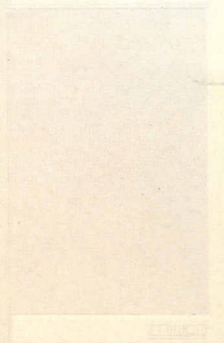
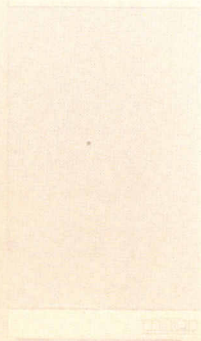
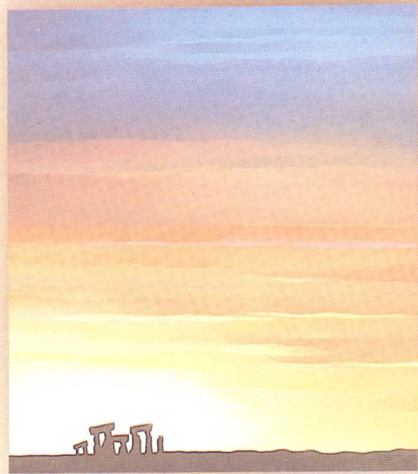
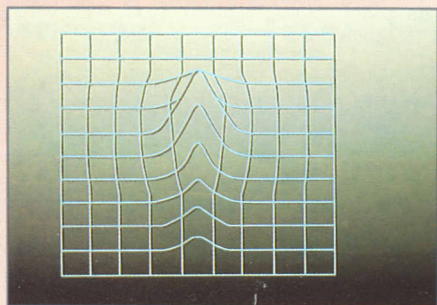


The human touch



# OUR MISSION



The equipment manufacturers involved in the reproduction of music can broadly be divided into two categories: the mass market and the specialist sector. The mass market manufacturers are dominated by mediocrity. This stems from their fundamental lack of interest in music and an irreversible commitment to a toy producing mentality. The principal design objective of mass market manufacturers is to reduce cost while maximising superficial features and gimmicks – to the detriment of sound quality. The specialist sector, however, continues in its relentless pursuit of excellence in the reproduction of music. Within the specialist sector Mission's leadership is acknowledged throughout the world, while we equally recognise that we cannot cater for certain fanatical fringe tastes. Mission designers discard such obscure tastes as strange and eccentric. After all to music there is a universal dimension – and Mission's track record of remarkable growth is confirmation enough that the musical values we rate so highly are widely appreciated.

Of all the complex reasons responsible for making Mission Number One, perhaps the most significant is that for Mission

music is the master, technology the servant. Advanced research and engineering provides the cutting edge which gives the company its lead in competitive performance. But Mission is careful to avoid the trap into which so many have fallen: the trap of technology as an end in itself.

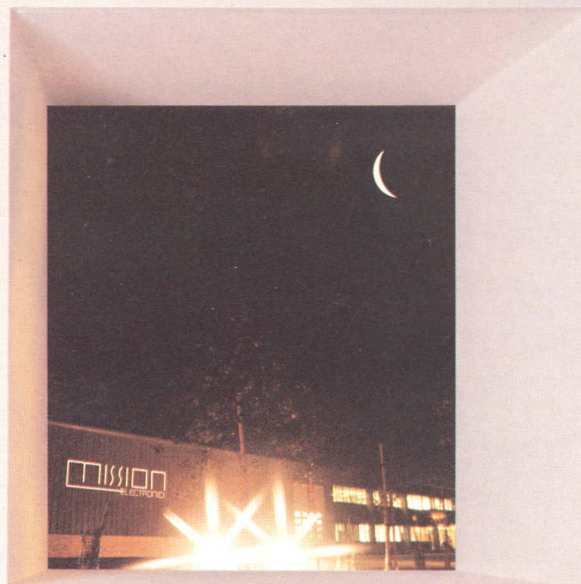
Designing hi-fi equipment is not merely an exercise in science and technology – it is also, perhaps above all, an art. Music is fundamentally a form of communication from the artist to the listener, and it is this intangible ability to convey the emotional content of music which distinguishes Mission from imitations. The ability to communicate a musically satisfying performance is paramount, overriding any technical specifications or features.

Deciding what a hi-fi system ought to achieve is the really skillful part; deciding how to achieve it is not much easier. Put differently, the designer of a full chain of music reproducing equipment is walking a minefield. We are dealing with a ten octave bandwidth phenomenon while video technology, for example, looks at a fraction of one octave. We are converting energy from mechanical into electrical and back into mechanical with all the complexities that this entails. We are dealing in a wide spectrum of problems from micro-electronics at silicon level to the large scale materials technology of loudspeaker cabinets. And now, with the advent of Pulse Code Modulation, we need an understanding of both analogue and digital techniques. It stands to reason that companies with an understanding of

one product alone will not survive. It is naive to think that one can design amplifiers without a thorough understanding of the behaviour of loudspeakers or a front-end input to the amplifier without a full knowledge of their potential interface. Mission's formidable strength encompasses loudspeakers, cartridges, tonearms, turntables, amplifiers, and more recently CD players - a unique achievement.

Of the handful of quality manufacturers, most owe their reputation to one component in the chain - some make good loudspeakers, a few companies make good tonearms, others make good turntables, very few design good amplifiers, and hardly anybody produces a good CD player. Only Mission dominates all these areas and produces a broad based product line much of which is acknowledged as the best that money can buy. The problems involved in such 'Systems Engineering' are in the realms of stage-by-stage bandwidth optimisation, impedance matching, interface distortions etc., and are beyond the scope of this brochure. Suffice it to say that based on such total understanding, full commitment to music, and the company's formidable technology, Mission has produced numerous Firsts throughout its history.

Years ago we put forward ideas and products which have influenced the industry ever since. We suggested that good specifications were not enough. We said that to design for low coloration was not enough. We insisted that two-way loudspeakers were inherently superior. We argued that systems had to reproduce the emotions and dynamics of live music. We claimed that good dynamic range needed higher sensitivity and power handling. We said that speakers had to be 'hard-wired'. The unique combination of our own ideas together with proven classical theories such as accurate stereo imaging, smooth frequency response, and low distortion etc., gave birth to a generation of products that made Mission the industry



leader. Our courageous work with new materials such as polypropylene, Sorbothane, carbon fibre, and MDF influenced designers all over the world.

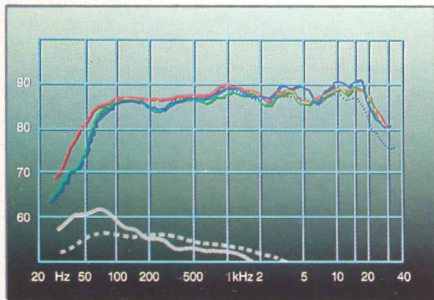
The classic 770 loudspeaker took the industry by storm and the competition has tried to out perform it ever since. The original 700 loudspeaker stopped the race to make the cheapest speaker with the most drive units as a symbol of value. The revolutionary 774 tonearm offered the first low mass direct-coupled-bearing tonearm design, and has been widely

copied ever since. International Audio Review in an American test of the Mission 7000 CD player stated "... all else is boat anchors!" Our revolutionary designs for Cyrus electronics have set new standards for the 1990s. The internationally acclaimed Cyrus One is frequently tested and compared with esoteria sometimes costing 20 times as much.

Today, Mission is a multinational company with sales, distribution and service networks across the world. As a Mission customer you can rely on our dependable long term support.

In a monotonous world, dominated by mindless technology...  
let Mission bring you THE HUMAN TOUCH.

# THE 70



Red = 700LE non-anechoic  
 Green = 700LE anechoic  
 Blue = 70 anechoic  
 Blue (dotted) = 70 at 30° off axis  
 Black = 2<sup>nd</sup> + 3<sup>rd</sup> harmonic distortions for Mission 70

The above is a composite of the frequency response and distortion behaviour of models 70 and 700LE, and demonstrates unusually smooth steady state responses both on-axis and off-axis. The on-axis sine wave response 1W at 1M - anechoic, remains within a staggering  $\pm 2.5$  dB even though the 700LE offers much greater bass extension. The 2<sup>nd</sup>, 3<sup>rd</sup>, and other harmonic distortions in the midband remain below 0.1% - approaching amplifier specifications! An order of magnitude better than most of the competition. Please note that when the speakers are positioned against a solid wall precalculated bass reinforcement occurs to produce enhanced low frequency extension. This wall reinforcement technique is used throughout the new generation Mission designs, to optimize the real non-anechoic behaviour of your loudspeakers.



## MISSION STANDS

Carefully researched special Mission stands are available to improve both the performance and appearance of your loudspeakers.

Winner of "Loudspeaker of the Year" in Britain; Hi-Fi Choice "Best Buy"; awarded "Decibel D'Honneur" in France; acclaimed "Wunderkind" in Austria; the Mission 70 has set new standards which others strive to attain.

The Mission 70's innovative design results in a unique wide bandwidth system, free of unwanted resonances, distortions, frequency response anomalies, and colorations - remarkable for a loudspeaker in its size and price category.

The 70 is designed with an unusual cabinet construction. The drive units are mounted on Mission's rigid particle baffle board while the carcass consists of a sandwich construction to distribute and dampen enclosure resonances. Carefully optimised drive units ensure the smooth bass performance essential in high quality systems. The driver geometry is inverted in

Mission's novel style. This combines with elegantly simple crossover networks to enhance phase coherence and produce an astonishing three-dimensional stereo stage.

Technically the frequency response is unusually smooth and well balanced. Whereas the competition has an irregular response often as poor as  $\pm 5$  dB the 70 measures flat to within  $\pm 2.5$  dB! When measured off axis it exhibits no mid-band cancellations. The modulus of impedance is very smooth, remaining above 6 ohms, and with minimal electrical phase angles.

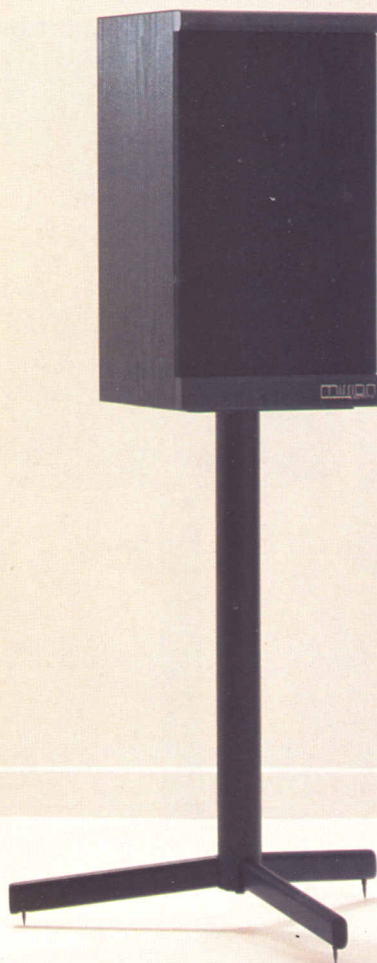
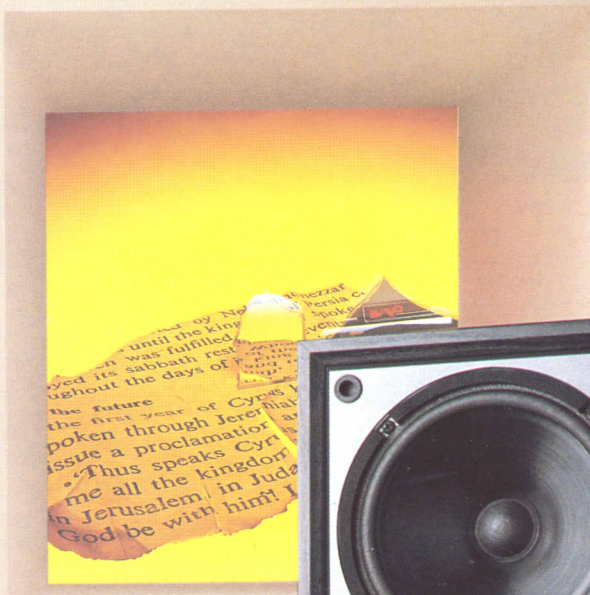
This ensures that the speaker presents an easy load to amplifiers. Harmonic distortions are minimised even at low frequencies, and sensitivity is above average at 90 dB producing high sound pressure levels even with modest amplifiers.



# THE LEADING EDGE

The original Mission 700 was a landmark in the history of loudspeaker design, such was the acclaim it received and the success it achieved. In fact it is common knowledge that before the 700, budget loudspeakers were simply 'boom-boxes'. Now, with benefit of many years of research and refinement, Mission are able to introduce a unique, sophisticated, and high technology bookshelf system - the 700 Leading Edge. Advanced technology has been used to develop an exceptional 7 inch bass-mid drive unit. Shaped pole piece and an ultra-fine voice-coil gap combine with a rigid high mass cone, to produce an unusually extended bass response. Refined cone geometry and damping, with progressive hyperbolic suspension affords both high power handling, and inherently low coloration. This bass-mid unit is complemented by a ferrofluid cooled 19 mm dome tweeter. The system is capable of handling musical material with exceptional dynamic range, including digital masters, and remains linear even at modest power levels-unlike many nonlinear systems which, at low level, sound little better than a transistor radio.

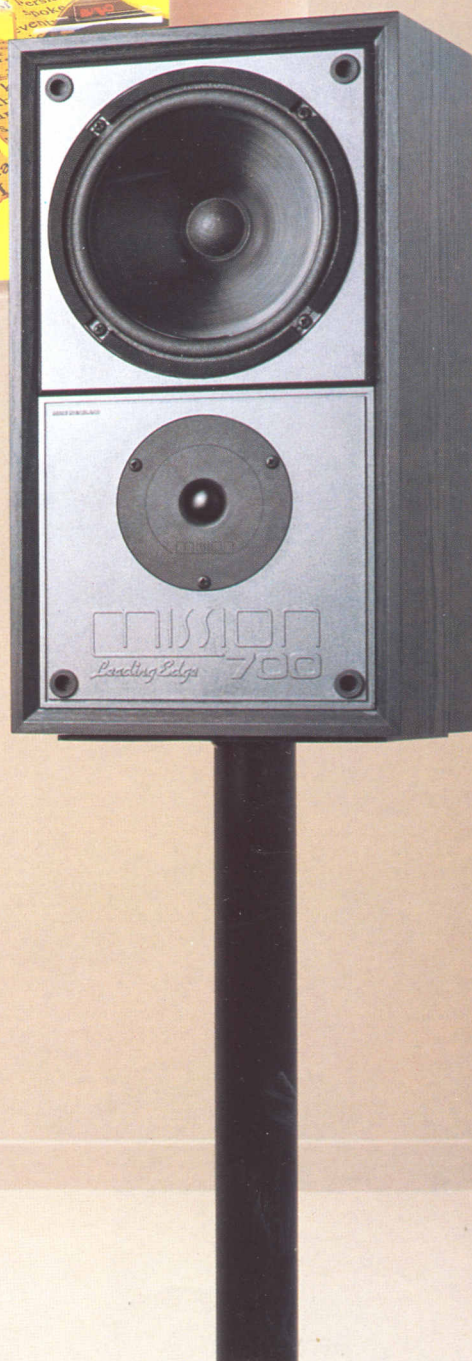
The unusual inverted drive unit geometry, first designed by Henry Azima in the Mission 700, goes some way towards equalising the distance from the acoustic



centres of the drive units to the ears of the normally seated listener. The effect of such a design is that at the crossover frequency the radiation lobe is directed up towards the listener rather than down to the floor.

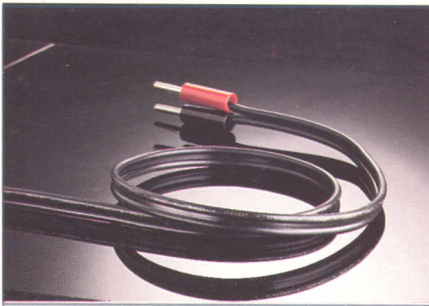
The refinement goes one step further in the use of a time delayed baffle board resulting in dramatically better acoustic phase linearity, with substantial improvements in realism, dynamics, and stereo imagery. The baffle board itself is precision injection moulded in polypropylene reinforced with natural composite materials. This combines with Mission's multi-fold technique for cabinet construction to ensure phenomenal transient attack.

The Leading Edge is a high performance system offering a rare combination of accuracy, low coloration, extended dynamic range, and high power handling.



# THE 707

In recent years much debate has taken place around loudspeaker cables. This is a sophisticated subject in its own right and beyond the scope of discussion here.



**THE MISSION CABLE**

At Mission we have carried out extensive research into the complex interface between loudspeakers and amplifiers and are now providing a very special, relatively low cost, speaker cable. This cable is manufactured in one pair of separated conductors. Each conductor is manufactured from high flexibility pure annealed oxygen-free copper strands,  $651 \times 0.07$ mm (laid up in units) with nominal cross-sectional area of  $2.5\text{mm}^2$ . The two conductors are laid parallel, separated and insulated together in a figure-of-eight section. The nominal thickness of the insulation is 0.7mm and the nominal dimension of the cable is  $3.8\text{mm} \times 9.6\text{mm}$ .

Measured at  $20^\circ\text{C}$ , the single conductor resistance is: 7.7 Ohms/km, with an inductance of  $1.6 \mu\text{H/m}$  and a nominal capacitance of  $35\text{pF/m}$ .

Mission cable is clearly designated with "+" and "-" marks. Like all esoteric cables it is directional and we recommend that the "M" of "Mission" is nearest the amplifier while the "n" of "Mission" goes towards the loudspeakers.

The arrival of digital compact disc sources and the continued improvement in conventional analogue recordings means that wide dynamic range has become a major requirement for the modern hi-fi loudspeaker. Not necessarily to play the music louder, but to be capable of handling, without compression, the sudden transients which the latest recording techniques capture faithfully. Thus the 'Raison d'Être' for the Mission 707.

The 707 incorporates our transverse folded cabinet construction and sophisticated injection moulded baffle board manufactured from polypropylene and natural minerals – the formula not being made public by Mission. This configuration offers optimum rigidity for accurate transient bass response with controlled and minimal resonances in the midband region. The bass-mid drive unit is the product of painstaking research to offer smooth response, low distortion, and controlled out-of-band aberrations. The tweeter is our proven ferrofluid 19 mm polymer dome and the overall results are optimum integration, and excellent off-

axis performance, resulting in an exhilarating stereo stage.

One key to loudspeaker dynamic range is high sensitivity to enhance headroom. Here we must point out that there is a fundamental design conflict between the efficiency and low-frequency performance of a loudspeaker. In nearly all cases efficiency is achieved at the expense of bass extension, and frequently high efficiency systems suffer high coloration. Not so with the new generation of Mission designs. The exceptional motor systems, combined with high quality cone materials and precision manufacturing techniques, have enabled us to offer extraordinary sensitivity with bass extension, while preserving the midband magic of classical Mission speakers. Our speakers have always been acclaimed for low coloration, neutrality, and transparency in the midband. They now offer bass extension with added control and articulation. Careful attention is paid to the linearity of both frequency response and distortion at different power levels. Consequently the dynamic headroom is so great that the loudspeaker system will not suffer 'saturation' and 'compression' at high listening levels.

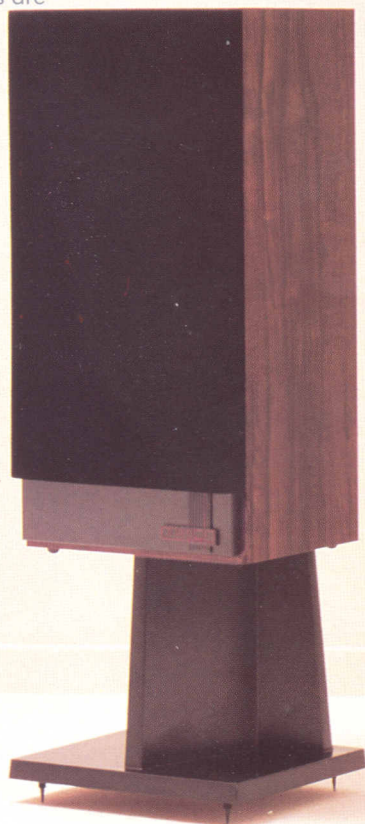


# THE RENAISSANCE

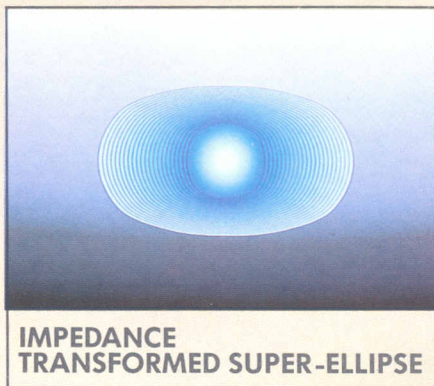
In 1978 when polypropylene as a cone material was in its development stages at the research laboratories of the British Broadcasting Corporation, and other manufacturers were carrying on with conventional materials, Mission were negotiating the patent rights for the coming technical revolution, and became the first licensee in the world for this British patent. Mission's pioneering research in this area resulted in one of the most advanced loudspeakers - the 770. Since then most other manufacturers have attempted to copy the Mission design with varying degrees of success.

At Mission progress continues. After many years of evolutionary refinements the most advanced version of the 770 drive-unit is now designed into the 737 Renaissance.

The cone membrane for this model offers a unique combination of rigidity, Q, lightness, and acoustic opaqueness. The drive-unit is manufactured into an esoteric die-cast magnesium chassis to improve rigid coupling. The acoustic properties of the cone are such that they do not allow for internal reflections or standing-waves to come out of the cabinet and reach the listener out of phase. The Renaissance cabinet is of precision transverse-folded construction, visco-elastically damped and incorporates our special non-resonant MDF for the baffle board. The total system is reflexed using the Mission resistive port, resulting in extended low frequency and power handling performance. The external finish is to the highest standard. Mission's integral matching stands are offered as an optional extra to complement the appearance and performance of this model.

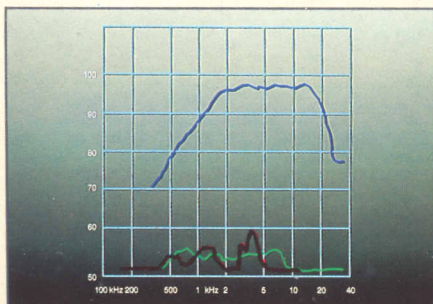


# THE FREEDOM



The above is computer simulation of the ultra-complex geometry of Mission's new impedance transformed high frequency unit.

A perfect circle develops into infinite numbers of super ellipses, none of which obey the same mathematical formula!



Frequency response plus 2nd and 3rd harmonic distortions of the impedance-transformed HF unit, measured on axis, anechoic.

Following the extraordinary success of the original Mission 770, inferior copies flooded the market to such a degree that at Mission we decided to move on. Brand new revolutionary drive units have been developed to ensure that the latest 770 Freedom builds on its illustrious past as a state-of-the-art reference monitor. In so doing certain specific areas had to be dealt with. Firstly, we wanted to ensure that the frequency range offered greater extension. Secondly, our design team felt that the bass response could be tighter, more articulate, with more transient attack. Thirdly, we wanted to increase the dynamic headroom so that all non-linearities, compression, and saturation problems were eliminated. Finally, we wanted to enhance sensitivity and efficiency for the era of digital masters.

Mission have developed a brand new homopolymer mineral-loaded plastics cone material, the latest stage in the quest to maximise the inherently conflicting requirements of transient response, sensitivity, damping, and acoustic opacity. Painstaking cone geometry development, a die-cast metal chassis, high temperature voice coil, and focussed magnetic field all help keep dynamic range high and coloration low. The cone material is

carefully optimised for mass, rigidity, compliance, and 'Q' to offer hitherto unattained low frequency extension for a system of this size. The brass-plated pole piece with special geometry, together with high temperature voice coil materials and ventilation, increase motor output and power handling. The high frequency unit is a further landmark in loudspeaker design.

This brand new double-chamber, impedance-transformed super-elliptical tweeter is designed to offer extraordinary smoothness and realism – eliminating the remnants of typical dome tweeter sibilance and offering uncanny dispersion characteristics. The mathematics of impedance transformation uniquely ensures structural form integrity to the polymer dome under severe transient conditions. The unit is then oil cooled to avoid temperature related performance aberrations and increase saturation thresholds. The cabinet construction is based on transverse-folded geometry, ensuring rigidity for low-frequency transient response and without colouring the open and transparent midband. The cabinet walls are visco-elastically damped to control and attenuate resonances and





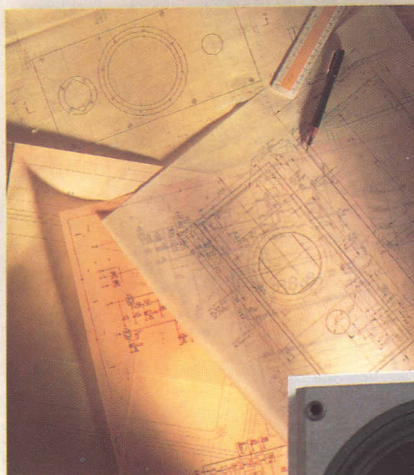
minimise stray acoustic output to ensure phase coherence. When measured, the Freedoms are capable of extraordinary behaviour. The on-axis response is smooth, off-axis measurements exhibit minimal aberrations, and driven at 90 dB

the midband distortion is close to 0.1% – approaching amplifier specifications!

Of the 770 we have always said, "... and when you switch over to the 770s you will smile and say – that's Magic!".

# THE ARGONAUT

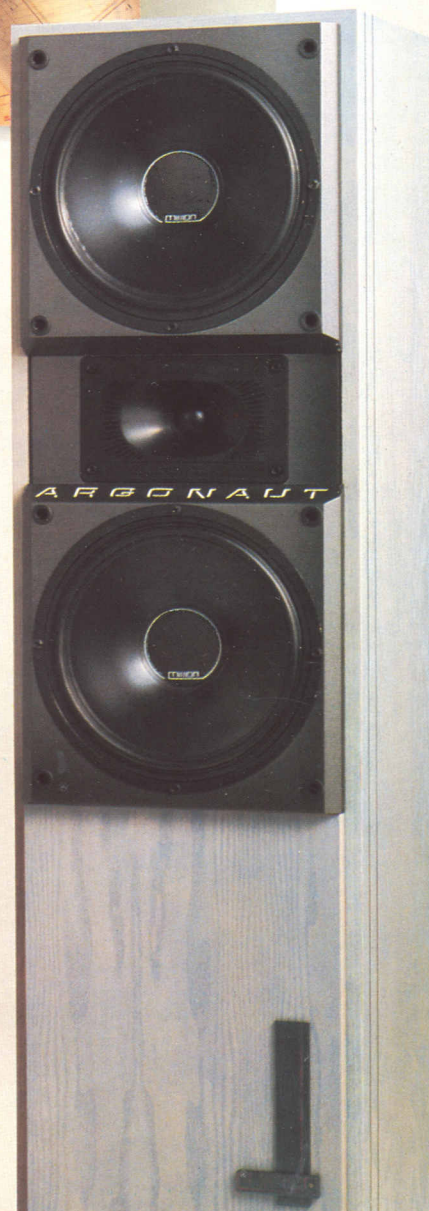
Improving on the 770F is no easy task, yet it is an excellent base from which to start. The core remains in the form of the highly developed homopolymer bass-mid drive unit, but to improve low-frequency bandwidth and overall sensitivity a second such unit is fitted and the enclosure volume critically raised. This extra driver merely augments the low bass, so the vital mid-treble crossover region remains simple and straight-forward. Mission insists on simple crossover filter designs to ensure electrical and acoustic phase coherence. This in turn requires absolutely superb drive-units so that the out-of-band aberrations do not have to be filtered too drastically! The brand new super-ellipse cavity-loaded tweeter with its exceptional transparency completes the system, retaining the neutral and musical character and fine imaging of the Freedoms, but with substantially added zest and power. The enclosure engineering



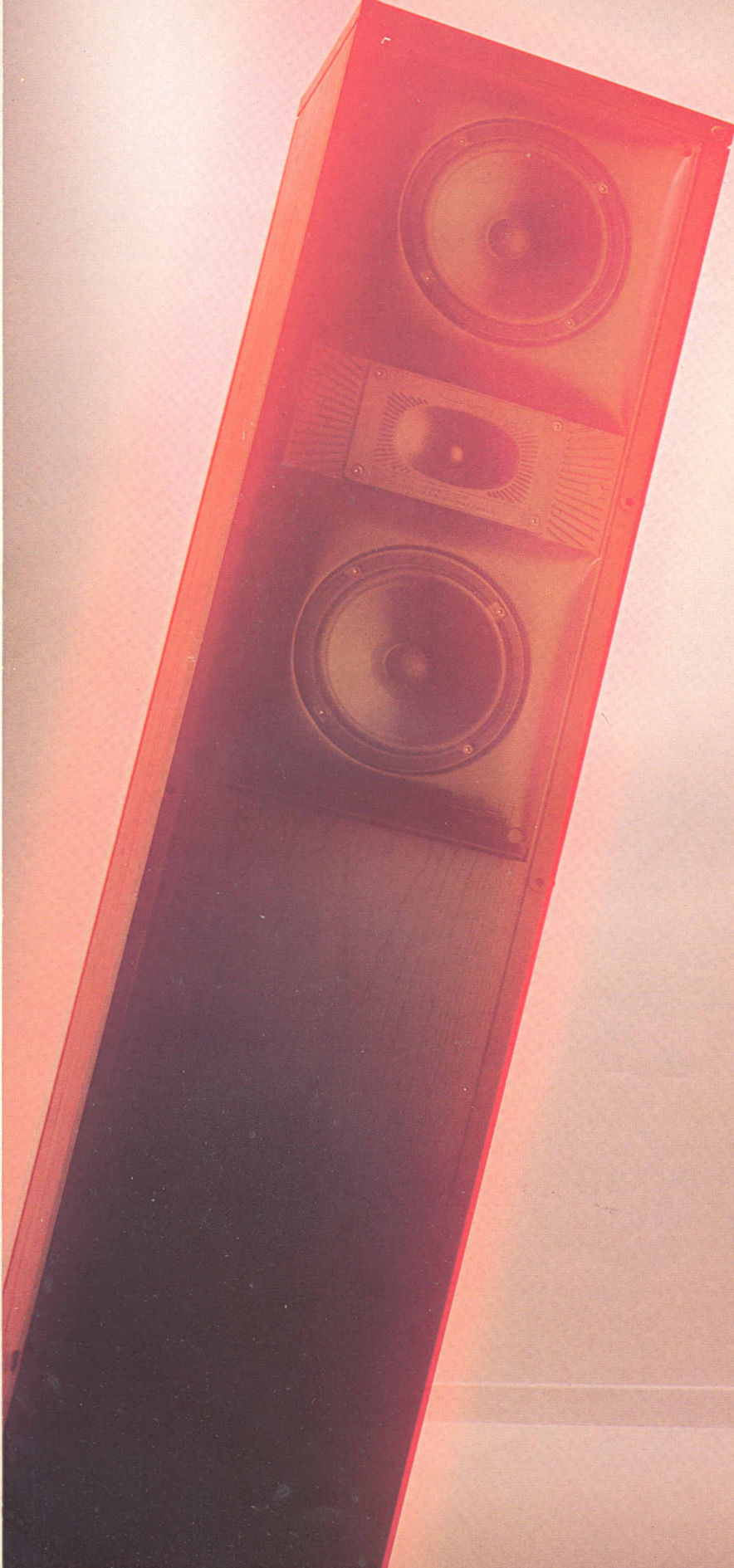
for a relatively large system such as the 780 Argonaut presents a challenging task in itself. The drive units involved are now so refined that the enclosure aberrations became audible, so the Argonaut is now manufactured from sandwiched non-resonant particle board with an MDF baffle board. Visco-elastic damping and other careful measures are taken to minimise cabinet colorations.

Careful balance of numerous complex variables of enclosure volume, damping, drive unit 'Q', low frequency alignment, system 'Q' etc., have resulted in an acoustic output in a non-anechoic environment which is capable of taking conventional rooms into consideration. This exceptionally efficient system is capable of producing 95 dB for 1 watt input.

A powerful expression of Mission's experience and technology, when used with quality ancillary equipment, the Argonauts are capable of electrifying performance, and are uniquely equipped to serve the enthusiast whose first priority is music itself.



# THE STATE O



Technology enthusiasts are familiar with the products of the experimental laboratories of frontier manufacturers. An example can be seen in the Porsche 959 "Gruppe B". The Mission Flagship shown in the artist's impression on this page is such a product. It is a brain-child of our experimental laboratories and will be made available in small quantities in 1987 to celebrate the company's 10th anniversary. We must at this stage point out that this product will only be available in selected markets.

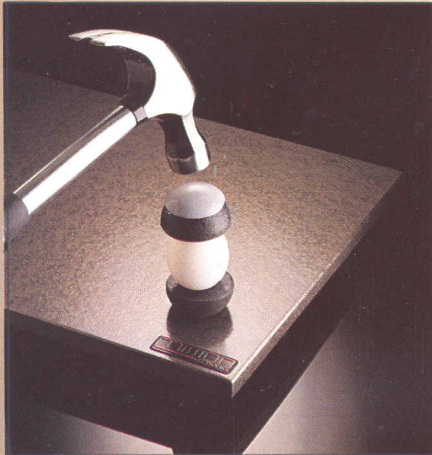
For Mission, who built their reputation on 'giant-killing' compact designs, a system such as the Flagship is a substantial departure from the past, especially as our designers have repeatedly pointed out that large loudspeakers suffer large problems. However, it was more recently felt that solving such problems would be meeting a formidable technological challenge and the expertise so gained would assist in the continuous development of other Mission models. The advent of digital compact disc provided further impetus. Whereas the low-frequency behaviour of analogue front-ends was so poor that a super-wide-bandwidth loudspeaker system would aggravate the problems in a vicious circle of cause and effect, the digital front-end combined with digital mastering techniques does not suffer the same problems. The Mission Flagship is now capable of producing low-frequency extension with dynamics and efficiency hitherto considered unattainable.

The challenge of the Flagship was to build on the Argonaut formula of high efficiency, high power handling,

# THE COMPACT DISC

In the design of electroacoustics systems the control and damping of vibration and resonances is of fundamental importance. Such problems cause significant distortions and detract from accurate information retrieval.

The Isoplat was developed by Mission to isolate high-fidelity and other precision equipment from extraneous mechanical interference. The success of Mission's Isoplat is well known and the results are clearly audible if used, for example, with a CD player.



THE ISOPLAT

The Isoplat is manufactured from sandwiched fibre board utilizing critically designed feet made from Sorbothane. Sorbothane is a unique polyurethane elastomer simulating the intriguing energy-absorbing properties of human flesh. The polymer is a quasi-liquid molecular spring and exhibits both the dimensional stability of solids and many hydraulic characteristics of fluids. Its hysteresis pattern is also unique, such that distortion and recovery can be independently controlled. Sorbothane has remarkable memory – permanent deformation under normal loads is virtually zero. The ability of this new polymer to absorb up to 95% of impact energy, combined with low compression set, flexibility, recovery rate, absorption of energy with low peak forces, and excellent kinetic energy absorption properties make this patented material totally unique. To dramatise the properties of Sorbothane, it can be demonstrated that an egg sandwiched in a Sorbothane mould and hammered with a mighty blow will not break, or that a submarine lined with sorbothane would not be detected by sonar, in that it would become acoustically invisible. Mission have the world exclusive rights to Sorbothane in electroacoustic applications.

Pulse Code Modulation is the 21<sup>st</sup> century technology for the storage and reproduction of music. Optical laser systems are an equally sophisticated partner for such a technology. The combination has produced Compact Disc. CD's staggering dynamic range, channel separation, low distortion, exact speed stability, zero disc wear, random access, programmability etc., put this medium in the forefront of audio technology. As with all new technologies the early implementations proved problematic, and the fact that the industry was dominated by the mass-market manufacturers, with minimal commitment to music, delayed acceptance of the medium by the discerning music lover. However, Mission's first CD player provided the stimulus for many to take the medium seriously and made the DAD7000 an instant international success.

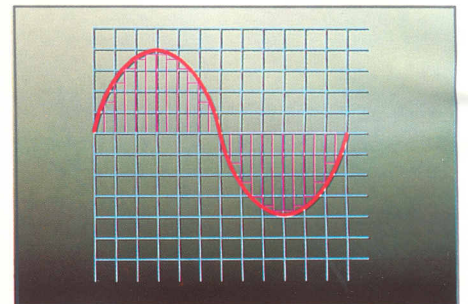
On the eve of the introduction of the DAD7000 an intensive and radical programme of research had started on advanced new generation Mission players code-named PCM4000 and PCM7000 – the company's definitive statement in Compact Disc technology. The unique combination of the following design features, seldom if ever found in competing equipment, underlines the sheer technical sophistication of Mission's new CD players. However, no amount of technical explanation can fully convey the breathtaking realism with which the MISSION PCM reproduce the emotional dynamics of music.

## DIGITAL TO ANALOGUE CONVERSION

The digital to analogue converter (DAC) is the most significant component in the compact disc replay system. Certain design flaws in this unit can cause serious degradation of the sound quality, while others may merely degrade the quality marginally. The linearity of the DAC is naturally one of the important parameters of the unit and often quoted in

manufacturers' specifications. However, there are certain types of non-linearities with serious audible effects, regardless of their magnitude. These usually manifest themselves in the form of compression and serious loss of linearity in low level signals.

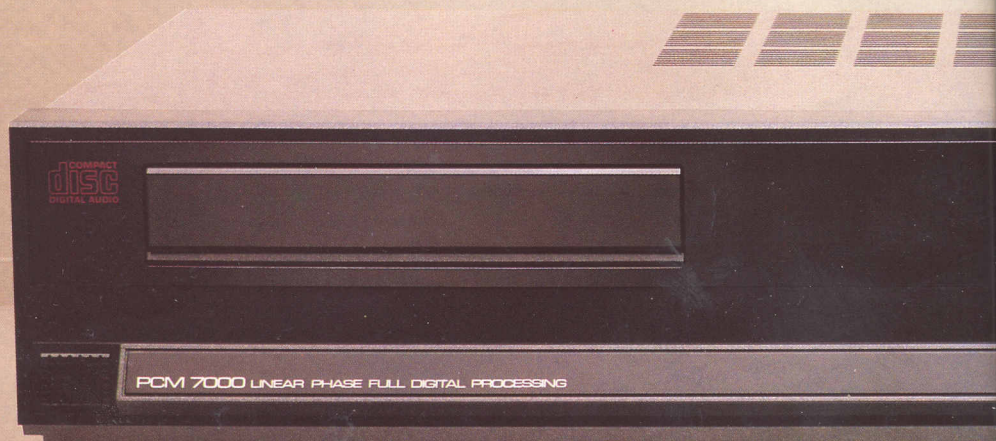
Other problems can arise from poor power supply rejection of the DAC; this can be very serious and can cause loss of clarity and poor high frequency behaviour of the audio output. A further common flaw is susceptibility to dynamic distortion caused by poor high frequency behaviour of the DAC normally due to dynamic



Typical output of digital to analogue converter to a sinusoidal signal.

mismatch of the conversion elements. The output sample-and-hold of the DAC also plays an important part in reconstruction of the audio signal. Typically, a poor design can cause a complex form of distortion consisting of anharmonics which can be audibly objectionable.

The DAD7000 had already successfully addressed the above problems, at only 14 bit resolution. The major area in which scope remained for improvement in the DAC was the loss of information inherent in the 14 bit chip, which could only be restored through the use of an equally optimised 16 bit chip, operating at the same high speed of 176.4 KHz. The MISSION PCM, through its pioneering use of the long awaited true 16 bit, 4X



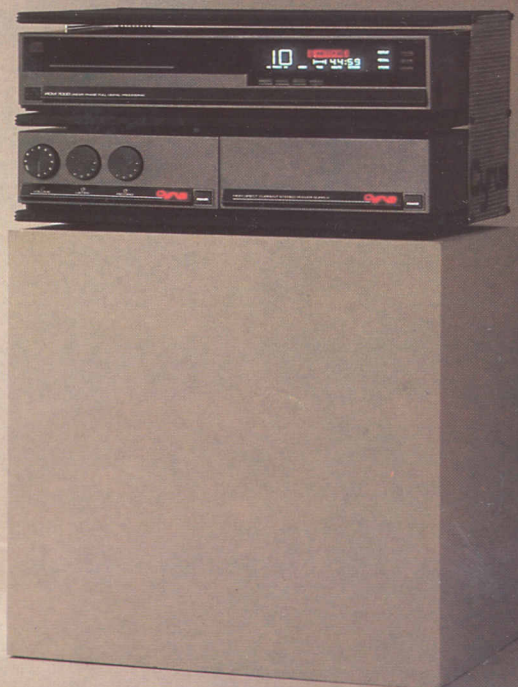
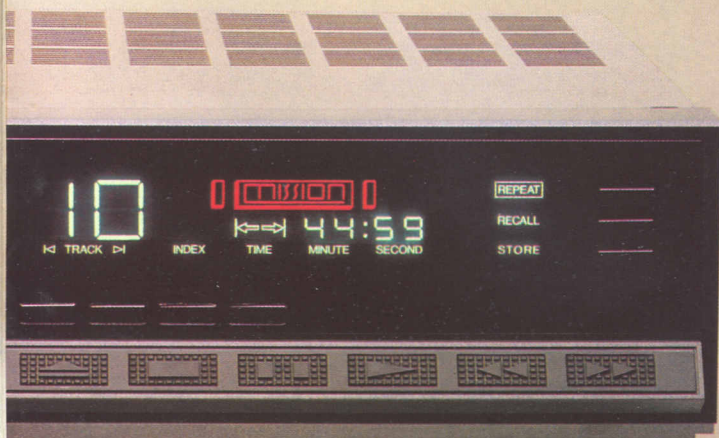
oversampling twin DAC/single chip technology, surpasses by a wide margin even the highly acclaimed DAD7000. This chip marks a new epoch in compact disc technology, giving a true 16 bit resolution at 176.4 KHz sampling rate. Its superb linear performance ensures the highest possible fidelity, while the single chip 'Very Large Scale Integration' makes for perfect inter-channel thermal stability.

#### DIGITAL FILTERING

It is widely recognised now that filtering the signal digitally is a far superior method in reconstituting the audio signal. Important advantages are: phase linearity, immunity to environmental changes and component variations. The MISSION PCM utilizes a Finite Impulse Response Transversal Filter which has unprecedented performance characteristics. The audio-band amplitude response is accurate to 0.02 dB, the phase response to 0.5 degrees and the out-of-band rejection greater than 60 dB. The filter has an extra 2 dB headroom to ensure perfect symmetry on full-scale modulation transient signals. The high performance of this filter puts less stringent requirements on the post DAC filtering.

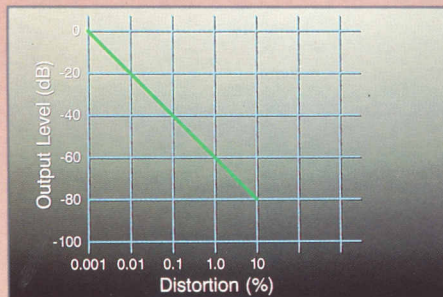
#### ANALOGUE SECTION AND POST DAC FILTERING

Much attention has been given to the analogue section design to ensure that the high standards attained through the use of a superior digital filter and DAC are preserved. Here Mission's extensive amplifier design expertise has been utilized in areas of circuit philosophy and topology, grounding techniques and component technology. A special filter is used after the DAC in order to ensure phase integrity of the audio signal. In the PCM7000 further stage filtering is used to improve the out-of-band spurious rejection further. This gives a subtle but noticeable improvement to the reproduction quality.



### POWER SUPPLY

Power supply design philosophy and implementation is probably the single most important section of any analogue audio device. Mission's extensive expertise and knowhow in this field has been called on in the design of the power supply section in the MISSION PCM. A massive transformer is used in the PCM to ensure ample current drive for the output analogue amplifier sections, as well as the other sections of the player. Four separate



Linearity: harmonic distortion versus level – for a PCM 16 bit system.

highly regulated DC supplies have been utilized to feed various sections of the unit; namely, the analogue circuitry, digital processing section, laser drive/servo system and finally the display. Optimised grounding techniques and appropriate supply decoupling ensures minimal interference and distortion.

### ELECTRONIC VOLUME CONTROL

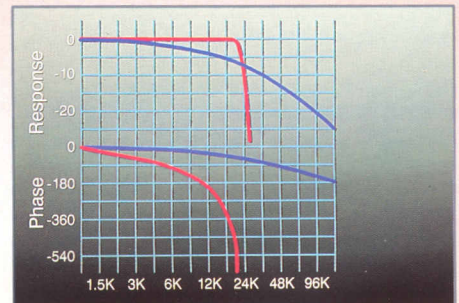
The PCM7000 incorporates a remote electronic volume control facility. Whereas such devices have traditionally suffered from dynamic distortion and other defects due to poor design, Mission's unique circuitry provides for extremely low distortion and is virtually transparent to the musical signal. This facility operates remote, from the handset, in steps of 1 dB, from 0 to -63 dB, with an accuracy of 0.01 dB. Accurate control of the volume setting from track to track, and from the listening position, can definitely enhance the enjoyment of music.

### DIGITAL OUTPUT

A standard format digital output is available on the MISSION PCM, which will allow direct recording, without degradation, on a digital tape. This will become invaluable once the digital tape medium is introduced on a wide basis for consumer use (subject to legal requirements).

### MECHANICAL ASPECTS

Compact disc players are sensitive to external vibrations, as conventional turntables are, but in a somewhat different manner. Whereas an analogue turntable can suffer directly from external vibration and manifest the problem in the form of acoustic feedback or distortion, a compact disc player can be affected in a totally different way, and in most cases the effect may not even be noticeable to the less discerning listener. Unless the vibration amplitude is serious enough to cause track jumping, most errors caused by less fierce disturbances can usually be corrected or at least softly muted. However, a well isolated mechanism will inevitably introduce less errors generated through vibrations and therefore, if and when transmission or reading errors occur, the whole capacity of the error detection/correction circuitry will be available to correct the error so generated, and hence improve the performance. The drive mechanism in the MISSION PCM is well isolated from the



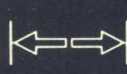
Phase and amplitude response of: Brick-wall filter (Red), digitally filtered followed by Bessel filter (Blue).



◀ TRACK ▶



INDEX



TIME



MINUTE

SECOND



TRACK



REPEAT



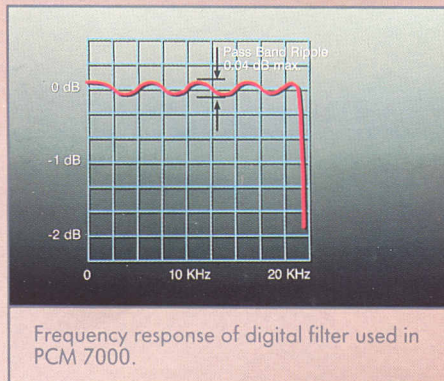
DISC

RECALL

STORE

chassis through optimisation of the suspension components and the servo loop characteristics, to minimise unwanted energies being imparted to the laser pickup head. The sub-chassis is injection moulded from reinforced engineering materials with superior stiffness and absorption characteristics to minimise resonance build-up in the pickup mechanism.

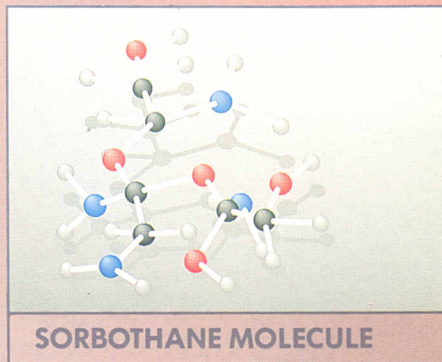
Naturally, only so much can be done internally to reduce the external vibration susceptibility of the player. We recommend the use of the Mission Isoplat



(Sorbothane supported isolating platform), for further isolation of the player and the ultimate performance of the MISSION PCM.

#### ERGONOMICS

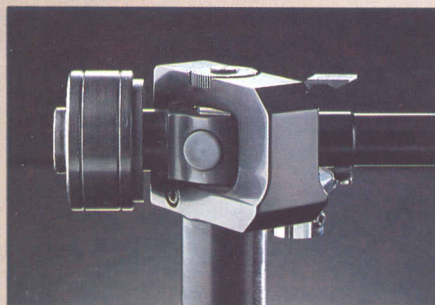
Last but by no means least is the ergonomics and user-friendliness of the MISSION PCM. The full function, fully interactive Fluorescent Tube Display, optimally slanted main-function keys, together with the elegant front panel design make the PCM a joy to use. The remote control PCM7000, gives the added pleasure of having a full-function remote control facility, including the unique high quality electronic volume control.



#### Features:

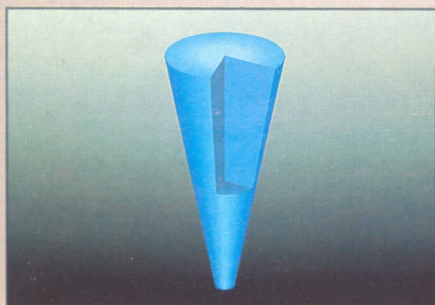
- 4x Oversampling, full 16 bit.
- Twin DACs, VLSI technology.
- Four separate DC power supplies.
- Full function interactive FTD.
- Random order 20 track/index programming.
- Single laser pickup system.
- Super fast track/index access time.
- Program review-add/correct facility.
- Three speed search-10 dB attenuation.
- Cueing to within 1 second.
- Electronically generated display of: Track/Index numbers; Elapsed/Remaining/Total time; Play, Pause, FFW and REW; Repeat, Store; Track/Disc errors etc.
- Motorised loading, anti-jamming protection.
- Output headphone jack.
- Standard format digital output.
- Two outputs-fixed and variable. (7000).
- 11 function IR remote control. (7000).
- Remote Electronic Volume control. (7000).
- Four regulated DC power supplies (7000)
- Special non-magnetic output connectors (7000)
- Pre-selected ultra high resolution DACs (7000).

# THE RECORD PLAYING



**CERAMIC TECHNOLOGY**

In precision engineering, ceramics have caused a major revolution. This material has many unique properties including high-rigidity and anti-resonance. Whereas, to our knowledge, all other tonearms on the market use high-carbon steel materials for their bearings; in the Mission Mechanic the bearing housing, as well as the ball-race are precision ground from high grade ceramic materials.



**CRYSTAL TECHNOLOGY**

The Linear Crystal Oxygen-Free Copper (LC-OFC) is superior to the standard tough pitch copper (TPC).

The copper dioxide ( $\text{Cu}_2\text{O}$ ) impurities of the TPC produce non-linearities in signal transmission. Copper dioxide forms semi-conductive boundaries at the crystal level in TPC, while oxygen-free copper, as used in Mission Cable, reduces this effect dramatically; the Mission Rose utilises LC-OFC winding for its moving coils.

While the compact disc points the way to the future of hi-fi, it will be some years before the analogue LP disc starts to disappear from the scene. The LP collection, like the photo album, is a source of personal memory and magic. This repository of decades of the world's great music will always be worth preserving, and a good replay system will maximise the pleasure it can give. With much attention focussing upon the new CD medium, the fact that the art of LP reproduction has advanced steadily over the past decade is often overlooked.

In essence a record playing system is not dissimilar to a loudspeaker. Whereas the loudspeaker converts electrical into mechanical energy, the record playing system converts mechanical into electrical energy, and both require similarly subtle arts of engineering compromise to achieve the most satisfying musical results. The complexities involved in the design of a good replay system are often overlooked by mass producers of so called hi-fi. The problem involved in converting the mechanical modulations of the groove into an electrical signal, is the enormously disproportionate size of the groove modulation as compared to the mechanical implements constituting the replay system. The stylus has to track the record modulations accurately under total mechanical equilibrium. This leaves no place for tolerance and imposes rigid constraints on the design and construction of the turntable, arm and cartridge.

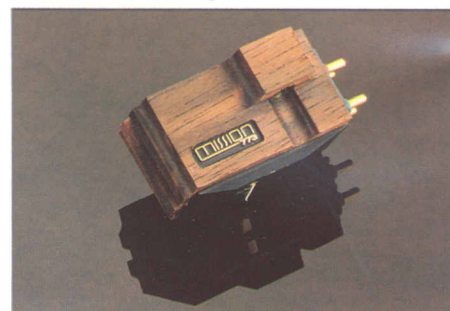
## THE TURNTABLE

The most important component in the analogue front end is the turntable, with the role of providing the arm and cartridge with a stable platform, isolated from all types of vibration and interference from within and without, while rotating the disc at a constant speed free from wow and flutter. Mission's patented and unique Sorbothane, together with the constraint-layer-damped plinth design gets round the first problem in a most elegant manner. The Sorbothane with its remarkable properties of energy absorption, decoupling and isolation is utilized as the support, while

the honeycomb MDF layered plinth construction helps isolate internal vibrations, preserving total rigidity at the same time. The belt-drive motor system using a precision Swiss-made motor provides for highly stable platter speed, free from wow and flutter, and the precision bearing assembly preserves lateral rigidity with minimal rumble noise. The result is the 775LC with unprecedented performance at an affordable price.

## THE TONEARM

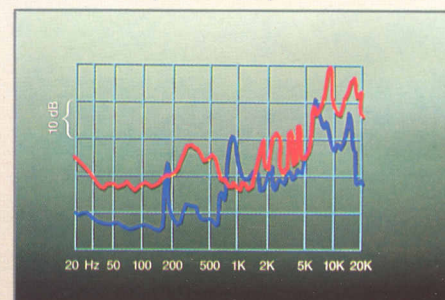
Almost a decade ago, when other



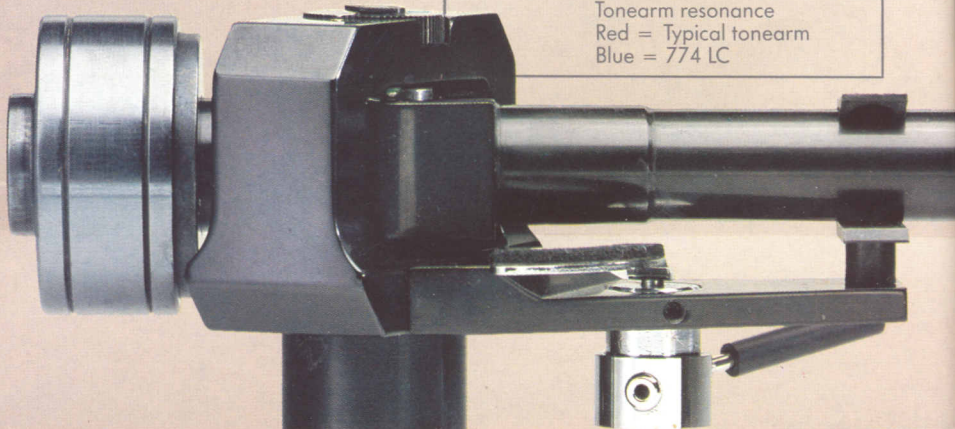
**THE ROSE.**

manufacturers were involved in unipivot and other decoupled bearing arrangements for tonearms, Mission designed the world's first direct-coupled low-mass tonearm with exceptional structural integrity – the classic 774. Today, following years of development and refinement the company offers two models.

The 774LC is a low cost, quality product designed on similar principles to the original Mission arm, and enjoys wide acceptance by the audiophile and other



Tonearm resonance  
Red = Typical tonearm  
Blue = 774 LC



# SYSTEM

manufacturers alike. This low-mass rigid structure design can be found on the turntables of many British and European manufacturers as a standard product – an important tribute to Mission's leadership in this area.

The Mechanic, on the other hand, is a product of engineering egotism. The main body, from counterweight mount through

musicality, and makes the ideal partner for the Mission 774LC. The Mission Rose, however, is an esoteric low-output moving-coil cartridge and is designed to complement the Mission Mechanic. The Mission Rose is built into a solid rosewood body precision machined using computer controlled equipment. Rosewood has been

specially selected for its inert and self-damping mechanical properties. Extravagant use is made of other specialised materials throughout, including ultra-fine Linear Crystal coil windings, annealed Boron tube cantilever and the finest quality MicroReach stylus with ridged profile.



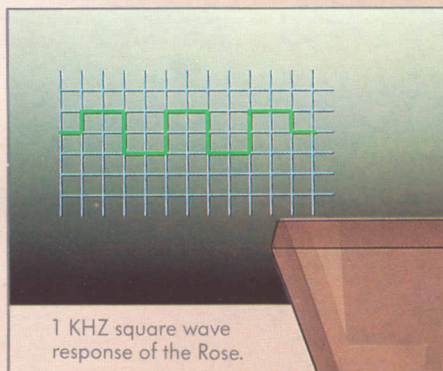
**THE SOLITAIRE.**

to the non-removeable headshell structure, is precision-milled out of a single billet of solid uniform aluminium alloy. Years of research and development have gone into complex geometric analysis, resulting in total dynamic equilibrium of the system under record playing conditions. Structural resonances and other aberrations are carefully minimised. The use of homogeneous materials has further resulted in careful mechanical termination of different sub-structures and control of the different modes of resonance. Aerospace grade Ceramic bearings are precision aligned during manufacture to offer consistent and long-term operation. This sophisticated bearing is the ultimate realization of the fundamental ideas seeded in the original 774 – that of combining utter rigidity with virtually zero friction in both the vertical and horizontal planes.

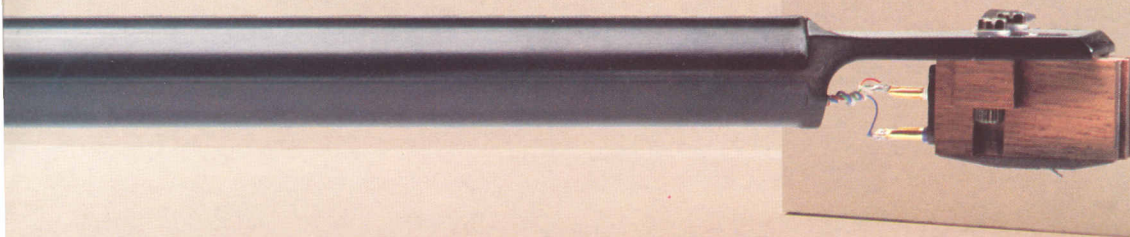
## THE CARTRIDGE

At Mission we have been in the forefront of cartridge design for many years. The 773HC, the world's finest high output moving-coil cartridge, received international acclaim for a design which combined the best characteristics of both moving-coil and moving-magnet cartridges.

The Solitaire is a low-cost moving-magnet cartridge with remarkable dynamics and



Mission, the company that in many ways led the analogue front-end revolution of the 1970s, now offers products such as the Mechanic and the Rose as their final statement in analogue music reproduction.





# LOUDSPEAKER DESIGN

Most people do not associate loudspeakers with complex technology. But in reality, of all the components in the audio reproduction chain the speaker proves the most difficult to design. The role of the loudspeaker is an intricate one, in that the transducer is required to transform electrical energy into mechanical energy. The complexities of this process, together with the subtle nature of music itself, have created countless controversies over the years and have resulted in many conflicting design philosophies. As a result listeners can discern marked differences between various models. Different designers emphasise different aspects of the speaker's characteristics. For example, some speakers offer high efficiency to the detriment of accuracy; others produce smoothness and low coloration but fail to generate adequate sound levels and musical dynamics; many impress on initial listening but in the long term produce fatigue and become irritating.

## SPEAKER TYPE

Once upon a time people bought speakers on the principle of "the bigger the better". The same people were equally impressed by a multitude of drive units, control knobs and other harmful gimmicks. But things have moved on and today most people know better. At Mission we pioneered elegant two-way designs and insisted that three- and four-way models were plagued with insurmountable problems. Today other manufacturers are increasingly copying the Mission philosophy. The compact, efficient, high power handling, full range, high performance Mission models are so advanced and have so many design secrets that they will not be outperformed by any competition for many years to come.

## DYNAMIC RANGE

– this we define as the differential decibels between the least audible musical information and the loudest attainable transients, while they are simultaneously present! Dynamic range is perhaps the single most important parameter of concern to our designers. Also, it is not a coincidence that the greatest difference between live and recorded music is in dynamic range differential. Nearly all hi-fi systems compress the dynamics of live music. Not so with Mission. High dynamic reproduction of music has become the company's signature. Indeed, this is recognised by reviewers and commentators throughout the world in their repeated references to Mission's ability to achieve exceptional realism. Linearity of the power response within the dynamic "window" is maybe even more important than the dynamic range itself. Mission systems preserve power response linearity throughout the wide dynamic range, allowing the reproduction of large transients while preserving quality at the lowest levels.

## COLORATION

– a term widely used to describe a multitude of distortions and other aberrations which occur in loudspeakers. A variety of complex "steady-state" and dynamic distortions lead to inaccurate and unrealistic reproduction of music. Subjective terms such as "boxiness", "chestiness", "nasality", "honkiness" etc. are generally used to describe such colorations. Coloration is often defined as "additive distortion" but at Mission we go further and contend that negative coloration can also exist. This occurs in the case of low dynamic systems with poor information retrieval capabilities. In such

cases the lost information cannot, obviously, suffer distortion! We call this "subtractive distortion".

The Mission design team is particularly strong in this department. In fact, the new generation of Mission speakers are so exceptional in terms of low distortion that they are approaching amplifier specifications! We believe that even the baby 70 has some 10 times less distortion than most other speakers. Mission enclosures are precision designed and visco-elastically damped to reduce unwanted acoustic output from the cabinet walls and eliminate internal standing waves. The driver membranes are made of special and rather unusual materials. They are light, but acoustically opaque and very rigid. Their mathematical profile and mechanical terminations are carefully optimised. Their chassis are mostly very rigid aluminium or magnesium die-casts. These drivers are inherently very smooth, have highly controlled break-up modes and minimal other resonances. Attention to detail extends to the analysis of accelerations involving drive unit displacements measured in microns! The drive units in your speakers are "Direct Coupled" to unusually substantial baffle boards of over 1" thickness which in turn are made of special materials such as MDF or polypropylene instead of conventional chipboard used by other manufacturers.

## FREQUENCY RESPONSE

– the characteristic amplitude response in the audio frequency band. Mission loudspeakers incorporate the company's exclusive and high technology drive units to ensure accurate and balanced reproduction of all forms of musical programme. Extensive anechoic

# SPECIFICATIONS

MODEL	THE 70	THE LEADING EDGE	THE 707	THE RENAISSANCE	THE FREEDOM	THE ARGONAUT
Recommended amplifiers	20-60 W/Ch	20-75 W/Ch	20-100 W/Ch	30-120 W/Ch	30-150 W/Ch	50-200 W/Ch
Frequency response	60 Hz-20 kHz ± 3 dB	55 Hz-20 kHz ± 3 dB	50 Hz-20 kHz ± 3 dB	40 Hz-20 kHz ± 3 dB	35 Hz-20 kHz ± 3 dB	30 Hz-20 kHz ± 3 dB
Sensitivity (ref 2.83 v, 1 m)	90 dB	90 dB	91 dB	88 dB	91 dB	95 dB
Nominal Impedance	6 ohms	6 ohms	8 ohms	8 ohms	8 ohms	4 ohms
High Frequency Unit	19 mm Polymer dome	19 mm Polymer dome	19 mm Polymer dome	19 mm Polymer dome	25 mm Polyamid Impedance Transformed Super Ellipse	25 mm Polyamid Impedance Transformed Super Ellipse
Low Frequency Unit	177 mm Plasti-flexed cone	177 mm Plasti-flexed cone	210 mm Reinforced Plastiflexed cone	215 mm Polypropylene cone	215 mm Mineral Composite Homopolymer cone	2 x 215 mm Mineral Composite Homopolymer cones
Terminals	4 mm plug/wire	4 mm plug/wire	5 way binding post	5 way binding post	5 way binding post	5 way binding post
Dimensions (W x D x H), mm	210 x 210 x 350	210 x 205 x 380	250 x 270 x 470	250 x 270 x 540	260 x 320 x 620	260 x 320 x 950
Weight (Kgs)	10	12	16	19	26	45
Crossover Frequency	3.4 kHz	3.5 kHz	2.7 kHz	2.5 kHz	1.9 kHz	1.7 kHz

## ISOPLAT

Dimensions (W x D x H), mm	430 x 325 x 40
Weight (Kgs)	2

## TURNTABLE

Type	Belt drive, Sub-chassis
Platter Mass	2.2 Kg
Speed Options	33/45 rpm
Wow & Flutter (DIN peak weighted)	0.1%
Absolute	0.1%
Rumble (DIN peak weighted)	-78 dB
Start-up time	1.5 sec
Dimensions (W x D x H), mm	420 x 330 x 125
Weight (Kgs)	5.5

research has resulted in careful optimisation of drive units and their interaction. The inherent qualities of the Mission drivers have further resulted in the use of elegant and "natural" roll-offs and crossover network designs - avoiding the pitfalls of complex filters with the resultant phase shifts, power impedance problems and loss of information. Essential to the accurate reproduction of music is the system's ability to retrieve maximum information from disc, tape or tuner. Please note, however, that such extraction of information must not be at the expense of frequency balance, otherwise prominence will be given to certain instruments to the detriment of other musical notes. Speakers with defective frequency balance may sound impressive for a short period but will prove unsatisfactory for serious reproduction of music.

#### TRANSIENT RESPONSE

- a system's ability to reproduce and control speed and attack of the music signal. Music consists of irregular transient impulses. The loudspeaker is called upon to respond instantaneously to sudden changes of electrical energy. The secret is one of dealing with the leading edge of the transient attack but perhaps even more important, of terminating the signal when the transient has stopped (no overhang). The latter proves the more complex of the two problems. Mission's use of high technology cone, suspension and voice coil materials has resulted in the dramatic reduction of moving mass. At the same time, powerful motor systems are employed to give both positive and negative accelerations to the moving air piston. Overall enclosure loading and reflex systems have been carefully optimised to assist in such

accelerations and recovery of the moving parts.

#### DISPERSION

- the ability of the system to reproduce sound accurately and smoothly off axis, both in horizontal and vertical planes. Stereo and high fidelity are so closely associated that the two terms now seem interchangeable - and with good reason. Unfortunately, the majority of hi-fi systems tend to produce a two-dimensional sound stage. Those which do not restrict the stage to a wall of sound may produce other aberrations such as imaging a tiny grand piano or an abnormally large flute. Again, the stage perspectives could be distorted and so on. The human perceptual mechanism finds it tiring to decipher the necessary information to reconstruct the original three-dimensional sound stage. It is, therefore, essential for hi-fi systems to recreate a solid three-dimensional sound stage with correct size and position of instruments in space, little drift, and accurate perspective. Mission loudspeakers will achieve such results, subject to correct positioning and the quality of the ancillary equipment.

#### IMPEDANCE

- the load characteristics of a loudspeaker as presented to the amplifier. Critical to the successful interface between loudspeakers and amplifier is the nature of the speakers' complex impedance. Here it is necessary to ensure that the speaker impedance will not drop below critical levels. At the same time, the phase shift angle throughout the frequency band must be minimised and kept at a realistic level. Speaker loads will otherwise prove too reactive for most amplifiers, resulting

in the latter going into premature clipping. The impedance curves of all Mission loudspeakers are smooth with small phase shift angles, and do not drop too low. All good quality amplifiers (including many inexpensive ones) are perfectly capable of driving Mission speakers. The exception is the 780 Argonaut; this is an extremely difficult model for amplifiers to drive and it is designed for use with Mission or other state-of-the-art amplifiers only.

#### SENSITIVITY

- the efficiency of the loudspeaker in converting electrical energy into acoustical output with minimal loss. Mission maximises this parameter in order to attain reproduction of wide dynamic range musical programme. The obvious benefit of efficiency is that a higher quality, lower powered (for the same cost!) amplifier can be used. But more important, our research categorically proves that it is impossible for low efficiency systems to reproduce high dynamic range material and cope with transient signals. Here the reason is that the loudspeaker is a mechanical device and beyond an optimum level of power, will set into "compression" and severe distortion. In other words, all else being equal, it is inaccurate to think that a low efficiency loudspeaker with large amplifiers can achieve the same results as a higher efficiency model with small amplifiers. All Mission models offer exceptionally high sensitivity, and the Argonaut is simply extraordinary in this area.

#### POWER HANDLING

- the ability of the loudspeaker to accept without distortion large electrical inputs associated with transient impulses, or to

operate at very high sound levels without thermal or mechanical fatigue or damage.

The scientific definition of the true power handling of a loudspeaker system is not a simple one. Manufacturers quote figures of maximum power handling under different definitions and mostly for commercial reasons. Very few of these figures are meaningful in determining a continuous amount of RMS power loudspeakers can sustain when playing music. As such we have dropped maximum power handling figures from our specifications and only refer to recommended amplifiers both in terms of minimum and maximum amplifier ratings permissible. This will merely indicate the range of amplifiers which can be used with each Mission model.

The real power handling of your loudspeaker depends on the model, but even more important is the quality of the ancillary equipment, especially the amplifier/turntable/arm and cartridge. In the case of poor "front ends" a great deal of unwanted low frequency energies will be delivered to the loudspeaker limiting its general performance, especially its power handling. As for the amplifier, a lot depends on its available spare headroom when amplifying sudden transients, its "clipping" characteristics and low frequency filter design. For example, a poor turntable/amplifier combination with a rating of only 30 W can damage the 770 Freedom if driven flat out, whilst we know for a fact that the Freedoms are capable of handling high dynamic digital master tape information with 400W amplifiers! All Mission loudspeakers use high temperature materials and cooling systems, and have truly exceptional power handling capabilities when used correctly.

TONEARMS	MECHANIC	774 LC	CARTRIDGES	SOLITAIRE	ROSE
Type	Direct coupled single billet construction	Direct coupled low mass	Type	Moving Magnet	Moving coil
Bearings	Ceramic	Alloy	Mass	5.7 g	7.9 g
Headshell offset angle	23° 45'	23° 45'	Stylus	Elipical/ aluminium cantilever	Micro Reach/ Boron tube
Effective length	225 mm	225 mm	Compliance	15 cu	10 cu
Pivot to spindle length	210 mm	210 mm	Output level (1 kHz, 5 cm/sec)	3 mV	0.26 mV
Overhang	18 mm	18 mm	Channel separation (1 kHz)	30 dB	30 dB
Effective Mass	16 g	12 g	Channel Balance (1 kHz)	0.3 dB	0.2 dB
Acceptable cartridge weight	4-14 g	3-10 g	Frequency response:		
Suggested cartridge compliance	5-20 cu	10-50 cu	30 Hz-20 kHz	± 2 dB	± 1 dB
Antiskating adjustment range	0-2.5 g	0-3 g	Stereo separation:		
Friction (vertical plane)	20 mg	25 mg	100 Hz	22 dB	28 dB
Friction (horizontal plane)	20 mg	25 mg	3 kHz	30 dB	40 dB
Mounting pillar diameter	25 mm	25 mm	10 kHz	25 dB	32 dB
Mounting cutout diameter	35 mm	35 mm	Tracking weight	1.8 g	2.5 g
Overall length	285 mm	288 mm	Recommended load	47 kOhm/100 pF	100 Ohm
Net weight (Kgs)	0.5	0.4	Recommended arm mass	5-16 g	10-15 g
<b>PCM</b>					
Frequency response	20 Hz-20 kHz		Channel balance	± 0.2 dB	
Signal-to-noise ratio (20 Hz-20 kHz)	96 dB		Channel separation	90 dB	
Output level ± 0 dB	2 V nom		Tracks access time	< 2 sec. mean	
Total Harmonic Distortion:			Error correction capability	900 µm	
At 0 dB	0.003%		Remote control (PCM 7000)	11 function	
At -10 dB	0.008%		Electronic volume control (PCM 7000)	0 to -63 dB (1 dB Steps)	
Intermodulation distortion			Dimensions (W x D x H), mm	430 x 300 x 85	
At 0 dB, 19 kHz/20 kHz	0.002%		Weight (Kgs)	5 Net	
At -10 dB, 19 kHz/20 kHz	0.003%				