



Royalty in the Making

Kingdom Royal by Tannoy: A statement in engineering excellence, hand crafted in the UK to exacting standards, setting a new reference for musical performance.

Foreword

By Dr Paul Mills, Director of Research & Engineering, Residential Products

"Royalty in the Making charts the entire development process of the Kingdom Royal reference loudspeaker design. From the history and current high fidelity music technology that lead to the decision to undertake the project, through concept and on to the reality, this document reveals Tannoy's most ambitious residential loudspeaker project in its illustrious 80-plus year history. The design brief was quite concise and specific on the goal: to create a new reference standard loudspeaker by which all others are compared. Over four years of dedicated research and development, the Kingdom Royal journey was one of both challenge and discovery, requiring new materials, new acoustic designs and bold new engineering techniques to achieve the goal. The finished product has surpassed even our expectations. Kingdom Royal is set to be another defining moment in Tannoy's history and I feel very proud to be part of Tannoy and immensely privileged to have headed up the Kingdom Royal project."

Summer 2010



Kingdom Royal is a new flagship loudspeaker representing the sum of Tannoy's rich heritage, cutting-edge technical innovation and world renowned acoustic engineering. A true no-compromise design, Kingdom Royal brings together a new series of Tannoy reference components, a radical new cabinet and the finest quality materials throughout.

From the high gloss wood veneer and Italian leather trim to the all-new 12 inch Dual Concentric driver with its cryogenically treated 3 inch HF dome and compression motor, every component represents the pinnacle of materials technology and the summit of Tannoy's technical excellence. The result is unsurpassed acoustic performance, ultra-low colouration, high efficiency and musical integrity unmatched by any other loudspeaker on the market today.

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Introduction

For over eight decades Tannoy has been producing class leading loudspeakers. In homes, in professional recording studios, in concert halls and stadiums across the world, Tannoy is the brand of choice when sound quality is critical. The brand name itself has its own entry in the Oxford English Dictionary and is synonymous with public address systems on every continent.

Over its illustrious history Tannoy has strived to offer reference level products in every loudspeaker category, with many models hailed by reviewers and pro-audio installers alike as defining the state of the art at the time. While many makers may boast that they make reference loudspeakers, few have Tannoy's rich heritage and trophy cabinet full of awards to back up such a claim.

Today the brand continues to lead the way in loudspeaker design and continues to produce true reference level loudspeakers across the many categories. In the professional sound installation market the VQ and VQNet horn-loaded compression-driver loudspeakers have redefined loudspeaker choices in the high energy club to small arena market. These ultra-compact cabinets are a fraction of the size of a traditional line-array yet offer astounding efficiency up to 114dB/Watt, class leading maximum Sound Pressure Levels, and pin-point musical accuracy and articulation. In the commercial sector, Tannoy's Q-Flex beam-steering array loudspeakers are capable of accurately placing spoken announcements with laser precision over large distances and allow a much lower SPL in the near field. The technology has revolutionised loudspeaker systems in shopping centres and large public buildings and has become the speaker of choice for new-build luxury shopping mall projects and airports worldwide.

For audiophiles and music-lovers the world over, Tannoy's residential loudspeakers have a following second to none. The design ethos has remained unchanged since Tannoy was founded, to produce loudspeakers that communicate the full emotion of the music with articulation, accuracy and coherence irrespective of the genre of music. Tannoy's famous Dual Concentric driver technology has become highly regarded the world over for its power, timing and point-source accuracy. The result is a legacy of products that have lead the field of loudspeaker design for eight decades, from entry level stand-mount mini-monitors right up to the enormous Westminster Royal at the top of Tannoy's retro-traditional looking Prestige range.

In today's world of 24-bit/192kHz digital recordings, media-less music downloads and hightech amplification, Tannoy needed a statement new product. A loudspeaker that would embody the new age of high definition audio yet be equally at grace with old analogue recording – and articulate the heart and soul of music like no speaker design has done before.

It would have to be a loudspeaker design capable of resolving detail like no other, with power and passion of delivery that encapsulates the magic of live music with breathtaking precision. A design of contemporary high-end elegance yet offering styling cues unique to Tannoy's Prestige range. A true no compromise design, enjoying cost-no-object development and a four-year R&D program in order to create Tannoy's most accurate, passionate and musically rewarding loudspeaker to date.

In the Summer of 2006, at Tannoy's Coatbridge UK Head Office, the Kingdom Royal project was born.



Design Concept

After eight decades in the loudspeaker business Tannoy is no stranger to the high-end residential loudspeaker market. Through a range of flagship products over the decades, one of the pivotal designs in recent history was the original Tannoy Kingdom. Launched to much acclaim in 1997, the design was aimed at maximising the high resolution of the then new SACD and DVD-A music formats. The Kingdom married a new 12 inch Dual Concentric driver with a Supertweeter for the first time in order to reproduce the ultra high frequencies of these new formats. An 18in bass unit ensured low frequency reproduction maintained 92db/Watt efficiency down to the lowest frequencies.

The outrageous magnet assembly on just one kingdom DC driver weighed more than most complete floorstanding loudspeakers of the day and offered tremendous power and grace with a wide gamut of music. It won many admirers from professional Rock Musicians to classical music fans alike. Its ability to get to the real heart of the music – any music – gave it wide ranging appeal. Cosmetically however the original Kingdom fitted firmly in Tannoy's traditional and bespoke-looking Prestige range. The Cherry veneer cabinet, time-honoured joinery, understated deep brown grille cloths and darkly veneered baffle exuded an air of traditional affluence and English country mansions. Being large and imposing, it was not necessarily a design to suit all tastes. That did not stop the model being highly successful and claiming many global press accolades for its performance.

If Tannoy was to make a new flagship loudspeaker whose acoustic performance would be a reference by which all other would be measured, Kingdom was a very good starting point. The new project nomenclature followed Tannoy's long standing tradition giving subsequent evolutions of a successful product a suffix of Royal. The project was duly named Kingdom Royal.

While class-leading performance irrespective of price was the primary project requirement, Kingdom Royal's aesthetic design had to have a broad based appeal. If the design leant too heavily on the Prestige cosmetic there was risk of alienating buyers looking for a more modern and contemporary loudspeaker. Conversely, if Kingdom Royal followed the sleek architectural curves and stark minimalism of the Definition range, some of Tannoy loyal admirers may find the look a little too modern. The industrial design team were given the brief to design a product that upholds Tannoy's traditional heritage and brand values yet would equally appeal to a contemporary customer. They would also have to consider the driver arrangement (loosely based on Kingdom at this time), cabinet volumes and acoustic structural considerations; a tall order indeed.

Drawing on diverse inspiration from both Tannoy's past products and the latest trends in industrial design, the first draft portfolio of sketches resembled nothing like Tannoy had produced before. Curvaceous, organic and yet bold and imposing. Each concept used generous curves, rich materials, contrasting textures and luxury finishes. The design team wanted to create a product that lived up to the 'Kingdom Royal' name by giving it a formidable presence and stance, combined with deep, dark finishes to make for a wholly impressionable design. Several concepts were chosen for further development by the project team and Tannoy's board of directors.

It was vital the design had appeal in all markets so the concept drawings were shown to a global customer group based on key people from Tannoy's distributors across Europe, Asia, Middle East, Russia and the Americas. Their opinions were collated and evaluated before the design team set about drawing up the first drafts of what was to become Kingdom Royal.

Making it real

Once the final designs had been agreed upon and vital acoustic parameters checked, the mechanical design and engineering team began working on turning the concept drawings into reality. The first stage was small scale modelling which often reveals shortcoming or impracticalities in the design that need to be addressed early on. The concept was fine tuned before moving to the next stage.

Detailed larger scale models were created from hand-machined MDF, known as 'whitewood' models. These are created to determine accurate positioning of drivers in relation to one another, where best the stressed members for internal bracing can be placed and even small detail like routing of internal wiring and how components can be connected by the craftsmen on Tannoy's hand-built production line. One major hurdle became apparent in the positioning of the proposed rear-facing bass driver. Orienting a very low frequency bass driver in this way offers considerable room gain advantages and, at the sub-bass frequencies the Kingdom Royal's bass driver works at, the output does not suffer from directional sound problems of say, a rear-facing mid bass driver. However, mounting the massive 15in driver rearwards would dramatically increase the cabinet size and volume as the design would require a rear baffle larger than the front.

The decision was made to keep an all forward facing driver arrangement and significantly upgrade the motor assembly of the bass driver to regain the reduced low frequency gain. With overall speaker efficiency targeting 94db/Watt (final production achieves 96dB/watt) the LF output needed to be prodigious and this made selection of the most accurate and yet most potent 15in Driver absolutely critical to achieve flat output down to nearly 20Hz.

The engineering team also used the large scale white wood models to consider how Kingdom Royal could be constructed in a manufacturing environment. This was a critical aspect as the next stage of R&D, acoustic engineering and testing, would be rendered pointless if the cabinet was unachievable in mass production. A solution was created that involves a removable panel on the underside of each speaker. While the entire speaker would need to be turned over during assembly, this provided the easiest access to mount the exceptionally heavy bass driver.

Once the team had solved the engineering and production processes, material selection of panels was conducted in conjunction with the acoustic engineers to provide the optimum sound quality. As this is an area in which Tannoy has many decades of expertise it did not take long to find an ideal cabinet construction, even though it would dramatically increase production costs.

Premium grade birch plywood was defined as the material of choice for the side panels and front baffle allowing the bulk of the cabinet to be as stiff and dense as possible without compromising on the shape of the cabinet. Tannoy has tested ply woods from around the world and constructed of many different timbers. For the Kingdom Royal the acoustic engineers selected the best birch-wood ply laminate, the raw timber grown in cooler regions. The result is a slower growing tree offering much denser birch timber and greatly improved cabinet sound quality.

The top panel of the cabinet and the plinth are constructed from MDF sheets bonded together in a horizontal laminate. These are then machined to allow the complex curves to be formed on both the internal enclosure and the outside of the cabinet. Finally an outer plywood 'wrap' is bonded onto the cabinet shell to further strengthen the curved cabinet side walls.



With the external dimensions and materials of the product now confirmed, a simple wood version of the cabinet was constructed to allow acoustic development.

Drivers

From the original concept stage Kingdom Royal was to follow the Kingdom as a true fourway design. Clearly this flagship product would have Tannoy's signature Dual Concentric driver at its heart, but it could not simply be the latest evolution of the concept as found in Tannoy's 12 inch DC driver Prestige models. Kingdom Royal demanded the very best DC driver that modern materials and current engineering technology could produce irrespective of cost. As the Dual Concentric time-aligned point source concept had been extensively evolved over decades, the challenge was to better the best.

Some two years in development the new Kingdom Royal 12 inch Dual Concentric driver emerged as the most extreme and advanced coaxial HF/LF driver Tannoy has ever developed. With a new chassis and 10-point fixing, the outer bass/mid driver section mates a revolutionary ultra-light multi-fibre cone and copper clad aluminium edge-wound voice coil to a massive ferrite motor system for breathtaking transient response. Its hard-edge roll surround has extremely low memory effect which further improves articulation in the mid and upper bass. The crossover to the DC's high frequency unit occurs at an exceptionally low 700Hz to ensure the majority of the vocal region is handled by the new tweeter.

This HF drive unit is one of Tannoy's most radical driver designs to date. It couples a 3 inch heat-tempered aluminium alloy dome and waveguide with a 1.5kg ferrite motor to create a true horn-loaded compression driver. Many months of R&D were spent perfecting the dome, Tannoy's engineers testing and auditioning many different alloys and heat treatment configurations before selecting the Kingdom Royal tweeter. The production domes are individually tested and, along with the mated copper-clad aluminium voice coil, are fully deep cryogenically treated. This innovative process, involving freezing to minus 190 degrees Centigrade and slowly thawing over a controlled period, relieves residual stresses in the microstructure of the dome and reduces crystal boundary imperfections in the voice coil. Extensive auditioning showed this extreme process to offer greater naturalness and emotional communication of the music.

With new audio formats capable of recording high frequency harmonics well beyond the accepted range of human hearing, a SuperTweeter was a vital component in the Kingdom Royal design. The goal was to extend the effective frequency response to over 50kHz in order to correct time and phase response within the normal bandwidth and further improve imaging and realism. Considering even some bass notes have leading edge transients that reach 30kHz, it was vital that the Kingdom Royal would resolve these details.

After many hours of auditioning, a magnesium alloy SuperTweeter dome was chosen for its coherence and near flat extension out to 61kHz. Each dome is vapour coated with a thin ceramic layer, producing a dome with high internal damping and low colouration, before being meticulously plasma treated by hand and bonded to the voice coil. The plasma process increases the surface energy of the domes, allowing for better bonding, and thus energy transfer from the coil. Combined with a Neodymium motor and rear damping cavity, the new SuperTweeter offers outstanding linearity and accuracy, alongside higher sensitivity and wider bandwidth than the previous generation titanium SuperTweeters.

To match the sublime top-end performance, a sub-bass system of considerable power and dexterity was required. Having already discounted a lower specification rear-facing bass driver, a 15 inch multi-fibre bass driver with massive ferrite motor system and underhung



voice coil was chosen for its accuracy and articulation down into the sub-bass region. In an underhung configuration the magnet assembly is extended to ensure the voice-coil remains completely within the flux of the magnet over its entire range of motion. The result is constant electromotive force on the voice coil, significantly lower distortion than traditional driver designs and improved motor cooling.

With the driver specification agreed, the engineering team turned their attention to the crossover.

Crossover

With such a complex array of new drivers and different driver technologies developed for Kingdom Royal, a completely new crossover network would have to be developed. Not only would this circuit have to be capable of seamlessly filtering and distributing the incoming signal to the four drive units, the design brief necessitated extremely high current capacity and class leading acoustic performance. From the outset it was decided that no printed circuit boards would be used and each crossover would be meticulously hand built using the finest components and connecting cables.

Following the mathematical circuit design, the acoustic development team set about selecting the very best available components for each section of the crossover. Many brands and types of component were individually auditioned and their parameters accurately measured under real world signal conditions and high current loads. By ordering premium specification components from suppliers in many different countries the team was able to select not only the best individual devices but also identify combinations of these components that offered the best performance synergies.

The final specification Kingdom Royal crossover uses the very latest ICW ClarityCap[™] MR capacitors extensively. The result of ICW's own ground breaking two-year research program, these devices use a high-specification metallised polypropylene film encapsulated in an epoxy resin offering excellent self damping characteristics. The negative effects of resonance inherent in wound components are substantially reduced, resulting in class-leading performance both measured and auditioned. The capacitors are further enhanced by Tannoy's proprietary DMT[™] (Differential Material Technology) damping compound.

Like many of Tannoy's premium loudspeaker designs, low loss laminated core inductors and thick film resistors are used throughout the crossover. These were chose for both their ability to resolve micro dynamic detailing and, with each non-inductive resistor mounted on a heat sink for thermal stability. This ensures that the Kingdom Royal's performance is exceptionally consistent from the first recording played to the very end of a high volume listening session.

Impedance matching the new Dual Concentric High Frequency unit became a project in its own right. Many iterations of traditional resistive circuits were auditioned for this role but none offered the extreme level of performance the acoustic team demanded. Eventually the team turned to autotransformer technology, creating a bespoke single-winding transformer with an exceptionally flat frequency response and very high power handling. The circuit allowed the new HF unit to realise its full potential, as a result of the enhanced amplifier damping afforded, giving it an incredibly open and natural sound.

The sheer size of the components chosen meant the Kingdom Royal crossover is the largest Tannoy has ever built. There was simply not room on a single supporting board, despite the very large cabinet volume, so an innovative double-deck crossover was devised. Two



heavyweight acoustically inert boards are used to support the full component array, placed one on top of the other and separated by non magnetic stainless steel fixings. The entire assembly is mounted on custom-built rubber suspension turrets to isolate the crossover from cabinet vibrations. Both the upper and lower boards are fully hard wired using PCOCC six nines copper (99.9999% pure) with each connection hand bonded with silver loaded solder. After extensive testing 99.997% purity single strand silver cable was chosen for the SuperTweeter circuit for its exceptional top end transparency. Tannoy's DMT[™] compound is used to bed-in components, further improving damping and resulting in greater naturalness and pin-point imaging.

Tannoy's experience with deep cryogenic treatment of materials had already been shown to enhance performance, so engineers looked at innovative ways DCT technology could be used to further improve the Kingdom Royal crossover.

DCT Treatment

Deep Cryogenic Treatment (or DCT) is an established science involving the use of extremely low temperatures to modify the molecular structure of materials. Modern DCT processing cools the component down very slowly, holding it at cryogenic temperatures (cooler than - 190 degrees C) for an extended period, before slowly warming it to room temperature over several days. In this way changes to the material structure of materials remain permanent.

While several audio cable manufacturers are using superior DCT treated conductors in their high-end interconnects, the process can benefit other materials too. As a result of the production process, be it drawing wire, casting or cooling of thermoplastics from a molten state, stresses and dislocations occur in any materials' crystal structure. Cryogenic treatment will relieve a lot of these stresses and dislocations across a wide range of materials used in audio components but it is not simple to implement. For example, in a traditional crossover circuit board, many of the benefits of using DCT treated cable would be lost through the soldering process.

For Kingdom Royal, Tannoy engineers wanted to apply the benefits of DCT technology to every component in the crossover. Rather than focus on individual components or cables, they wanted to treat the whole crossover assembly as a complete unit. Other than fixing the assembly into the speaker, no further operations would be carried out after treatment. This would ensure that the material structure of all the cables used, inductors, resistors, capacitors and even the drive unit terminals were set to benefit. The effect was hoped to significantly improve the acoustic properties of the solder joints in particular, as new lead free solders which must be used for environmental reasons are renowned for their very poor crystal structure.

Even locating a company in the UK that could undertake DCT treatment on such a large component was a challenge, but initial results were very encouraging. In A-B comparison back at the design studio, the DCT processed crossovers sounded more natural and had greater resolution of both fine detail and tonality. There was more air and space around individual instruments and a complete absence of grain. It was decided that each Kingdom Royal crossover would be DCT treated as a whole prior to final assembly in the cabinet.

The decision created a new project stream for the engineering team as Tannoy needed to ensure the treatment did not affect the long term reliability of any component. Extensive testing and accelerated aging was carried out on all the materials and components used in the crossovers. While the majority of components remained very stable over time, it was discovered that the adhesives generally used to secure components become brittle when subject to DCT treatment. A special mastic bonding compound that is unaffected by the



treatment was sourced as a replacement material and is used throughout the crossover construction.

For Kingdom Royal production, the DCT work is entrusted to a leading cryogenic processing house in the UK, using proprietary techniques, and with much experience in the audio industry. While Deep Cryogenic Treatment is a very expensive process for such a large assembly, the resulting benefit in terms of musical cohesion and smoothness made it an essential part of the Kingdom Royal's sound.

Prototypes

Turning white wood cabinet models, drivers and crossovers into a prototype loudspeaker was the next process in the chain. Prototype development is a key stage to ensure that that the manufactured final version of Kingdom Royal lives up to both the designer's cosmetic aspirations and the precise sound performance established by the acoustic team. This is a costly and time consuming stage as tooling and manufacturing methods have to be established.

Kingdom Royal cabinet construction was especially difficult as the design involves a number of complex shapes, mixed materials and different textures and styles of finish. Curved sides panels along with an intricate plinth assembly and tweeter housing demanding precision milling, meant that this flagship loudspeaker could not be built like a standard cabinet. Aspects such as strength, joint position, bracing, humidity resistance and final finishing processes all had to be taken into account. The final solution required new manufacturing methods to be introduced and a considerable amount of trial and error to ensure the high standard of finishing could be achieved once the cabinet was in production.

Like the finished loudspeaker, the prototype cabinets were constructed in a raw wood state. The panels of high-density fibreboard are machined to shape with all brace points grooved into the timber for additional strength. The base plinth and tweeter housing are formed by bonding pre-machined layers of the same high-density fibreboard into a laminate construction with a precision milled cavity. Inner bracing and several key joints also benefit from Tannoy's Differential Materials Technology (DMT[™]) that enhances the self damping characteristics of the cabinet construction. Once the main cabinet panels are mechanically fixed and adhesion bonded together, the horizontally laminated outer birch ply sections are glued into place. This engineering technique has afforded a very stiff enclosure with high internal volume that allows the deepest bass notes to expand naturally into the room.

To remove as many production manufacturing problems as possible, each finish (e.g. paint, leather and veneer) was sampled on smaller panels to get an idea of what could be achieved. The veneering process had to be of impeccable quality with seamless folds around the contours of the ply-wood wrap panel. Several grades and thicknesses of veneer were sampled to achieve the very best finish before being hard-lacquered in a multi-stage process to give a hear wearing mirror smooth high gloss finish. Getting a smooth satin finish on the cabinet paintwork was a relatively straightforward process in comparison.

With the position of the SuperTweeter housing set back from the plane of the front panel to aid time alignment, the dispersion characteristics of front edge of the main cabinet had to be taken into consideration. Through a process of measurement and auditioning, the acoustic team concluded that a soft padded dispersion panel offered the best performance. After trialling a number of synthetic and natural materials, soft Italian leather was selected as the acoustic dispersion panel of choice.



Having ascertained a manufacturing process stream for Kingdom Royal from the extensive prototype stage, several samples were created to ensure the system would run smoothly in production. With high gloss finishes and painted surfaces the likelihood of damage in assembly is very high, particularly as a fully built Kingdom Royal loudspeaker weighs 120kg. A number of special jigs were required to handle the speaker carefully, including one that flips the cabinet on its front to fit the massive bass driver.

Even once the manufacturing process was finalised, a new packaging system had to be designed to ensure this luxury loudspeaker arrives at the customer in pristine condition.

Detailing

In a flagship loudspeaker the small details are as important as the key components. Tannoy has left no aspect of the Kingdom Royal unchallenged. After again consulting with key customers from the many regions of the world in which the Kingdom Royal will sell, the design team set about completing the Kingdom Royal look. There were many different suggestions as to finish and trim specification but several factors emerged as important on a global basis.

One of these requirements was that absolutely no fixings can be seen externally. Even with the grille removed there should be no driver mounting blots visible, the grille should have concealed magnetic catches and the trim and control panels should be smoothly bonded to the main structure. With very few parts secured from the external surfaces, engineering became a challenge. New solutions had to be devised so that the fixings are hidden inside the cabinet, which caused difficultly both for the design itself, and when addressing assembly issues.

The detail of every part was considered at this stage to ensure that they would all fit perfectly into the final product. Some parts required changes to be made from the original concept for manufacturing purposes; however the engineers took great care to ensure that these changes did not impair the aesthetic or acoustic performance of the product. From the 3D models created, technical drawings were created to allow the many outsourced manufacturers to understand the exact requirements of each individual part.

Another area of passionate concern among international customers was the grille itself and a satisfying 'reveal' of the front baffle when it was removed. Fixing the grille is achieved by the use of sub surface magnets embedded into the baffle plate from the inside and corresponding magnets machined into the grille woodwork. As the grille structure fits seamlessly into the front surround for a smooth finish, a small handle is added to the grille structure to aid removal.

The grille itself was a fiercely debated area for Tannoy engineers. While thousands of grille cloth samples could be obtained, the chosen material had to perfectly complement the Kingdom Royal aesthetic and be 100% acoustically transparent. There was no room for compromise on either requirement. The chosen cloth has a heavier open net weave for strength and lightweight mesh-weave backing that is entirely transparent through the audio region. Using slightly different colour threads for each weave a warm russet colour was achieved that harmonises perfectly with the rich veneer on the timber frame of the grille.

The leather dispersion panel in front of the SuperTweeter proved to be another challenge. Being a natural material that is subsequently dyed there can be a significant variance in the texture and shade of the sheets of leather from different batches. Sourcing a supplier who could guarantee tight tolerances on cosmetic consistency of the leather took several months,



with the agreement that no two samples of natural leather could ever be truly guaranteed to be identical. This required another link in the manufacturing process whereby the leather swatches are hand picked to ensure that each pair of Kingdom Royal loudspeakers is perfectly matched.

The selection of gold coloured trim fixings was derived from demand from the Far East and Japanese market where Tannoy's traditional cabinetry models are very popular among affluent audiophiles. Several different shades of gold trim were sampled on the finished Kingdom Royal loudspeaker to ensure harmony across the whole aesthetic.

Kingdom Royal launches in this single cosmetic scheme, with different colour veneers, paint and trim versions planned in the future.

Usability

One of the most difficult aspects of loudspeaker design is in making a product that sounds as good in every purchaser's home as it does in the design studio. It is a difficult proposition because every Kingdom Royal customer will use their speakers in rooms with different dimensions and acoustic characteristics, with differing partnering equipment and even have different preferences on the perfect balance of sound. To this end, Tannoy's engineers went to great lengths in making the Kingdom Royal as flexible as possible with features that enhance usability in any installed situation.

Key to the Kingdom Royal's flexibility is its high sensitivity. While Tannoy recommends high quality high power amplification, the Kingdom Royal's sensitivity is a market leading 96dB/Watt. This makes it compatible with any type of amplification from single-ended triode vacuum tube based designs to high power transistor based devices. Moreover, the speaker's impedance characteristics represent a relatively easy load across the frequency spectrum, again affording compatibility with the widest range of amplification.

A feature developed from Tannoy's flagship Prestige range loudspeaker, the Westminster Royal, is user controllable high frequency output. The energy of both the Kingdom Royal's Dual Concentric high frequency unit and the SuperTweeter can be adjusted according to taste and the balance of partnering electronic equipment. Via a baffle-mounted control panel using chunky gold plated pins for minimum signal degradation, the HF output of each unit can be adjusted in 1.5dB steps to plus/minus 3dB. The adjustment range for the DC driver is 700Hz to 17kHz while the SuperTweeter is controlled from 17kHz upwards. The Kingdom Royal has been designed to achieve the most neutral balance with the pins in the central 0dB position for the purest performance.

Room placement has a major impact on the performance and balance of all loudspeakers. This is particularly pertinent in models, like the Kingdom Royal, that use a rear firing port tuned to low frequency output. The Kingdom Royal port is tuned to 15Hz, meaning the boundary gain through the sub bass region will be particularly affected by distance from the rear wall and room corners. Trialling different room placement positions is the best way to elicit the flattest response from the loudspeaker, but when the speaker weighs 120kg this poses an acute physical problem.

To address this issue and allow for the most flexible room placement, each Kingdom Royal has easy glide castors built into the base plinth. Once in an approximate room position based on guidelines in the user manual the speaker can be moved around easily to assess the relative merits of different placement. In absolute performance terms, castors are a compromise to the vital speaker-floor coupling, so engineers at Tannoy came up with an



innovative dual mounting system. When the correct speaker position has been ascertained the cabinet is tilted and large aluminium floor cups are placed beneath the cones fitted to the Kingdom Royal's three structural mounting points. Together the cone and cups are taller than the castors, raising them off of the ground, and securely stabilising the speaker to realise the full dynamic potential and best resolution of detail.

Connectivity is another key area of the Kingdom Royal's flexibility. Using two pairs of the market-leading gold-plated WBT binding posts affords easy connection to a wide range of cables and end terminations to the end user's preference. Tannoy's unique fifth grounding terminal is also included, connecting internally to the chassis of the main drivers. When this terminal is connected to the ground plane on partnering equipment it dramatically reduces circulating RF interference in the audio system, leading to further improved micro-detailing and a more communicative sound.

The Kingdom Royal has achieved the brief of best performing high end loudspeaker yet retains exceptional flexibility and ease of use.

The Result

Kingdom Royal is a triumphant expression of Tannoy itself. The brand, the rich heritage, the engineering excellence, the acoustic expertise and the values that have kept the name Tannoy at the forefront of loudspeaker design for over eight decades. Four years of research and development, mating new materials, technologies and processes with traditional acoustic tenets and extensive auditioning, have resulted in Tannoy's most dynamic, articulate and musically revealing speaker in its prestigious history.

Kingdom Royal pushes forward the boundaries of no-compromise loudspeaker design. The impressive specification sheet and class-leading measured performance are set to redefine the parameters of the high-end loudspeaker market, and the figures only tell part of the story. Kingdom Royal is about delivering music with passion and integrity. With a sense of scale and articulation that underpins live performances. With the power to drive rock music to concert levels in the largest room and with the subtlety to reveal the timbre and micro detailing of strings in the quietest classical passages.

From the significant output down to 15Hz through to the upper reaches of the 61kHz SuperTweeter, Kingdom Royal reproduces music with ultra-low colouration across the spectrum. The result is a natural and expansive sound that allows the character of each instrument to shine through like no other loudspeaker design. From the rich, woody quality of a Stradivarius violin to the startling leading edge attack and deep-bass impact of Timpani drums. From the distinctive signature of a Steinway piano to the vibrant warmth and bass punch of a Fender bass guitar. From the silken upper reaches of mezzo-soprano vocal to the gruff growls and screaming guitars of a heavy rock anthem. Kingdom Royal delivers music with precision and passion for a lifetime of listening pleasure.

Designed without compromise, engineered to exacting standards and finished the highest level, Kingdom Royal has achieved and exceeded its design brief: To set a new reference standard by which all other loudspeakers will be compared.



Specification

Frequency response: 24Hz – 61kHz (-6dB) Sensitivity: 96dB (2.38V @ 1m) Nominal impedance: 8 ohms Power handling: 300 Watts RMS, 1200 Watts peak Dimensions: 1275 x 585 x 600mm (50.2 x 23.0 x 23.6") Weight: 120Kg (256lbs)

Dual Concentric[™] LF

- 12 inch driver with high rigidity cast chassis, 10 point fixing to cabinet
- Copper clad aluminium edge wound voice coil and massive ferrite motor system
- New multi-fibre paper cone design, Tannoy's most rigid to date
- New hard edge roll surround, for low memory effect
- Crossover to Dual HF section at very low 700Hz to retain vocal purity

Dual Concentric[™] HF

- 3 inch heat treated aluminium alloy dome with Mylar surround
- Copper clad aluminium voice coil
- 1.5Kg high linearity ferrite motor system
- Dome/ coil assembly are cryogenically treated to further relieve residual crystal stresses
- Crossover to SuperTweeter at 17kHz

SuperTweeter™

- 1 inch magnesium alloy dome with exceptional linearity
- Ceramic coated dome for ultra-low colouration
- · Plasma treated assembly to ensure excellent energy transfer and high consistency
- · Neodymium motor system with bespoke rear damping cavity
- -6dB point of 61kHz

Bass Driver

- 15 inch paper multi-fibre paper cone with high rigidity cast chassis
- UV stabilised foam surround for low resonant frequency
- Massive ferrite motor system for large excursion and high linearity
- Rear ported, tuned to 15Hz for significant sub-bass response
- Crossover to Dual at 120Hz

Crossover

- · Massive double-deck crossover with independent suspension
- Latest ICW ClarityCap™ polypropylene capacitors, low loss laminated core indictors
- Non inductive heat sink mounted thick film resistors for excellent stability
- PCOCC 6 9's (99.9999% purity) copper wiring, hard-wired using silver loaded solder
- High 99.997% purity single strand silver wiring for the SuperTweeter
- · Dual Concentric tweeter impedance matched by autotransformer
- Entire completed crossover cryogenically treated, to reduce internal material stresses

Cabinet

- Differential Material (DMT[™]) acoustic cabinet combining high density board and birch ply
- · Birch sourced from cooler slowing growing regions for superior density
- Ultra-rigid Dual Concentric enclosure with curved panels and extensive bracing
- Precision milled and isolated SuperTweeter enclosure with damping material
- High gloss wood veneer and paint finish with Italian leather SuperTweeter dispersion panel

Function

- Adjustments for tweeter and SuperTweeter energy, using new low loss switching panel
- · WBT gold plated input terminals, considered the most acoustically transparent available
- Provision of earth terminal, to reduce effects of radio frequency interference
- Smooth action castors fitted for ease of movement, cup and cone stability and isolation system
- Single wire bridging cables in high purity copper (99.9999% pure) supplied
- Spare SuperTweeter grilles and spare HF control pins supplied



"This is a truly sumptuous, no-compromise loudspeaker that delivers music like no other speaker I have heard in my 20 years of reviewing high fidelity equipment. Exciting, accurate, detailed and incredibly involving, Tannoy's Kingdom Royal has become my reference loudspeaker of choice."

Richard Stevenson UK-based audio reviewer (Hi-Fi News, Home Cinema Choice)



serious technology at play

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Tannoy adopts a policy of continuous improvement and product specification is subject to change.

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