NATIONAL COLLEGE OF ART AND DESIGN

Faculty of Design

Department of Industrial Design

# SOLID BODY ELECTRIC GUITAR DESIGN FROM THE 1950s TO THE PRESENT

by

MARK McCAGUE

Submitted to the Faculty of History of Art and Design and Complementary Studies in Candidacy for the Degree of

**BACHELOR OF DESIGN**

**1992**

# TABLE OF CONTENTS

## LIST OF ILLUSTRATIONS

## LIST OF ILLUSTRATIONS

## INTRODUCTION

The modern solid body electric guitar was developed from amplified acoustic instruments in the early 1930s. The worlds first commercially produced solid body electric guitar arrived in 1948, in the shape of radio repair man Leo Fenders, 'Broadcaster'. Leo Fender's 1948 design paved the way for the development of the electric guitar almost 15 years before the instrument was to become the catalyst that provided the 'Beatboom', and eventually led to the emergence of rock music generally.

The design of Fender's first solid electric guitar was simple yet functional, and today's ever popular 'Telecaster' more than 30 years later is almost identical to the original 'Broadcaster'. Gibson, another guitar manufacturer of the early 1930s also introduced a solid body electric guitar the 'Les Paul'which was designed by musician and designer, 'Lester William Polfus'. This design was less radical, and was evolved, rather than created, from earlier Gibson acoustic instruments. Today, Gibson's 'Les Paul' model, solid body electric guitar also remains identical to the original model. Why is this?

> There is far more scope for solid body electric guitar design than there is far acoustic guitar design. This is because an acoustic guitar has to be constructed within certain design parameters if it is to produce sufficient volume and an acceptable tone (4, p.50).

As long as the solid body of an electric guitar keeps the pick-ups fairly stable and provides a mounting for the necessary components, its shape is limited only, by practicality and by the designers imagination. However one look in the local music shop is almost like a step back in time, with almost all solid body electric guitars, being based at least, aesthetically on the early

innovative products of Fender and Gibson. But is this first impression accurate? Are modern solid body electric guitars just reworkings of the original classic guitars or are there any innovative new products being produced? The solid body electric guitar is a unique musical instrument, no other instrument combines in such a portable package, such inherent harmonic, melodic and rhythmic potential. Even played on its own, the guitar offers a remarkable range of harmony to the player who has continuous access to over three octaves, four on many modern electric guitars, with polyphony limited only by the guitarist's dexterity and musical context. The guitar's ability to sustain a note is also of great importance:

> Plucked strings have a slightly exotic quality, because the note always decays from the moment its struck. It has an extadordinary death in a way unlike every instrument that's in the orchestra except, perhaps the drums (9, p.7).

The overall musical potential of the guitar is kept in a continual state of development by pioneering players. Just one example from many will suffice: during the 1980s a two handed 'tapping' style was extended and updated by a number of jazz, fusion and heavy rock guitarists. It gave them the ability to play with rapid violin-like leaps, impossible with normal playing techniques.

The rise of 'tapping' is interesting because it highlights the constant interplay between guitarists, and those who design and make guitars. Tapping benefits from a long finger-board, so suddenly guitars were regularly seen with 24 frets. But which came first: the player's need or a totally new kind of guitar? Often it is hard to work out the source of such developments. Is it the new type of instrument that inspires a style of playing, or do guitarists' 'new methods' provoke new kinds of guitars and hardware? Did Floyd Rose's (guitar player) and Dave Starey's (designer)

locking vibrato systems encourage the new breed of 'tapping' guitarist to start using extreme vibrato techniques? or were these designers trying to provide a device that could do things that players were trying unsuccessfully to achieve with existing systems?

This thesis looks at the history of solid body electric guitar design from conception, by discussing and analysing the 'classics', their development and also the introduction of new products and designs. It will show how designers have put their own improvements into practice, and shall demonstrate how the basic designs have become classics and how some have failed. It will also investigate 1990s guitar design how it has evolved to its present form, and if this evolution has led to the creation of innovative new products or just a reworking of the original classics.

## CHAPTER 1:

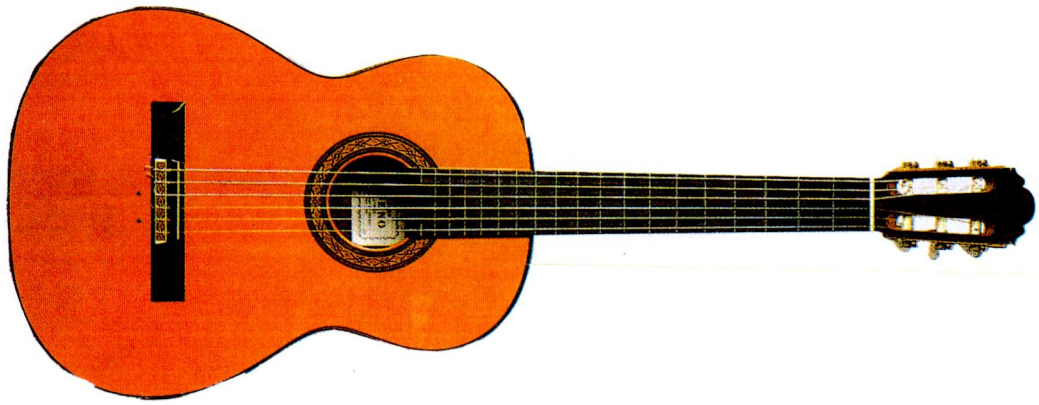
## CATEGORISATION AND GENERAL DESCRIPTION OF SOLID BODY ELECTRIC GUITARS

There are principally two kinds of acoustic guitar, the flat top and the arch top. The general description of the flat top with a round hole, includes classical nylon string instruments as well as steel string folk instruments. (illus. 1 and 2 respectively). The archtop of acoustic designs was a later development to increase the volume of the basic instrument (1, p.18). These guitars rely on their natural acoustic properties to amplify their sound.Next are 'Semi-Solid' or electric acoustic guitars which have a solid block of wood running down the centre of a thinline acoustic body (illus. 3), with electric pick-ups fitted to amplify the sound.Then we have the solid body electric guitars which rely solely on amplification to be heard. These shall be dealt with in this thesis (illus. 4).

There are also 'Synth' and 'midi' guitars, which apply keyboard and computer technology to the guitar to create new sounds (illus. 5).And finally there are bass guitars which are distinct in having four not six strings and are primarily rhythm instruments, and not for our purposes in the same design fields as the above groupings. (illus. 6).

### Electric guitars

The modern solid body electric guitar was developed from amplified acoustic instruments. These instruments were ordinary, acoustic guitars with 'pick-ups' attached to them. A 'pick-up' is a magnetic device which responds directly to the vibration of the strings and transforms this energy into electrical impulses, which are then amplified and led to a loudspeaker or amplifier. When the 'pick-up' or 'magnetic coil' is fitted to an acoustic

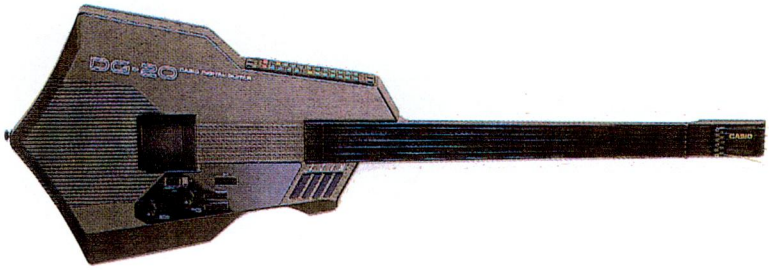


Illus: 1. classical nylon strung acoustic guitar.

Illus: 2. steel strung acoustic guitar.

Illus :3. semi-solid electric guitar.

Illus :4. 1950s Fender Telecaster solid body electric guitar.



Illus :5. Synth / MIDI guitar.

Illus :6. Bass guitar.

guitar, two main problems are created. First, the pick-up or 'coil' itself may move as the sound board of the guitar vibrates. Secondly, speaker 'feedback' (electric noise) may be generated. 'Thus the "coil" should be as stable as possible and should not be disturbed by vibrations from the guitar body', (3, p.33).

With electric guitars the solution to the problem is to increase the mass of the guitar body so that its ability to receive and transmit vibrations is reduced. If this idea is taken to its logical conclusion the body should be made from concrete or perhaps even lead. In practice weight is an important factor so a compromise has to be reached. Through experiments with various prototype instruments, pioneer makers of electric guitars usually used a solid body made of high density hard wood which reduced the problems to a manageable level.

> There is far more scope for solid-body guitar design than there is for acoustic guitar design. This is because an acoustic guitar has to be constructed within certain design parameters if it is to produce sufficient volume and an acceptable tone (4, p.50).

As long as the solid body of an electric guitar keeps the pick-ups fairly stable and provides a mounting for the necessary components, its shape is limited only by practicability and the designer's imagination. Well seasoned or kiln-dried hardwoods such as mahogany, walnut, ash, alder and maple are frequently used in solid body construction. However laminated timbers are also common. The original 'Les Paul' guitars actually had a mahogany body with a maple 'Cap or front' (illus. 7). Several other materials have also been successfully employed; Dan Armstrong's plexiglass guitars for example (illus. 8).

> The material used in the construction of a solid body can in fact affect the sound of the guitar. The denser the material, the longer the natural (not feedback-assisted) sustain the instrument will have. The tone can

Illus :7. 1958 sunburst Gibson Les Paul.

Illus :8. Dan Armstrong, plexiglass guitar.

Illus :9. The Fender Stratocaster.

be altered by changing the wood used for both the body and the neck (4, p. 50).

## General Description

The solid body electric guitar is a relatively recent invention, and many contemporary makers now take advantage of modern mass production methods in their factories, enabling them to produce a precisely tooled and cost effective instrument.

The Fender company, with 1950s innovations like the Telecaster (illus. 4) and the Stratocaster (illus. 9), did more than any other to foster these production systems. Their guitars, and those of many major manufacturers, are based on the idea of modular construction; necks and bodies, can and are made separately and bolted together; controls, pick-ups and wiring are fitted to a scratch plate, which is then screwed to a body with routed channels to allow for these components; and other hardware, including the bridge, machine heads and jack socket to be screwed to the body.

There are, of course, variations. Glued in necks are a traditional alternative to the bolt-on type, primarily on guitars made by or in the style of the Gibson Company. Another method has the neck made from a single or laminated piece of wood which travels the whole length of the guitar, wooden 'wings' are then added to complete the body shape. This 'thro-neck' design was visible on some natural-finished guitars popular in the 1970s (illus. 10 but is now often hidden under coloured finishes.

> However the classic wooden Stratocaster design see (illus. 9) remains a blueprint for stylish, modern mass-produced electric guitars, despite many makers' experiments with different shapes and materials, (3,p.66).

Illus :10. Kramer (through neck) guitar.


Illus :11. Bigsby, Travis prototype.

The Anatomy:

Bodyshaping; The classic Stratocaster design (illus. 9) popularized the contouring of the back of the body. This makes the guitar more comfortable to play.Body; Solid electrics are usually made from various hard woods. Maple, mahogany, alder, ash and related types are all popular, each subtly affecting tone.Finish; Modern electrics come in a variety of 'sunburst' solid or metallic colours; even wild graphic designs. After numerous coats of paint etc. the surface is buffed to a high gloss.Position Markers; These range from plane dots to ornate designs. Once made from pearl or ivory they are now often plastic.Fingerboard; Often this is a separate piece of wood, tough rosewood, ebony, maple or synthetic material glued to the neck.Truss Rod; Inside the neck is a full-length steel rod, adjustable to counter bending of the wood.Machine Heads; These are screwed to the headstock individually or in strips of three or six. Enabling the strings to the 'tuned' accurately.Scratch Plate:;Metal or plastic and wood can be used. But plastic is the favourite. Used to protect the finish of the guitar.Jack Socket; This is the socket from which the lead 'cable' to the amplifier is connected.Bridge; Used to set string height (from the neck board) and string length.Vibrato Unit; This allow the tension of strings to be adjusted to created a 'vibrato' effect.

## CHAPTER 2:

### Early History and Development of electric, solid body guitars:

In the 1920s Lloyd Loar was a leading figure in the Gibson Guitar Company of Michigan. Orville Gibson had founded the company towards the end of the nineteenth century, and by this time it was well known for its carved-top guitars. Loar had been responsible for introducing several innovations to Gibson instruments such as the neck truss rod and the adjustable bridge, but he was interested in the new art of amplification and electrification of musical instruments. He experimented with crude magnetic coils to develop a pick-up for instruments and soon left to form his own Vivi-tone company, and his idea disappeared until the 1930s.

In 1931 Horace Rowe, an engineer, and Mr. de Armond, a musician, were among the first few into production with a guitar pick-up. This design was a magnetic pick-up simply designed to clip into the sound hole of a flat-top acoustic guitar and therefore amplify its natural sound.

Also during this period, George Beauchampe and Paul Barth were employed by the National company in California and were keenly experimenting with instrument pick-ups.

Adolph Rickenbacker, a Los Angeles based machine and engineering contractor, was approached by National to make guitar bodies for their resonator guitars, and through this connection met Beauchamp and Barth. Together, the three men formed the Electo String Company which produced the first commercial electric guitar in 1931. This was probably the first truly 'electric' guitar i.e. one with a solid body and no sound box. These Rickenbacker A22 and A25 models were cast lap steel instruments and became affectionately know as 'frying pans' due to their shape. The twin

horseshoe-shaped magnet structure around the pick-up coil was a feature of the early guitars which survived through to some recent models. The first Commercial produced electric 'Spanish' guitar is credited to the National Company soon after Rickenbacker first instrument.

In Kalamazoo, Gibson were not slow to react to the interest in electric instruments, and their semi-acoustic ES-150 model made its debut in 1935 after the company had already produced some electric steel guitars. The ES-150 model incorporated what is now know as the Charlie Christian pick-up, Christian was a pioneer among pre war electric guitar players, and the ES150 enjoyed considerable popularity, partly because of his use of the guitar. The Gibson Charlie Christian pick-up consisted of a mild steel core or pole piece bolted to two strong magnets underneath the top of the body. The core protrudes through the top and is covered by a copper wire wound coil in a distinctive black and cream angled bakelite mounting.

Throughout the pre war years there continued to be a good deal of development work and experimentation in electric guitar design. Les Paul a well known player of the time, was meddling with a solid-core guitar in the early 1940s, his so-called 'log' was a cello guitar with the middle section sawn through and replaced with a solid piece of wood on which were mounted the electrics and bridge hardware. Paul Bigsby also made solid guitars in the late 1940s in collaboration with a popular country guitarist, Merle Travis. An example of their work currently resides at the country music hall of Fame in Nashville.

In 1948 the big break through in electrical instruments came in the shape of Leo Fenders Broadcaster model the worlds first commercially produced solid body electric guitar. It had an ash body with a detachable,

solid maple neck into which frets were directly sunk. There were two single-coil pick-ups on the Broadcastor, are smaller unit near the neck, the other sloping and built into the bridge. Two brass knobs controlled volume and tone, and a selector switch on the same control plate offered three distinctive pick-up selections (front both, and back). Although Fender's first instruments were without truss rods, these were fitted as standard soon after.

Leo Fender named the Broadcaster after his business interests in radio, but had to change the guitar's name to Telecaster in 1950 after the Gretsch company pointed out the use of the name on their Broadcastor drumkits. The design of Fenders first solid electric guitar was simple yet functional, and todays ever popular Telecaster, more than 30 years later, is almost identical to the original.

Undoubtably Leo Fenders 1948 design paved the way for the development of the electric guitar - almost 15 years before the instrument was to become the catalyst that provided the 'Beatboom' and eventually led to the emergence of rock music generally.

## CHAPTER 3:

### American electric, solid body guitar design from 1948.

The Fender Broadcaster:

The Fender Broadcastor (illus. 4) launched commercially in 1949 was the worlds first mass produced solid body electric guitar. It was developed and built by Leo Fender at his small factory in Fullerton California, and although Leo didn't invent the solid body guitar, his hard work and clear sighted technical approach forged a design classic.

During the 1940s Paul Bigsby and Les Paul, had already constructed electric non-acoustic instruments. Leo Fender was drawn to the idea of building such a guitar, making one himself in 1943/4. By nature an inventor with a strong interest in anything mechanical or electrical. He saw that an instrument without Acoustic properties gave clarity and a cutting edge to the sound produced.

When the Broadcastor was released it quickly established itself and started a revolution in design and production.

The Broadcaster and Telecaster are really separate instruments in name only, the very first Broadcasters having a number of small prototype variations.

The guitar is simply are piece of wood bolted to another in its basic structure and can be described as follows. Rather than having a separate fingerbound the 21 frets are set directly onto a contoured maple neck. This gives the striking 'blond maple' appearance and substantially affects the tone and feel of the guitar. Black dot markets run up the fingerboard. The asymmetric headstock has six Kluson nickel tuners on one side and a round

string retainer holds the E and B strings on the headstock face. Some early Broadcasters were made without truss rods but this fitting became standard, with a channel cut and filled by a walnut strip called the 'skunk strip'.

The body is made of a single piece of ash whose woodgrain can be seen through a cellulose finish with a creamy limed colour. This can vary, some guitars are almost clear, others age to a butterscotch colour and there are some with an almost cream/grey look.

The black plastic fibre pick-guard is held by five slot screws. Straight forward controls sit on a chrome plate: tone, volume and pick-up selector. The selector gives either pick-up but not a combination of the two: the third position is the rhythm pick-up (neck pick-up) with an added capacity in the circuit giving a very bassy tine. The back pick-up is angled to accentuate a brittle clarity on the treble strings, and the rhythm pick-up has a mellow depth yet still retaining that 'twangy' sound. There are flush polepieces on early back pick-ups. The metal base plate surrounds the back pick-up and has a clip on cover which is usually removed. These brass saddles have two height adjustment screws and each has a length adjustment screw for setting the interaction of the strings, which run over the saddles in pairs, through the body and held by six fersules at the back.

Fenders legendary 'spaghetti' logo transfer in silver with a black border appears for the first time; this style of lettering was in use until the mid-sixties. Broadcastor or Telecaster sits underneath in smaller letters.

When the Broadcastor was launched, there was an immediate dispute with Gretsch who were already using this term for their drumkits. The name was therefore changed to Telecaster around the end of 1950. The Telecaster as described here was the forerunner of all mass produced electric

guitars and introduced many innovations of both guitar design and manufacturing processes. It can be regarded as a 'classic' of guitar design. Thus it is important to compare and contrast it with later developments. Although the guitar was extremely successful, it produced a distinct 'twangy' or 'nasal' sound that while perfect for some styles of music, some players feel that it has too 'hard' a sound To cater for all tastes and styles. Thus while verstile it cannot be considered an all purpose guitar.

Updates of this classic theme, intended to broaden the guitars appeal, have recently appeared and thus I reviewed a current model to investigate the changes that have occured.

## The Fender Tele Plus

The Fender Tele Plus is the latest addition to a line that has remained at the forefront of popular music for 40 years. I investigated how state of the art electronics compare with Leo Fender's basic design of 1948.

This particular sample was finished in a smokey translucent black sunburst with a slight metallic flick. The term 'Plus' would seemingly allow Fender to take some liberties with this design, but the square sided 45mm thick slab body is retained without any heel chamfering. In fact, if anything, the Plus looks back to older vintage designs. It is quite thick in depth with a full 'D' section, much closer to the original '52 Tele in the Vintage column. The satin-finished, one piece maple neck has some expensive looking flame and curl contrasted by the black plastic position dots and the walnut skunk stripe hiding the Biflex truss rod.

The main visual deviation of the Tele Plus comes with the bridge plate: instead of a standard Tele bridge plate we have a Strat type non-tremolo

bridge with six stainless steel saddles from the American Std Strat models and two Red Lace Sensors mounted in a humbucking sized pick-up surround.

How did this major design departure come about? Fender explained that they had seen a lot of contemporary players going to Telecasters but they wanted something beyond the original Telecaster sound. So, by putting the two Red Sensors in the bridge position they'd be able to get virtually a humbucking sound, which is becoming pretty popular on Telecasters.

On the Tele Plus the pick-ups are placed at right angles to the strings and this together with the missing bridge plate looks a little odd. Mounted to the tree-ply white scratch plate is a Blue Lace Sensor pick-up in neck position allowing height adjustment of the pick-up without removing the scratch plate. Electronically the Tele Plus is straightforward: a conventional three position pick-up selector along with a master volume and master TBX tone control with centre detent. Below the detent it functions conventionally to cut treble, and above the centre notch the tone becomes slightly treblier. A small three position mini-toggle switch, placed between the two flat-topped knurled knobs, on the chromed control plate, provides three tonal options for the dual lace sensors in bridge position: front coil, rear coil or both together. The output jack socket is placed in the standard cup recessed into the body's side.

The Tele Plus produces a far louder sound than a normal Tele. With both coils of the bridge pick-up there's a smooth warm humbucking - type of tone without the crispness or twang of the original Tele. With the single Lace sensor nearest the bridge the tone is more single coil-like, the closest to the original but without the character of that guitar's bridge pick-up. The

other red sensor, despite being so close, produces a markedly different tone with more low end than the other single sensor and less midrange than the two combined.

Amplified the Tele Plus with its generally fatter tone, produces some good rock tones. The combined Red Sensors sound even more like a humbucker with a good strong signal ideal for any overdrive situations. The neck pick-up sounds very sweet with a smooth Fender style overdrive and also handles high gain distortions well producing a fine full bodied bluesy soloing tone. Reducing the guitar's volume produces a more Fender like tone. Generally the Tele Plus's sound fall somewhere between a Les Paul and a Tele, in comparison with the original Tele, the Tele Plus feels better to play and performed like a modern guitar should. It looks good too. Once you get used to the missing bridge Plate and the new humbuckers. It lacks the character and sound of the original Tele but the sounds produced really suit modern amp tones and processing much better.The Tele Plus is really a very different guitar. Although it remains true to the originals simple aesthetic, it is considerably more developed and in my opinion a better guitar.

## The development of the Fender Stratocaster.

> Leo Fender's Stratocaster, can be described as the pre-eminent electric instrument of our era. Unveiled in 1954 the "Strat" has established itself as an instrument which embodies futuristic design with a graceful appearance. Looking at the guitar today, hackneyed phases such as "timeless" seem entirely appropriate (1 p.241).

Its easy to forget just how futuristic the Strat (illus. 9) was when it just appeared, but go back to films and photos from the 1950s, and in the hands of the soberly-dressed professional musicians of the time, the guitar looks like something from another era - or planet! Yet this design was developed

almost entirely as a practical solution to the needs of musicians in the post-war period.

The Strat was the culmination of a four year period of outstanding manufacturing creativity on the behalf of Leo Fender, which saw the development of the world's first mass production solid body, the Telecaster (illus. 4), followed by the invention and production of the first electric bass (illus. 6), and the addition of what is perhaps the finest electric solid body design in history, the Stratocaster. The Strat was meant to be a sophisticated companion to the rather four square Telecaster. The Stratocaster obviously representing the upper limits of what was allowable in the company's imagination.

It has to be noted that this guitar has such a mystique that high quality imitations by other manufactures have often been equally sought after. This is a rare achievement for any type of object, and many of today's guitar designers still base their outline on this instrument.

> There is no doubt that the utilitarian Telecaster did pave the way for the Stratocaster. Key constructional problems were solved by the "Tele" and its success gave the company the confidence to launch a new guitar model (1, p.121).

The exceptionally talented engineer and designer Paul Bigsby had a key influence on Leo Fender's products. The guitar Bigsby built for Merle Travis in 1947 (illus. 11) was well ahead of it time and this solid body with an asymmetric headstock has been sadly overlooked. Fender used a regularized version of this headstock shape. Nevertheless, this type of peghead has been around for many centuries and can be seen on guitars from Staufer in Vienna in the first half of the 19th and much earlier Renaissance stringed instruments. Paul Bigsby's vibrato units, developed during the late 1940s,

started to gain widespread acceptance and Leo Fender felt the need to use some sort of 'vibrato' device on the Strat.

It is interesting to compare Gibson's first solid body, the Les Paul model of 1952 (illus. 7). Entirely traditional as a scaled down archtop (illus. 12) in its basic format, this instrument represents an evolutionary approach to guitar building a opposed to Leo Fender's revolutionary way of working.

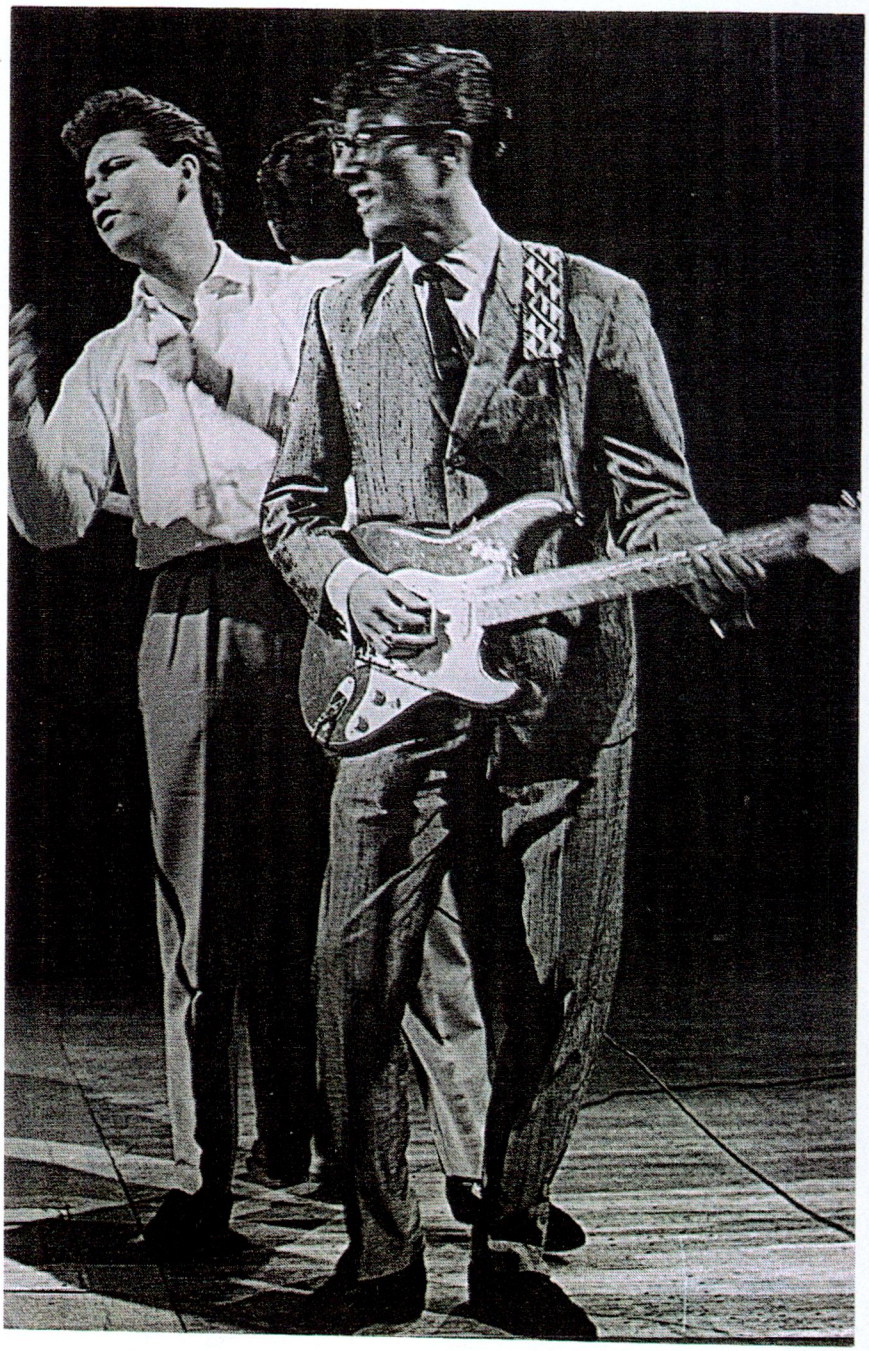
> Leo's genius lay in inventing, building and marketing a straightforward working item incorporating the latest trends in thinking as well as the objectives of playability and appearance (13, p.69).

The new guitar had a double cutaway giving easy access to the upper register on the fretboard and a 'comfort contour' body with wood dressed away. In competition to the Bigsby vibrato, Fender used a concealed on-board spring vibrato unit. Intonation could be accurately modified by individual length and height saddles for each string. The controls gave a wide spectrum of sound and could be reached by the right hand while still playing. The jackplate was recessed for practical considerations and the guitar had a good centre of gravity when used by a player standing up..

Leo Fender and George Fullerton, his right-hand man started work on the Strat in 1951 (1, p.200). Problems were encountered with the first experimental vibrato unit and the company lost $5000 when they had to dispose of redundant equipment used to develop the prototypes and write off labour costs. By 1953 Freddie Travares was working on the Strat and towards the end of the year Country and Western guitarist Bill Carson started to take out the guitar to play and test in a professional environment.

> The Strat appears to have met with consternation and this "outrageous" instrument was referred to as "Carsons Guitar"(1 p.201).

Illus :12. Gibson archtop, acoustic guitar.



Illus :13. Hank Marvin with a Stratocaster.

The Strat finally came out in Spring 1954, priced at $249.50. It was also offered without a vibrato now termed 'synchronized tremolo'. Reaction in sales terms was slow, but gradually picked up during the 1950's. Production rose from a few hundred in 1954 to a few thousand in the late fifties. As with other Fender instruments there are no production figures and no body seems to know exactly how many early strats were manufactured.

The first Strat inherited the following basic characteristics from the Tele: A solid ash body with a bolt on 21 fret solid maple neck, asymmetric headstock and a related type of Fender single coil pick-up.

While discussing the Technical details of the fender Stratocaster we can see that the number of technical improvements since its conception have been very minor. It would appear that the basic design is very sound. 'Most importantly, this guitar has enabled countless number of musicians to express themselves. It has contributed to the development of virtuosity in nearly all styles and expanded compositional vocabulary, and texture in a vital way'. (13, p.71).

However the most telling tribute to Leo Fender's Stratocaster is the wide variety of players for whom it remains a state of the art instrument.

As the main guitarist with Cliff Richard's band, 'The Shadows,' Hank Marvin's Red Stratocaster (illus. 13) was the first in Britain and popularized the instrument for a whole generation of players. He explains the attraction of the instrument.

> The first time I saw a Stratocaster was a photo on the front of a Crickets album, I think it was called the "Chirping Crickets" and Buddy Holly had a sunburst Strat. I was in a skiffle group at the time in Newcastle, and I looked at this and thought "What on earth is that?" If I remember right you couldn't see the headstock in the photo, just the body. We

> were impressed by the three pick-ups and the very sensuous body shape, plus the shape of the pick-guard it looked very futuristic ..... Its difficult to describe what it was like seeing that Stratocaster in the flesh for the first time. Its pretty old hat now because everybody seen so many but at the time it was a little like seeing an instrument from another planet, it just didn't look like a guitar (13, p. 14).

Jeff Beck, swiftly gained a reputation as one of Britain's finest guitarists with the aid of a Gibson Les Paul, but was one of the first UK Blues players to switch to a Strat, he explains why;

> The change happened largely because I used to break guitars, I used to do in the dressing room more than anything. With "Les Paul" I'd put it carelessly down, they weigh a ton, and if you snap the head off one of those you're in big trouble (glued in neck) you can't bolt another neck on. So I got fed up of having to have repairs made, and I suppose I turned to a Strat in an emergency one night and just never went back. (13, p.20).

Fender guitars are made in different location for reasons of cost efficiency. Cheaper models are usually made in Mexico and Japan etc. and more expensive models in America. But what of the present day Stratocaster, 'do they still make them like they used to?' and have they made any significant design changes or improvements. To investigate this I viewed one of the latest Fender models.

1991 American Standard Strat.(illus. 14)

Finished in a well applied and finished polyurethane three tone sunburst the alder body timber is clearly visible, with a mild and quite straight grain. The contouring is quite deep, though not as severe as the original '50s model.

The neck is chunkier than the first US Standards which appeared in 1987. The 9.5" camber on the rosewood fingerboard with off white plastic dots, is flatter than the original 7", reducing the upper fret ehoking while

Illus :14. 1991 American standard Stratocaster.


Illus :15. Les Pauls solid electric prototype, (The log).

retaining a definite Fender feel. The extra fret gives you a top D on the E string although no extra gacility is provided for access. The chunkier fret with (.1" wide and .045" high) gives a very positive feel to the board: it's easy to bend strings.

As a left-over from the 'Elite' the neck has the Bi-flex truss rod system which allows both concave and convex bow adjustment via the open hole behind the rest. Also there's the micro-tilt neck adjustment but with a four screw neck fixing, which certainly saves messing with shims for altering the neck pitch.

The Fender logo 'D' heads are made by Schaller; they feature a smooth action and appear very similar to the M6 design but with a rectangular gear casing. The bridge is a definite step forward over the original Fender type and over-complex Elite Style. It replaces the six pivot screws with just two, the block is champered to allow a greater bend range, and although the strings anchor from the back of the block the anchor point is closer to the bridge face so less string passes through the block reducing potential tuning problems. Six rectangular saddles are cast stainless steel to increase sustain, the string break point is also nicely sounded helping to protect against string breakage. All are adjustable for height and intonation. Although the arm screws into the block there's a spring inside the hole which provide tension, if you want the classic swing arm you just drop the spring out.

With extended travel, tuning stability is only as good as the set up. The white cyclovac (a moulded plastic that's been used by Fender for many years) nut on this sample needed lubrication. The Ezy-glide trees are mounted slightly off centre - especially the D and G string tree, they don't feature roller bearings and although an improvement in terms of fiction reduction

over the pressed steel type in conjunction with the nut they do contribute to minor tuning problems.

The standard offers a 5-way pick-up selector and three single coil pick-ups - the middle pick-up is reverse polarity and reverse wound for humcancelling in mixed positions - along with a master volume and mid-placed neck tone control. The third control is the centre-dented passive TBX tone (for the middle and bridge pick-ups). It works from centre to 'off', with a gradual perceived 'increase' in top end so you can go from that classic springy, almost organ-like tone of the neck pick-up with the tone rolled off to a 'brighter Fender twangin' bridge pick-up with all the mixtures in between.`Apart from very minor improvements in some of basic materials used (and in the American Std, an active tone boost) these guitars remain unchanged from the original Stratocaster design. Their modern construction and wide ranging tonal options, through the three pickups, means that these are very versatile instruments giving maximum control and playing comfort. This is a design which is as valid today as it was 40 years ago. It`can be considered the industry standard against which all others are measured. But are modern designs merely refinements on this 'classic' instrument? To answer this we must look at another industry standard the Gibson 'Les Paul', designed by Les Paul himself.

## Les Paul

Lester William Polfus, whose inventions have had a lasting effect on modern electric guitars and on the methods adopted in todays' recording studios, was born in 1916 in Waukesha about 20 miles from Milwaukee, Wisconsin.

Les first amplified a guitar when he was 12, working to entertain the customers at a local hamburger stand who had complained that they couldn't hear him. So he jabbed a record player pick-up into his acoustic guitar, slid a telephone mouthpiece under the strings, and wired up both to his parent's radio which doubled as an amplifier.

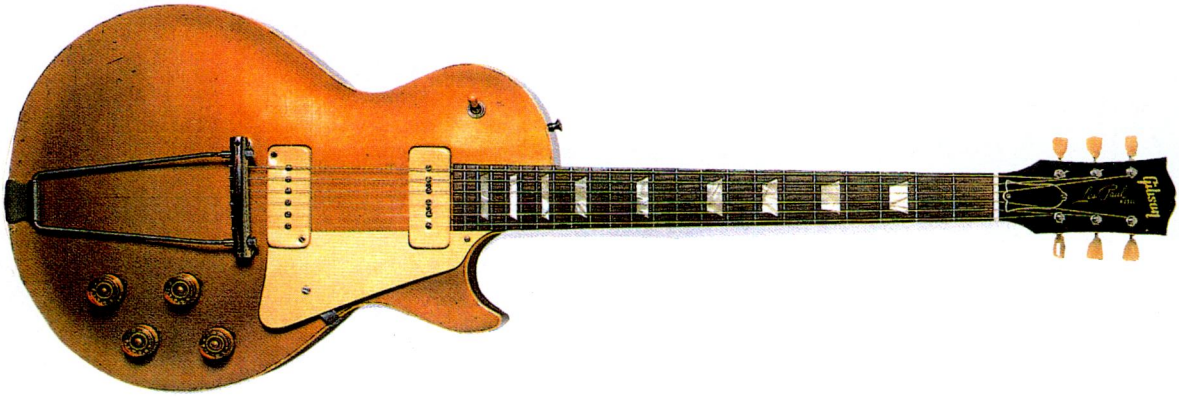
Les also came up with a recording method now called sound to sound. Another of his very important inventions was the multitrack tape recorder the basis of all modern recording. Gibson had first laughed at his first attempt in the early 1940s to interest them in his solid electric 'log' (illus. 15) guitar, which he'd put together at weekends at Epi Stathopoulo's Epiphone factory in New Jersey.

When Fender started his revolutionary mass-produced solid electric guitars in 1950. Gibson decided that they need the 'kid with the broomstick with the pick-ups on it' (1, p.38) as they had described Les and his log more than 45 years before.

The Development of the Gibson Les Paul:

Gibson is a magical name in guitar design for many players. Gibson themselves claim to have made electric guitars since 1924 although the 1935 ES150 semi-acoustic guitar was Gibson's first commercial electric guitar, and it continued alone until the 1940s when it was joined by other ES models.

Gibson's first solid electric guitar appeared in 1952 and was known as the Les Paul model, Les Paul lending his name to the instrument via an endorsement deal. This first Gibson Les Paul solid electric guitar had two cream coloured single-coil pick-ups designated P90 types, and came with a trapeze tailpiece and bridge combination (illus. 16). The guitar had a gold



Illus :16. Gold top Gibson Les Paul.

Illus :17. Gibson S.G.

Illus :18. The Gibson Flying V.

lustre finished top which was carved into a shallow arch, and had distinctive trapezoid-shaped pearl position markers in the rosewood fingerboard. Most of the Les Paul guitars made since 1952 have been based on the original single cutaway design and specifications. Like Fender's 'Telecaster' and' Stratocaster' (illus 4 and 9), the Gibson 'Les Paul' remains one of the most popular designs today and is almost certainly the design most imitated by other makers, whether directly or indirectly.

Flat-topped, uncarved versions of the Les Paul were introduced in 1954, with two pick-ups (the Les Paul Special) or a single pick-up (the Les Paul Junior). These guitars, like all early Les Pauls, were inexpensive at the time of issue but command high prices today. Perhaps the most highly prized Les Paul among players and collectors is the original Les Paul Standard, made between 1958 and 1960, and affectionately know as 'the sunburst' (illus. 7) due to its fine cherry sunburst - finished, flame maple top. This guitar had two of the new humbucking pick-ups set in cream mounting rings, some gold-top Les Pauls were made a year earlier with these new pick-ups. The humbucking, or hum-cancelling, pick-up was an important new development and showed up in the late 1950s on several new Gibson models.

> 'The problems of feedback and hum were the most difficult to eliminate of those facing players using early pick-ups, and the humbucking pick-up was a major improvement.'(1,p.182)

In 1956 Seth Lever and Ted McCarthy were finalizing their ideas at Gibson in order to put into production a twin-coil hum-cancelling pick-up, based on the relatively simple concept that two coils placed next to each other, wound in parallel with opposing magnetic poles will cancel each others hum. The humbuckers on the early Les Pauls were marked 'Patent Applied For' and are now known as PAF types.

The styling was pure Gibson, the heavy carved tip and classic symmetrical headstock were borrowed from their established archtop guitars, as was the scaled-down yet much heavier solid body. It was heavier due to the fact that it was made from Mahogany rather than maple, to the natural sustain of the body. This accounts for its deeper tone than other solid bodied guitars of the era. These aspects of the Les Paul guitar's design, together with features such as the glued in neck and ornate fingerboard inlays, conveyed Gibson's craftsmanship, almost certainly intended to contrast with Fender's slab-bodied instruments and mass-production approach.

Gibson's Les Paul started life as the company's first tentative step toward a modern solid body instrument, yet the design has remained virtually unchanged throughout its 30 year history. Together with Fender's 'Telecaster' and 'Stratocaster 'designs the Les Paul is among the most popular and emulated electric guitars ever made.

In 1958 Gibson replaced the Les Paul Gold Top with the Standard model, an identical guitar except for its more conservative three-tone sunburst finish; at last the maple top could be seen, sometimes to stunning effect.

Demand for the Les Paul had dwindled, so perhaps Gibson were trying to attract customers with more traditional tastes who had been deterred by the earlier model's garish gold paing. Gibson gave up on this model in 1961, and launched the SG style (illus. 17) instead. However later in the decade, players discovered that a Les Paul at high volume produced a desirably thick sustaining sound, ideal for blues based music.

> The sound of the Les Paul depends great on the timbers used in its construction. The original concept was for a mahogany body to provide depth of tone, with a maple front adding brightness. The combination offered good sustain without being too heavy and these woods have remained consistent throughout the Standards production history.The glued neck and the larger humbucking pick-ups also contribute to the guitar's natural sustain and wide tonal range, elements that meet Les Paul's own original requirements and are responsible for the instruments continuing and wide ranging popularity (3, p.82).

This renewed interest led to the reintroduction of some Les Paul's models in 1968, but surprising the Standard didn't appear again until 1975, since when it has remained in continuous production at Gibson.

Gibson SG Standard

Launched in 1961 priced at $290 the new SG (solid guitar) was in many ways Gibson's response to the flagging sales of the old style Les Paul series. This new body shape (illus. 17) was developed to create a modern stylized look with a more comfortable contoured body. It was also light in weight and featured a double cutaway body giving full access to the top of the fingerboard. A new type of vibrato came in as a standard fitting.

There is no doubt that Gibson had been prompted yet again to respond to demand from the market place brought about by the success of Fender innovation. This time in the form of the Stratocaster. Gibson's new standard solid body was a success. Production rose in the late Sixties when the SG was in its hay day. In 1970 the SG Standard was Gibson's most popular electric guitar but by the seventies its appeal had started to wane. Although recently it has been reintroduced as a collectors re-issue in small numbers.

## Odd Shaped Gibson's

Until the late 1950s, Gibson's solid body guitar designs had been very traditional. All that changed with what the company called its "modernistic" guitars. The 'Flying V', The 'Explorer' and The 'Moderne' (illus. 18, 19 and 20).

Before these designs, solid electric guitars had reflected established acoustic guitar styling: a waisted body with smaller top bout balancing a larger bottom (illus. 7). Gibson president Ted McCarthy came up with the new shapes by using 'modern' straight lines rather than traditional curves, a very radical move for some time. So radical, in fact that the response from both retailers and players was negative. Despite Gibson's high hopes, none of these unusual guitars sold well and production stopped within two years.

Many years later and today, these rare guitars are now very desirable, and this renewed interest has led to other makers adopting the Flying V and Explorer styling. Gibson themselves have also managed to offer simple reissues, as well as updates based on the shapes of the Explorer and Flying V designs proving that these innovative guitars were well ahead of their time.

In 1963 Gibson launched the first series of Firebird models (illus. 21), devised with the clear intention of competing with Fender. The four models - I, III, V and VIII used specially designed humbuckers and all but the I featured a vibrato tailpiece.

These were Gibson's first through neck guitars, using a one piece body centre and neck, with added body wings to complete the shape. Sales were disappointing, and the design was drastically revised in 1965.

Illus :19. The Gibson Explorer.

Illus :20. The Gibson Moderne.

Illus :21. The Gibson reverse Firebird.

Gibson played safe with the new Firebirds (illus. 22), disparing of that innovative back to front look. A conventional glued neck replaced the more expensive through-neck construction of the originals, machine heads reverted to the normal side mounted types, and stock P90 single coil pick-ups were fitted to models I and III. Despite the changes and the longer production run, these firebirds were unpopular, although the 'reverse' versions have enjoyed later success, prompting copies and Gibson reissues.

In the early 1960s more and more teenagers began to buy electric guitars, but Gibson's rather staid instruments proved unattractive to these youthful guitarists. Even the new SG guitars suffered in comparison to Fender's flashy, colourful jazzmasters, jaguars and Stratocasters. Later in the 1960s serious musicians emerging from the teenage pop scene began to rediscover Gibson's instruments, and so the pendulum of fashion swung back in Gibson's favour over the next ten years.

The Stratocaster dominated early 1980s proved to be a lean time for Gibson: their traditional thick sounding humbucker equipped guitars didn't mesh with the new synthesizer based music. Even the normally Gibson-toting 'Heavy Metalers' were playing Fenders. Given historical precedent Gibson must have expected fashion to swing back in their favour. But in the mid 1980s came a new trend, the Fender inspired 'Super Strat' and again Gibson lost out. At the start of the musically diverse 1990s, Gibson has found more success by returning to their classic designs.

## Other Fenders

Although the Telecaster and the Stratocaster made Fender's name, a few minor models have been intermittently fashionable, enjoying limited use as a result.

Illus :22. The non-reverse Gibson Firebird.

Illus :23. The Fender Jazzmaster.


Illus :24. The Fender Jaguar.

The misleadingly named Jazzmaster was Fender's top-of-the-line solid when introduced in 1957. It featured a new offset-waist body (illus. 23) and a ridier, deeper sound from the steel-guitar like pick-ups. Yet another long-running Fender model, it remained virtually unchanged until dropped in 1980. It was intended as a jazz player's solid alternative to the Rock 'n' roll Stratocaster, but this was rarely how it was used.

Later, in 1961, an updated version called the Fender Jaguar (illus. 24) was put on the market with similar styling but with added switches and controls. The Jaguar was Fender's most expensive solid, but never a huge success.

## Fender Japan

In the face of increasing oriental competition, mainly in the form of well produced copes, CBS set up Fender Japan in 1982. Initial production concentrated naturally, on high-quality copies of the most popular Fender Vintage originals, alongside cheaper versions marketed under the Squier brandname. 'An expanded mid 1980s range boasted new models and updated designs and hardware'. (7,p.202)

More copies appeared, reproducing the majority of the Fender USA range and spanning all price brackets. Fender Japan then seemed to tire of copying and tried its first original designs, the master series of 1984. But these were unusually conventional and quite different from Fenders usual style, as was the quirky but equally short lived Katana from 1985. These were followed in the same year by the angular Performer, but it also proved unpopular and lasted only until 1986. (illus. 25).

Illus :25. The Fender Performer and Katana.

Illus :26. The Guild solid body electric guitar.

-Fender to CBS

In 1965, the huge CBS corporation paid $13 million for the Fender companies, and Leo Fender departed to form CLF Research (which later manufactured Music man guitars).

> 'Once Leo's association with the Fender brand ended, there was little innovation in design, and there was an apparent loss of quality' (1,p.130).

A new outlook came eventually in 1985 when the existing Fender management, bought the company from CBS and successfully set about production, both in the USA and the Far East.

Other American Makers

The Guild Guitar company was conceived and founded by Alfred Dronge in 1952 when he opened a workshop in Manhattan to make jazz guitars. In the late 1950s, Dronge moved Guild to Hoboken in New Jersey where they were soon making electric versions of their arched-top cello acoustics and these became popular with some of the rock 'n' roll players of the time. Most notably the young twanging guitar star, Dwaine Eddy. A model was made bearing his name and in England a similar model was endorsed by another guitar instrumentalist of the time Bert Weedon.

Guilds first solid electric models arrived in 1963 and in keeping with the style of the Gibson Firebird and other contemporary designs, were of unusual body styling (illus. 26). The Guild Jet Star (single pick-up), Polara (two pick-ups), and Thunder bird models (deluxe, two pick-ups) were all fitted with unique folding stand in the back of the body which was scooped out at the bottom to form two 'legs' of a tripod with the folded stand. Later, the Guild solids were to become very similar to Gibson's SG series, and the

Guild Starfire range of single and double cutaway models proved to be very popular among players in the 1960s. Later in the 1970s Guild experimented with active electronics, and currently continues to sell steadily its small, well-made range of guitars.

Gretch were producing jazz guitars in established work shops long before Guild was started, and by the mid 1950s they were making solid electric guitars of single cutaway, arched-top design in a similar style to the Gibson Les Paul. Four models were listed in the 1953 catalogue, differing only in colour option: The Duo Jet was black, the Silver Jet silver (illus. 27) and the Round Up brown. Later models came in other colours.

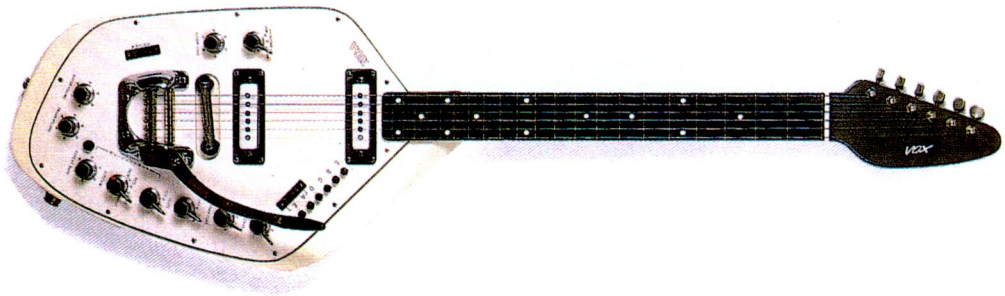
Many other American manufacturers also flourished during the late Fifties and Sixties, to meet the huge demand for guitars. Harmony and Kay were both Chicago-based concerns producing a wide range of instruments under a variety of names, such as Silver tone, Regal, Airline and Old Kraftsman.

Better known manufactures were Epiphone (later taken over by Gibson) Rickenbacker Gretsch, Hallmark, Premier and Mirco Frets.

Of these companies Micro Frets is worthy of note. Producing guitars in the 1960s and 1970s, they specialized in innovative hardware such as the Micro-nut and Calibrate Vibrato, both seen on the Golden melody model (illus. 28). Another feature of some models was a built in radio transmitter, an idea well ahead of its time. Another company Ampeg in conjunction with designer Dan Armstrong, produced a range of transparent 'plexiglass' guitars which have been quite successful.

Illus :27. The Gretch Silver Jet.

Illus :28. The Microfret Golden Melody.



Illus :29. Vox guitar organ.

During the 1970s the number of electric guitar producers in the USA mushroomed. The increased competition meant that makers had to establish their own identities, leading to the appearance of many original designs. But most failed to make any significant impact on players tastes, and many brands thus disappeared. 'This lack of success for originality prompted most US designed to play safe in the 1980s and 1990s. The majority choose to follow trends like the so called "Superstrat"'. (3, p.92).

## CHAPTER 4:

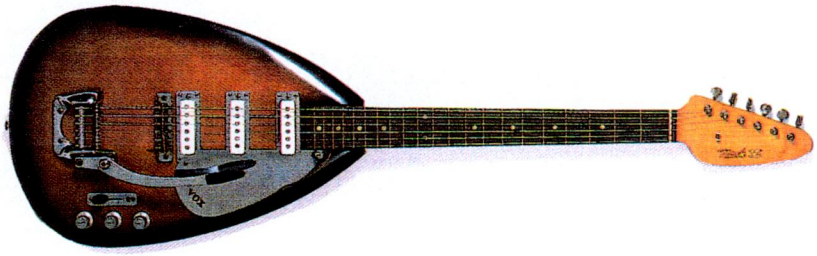
## European electric, solid body guitar design, from 1960, and in the rest of the world.

The early 1960s supported a very active guitar making industry in Europe before the cheaper imports, mainly from Japan and the East, began to attract players and caused many European companies to fail.

There is an interesting contrast between the huge impact of British music throughout the world over the past 30 years and the rather low-key nature of the UK guitar-making scene. During the 1960s only a handful of British guitar brands made any significant impact on their home market. Most guitarists seemed to prefer the imported competition.

Although UK-made guitars have often offered better value and quality, they apparently lack the mystique of leading USA instruments. Only Burns and Vox had any noticeable success with the exporting of guitars and the majority of UK-made models were destined for home consumption.

In Britain, several companies were producing a large quantity of good quality guitars, though most of them did not seem to catch the popular mood or attract major endorsements. One of these companies was Vox who while well known for their amplifiers never made a large impact with their electric guitars. The company experimented with on-board electronics and touch-activated frets on the guitar organ in the mid 1960s (illus. 29). 'They also issued some models that have since become classics of the period'. (3,p.100). Best known are probably the coffin shaped Phantom models, and the MK series, such as the MCVI (illus. 30) nicknamed 'teardrops'. Vox were not limited to one price bracket and their large ever changing range included many original designs and features. Interestingly, Vox instruments came




Illus :30. Vox Teardrop.


Illus :31. The Burns Bison.

from various sources, the name first appearing on imported models during the early 1960s. British made guitars followed and later in the decade production moved to Italy.

The other British maker of note is Burns. Jim Ormston Burns early Frisonic and Duasonic guitars are now classics of 1960s guitar design, and models like the Black Bison (illus. 31), the Vibrasonic and the TR2 were popular in the company's hay day. Jim Burns and his team were never short of original ideas, which were often claimed as firsts by other companies. The 1960 Artist had a heel-lens glued in neck with a 24-fret fingerboard. The 1961 Bison had a truss-rod gear box for effective neck adjustment and low-impedance pick-ups for greater clarity. The 1963 Burns TR2 was the first guitar with tone-boosting active circuitry. The 1964 Marvin used a knife-edge vibrato, and the 1965 Virginian had a stacked-coil pick-up.

Generally the guitars were not well received and often produced many reissues and odd ball designs Burns finally closed in 1983.

## German Design

In Germany the influence of rock 'n' roll was felt earlier than in other parts of Europe, thanks mainly to the American armed forces that were stationed there. This gave German companies a significant head start over other European manufacturers and they were soon exporting guitars to many other countries, including, ironically, the USA. The major manufacturers, Hofner, Framus and Kilra were concentrated in the Bubenreuth and Erlangen areas, and overall production continued to expand to match the demand generated by the thousands of groups active in the beat boom of the 1960s.

After that peak came the era of copy guitar, a 1970s phase when virtually every guitar maker produced versions of famous Fender and Gibson originals. An example of this is the range of Hofner 1960s solids (illus. 32), which offered the visuals if not the sounds of the American originals. This Hofner Galaxie was a classic mix of Hofner features and Fender influences.

Because of dwindling demand for homegrown products, over the next decade some major names disappeared. Currently German companies still produce high quality guitars but in smaller quantities finding it hard to compete with American and oriental competition.

Like every European country, Italy experienced the pop music boom of the 1960s, and this led to a great demand for electric guitars.

> Many Italian models were supplied by accordion makers who combined aspects of this tradition instrument with their own ideas about electric guitar design and the result was unlike anything being produced elsewhere (2,p.54) (illus. 33).

Later instruments began to reflect American design instruments. By the 1970s much of the accordion flavour had disappeared and, and in most countries, copies of famous brands became common place.

Many European guitar-making companies started in the early 1960s boom. Often one domestic brand per country was enough to cater for the demand, offering cheaper alternatives to the imported competition. Naturally, many of these guitars have been based on the big name American brands, but some European makers added distinctive features that lent some local character and avoided the copying that was so widely practised by oriental companies in the 1970s. Even in Eastern Europe the solid electric guitar made an early impression. Although there were far fewer makers

Illus :32. Hofner 176 Galaxie.


Illus :33. Italian solid electric guitar.

than in the west, large numbers of instruments were produced, and many were exported.

European instruments have never enjoyed the same level of worldwide success as the American originators, but some brand names did enjoy limited success and a reasonable lifespan. Circumstances changed again as standardized products from the USA and the orient supplanted most of the local varieties. Smaller makers that have survived, usually offer smaller runs of high-quality guitars, which sell to a select and often elite minority of relatively well-off players.

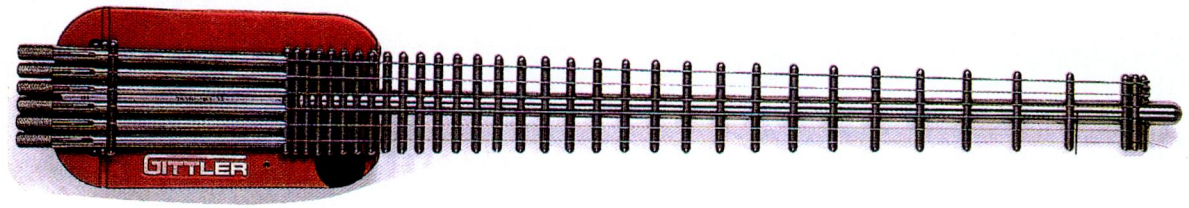
## THE REST OF THE WORLD

'The popularity of the electric guitar has spread worldwide during the past 30 years'. (3, p.114). Virtually every country has produced its own instruments to meet the demand, particularly when imported competition is either unavailable or priced beyond the reach of local players.

Often, instruments built away from the traditional centres of guitar-making have nonetheless been heavily influenced by the leading US brands. They range from out-and-out copies to mere suggestions of the real thing, depending for accuracy on the amount of information available to the domestic maker. Where few outside influences exist, electric guitar design has sometimes taken idiosyncratic turns.

If cultural and trade barriers continue to fall in the 1990s, it seems likely that, throughout the world, guitarists' needs will increasingly be met by products from American and oriental manufacturers. It would be sad if this were to mean the disappearance of local makers, particularly those producing unusual and individual guitars. An example of an unusual

guitar is the instrument designed by American Alan Gittler who decided to remove all conventional aspects of the conventional guitar which he considered unnecessary (illus. 34). It has a miniscule body and a novel stainless steel 'skeleton' chassis. His new model of 1990 reflects his minimalist approach even more strongly (illus. 35) with its primitive construction and simple materials.




Illus :34. Gittler 1985.

Illus :35. Gittler 1990.

## CHAPTER 5:

## Japanese, Korean and Taiwanese electric, solid body guitar design from the 1950s,

'The Japanese began to produce solid electric guitars in the late 1950s'. (3, p.108). Looking at instruments of the early 1960s, one can see that the oriental makers had absorbed western influences, incorporating them into their own relatively original designs. These early instruments are significant, because it is often wrongly assumed that the Japanese guitar industry was founded on the production of copies. The 1967 Yamaha SG5A (illus. 36) is an example of a design from this period and no obvious Fender or Gibson influences can be seen.

The reissue in the late 1960s of Gibson's Les Paul solid electric guitars was provoked not only by players interest in the sound of older instruments, but by an invasion of Western guitar markets by inexpensive replicas.

Most of the earliest Japanese guitars were crude in comparison to their European and American counter parts of the 1960s, but they offered the only financial alternative for many first time players. This development took place at the start of the beat boom, the Japanese shrewedly moved into a market that was to see millions of electric guitars sold throughout the 1960s. Brand names like Broadway, Guyatone and Zenon were seen on the headstocks of these early oriental efforts. Lack of technical knowledge meant that early efforts were often of poor quality, making 'Japanese copy' a derogatory description. But as expertise and understanding improved, so did their product, eventually presenting the established western markers with a real challenge. The Japanese were quick to capitalize on many star guitarists use of obsolete Les Pauls in the late 1960s by turning out thousands of copies which in many cases were excellent facsimiles. They went on to produce a


Illus :36. 1967 Yamaha SG 5A.


Illus :37. Japanese Les Paul copy.

Illus :38. Japanese Stratocaster copy.

plehora of copies, mostly Fender and Gibson designs (illus. 37 and 38). Fender USA decide to start their own oriental production in 1982 because of the increased competition typifed by this Tokai.

Gibson had also indulged in some legal activity over the use of their designs by other companies, but the knowledge gained by the Japanese makers in copying gave them a firm foundation on which to experiment. Several Japanese companies have emerged from this period of transition as particularly fine guitar makers with their own original ideas.

> With the great success of their copies, many of the well established Japanese makers felt confident enough to produce original designs once again. Western influences were still there, but during the 1970s a distinct Japanese visual style emerged (3,p.110).

Their second stage makers all dabbled in copying before rising to their current status. The Yamaha company, for example, has long been in existence and its early Les Paul copies were as good as most. But Yamaha decided to design a firm competitor for the Les Paul, rather than continue to produce its mirror image. In 1978 they launched the SG 2000 (illus. 39) as top of their solid guitar range, loosely based on the Les Paul design despite its double cutaway shape, and boasting all the class and craftsmanship of top American instruments.

Arai produce Aria guitars, which owe a lot of their original success to the excellence of their Pro II PE1000 guitars, beautifully carved and crafted instruments first put on the market in 1977. Many Aria designs and ranges have followed these originals. The Urchin (illus. 40) was the first odd shaped guitar from Aria, and its sales did not however match those of mere traditional instruments, but illustrates that the new design aesthetic had changed considerable from the early days.

Illus :39. Yamaha SG 2000.

Illus :40. Aria Urchin.

Ibanez has had a relatively long history for a Japanese guitar manufacturer, including, like Aria, the obligatory period of Gibson and Fender copying. Unusually they have fared better with their original design guitars and have been active in opening market opportunities by offering a very wide range of guitars and by signing endorsement agreements with many top players as these ads and catalogues show (illus. 41).

Some of these Japanese designs were radical, and in the 1980s a number of makers experimented with synthetic materials. The Japanese popularized several construction methods during this period, including the laminated through-neck style, which created a distinctive centre - section on the body. Increasing US production costs in the early 1980s encouraged various American makers to have some of their guitars made in Japan, most significantly Fender. The Stratocaster design and its modern 'Super Strat' derivatives became the dominant guitar styles of the 1980s. Oriental companies were quick to follow these trends.

The Japanese, too were hit by an increase in production costs, and major guitar companies began to put production out to other eastern countries to maintain their cheaper lines. Japanese built guitars now sell for prices similar to those of their American competitors.

## Korea and Taiwan

When the cost of producing guitars in the United States and Japan began to climb during the early 1980s, the major manufacturers in those countries had to look elsewhere for cheaper manufacturing sources. A few chose Taiwan, but the more suitable climate in Korea made it the most popular option.


Illus :41. Ibanez advertisements and catalogues.


Illus :42. Yamaha RGX.

The prime requirement from the Korean maker is a guitar built down to a price, and almost inevitably this causes compromises in the materials used. The result is often a guitar where fashionable features and a good painting job take precedence over quality and durability. However, the technical knowledge involved is much higher than an earlier oriental effort.. Thanks to expertise provided from both the USA and Japan 'Standards are gradually rising but so are prices - ironically, companies are again looking for cheaper production bases' (3, p.112).

Yamaha's guitars were originally made in Japan, but in the early 1980s all production moved to Taiwan. Yamaha maintained quality by using their own, new factory. (illus. 42) shows the 1989 RGX Custom, based on the popular Superstrat style, was top of the range but has now been suspended.

Many other well-known companies have used Korean sources for their cheaper brands. For example Harmony, Gibson's Epiphone and Fender's Squier all new originate in Korea. Some American companies such as Kramer and B.C. Rich adapted a three-tier system, making their most expensive models in the USA, mid-priced guitars in Japan, and the cheapest instruments in Korea.

## CHAPTER 6:

### 1990s Electric, solid body guitar design.

'Grover Jacksons California-based company can lay claim to the invention of the so-called "Super Strat" (3,p.97) The Super Strat (illus 43) is a refined and updated version of Fenders Stratocaster design rather than a new instrument. The Strats' 21 frets were increased to 24, to accommodate new playing styles which required an increased playing range. Cutaways in the body were deepened to allow access to these upper frets, giving the body longer horns, which also gives the guitar a more aggressive appearance which lends itself to the more aggressive styles of rock music.

Up market Superstrats use a through-neck rather than Fender's bolt-on type with its bulky point, which hinder's fast high register playing positions (top fret access). The Superstrat added the power of a humbucker to the Strat's pick-up layout, and the simple Fender vibrato has given way to a heavy duty locking system.

Early vibratos such as the Fender and the Bigsby systems were designed for gentle, expressive use, and ideally only for lowering the strings pitch. But players began to demand greater pitch variation, which highlighted the limitations inherent in the design of these units. The main problem that musicians encountered with these early designs involved tuning stability; they found that such vibratos did not always return to accurate pitch after they had been used. The solution that emerged in the late 1970s was to lock the strings, if they couldn't move, they couldn't go out of tune, New Zealander Dave Storey clamped them at the nut on his design, which was marketed by the US Kahler company. American Floyd Rose took this further; he added bridge clamps for each string. Both systems used bridge


Illus :43. Jackson Superstrat, Soloist.

Illus :44. Jackson Randy Roads.

Illus :45. Jackson Warrior.

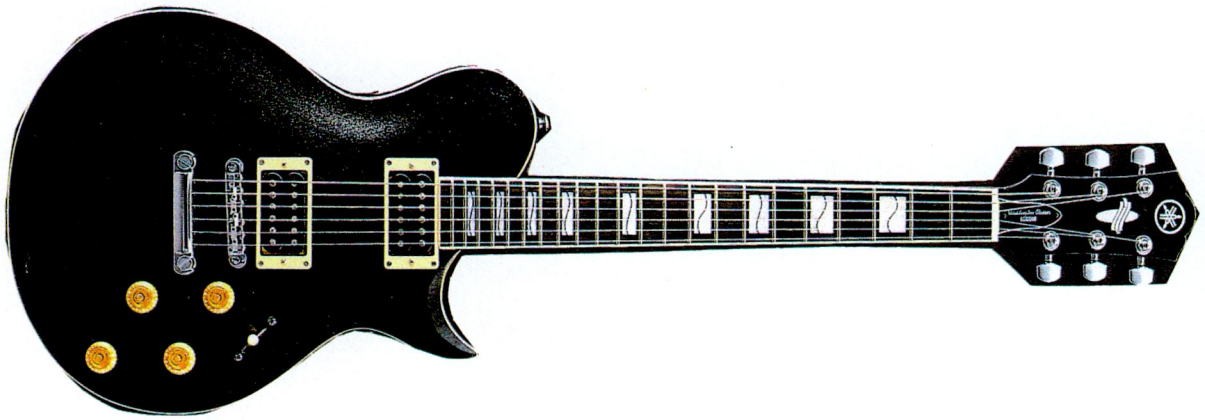
mounted fine-tuners so that tuning could be adjusted once the strings had been clamped.

'The popularity of the heavy-duty locking vibrato grew as a new breed of fast fingered, high-volume guitarists emerged' (9,p.70). The efficiency of the new systems, enable players to drag from the guitar, sounds way beyond its normal range. The Floyd Rose design now dominates the market, and virtually every Superstrat comes fitted with this unit, or one of its many licensed versions.

The first Jackson Superstrat was the Soloist (illus. 43), introduced in 1980. It embodied all these improvements, together with a newly designed 'droopy' pointed headstock. Since then, Jackson have added US-built variations, plus oriental lines under their Jackson Pro, Charvel and Charvette brand-names. Prime examples of these are the Randy Rhoads models (illus. 44) and the Warrior (illus. 45) which are quite radical departures from the companies usual Superstrat style, although not yet completely removed from vintage American influences as Gibson's 'Flying V' (see illus. 18) and 'Explorer' (illus. 19) bear obvious similarities to these Jackson guitars.

During the late 1980s and early 1990s Gibson and Fender have reissued a lot of their early classic designs such as the Les Paul, Explorer, Stratocaster and Telecaster guitars, among others. The rising price of the originals has reached such levels that ironically, musicians are now rarely able to afford these instruments, many of which have ended up locked away in bank vaults as financial investments. The vintage reissues however are intended to combine the appearance of matured 30 year old guitar with the relatively low price of a new guitar. The 1990 classic Les Paul Standard (illus. 46) is a

Illus :46. 1990 Gibson Les Paul standard.



Illus :47. 1990 Yamaha Les Paul.

Illus :48. Blade Stratocaster.

excellent example of this. The recent popularity of sixties music and fashion, in conjunction with a revival in blues based music has led to an increasing number of modern players back to using these reissues. Demand for these reissues is so great that a lot of manufacturers have started to issue designs which, while different, contain many of the basic characteristics of the original guitars Yamahas latest 'Les Paul' type of guitar is a good example of this, as are the Stratocaster designs by Blade a Swiss manufacturer (illus. 47 and 48).

In fact it seems as if the copy era has begun all over again. Some manufacturers however are determined to take the design of the electric guitar further.

## New Materials

Guitars have traditionally been made from wood but makers have tried out other materials. Sometimes, this has been for economic reasons, or sometimes to improve the guitars sound, strength or appearance.

Metals and plastics have been tried since 1920s for the apparent improvement of ridigity and sustain. Some plastics also offered potentially faster production. But working these materials often presented new problems to the makers, and some players found that metals felt cold and plastics appeared cheap. It wasn't until the 1980s and new materials such as 'Graphite' that musicians eventually accepted more alternations to wood.

In the 1960s Valco who owned the National name made a range of fibre glass bodied models (illus. 49), intended for speedy cost effective production, but these ended up more expensive than planned. Designer/manufacturer Dan Amstrong designed a model using clear plastic to improve sustain,


Illus :49. National plastic electric guitar.

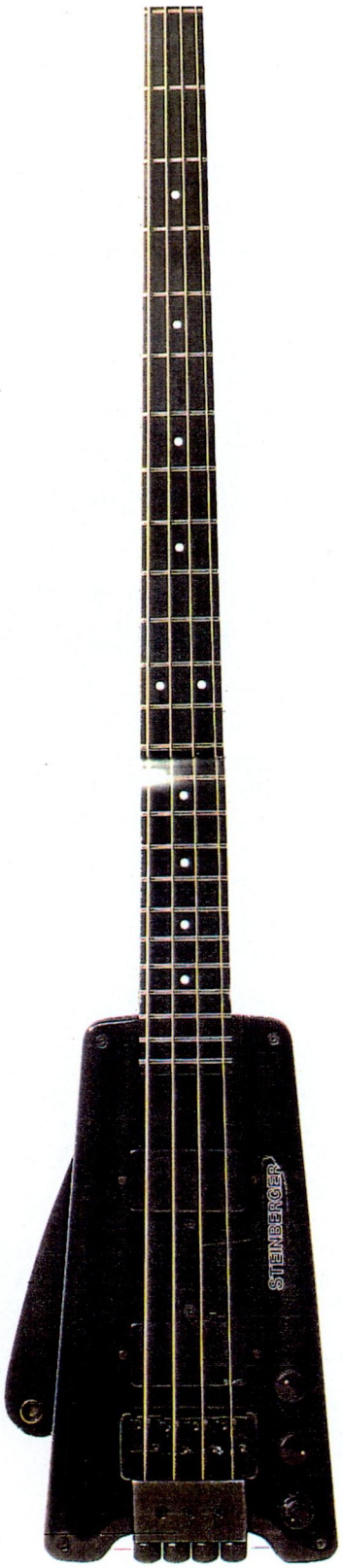
Illus :50. Travis Bean aluminium guitar.

(illus. 8) for Ampeg but it was never a great success. Aluminium has been a favourite alternative material for designers and the Travis Bean company developed their alternative models in California, (illus. 50) but despite increasing volume and sustain the neck's cold feel made Bean's expensive, high quality guitars unpopular and production ceased in 1979.

Increasingly guitar makers have been forced to find more alternatives to wood. Quality timbers are already scarce, and the use of certain woods in quantity is out of step with modern ecological thinking. Some woods have already been embargoed, while other rare types are too costly for mass-produced guitars. Cheaper varieties include, bass wood are now in common use. The Danelectro company which manufactured guitars between 1956 and 1968, used cheap materials and construction in a simple and effective way. Bodies were of (masonite) hardboard on a wooden frame, fitted with basic hardware and pick-ups made from lipstick cases. The combination worked surprisingly well, and many budget Danalectros now sell for high prices. The modern trend however, is to combine woods with synthetic materials such as ebenol plastic and carbon graphite.

One manufacturer who has used synthetic materials with great success is Ned Steinberger. Ned Steinberger was an industrial engineer who worked for Spector, a New York bass guitar-making firm, in the late 1970s. After leaving, he experimented for three years, finally completing his Steinberger bass guitar design in 1980. Ned had concluded that the all-important constituent of an electrical bass is the neck, and that a headstock is likely to cause unwanted changes to the resulting bass's sound. He also reckoned that a guitar's solidity is the key to its sustain and clarity, and so chose to use fibre reinforced epoxy resin for his bass guitar (illus. 51). So unusual was this headless all composite bass that it created a sensation with artists and press

Illus :51. Steinberger bass guitar.



alike. The overwhelming popularity of the original bass guitar design was such that it prompted guitarists to demand, a Steinberger of their own. The first guitar model the GL2 (illus. 52) went into production early in 1982 and embodied the same features as the L2 bass guitar. Augmented by the introduction of the transtrem, which enables players to transpose to any six different tunings (B,C,D,E,F and G). The guitar is also made from an advanced composite graphite material, which the manufacturer claims will never warp, or deform under the highest of string tensions or temperatures. This material is claimed to have twice the density and ten times the stiffness of wood. This leads to a clean, brilliant tone for guitars virtually eliminating 'dead spots' (notes that do not ring true) and any muddiness in the tone. The headstock was removed primarily for balance and tuning convenience, and the tuning gears were moved to the body. The novelty and practicality of the tiny body has faded, but the idea of non-wood materials and headless neck certainly has lasted although the latest Steinberger models have reverted to less radical shapes as his latest model the sceptre (illus. 53) demonstrates while retaining all the advanced features of previous models. While the cost of these guitars puts them out of the reach of most players their advanced design features make Ned Steinberger the second most important name in the history of bass guitar (and to a lesser extent normal six string guitars) after Leo Fender.

## Roland Guitar Synthesizers

During the 1980s the guitar began to lose its dominance of popular music to keyboard-based instruments, primarily synthesizer and later to the sampler, a device which enables real sounds to be recorded digitally and replayed at any pitch by a keyboard. The use of the computer as a compositional tool to control synthesizers and samplers began common

Illus :52. Steinberger GL2, headless guitar.

Illus :53. Steinberger Sceptre.

place in the 1990s, and this change of musical emphasis in the production of popular music has meant a shift in the fortunes for some guitar makers.

But as Keyboards, synthesizers evolved in the 1970s, certain manufacturers saw the possibility of applying the technology to the guitar. This was in effect a development of the guitar organ idea, producing keyboard sounds from a guitar (illus. 29). But these early guitar organs were unreliable. They were also very heavy, because makers put all the bulky circuitry into the guitar. Synthesizer electronics however were becoming increasingly small and generally reliable.

Roland a leading Japanese synthesizer maker, was established in 1974. The company soon began experiments with guitar synths and developed the concept of a two-piece outfit consisting of a guitar (they called it a 'controller') and separate synthesizer box. A series of such models appeared between 1977 and 1985, all the guitars were made for Roland by Fuji Gen-Gakki, best known for their Ibanez and Gieco instruments. Roland must have believed very strongly in the idea. For eight years the company developed their concept and tried to create a market, while no other makers seemed confident enough to provide any real competition.

But Rolands guitar synths never achieved the success that the company clearly believed they deserved. Potential sales were hindered by various factors, not least that, with Rolands system guitarists had no choice but to use the supplied guitar. They also had to modify their playing style to accommodate the idiosyncrasies of the instrument. The outfits were expensive too. Some players thought that having to buy an extra guitar just to obtain the new synth sounds was an expensive luxury. Roland's insistence on synthesizer terminology seemed to imply that guitarists could

become synth experts overnight. In reality, most guitarists like things simple and direct, and were often baffled by these seemingly complex instruments. The Roland guitars were of high quality, but this wasn't enough to tempt many players away from their beloved Fenders and Gibson's. The peculiar styling (illus. 54) didn't help the popularity, giving the impression that Roland wanted to create a market rather than sell to the existing one.

## Synth and MIDI-Guitars

In the mid-1980s several British and Japanese companies decided that there was enough interest in the guitar synthesizer to warrant their involvement. Roland virtual creators decided to abandon the dedicated guitar system, opting instead for a rack-unit driven by a hex pick-up suitable for any electric guitar. Ironically, most of the competition chose Roland's original idea, and offered purpose-built guitars. Some refined this still further by offering completely self-contained guitar synths, with all sound generation circuitry built into the guitar.

The introduction of MIDI, - the Musical Instrument Digital Interface - in 1983 broadened the potential sounds available to the synth-gutarist. MIDI is a communication system agreed by all major makers that enables synthesizers to be linked and to control one another. MIDI-equipped guitar 'controllers' can therefore, use the sounds from suitable synthesizers when connected to them via MIDI. In theory, any brand of MIDI guitar can be used with any brand MIDI synthesizer.

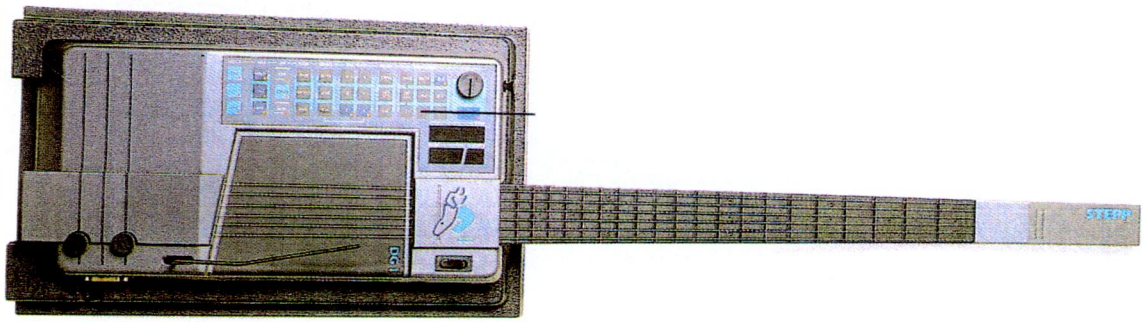
Despite the great advances made in sound synthesis, guitarists have been slow to embrace this new technology. This has been due in part to hi-tech manufacturers failing to grasp what guitar players really want. Applying keyboard synthesis techniques and computer technology directly to the


Illus :54. Roland synth guitar.

guitar has so far failed to work completely successfully, and only a minority of guitarists appear willing to accept the inherent compromises of this method. Most guitarists want simple instruments: makers seem intent on complicating them. It is possible that the guitar and the synthesizer will never be married successfully unless the attitudes of both manufacturers and guitarists change significantly.

However new products such as the Synthaxe (illus. 55) have been a step in the right direction. The Synthaxe was a British attempt to change the way guitarist play, this model was strongly influenced by ergonomic considerations i.e. the angle of neck and had equally spaced frets and separate 'Trigger' and fretting strings. The appearance and cost some £9000 complete has deterred many players from buying this unusual product. It also required a substantial change in the players playing technique. A much more, promising product is the Stepp DG1 (illus. 56). This is a British invention and is the worlds first digital guitar, and this is 'one of the most revolutionary and sophisticated instruments ever made', (14, p.56). This is mainly because it actually plays the responses like a guitar so anybody can use it unlike the afore mentioned products. The Stepp DG1 is an instrument that genuinely pushes forward the frontiers of guitar and instrument design in general. Stepp believe that the DG1 is the natural and logical step in the development and evolution of the guitar.


Illus :55. Synthaxe.




Illus :56. Stepp DG1 digital guitar.

## CONCLUSION

New developments in guitar design have occured for two main reasons. To cater for the requirements of musicians and due to the application of new technology, materials or manufacturing methods.

These developments have rarely led to completely new designs, players and manufacturers prefering to revise and update the more popular existing 'classic' designs. For the established companies of Fender and Gibson, this has meant a continuous traditional market for their older designs. Their more recent designs have failed to achieve the same level of success. The Telecaster, Stratocaster and Les Paul have remained extremely popular with players for a number of reasons' but primarily because of the distinct styling and tonal character that each pocesses due to the design and materials used in their construction. The majority of other companies of the 50s and 60s, who have since disappeared produced well made, but less distinctive sounding guitars which were less preferred by players. Many contemporary 1990s designs are similar to one another in both design, construction and in the materials used. This has led to less distinct tonal variations, and modern guitars from many manufacturers sound remarkably similar despite radically different aesthetics in some models! Hence the popularity of the 'classic' Fender and Gibson guitars.

Other relatively new manufacturers, such as Jackson and Ibanez, though producing guitars which are modern updates of the Fender and Gibson 'classics' have been more successful with their own original designs. The first Jackson Superstrat was the Soloist (illus. 43), introduced in 1980. It had a newly designed 'droopy' pointed headstock amongst other improvements on the Stratocaster theme. Since then, Jackson have added US-built variations, plus oriental lines under their Jackson Pro, Charvel and

Charvette brand-names. Prime examples of these are the Randy Rhoad's models (illus.44) and the 'Warrior'.(illus.45). These are quite radical departures from the company's usual Superstrat style, although not yet completely removed from vintage American influences such as Gibson's 'Flying V' (see illus.18) and 'Explorer' (illus.18) which bear obvious similarities to these Jackson guitars.

These 'newer' designs often contain elements of earlier instruments and are therefore not entirely original, but they at least offer alternatives to the typical Fender and Gibson clones. These modern guitars also offer improvements and refinements on older designs.

The Super Strat (illus 43) is a refined and updated version of Fenders Stratocaster design rather than a new instrument. The Strats' 21 frets were increased to 24, to accommodate new playing styles which required an increased playing range. Cutaways in the body were deepened to allow access to these upper frets. Up market Superstrats also use a through-neck rather than Fender's bolt-on type with its bulky point, which hinder's fast high register playing positions (top fret access). and the Superstrat added the power of a humbucker to the Strat's pick-up layout, and the simple Fender vibrato has given way to a heavy duty locking system.

The humbucker was added to allow a greater range of sonic posibilities, Fenders twang and Gibsons heavier deeper sounds can all be accessed from this new pickup arrangement. Early vibratos such as the Fender and the Bigsby systems were designed for gentle, expressive use, and ideally only for lowering the strings pitch. But players now demand greater pitch variation, which highlights the limitations inherent in the design of these units. The main problem that musicians encounter with these early designs involves

tuning stability; such vibratos do not always return to accurate pitch after they are used. The solution that emerged in the late 1970s was to lock the strings, if they couldn't move, they couldn't go out of tune, New Zealander Dave Storey (a musician) clamped them at the nut on his design, which was marketed by the US Kahler company. American Floyd Rose (a guitar player and designer) took this further; he added bridge clamps for each string. Both systems used bridge mounted fine-tuners so that tuning could be adjusted once he strings had been clamped.

> 'The popularity of the heavy-duty locking vibrato grew as a new breed of fast fingered, high-volume guitarists emerged, (9,p.70).

The efficiency of the new systems, enable players to drag from the guitar, sounds way beyond its normal range. The Floyd Rose design now dominates the market, and virtually every Superstrat comes fitted with this unit, or one of its many licensed versions.

So is there no completely new guitar design? Well there is! Some makers such as Steinberger, Stepp and Synthaxe have utilized new materials and technology in exciting and innovative ways. Expanding and developing the design and scope of electric guitars in the process.

Ned Steinberger was an industrial engineer who worked for Spector, a New York bass guitar guitar guitar guitar-making firm, in the late 1970s. After leaving, he experimented for three years, finally completing his Steinberger bass guitar design in 1980. The overwhelming popularity of the original bass guitar design was such, that it prompted guitarists to demand, a Steinberger of their own. The first guitar model the GL2 (illus. 52) went into production early in 1982 and embodied the same features as the L2 bass guitar. So unusual was this headless all composite guitar that it created a sensation with artists and press alike. Generally the extremely high cost of

these new products, along with the unusual aesthetics employed have led to a less than successful response from players. The novelty and practicality of the tiny body has faded, but the idea of non-wood materials and headless neck certainly has lasted although the latest Steinberger models have reverted to less radical shapes as his latest model the sceptre (illus.53) demonstrates while retaining all the advanced features of previous models. Steinberger has reverted to more traditional styling to cater for the conservative tastes of players, but has retained his innovative features and materials.

Although these innovative new products have many advantages and improvements over the more traditional,'classic' guitars, the very conservative tastes of the overall market, have prevented the mass appeal, of radical new products. While the majority of manufacturers are recycling 'replicas' of the original 'classics', the few innovative designs by smaller manufacturers demonstrate that original guitar design does exist and although it's mass appeal has thus far been limited, it is as original and valid as the original 'classics'.

## BIBLIOGRAPHY


1. ACHARD, KEN, The history and development of the American guitar, New York, Musical new services, 1979.

2. BACON, TONY, Rock Hardware, New York, Harmony, 1981.

3.BACON, TONY, The Classic Guitar book, Dorlin Kindersley, London, 1986.

4. BISHOP, IAN, The Gibson Guitar from 1950, New York, Musical new services, 1977.

5. DENYER, RALPH, The Guitar Handbook, London, Pan Books, 1982.

6. CILLFORD,MIKE, Play Rock Guitar, London, Salamander, 1987.

7. LAWRENCE, ROB, The Story of American Guitars, London, Pan Pan, 1989.

8. WHEELER, TOM, The Guitar Book, London, Macdonald and James,1974.


## PERIODICALS


9. BOSSO, JOSEPH, "Product review", Guitar World, Vol 3, Stanley. R. Harris, Nov'1991.

10. MILANO, DOMINIC, "Oldies", Guitar Player, San Francisco, Miller Freeman, Nov'1991.

11. MARTEN, NEVILLE,"Review, Steinberger", Guitarist, Vol 12, Cambridgeshire, Music Maker, Nov'1991.

12. POLLOCK, BRUCE, "Vintage review, Stratocaster", Guitar, Vol 4, Howard Cleff, Nov'1991

13. TRYNKA, PAUL, "Vintage review, Telecaster", Guitar the Magazine, Vol 1, Northern and Shell Ltd, June 1991.

## SECONDARY SOURCES

14. DESIGN MAGAZINE, November 1984, February 1988, October 1988.

15. GOODWINS, (Music shop).

16. MUSICIAN., (Music shop).

17. WALTONS, (Music shop).

18. LIST OF MANUFACTURERS:

Alvarez - Yairi
Aria Ltd.
B.C. Rich Guitars
Blade Guitars
Carvin.
Charvel/Jackson.
E.S.P. Guitars.
Fender Musical Instruments.
Gibson Guitars.
Hohner H.S.S.
Ibanez.
Mr. Jim Marshall (Ltd.)
Modulus Graphite.
Rickenbacker International Corp.
Status Graphite.
Steinberger Guitars.
Shadow Guitars.
Washburn International.
Yamaha Corp. of AMerica.
Zoid Fight Guitars.
Zon Guitars.
Zoom Guitars.