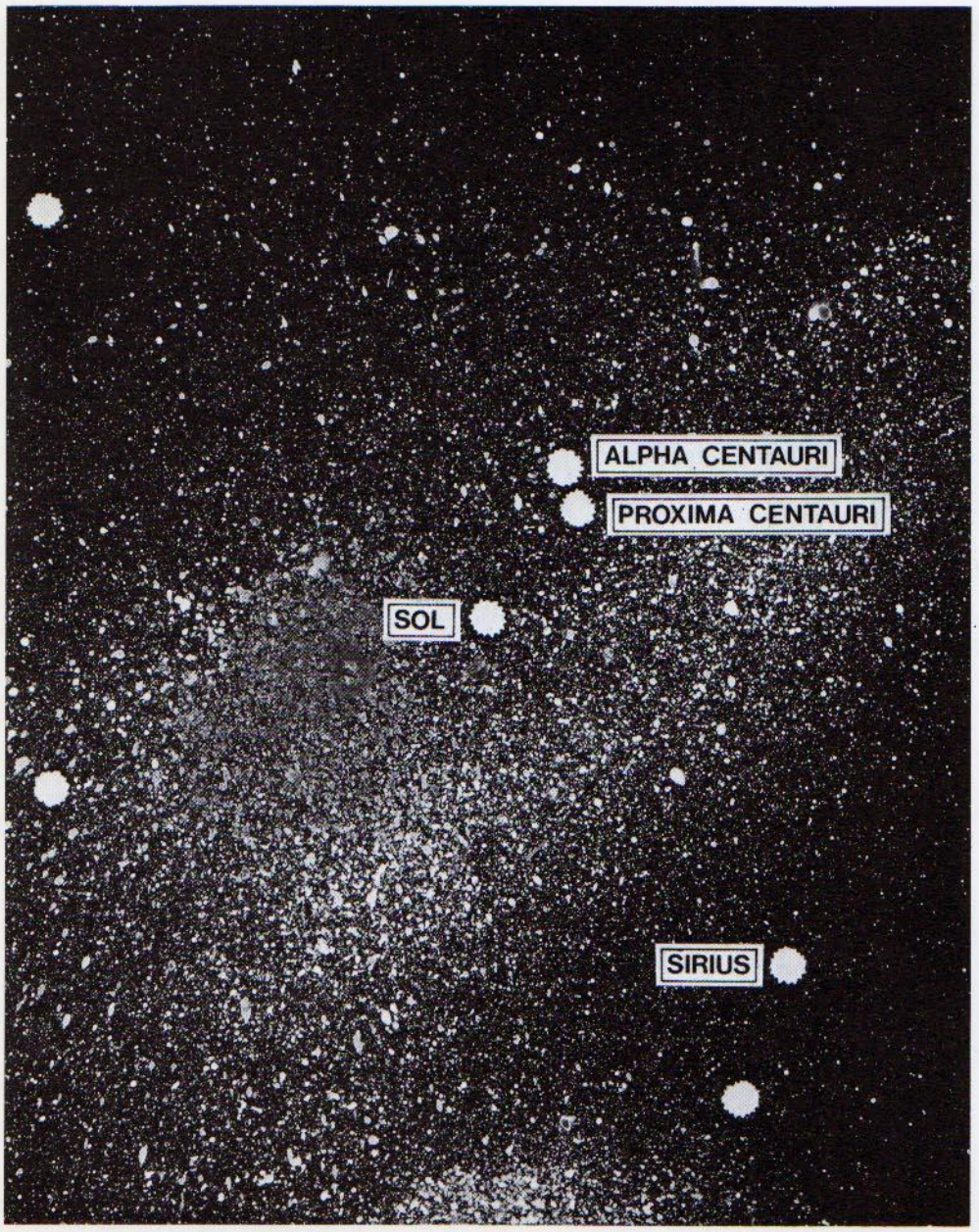
Many attempts have been made to establish bases on the planet but the constantly moving surface has made this impossible. Geological tests and drillings have failed to disclose any stable stratum which might provide an anchorage for constructions of any permanence. A further difficulty is that sound-proofed surface installations would only be habitable for brief periods as the unrelenting resonance has the effect of seriously disturbing mental equilibrium.

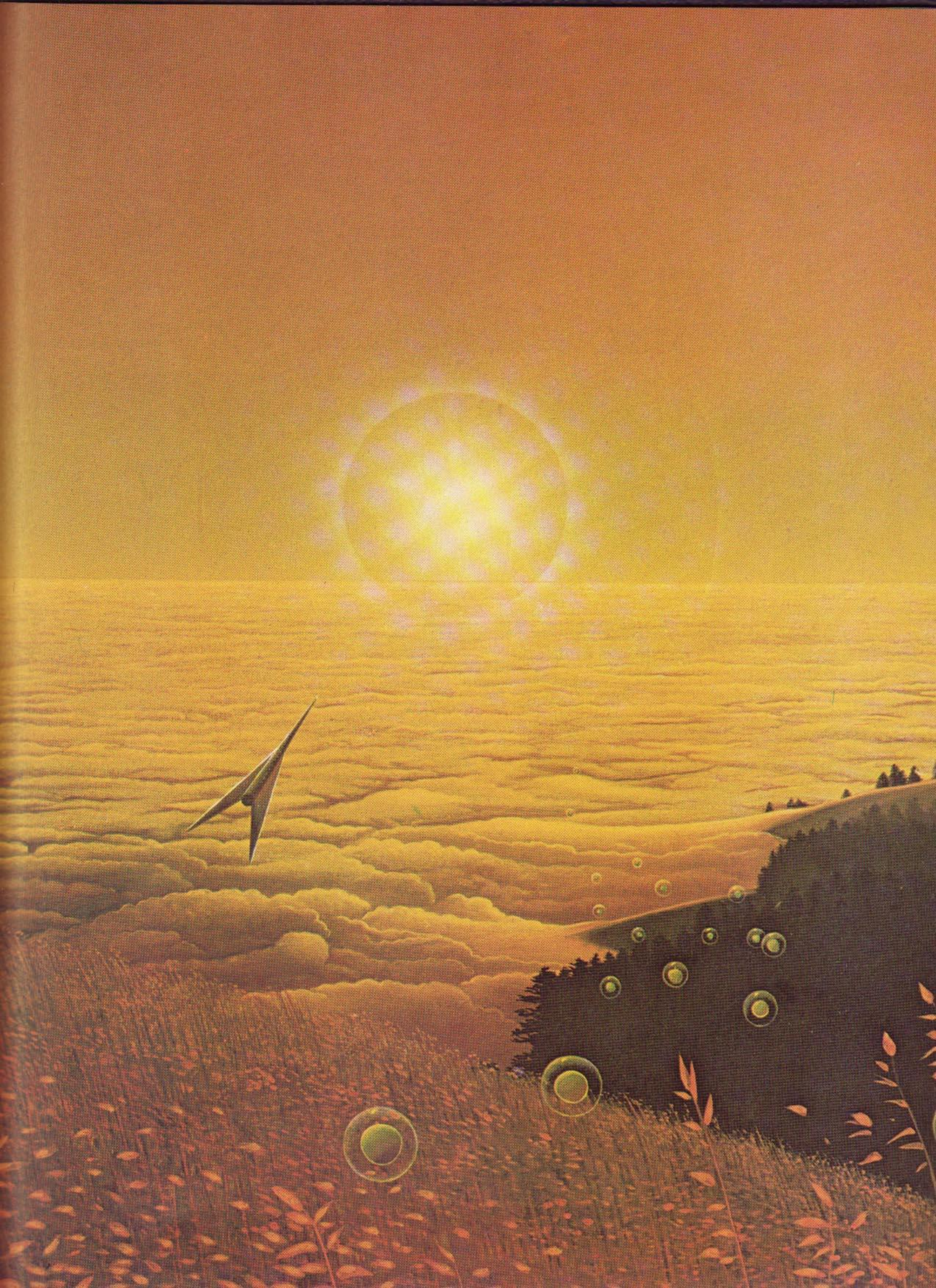
Absolutely no clue exists to the reason for this phenomenon, nor do we have an explanation for the fact that the planet has nomadic pockets of gravitational variation. One suggestion put forward is that somewhere near the core there exists a large number of very high-density bodies in a state of constant movement.

In 2091 a small research team discovered a complete and apparently undamaged ship of unknown origin suspended above the planet's surface. They had not witnessed its arrival but it would have been within the previous thirty-five hours. After failing to communicate with the craft they established by means of their density analysis equipment that it contained only electronic equipment. It was noted that the volume of sound in the immediate vicinity of the craft was unusually intense and that the gravitational field around it was weaker than any other measured area. The object was transmitting beamed signals in an organized fashion but these were not decipherable and the team was unable to identify their destination. These signals increased in volume when any team member approached the ship, and subsided when he moved away. The hull surface was formed of an alloy similar to steel enclosed in a continuous layer of acrylic material. Attempts to cut an access to the interior were unsuccessful as the lasercutter failed to operate when near the ship.

Within four hours of the first sighting the ship moved rapidly out of sight without the visible use of a propulsion system and has not reappeared.

It seems probable that this ship was an unmanned survey vessel of some kind. If so it is possible that our presence deterred it from executing its task as it is unlikely that it could have completed its study in so short a time.





UNIDENTIFIED ALIEN

OBJECT # 6 LALANDE 21185

The most recent alien craft to be discovered was found in 2098 on the small, bleak planet accompanying the star Lalande 21185, eight light years from Earth. A team of prospectors were working on the surface when they came across an area of high radioactivity which they assumed was of natural origin. As the radiation level was well within the tolerances of their suits and equipment they entered the zone and noticed that the emissions increased as they advanced. Their sensor gear was able to pinpoint the area of peak activity and when they reached the spot indicated, they found the remnants of a craft unlike any that they were familiar with. Wherever it was from it seems likely that its original intention had been to land, as the wreckage was confined to a very small area. Either the ship came to grief as it settled onto the surface, or more likely, it suffered a disastrous accident once it was down. It is highly probable that there were survivors, as a number of small artefacts and an improvized radiation shield were found in a small hollow some distance from the ship. No other evidence of the crew could be found, but the incident must have occurred a very long time ago as, despite the minimal amount

of oxygen in the thin atmosphere, the ferrous alloy of which the hull was made was badly corroded.

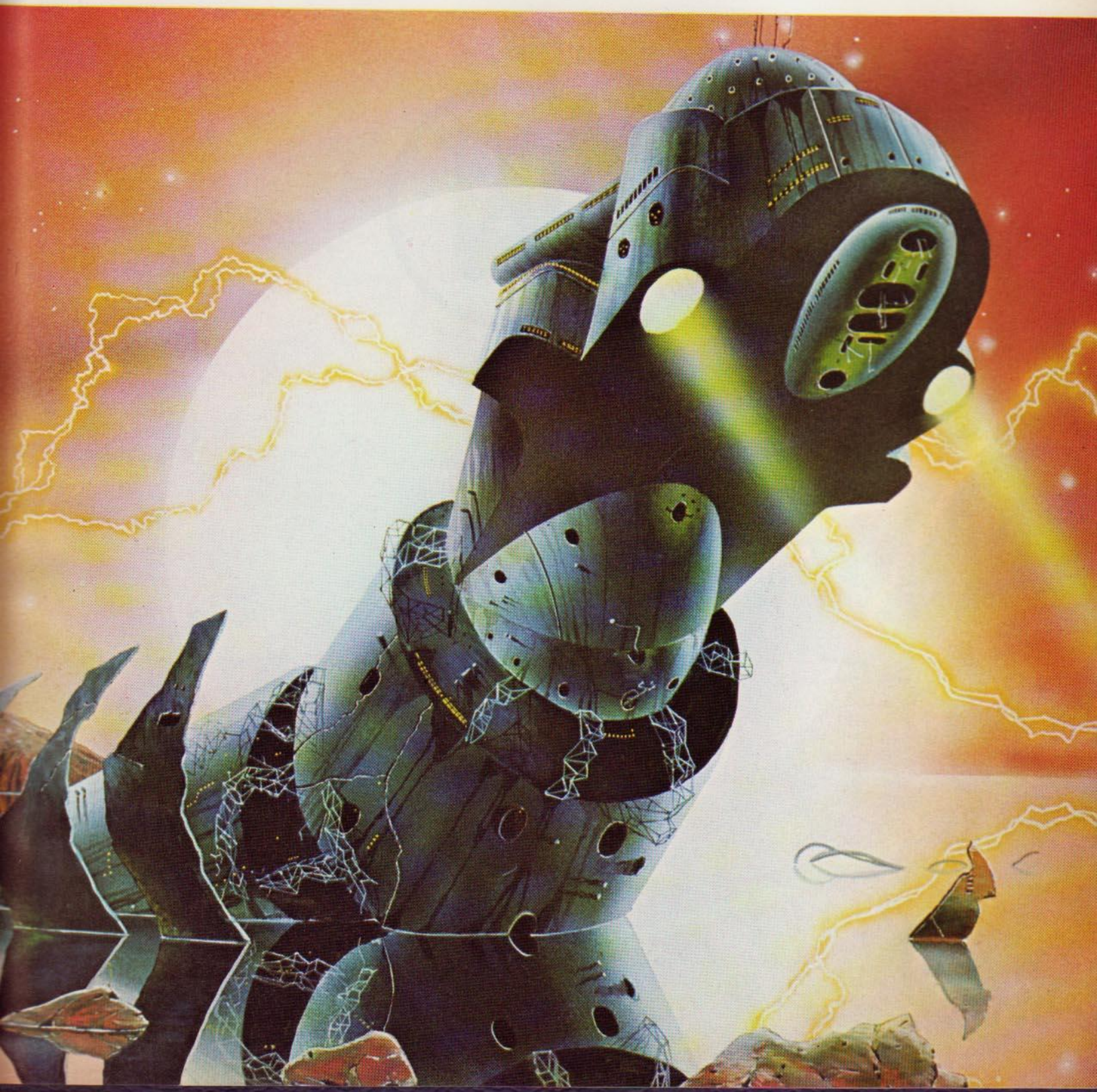
The nature of the wreck suggests that an explosion took place, almost certainly in the reactor room or its equivalent, as the extremities of the craft are virtually intact. Some equipment in the forward section is obviously still in good order as a number of lights are functioning, probably drawing power from solar convertors of some kind.

The survey team did attempt to reach this section of the ship but, lacking the necessary equipment, were unable to get a look inside.

The stern portion of the ship had broken away entirely and probably contained the drive units. It was composed of a ceramic material and had not deteriorated like the rest of the hull, but it emitted a level of radiation too high for the team to investigate closely. The many venturis and nozzles suggest that the ship was powered by thrust units which cannot have been too different from those we have developed ourselves.

Further information about this strange and desolate vessel is unlikely to come to light for a long time as the planet proved to be of little commercial value and the information that the ship is likely to surrender does not justify the cost of mounting a research operation for this purpose alone.

It is perhaps fitting that it remains undisturbed as a gaunt epitaph to the beings who lay dying of radiation sickness among the rocks of a strange and empty world.



Terran Defence Authority Commander Stewart Cowley first entered the Service as a flying officer with the XIII th 'Bear' Squadron of the Mars Defence Group during the Proxima Wars, and gained first-hand experience of many of the ships described in *Spacecraft 2000-2100 AD*. After the war he was posted to Earth as a liaison officer attached to the Terran Trade Authority. His interest in the history of spaceflight led to his appointment to the Public Information Office of that organisation, and in that capacity he was closely involved with the preparation of both the Galactic Technology Museum at Miami Spaceport and the Mars War Museum. He is currently involved in building a full-size replica of the SSF21D Cutlass, the craft he operated for most of the war, out of macaroni.

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