

**Concert electric guitar composition: Techniques,
challenges and creative possibilities**

**A Thesis Submitted for the
Degree of Doctor of Philosophy**

By

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ABSTRACT

The growing presence of the electric guitar in contemporary art music highlights the need for a focused investigation into its compositional role. This thesis examines the instrument within what is here defined as the domain of the concert electric guitar, that is, the use of the electric guitar in notated, composer-led art music contexts. The thesis functions both as a musicological study and as a compositional resource. It is structured around a theoretical section, addressed to musicologists and composers, which analyses the development of the electric guitar in art music and the ambiguities between popular and concert practices from which the notion of the concert electric guitar emerges. A practical component, specifically directed at composers, complements this discussion. The latter includes annotated examples, original audio and video demonstrations, and a collection of nine studies and a fugue composed by the author, conceived as compositional case studies.

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Chapter 1: Introduction

In the last thirty years, classically trained composers, guitarist-composers, and interdisciplinary practitioners have shown a growing interest in the electric guitar as a compositional medium within art music. This expansion has been accompanied by an increasing number of pedagogical and technical publications, some explicitly addressed to composers. Such developments indicate a progressive consolidation of the field and reflect the instrument's growing institutional recognition. However, while technical resources have become more detailed, the broader conceptual framing of the electric guitar within art music remains less systematised. Questions concerning the ontological status of the instrument, the identity of the musical work, and the distinction between popular and concert practices continue to generate ambiguity.

Recognised publications such as *The Composer's Guide to the Electric Guitar* by David Laganella (2003) and *The Contemporary Guitar* by John Schneider (2015) have provided important contributions to performance and compositional practice. More recent works, including *The Techniques of E-Guitar Playing* (Josel and Lou, 2025), further demonstrate the increasing sophistication and technical precision with which the instrument is being addressed. These publications testify to the field's maturity and growing interest in systematic articulation. Nevertheless, such resources often prioritise the organisation of techniques and performance strategies over a sustained critical examination of the aesthetic positioning of the electric guitar within art music.

The proliferation of technical guides highlights the need to situate the electric guitar within a coherent theoretical framework. Although extended techniques, pedal systems, and electronic mediation are increasingly described and systematised at the technical and notational levels, their formalisation remains partial and not fully stabilised. The criteria distinguishing what is here defined as the Concert Electric Guitar (CEG) from the traditions of the Popular Electric Guitar (PEG) often remain implicit and fluid. In the absence of a clarification of these distinctions, the technical systematisation of the instrument risks becoming descriptively elaborate yet conceptually indeterminate.

The present study arises from the need to address this structural ambiguity and to offer composers a clearer operational reference. Unlike instruments historically stabilised within the concert repertoire, the electric guitar carries a cultural and technological stratification that complicates its positioning. Its identity cannot be taken for granted but must instead be understood as the outcome of conscious compositional choices and formal decisions that regulate its use within a given aesthetic context.

Establishing what is meant by the Concert Electric Guitar does not respond solely to a theoretical or methodological concern, but to an operative necessity. The definition of clear criteria provides

composers with a concrete reference through which to orient their choices, making it possible to consciously modulate the degree of integration or distance in relation to the Popular Electric Guitar. In this sense, the CEG does not impose an aesthetic direction, but provides a tool for decision-making control within each compositional project.

Within this evolving landscape, the expansion of the repertoire for electric guitar within art music, of specialised performance practice, and of scholarly discourse has not represented a simple linear ascent, but rather a process of consolidation in which technical codification and aesthetic positioning develop simultaneously. The different positions and perspectives that have emerged in this context underscore the cultural and sonic significance of the instrument and reflect an ongoing negotiation of its status within concert practice, highlighting both its growing acceptance and the tensions inherent in its integration into art music institutions.

The clarification proposed here does not imply a denial of the instrument's popular origins. On the contrary, engagement with the genres in which the electric guitar developed — particularly jazz, rock, and metal¹ — constitutes an integral part of the definitional process. Many of its timbral and technical innovations emerged within these contexts and once transferred into the domain of art music, acquire different functions and meanings. Even when employed in concert settings, the electric guitar continues to evoke its cultural stratification. Some composers have sought to neutralise such associations through timbral and formal strategies aimed at distancing the instrument from its most recognisable idiomatic traits;² others have instead consciously integrated this legacy. The definition of the CEG is situated precisely within this space of tension.

Within this perspective, the present thesis does not position itself as a corrective to a presumed lack of resources, but as a contribution to the consolidation of the field through the articulation of the CEG as a compositional domain. The study does not merely acknowledge the instrument's popular origins, but analyses their operative implications within the concert domain. Engagement with such practices makes it possible to understand how technical, timbral, and performative solutions assume different functions when situated within a context governed by the primacy of notation and formal

¹ The electric guitar's expressive capacity in 'art music' greatly benefits from innovations within popular genres. Techniques pioneered by rock and metal music have significantly broadened the technical and expressive range of the instrument. The intersection of these influences is well-chronicled in musicology and performance practice analyses. For example, the integration of distortion and extended techniques such as tapping into contemporary compositions has blurred the distinction between popular and art music. Research by Vallejo (2020), Waksman (2001), and Herbst (2023) provides a comprehensive examination of these techniques and their contribution to enhancing performance virtuosity.

² An emblematic example of this approach is Morton Feldman's commentary during an interview with John Cage. Feldman noted that while experimenting with the electric guitar for his unfinished piece *The Possibility of a New Work for Electric Guitar*, he would only take note when the instrument did not sound like a traditional electric guitar, seeking to detach from the instrument's typical rock connotations (John Cage and Morton Feldman in Conversation, Radio Happening I, 1966).

construction. To this end, the research is structured around three complementary perspectives: a critical analysis of significant works from the repertoire, considered as case studies in writing for the Concert Electric Guitar; a systematic organisation of techniques and notational strategies relevant to this domain; and a portfolio of original compositions, conceived as a practical verification of the principles developed.

Although the thesis adopts a practice-based orientation, it does not limit itself to a technical exposition. Rather, it proposes a structured framework in which instrumental organisation, notation, and technological mediation are examined in relation to broader theoretical considerations, with the aim of providing tools that support a more conscious development of the repertoire. In this sense, the proposed systematisation does not seek to direct the field, but to render explicit the underlying premises that may orient compositional choices.

In summary, this thesis sets out to achieve three main objectives:

1. to define the position of the electric guitar within contemporary art music, introducing the concept of the CEG as a distinct compositional domain
2. to develop a structured and critically grounded system of techniques and notational strategies for composers working within the domain of the CEG
3. to contribute to the contemporary repertoire through a portfolio of original compositions for electric guitar, presented as compositional case studies

The following research questions help to define the aims of this study with clarity and to articulate the key issues it seeks to address.

1. How has the repertoire for the electric guitar developed within art music, and which historical, cultural, and aesthetic dynamics have contributed to the reconfiguration of popular music practices in the definition of the Concert Electric Guitar?
2. How can the definition of the Concert Electric Guitar constitute an operative framework that enables the composer to exercise conscious control over the degree of integration or separation in relation to the Popular Electric Guitar?
3. How can the instrument's techniques, gestural vocabularies and notational solutions be organised into a clear and accessible system that supports composers who wish to write for the Concert Electric Guitar?

Taken together, these research questions define the conceptual and practical scope of the study.

1.1 Literature Review

Introduction and Delimitation of the Field

The composition for electric guitar in contemporary art music, although rapidly expanding, still represents a marginal area within musicological research. The instrument, which progressively entered the concert repertoire from the second half of the twentieth century onwards, has been the subject of numerous cultural and historical reflections, yet it has rarely been investigated systematically from a technical and compositional perspective.

Even the existing literature, while offering significant contributions in sociocultural fields, proves to be lacking when it comes to addressing the electric guitar from the standpoint of writing, notation, and instrumental techniques applied to art music. For this reason, the present review aims to critically map the main theoretical and practical references related to what is defined in this study as the Concert Electric Guitar (CEG), that is, the instrument employed in art music contexts, with particular attention to timbral treatment, interaction with electronic devices, and performative gesture.

In this context, composition for electric guitar refers to the set of compositional practices intended for the instrument within art music, with an emphasis on formal organisation, the relationship between technique and sound, and the possibilities of extension offered by analog and digital technologies. This definition excludes exclusively improvisational practices or the use of the electric guitar as a rhythmic instrument in pop/rock ensembles, unless such contexts contribute significantly to a consciously developed compositional language.

This review does not aim to be exhaustive, but rather to offer a critical synthesis of the most relevant sources for understanding the development of electric guitar writing in contemporary music. The focus is placed on publications that provide operational tools for composers: technical analyses, notational and aesthetic reflections, and representative case studies.

Manuals and Pedagogical Texts

Several texts represent fundamental reference points for those approaching electric guitar writing from a compositional perspective, most notably *The Contemporary Guitar* by John Schneider (2015), *The Composer's Guide to the Electric Guitar* by David Laganella (2003), and more recently *The Techniques of E-Guitar Playing* by Seth F. Josel and Michelle Lou (2025).

Schneider's volume offers a detailed overview of the contemporary concert guitar, with particular attention to historical developments and performance techniques. Although the focus is mainly oriented toward the classical guitar, significant references to the electric guitar are included, especially regarding its microtonal potential. The adopted approach is both practical and

musicological: techniques are illustrated through clear notation and supported by audio examples that aid understanding. However, the treatment of the electric guitar remains marginal compared to that of the acoustic instrument, and the lack of a thematic or genre-oriented perspective limits a deeper understanding of the guitar's role in art music contexts. Nonetheless, the text stands out for its technical precision and for highlighting the instrument's innovative potential, particularly in the realm of microtonality (Schneider, 2015).

Laganella's manual, more direct and practice-oriented, represents the first systematic attempt to provide composers with a guide dedicated exclusively to the electric guitar. Among its strengths are the analysis of sound processors and their impact on the instrument's timbre, along with the inclusion of online audio examples that enhance the text's pedagogical value. However, the decision to base the examples exclusively on the author's own compositions limits the stylistic variety of the material. Additionally, each technique is presented with a relatively narrow range of approaches, making the treatment useful but not exhaustive. Despite these limitations, the text proves to be a valuable resource, especially for non-guitarist composers, due to the clarity of its explanations and the attention given to notation, harmonics, and the timbral characteristics of different electric guitar models.

A substantial recent contribution to this area is *The Techniques of E-Guitar Playing* by Seth F. Josel and Michelle Lou (2025), which offers an extensive and systematically organised survey of the electric guitar's organology, amplification, signal processing, extended techniques, and orchestration practices within contemporary contexts. The volume combines technical documentation, notational clarification, performer interviews, and repertoire examples drawn from both solo and ensemble works, thereby providing composers with a comprehensive practical reference framework. Its scope reflects the growing institutional recognition of the electric guitar within contemporary art music and marks a significant step in the consolidation of composer-oriented literature dedicated specifically to the instrument.

The present research is partially situated within this emerging body of composer-oriented manual literature. In its technical component, it aligns with the pedagogical and systematic tradition represented by such publications, particularly in its attention to notation, instrumental resources, and the interaction between the electric guitar and technological devices. However, the project differs in both structure and intention. While Josel and Lou provide a more extensive and systematically comprehensive technical survey of the instrument, the handbook component developed here does not aim at encyclopaedic coverage. Rather, it emerges from the theoretical framework established in Part A of the thesis, where the Concert Electric Guitar is defined and historically contextualised as a distinct artistic category.

Technical materials are therefore approached not as an exhaustive catalogue of possibilities, but as compositional tools situated within a broader aesthetic and conceptual investigation. Furthermore, this component of the study is grounded in a practice-based methodology, incorporating a portfolio of original compositions and multimedia documentation as integral elements of the research process. The included works function not merely as illustrative examples, but as compositional laboratories in which instrumental resources are structurally integrated and critically examined within concrete artistic situations. In this sense, the project situates technical discourse within compositional experimentation and theoretical framing, rather than presenting a standalone technical compendium.

Academic Research

The academic literature dedicated to the electric guitar in art music includes several doctoral theses which, despite their diversity, have contributed meaningfully to the development of the field. However, most of these studies remain limited either by geographical scope, the range of repertoire analysed, or methodological approach.

The doctoral thesis by Robert John Tomaro (1994) is one of the earliest attempts at systematising compositional techniques for electric guitar in concert music. Through a chronological pathway covering the period between 1960 and 1984, Tomaro analyses works by American composers such as Donald Erb and Elliot Sharp, focusing on notation, instrumentation, and performance style. The work is valuable for its documentary richness but is now somewhat outdated due to its limited time span and the absence of references to subsequent developments or international practices.

Zane Banks (2013) offers a broader historical overview of the electric guitar's integration into art music since the 1950s. His thesis includes interviews with performers and reflections on the relationship between performance and composition. However, the core of the study focuses almost entirely on the author's collaboration with composer George Lentz, specifically regarding the composition *Ingwe* (2009). While this provides valuable insights, the discussion remains confined to a single composer and aesthetic, resulting in a limited theoretical and methodological impact.

The theses by Alec Summers (2013) and Paul Ellis (2010) both concentrate on the work of Steven Mackey. Summers presents a detailed theoretical analysis of *Troubadour Songs* and *Three Moments*, focusing on formal structure, harmony, and electric guitar techniques. Ellis, by contrast, adopts a comparative approach, juxtaposing his own concerto with works by Mackey and Takemitsu, with particular attention to orchestration and the differences between writing for electric and classical guitar. Both theses offer thorough analytical examples, but they remain restricted to a small number of composers and aesthetic directions.

George Turner (2015) presents a study of critical and historical discourse around electric guitar

techniques such as tapping, power chords, and the use of the wah-wah pedal. Although not specifically aimed at composers, the work provides an interesting sociocultural and historical perspective on how certain techniques have evolved and been represented in literature.

Benjamin T. Jameson (2017) adopts an interdisciplinary approach that combines composition theory, popular music studies, and cultural studies. His thesis examines how the electric guitar transitioned from rock to the concert hall, with particular focus on composers such as Tristan Murail and Laurence Crane. Despite offering a rich and well-contextualised theoretical framework, the study is limited by the small number of works analysed and by a strong emphasis on aesthetics and cultural positioning, rather than on compositional technique.

A more recent contribution is the thesis by Andrew Noseworthy (2023), which analyses the composition *Transference Music* for electric guitar soloist and amplified orchestra. The work is conceived as the result of a creative process integrating performance and composition, and it explores the performer's gestural and textural experience as the foundation for form, motivic structure, and orchestration. Although the thesis is highly self-reflective and centred around a single work, it marks a significant step in recognising electric guitar composition as an emerging field of doctoral research.

Taken together, these studies map several important directions within the field of electric guitar in contemporary art music. Banks (2013) foregrounds performance practice and performer–composer collaboration, while Jameson (2017) develops a theoretically informed exploration of the instrument's cultural and stylistic positioning within the concert hall. Other studies focus on specific composers or repertoires, offering valuable analytical insights within clearly delimited contexts.

However, a systematically articulated, composer-oriented framework that defines the Concert Electric Guitar as a distinct artistic category while integrating theoretical reflection with compositional practice remains comparatively underdeveloped within existing doctoral research. The present study seeks to contribute to this area.

Academic Articles

In addition to monographs and academic theses, several peer-reviewed journal articles have contributed to enriching the discourse on the use of the electric guitar in contemporary art music. Although these studies address specific topics, they offer valuable insights from both technical and conceptual perspectives, proving useful for composers interested in integrating the instrument within a critical and experimental framework.

Lähdeoja et al. (2010) examine the electric guitar as a modular and augmented instrument, using Santiago Quintans' *5 Fragments pour guitare électrique* as a case study. The article highlights the

technological potential of the electric guitar as a platform for timbral exploration, particularly in connection with real-time sound processing and spatialisation. It is an important contribution to understanding the instrument's role in compositional practices that blur the boundaries between instrumental performance and electronic sound design.

In his article *Formant Synthesis, Granular Synthesis, and Waveshaping in "Halo, Bells and Voices"*, David Bessel (2007) outlines a compositional method for electric guitar inspired by electronic music techniques. Through the analysis of his own work *Halo, Bells and Voices* (2004), Bessel explores the instrument's potential to metaphorically represent electronic concepts via extended techniques such as controlled vibrato, distortion, and the use of a tube amplifier. His approach straddles the space between radical improvisation and structured writing, bringing the electric guitar closer to the language of spectral synthesis. The value of this article lies in its ability to articulate a sonic poetics where the instrument serves as a bridge between acoustic and electronic domains.

Grimes (2014), in *The Physics of String-Bending and Other Electric Guitar Techniques*, examines the physical implications of typical electric guitar techniques such as bending, vibrato, and legato, linking them to cultural and stylistic references (e.g. Eric Clapton, Mark Knopfler). The article stands out for its methodological rigour and its intention to fill a gap in the literature on the physics of electric guitar playing—still largely neglected compared to other string instruments. The analysis includes variables such as finger pressure, string tension, and instrument design, offering relevant input for technically informed compositional choices.

Jan-Peter Herbst (2017) addresses the role of distortion in relation to virtuosity and expressiveness, with a specific focus on rock and metal guitar playing. Drawing on acoustic, musicological, and empirical methods, his article demonstrates how distortion may facilitate technical execution while expanding the expressive range of the instrument. At the same time, the study also highlights challenges and complexities associated with distorted performance that are often overlooked in academic and journalistic discourse. Although the article is rooted in popular music contexts, it provides insights that are equally relevant to art music composition, particularly in relation to timbral design and gestural expression.

These contributions, while not functioning as handbooks or compositional treatises, offer specific perspectives that enrich the practice of electric guitar writing, both in terms of sound design and in the understanding of the physical and symbolic dynamics associated with the instrument.

Research Positioning

The surveyed literature demonstrates a progressive diversification of approaches to the electric guitar within contemporary art music. Historical studies, technical manuals, analytical commentaries, and

composer testimonies each illuminate specific modes of integrating the instrument into concert practice. Taken together, these contributions outline a field that is increasingly articulated, yet methodologically heterogeneous.

Within this landscape, the electric guitar does not emerge as a uniformly stabilised category, but rather as a site of negotiation between different aesthetic, cultural, and notational orientations. The boundaries between concert-oriented practices and those derived from popular traditions are neither consistently defined nor systematically theorised but instead take shape through contextual decisions and compositional strategies.

The present study situates itself within this heterogeneity. Rather than presupposing the electric guitar as a fixed entity, it examines the conditions under which the instrument is framed and constructed as a compositional object within contemporary art music, engaging with the tensions and intersections identified in the existing discourse.

Table 1. Mapping of Key Areas and Sources in Electric Guitar Studies

Technique / Concept	Key Sources	Context / Notes
Tapping, Power Chord, Wah-Wah	Turner (2015), Herbst (2017)	Cultural and technical analysis of virtuosic playing
Distortion and Timbre	Bessel (2007), Herbst (2017)	Impact on expressiveness and playability
Microtonality and Intonation	Grimes (2014), Schneider (2015)	Acoustic studies and microtonal applications
Extended Techniques and Modularity	Lähdeoja et al. (2010)	Guitar as an augmented and flexible compositional tool
Notation and Compositional Pedagogy	Laganella (2003), Schneider (2015) Josel/Lou (2025)	Manuals and taxonomies for composers
Integration with Orchestra	Ellis (2010), Noseworthy (2023)	Concertos for electric guitar and ensemble
Performer-Composer Reflexivity	Banks (2013), Noseworthy (2023)	Practice-led research from the performer's perspective
Stylistic and Cultural Analysis	Tomaro (1994) Summers (2013), Jameson (2017)	Focus on individual authors and aesthetic positioning

1.2 Research Design, Methodological Approach and Thesis Structure

This research adopts a composer-centred approach to exploring the potential of the electric guitar within contemporary art music. It recognises that composers engage with the instrument from diverse aesthetic and technical perspectives and seeks to develop a structured framework that integrates theoretical reflection with compositional application. Rather than proposing an exhaustive theoretical model, the thesis combines critical analysis, historical inquiry, and creative experimentation.

Methodologically, the project is analytical, curatorial, and compositional. It is grounded in a critical selection of repertoire, technical and contextual analysis, and practical experimentation. These elements are synthesised into compositional strategies that are subsequently examined and demonstrated through original works. The research therefore unfolds through a continuous dynamic between theoretical elaboration and creative application.

The thesis is divided into two main sections, each with a distinct and complementary role:

Part A – Historical, Technical and Aesthetic Framework

Part A adopts a historical-critical and genealogical approach aimed at constructing and theoretically delimiting the field of inquiry. Its objective is not to provide a mere survey of the repertoire, but to articulate an operative category – that of the Concert Electric Guitar – through a process of progressive clarification. Methodologically, this section is grounded in a combination of historical reconstruction and conceptual analysis. The historical dimension does not serve a purely descriptive function; rather, it is employed argumentatively to demonstrate how the compositional identity of the electric guitar gradually emerges through transformations in writing practices, performance contexts, and notational conventions.

A focused comparison between *Eruption* and *Vampyr!* functions as a central theoretical hinge, enabling a critical interrogation of the distinction between popular and art music. The research critically examines this distinction, treating it as a historical and cultural construction and subjecting it to scrutiny through comparative analysis and the examination of liminal cases. Additional works discussed subsequently contribute to consolidating and further problematising the proposed category. The inclusion of liminal cases serves a precise methodological function: not to illustrate exceptions, but to test the theoretical robustness of the definition developed, thereby avoiding essentialist or rigidly dichotomous formulations.

The approach adopted is also critical-discursive, in that it interrogates notions frequently naturalised in discussions of the electric guitar – such as authenticity, expressivity, and instrumental identity – in order to clarify their conceptual implications.

Through this framework, the notion of the Concert Electric Guitar is not posited a priori but emerges as the outcome of a process of delimitation grounded in the analysis of compositional practices and their contexts of legitimation.

Part B – Practical Handbook for Composing for the Electric Guitar

This section represents the practical core of the project. It takes the form of a thematically organised handbook, conceived as a stand alone resource that can be used independently of the thesis' theoretical framework. It offers detailed descriptions of standard and advanced techniques, notational challenges, the use of pedals and modular effects, as well as the implications of selecting specific guitar models (e.g. fixed or floating bridges, tonal range, and related characteristics). The aim is to provide a practical and up-to-date tool for writing idiomatically for the electric guitar, supported by examples and notational guidance.

To accompany each technique discussed, specially produced video demonstrations are also provided. These audiovisual materials allow the viewer to observe execution methods directly and to assess, in practical terms, the level of difficulty, physical gesture, and naturalness involved. This support is considered essential not only for fully understanding how the techniques work, but also for enabling composers to evaluate their real-world feasibility and sonic impact, going beyond the abstract or purely notational dimension.

Appendix – *Nine Studies and a Fugue for Concert Electric Guitar*

This appendix presents the complete score of *Nine Studies and a Fugue for Concert Electric Guitar*, accepted for publication by Da Vinci Publishing and currently in press.

The cycle was conceived in dialogue with the handbook and applies a selection of the techniques discussed in Parts A and B, demonstrating their integration within structured compositional contexts. Each study focuses on specific technical and notational strategies relevant to concert electric guitar writing, not as isolated effects, but as elements capable of sustaining coherent formal and expressive structures.

Within the handbook, some of these techniques are further referenced through specific cross-references to the studies, which function as extended applied examples. In this way, the relationship between technical exposition and compositional elaboration assumes a circular form: the techniques are systematised and described in the handbook, while the studies explore their potential in integrated form, offering score-based examples that clarify their implementation within complete musical contexts.

Chapter 2: Historical and Contextual Overview - The electric guitar's evolution in classical repertoire

It is now evident that both the technical and aesthetic dimensions of music are subject to increasingly detailed investigation. In parallel, the boundaries between musical genres have progressively blurred, and the concept of classical music has acquired a broader and more articulated meaning than in the past. Categories such as aleatoric music, electronic music, and *musique concrète* are now generally included within what is described as contemporary classical music, or art music. Until at least the 1970s, however, the distinction between art music and popular music appeared more clearly defined. Many composers, particularly within the European and American postwar avant-gardes, deliberately operated within an aesthetic framework that sought autonomy from commercial culture. Their stylistic choices reflected a conscious effort to maintain distance from popular music, thereby reinforcing a hierarchy between the two spheres.

Today, this distinction has become increasingly difficult to define. The term art music is therefore interpreted in different ways, depending on theoretical perspective. The *Oxford Companion to Music* defines art music as a written musical tradition (Arnold, 1983), a formulation that implicitly excludes unnotated or improvised practices. By contrast, Jacques Siron, in *Musique Savante* (1993, p. 242), proposes a broader understanding, describing art music as music grounded in advanced structural and theoretical reflection. From this perspective, even unwritten musical expressions may be considered part of this category.

The question also arises as to which instruments are considered appropriate within the context of art music. With the growing tendency of contemporary composers to explore unconventional instruments and sound devices in the search for new sonorities (consider, for example, John Cage's use of silence)³, the potential palette of admissible sound sources appears virtually unlimited. This situation raises an important question: can a piece be considered art solely by virtue of the intellectual pedigree of its creator, as in the case of John Cage? Or, as Siron suggests, is it rather the depth of aesthetic reflection that truly distinguishes art music, regardless of the composer's notoriety?

These questions give rise to a variety of complex and potentially divergent responses, leading us more toward the philosophical plane than the strictly musicological one. From this perspective, it is important to clarify that the comments on art music presented in this thesis are intended simply to provide a contextual framework for the research, and do not aim to establish a definitive or universally

³ The reference is to the well-known piece *4'33"* (1952), in which the pianist does not play any notes on the keyboard. The work explores the concept of silence as a sonic event, making the listening environment an integral part of the composition.

valid definition. The issue becomes even more complicated when considering the often-blurred line that separates art music from popular music in the context of the electric guitar. The cultural identity of this instrument is in fact so deeply rooted in popular genres that it becomes almost impossible to separate it from that context, regardless of the compositional approach adopted.

During the second half of the twentieth century, the electric guitar played a decisive role in narrowing the distinction between art music and popular music. Its sonic nature, capable of alternating between timbral purity and distortion, allowed it to move with agility between contrasting languages, becoming a point of contact between aesthetics traditionally considered irreconcilable. On the one hand, the instrument's timbral versatility made its use possible both in concert settings and in more informal or experimental environments; on the other hand, the adoption of the electric guitar by composers operating within the sphere of art music produced a direct symbolic confrontation with the heritage of the European tradition, contributing to a destabilisation of the canonical categories of genre and stylistic belonging (Tomaro, 1994).

At the same time, the electric guitar has contributed to redefining the very concept of virtuosity. While technical mastery has always been a foundational element in both art music and popular music, the invention of new techniques—originating in part from rock and later migrating into the territories of the avant-garde—has transformed the way instrumental skill is conceived and assessed (Waksman, 2004; Herbst, 2017). Added to this is a symbolic dimension that is far from neutral: the instrument has become imbued with strong cultural meanings, serving as a vehicle for identities linked to gender, ethnicity, and the tension between tradition and innovation (Fincher, 2021; Waksman, 2014). In this sense, its presence within contemporary art music is not merely a timbral choice, but an aesthetic and cultural act that challenges established hierarchies.

For the purposes of this study, a pragmatic approach was adopted, selecting scores on the basis of personal criteria supported by widely shared musicological and philosophical reflections, indicative of a style and context typical of contemporary classical music. Firstly, drawing on Siron's (1993) previously cited interpretation, the composers' training and stylistic approach were taken into account, including exclusively those who had received a classical education or who operated primarily within a classical context. This criterion resulted in a heterogeneous selection of examples, ranging from the pioneering and initially marginal use of the electric guitar by classical composers such as Stravinsky and Maderna, to the psychedelic post-spectralism of Fausto Romitelli, and finally to contemporary figures such as Clemens Gadenstätter, Steve Mackey, and Dai Fujikura.

Secondly, the performance context and the aesthetic reflection underpinning the selected compositions were taken into consideration. Each score is, in fact, intrinsically connected to the

context for which it is intended and reflects a specific aesthetic-musical vision of the composer. For example, in the analysis of *Trash TV Trance* (2002) by Romitelli, attention is given to the composer's distinctive aesthetic, suspended between strict control and aleatoric elements. In other cases, the aim has been to highlight the influence of popular music on art music, as in the analysis of *Vampyr!* by Tristan Murail, examined in relation to the iconic rock track *Eruption* by Van Halen.

It is worth noting that, despite the reciprocal influences already described, the distinction between art music and popular music was, at times, accentuated during the twentieth century by specific stylistic choices. In particular, the avant-garde movement introduced a linguistic complexity that often alienated much of the audience, contributing to a clearer separation between art and popular music. However, it is precisely from this complexity that a profoundly multifaceted contemporary musical landscape has emerged, in which the only real limitation appears to be the individual creativity of the composer.

From a general theoretical perspective, art music has often been described as a form of self-reflective engagement with musical language, while popular music has frequently been associated with commercial dissemination and market circulation. Although this distinction may appear intuitive, art music cannot be reduced to such a binary opposition, as it encompasses diverse aesthetic positions and historical developments that have continuously reshaped its scope. Unfortunately, a universally accepted definition of art remains elusive, precisely because art, by its very nature, resists any attempt at rigid classification. This study acknowledges the provisional character of such definitions, with the awareness that they are subject to revision, expansion, or even refutation. It is with this awareness of their intrinsic fragility that such definitions are used here as temporary points of reference within the discourse of this research.

In light of these complexities and the ambiguities surrounding the categorisation of art music, the intrinsic role played by the electric guitar becomes particularly significant. Thanks to its exceptional technical versatility, its unique timbre, and its ability to engage with diverse musical languages and genres, the electric guitar today represents a valuable resource for innovation and experimentation within the landscape of art music. As demonstrated by numerous academic studies—and as this research will further argue—the instrument has by now entered in a consolidated and undeniable way into the sphere of art music. Not only is it regularly employed by contemporary composers, but its growing presence within contemporary music contexts appears to coincide with a parallel decline in its use within more recent popular music. The latter, increasingly dominated by digital production and synthesisers, has progressively marginalised the electric guitar, whose symbolic and sonic significance has been diminished by a combination of cultural, technological, and social factors.

As Waksman (2014) argues, the shift from a rock-centred musical culture to one based on digital languages has reduced the electric guitar from a symbol of innovation and rebellion to a residual element in a stagnant and self-referential pop scene. Herbst (2017) highlights how digital timbres have progressively overshadowed the instrument's specific tonal qualities, while Hill (2022) points out that the versatility offered by electronic production has led many artists to prefer virtual instruments over the electric guitar. Added to this is Fincher's (2021) observation that the persistent masculinisation of the guitar's cultural imagery has contributed to its marginalisation, making it less accessible to new generations of musicians—particularly women and those from marginalised identity backgrounds. In this scenario, the shift of the electric guitar from popular music to art music appears not only plausible, but already partially underway.

This phenomenon of the electric guitar shifting from popular music to art music reminds us, however, that beyond theoretical discussions and stylistic categorisations, what remains central to musical experience is the subjective engagement of those who play and listen. Indeed, it is important to emphasise that such classifications and terminological debates should not obscure the experiential dimension of music itself. The act of playing, listening to, and interacting with music—in all its forms and contexts—remains an essential factor in truly understanding the musical phenomenon. Regardless of attempts to classify or intellectualise it, the subjective experience generated by music transcends any definition and often becomes a source of innovative and profound insights.

Therefore, the approach adopted in this research has been to maintain an open perspective on the multiple ways in which the electric guitar can be employed and understood within the domain of art music, without overlooking its fundamental role and extraordinary technical development within musical genres outside the classical sphere, such as rock and metal, where it has reached a notable level of technical and expressive achievement. This approach aims to contribute to a broader understanding of the instrument's potential, offering new perspectives and resources to composers and enriching the current debate on its aesthetic, technical, and creative possibilities. Indeed, openness to multiple perspectives constitutes an essential element in the evolution of art music, allowing it to be continually enriched through new sonic explorations.

Looking at the overall picture, it is fascinating to observe how the distinction between art music and popular music—once considered clear-cut and insurmountable—now appears increasingly fluid and permeable. The electric guitar, with its ability to inhabit multiple musical spaces simultaneously, emblematises this shift, offering us a privileged lens through which to explore new aesthetic and cultural connections. Perhaps precisely because of this ambiguity, continued reflection on the nature and boundaries of art music remains not only possible, but necessary. After all, the true richness of

music lies in its very ability to challenge and transcend categorisations, continually inviting us to rethink the limits of our artistic experience.

2.1 Early Repertoire: Acoustic or Electric? Terminology and Hybrid Technique

In the examination of the electric guitar's assimilation into classical music circles during the 1950s and 1960s, it becomes imperative to dissect the implications of how instruments were described. The term 'electric guitar' during this period often had a dual reference, potentially alluding to either a genuine electric instrument or a classical guitar that had been amplified. Banks (2013) observes that some compositions for chamber and orchestral settings from this era were composed in such a straightforward manner that they could be accommodated by both amplified acoustic and electric guitars, without necessitating any specific sound effects or advanced playing methods. This terminological instability is significant because it reveals that the category of 'electric guitar composition' was not yet conceptually fixed. Rather than functioning as a binary acoustic/electric distinction, the repertoire of the period demonstrates a fluid continuum that must be accounted for in any contemporary attempt to define the instrument's role in art music contexts.

Supporting this analysis, Seth Josel—cited in Banks—discusses the fluidity with which amplified classical guitar and electric guitar were used interchangeably in the 1950s and early 1960s (Banks, 2013, pp. 42–43). This transitional lexicon indicates not only a period of technological adoption but also a gradual recognition of the electric guitar's emerging identity within composed music. For instance, Earle Brown's *Indices* (1954) includes an electric guitar labelled as an 'amplified guitar', yet the specification of tone-knob settings makes clear that Brown was writing for an electric instrument rather than merely an amplified acoustic guitar. These examples illustrate that early electric-guitar parts were shaped as much by the composers' conceptual frameworks as by the physical instruments themselves. The repertoire does not simply document the arrival of a new instrument—it exposes the processes through which its artistic identity was negotiated, contested, and gradually formalised.

Exploring Terminological Ambiguity: Radamès Gnattali's *Concerto Carioca No. 1*

This transitional phase is exemplified by Radamès Gnattali's *Concerto Carioca No. 1* (1965), a work that integrates the electric guitar directly into a classical idiom. Gnattali (1906–1988), widely respected for his pedagogical and concert works for classical guitar⁴, makes a conspicuous choice in selecting an electric guitar for a concerto embedded within Brazilian musical traditions. The

⁴ Among his contributions is the *Concerto de Copacabana* for guitar and orchestra (1951), which positions the guitar within an expansive orchestral setting. Additionally, his *Toccata em Ritmo de Samba No. 1* (1951) and *Toccata em Ritmo de Samba No. 2* (1956) stand as significant works in the guitar canon.

orchestration includes instruments associated with popular Brazilian genres—Rec-recos, Chocalho, Pandeiro, Surdo—making the adoption of a nylon-string classical guitar an expected solution. Instead, Gnattali opts for a North American electric guitar, an instrument largely absent from mid-century Brazilian art and popular music.

While one might assume an orchestration issue motivated this choice, contemporary practices in Brazil already employed microphones to amplify acoustic instruments without altering their timbre substantially. Gnattali's preference is therefore more plausibly interpreted as an aesthetic and timbral decision. Interviews with José Menezes (Correa, 2005), who premiered the work, confirm that the intended instrument was indeed an electric guitar, despite the score's ambiguous terminology. The concerto exhibits hybrid characteristics: idiomatic classical-guitar writing, frequent use of arpeggios and open strings, and indications for right-hand fingerings rather than pick usage. Studies by Lobo (2018) further demonstrate that the part requires a hybrid plucking technique drawing from both classical and plectrum traditions. The electric guitar thus appears not merely as a louder stand-in for nylon strings but as a consciously selected timbral identity.

Gnattali's concerto exemplifies an early stage in the emergence of what would later be conceptualised in this study as the Concert Electric Guitar (CEG): a compositional mode in which the electric guitar's presence does not automatically entail the adoption of popular music idioms but instead situates the instrument within a structurally conceived art music framework. This challenges the assumption that the instrument's cultural associations automatically anchor it within popular music, and it highlights the need to understand its role within art music traditions on their own compositional terms. Throughout the work, the electric-guitar sound remains clean, without timbral modifications; modular effects ubiquitous today were not yet available. Menezes used a Gibson Les Paul (Lobo, 2018), whose only possible alterations were pickup selection and volume adjustment—neither of which are exploited in the score, which relies entirely on conventional dynamic markings.

The terminological ambiguity persists into the 1960s, as seen in George Crumb's *Songs, Drones, and Refrains of Death* (1968). Although the score explicitly calls for an electric guitar, Crumb allows for substitution with an amplified classical guitar if equipped with a suitable pick-up. These further blurs the boundary between acoustic and electric identities. Crumb's flexible scoring underscores that early composers approached the electric guitar pragmatically rather than categorically, treating it as one component within a spectrum of amplified and hybrid instruments. This historical context demonstrates that the classification of a work as 'electric guitar composition' is not self-evident but contingent upon aesthetic, practical, and conceptual factors—a principle that informs the present study's analytical framework.

2.2 The Electric Guitar's Early Presence in Art Music: Cultural Significance, Functional Roles, and Idiomatic Ambiguities

Despite the terminological ambiguities already discussed, the 1950s and 1960s marked an important phase in the slow yet meaningful integration of the electric guitar into art music. This process was neither linear nor free of misunderstandings but instead developed through hybrid trajectories that challenged conventional definitions of 'electric' and 'amplified' instruments. Within this context, the contribution of Harry Partch stands as an emblematic case—not for the use of the electric guitar in the modern sense, but for his invention of hybrid instruments that questioned traditional categories altogether.

An American composer and performer, Partch (1901–1974) was a pioneer of timbral experimentation. He built a family of original instruments, including four distinct Adapted Guitars, between 1934 and 1952. These instruments were inspired by Hawaiian guitars and played horizontally using a slide. They featured metal strings and were designed to be amplified (Ruşen et al., 2022). However, they were not electric guitars in the conventional sense—that is, instruments whose timbre is shaped by the direct interaction between strings and magnetic pickups. Rather, they were acoustically constructed devices enhanced by amplification, created to extend the tuning possibilities and dynamic range of the traditional guitar.

In this context, electrification assumes both technical and aesthetic significance. It is not merely a matter of increasing volume, but the introduction of a new interface between body, gesture, and sound. As noted by Lähdeoja et al. (2010), instruments like the electric guitar can be understood as augmented instruments, that is, instruments in which acoustic, electromechanical, and digital components converge, thereby redefining their organological function and identity. The electric guitar, as well as other hybrid or adapted string instruments, is not merely an extension of the classical guitar, but a technological and cultural site in which categories of sound, gesture, and timbre are redefined.

In Partch's case, these implications are explicit: his Adapted Guitars not only enabled the exploration of microtonalities, but redefined the identity of the instrument itself, situating it at the intersection of organology and sound sculpture. The study by Ruşen et al. (2022) highlights how Partch introduced an approach in which the guitar, whether adapted or electrified, serves as a vehicle for a new timbral and formal conception within art music. Works such as *Eleven Intrusion* (1949-1950), *Oedipus* (1951, 1952–54, 1967), and *The Bacchae of Euripides* (1960) demonstrate that the Adapted Guitar was an integral part of Partch's theatrical and ensemble practice, rather than an isolated experiment.

Partch's work illustrates a tension that would persist throughout the following decades: on one hand,

the desire to amplify the guitar for practical reasons (projection, timbral balance); on the other, the will to redefine its role and idiomatic potential within a compositional framework.

A different but complementary approach can be found in *Ebony Concerto* by Igor Stravinsky, composed in 1945 for Woody Herman's Big Band. The inclusion of the electric guitar in this orchestral piece, premiered in 1946, represents an early attempt to place the instrument within a symphonic context by a highly regarded classical composer. However, the guitar's role remains marginal: in the first movement it provides rhythmic and chordal accents, while in the third it supports the variations with bass lines. In many modern performances, the guitar part is omitted altogether—an indication of its functional rather than expressive role.

This limited use reflects a broader uncertainty among mid-century composers regarding the electric guitar's aesthetic function within art music contexts. Stravinsky appears to have included the instrument more to align with the instrumentation of the Big Band than out of genuine aesthetic conviction. Nonetheless, this limited presence represents a first step toward the legitimisation of electricity as an orchestral resource in art music.

A more radical transformation is found in *Gruppen* (1958) by Karlheinz Stockhausen, a composition for three independent orchestras, each led by its own conductor. In this work, the electric guitar is employed through a range of extended techniques: microtonal glissandi, percussive distorted sounds, playing behind the nut, and the use of objects to alter the timbre. Here, electrification is no longer just a tool for amplification—it becomes an integral part of a compositional language aimed at deconstructing the traditional orchestral palette.

Yet, as noted by Richard Toop (Banks, 2013, p. 44), Stockhausen's assistant and close friend, the inclusion of the electric guitar does not necessarily reflect an idiomatic exploration. Stockhausen conceived the orchestra as a set of instrumental families (strings, keyboards, plucked instruments) and sought timbral diversity within those categories. In this context, the electric guitar is included for practical reasons—mainly its ability to project through dense orchestral textures—rather than for a genuine interest in its expressive potential. Its presence, though significant, remains driven by functionality rather than a coherent compositional vision for the instrument. Thus, even in its more experimental appearances, the electric guitar entered art music through a tension between practical considerations and emerging aesthetic possibilities—a dynamic that would shape the development of its repertoire in the decades that followed.

In both Stravinsky and Stockhausen, the electric guitar appears as an accessory yet revealing presence. In each case, the instrument enters the world of art music more as a result of circumstantial choices than as the product of idiomatic reflection. Nevertheless, these early inclusions—however

marginal—opened a space for legitimacy and experimentation that other composers would later explore more consciously.

Among them, Bruno Maderna, Luciano Berio, and Bernd Alois Zimmermann stand out for their early and original integration of the electric guitar into their works. In *Studi per il Processo di Kafka* (1950), Maderna incorporates the guitar within contrapuntal writing that enhances its timbral function, even without assigning it a soloistic role. Zimmermann, by contrast, makes more substantial use of the instrument in *Metamorphose* (1954) and especially in *Die Soldaten* (1957–65), an opera considered by critics—and notably by musicologist Bruno Bartolozzi (1982)—to be one of the most important theatrical works of the twentieth century. In these contexts, electrification is not merely a technical issue: it signals a broader transition toward an instrumental practice conceived as a political and sonic gesture, capable of incorporating aesthetic contaminations and non-academic materials, thereby opening the way to new timbral and aesthetic possibilities within postwar art music.

These early integrations suggest that, up to the mid-1960s, the electric guitar entered art music primarily through functional or hybrid logics rather than through a fully developed and sustained idiomatic conception. In most cases, the instrument was incorporated for reasons of projection, timbral novelty, or orchestral expansion, without a corresponding redefinition of its compositional identity. Only in the following years would a more conscious reflection on the specific possibilities of the electric guitar gradually emerge, paving the way for a more autonomous and coherent conception of its role within art music.

2.3 Pushing Boundaries and Emancipation in the 1960s

During the 1960s, the presence of the electric guitar in art music intensified, yet this intensification did not coincide with its immediate idiomatic stabilisation. The experimentation of the decade did not merely mark a technical expansion of the instrument's possibilities; rather, it brought to light a structural tension that remained unresolved: on the one hand, radical timbral exploration; on the other, the absence of a genuine idiomatic redefinition of the electric guitar.

In *Sonant* (1960), for example, Mauricio Kagel subjects the electric guitar to practices that destabilize its traditional function: the use of amplification as a compositional parameter, the employment of feedback as structural material, and the integration of non-conventional performative gestures transform the instrument into an element of timbral friction within the ensemble. In *Unter Strom* (1969), this logic intensifies through direct interaction with electrical devices and the exploration of micro-variations of resonance and sonic interference, rendering the guitar a generator of unstable sonic configurations determined by the interaction between instrument and electrical circuit, rather than a carrier of defined harmonic lines or functions.

In parallel, the performative practices of Keith Rowe, beginning in the mid-1960s within the AMM collective, represent a significant step in redefining the instrumental gesture of the electric guitar, as documented in the group's early recordings, including *AMM Music* (1966) and *The Crypt: 12 June 1968* (recorded 1968, released 1991). Rowe abandons the traditional vertical posture, placing the instrument horizontally on a table and treating it as a resonant surface rather than as a string instrument in the conventional sense. The activation of sound through everyday objects, radio devices, and electromagnetic interference is described by Rowe himself in several interviews (Gruel, 2020), configuring the guitar as an open electroacoustic field rather than as a medium for the articulation of defined pitches. However, as discussed by Piekut (2011) in the context of experimental improvisation, such radicalisation of the instrumental device remains outside the tradition of notated writing. Rowe's intervention redefines the performative identity of the electric guitar, but it does not yet produce a formalized compositional model within art music.

A different type of integration can instead be observed within notated composition. Even in cases where the instrument gained greater visibility — as in Donald Erb's *Trio* (1967) — its inclusion occurred primarily in terms of structural parity with acoustic instruments, rather than through an explicit problematisation of its organological and electrical identity. In the *Trio*, the electric guitar participates in the contrapuntal and timbral processes of the ensemble, sharing with the other instruments rhythmic articulations, textural densities, and formal dynamics. However, the elaboration of the material does not appear to derive specifically from the instrument's electroacoustic properties — such as controlled feedback, circuit–amplifier interaction, or manipulation of sustain — but rather from compositional logics already operative within contemporary chamber language.

This mode of integration finds further examples in works such as Frank Martin's *Poèmes de la mort* (1969–71), Lukas Foss's *Paradigm* (1968, rev. 1969), David Bedford's *18 Bricks Left on April 21st* (1967/68), and Ernst Krenek's *Fünffache Verschränkung* (1969). In each of these cases, the electric guitar is inserted into complex compositional structures, often marked by a pronounced theatrical or experimental component, yet its role remains predominantly relational. The instrument contributes to timbral density and to the expansion of the ensemble, without configuring itself as a generative principle of the writing.

The inclusion of the electric guitar thus consolidates progressively as a timbral possibility within the compositional language of the period, but not yet as an autonomous structural foundation. Even when the instrument assumes greater visibility, it continues to operate within pre-existing configurations, contributing to the expansion of the ensemble and the enlargement of timbral resources without determining an internal transformation of compositional grammar.

In this sense, the 1960s represent a phase of experimental intensification and gradual institutional legitimization of the electric guitar, but not yet the moment of its full idiomatic redefinition. The instrument is destabilized, experimented with, and integrated, but not yet assumed as the object of a writing genuinely conceived for the electric guitar as such — a writing capable of deriving form and the organisation of material from its specific characteristics. The electric guitar enters art music, yet it does not yet constitute itself within it as an autonomous concert entity.

It is precisely within this tension — between integration and autonomy, between timbral expansion and idiomatic foundation — that a more systematic reconsideration of the instrument as a primary compositional subject would become necessary in the following decades, an indispensable premise for what would later be defined as the Concert Electric Guitar.

2.4 Morton Feldman and the Electric Guitar: A Liminal Threshold in Art Music

Morton Feldman's composition for solo electric guitar represents the first recognised attempt at writing for this instrument within an art music context by a major composer, while nevertheless situating itself in an early and liminal phase of the process that would lead to the definition of the concert electric guitar as an autonomous compositional domain. Regrettably, the sole copy of the original manuscript was lost in 1967 leaving behind only a single-page sketch (Villars, 2006). Nonetheless, a tape reel discovered in the archives of KPFA radio in 2006, which captured a performance of Feldman's piece by Christian Wolff in 1966⁵ (Villars, 2006), enabled a full reconstruction of the score.

Analysing Feldman's compositional approach to the electric guitar proves challenging. Without the original score, we can only glean a partial understanding of the composer's intentions for the instrument. Furthermore, as the title suggests, the piece remains an unfinished work. The minimal details in the sketch do not provide a complete understanding of Feldman's compositional intent, but they highlight the sound experimentation that Feldman and Wolff embarked on. This experimental attitude is evident in a radio conversation with John Cage, in which Feldman recalls a session with Wolff exploring diverse and unconventional sound techniques (*John Cage and Morton Feldman in Conversation Radio Happening I, 1966*). In that context, Feldman explicitly stated: “when it didn't sound like an electric guitar, I wrote it down”. In this sense, the piece does not yet testify to a full integration of the electric guitar as a stabilised compositional instrument, but rather to an initial and

⁵ Christian Wolff, a composer known for his experimental techniques and collaborative spirit, was part of the influential New York School of composers. His contributions to the avant-garde community, along with his innovative approaches to composition and performance, often challenged traditional perceptions of musical structure and notation (Nyman, 1974). Wolff's involvement in Feldman's piece for electric guitar is a testament to his versatility and openness to exploring the boundaries of contemporary music.

cautious phase of its entry into the context of art music.

The phrase uttered by Feldman, apparently light-hearted and delivered with a certain irony, in fact reveals much about the attitude of composers of the period towards the electric guitar. As already noted, up to that point no major composer had engaged with writing for solo electric guitar, and Feldman himself approached it in a contingent, almost accidental manner, prompted by his friend Christian Wolff. This episode highlights a relationship with the instrument that was at once open to experimentation yet cautious, marked by a desire to avoid a direct association with the imagery and practices of popular music. The electric guitar is thus received as a sound object to be explored, rather than as an instrument endowed with an autonomous compositional identity within art music. An attitude of cautious distance that, albeit in progressively less pronounced forms, will continue to emerge in subsequent decades, as will be discussed in Chapter 2 in the case of Murail.

This suspension of an idiomatic approach to the electric guitar also finds confirmation on the material level of the writing. The remaining sketch does not adhere to any specific guitar techniques. A notable element in the sketch is the isolated tones with a descending motion (see Fig. 1), resembling the effect produced by a whammy bar⁶, similar to what was on Wolff's guitar⁷.

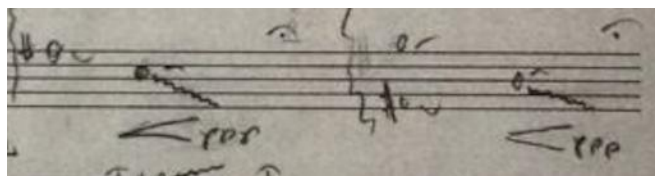


Fig. 1: Descending glissando from *The Possibility of a New Work for Electric Guitar*

Another probable explanation of Feldman's guitar writing's simplicity might be the result of Wolff's unconventional playing techniques, as he used to play with the guitar lying on the floor (Söderberg, 2016). This rudimentary technique has surely had a huge impact on the writing results.

An in-depth examination of Feldman's approach to guitar composition can be understood by evaluating Seth Josel's reconstruction, which draws inspiration from Wolff's recorded rendition. Within the 2013 Edition Peters, Josel offers two distinct versions: one rooted in the original composer's sketch and another that faithfully transcribes the extant recording. Wolff's rendition illuminates Feldman's distinctive compositional style of that era, often marked by a delicate texture, an emphasis on tranquillity, and expansive breaths. Moreover, it intimates that Feldman possibly

⁶ In this thesis, the utilisation of the whammy bar by contemporary composers, such as Pierluigi Billone, is discussed in detail. A specific paragraph is dedicated to the exploration of the whammy bar's usage, highlighting its role and application in modern composition.

⁷ Söderberg (2016) noted in his article that the guitar used by Wolff in Morton Feldman's composition *The Possibility of a New Work for Electric Guitar* was equipped with a whammy bar.

embraced an open-form structure, positioning the documented sonic materials as a foundational canvas for improvisational endeavours. This hypothesis gains traction when one considers Wolff's own guitar composition, *Another Possibility* (Ed. Peters, 2004). In this work, the concluding two score pages proffer merely rhythmic values and directives regarding open or fretted strings, effectively entrusting the actual pitches to the performer's judgment. This modality of semi-prescriptive improvisation arguably resonates with the essence of Feldman's oeuvre.

In the annals of classical composition, the realm of electric guitar seldom occupied centre stage during the 1960s. This makes Morton Feldman's pioneering composition, dedicated to Christian Wolff, particularly significant. It's plausible to suggest that Feldman may not have fully appreciated the potential breadth of influence and recognition that his piece might command. In that era, the incorporation of the electric guitar was mostly restricted to peripheral roles in stage compositions⁸. Given this landscape, Feldman's decision to spotlight a solo work for the electric guitar seemed like a venture into uncharted waters, with limited prospects for broad acceptance or distribution.

However, the historical trajectory shows a different narrative. Feldman's composition, even if unintentional, has indisputably enriched the electric guitar's repertoire in classical settings. As the boundaries of traditional classical music were being expanded and redefined, Feldman's contributions served as a beacon, guiding and inspiring modern composers towards more adventurous terrains. Christian Wolff's composition *Another Possibility* stands as a testament to this influence. The piece is strongly influenced by Feldman's distinctive approach, characterized by quiet and minimal textures, along with brief, fleeting themes that draw the listener into a subtle interplay of sound that alternately diminishes and intensifies (Dougherty, 2015). Moreover, Wolff's compositional methodology for the instrument seems to align closely with Feldman's perspective. As Feldman stated in an interview, he sought to overcome the very condition of the electric guitar (Cage and Feldman, 1966). In *Another Possibility*, Wolff intricately crafts segments that challenge traditional paradigms associated with the guitar, compelling the musician to embark on innovative avenues of execution and interpretation.

Wolff's oeuvre is but a single facet within a larger constellation of compositions that echo Feldman's pivotal piece. Remarkably, the broader repertoire includes at least three other compositions for the solo electric guitar, each is clearly marked by the influence of Feldman's piece. In a noteworthy parallel, in the very same year that Wolff unveiled *Another Possibility*, the Italian guitarist Marco Cappelli, who had established his base in New York, proactively undertook the transcription of Feldman's 1964 piano piece. This effort culminated in *After the Possibility of a New Work for Electric*

⁸ This is evident in pieces such as Bernd Alois Zimmermann's *Die Soldaten* and Bruno Maderna's *Studi per il processo di Kafka* (1950), where the electric guitar, while still prominent, never executes solistic passages or stands out above other instruments.

Guitar (2004). Drawn irresistibly to the allure and enigma encapsulated within the original composition, Cappelli embarked on an intricate exploration of Feldman's vast oeuvre. His objective was clear: to identify and adapt a piece that would harmoniously align with the guitar's unique tonal spectrum.

In the context of transcriptions and arrangements for the electric guitar, it is imperative to reference the scholarly endeavours of the French guitarist Noël Akchoté. In 2015, he penned and recorded a transcription of Feldman's entire 90-minute solo piano work, *Triadic Memories*, rechristening it as *Triadic Memo Pickup's* (2015). Additionally, Akchoté executed an arrangement for electric guitar of Trio, Chorus & Instruments (2015).

Another homage to Feldman's work is Larry Polansky's *34 Chords: Christian Wolff in Hanover and Royalton*, conceived in 1995. This composition was curated for a private concert in celebration of Christian Wolff's quarter-century tenure at Dartmouth College. It was an ode to the elusive Feldman composition, aiming to fill the void left by the lost piece (Polansky, 1995). Polansky's rendition is a unique exploration, marrying the original pitches with the intricacies of the guitar, thereby challenging guitarists to deploy a gamut of advanced techniques to master the composition.

In summation, Morton Feldman's piece, initially perceived as marginal within the repertoire, has come to occupy a significant position in the early development of electric guitar writing in art music. Its implications extended beyond the individual composition, influencing subsequent works and contributing to a gradual redefinition of the instrument's role within contemporary art music contexts. Rather than representing an isolated episode, the work may be understood as an early point of reference in the consolidation of electric guitar writing in art music. The composition dedicated to Christian Wolff thus assumes relevance not only for its musical characteristics, but also for its position within this broader historical process.

Table 2. Works inspired by Feldman's *The Possibility for a New Work for Electric Guitar*

Composer	Title	Year
Larry Polansky	<i>34 Chords: Christian Wolff in Hanover and Royalton</i>	1995
Marco Cappelli	<i>After The Possibility of a New Work for Electric Guitar</i>	2004
Christian Wolff	<i>Another Possibility</i>	2004
Noel Akchoté	<i>Triadic Memo Pickups</i>	2015
Noel Akchoté	<i>Chorus and Instruments II</i>	2015

Chapter 3: Towards a Definition of the Concert Electric Guitar: Case Studies and Liminal Practices Since the 1980s

The 1980s represent a fundamental turning point for the electric guitar within the context of contemporary art music. As noted by John Tomaro in his study *Contemporary Compositional Techniques for the Electric Guitar in United States Concert Music* (1994), it is precisely between the 1960s and the 1980s that the role of the electric guitar in concert music undergoes a progressive and systematic expansion, no longer limited to episodic or purely experimental uses, but increasingly integrated into formalised compositional contexts and institutionally recognised practices. Tomaro further argues that the introduction of the electric guitar into the environment of art music produces what he defines as a *symbolic confrontation* between the European classical musical tradition and modern American cultural identity (Tomaro, 1994). This transitional phase is further confirmed by Zane Banks, who observes that from the mid-1980s onwards the electric guitar begins to lose its status as a novelty within contemporary art music, as a result of the emergence of a stable repertoire and the growing involvement of institutionally recognised composers and ensembles (Banks, 2013).

At the same time, this phase of consolidation does not resolve the tensions between art music and popular music but rather renders them more explicit. The 1980s thus produce a dual outcome: on the one hand, a relatively solid ground on which it becomes possible to begin defining what this study terms the Concert Electric Guitar; on the other, a series of practices that operate within a zone of boundary crossing, giving rise to liminal cases in which the electric guitar continues to oscillate between different aesthetic and cultural domains.

The practices developed between the late 1970s and the early 1980s by composers such as Glenn Branca and Rhys Chatham are emblematic of this latter tendency. As documented in depth by Paul Gilgun in his doctoral thesis *Distillation and Synthesis: Aesthetics and Practice in Rhys Chatham's Music for Electric Guitar* (2017), Chatham's compositions from 1977 through the early 1980s are based on an explicit synthesis of minimalism and rock, often realised through non-notated practices, idiosyncratic performative approaches, and an intensive use of amplification and volume. Gilgun situates this body of work within a radically pluralistic post-minimalist context, in which the distinction between art music and popular music is deliberately destabilised, rendering these works difficult to classify according to traditional institutional categories. In this sense, works such as *Guitar Trio* (1977) or *Symphony No. 3 (Gloria)* (1981) may be understood as liminal cases structurally weighted towards the popular pole, despite operating within experimental contexts aligned with the avant-garde.

Alongside these practices, however, the same decade also sees the emergence of works that contribute

more directly to the stabilisation of the field. *Electric Counterpoint* (1987) by Steve Reich occupies a central position in this process. As observed by Twila Bakker in her chapter *Steve Reich's Counterpoints and Computers: Rethinking the 1980s* (2019), the *Counterpoint* series belongs to a phase of consolidation in Reich's institutional position, marking his transition from outsider to a figure fully integrated within the context of American new music. Bakker emphasises that the adoption of digital technologies and prerecorded materials does not result in a loss of formal control but rather reinforces the structural and authorial character of these works, which retain a firm anchoring within the Western art music tradition.

In *Electric Counterpoint*, the dialogue with performance practices and sonic materials derived from jazz and popular music thus coexists with a rigorously determined formal structure, a central role for notation, and an identity of the work that remains distinct from that of the performer. These elements make it possible to interpret Reich's composition as a controlled liminal case, one that contributes to the operational definition of the Concert Electric Guitar while simultaneously exposing the internal tensions inherent in this category.

A further contribution to the definition of the field emerges from composers associated with spectral thought. In *Vampyr!* (1984), Tristan Murail employs the electric guitar as an instrument fully integrated into a complex orchestral context, exploiting its timbral and spectral potential without recourse to direct references to the grammar of rock music. This approach reinforces the possibility of distinguishing between art music and popular music practices on the basis of compositional, formal, and contextual criteria.

Taken together, the 1980s do not constitute merely a phase of stylistic ambiguity but rather represent the historical moment in which the conditions enabling distinctions between different modes of employing the electric guitar become explicit for the first time. As shown by the studies of Tomaro, Gilgun, and Bakker, while certain practices remain liminal or structurally inclined towards the popular pole, others consolidate compositional, notational, and institutional criteria that make an operational definition of the Concert Electric Guitar possible. It is on the basis of these criteria that the following sections will propose more clearly defined distinctions, subsequently tested through case studies that expose their limits and internal tensions.

3.1 A Case Study on the Electric Guitar: Distinguishing Art Music and Popular Music Through *Vampyr!* and *Eruption*

This comparative analysis focuses on two contrasting works that reflect contrasting approaches to the electric guitar, providing a clear framework for distinguishing between art music and popular music. *Vampyr!* by Tristan Murail is a notated composition situated within the spectral tradition of

contemporary music, in which the electric guitar is explored for its timbral qualities and its role within a rigorously organised formal and harmonic structure. *Eruption* (1979) by Eddie Van Halen, by contrast, is an iconic improvised solo from the rock repertoire, renowned for its spontaneity, technical innovation, and expressive immediacy.

These two works exemplify opposing paradigms: on one side, a concert work written for trained performers, intended for interpretation in specialised artistic contexts; on the other, a performance-based creation, rooted in live rock culture and shaped through recording, stage presence, and audience interaction. Through this comparison, the case study highlights fundamental differences in how the electric guitar is conceived, performed, and received in these two traditions—revealing distinctions between composition and performance, notation and orality, formal control and interpretative freedom.

It is important to note that while these two pieces represent archetypal extremes clearly highlighting theoretical distinctions, numerous other musical examples exist along a continuum between these poles, embodying aspects of both approaches. Musicians such as Robert Fripp and Frank Zappa, for example, integrate notated and formally organised compositional elements within a stylistic framework more typically associated with rock. At the same time, this analysis demonstrates how the electric guitar operates across stylistic boundaries, functioning both as a compositional tool and as a powerful cultural symbol.

3.1.1 Historical and Musical Context: A Continuum of Electric Guitar Approaches

In the 1970s and 1980s, the electric guitar consolidated its iconic role in rock music, becoming a symbol of virtuosity and spectacle—especially in the United States and the United Kingdom—with guitarists such as Jimmy Page, Eddie Van Halen, and Ritchie Blackmore (Walser, 1992). While many of the core technical developments in amplification, distortion, and guitar technique had already emerged in the 1960s, the 1970s and 1980s saw a radical transformation in the broader sonic and technological landscape. The introduction of synthesizers, drum machines, and sampling technologies reshaped the way music was produced and performed, influencing both the aesthetics and the structural role of the electric guitar within popular music.

Meanwhile, in contemporary art music—particularly in France—the electric guitar was being explored in a radically different way, focused on its timbral and coloristic potential. This was exemplified by the emergence of spectralism in the 1970s, a movement developed by composers such as Tristan Murail and Gérard Grisey.⁹ It is worth noting, however, that spectralism was only one

⁹ Murail's *Mémoire-érosion* (1976) premiered alongside Grisey's *Partiels* (1976) are often cited as a foundational work of spectral music, exploring sound's microstructure and temporal evolution ("New Dimensions (1976–1978)", 2023).

among several influential compositional approaches of the time. Minimalism, with its emphasis on repetition and gradual process (as in the works of Steve Reich and Philip Glass), post-serialism, and the integration of non-Western musical elements through the so-called world music aesthetic also shaped the diverse landscape of contemporary art music during this period.

Spectralism is based on the scientific analysis of sound and the creation of harmonic structures derived from the acoustic spectrum. This approach redefines the concept of musical writing by placing timbral continuity and microtonal control at the centre of the compositional process. According to Murail, spectral composition is rooted in the decomposition of sound into its physical components, reconceiving timbre as a complex entity that encompasses frequency, intensity, and duration (Alla, 2005). *Vampyr!* fits squarely within this tradition, treating the electric guitar not as a soloistic instrument intended to express melody or virtuosity, but as a generator of constantly evolving sounds, where distortion, harmonics, and resonances become essential elements of the compositional structure.

During the same years in which spectralism was establishing itself as a compositional technique, the electric guitar in rock music became the primary instrument through which musicians explored new performance techniques and sonic possibilities, asserting their artistic identity. Bands such as Led Zeppelin and guitarists like Jimmy Page helped consolidate the central role of the instrument by experimenting with electronic effects and unconventional techniques, such as using a violin bow on the guitar to create previously unheard textures (Waksman, 2017). In the same period, Eddie Van Halen pushed this technical and stylistic evolution further, popularizing two-handed tapping, a technique that allows fast sequences of notes that would otherwise be difficult to perform on the guitar (Walser, 1992). The piece *Eruption* fully embodies this pursuit, clearly demonstrating how speed, sound control, and technical innovation combine in a solo with a strong individual identity and powerful sonic impact.

However, while these two examples illustrate contrasting archetypes of spectral art music and virtuoso rock performance, the broader musical landscape of the period resists a strictly binary interpretation. Rather than constituting mutually exclusive domains, rock and contemporary art music practices frequently intersected through shared techniques, technologies, and aesthetic concerns. In particular, composers such as Steve Mackey, in his orchestral works featuring electric guitar, and Rhys Chatham, in his minimalist compositions for amplified guitar ensembles, incorporated techniques traditionally associated with rock—distortion, amplification, and repetitive processes—into notated compositional frameworks. In these contexts, rock-derived sonic materials are recontextualised within concert-oriented structures, demonstrating how the electric guitar functions

not only as a vehicle for virtuoso performance but also as a compositional resource within art music practice.

This broader spectrum of approaches enriches our understanding of how the electric guitar can operate across stylistic boundaries, highlighting its unique versatility as both a compositional tool and an expressive cultural symbol. The contrast between the analytical compositional logic in spectralism and the expressive performativity inherent in rock remains central to this comparative analysis. Yet the presence of these intermediate figures underscores a more nuanced understanding of musical practice—one that embraces elements from both compositional rigor and performance spontaneity, from notation-based works to improvisational live creations. Thus, while the distinction between *Vampyr!* and *Eruption* clearly illustrates fundamental differences in terms of composition, performance, notation, and reception, it simultaneously points to the electric guitar's capacity to bridge and synthesize seemingly divergent musical worlds.

The stylistic continuum discussed above can be visualized more clearly in the following diagram (Figure 2), which positions Murail and Van Halen at the extremes, and situates hybrid creators in intermediate points.



Fig. 2: Continuum of electric guitar artists from contemporary art music to rock/pop music

3.2 Comparative Analysis: *Vampyr!* and *Eruption*

In order to clearly understand the differences between *Vampyr!* and *Eruption*, it is helpful to examine not only their musical content, but also their respective methods of composition, transmission, reception, and underlying conceptual approaches within their cultural contexts. The two works will be analysed separately, with cross-references: the first part will focus on *Vampyr!* in relation to *Eruption*, followed by the reverse perspective. The goal is not only to highlight technical and aesthetic differences, but also to reflect on the contrasting compositional and performative logics that define art music and popular music, taking the electric guitar as a key example of an instrument that bridges these two musical worlds.

3.2.1 *Vampyr!* Notated Art Music Writing and Timbral Strategy

3.2.1.1 Notational Writing and Guitar Effects

Tristan Murail adopts an extremely detailed form of writing, specifying every performance parameter with precision and thus making the score the central element of the work. Although this meticulous attention to notation seems to underscore the difference from the performative approach typical of rock, it is already possible to identify certain points of contact between the two musical worlds—particularly in the use of the electric guitar and its characteristic effects. The composer carefully defines the structure, sound materials, and playing techniques of *Vampyr!*, assigning a crucial role to musical notation. Among the indications found in the score, Murail places particular emphasis on effects typical of the electric guitar, such as distortion and compression. The latter, commonly used by rock guitarists in the 1980s, acts by levelling out dynamic differences, amplifying weaker notes and containing louder ones, thus producing a more homogeneous sound and enhancing the natural sustain of the instrument (Kröning, Dempwolf & Zölzer, 2011). Murail's intention appears to be to create a stable and well-defined timbral environment by fully exploiting the sonic possibilities offered by the electric guitar.

3.2.1.2 Distortion as a Compositional Element

Another key effect in Murail's writing is distortion, which he explicitly includes in the score for *Vampyr!* In rock, distortion is omnipresent and represents the most iconic sound of the electric guitar, closely associated with virtuosity and the spectacle of performance. In contrast, in contemporary art music, distortion is often incorporated within broader processes of timbral transformation rather than functioning as a signifier of instrumental virtuosity. Within the spectral tradition, timbre is treated as a primary structural parameter, frequently dissolving the conventional distinction between harmony and sound colour (Fineberg, 2000; Hasegawa, 2018). In Murail's work, compositional processes involve the transformation of harmonic structures into timbral and noise-based phenomena, reflecting an understanding of sound as a dynamic spectral entity rather than as a neutral or transparent medium (Murail, 1989; Fineberg, 2000).

In spectralism, timbre constitutes a fundamental compositional parameter, and Murail's use of distortion allows him to further explore and enrich the harmonic structure of the acoustic spectrum with new timbral possibilities¹⁰. In the preface to the score, Murail explicitly calls for an energetic performance with a typically rock character, clearly specifying the final sonic result he intends to

¹⁰ Distortion works by directly altering the waveform of the electric guitar's original signal, thereby modifying its harmonic components and, as a result, the spectral structure of the sound. Consequently, the presence or absence of distortion has a direct impact on the composition of the final sound spectrum, opening up timbral possibilities that differ significantly from those of a clean, unprocessed tone.

achieve (Murail, 1984). Unlike Eddie Van Halen, who uses distortion implicitly and spontaneously, Murail treats distortion as an intentional compositional element. He defines the effect through clear instructions regarding volume and the overall character of the desired timbre, while still allowing the performer some freedom in configuring the exact technical parameters.

3.2.1.3 Stylistic Dualism - Soloistic Role and Rhythmic Function

Murail approaches the integration of spectral language and rock aesthetics through a series of oppositions and contrasts that are clearly perceivable from the very beginning of *Vampyr!*. As Jamenson (2015) points out, the core structural element of the piece lies in the gradual exploration of a specific harmonic spectrum, which provides a strong sense of harmonic coherence throughout the work. However, this harmonic foundation is contrasted with a distinctly rock-inspired gestural vocabulary that Murail introduces through specific guitar techniques.

Right from the opening bars, a stylistic dualism is evident: the composer uses a pair of high notes coloured by a short glissando executed with the vibrato bar, clearly evoking the virtuosic solo style of rock guitarists (Fig. 3). This is immediately followed by a second musical material, rhythmically driven and based on the insistent repetition of the lowest string (open E), which offers a stable harmonic and rhythmic anchor. The juxtaposition of these two distinct musical gestures symbolically mirrors the dialectic, typical of rock idioms, between the virtuosic lead guitar and the stabilising role of rhythm guitar.



Fig. 3: *Vampyr!* (Bars 1-2)

In this way, Murail adopts and reworks a typically rock-oriented dualism through a spectral lens, transferring to the compositional domain a contrast that usually occurs in the performative and collective dimension of popular music. As Walser (1993) observes, this division in rock music generates a dynamic tension between rhythm guitar, seen as a ‘restrictive’ and structuring element, and lead guitar, which represents sonic and expressive emancipation. Murail reproduces this dynamic in a solo context, where the simultaneous presence of both roles is physically impossible. As a result, the contrast is articulated through the temporal alternation of two types of material: more fluid and exploratory phrases, typical of lead guitar, are interrupted by rhythmically defined and harmonically stable figures, echoing the function of rhythm guitar.

This approach differs significantly from *Eruption*, where Eddie Van Halen, in certain brief moments,

manages to perform both roles simultaneously through initial power chords and virtuosic techniques such as tapping, combined with constant control of distortion and effects. However, in *Eruption*, this contrast does not follow an analytical or structured logic; rather, it emerges spontaneously during the performance, reflecting the inherently improvisational and performative nature of rock language.

This contrast in compositional approach—analytical and detailed in spectralism, improvisational and performative in rock—stands at the core of the comparison between *Vampyr!* and *Eruption*. While Murail meticulously defines every detail through notation, Van Halen instead relies on improvisation as a primary compositional tool. Nonetheless, even in Murail’s highly detailed writing, some elements—though limited—are not rigidly controlled by the score. These can be seen as points of contact with rock’s approach to composition and performance, which is based on improvisation and performative spontaneity.

A significant example of this emerges in the final section of the score, where Murail notates the use of the vibrato bar graphically (see Figure 4). The movement is illustrated with a visual symbol that clearly suggests its trajectory: after an initially intense and fast vibrato, the gesture culminates in a descending glissando whose exact pitch is not specified. Despite the precision of the notation, the performer retains a degree of controlled freedom in determining the intensity and amplitude of the gesture. This freedom is not open-ended but operates within a framework defined by Murail’s notational cues and aesthetic goals—an example of how contemporary art music can accommodate spontaneity without abandoning compositional rigour. In actual performances, this passage is often interpreted as a true ‘dive bomb’, a quick and wide drop of the vibrato bar that produces a sound effect similar to a falling bomb (Brewster, 2003). This interpretive freedom granted by Murail suggests a compositional intent to leave space for performance, partially aligning the spectral language with the spontaneity typical of rock guitar performance.

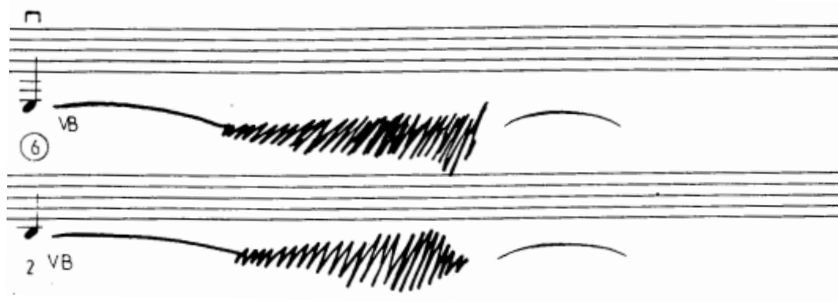


Fig 4: The dive bomb Guitar Gesture and Notational Indeterminacy

It is interesting to note that this type of guitar effect, already widespread in rock by the early 1980s thanks to guitarists such as Eddie Van Halen and Randy Rhoads (Zwicker, 1998), was highly popular at the time Murail was composing *Vampyr!* (1984). Given that the recording of *Eruption* (1978)

predates Murail's composition by several years, one might wonder whether the French composer was aware of the existence and popularity of this technical gesture. However, such awareness remains uncertain—especially in light of a 1988 interview in which Murail admitted not being particularly interested in rock music, nor familiar with its guitar idioms (BBC, 1988). It is therefore plausible that Murail inadvertently recreated a timbral effect similar to the 'dive bomb' through his open-ended and ambiguous notation. This highlights how the electric guitar inevitably becomes a point of convergence between seemingly distant musical languages, even in the absence of explicit compositional intent.

In this case, the dive bomb effect arguably represents the most evident link between *Vampyr!* and *Eruption*. Although it has already been noted that Murail was likely unaware of the dive bomb as a rock technique, it is significant that both works conclude with this very gesture. Nonetheless, the fundamental difference lies in how the effect is used within the compositional and performative processes. In art music, as exemplified by *Vampyr!*, the composer may not fully anticipate the practical realisation of a technique or effect, thereby allowing the performer to realise it according to their understanding of the instrument and its performance practice. In popular music, on the other hand—as in the case of *Eruption*—the dive bomb arises directly from the guitarist's practical and spontaneous experimentation, becoming an integral part of the work itself. This distinction further reveals that the boundary between these two musical worlds lies not only in stylistic and compositional aspects, but also in the creative processes that generate and define musical works.

3.2.1.4 Bending Technique and Interpretative Freedom

Another significant element in Murail's writing that suggests a degree of interpretative freedom—thus approaching the idea of controlled improvisation typical of rock, albeit in a less explicit way than the dive bomb—is his use of bending. This technique is highly characteristic of the electric guitar, particularly in rock and blues contexts, where it serves as a fundamental expressive device. In the score for *Vampyr!*, Murail employs a specific idiomatic notation to indicate bending, using a symbol that graphically represents the physical motion of the string being pushed (Fig. 5). As with the use of the vibrato bar, the composer does not specify the exact pitch deviation resulting from the bend, thus leaving the performer a certain degree of interpretative freedom in executing the gesture.



Fig. 5: Bending techniques in *Vampyr!* (Bars 1-2)

This choice exemplifies the balance in contemporary classical music between compositional intent and performative interpretation. In Murail's case, bending is notated with clear gestural indicators, yet the exact pitch result is deliberately left unspecified. This creates a form of guided indeterminacy, where the performer engages creatively with the material but remains within the sonic framework envisioned by the composer—unlike the more autonomous and self-directed approach characteristic of improvisation in rock music. As noted by Macedo (2019), indeterminacy in contemporary music is often used as a compositional strategy that allows performers to make interpretative decisions, giving them the opportunity to engage creatively with the musical text and to generate performances that are always new and original. Murail's limited use of precise pitch indications for bending can be understood within this framework, as it enhances the performer's expressive and creative freedom. In this way, the interpretative practice of art music comes closer—albeit indirectly—to the improvisatory and performative dimension typical of rock.

However, this interpretative freedom does not imply, in Murail's case, a generic approximation of pitch by the performer. It is plausible to assume that the composer viewed bending as an expressive tool consistent with the aesthetic logic of spectralism, where timbre and microtonality are as important as precise pitch. From this perspective, the performer is not merely executing notated pitches, but actively sculpting the sound, taking into account the physical nature of the instrument and the acoustic characteristics of the performance space. The possibility that a technique typical of rock guitar practice may have been integrated—perhaps even unconsciously—into a rigorously controlled spectral composition represents an additional and significant point of contact, while still maintaining the fundamental differences in approach between the two musical domains.

3.2.2 *Eruption*: Comparative Analysis with *Vampyr!*

The analysis now reverses its perspective. If the previous section examined how a notated art music work incorporates elements commonly associated with rock practice, the following discussion considers a canonical rock solo in relation to compositional criteria usually associated with art music.

3.2.2.1 Orality, Improvisation, and Live Performance

Unlike Murail's *Vampyr!*, which is based on an extremely detailed and precise score, Eddie Van Halen's *Eruption* does not exist in its original form as a written text. Van Halen himself stated that he recorded the iconic solo in two or three takes, ultimately selecting the version that felt most spontaneous and natural for the final album release. This compositional and performative approach emphasizes authenticity and spontaneity—core values of rock and popular music (Butler, 2010). While *Vampyr!* exists primarily on the page, *Eruption* lives exclusively as an audio recording,

distributed through media that prioritize direct listening over notational reading. Available written versions, such as user-generated tablatures circulating on platforms like Ultimate Guitar (n.d.), are retrospective transcriptions created by guitarists through listening, rather than primary compositional documents. This clearly highlights a fundamental difference between the two compositional and performative models: the oral/improvisational tradition of rock stands in stark contrast to the written, compositional precision of contemporary art music.

3.2.2.2 Playing Techniques and Guitar Innovation from a technical-performance perspective

Eruption introduces elements that would become iconic in the history of rock guitar. Van Halen popularized the two-handed tapping technique, which constitutes the virtuosic peak of the solo. This technique, absent from the strictly predetermined writing in *Vampyr!*, perfectly embodies the spontaneity and personal expressiveness typical of rock. The solo begins with a power chord (A5), a sound that responds ideally to the distorted timbre characteristic of rock (Herbst, 2019), immediately setting it apart from the more analytical and spectral harmonic treatment that Murail applies in *Vampyr!*, based on the exploration of natural harmonics and microtonality.

Another distinctive element is Van Halen's customized modification of his guitars, particularly the instrument later known as the 'Frankenstrat', assembled from parts of various instruments and designed to produce specific timbral and performance characteristics. This clearly demonstrates Van Halen's desire to create a personal sonic identity through individual timbral and technological experimentation. Murail, by contrast, while employing rock-inspired techniques and effects (such as distortion and bending), prescribes these elements precisely in the score, intentionally limiting the performer's interpretative freedom—unlike the complete liberty Van Halen retains.

3.2.2.3 Virtuosity, spectacle, and audience reception

Eruption is inherently virtuosic and spectacular in live performance. On stage, as documented in the US Festival performance (Van Halen, 1983), Van Halen continually modified his solo according to context, displaying an energetic and theatrical physical presence, running, jumping, and engaging the audience through exaggerated and communicative gestures. This kind of direct and physical emotional engagement is largely absent from the typical performance context of contemporary music. As noted in the analysis of *Vampyr!*, the performer is instead expected to realize the composer's intentions with near-philological rigour, maintaining a more restrained and controlled interpretative stance.

An intriguing bridge between the two worlds is offered by Jamenson (2015), who analyses a performance of *Vampyr!* by guitarist Verdejo within a theatrical setting ironically inspired by rock. In a Halloween-themed performance, Verdejo deliberately adopted a rock-influenced aesthetic and

gestural language: he played an Ibanez ‘superstrat’ guitar, an instrument strongly associated with 1980s rock aesthetics, and moved with exaggerated, theatrical gestures that parodied the stage behaviour of a rock guitarist. This example demonstrates how the spectacular elements typical of *Eruption* can also be ironically incorporated into a contemporary art music performance, further revealing the complexity of distinctions between the two domains.

3.3 Influences and Possible Unconscious Convergences

despite the profound differences between the two pieces, there are unexpected and meaningful points of convergence. Both works conclude with the technical-sonic gesture of the dive bomb, a quintessentially rock expression that Murail uses in *Vampyr!* with ambiguous notation, allowing a limited degree of interpretative freedom. For Murail, however, this gesture is compositionally prescribed as an expressive timbral element, whereas for Van Halen it emerges spontaneously from improvisational experimentation. This technical convergence further underscores the electric guitar’s role as a ‘bridging instrument’ between distinct musical worlds, illustrating how certain gestural and timbral elements can move freely across the boundaries of art and popular music, despite fundamental differences in compositional, performative, and creative approaches.

The table below summarises the main distinctions between *Vampyr!* and *Eruption*, highlighting how the concept of the concert electric guitar implies a fundamentally different compositional and performance logic compared to its use in popular music.

Table 3. Comparative analytical summary of *Vampyr!* (Murail) and *Eruption* (Van Halen).

Criterion	<i>Vampyr!</i> (Tristan Murail, 1984)	<i>Eruption</i> (Eddie Van Halen, 1978)
Duration	Approx. 9 minutes	Approx. 1 minute and 42 seconds
Transmission mode	Published score (Ed. Lemoine)	Audio recording on album (<i>Van Halen</i> , 1978)
Performance context	Concert hall, contemporary music festivals	Rock stage, live amplified context
Role of performer	Separate from composer; must realise the written indications	Composer and performer coincide; improvisatory and creative execution
Notation	Detailed score with graphic and symbolic indications for effects	No original notation; later transcribed for educational purposes
Formal structure	Compositional design based on timbral materials	Improvised flow of technical-expressive ideas

Criterion	<i>Vampyr!</i> (Tristan Murail, 1984)	<i>Eruption</i> (Eddie Van Halen, 1978)
Instrumental techniques	Predefined by the composer (bending, whammy, distortion, etc.)	Performer-driven choices (tapping, dive bomb, harmonics, etc.)
Use of effects	Prescribed in score (e.g., compression, distortion, volume indications)	Controlled live by the performer (e.g., phaser, delay, overdrive)
Sound aesthetics	Spectral timbral focus, microtonal precision	Expressive power, virtuosity, and sonic impact
Audience	Niche, specialised in contemporary music	Wide and popular, general rock audience
Aesthetic purpose	Exploration of sound as a compositional material	Emotional and technical display, performative impact

The comparative Table 3 is not intended to establish a rigid or normative taxonomy between Concert Electric Guitar (CEG) and Popular Electric Guitar (PEG), nor to imply a hierarchy of value between musical practices. Rather, it functions as an analytical framework designed to highlight recurring tendencies, functional distinctions, and compositional logics that emerge when the electric guitar is situated within contexts broadly associated with art music or popular music. In this respect, the comparison between *Vampyr!* by Tristan Murail and *Eruption* by Eddie Van Halen constitutes an emblematic case in which differences of aesthetic context, treatment of sonic material, and relationships to compositional tradition become particularly legible, despite the presence of superficially similar instrumental gestures.

At the same time, the CEG/PEG distinction must be approached with critical caution. Given the electric guitar's historical and symbolic association with rock performance practices, its adoption within art music inevitably produces zones of overlap in which stylistic, technical, and perceptual elements destabilise categorical boundaries. The table should therefore be understood not as a definitive classificatory scheme, but as a comparative instrument that supports analytical orientation while acknowledging the inherent permeability of the categories it employs.

3.3 Electric Counterpoint (1987): A Liminal Case between Concert Electric Guitar and Popular Electric Guitar

An awareness of the limits and subtleties inherent in the distinction between Concert Electric Guitar (CEG) and Popular Electric Guitar (PEG) becomes particularly relevant in liminal cases, in which this opposition is not immediately applicable or appears deliberately problematised. It is within this intermediate space that *Electric Counterpoint* (1987) by Steve Reich is situated, a work that does not

contradict the analytical categories proposed earlier but instead exposes their conceptual precariousness and the need for a more nuanced interpretative approach. In such contexts, comparison operates less through the opposition of two distinct models than through a continuous negotiation between different languages, practices, and traditions, rendering the CEG/PEG distinction analytically useful only when applied with critical caution.

Electric Counterpoint represents an emblematic case of this liminal condition, as it shares several characteristics commonly associated with the Concert Electric Guitar, such as the centrality of notation and its affiliation with a compositional horizon recognisable as art music.

At the same time, the work introduces elements of tension with respect to some of the criteria summarised in Table 3, calling into question their rigid application without invalidating them. In particular, areas of ambiguity emerge concerning the performative context, which cannot be clearly aligned either with the concert hall typical of art music or with the stage of popular music; the relationship between composition and performer, which appears more complex and stratified than a clear separation between author and interpreter would suggest; and, finally, the destination of the work, which extends beyond a specialised contemporary music audience to address a broader public.

In this sense, *Electric Counterpoint* may be read as a point of intersection between different models of musical production, in which the electric guitar is neither fully ‘normalised’ within the language of art music nor allowed to operate according to the performative logics typical of rock. The work thus constitutes an exemplary case for understanding how the electric guitar may function within art music without renouncing its historical and cultural identity, while at the same time avoiding the expressive and formal models of popular music.

3.3.1 Compositional Framework and Art Music

From a compositional perspective, *Electric Counterpoint* is coherently situated within the domain of art music, fully reflecting the authorial profile and working methods of Steve Reich as a central figure of late twentieth-century art music. Within musicological literature, Reich’s work is consistently framed within minimal music as a compositional practice that is historically and institutionally recognised as part of the art music tradition, despite its incorporation of processes and rhythmic models derived from extra-Western musical traditions.

In *Electric Counterpoint*, this dialogue is particularly evident in the first movement, in which Reich reworks motivic material inspired by models of Central African music, assimilated through his study of the research of Simha Arom (1985). As noted by Scherzinger (2019), a motif originally conceived for three horns is adapted into a two-bar phrase and developed through an eight-part canonical structure, generating a dense and progressive contrapuntal texture (Fig. 6).

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Live

Gt. 1

Gt. 2

Gt. 3

Gt. 4

Gt. 5

Gt. 6

Gt. 7

Gt. 8

Gt. 9

Gt. 10

B. Gt. 1+2

Fig. 6. Excerpt from *Electric Counterpoint* (bars 36–41)

African influence manifests itself here not so much at the timbral level, but rather in the management of metric ambiguity and the distribution of accents, achieved through the superimposition and densification of rhythmic patterns, while remaining within a conventional 4/4 metre. On this analytical basis, more recent scholarship has proposed readings of *Electric Counterpoint* in relation to African musical practices, broadening its reception through world-music perspectives and postcolonial frameworks, and extending its interpretative communities beyond the traditional boundaries of art music and jazz (Glover, 2013).

These elements, far from situating the work within a hybrid or extra art music domain, are fully integrated into a rigorously controlled compositional project, grounded in notation, formal design, and the advance definition of structural processes. Musicological scholarship has consistently located Steve Reich's output, and in particular the works of the *Counterpoints* series, within the tradition of contemporary art music. Foundational studies by Keith Potter (2000), Edward Strickland (1993), and Kyle Gann (1997) interpret Reich's minimalism as an internal redefinition of the parameters of the Western art music language, characterised by strong formal control and a structural conception of musical material.

In this sense, Reich's later production contributed to his full integration into the institutional context of contemporary music, situating works such as *Electric Counterpoint* within the circuit of new music and its associated analytical and performance practices (Bakker, 2019). In light of this framing, *Electric Counterpoint* unambiguously satisfies the analytical criteria associated with the Concert Electric Guitar (CEG), particularly with regard to the centrality of the score, the stability of the work as an autonomous compositional entity, and the adoption of clearly determined formal processes, as outlined in Table 3.

3.3.1 Technology and Effects as Prescribed Devices

In *Electric Counterpoint*, technology does not function as a performative extension or as a space for real-time intervention by the performer, but rather as a structural device fully integrated and stabilised within the compositional project. The work is entirely notated and conceived as a closed composition, in which the stratification of prerecorded parts and their interaction with the live solo part respond to a rigorously predetermined formal design. The prerecorded parts are not subject to manipulation by the performer nor to improvisatory practices, but instead constitute fixed compositional elements, serving the construction of a polyphonic texture based on repetition, temporal superimposition, and gradual variation of relatively simple materials.

Although the prerecorded materials cannot be considered 'effects' in the strict sense, they are functionally comparable to the category of prescribed technological devices, analogous to the effects indicated in the score within Concert Electric Guitar practice. In this respect, *Electric Counterpoint* fully adheres to the criterion concerning the use of technology summarised in Table 3, in which technical devices are defined and stabilised at the compositional level rather than controlled by the performer in real time.

As illustrated by the technical stage setup diagram of the work (Fig. 7), the management of the prerecorded materials is external to the performer and entrusted to a predetermined technical configuration, which excludes any form of direct performative control over the sound layers.

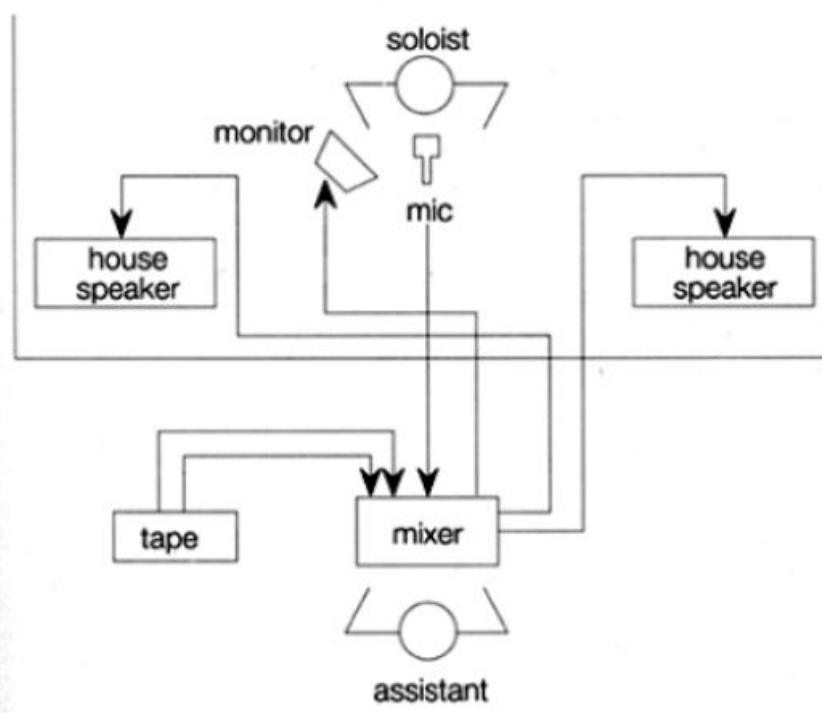


Fig. 7. Stage setup diagram for *Electric Counterpoint*

This configuration confirms a conception of technological use grounded in formal design and in the advance definition of parameters by the composer rather than by the performer, who in this case does not coincide with the authorial figure. This approach is consistent with a compositional practice of art music origin. From this perspective, *Electric Counterpoint* is clearly situated within the Concert Electric Guitar tradition also with regard to its use of technology, understood not as a contingent expressive resource entrusted to the performer's initiative, but as a prescribed structural component of the work.

3.3.2 Composition and Performer

Having clarified the full adherence of *Electric Counterpoint* to the criteria of the Concert Electric Guitar at both compositional and technological levels, several areas nevertheless emerge in which the CEG/PEG distinction proves less stable and requires more articulated analysis.

Despite its unambiguous placement within the domain of art music on compositional and technological grounds, *Electric Counterpoint* introduces a first area of tension with respect to the CEG/PEG distinction in the relationship between composition and performer. The work was conceived and written by Steve Reich for Pat Metheny, a central figure of jazz and popular guitar, rather than for a performer originating from the academic contemporary guitar circuit. This fact, widely documented in the historical reception of the work and in its reference recordings, does not affect the structural or formal control of the composition, which remains entirely in the hands of the

composer, but it introduces an interpretative dimension strongly marked at the timbral, gestural, and cultural levels.

Analytically, this configuration does not align *Electric Counterpoint* with the model of the Popular Electric Guitar, since composer and performer do not coincide and the work retains full structural autonomy. However, the fact that Metheny's sonic and performative identity has contributed significantly to the dissemination and perception of the piece places it in an intermediate zone, in which the performer assumes a greater weight than is typically the case in the Concert Electric Guitar repertoire. The ambiguity thus concerns not compositional authorship, but the degree to which the work becomes embodied in a performer originating from a domain historically associated with popular music.

3.3.3 Destination and Performative Context

A second area of ambiguity concerns the destination of the work and the performative contexts in which *Electric Counterpoint* is performed. On the one hand, the piece is fully integrated into the contemporary music repertoire and is regularly performed by guitarists specialising in Concert Electric Guitar in concert halls and new-music festivals. A paradigmatic example is the interpretation by Yaron Deutsch on the album *33 RPM* (2020), which includes *Electric Counterpoint* alongside works such as *Vampyr!* by Tristan Murail and *Studies for a Portrait* by Clemens Gadenstätter, pieces analysed in this thesis as paradigmatic examples of electric guitar writing within art music.

On the other hand, *Electric Counterpoint* has also circulated in performance contexts associated with jazz and popular music, particularly through the activity of Pat Metheny, for whom the work was originally written. Metheny recorded the piece on the album *Different Trains / Electric Counterpoint* (Nonesuch, 1989), released within his own discographic trajectory and addressed to an audience largely identified with the jazz and crossover sphere. In this way, the work entered circuits of reception that extend beyond the strictly institutional framework of contemporary art music, while retaining its compositional identity. This dual circulation is not common to the entire Concert Electric Guitar repertoire and contributes to problematising the parameter of performative context as outlined in Table 3.

In this respect, *Electric Counterpoint* differs from much of the CEG repertoire not through a lack of placement within art music, but through its capacity to circulate across distinct reception frameworks without losing its structural identity. The coexistence of interpretations in concert halls and within jazz-oriented discographic and performance circuits renders the work a liminal case, in which its destination cannot be reduced to a single specialist domain.

3.3.4 Positioning Electric Counterpoint within the Minimalist Guitar Repertoire

Electric Counterpoint, while a work within minimalist music, does not stand in isolation, but rather emerges within a broader constellation of compositions that engage with minimalist principles through the electric guitar. The oeuvres of Glenn Branca (1948–2018) and Rhys Chatham (b. 1952) are particularly notable for their innovative and large-scale contributions to this repertoire, highlighting alternative trajectories for the electric guitar within and adjacent to the minimalist canon.

Branca, for instance, in works such as *Lesson No. 1* (1979), begins with a modest ensemble of four electric guitars, bass, and drums, later expanding the guitar ensemble to an extreme scale, most famously in *Symphony No. 13 – Hallucination City* (2001) for ninety-one electric guitars. Through the use of repetitive cellular structures and gradual accumulative processes reminiscent of Reich's compositional procedures, Branca constructs dense, immersive sound masses that foreground amplification, physicality, and collective performance. *Lesson No. 1* exemplifies this approach through a descending two-note cell that migrates and phase-shifts across the ensemble, producing a trance-like effect comparable, though not identical in intent or context, to that of Reich's *Electric Guitar Phase* (2001).

Similarly, Chatham's *Guitar Trio* (1977) adopts interlocking repetitive patterns characteristic of early minimalism, while extending these principles toward an explicitly amplified and performative dimension. This trajectory reaches an extreme in *A Crimson Grail* (2005), scored for up to four hundred electric guitars, where the electric guitar functions as a massed sonic body rather than as an individually articulated compositional voice. The minimalist landscape is further enriched by works such as *Septet* (1981) by James Tenney (1934–2006), for six guitars and electric bass, and *Go Guitars* (1981) by Lois V. Vierk, both of which explore repetition and timbral interaction within more compact yet still process-oriented frameworks.

Taken together, these works underscore a significant historical moment in which the electric guitar became a central medium for minimalist experimentation across a wide spectrum of aesthetic positions and performance contexts. Within this landscape, *Electric Counterpoint* occupies a distinct and carefully delimited position. Unlike the works of Branca or Chatham, Reich's composition remains firmly anchored in notated structure, fixed formal design, and strong authorial control, aligning it clearly with the criteria associated with the Concert Electric Guitar. At the same time, its reliance on repetition, groove, and amplified sound situates it in dialogue with practices more commonly associated with popular and experimental music cultures.

This comparison clarifies that *Electric Counterpoint* is neither representative of a wholesale convergence between art music and popular music, nor an isolated anomaly, but rather a paradigmatic

liminal case. Its position within the minimalist repertoire reinforces the usefulness of the CEG/PEG distinction not as a rigid taxonomy, but as a flexible analytical framework capable of accounting for historically and aesthetically situated zones of overlap and productive tension in the repertoire for electric guitar within art music.

Chapter 4: The 21st Century Repertoire: Bridging Popular and Art Music through the Electric Guitar

Although the criteria outlined in Table 3 remain analytically valid, the works discussed in this chapter demonstrate how these parameters are progressively negotiated, combined, or reconfigured, rather than simply opposed. The controlled liminality observable in Steve Reich's *Electric Counterpoint* constitutes, in this sense, a decisive point of transition: within the repertoire of the twenty-first century, the relationship between art music and popular music no longer appears as a problematic exception, but rather as a structural condition of compositional practice for the electric guitar.

Already by the end of the 1970s, the need for post-war composers to maintain a rigid distinction between cultivated and popular music had begun to lose its historical urgency. As Born (2023) observes, the aesthetic hermeticism of the avant-gardes is progressively destabilized by the desire to articulate a musical identity rooted in the culture of one's own time, rather than grounded in inherited ideological oppositions. This culture is deeply marked by the pervasive presence of rock music, within which the electric guitar assumes a role that extends beyond its instrumental function, configuring itself as an icon and spokesperson for forms of artistic and intellectual freedom (Waksman, 2001).

In this context, the gradual abandonment of certain compositional techniques inherited from the avant-garde should not be interpreted as a rejection of compositional craft, but rather as a response to the limitations that such techniques had imposed on the representation of a sonic universe that had undergone profound transformation. In the case of the electric guitar, an instrument historically and culturally linked to popular and rock music practices, these limitations become particularly evident. The timbral, gestural, and technological identity of the instrument makes it increasingly difficult to sustain a clear separation between cultivated and popular languages, especially within a generation of composers who, despite being trained within academic institutions, grew up immersed in rock culture. In this sense, the electric guitar does not function merely as an expressive medium, but as an element of articulation between different traditions, fostering processes of hybridisation that redefine from within the very categories of art music and popular music.

Since the 1990s, the electric guitar became increasingly prominent in contemporary art music, achieving a status comparable to classical instruments and often featuring as a solo instrument within ensembles. Composers from the mid-20th century onwards have incorporated the electric guitar into their works, capitalizing on the instrument's tonal range and the technical capabilities demonstrated by rock guitarists. They have created new and distinctive sounds by combining traditional playing techniques with rock-specific effects and distortions. The previous need to differentiate the electric

guitar from its associations with pop culture has diminished. This evolution is reflected in conversations such as the one led by John Cage with Morton Feldman in 1966, which investigated alternative sound production methods. Feldmann stated, "When it didn't sound like an electric guitar, I wrote it down" (Cage & Feldman, 1966). Twenty years later, the desire to disassociate from rock music was still present, even though it was not entirely evident in music as in the case of Tristan Murail who expressed his distance from rock music in a BBC interview, stating, "I don't know much about it [rock music] and I'm afraid I don't like it very much" (BBC Radio 3, 1988). However, Murail's stated disinterest in and lack of knowledge about rock music is surprising, considering his documented engagement with the genre, as noted by Jamenson (2017)¹¹.

Generational Shifts and the Reconfiguration of Rock Idioms

In the evolving landscape of contemporary music, the electric guitar has emerged as a key element in the vocabulary of new-generation composers, signaling a departure from the philosophies of earlier figures such as Morton Feldman, who advocated for a clear separation between art music and the conventional sounds of the electric guitar. This historical perspective, which once prioritized rhythmic aperiodicity, systematic dissonance, and the exploration of non-traditional sounds, is giving way to a new paradigm. Current composers are not just incorporating, but actively seeking to legitimize the timbres, and in some cases, the rhythms and motifs that are emblematic of iconic rock and metal guitarists. Take, for instance, the works of Rhys Chatham (1952) Fausto Romitelli (1963-2004), Claude Ledoux (1960), Stefano Taglietti (1965), and Dai Fujikura (1977)¹². These composers exemplify the contemporary trend to harness the electric guitar's full technical and expressive potential, drawing from its rich heritage in rock and heavy metal. They do not shy away from the instrument's association with popular genres but instead celebrate and elevate it within the context of art music. This approach does not merely borrow from the language of rock and metal; it recontextualizes it, creating a dialogue between the virtuosity of famed guitarists and the sophisticated textures of modern composition.

The foundational influence of the guitar backgrounds possessed by classically trained composers has been pivotal in the synthesis of popular and classical music genres. The electric guitar emerged as a vital connective element, bridging the gap between these two seemingly disparate sonic realms. Composers of the post-World War II generation were immersed in pop/rock culture. Whether through active participation in rock bands during their formative years or as avid listeners of rock music, the

¹¹ It is posited that Murail's comments regarding rock music stem primarily from an intent to dissociate his compositions from the rock genre, a connection that might potentially detract from the perceived artistic value of his work.

¹² The compositions of authors such as Fausto Romitelli, Claude Ledoux, Fausto Taglietti, and Dai Fujikura are examined within this thesis. The analysis reveal the interrelation between their works and elements characteristic of rock music, underlining the associations and influences that rock music has had on their compositions

imprints of their musical upbringing are discernible in their compositional works. The explicit references to pop/rock culture are conspicuous within the contemporary classical repertoire, and it was with the cohort of composers who matured alongside guitar-centric pop/rock and Heavy Metal music that the genuine integration of the guitar into the classical domain was realized.

Building on this evolution, in 1976, Rhys Chatham, a classically trained flutist, found inspiration in the dynamic punk scene at CBGBs in New York. This immersion into punk culture significantly influenced his musical direction, culminating in his work *Guitar Trio* (1977). Characterized by its relentless strumming and open tuning with high distortion, the piece uses rhythmic persistence to allow the harmonic overtones, typical of rock music, to resonate—as noted by Fox in 2016. This simplicity of form yet intricacy of sound laid the groundwork for further explorations within this genre. Glenn Branca, who worked closely with Chatham, would later extrapolate these concepts into his monumental symphonies for electric guitar orchestras, pushing the textural and harmonic boundaries of massed guitars.¹³

The strategy pioneered by Chatham, familiar in classical music, involves the abstraction of a folk instrument from its traditional cultural connotations, focusing instead on its core acoustic properties. This approach is continued by contemporary composers, as seen in Dai Fujikura's work *Abandoned Time* (2004), scored specifically for rock guitar and ensemble. The electric guitar in this concerto adopts a tone deeply influenced by distortion, employing a range of effects and techniques that recall the groundbreaking styles of guitarists such as Van Halen, and Randy Rhoads. Fujikura's own exposure and affinity to these musicians during his college years in London manifest in the concerto's tribute to the rock guitar genre¹⁴. His personal encounters with rock music markedly shape the concerto's aesthetic, merging his formal compositional education with the energetic and technical aspects of the rock genre that enthralled him in his early years.

The permeation of rock music into the electric guitar's repertoire within the cultivated sphere of art music extends beyond its collaborative role in ensemble pieces to its assertive presence in solo compositions. This phenomenon is not merely an incidental trend but a deliberate incorporation of the electric guitar's versatility and expressive potential. For instance, the composition by Fausto Romitelli, intriguingly titled *Trash TV Trance* (2002), reflects the cultural zeitgeist of the early 2000s, serving as a nod to the pervasive influence of television culture. Downplaying the rock-derived

¹³ In *Symphony No. 13, titled Hallucination City* (2001), Glenn Branca employs an ensemble consisting of 91 guitars. Similarly, Canadian composer and guitarist Tim Brady has been at the forefront of compositions for ensembles of electric guitars. The famous Brady's work *100 questions, 100 réponses* for 100 guitars is a notable example, blending the talents of 20 professional musicians with 80 amateurs, thus eroding the boundaries between avant-garde music and the public.

¹⁴ The information regarding Dai Fujikura's engagement with rock music during his college years and its influence on his composition *Abandoned Time* comes from a personal communication with the composer in October 2021.

elements present in *Trash TV Trance* would imply the imposition of a rigid conceptual boundary between art music and popular music, a boundary that is not supported by the compositional materials of the work itself. However, such a demarcation fails to acknowledge the genuine artistic merits and cross-genre dialogues that this piece exemplifies. The initial fast-paced rhythm and the frequently used progression of quartal chords in rock, poses an evocative question regarding the origins of influence and the authenticity of stylistic borrowings. Furthermore, the piece employs aggressive, distorted sonorities that are emblematic of heavy metal guitar techniques, thereby challenging traditional auditory aesthetics and inviting listeners into a realm where the raw energy of rock coalesces with the conceptual rigor of contemporary classical composition. This intersection crafts a sonic landscape where the electric guitar is not merely an interloper but a legitimate and eloquent voice in the concert hall.

Another salient example of the fusion between art music and popular music is encapsulated in Steven Mackey's composition *Grungy* (1994). The piece can be understood as a tribute to the grunge movement of the 1990s, a genre strongly associated with distorted guitar sounds and a raw, powerful aesthetic (Waksman, 1999). The title itself clearly refers to that musical world, preparing the listener for an engagement with its characteristic soundscape. In *Grungy*, Mackey uses the electric guitar with distortion and chorus effects, drawing on sonic practices typical of rock performance. The strong, forceful phrases and dense textures recall the expressive intensity often linked to amplified guitar music in late twentieth-century rock culture (Fink, 1998). However, Mackey does not simply imitate grunge style; instead, he places these sounds within a contemporary classical framework. Through its exploration of gritty textures and dynamic contrasts, the work creates a dialogue between the energy of popular music and the structural thinking of art music. In this way, *Grungy* highlights the adaptability and expressive potential of the electric guitar within the concert music tradition.

In a similar vein, Claude Ledoux's *Zap's init* (2008) for solo electric guitar goes beyond imitation of rock style and explores its structural and technical possibilities. As specified at the beginning of the score, the composer clearly defines the required equipment and sound configuration, including distortion, compressor, delay, octaver, wah-wah, WR3, and expression pedal (Fig. 8)

MATÉRIEL NÉCESSAIRE :

- guitare électrique de type "Rock", munie d'une manette de vibrato, éventuellement avec un effet de sustain. Utilisation du plectre (mais certains passages peuvent / d'autres doivent être joués sans plectre)
- Une pédale d'octavation (octaviateur programmé pour ajouter l'octave inférieure)
- Une pédale de type Dunlop - Crybaby (ou pédale assimilée)
- Une pédale de type WR3 - Gyatone (ou autofiltre Boss, ou autre pédale assimilée)
- Une pédale d'expression liée à la distorsion (ou possibilité de régler la distorsion via le bouton de volume de la guitare)

Fig. 8: Excerpt from *Zap's init* (Pg. 2)

From the outset, the score reveals a high degree of compositional control over sonic parameters. The explicit marking 'WR3 disto. 100%' (Fig. 9). demonstrates that distortion is not treated as an uncontrolled expressive excess, but as a precisely calibrated musical element. The regulation of effects, articulation techniques such as bend and palm mute, and the detailed dynamic indications show that the energy typically associated with rock performance is fully integrated into a rigorously notated compositional structure.

Phrasés et doigtés de Hughes KOLP

Guitare électrique

ca 30"

WR3 disto. 100%

- improvisation sur le son : varier les effets
- tirer la corde de bas en haut avec le premier doigt

ff > [sustain / ou régénérer le son] > > > >

Fig. 9: Excerpt from *Zap's init* (Bar 1)

This meticulous control situates *Zap's init* at the intersection between rock performance practice and contemporary art music. While the sonic vocabulary clearly draws on the expressive world of amplified rock guitar, the precision of the notation and the structural organisation of sound affirm its identity as a concert work for electric guitar. The piece thus embodies a productive tension: rooted in the aesthetics of rock, yet articulated through the disciplined framework of written art music.

Continuing the investigation into the electric guitar's versatility within the fusion of art and popular music genres, a further significant case can be observed in Stefano Taglietti's *Rocking Up* (2013). The title itself signals an explicit engagement with rock idioms, yet the compositional treatment of these elements situates the work within a notationally defined and structurally regulated framework typical of concert practice.

Particularly significant is the use of delay. The score indicates precise parameters—such as one-second delay time, three repetitions, and approximate volume settings (Fig. 10)—transforming what, in popular music contexts, often functions as an expressive or atmospheric device into a structurally

controlled compositional element. The repetition pattern creates tightly spaced echoes that contribute to a canon-like texture, not as a by-product of amplification, but as an integrated component of the work's polyphonic design. In this sense, the delay is not merely an effect but a compositional layer subject to regulation and formal intention.



Fig. 10: Excerpt from *Rocking up* (Bars 78-80)

Although the sonic result may evoke the experimental sound world of Pink Floyd or the distinctive guitar work associated with David Gilmour, the identity of the piece remains anchored in its score rather than in a specific performer's interpretative agency. The rock-derived materials are therefore recontextualised within a framework in which notation, parameter control, and structural integration take precedence over improvisatory freedom or performer-specific stylistic imprint. *Rocking Up* thus exemplifies how elements conventionally associated with popular music can be assimilated into a concert electric guitar practice without dissolving the compositional identity of the work.

The Institutionalisation of the Concert Electric Guitar

The electric guitarist has emerged as a pivotal force in the fusion of art music with rock, transcending their traditional role within popular music genres. The challenges of the 1970s, such as finding an electric guitarist capable of proficiently reading scores and collaborating with an orchestra conductor, have largely been overcome. Today, we see an emergence of highly skilled performers, many of whom are the dedicated recipients of substantial compositions. Performers active within contemporary art music contexts—such as Tom Pauwels; Seth Josel, responsible for the reconstruction of Morton Feldman's *The Possibility of a New Work for Electric Guitar*; Yaron Deutsch, for whom composers including Pierluigi Billone and Clemens Gadenstätter have written; and Elena Casoli—illustrate the consolidation of a specialised performance practice dedicated to the concert electric guitar. The interaction between guitarist and composer has become more systematic and crucial, with performers often initiating new works and providing essential input. These examples represent just a fraction of the breadth of performers that enrich today's musical landscape.

Contemporary ensembles are also born in which the electric guitar is a core instrument. Among the

many formations that stand out, the Bang on a Can All-stars, defined by the New York times as a fiercely aggressive group, combining the power and punch of a rock band with the precision and clarity of a chamber ensemble (Sun, 2007). Since 1991 guitarist James Woodrow has been a leading member of Icebreaker, an English ensemble dedicated to contemporary repertoire. Daryl Buckley, a guitarist of great talent, is the artistic director of the Australian formation Elision. Particular attention is paid to the electric guitar by the prominent exponents of French spectralism, creators of the ensembles L'itinéraire, among whose founders we find Hugues Dufort, Gérard Grisey and Tristan Murail, that used the instrument in their compositions.

As we look to the future, it is evident that the electric guitar will continue to play a pivotal role in the evolution of musical expression. The instrument's versatility has been embraced by composers seeking to expand the boundaries of traditional music genres, and its capacity to convey a wide spectrum of emotions has been recognized. The fusion of popular music elements with art music has not only enriched the repertoire but has also changed the listener's experience. The electric guitar's distinctive sound has added new dimensions to contemporary compositions, allowing for a broader range of expression and a deeper connection with audiences. This trend is a testament to the ever-evolving nature of music and its ability to adapt to cultural shifts.

What has been discussed so far leads to considering an informed engagement with the traditions of rock and heavy metal as a relevant factor for composers who seek to write idiomatically for the electric guitar within an art music context. The technical development and expressive vocabulary of the instrument have in fact been shaped to a large extent by the practices of rock guitarists, and this legacy constitutes an essential component of the electric guitar's historical and sonic identity.

With the progressive weakening of the distinctions between art music and popular culture, the contribution of techniques, timbres, and gestural practices derived from popular music, and in particular from heavy metal, assumes particular significance. This process of cross-fertilisation has fostered the emergence of a more diversified compositional landscape, in which the electric guitar occupies an active and structurally meaningful role. In this context, the instrument functions less as a symbolic bridge between separate musical worlds and more as a site in which their interaction is negotiated and articulated through compositional practice.

Emblematic cases, among many possible ones, such as those of Fausto Romitelli and Clemens Gadenstätter, which will be discussed later, demonstrate how the integration of the electric guitar into contemporary art music is strongly influenced by composers whose musical formation was itself immersed in rock culture. As will also be seen in the works of Dai Fujikura and Steven Mackey, particularly with regard to the integration of the electric guitar within orchestral contexts, these

composers do not merely cite stylistic elements drawn from popular genres, but employ techniques derived from rock and metal — such as, for example, the deliberate use of distortion — in order to expand the expressive and technical possibilities of the instrument, contributing to the emergence of a new compositional lexicon.

4.1 *Trash TV Trance*: Sound Saturation, Gesture, and the Edge of Control

Within this broader framework, the work of Fausto Romitelli occupies a position of particular significance. His writing for the electric guitar demonstrates how techniques and forms of gestural practice historically associated with rock music—such as the sustained use of distortion, the control of feedback, repetitive quartal harmonies, and a physically insistent performance gesture—are not merely quoted but structurally integrated into a compositional language firmly situated within contemporary art music. Rather than treating these elements as stylistic references, Romitelli adopts them as fully fledged compositional materials, subjecting them to rigorous formal control and precise notation. This approach allows the electric guitar to function as a space in which idiomatic techniques derived from rock are reworked and articulated within a clearly structured artistic framework. For this reason, *Trash TV Trance* provides a paradigmatic case through which the status of the concert electric guitar can be examined: it appropriates the sonic and gestural vocabulary of rock while reinscribing it within the formal discipline and notational precision of contemporary art music.

This approach is particularly striking given that Romitelli (1963–2004) was not a guitarist himself, yet he demonstrated a high degree of idiomatic awareness and innovation in writing for the electric guitar, both as a solo instrument and within ensemble contexts. His contribution to the repertoire and the development of original notation is evident in ensemble works like *Professor Bad Trip: Lesson I, II, III* (1998–2000), which also employ acoustic instruments used unconventionally with tools from the guitar world, such as wah pedals and distortion. The video opera *An Index of Metals* (2003) is also significant, where the guitar fills the sonic space with extreme noises evoking psychedelic images (Hiendi, 2012). The instrument also holds an important place in two other works for ensembles, *Acid Dreams & Spanish Queens* (1994) and *Dead City Radio* for orchestra (2004). However, the most striking example of the innovative use of the instrument is realized in Romitelli's unique solo composition for electric guitar, *Trash TV Trance* (2002).

4.1.2 Notation, Control, and Threshold Aleatoricism

In Romitelli's work, the boundaries between compositional intent, the musical text itself, and the listener's perception become blurred. The tension between the composer's creative choices and the objective musical structure significantly shapes the perceptual experience. The author engages with the challenges and limitations of traditional notation. Rather than being hindered by or completely

discarding this system in favour of alternative methods of notation, the work chooses a different path. It moves along the margins of these boundaries to explore a new aesthetic dimension, which might be described as a hybrid or threshold aleatoricism¹⁵.

This type of aleatoricism lies on the border between the controllable and the uncontrollable: it is controlled because each action is meticulously notated in the score, despite the inherent limitations of the notational system; the performance must therefore adhere to the composer's directives. In the case of *Trash TV Trance*, the quest for gesture requires precise instructions. Yet an uncontrollable component remains, since the final timbral outcome is shaped by variables that cannot be fully predicted or constrained. The solo electric guitar does not produce a uniform sound from one performer to another, due to individual choices of instrument, amplifier, strings, pickups, and effects.

This tension between strict notational control and timbral contingency exemplifies a defining condition of the concert electric guitar: the work is conceived as structurally determined, even when its sonic realisation remains partially unstable.

Romitelli nonetheless seeks to reduce the impact of environmental variables through precise notation. Rather than relying on room acoustics or amplifier placement to generate feedback, the score requires the use of an electric razor to produce it in a specific and controlled manner, with detailed instructions regarding its positioning (see Fig. 11). The feedback effect—historically associated with performative excess and improvisatory risk in rock practice—is thus detached from contingency and redefined as a notated and reproducible compositional device.

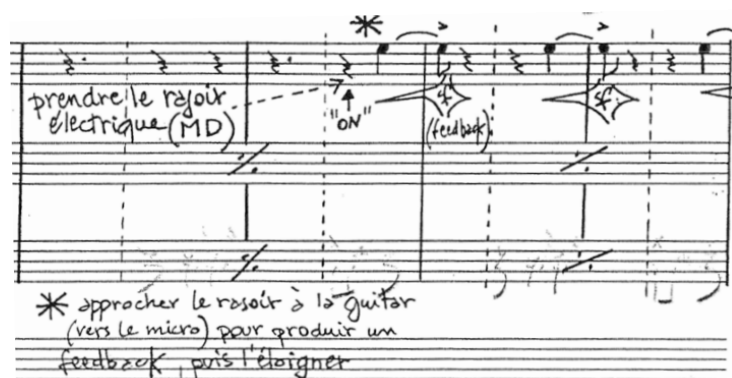


Fig. 11: Excerpt from *Trash TV Trance* (Bars, 171-173)

¹⁵ The concept of 'threshold aleatoricism' as discussed in the text aligns with John Cage's philosophy of introducing indeterminacy into the compositional process. Cage's exploration of chance operations challenges the conventional boundaries of musical notation and performance, allowing for elements of unpredictability within a structured framework (Cage, 1961). Similarly, Pierre Boulez's notion of 'controlled chance' and Karlheinz Stockhausen's 'moments' technique, where certain parameters of the composition are left to chance, contribute to the theoretical underpinning of aleatoric approaches that reside at the intersection of the deterministic and the stochastic (Boulez, 1957; Stockhausen, 1963).

The ambiguity in sound production and the use of technology ‘to dirty’ the sound is an essential part of Romitelli’s Aesthetics which explores the acoustic of the contemporary world. In an interview with Eric Denut the composer shows his aesthetic stating that modern society has progressively forgot the acoustic sound, it is more and more immersed in a world made by reproduced sounds, filtered and transformed (Denut, 2003, p.87). The electric guitar sits ambiguously between the electronic and acoustic worlds and could be consider a metaphorical representation of the meeting between the old and the new way to conceive sound.

In the analysis of the composition, it becomes evident that it is carefully constructed with complex layers. This complex method of composition is essential to express the detailed non-verbal language that includes a wide range of objects and sounds. The work features an array of sophisticated techniques and a variety of sound effects, from altering original sounds to creating backward sequences. The accompanying table specifies the additional tools needed for the performance, explaining how each contributes to creating the intended sound environments and realizing the complex demands of the musical score. The detailed approach to choosing instruments and effects goes beyond simply producing sounds. It aims to provide a deep listening experience that pushes and broadens the audience’s sensory limits.

Table 5. Additional Equipment for the Performance of *Trash TV Trance*.

Objects	Effects
Two-Euro coin	Delay
Electric razorblade	Heavy distortion
Metal Bottleneck	Loop Station
Wood bottleneck	Wah-Wah
Sponge	E-bow

The opening of the composition presents a layered texture built from unconventional performance techniques, distributed across different pitch registers and notated on two staves. This creates a dense timbral field unusual for a solo work. The section begins with a low-register ostinato produced by striking a string with a metal stick, as indicated in the score (‘frapper la corde avec une baguette métallique’). The sound is then fed into a loop station and rhythmically inverted (‘inverser le loop’), emphasising the work’s temporal structure (see Fig. 12).

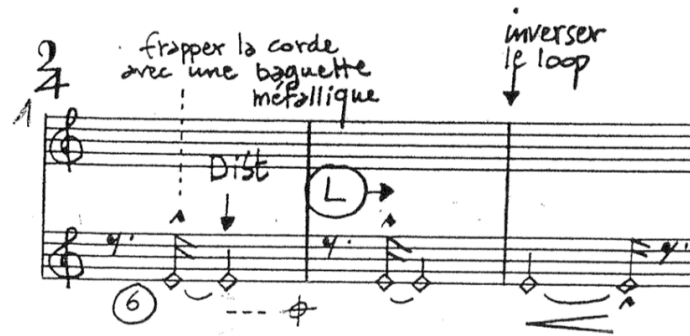


Fig. 12: Excerpt from *Thrash TV Trance* (Bars, 1-3)

Following the introduction of the persistent bass line using the loop station, the piece progresses by incorporating additional percussive noise elements. These are created by the contact of an unplugged jack on the strings¹⁶, which then engage in a dialogue with the pre-existing bass. Romitelli, through the quaternary repetition of this section, conjures a state of hypnotic trance (see Fig. 13). The persistence of these sound figures, perpetuated by the use of the loop station, establishes a structure of considerable cohesion, imprinting an unchanging constancy that emerges as the thematic core of the entire composition.

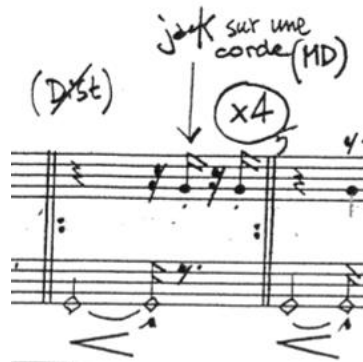


Fig. 13: Excerpt from *Thrash TV Trance* (Bar, 4)

During the unfolding of the musical narrative, an iterative process can be discerned through which the interaction between the looped bass line and the percussive effects elicited by the jack striking the strings unfolds. This interplay is characterized by subtle rhythmic variations, creating a dynamic yet coherent soundscape. Within this context, another unconventional sound event emerges: the piercing cry of a glissando on the strings produced by the use of a coin¹⁷. To emphasize its presence, this sound is introduced by temporarily interrupting the loop, thus punctuating the musical continuum with a

¹⁶ The technique of utilizing an unplugged jack to contact the strings, as described, was not only an inspiration but also thoroughly explored and developed in *Study No. 6*, which is presented in the portfolio of this thesis. This innovative method contributes a distinct percussive element to the composition by generating rhythmic sounds that enhance the musical texture.

¹⁷ A similar guitar technique, known as 'Pick scrape,' is extensively employed by modern guitarists. Fausto Romitelli opts to use a coin instead of a pick to emphasize the noise and screeching sound of the object scraping across the strings.

deliberate disruption (Fig. 14). Upon the loop's reinstatement, the coin's sonority is woven into the acoustic fabric of the piece. Consequently, a tripartite instrumental interaction emerges, as if the looped bass, the jack, and the coin were distinct entities engaged in a complex and intertwined dialogue.



Fig. 14: Excerpt from *Thrash TV Trance* (Bars, 19-21)

These noise elements are reiterated until, at the climax of this initial section, the incorporation of tapping techniques emerges as a pivotal event. For the first time in the piece, these techniques produce a sound that is somewhat 'traditionally' identifiable with the designated instrument, thus marking a critical moment within the composition. To accentuate the surprise of this element, it is introduced by momentarily halting the bass loop, which then relentlessly resumes immediately after. The interplay between the tapping, the established loop, and the metallic timbre of the coin drives the composition towards the epilogue of its first section. Both the orchestration—which encompasses the spectrum of required gestures—and the insistent figures of repetition converge to uphold the formal coherence of the segment. The conclusion is articulated by a recalibration of the loop where the repetition of the bass is interrupted, and the sound of a sponge interacting with the instrument is captured and looped, signalling a new structural shift in the soundscape.

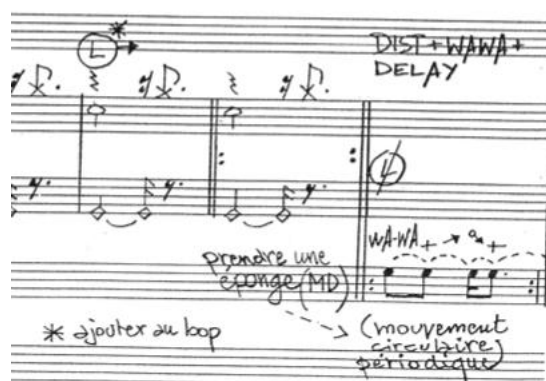


Fig. 15: Excerpt from *Thrash TV Trance* (Bar, 49)

The composition proceeds, imparting a pervasive sense of 'remoteness,' achieved through the adoption of timbres that exclude sharp attack transients, such as the muted strikes of a sponge on the

strings and the breath of a wooden wand scraping the same, both producers of 'circular' sound effects. This sensation is further accentuated with the addition of an echo effect to the authentic sound of the instrument. This intentional choice in sound design relegates the auditory focus to the background and induces a psychological shift through perceived temporal planes: transitioning from an atmosphere of very present sounds with marked attacks in the first section to evocative timbres with less pronounced sounds in the second, sounds that seem to come from afar.

Here too, the patterns are regularized by looping sequences, which, although lacking the temporal constraint felt in the first section, alter the repetitive cycle. The timbral materials in loop transform the sense of cyclicity, transitioning from a cycle that we might almost define as 'techno' to a more ethereal and static one. The conclusion of this segment is signaled by the cessation of recorded sounds: the phrases are isolated and gradually blend with bottleneck slide techniques, building a climax that resolves into the quartal chords of the following section.

At the heart of the piece, a significant transition occurs with the total interruption of pre-recorded sounds. This marks the beginning of a segment where the composition becomes more idiomatic, offering an incessant and concentrated exposition. This part, lasting about two minutes, synthesizes two decades of characteristics from blues-influenced rock, from the late '60s to the '70s. In this way, a continuity is established not only in sound but also in the physicality of the performance. The analysis reveals how Romitelli, in this central part of the piece, intentionally chose to adopt techniques common to the electric guitar repertoire to create a sort of tribute to the rock tradition, momentarily moving away from his bolder and more technological experiments that characterize the other parts of the work. The chords, primarily consisting of fourths, burst forth vigorously announcing the entrance into a distinct phase of the work, where passion and enthusiasm in the execution become central (Fig. 16)



Fig. 16: Excerpt from *Thrash TV Trance* (Bar, 102)

The sound fabric of this section is notably cohesive, especially considering that it represents the only segment in the entire work where exclusively traditional instrumental techniques of the electric guitar are employed. No extended or unconventional techniques are present, and notably, loops are entirely absent—markedly deviating from the rest of the composition. This choice creates a point of discontinuity, making this section unique within the piece. Romitelli exits this section with a leap

forward in time, introducing an obsessive riff reminiscent of the distorted and noisy sounds of 90s Grunge (Fig. 17).



Fig. 17: Excerpt from *Thrash TV Trance* (Bars, 145-147)

The rock foundations dissolve, and the reintroduction of the loop station brings back the initial 'mechanical' cyclicality, albeit in an altered rhythmic form. At this juncture, the percussive electrical interference of the jack becomes the focal point, effectively recalling the first section and signalling the ongoing modulation process. The soundscape becomes diversified once again with atypical gestures: the right and left hands separate once more in sound production, returning to the use of the jack on the strings, abrasive glissandos with a coin, and even an electric razor to generate feedback, in addition to an electromagnetic bow in the section's finale.

Here, cyclicality reaches its formal culmination: the accumulation of layers through the loop station saturates the sonic space, overwhelming the listener's capacity to process simultaneous information. Romitelli pushes the medium to its limit, transforming amplification from an expressive resource into a structural mechanism of overload. The loop no longer supports articulation but generates opacity. In this moment, the electric guitar exceeds its communicative function and becomes the site of controlled collapse. The sequence culminates in a relentless climax, as the final phrases gradually shift against the looped layers in an attempt to escape the repetitive grid. Yet this asynchronous gesture is ultimately reabsorbed into the saturated texture, dissolving into the final cacophonous maelstrom (Fig. 18).



Fig. 18: Final bars from *Trash TV Trance*

The preceding analysis demonstrates how Trash TV Trance articulates a constant tension between compositional control and sonic instability. Throughout the work, the score functions as a gestural script: each action is precisely notated, yet its timbral outcome cannot be fully stabilised due to the inherent variability of the instrument and its technological mediation. This liminal form of aleatoricism does not weaken structural coherence; rather, it defines a specific mode of writing for the electric guitar in art music, in which the controlled and the uncontrollable are deliberately held in equilibrium.

In this work, the electric guitar is neither a vehicle for performer-centred expression nor a neutral sound source. Rock-derived gestures are integrated into a controlled notational framework, and amplification becomes part of the compositional design. Situated at the turn of the twenty-first century, the piece intensifies a trajectory already visible in *Vampyr!*: the relocation of rock-derived practice within a formally sustained art music context. In doing so, it consolidates a defining condition of the concert electric guitar — the transformation of contingent performance gesture into structurally codified compositional material.

4.2 From Fingertips to Pedals: Polyphonic Innovations in Gadenstätter's *Studies for Portraits for Electric Guitar* (2018)

If the work of Fausto Romitelli demonstrates how idiomatic materials derived from rock can be integrated within a compositional language that consciously occupies a zone of tension between control and indeterminacy, the music of Clemens Gadenstätter takes a further step by drastically reducing the margin of indeterminacy, without eliminating it entirely. Elements that cannot be fully controlled, and that are unavoidable in the use of effects and extended techniques, are not emphasized as autonomous expressive factors, but are integrated into a compositional system that governs their interaction and structural function. In this sense, *Studies for Portraits for Electric Guitar* (2018) is clearly situated within what is defined in this study as Concert Electric Guitar (CEG), not because of the absence of references to popular practices, but because of the way in which such practices are absorbed, reorganized, and subjected to rigorous formal and notational control.

The current section of this chapter therefore proposes a compositional framework for the electric guitar based on the concept of modular augmentation, in which pedals and extended techniques are not conceived as mere devices for timbral transformation, but as autonomous sonic modules, each endowed with a specific structural function. In *Studies for Portraits*, this approach materializes through a contrapuntal performance model in which each limb of the performer (hands and feet) articulates an independent voice, configuring a polyphony distributed across the performer's body and making explicit the modular organisation of the musical discourse.

The analysis shows how Gadenstätter integrates gesture, extended technique, and modular organisation into a coherent language, in which elements historically associated with rock-based electric guitar practice (such as the use of distortion, bottleneck, and signal manipulation) do not function as stylistic references, but as structural components of the musical discourse. In this sense, the electric guitar is not freed from its cultural associations but rather ceases to operate within a condition of unmanaged liminality, becoming instead inscribed within an art music context through compositional procedures that are recognizable, replicable, and formally controlled.

4.2.1 The Role of Pedals in Augmenting the Electric Guitar

The electric guitar can be reconceptualised as a medium for experimental composition through modular thinking. In this perspective, augmentation is not merely a technical extension of the instrument but a compositional strategy that reshapes the interaction between sound, gesture, and musical structure. In *Studies for Portraits for Electric Guitar* (2018), Clemens Gadenstätter treats the instrument as a modular system in which pedals, bodily gesture, and signal processing function as coordinated compositional agents rather than auxiliary devices.

The term ‘augmentation’ refers to the expansion of an instrument’s sonic possibilities through technological means while preserving its fundamental ergonomics and performance technique, as discussed by Miranda and Wanderley (2006). In the electric guitar, this expansion occurs primarily through the integration of external processing modules. Unlike acoustic instruments, the electric guitar is inherently dependent on amplification and signal transformation; its sound emerges from a chain that includes pickups, cables, effects, and amplifier. Modularity is therefore not an addition to the instrument but a structural condition of its operation.

A crucial aspect of this modular condition concerns real-time control. In many digital systems, interface manipulation risks interrupting instrumental continuity. The electric guitar addresses this through the spatial distribution of control interfaces—most notably pedals—situated outside the traditional two-hand playing domain. The pedal enables sound transformation without disrupting manual execution. In Gadenstätter’s work, this hands-free modulation is not incidental but compositional: pedal activation participates in the articulation of independent musical layers.

In performance, a feedback loop is established between performer, instrument, processing modules, and amplifier. The guitarist produces a signal, which is transformed through analog or digital processing before being projected back through amplification. The resulting sound informs subsequent gesture, creating a continuous interaction between physical action and technological mediation. What distinguishes the context of Concert Electric Guitar is that this loop is not left to improvisational convention or stylistic habit. Instead, it is organised within a notationally defined

framework. Signal transformation becomes structurally regulated rather than expressively spontaneous.

In *Studies for Portraits*, this feedback system is formalised: pedal activation, signal manipulation, and bodily gesture are distributed as independent yet coordinated strata. Polyphony thus extends beyond the traditional two-hand model of guitar writing and becomes corporeally distributed across the performer's body. Crucially, this distribution is codified in the score. The modular chain is not performer-dependent in the manner typical of popular electric guitar practice; rather, it is inscribed as a reproducible compositional structure, reinforcing the work's identity beyond a single interpretative instance.

4.2.2 Composing with Modular Expansions

Building on the modular condition already outlined, composing for the electric guitar in this framework means organising a network of reconfigurable sonic agents rather than writing for a fixed instrumental body. The instrument's chain of pickups, amplification, and effects does not merely extend its timbral range; it defines a compositional environment in which discrete modules can be structured as interdependent elements.

In *Studies for Portraits for Electric Guitar* (2018), this condition is formalised. Pedals are not treated as supplementary colouristic devices but as autonomous strata within a contrapuntal texture. Each module contributes a distinct sonic identity, articulated through notational control rather than spontaneous manipulation. This conception resonates with the object-based listening proposed by Pierre Schaeffer in *Traité des Objets Musicaux* (1966), where sound is approached as an entity defined by its perceptual qualities rather than its physical source. In this perspective, an effect is not merely an alteration of an existing sound but the emergence of a distinct sonic object. The modular chain of the electric guitar thus becomes a field of interacting sound objects, structured through compositional intention.

Subsequent developments in acousmatic theory—such as François Bayle's concept of the *image-de-son* and Denis Smalley's spectromorphology—further illuminate the spatial and morphological dimensions of this approach. However, in the context of Concert Electric Guitar, these perceptual models are not abstracted from performance; they are embodied through gesture, notation, and technological mediation. The modular instrument thus operates not as an open-ended improvisatory system but as a structurally organised network of sonic relations.

4.2.3 Notational Architecture and Anatomical Counterpoint

The opening bars of *Studies for Portraits for Electric Guitar* reveal a notational design that makes the anatomical distribution of voices immediately visible. The score is organised across four staves, corresponding to the performer's two hands and two feet. This division establishes a structural separation between the guitar and the electronic modules: the hands engage directly with the strings, while the feet operate the pedals. Rather than reflecting practical convenience, this layout formalises a contrapuntal model in which each limb functions as an independent musical agent. The modular organisation of the instrument is thus translated into a spatially differentiated notational system, where bodily articulation and sonic structure coincide

The image shows a musical score extract from *Studies for a Portrait* by Clemens Gadenstätter, covering bars 1-3. The score is written for four staves, each representing a different part of the performer's anatomy: the right hand (Bottleneck R.H.), the left hand (Electric Guitar L.H.), and two pedals (Pedal 1 and Pedal 2). The Bottleneck R.H. staff uses a simplified notation with notes on a five-line staff, with fingerings (1-5) and dynamic markings like *sfz* and *ff*. The Electric Guitar L.H. staff uses standard musical notation with notes, rests, and dynamic markings like *mf* and *ff*. It includes technical instructions such as "whipping", "hold barré as long as possible", and "Rotating + Gliss.". The Pedal 1 staff uses a simplified notation with notes on a five-line staff, and the Pedal 2 staff uses a similar notation. The score is organized into measures, with time signatures of 2/4 and 3/4. The overall layout is designed to show the independent functioning of each limb as a musical agent.

Fig. 19: Extract from *Studies for a Portrait* by Clemens Gadenstätter (Bars, 1-3)

The independence of the upper limbs is achieved through the systematic use of left-hand tapping. By producing pitched material directly on the fretboard, the left hand no longer depends on right-hand plucking. This separation allows the right hand to engage in alternative gestures or interact with external modules without interrupting the continuity of the left-hand line. The traditional interdependence of the hands in guitar technique is therefore suspended, enabling a redistribution of functions that mirrors the contrapuntal design of the score. The tapping line frequently sustains independent rhythmic and registral trajectories, further reinforcing its structural autonomy within the four-staff layout.

The following sections examine how this redistribution is realised through the specific techniques assigned to each hand.

4.2.3.1 Right Hand – The Bottleneck

A closer examination of the right-hand staff reveals that the performer holds a bottleneck (BN), whose operational range is explicitly delimited in the score. The notated region extends from the area of the first pickup (approximately E1 on the lowest string) to an octave above (E2 on the sixth string), while the upper physical limit before the bridge corresponds approximately to B5 (Fig. 20). Rather than indicating discrete pitches, the notation defines a spatial field within which the BN operates.

Functioning as a movable bridge, the BN is pressed against the strings and displaced to generate continuous glissandi, controlled vibrato, articulated glissandi with accents, percussive clicks, and, in certain instances, direct plucking. The score does not merely describe these actions but regulates their spatial and gestural parameters. By defining a specific region of interaction, the composer transforms the BN into a controllable sound-producing unit with clearly circumscribed boundaries.

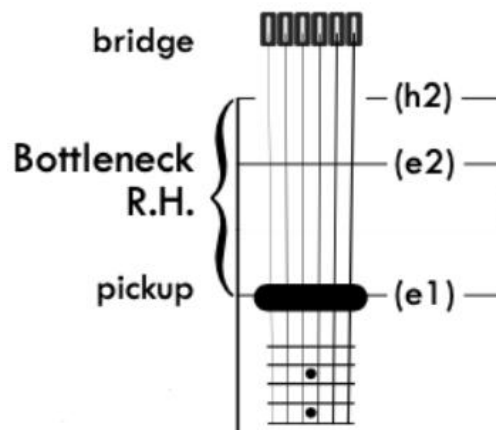


Fig. 20: Detailed notation for bottleneck technique in *Studies for a portrait*

Unlike pedals, which operate through electronic mediation, the BN establishes a direct mechanical interaction between hand and string. Its behaviour depends on pressure, angle, and position within the indicated area. This physical immediacy requires a distinct notational strategy: graphic symbols such as 'Rotating + Gliss.' and articulated accents specify both the direction and character of motion (Fig. 21). The notation therefore codifies gesture as a structural parameter rather than leaving it to improvisational convention.

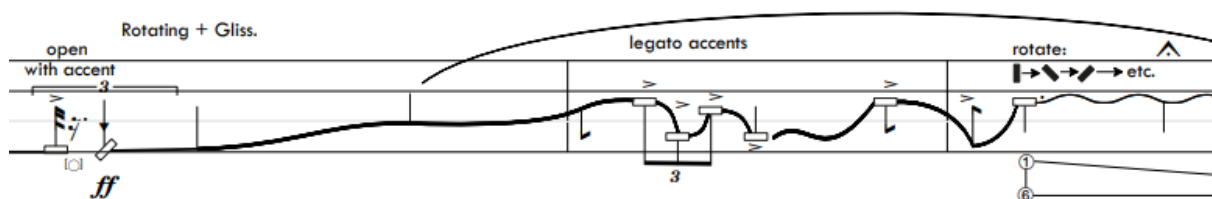


Fig. 21: Notation of bottleneck techniques

Within the four-staff layout, the BN occupies its own layer, contributing a continuous, sliding or percussive line that contrasts with the discrete tapping material of the left hand. Its role is not ornamental but textural: it generates sustained and morphologically unstable material that interacts contrapuntally with the other strata. In this way, the right hand does not merely manipulate an effect; it articulates an independent module defined by spatial control, gestural precision, and notational inscription.

4.2.3.2 The Left Hand – One-Handed Tapping

The left-hand staff is dominated by one-handed tapping, which produces pitched material independently of right-hand plucking. Throughout the piece, tapping constitutes the primary mode of sound production for this limb, while conventional plucked gestures occur only sporadically. This predominance stabilises the left hand as a discrete layer within the four-staff texture.

As shown in Fig. 22 (Bar, 27), the tapping line unfolds through irregular subdivisions, including triplet groupings and sextuplets, maintaining rhythmic autonomy from the continuous, accent-driven trajectory of the bottleneck in the right hand. The increasing density of the left-hand figures, combined with the gradual dynamic intensification (*poco a poco cresc.*), reinforces its independent structural trajectory within the texture.

The figure shows a musical score for two staves. The top staff is labeled 'R.H.' and the bottom staff is labeled 'L.H.'. The R.H. staff has a treble clef and a key signature of one flat. It shows a continuous, sliding trajectory with a crescendo leading to a fortissimo (ff) dynamic. The L.H. staff has a treble clef and a key signature of one flat. It shows a tapping line with irregular subdivisions, including triplet groupings and sextuplets, with a crescendo leading to a fortissimo (ff) dynamic and a 'molto cresc.' marking. The L.H. staff also includes a '3 4' time signature and a '3 6' grouping.

Fig. 22: Left-hand tapping line in *Studies for Portraits for Electric Guitar*, showing independent rhythmic articulation and progressive densification (Bars, 27-28)

Beyond pitch production, tapping introduces a percussive articulation generated by the impact of the finger on the fretboard. The resulting sound combines defined pitch with transient noise components, creating a hybrid profile that contrasts with the sustained, morphologically fluid material of the bottleneck. The rarity of simultaneous bilateral action further clarifies this separation: rather than forming a unified instrumental gesture, the hands operate in parallel strata whose coordination is determined by notation rather than physical interdependence.

4.2.3.3 Pedals and Tonal Exploration

Pedal manipulations are notated on two independent staves corresponding to the performer's feet (Fig. 23). The graphic lines indicate continuous motion rather than discrete pitch events: upward trajectories denote engagement of the pedal, while downward trajectories indicate release. Duration and intensity of pressure are visually encoded, providing temporal control over modulation.

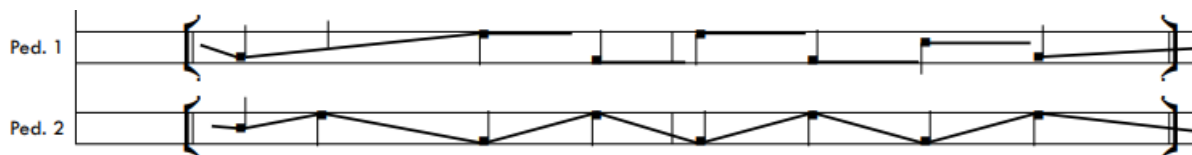


Fig. 23: Notation of independent pedal trajectories showing contrary motion and controlled modulation in *Studies for Portraits for Electric Guitar* (Bars, 223-224)

As shown in Fig. 23, the two pedal lines frequently move in contrary or oblique directions, generating evolving pitch transformations within the texture. This visual counter-motion does not imitate classical voice-leading as a stylistic reference but organises modulation as a structural process distributed across the lower limbs.

A central role is played by the combined use of ring modulator and Whammy pedal. The ring modulator, set to 416 Hz, generates sum and difference frequencies, producing characteristic metallic spectra while maintaining controlled pitch displacement. The Whammy pedal introduces digitally mediated pitch shifts that extend the glissando principle already established by the bottleneck.

Whereas the bottleneck produces microtonal variation through direct mechanical interaction, the Whammy pedal achieves comparable transformations electronically. Their coordinated action distributes tonal modulation across manual and pedal layers, integrating continuous and discrete transformations within the notated contrapuntal system.

Together with the bottleneck and tapping strata, the pedal layers complete a distributed system of tonal transformation. Continuous mechanical modulation (BN), discrete percussive articulation (tapping), and electronically mediated pitch displacement (Whammy and ring modulation) operate as differentiated yet coordinated processes. The contrapuntal organisation of the piece thus emerges not from harmonic voice-leading alone, but from the controlled interaction of distinct modes of sonic transformation across all four limbs.

4.2.4 Concert Electric Guitar as a Modular Contrapuntal System

Building on the analytical observations above, the electric guitar in *Studies for Portraits for Electric Guitar* can be understood as a paradigmatic instance of Concert Electric Guitar (CEG). Here, modularity is not an external addition to the instrument but a structurally inscribed principle, through

which gesture, electronics, and timbral processes are formally integrated within a notationally organised system. In this sense, the identity of the work exceeds the individual performer, as its modular architecture is reproducible through notational prescription rather than dependent on stylistic interpretation.

Unlike the use of pedals in many popular music contexts—where modulation often remains performer-driven and stylistically coded—the pedals in this work are inscribed within a compositional logic. Their trajectories, durations, and interactions are regulated through notation, rendering tonal modulation a structural parameter rather than an expressive supplement. The resulting counterpoint does not arise solely from pitch organisation, but from the controlled interaction of continuous mechanical, digital, and percussive transformations across all four limbs.

This perspective invites a reconsideration of the relationship between instrument and performer as a distributed and coordinated system. Composition extends beyond pitch selection or electronic manipulation to include the design of bodily and technological interactions. While the present analysis focuses on the electric guitar, the principles articulated here—modular inscription, gestural distribution, and structuralised timbral control—may inform approaches to other hybrid or electroacoustic instruments.

In this sense, the electric guitar occupies a specific position within contemporary art music: not as a stylistic borrowing from rock, but as a medium capable of sustaining formally controlled, reproducible, and embodied counterpoint. Pedals, bottleneck, tapping techniques, and gestural regulation do not function as ornamental extensions; they constitute compositional agents whose interaction defines the structural identity of the work.

4.3 The Electric Guitar in the Contemporary Ensemble: Orchestration and Distortion as Structural Parameters

Starting with Radamés Gnattali's *Concerto Carioca* (1951), and especially from the late 1970s onwards, the orchestral repertoire for electric guitar gradually expanded through works in which the instrument assumed a clearly defined structural role. This development marked a departure from earlier marginal uses, such as Karlheinz Stockhausen's employment of the instrument as an accessory in *Gruppen für drei Orchester* (1955–1957) or Bruno Maderna's timbral inclusion of the electric guitar in *Serenata per Kafka* (1950), where it was rarely granted thematic prominence.

From the 1970s, however, a shift becomes evident. Francis Thorne's *Sonar Plexus* (1970), discussed in Robert Tomaro's doctoral thesis (1994), as well as Blas Galindo's *Dimas Concertino* (1973), Denis Betro's *Concerto for E-Guitar* (1977), and John Buller's opera *Proença* (1977), attest to a growing

integration of the electric guitar within symphonic and operatic contexts. In these works, the instrument increasingly participates in large-scale formal processes rather than functioning as a peripheral timbral resource.

This trajectory consolidated during the 1990s with works such as Tim Brady's *Loud* (1993) and *The Body Electric* (1997), and Steven Mackey's *Deal* (1995), culminating in a further expansion during the early 2000s. Works including Bryce Dessner's *St. Carolyn by the Sea* (2001), Tristan Murail's *Contes Cruels* (2007), and Claudio Lugo's *Händelectric* (2009) illustrate a phase in which the electric guitar was no longer perceived as an external or hybrid presence, but as an instrument increasingly normalized within orchestral writing. Amplification and electronic processing became integrated into compositional thinking rather than treated as supplementary devices.

Within this evolution, distortion assumes particular importance. As the electric guitar's role within the ensemble became more structurally defined, distortion ceased to function merely as an accessory or stylistic marker. Instead, it emerged as a compositional parameter capable of shaping timbral density, projection, and expressive tension within the orchestral texture. Far from serving solely atmospheric or disruptive purposes, distortion is deployed in nuanced and differentiated ways, aligning with each composer's aesthetic orientation and formal design. The following sections examine how this process unfolds in selected works by Steven Mackey and Dai Fujikura, considered here as focused case studies rather than exhaustive representatives of the repertoire.

4.3.1 Distortion as an Expressive Device: Two Aesthetic Trajectories (Mackey and Fujikura)

In the context of contemporary ensemble writing, distortion operates as an orchestration parameter regulating projection, spectral density, and instrumental hierarchy. A notable example is *Tuck and Roll* (2000) by American composer Steven Mackey, in which the alternation between distorted and clean tones becomes an active component of the overall musical writing. This is particularly evident in the first movement, titled *Anthem*, where a highly effective interplay between dynamics and the use of distortion emerges. In the initial presentation of the thematic material, up to bar 20, Mackey explores the timbral potential of the electric guitar by using a clean tone combined with palm muting, progressively reducing the timbral distinction between the electric guitar and the surrounding strings and winds, thereby enabling a controlled process of orchestral integration. This process generates an increasingly rich interplay of colours and nuances, eventually merging the guitar sound with that of the synthesizer to the point of near indistinguishability (see Figure 24).

Fig. 24: Introduction from *Tuck and Roll* – (Bars, 1-3)

Following this introductory section, characterized by a playful and light tone, the expressive power of distortion comes into play, imparting body to the guitar sound and expanding the orchestra's overall dynamic range, thus offering a more articulated expressive palette. The rich and dense timbre of the distorted guitar secures a clearly defined space within the orchestral texture, allowing the ensemble to sustain broad dynamics without overshadowing the solo voice of the instrument. Mackey exploits this quality deliberately, assigning a prominent role to the brass section—an orchestration choice that would risk imbalance if paired with an undistorted signal, given the brass section's spectral weight (Fig. 25).

Fig. 25: Distorted guitar along with the brass group in *Tuck and Roll*– (Bars 25-26)

In the section shown in Figure 25, the composer highlights the strategic use of distortion within an orchestral context. Distortion imparts the melody with a sharp, incisive timbral force that amplifies its sonic presence and renders it clearly identifiable. The guitar's melodic line, as illustrated in the figure, is characterized by a sparse and elongated rhythm, establishing the fundamental theme of the first movement. Without the application of distortion, the distinctive and celebratory quality of the melody—with a character reminiscent of an anthem—would risk being lost within the brass section. Mackey avoids this effect by employing heavy distortion, which gives the melody a robust presence, allowing it to sustain and assert itself within the dense brass texture, in a manner analogous to that of a wind instrument.

Mackey's compositional technique clearly demonstrates that distortion is not conceived as a mere effect, but rather as an essential element for ensuring the centrality of the electric guitar within the ensemble's complex sonic fabric. The dynamic contrast between clean and distorted tones is not simply a recurring motif—it functions as a true orchestral strategy that permeates the entire work, enabling constantly shifting instrumental combinations and timbral textures. Examples of distortion being used as a formal and shaping device can be observed in passages where it is gradually reduced or entirely removed, coinciding with a thinning of the orchestral texture. In these moments, the guitar moves into the foreground with a clean, crystalline tone, often accompanied by irregular percussion rhythms, initiating more intimate, soloistic sections. What is particularly striking is how the previously bold and solemn melodic material—originally presented with heavy distortion—transforms into a more introspective musical idea, while maintaining thematic continuity. These passages reflect Mackey's sculptural and coherent approach: distortion is not merely a colour, but a true compositional tool, capable of shaping and redefining the identity of the electric guitar within the narrative arc of the piece.

At bar 142, highlighted in Figure 26, we find another significant example of how the electric guitar is able to maintain its presence within the full orchestral tutti. In this passage, which represents the climax of *Anthem*, the guitar employs a strumming technique using four-note chords in semiquavers. This choice not only matches the full force of the orchestral *fortissimo* but also creates a rich and harmonically dense texture in which the guitar's timbre emerges clearly from within the orchestral mass. This technique reflects a deliberate orchestration strategy, demonstrating that the electric guitar can not only sustain its audibility but also preserve its distinct timbral identity even during the ensemble's most intense moments.

The image displays a musical score for a specific section, starting at bar 142. The score is written for a large ensemble, including woodwinds, brass, and strings. The Electric Guitar part is highlighted, showing a series of four-note chords strummed in a semiquaver (eighth-note) pattern. The notation for the guitar is in standard staff notation with a key signature of one flat (B-flat) and a 4/4 time signature. The other instruments have more sparse or sustained parts in this section.

Fig. 26: Electric guitar's prominence through semiquaver chord strumming (bar, 142)

The use of four-note chords on the electric guitar, rather than potentially more resonant six-note chords, suggests a deliberate choice in favour of clarity within the dense sonic environment created by heavy distortion. Distortion often tends to obscure the nuances of full chords, blending tones and overtones into a less distinguishable sound. For this reason, power chords—chords stripped of the third, resulting in a more open and harmonically ambiguous sound—are particularly effective and widely used in genres such as heavy metal, especially when paired with high levels of distortion. In a particularly compelling passage, Mackey assigns power chords to the brass section near the end of the first movement, omitting the third to achieve this specific effect. This decision may be read as a reversal of customary instrumental functions within orchestral discourse: the electric guitar, typically associated with rhythmic power chords in rock contexts, cedes this characteristic to the brass section—an emblematic component of the symphonic orchestra.

A few years after *Tuck and Roll*, a contrasting example not only in the use of distortion but also in the technical and compositional approach to a concerto for electric guitar and orchestra is found in *Abandoned Time* (2004–2006) by Dai Fujikura. Although Fujikura is not a guitarist, he writes for the instrument with a deep idiomatic awareness. In particular, distortion assumes a central role in his work and is characterized by a more continuous presence compared to Mackey, avoiding notable shifts in intensity. This compositional choice resonates with distortion-centred rock timbral practice,

while being recontextualised within a symphonic framework¹⁸.

In Fujikura's piece, the distorted electric guitar serves as the true structural and timbral core of the composition. Indeed, Fujikura employs a 'crunch' tone as the minimal level of distortion, completely avoiding the clean sound that Mackey frequently alternates with in *Tuck and Roll*. Fujikura adopts a different compositional strategy to facilitate the integration of the instrument within the ensemble, relying primarily on register and the guitar's ability to project clearly through techniques such as bending with vibrato (Fig. 27).



Fig. 27: Excerpt from *Abandoned Time* (2004-6) by Dai Fujikura, illustrating the use of vibrato and bending techniques to ensure the electric guitar's clarity and prominence within the orchestral texture.

While the electric guitar articulates a soloistic phrase, its timbre dominates the orchestral texture while remaining embedded within a symphonic context. The orchestral accompaniment, consisting of long sustained notes played by winds and strings, functions as a continuous harmonic fabric—a true backdrop that supports the guitar's melodic line. Despite the medium level of distortion employed, the guitar sound stands out clearly due to its chosen register and the inherent expressive nature of the bending technique. This approach finds a partial counterpart in the method adopted by Steven Mackey in *Anthem*, where the use of generally lighter distortion allows the electric guitar to blend into the orchestra in a more fluid and less prominent manner than in Fujikura's work.

In both cases, the orchestral dynamics remain moderate, fluctuating between *piano* and *mezzo forte*—a conscious compositional choice that ensures a well-defined and perceptible timbral space for the guitar. However, whereas Mackey exploits distortion modulation to fuse the instrument within the ensemble, Fujikura opts to maintain a constant distortion level, relying instead on the guitar's register and texture to achieve its sonic balance within the orchestral setting.

Both works employ distortion as a structural and linguistic element, confirming that this timbral treatment has become a defining feature of the electric guitar, no longer merely a secondary effect. However, the two composers adopt divergent approaches that reflect different aesthetics and backgrounds: Steven Mackey (b. 1956), an active guitarist, integrates distortion with restraint, using it in relation to the orchestral context, while Dai Fujikura (b. 1977), a non-guitarist from a younger

¹⁸ Personal conversation with Dai Fujikura

generation, treats it as a constant and identity-defining sonic element.

Both works demonstrate that distortion in contemporary ensemble writing functions beyond stylistic reference. In Mackey, it operates as a modulated orchestral parameter governing blend, projection, and contrast; in Fujikura, it establishes a continuous timbral identity that anchors the guitar's structural presence within the ensemble. In both cases, distortion regulates texture, hierarchy, and perceptual focus rather than merely colouring the musical surface. Within the framework of Concert Electric Guitar (CEG), distortion thus emerges as a formally integrated compositional resource, embedded in orchestration rather than appended as expressive ornament.

In recent years, the process of integrating the electric guitar into the orchestra has received increasing academic attention, with the emergence of research projects and doctoral dissertations entirely dedicated to composing for the instrument in a symphonic context. A recent example is the thesis *Transference Music: for Electric Guitar Soloist and Amplified Orchestra* by Andrew Noseworthy (2023), a 25-minute concertante work inspired by the author's experience as a composer and electric guitarist. In this composition, elements such as performative gesture, the instrument's specific timbre, the aesthetics of contemporary genres, and electronic sound production are transferred into the compositional process, shaping the structure, thematic material, and orchestration of the work. At the same time, articles such as *Composing for Guitar Orchestra: Challenges and Advantages of Homogeneous Orchestration* by Jason Noble and Steve Cowan (2023) reflect a growing interest in the orchestral potential of the electric guitar even in homogeneous settings, such as guitar orchestras.

These academic contributions clearly indicate that the electric guitar is gaining fully recognized status within the landscape of contemporary art music—not only as a solo instrument, but also as a catalyst for new compositional and orchestral perspectives.

Chapter 5: Conclusion to Part A – Theoretical Consolidation of the Concert Electric Guitar

The preceding chapters have articulated a structured theoretical framework for understanding the positioning of the electric guitar within the context of contemporary art music, outlining the principles, operative criteria, and historical trajectory that led to the definition of the Concert Electric Guitar. At the same time, they have identified the limits within which this definition remains fully valid, clarifying when it applies coherently, when it fully converges into the domain of the Popular Electric Guitar, and when, finally, it occupies an intermediate zone that requires a more articulated analysis in order to be properly interpreted.

The analytical distinctions that emerged, particularly the more structured and operative ones, were initially formulated in Table 3 (p. 45), developed through the comparative case study of *Vampyr!* and *Eruption*. This table made it possible to construct a synthetic and operative framework for distinguishing, in a systematic but not rigid manner, the compositional and interpretative differences, both on a technical and theoretical level, between the Concert Electric Guitar (CEG) and the Popular Electric Guitar (PEG).

However, given the complexity of the distinction between the two domains — within which the electric guitar often occupies an ambiguous position — Table 3, while describing the technical-operative aspect of the differentiation, only partially exhausts the issue. For this reason, the subsequent Table 4 reinforces and broadens this perspective by synthesising the principal phases through which this distinction progressively emerged within art music contexts.

Table 4: Diachronic Synthesis of the CEG/PEG Distinction

Historical phase	Status of the electric guitar	Relationship to popular music	Position within art music	Relevance for the CEG / PEG distinction
Mid-20th century (early appearances)	Hybrid and unstable instrument, often assimilated to the amplified classical guitar	Implicit presence, not thematised	Experimental use in orchestral and chamber contexts	No clear distinction: the electric guitar does not yet possess an autonomous status
1950s–1960s (terminological ambiguity)	Coexistence of electrified guitar and electric guitar	Ambiguous relationship, often deliberately avoided	Episodic use, lacking stabilised idiomatic writing	The CEG / PEG distinction is not yet formulable, though aesthetic tensions begin to emerge
1960s–1970s (deliberate distancing)	Progressive definition of the instrument as a distinct entity	Conscious distancing from popular music	Neutralisation of popular idioms. references	Conceptual foundations for a practice identifiable as CEG are established

Historical phase	Status of the electric guitar	Relationship to popular music	Position within art music	Relevance for the CEG / PEG distinction
1980s–1990s (consolidation)	Instrument treated as an autonomous compositional medium	Exclusion or strict control of popular references	Expansion of techniques, notation, and repertoire	CEG emerges as a recognisable domain within art music
2000s (critical re-articulation)	Instrument fully integrated into contemporary composition	Conscious and problematised reintroduction of popular elements	Reflexive use of distortion, amplification, and gesture	The CEG / PEG distinction becomes analytically necessary
Contemporary practices	Modular and technologically mediated instrument	Negotiated and context-dependent relationship	Writing integrating gesture, technology, and notation	The CEG / PEG distinction is understood as a historical and operative construct, not an essential category

As has been shown, the previous Table 4 does not merely trace a chronological sequence but highlights the compositional transformations that contributed to defining the domain of the CEG. In this sense, Table 4 does not replace Table 3, but completes and deepens it, offering a historical and conceptual framework that strengthens and clarifies the proposed distinction.

In conclusion, by consolidating the theoretical foundations of the Concert Electric Guitar, Part A constructs a conceptual architecture in which technical, aesthetic, and historical dimensions converge. From this emerges a clear synthesis: when inscribed within the concert context, the electric guitar is configured as a compositional medium defined by the regulation of timbre, the distribution of gesture, the integration of technological infrastructure, and the negotiation of cultural reference, all of which are made operative through musical writing. In this way, the principles governing its use are made explicit and systematised.

The subsequent section of the research builds upon these foundations, moving from theoretical articulation to the systematic codification of techniques and strategies, and translating into practice, through musical writing, what has been affirmed at the conceptual level. This systematisation then finds concrete artistic realisation in the compositional appendix. While rooted in the analytical distinctions developed previously, it expands the investigation through practical organisation, notational clarification, and the structured presentation of instrumental resources. The transition from Part A to Part B therefore does not represent a change of subject, but a methodological reorientation: from critical consolidation to operative systematisation.

Part B: Handbook for Concert Electric Guitar Composition

By

Vincenzo La Spesa

Introduction

This handbook is conceived as a practical guide aimed at helping and supporting composers in navigating the complex world of electric guitar writing, regardless of their level of familiarity with the instrument. Whether it is a first exploration or the desire to further investigate its compositional possibilities, the text provides concrete tools to approach writing in an idiomatic, effective, and informed way.

It is a technical handbook specifically oriented towards composers, accompanied by examples drawn both from the repertoire and from an original portfolio included with the work. The latter contains scores and audio recordings, designed to directly illustrate the most relevant techniques, effects, and notational conventions within the context of contemporary art music.

The handbook aims to:

- present instrumental techniques (both conventional and extended).
- illustrate the creative use of principal modular effects (distortion, delay, e-bow, etc.).
- provide practical examples by integrating written material with original audiovisual resources (videos and recordings), supplied through links, to facilitate the understanding of the sounds and techniques discussed.
- offer clear and standardised notational guidelines, useful for effective communication with performers.
- suggest compositional solutions to fully exploit the expressive potential of the electric guitar.

The handbook is organised into thematic sections that address:

- the morphology of the instrument and its compositional impact.
- standard, extended, and advanced performance techniques.
- modular effects (distortion, delay, flanger, e-bow, etc.).

How to use this handbook

- The handbook can be consulted either sequentially or by directly accessing the technique of interest.
- Wherever the  symbol is shown, audio and video examples created specifically for this handbook are available at the following links:

Audio Examples (Nine Studies and a Fugue for Concert Electric guitar) -

<https://on.soundcloud.com/o0bsws5zx9jhle5eZr>

Video examples - https://www.youtube.com/watch?v=Qe9TEwzgEvs&list=PLW7-0nA4_JcXaned7PYSRhV8glV39HXYI&ab_channel=VincenzoLaSpesa

1. Mechanical Control Techniques

The choice of an electric guitar is traditionally the performer's prerogative, shaped by genre, timbre, and playability. For the composer, however, an understanding of the instrument's morphology is essential in order to write idiomatically. As demonstrated in *Empirical Explorations of Guitar Players' Attitudes Towards Their Equipment and the Role of Distortion in Rock Music* (Herbst, 2019), the structural components of the instrument directly affect its sonic output and, consequently, the musical material itself.

Although the electric guitar exists in a wide range of models with differing tonal and ergonomic characteristics, this manual does not attempt an exhaustive catalogue. Instead, it focuses on those structural elements that most directly influence compositional decisions and are common across multiple instrument types.

Core Components and Their Sonic Implications

There are three fundamental elements of the electric guitar's design that directly affect its sonic behavior and, consequently, compositional decisions:

1. Tone and volume controls
2. Pickup configuration
3. Bridge type (with or without vibrato arm)

Each of these components influences the instrument's sound production in specific ways, shaping how a composer may choose to work with tone colour, articulation, and dynamic expression.

This chapter will focus on three core components: pickup configuration, tone and volume controls, and bridge systems, including the use of the vibrato arm. While pickups and controls tend to be relatively consistent across different guitar models, bridge design is far more variable and has a direct impact on what is compositionally possible.

Among all aspects of the instrument's morphology, the bridge type—particularly whether it includes a vibrato arm—is arguably the most consequential for composers. The expressive possibilities introduced by vibrato arms depend entirely on the type of bridge: from fixed, immobile designs to floating tremolo systems that allow pitch modulation and gestural effects.

Understanding these differences is essential, as they define whether certain techniques can be performed or not. For composers who wish to engage deeply with the idiomatic resources of the electric guitar, bridge morphology is not a secondary detail—it is a gateway to entire dimensions of expression.

1.1 Tone and Volume Controls

Overview

Most electric guitars feature one or more knobs that allow the performer to adjust volume and tone. These controls are passive analog circuits located on the guitar body and directly affect the signal before it reaches any external effects or amplification. The exact layout, number, and labeling of these controls vary between models. Each guitar has its own configuration depending on brand, design, and intended use. Figure B1 illustrates a common example (a Telecaster-style guitar), showing the placement of pickups (single coil), volume and tone knobs, and a three-way selector switch.

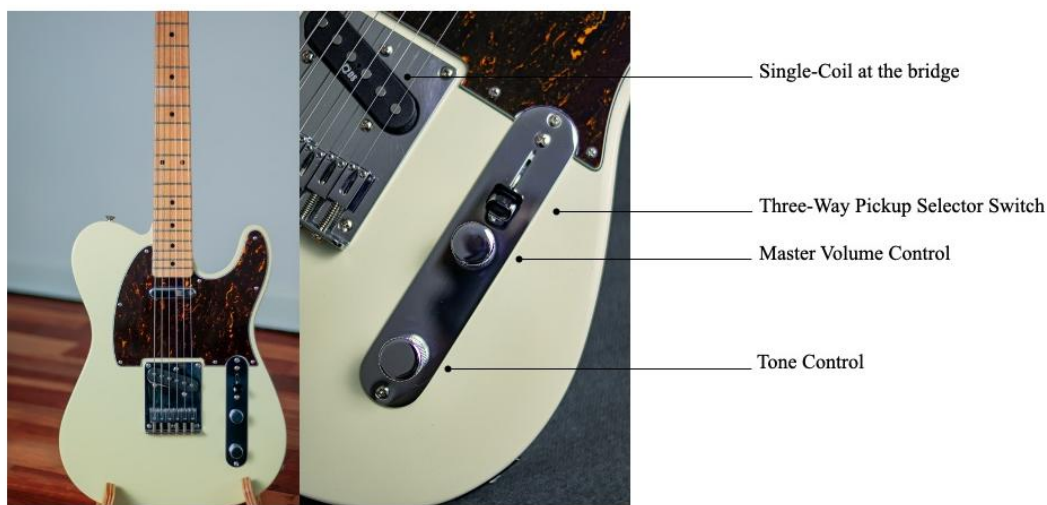


Fig. B1: Telecaster guitar with labelled parts: pickups, controls, and selector switch.

- **Volume control** adjusts the output level of the signal.
- **Tone control** (usually a low-pass filter) reduces the brightness of the sound, softening higher frequencies.
- **Pickup selector switch** activates one or more pickups, allowing the performer to change the guitar's tone color by selecting different positions.

Not only can the number and combination of volume and tone controls vary from one guitar to another, but their placement on the instrument also changes depending on the design. Some models, such as those inspired by the Gibson design, feature two volume knobs and two-tone knobs, with one pair dedicated to each pickup, as well as a selector positioned on the upper left side of the body (Fig. B2). This configuration, while historically associated with a particular type of guitar, is now found in many other models as well. Similarly, some guitars adopt different solutions, with unified controls for both pickups or alternative layouts designed for ergonomics or specific performer needs.

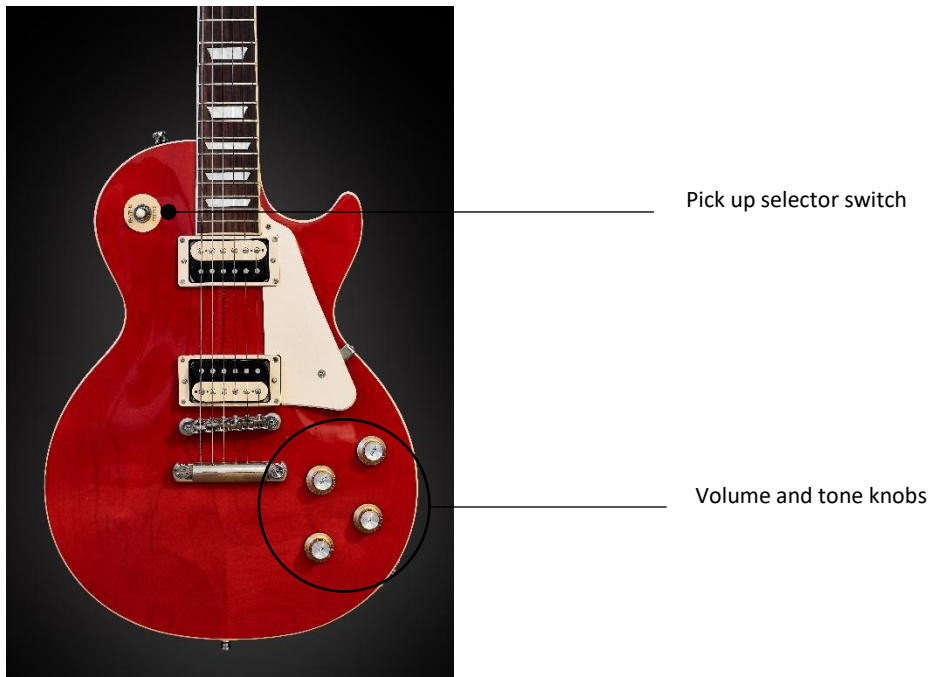


Fig. B2: Gibson guitar with labelled parts

Although performers frequently manipulate these controls during live performance or recording, composers rarely address them in written scores. Nonetheless, in certain contexts—especially those emphasizing nuance, expression, or extended techniques—these controls can play a compositional role.

Compositional Implications of volume and tone knobs

- Volume swells: Gradually turning up the volume after plucking a note creates a smooth, attack-less onset. This can be used to introduce notes with a softer entrance, shape dynamic contours over sustained tones, or build gradual intensities within a texture.
- Tone shading: Writing for a rolled-off tone control can emphasize darker colors, useful for timbral contrast within a texture.

 **Video Example 1 – Volume Knob Swell Technique** - This video demonstrates one of the many possible applications of the volume knob on the electric guitar. By gradually turning up the volume after the strings are plucked, the initial attack is removed, creating the illusion that the chords emerge from silence, as if appearing out of nowhere.

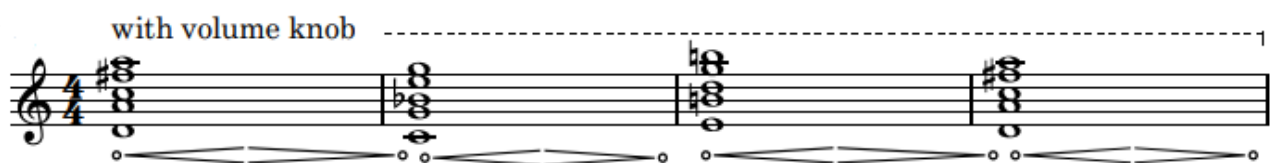


Fig. B3: Proposed notation of video example 1

Notation Guidelines

Because there is no standardized symbol for these controls, text instructions are recommended. Traditional crescendo or diminuendo hairpins may be misinterpreted as dynamic changes performed through picking or finger pressure. To avoid confusion, it is essential to specify that the gesture should be executed using the volume knob, for example: ‘crescendo with volume knob’ or ‘volume swell’ (knob).

Practical Considerations

- Manipulating the volume knob in real time while playing can be technically challenging, especially during fast or rhythmically precise passages. In such contexts, a volume pedal offers a more practical and reliable solution, allowing continuous dynamic control without interrupting hand positioning¹⁹.
- Tone controls vary in effectiveness between guitar models; not all settings yield dramatically different results.
- Avoid excessive reliance on knob-based gestures in fast passages unless coordinated with electronics or pre-set effects.

1.2 Pickup Switches

While the technical differences between single-coil and humbucker pickups are often relevant to performers, composers are primarily concerned with how pickup selection affects tone color in performance. Most electric guitars are equipped with a selector switch, which allows the performer to activate a specific pickup or combine multiple pickups to produce different timbral qualities.

There are two common types of selector switches:

- **3-way switches**, typically found on Les Paul or Telecaster models.
- **5-way switches**, standard on Stratocaster-style guitars.

Each switch position yields a distinct tone:

- **Bridge pickup**: bright and sharp; useful for articulating rhythmic material.
- **Neck pickup**: warm and mellow; ideal for lyrical or sustained passages.
- **Middle and blended positions** (on 5-way switches): offer tonal hybrids that balance brightness and warmth, supporting nuanced timbral shaping.

¹⁹ The use of volume pedals will be discussed in greater detail in the chapter dedicated to effects.

Compositional Implications

Pickup selection directly affects the tone colour of the instrument, making it a valuable resource for composers interested in timbral control. While performers often choose pickup positions intuitively, indicating a specific setting in the score can enhance the clarity and contrast of a musical gesture, especially when writing for unprocessed or minimally amplified guitar sounds.

Here are some compositional applications:

- Sectional colour shifts: Switching pickups between sections can create subtle changes in timbre without altering the material.
- Colour stability: In minimal or drone-based music, fixing the pickup selection can establish a specific ‘sonic identity’ for an entire section.

Recommended Notation for Pickup Selection

Textual indications are the clearest way to communicate pickup selection, switch settings, and vibrato use. Examples include:

Table B1. Five-Way Selector (e.g. Stratocaster)

Notation in Score	Selector Position	Active Pickups	Typical Use
<i>pos. 1 or bridge PU</i>	1	Bridge only	Bright, sharp tone;
<i>pos. 2 or bridge + middle PU</i>	2	Bridge + middle	‘Quack’ tone; funky rhythm
<i>pos. 3 or middle PU</i>	3	Middle only	Balanced tone; neutral color
<i>pos. 4 or middle + neck PU</i>	4	Middle + neck	Warm tone with clarity
<i>pos. 5 or neck PU</i>	5	Neck only	Warmest tone;

Table B2. Three-Way Selector (e.g. Les Paul, Telecaster)

Notation in Score	Selector Position	Active Pickups	Typical Use
<i>bridge PU</i>	Position 1	Bridge only	Bright with a crystalline tone
<i>bridge + neck PU</i>	Position 2	Bridge + neck	Hybrid tone; wide dynamic range
<i>neck PU</i>	Position 3	Neck only	Warm and rounded; suitable for melody

Video Example 1.2 – Pick up selector

Same phrase performed using the two main timbral extremes of the electric guitar: first with the bridge pickup (bright, cutting tone), then with the neck pickup (warm, mellow tone).

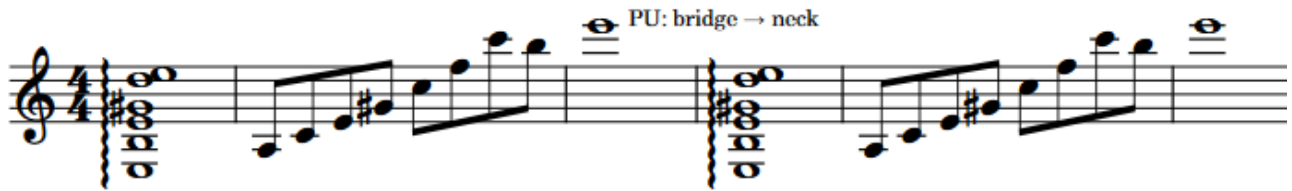


Fig. B4: Notation of video example 1

Special Effects Using Pickup Switching – ‘Flick of the switch’

In addition to tone colour control, pickup selection can also be used to create rhythmic special effects by alternating between an active pickup and one whose volume has been turned down to zero. This technique is only possible on guitars equipped with

- use a 3-way selector (e.g., Les Paul), and
- have separate volume knobs for each pickup.

A well-known example of this technique is the so-called ‘flick of the switch’ effect. The performer holds a chord or a note with the fretting hand, while rapidly toggling the pickup selector between the active and muted pickups. This creates a percussive on/off stutter, generating a rhythmic pattern without rearticulating the strings.

Video Example 1.3 – Flick of the Switch

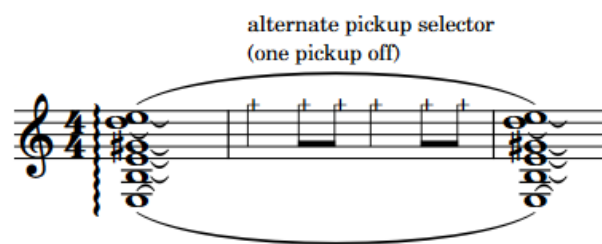


Fig. B5: Proposed notation of ‘flick of the switch’ effect

Video Example 1.4 – Flick of the Switch with distortion

In this example, the same phrase used in Video Example 3 is presented again, this time processed with a distorted tone. The flick of the switch technique—based on the rapid alternation between an active and a muted pickup—produces a stuttering on/off effect that, under distortion, closely resembles a simulated power failure or glitch-like interruption. The contrast is sharper and the

gesture more dramatic, making it particularly effective for creating sudden textural disruptions or emphasizing formal transitions.

General Considerations

- Indicating specific pickup positions in a score is not a standard practice in guitar notation. Most guitarists do not expect to find such indications and will typically choose the pickup setting themselves based on the desired tone.
- However, in contexts where precise timbral control is an integral part of the composition, suggesting a specific pickup selection can enhance the musical intention and bring clarity to contrasts between voices or sections.
- These indications are particularly effective in works that focus on orchestration of tone color or minimal amplification settings, where the natural color of the guitar is exposed.
- When using pickup instructions, avoid rapid switching or ambiguous markings. The composer should clearly notate only when the change has musical relevance.

1.3 Bridge Design and Tremolo/Vibrato Arm System

Electric guitar bridges equipped with a vibrato arm allow real-time pitch modulation through changes in string tension. For the composer, bridge design determines the range of pitch deviation, tuning stability, and the availability of specific gestural techniques.

Although commonly called ‘tremolo’ bridges, they produce vibrato (pitch variation), not tremolo (volume modulation). In this manual, the term ‘whammy bar’ will be used for clarity.



Fig. B6: Different bridge models

The most common vibrato bridge systems—Bigsby, Fender, and Floyd Rose—each offer different degrees of pitch flexibility and mechanical responsiveness.

A comparative overview of their characteristics is provided in the following table.

Table B3. Pitch range and usage differences among common vibrato bridges.

Bridge Type	Pitch Range	Best For	Limitations
Bigsby	$\pm\frac{1}{4}$ to $\pm\frac{1}{2}$ Semitone	Chordal vibratos, slow bending	Limited range, not suitable for great range
Fender (Synchronized)	$\pm 1\text{--}2$ Semitones	Moderate vibratos, expressive gestures	May cause tuning instability if overused
Floyd Rose (Locking)	Extreme downward range (up to complete string slackness); upward motion limited ($\pm 1\text{--}2$ semitones)	Extreme pitch bends, dive bombs, harmonic glides	Stable but hard to retune or use alternate tunings

N.B The Floyd Rose bridge offers the widest downward pitch range among all tremolo systems. By pressing the vibrato arm, the strings can be lowered to the point of complete slackness, effectively neutralizing their tension. This enables dramatic pitch drops like *dive bombs*, that are not achievable with other bridge types.

Video Example 1.5 – Extreme Downward Motion with Floyd Rose

This video demonstrates the maximum downward pitch range achievable using a Floyd Rose vibrato system. By fully pressing the vibrato arm, the open strings are slackened to the point of complete looseness, producing a deep dive effect with no perceptible pitch center. This gesture can be used to create sudden structural collapses, cinematic textures, or noise-based articulations within a composition.

Upward motion is also possible, but its extent is limited by the flexibility and gauge of the strings. Thinner strings allow a greater pitch rise, while heavier gauges reduce the available upward range. For this reason, the Floyd Rose is particularly well-suited to radical pitch manipulation, including both melodic glissandi and sound design-oriented gestures.

Approaches to Notating and Interpreting the Vibrato Arm

The whammy bar presents a unique challenge in musical notation due to its variable nature. Unlike fixed pitch instruments, the whammy bar does not have definite pitch points for reference, such as a semitone or whole tone decrease. This characteristic necessitates that guitarists rely heavily on their auditory acuity for accurate intonation, which could be difficult to achieve with precision. Despite this, it is possible to provide explicit instructions on the degree to which the lever should be depressed

or elevated, though one must always account for the potential slight detuning during a performance.

Pierluigi Billone's composition *Sgorgo Y* (2012) for solo electric guitar exemplifies an effective method for notating the use of the Floyd Rose tremolo system. This piece primarily revolves around intricate right-hand techniques, including tapping and percussive effects, while the left hand primarily modulates the sound through the whammy bar. The auditory experience engendered by this method is one of ‘suspension,’²⁰ as melodies and waves of sound seem to emerge from an ethereal space. Notably, the score for *Sgorgo Y* is divided into a traditional staff for the left hand and a five-line system to denote the whammy bar's movement (refer to Figure B7), thereby providing a clear framework for the performer to follow. This notational approach allows for the controlled execution of pitch variations, capturing the intended atmospheric qualities of the music.

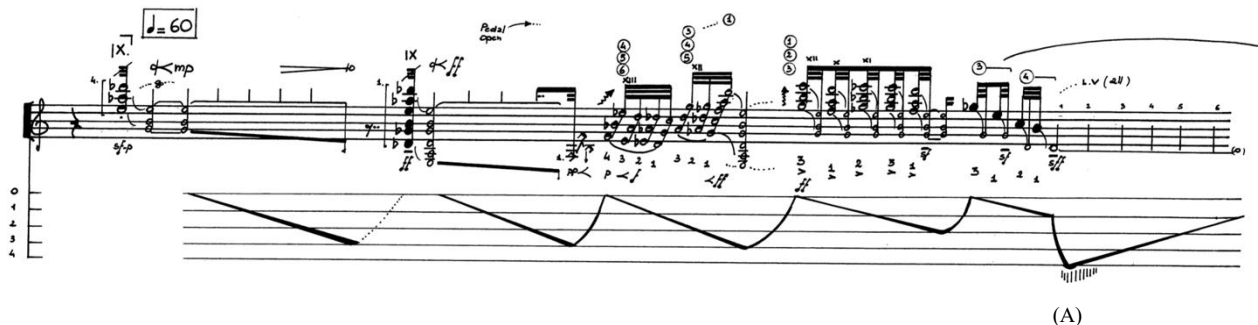


Fig. B7: Excerpt from *Sgorgo Y* by Pierluigi Billone.

As can be seen from the excerpt, Billone, the composer has crafted a distinct notational symbol to illustrate the bar's movement across its full extension range, thereby conveying a precise gesture. Furthermore, the curved line depicted suggests an inherent, automatic recoil of the bar. Billone meticulously quantifies the pitch alteration, designating each line position from 0 to 5, and so on (Fig. B8) as corresponding to a minor second interval. The directions for the vibrato arm are integral to the piece's execution and demand diligent practice.



Fig. B8: Whammy bar pitch alteration in *Sgorgo Y*.

²⁰  Pierluigi Billone's composition *Sgorgo Y* (2012) for solo electric guitar, available on Spotify: <https://open.spotify.com/intl-it/track/1sTvOCHkcQhztW9sX0D16f>

It is additionally noteworthy to observe how position number 5 is notated in parentheses, an annotation that, as previously mentioned, indicates the whammy bar being fully depressed, which yields a sound of such low pitch that it challenges precise measurement. In this particular position, the strings, being slackened to their fullest extent, come into contact with the pickups, producing a metallic timbre (see video examples 4). Billone effectively communicates this sonic phenomenon in the score with the inclusion of 'wiggles' lines (as shown in A in fig. B7), which serve as a graphical representation of the resultant sound's unique characteristics. This notation strategy is reflective of Billone's meticulous attention to the idiosyncratic sounds produced by the instrument's interaction with its various mechanical components.

In contrast to the precise notation employed by Billone in his composition, where explicit instructions for the whammy bar's intonation are provided, Stefano Taglietti in *Rocking Up* (2013)²¹ uses an alternative approach that affords the performer interpretative freedom. This method verbally indicates the vibrato arm with the Italian 'con leva' and draws in the score an approximate movement of the lever (Fig. B9)

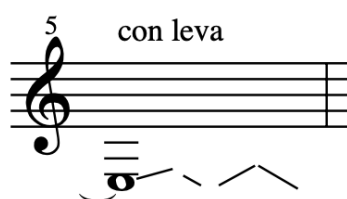


Fig. B9: Stefano Taglietti whammy bar in *Rocking Up* (Bar 5).

The notational method used by Taglietti can be particularly useful when the composer is not aiming for a specific vibrato arm effect, is unsure about the type of bridge the performer will use or simply wishes to create a general undulating movement on a note or chord. It represents an approach based on performative freedom, where the gesture is indicated but not tightly controlled.

In contrast, Billone's method exemplifies the opposite pole: a highly precise system of notating vibrato arm movements, with detailed rhythmic and pitch control. These two approaches illustrate the full spectrum between open interpretation and compositional precision.

Once a composer understands the basic mechanics of the whammy bar, they can position themselves along this continuum, choosing the approach that best aligns with their aesthetic goals and the effect they wish to communicate.

²¹ Stefano Raglietti's composition *Rocking Up* (2013) can be found: <https://open.spotify.com/intl-it/track/77FEj6NeOTKS5544AjJIWr>

Notational Strategies Inspired by Performance Practice

The approach adopted in *Nine Studies and Fugue for Electric Guitar* involves mapping the pitch range of the Floyd Rose system into distinct notational zones:

- Rest position (neutral)
- Half-way down
- All the way down

This method allows the performer to understand the intended degree of movement, while maintaining interpretative clarity and allowing for a certain degree of expressive freedom.

An important mechanical detail: the Floyd Rose is spring-loaded, which means that downward movement requires pressure, but when released, the bridge snaps back rapidly to its rest position. This feature is exploited with a specific gesture: as shown in Video Example 1.6, a natural harmonic at the 5th fret is plucked and immediately followed by the rapid release of the vibrato arm, without accompanying it back. This creates a dramatic ‘swallowing’ effect, as the pitch rushes upward back to its origin with a sudden, expressive gesture.

Video Example 1.6 – Swallowing Effect via Rapid Vibrato Arm Release

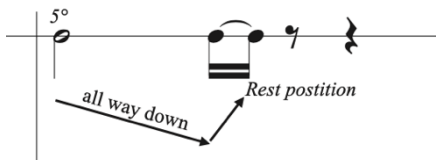


Fig. B10: Notation of the ‘swallowing effect’ gesture (Video Example 5)

Video Example 1.7 – Variations of the Swallowing Effect

This video illustrates the versatility of the swallowing effect obtained through the rapid release of the vibrato arm. The gesture is demonstrated on single notes, chords, and open strings, showing that it can be freely adapted to a variety of musical materials, regardless of specific notation.

Video Example 1.8 – Inverted Swallowing Effect (Upward Vibrato Arm Release)

This video presents the reversed version of the swallowing effect, performed by pulling the vibrato arm upward rather than pressing it downward. As explained earlier, this upward motion produces a smaller pitch range, due to the natural tension limits of the strings. Nevertheless, the expressive impact of the release gesture remains effective when applied to short notes, harmonics, or light textures.

A further method that emphasizes the rhythmic aspects of a phrase when using the whammy bar has been exemplified in *Study No. 3*. It grants the performer some freedom in tonal execution while

providing specific rhythmic instructions (refer to Figure B11). This technique delineates the temporal structure within which the performer is expected to operate, anchoring their interpretative and expressive freedom to the rhythmic precision and patterns established by the composer.

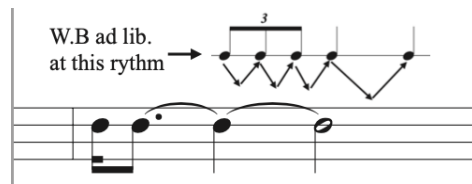


Fig. B11: Excerpt from *Study No. 3*.

By emphasizing rhythm, composers can shape the pacing, drive, and flow of a piece, ensuring that essential structural elements remain intact regardless of the tonal variations introduced by the whammy bar. This approach is particularly potent in works where rhythmic consistency is crucial to the composition's essence, such as in *Study No. 3*. It provides a definitive framework that underpins the guitarist's improvisational or interpretative pitch modulations. Consequently, the notation transforms into a hybrid form, combining the precision of rhythm with the malleability of pitch, facilitating a performance that is both controlled and dynamically expressive.

Whammy bar effects

The whammy bar, when used in combination with a Floyd Rose bridge, enables effects that have become iconic within the electric guitar's sonic vocabulary. Among these, the dive bomb and its inverse, the reverse dive bomb, are particularly notable.

The dive bomb simulates the sound of a falling object or descending explosion. It is produced by striking a note—often a natural harmonic or an open string—and fully depressing the vibrato arm until the string tension is completely released and the pitch drops into inaudibility. When performed with high distortion, the theatrical quality of this gesture is further amplified, enhancing its dramatic, almost cinematic character.

Video Example 1.9 – Dive Bomb on 3rd string Harmonic with High Distortion

This video demonstrates a classic dive bomb performed on a natural harmonic at the 3rd string harmonic, using a Floyd Rose vibrato system. The vibrato arm is fully depressed, and the high distortion enhances the theatrical impact, pushing the harmonic into a deep, descending collapse with a cinematic quality.

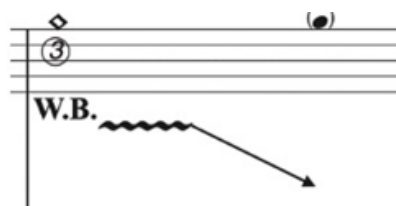


Fig. B12: Proposed notation of dive bomb effect (video example 1.9)

Video Example 1.10 – Reverse Dive Bomb

The reverse dive bomb requires the opposite gesture: it begins with the vibrato arm fully depressed, followed by the attack of a harmonic, and then a gradual return of the bar to its rest position, producing a rising pitch effect with a controlled, ascendant character.

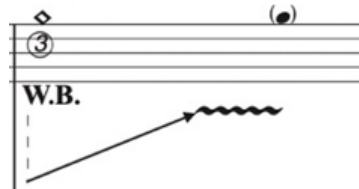


Fig. B13: Proposed notation of ‘reverse dive bomb’ effect (video example 9).

Additionally, the Elephant effect, famously demonstrated by Edward Van Halen (JMR Random Stuff, 2021)²², combines natural harmonics, dynamic volume control, and tremolo bar manipulation. This complex effect necessitates preparatory steps and timing consideration, particularly in rapid tempos, to ensure clarity in execution. The procedure for the Elephant effect within a composition might include muting the volume, playing specified natural harmonics, lowering then raising the tremolo bar while simultaneously adjusting the volume for dramatic presentation (refer to Figure B14 for notational example).

Video Example 1.11 – ‘Elephant Effect’ (Van Halen-Inspired Technique)

This video demonstrates the Elephant effect, a dramatic gesture combining natural harmonics, vibrato arm motion, and volume swells. The performer begins with the volume turned off, plucks the indicated harmonics, then manipulates the vibrato arm downward and upward while simultaneously increasing the volume. The result is a gliding, voice-like swell reminiscent of a trumpet or elephant call. Timing and preparation are essential for clarity, especially in faster passages.

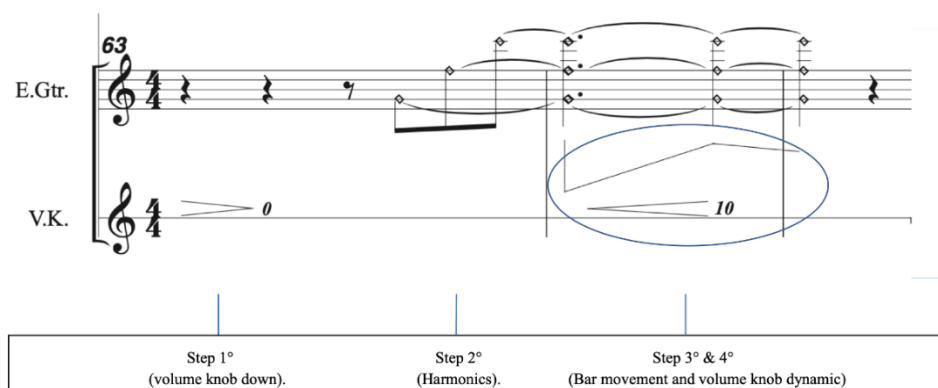
A musical score for two staves: E.Gtr. (Electric Guitar) and V.K. (Volume Knob). The E.Gtr. staff is in 4/4 time and shows a sequence of notes with natural harmonics indicated by diamond symbols. The V.K. staff is in 4/4 time and shows a volume swell from 0 to 10. A blue oval highlights the volume swell from 0 to 10. Below the staves, a timeline is divided into three steps: Step 1° (volume knob down), Step 2° (Harmonics), and Step 3° & 4° (Bar movement and volume knob dynamic).

Fig. B14: Proposed notation of ‘Elephant effect’ (video example 11)

²² Van halen’s demonstration can be found:
https://www.youtube.com/watch?v=N4Q_15m9vbQ&ab_channel=JMRRandomStuff

General consideration

The vibrato arm represents one of the most expressive and dynamic tools available to the electric guitarist. As demonstrated throughout this chapter, it enables a wide range of gestures—from subtle pitch inflections to extreme effects such as *dive bombs*, *swallowing gestures*, and *harmonic manipulations*.

While many modern guitarists actively use the whammy bar in both traditional and experimental contexts, it's important to note that not all performers use—or even have—a vibrato-equipped bridge. Some guitarists prefer fixed bridges for their stability or stylistic reasons. Therefore, composers are encouraged to approach the whammy bar as an optional but powerful resource, always adaptable to the performer and the context.

The techniques shown here represent only a selection of the expressive possibilities offered by this system. When working directly with a guitarist, the vibrato arm can become a collaborative instrument within the composition itself, shaped and refined through dialogue and experimentation.

2. Tuning Systems and Register

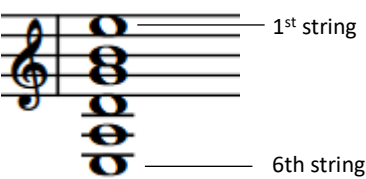
This chapter focuses on the standard tuning of the electric guitar, as well as a range of alternate tunings that are occasionally adopted by performers for expressive or technical purposes. It includes both the most commonly used tunings and others that, while less frequent, are nonetheless practical and fully playable.

The chapter also explores tunings for extended-range guitars—instruments with more than six strings—which have become increasingly common in recent years. Particular attention is given to their effective pitch range, in order to provide composers with a clear overview of the possibilities these instruments can offer.

2.1 Standard tuning

6-strings guitar (Guitar Standard)

The standard tuning of the six-string electric guitar is based on a sequence of perfect fourths, with the exception of a major third between the third and second strings.



The notes shown do not represent the actual sounding pitches, as the guitar sounds one octave lower than written. However, standard practice is to notate guitar music at sounding pitch without using octave transposition signs, taking into account the instrument's transposing nature.

Alternate tunings are often used to expand the harmonic vocabulary, facilitate open chord shapes, or adapt the instrument to a particular musical style or technique. While standard tuning remains the default for most repertoire, many guitarists—especially in blues, folk, metal, and experimental genres—adopt alternate tunings to access unique resonances, simplify technical passages, or achieve a specific tonal character.

Table B4. Common alternate tunings for electric guitar

Tuning Name	Tuning (Low to High)	Interval from Standard	Typical Usage	Notes / Advantages
Drop D	D–A–D–G–B–E	6th string ↓ whole step	Rock, metal, folk	Easy power chords; deeper bass register
DADGAD	D–A–D–G–A–D	Mixed intervals	Folk, Celtic, acoustic	Modal sound; drones and suspended harmonies
Open G	D–G–D–G–B–D	Multiple ↓	Blues, rock (slide)	G major chord open; slide-guitar

Tuning Name	Tuning (Low to High)	Interval from Standard	Typical Usage	Notes / Advantages
Open E	E–B–E–G♯–B–E	3rd, 4th, 5th strings ↑	Slide blues, rock	E major chord open; bright tone
Half-Step Down	E♭–A♭–D♭–G♭–B♭–E♭	All strings ↓ semitone	Blues, rock, metal	Warmer tone; easier bends; common in classic rock
Drop C	C–G–C–F–A–D	All strings ↓ 1 step + drop	Modern metal	Heavy sound; aggressive low end
Open D	D–A–D–F♯–A–D	Multiple ↓	Slide, folk, alternative tunings	D major chord open; resonant and rich

2.2 Extended-Range Guitars

In recent decades, electric guitars with more than six strings have become increasingly common, particularly in metal, progressive rock, and experimental music. These extended-range guitars—typically with 7, 8, 9, or even 10 strings—offer greater pitch depth, wider chordal possibilities, and enhanced polyphonic potential.

The most common configurations include:

- **7-string guitar:**

Standard tuning is **B–E–A–D–G–B–E**, adding a low B below the 6th string.

- **8-string guitar:**

Typically tuned **F♯–B–E–A–D–G–B–E**, extending the lower range further into the bass register.

- **9-string guitar:**

Often tuned **C♯–F♯–B–E–A–D–G–B–E**, these instruments are often used in extreme metal or experimental contexts.

- **10-string guitar:**

Tunings vary widely. Some extend upward, others downward, and a few add sympathetic strings or hybrid tuning systems.

While extended-range guitars offer exciting creative opportunities, they remain less commonly used

in most performance contexts. For this reason, the remainder of this manual will focus primarily on the standard 6-string electric guitar, which continues to represent the core reference point for most composers and performers.

2.3 Range and Register

The effective range of the electric guitar can vary slightly depending on the specific instrument used by the performer. One of the key factors affecting range is the number of frets on the neck, which determines how high the guitarist can play on the first string.

Standard electric guitars typically fall into three main categories:

- **21–22 Frets:** Traditional guitars, such as early Fender Stratocasters, typically have **21 frets**, allowing a maximum pitch of **D#6** on the first string.

Most modern guitars feature **24 frets**, extending the playable range to **E6**. This is the highest note available on the first string in standard tuning without extending beyond typical neck design.



Fig. B15: Guitar range

Regardless of the fret count, the lowest note on a 6-string guitar in standard tuning remains E2, on the open sixth string. Therefore, depending on the instrument, the total range typically spans from E2 to E6.

As the performer moves into the higher positions of the fretboard, the physical space becomes increasingly narrow, and the tone tends to lose fullness and resonance. However, with the support of effects and amplification, it is still possible to achieve rich and effective sounds even in the upper register.

From a technical standpoint, an experienced guitarist can comfortably reach up to D6, but it is advisable to approach the highest notes with caution, especially in fast passages. On a 22-fret guitar, full fluency is typically maintained up to the 18th or 19th fret; beyond that point, execution becomes more demanding, and the sound tends to lose warmth and brilliance.

Video Example 2 – Same Phrase in Different Positions and Registers

This video demonstrates how the same melodic phrase can be performed in three different fretboard positions: 5th, 15th, and 21st. Although the fingering remains similar, each position results in a different pitch register, affecting both the sonic height and tone colour of the phrase.

Lower positions offer warmer, fuller sounds, while higher ones introduce brighter timbres and greater technical demands, especially in fast passages.

V pos. 	Comfortable – easy
XV pos. 8^{va} 	Comfortable – easy
XXI pos. 8^{va} 	More difficult but achievable

Fig. B16: Notation of Video Example 12

Range of the individual strings on 24th fret guitar

	6 th String		5 th String
	4 th String		3 rd String
	2 nd String		1 st String

Fig. B17: Range of the individual strings on 24th fret guitar

3. Conventional Playing Techniques

This section outlines the conventional playing techniques of the electric guitar, understood as the fundamental gestures produced through direct contact between the performer and the strings using the hands or plectrum. These techniques form the core articulatory vocabulary of the instrument and are widely employed across musical contexts.

Rather than offering performer-oriented instruction, this section considers these techniques as compositional parameters. Their articulatory, dynamic, and registral characteristics define structural possibilities within the score. The clear notation and controlled combination of these gestures provide the basis upon which extended or experimental practices may be constructed.

3.1 Plectrum Techniques: Articulation and Notation

The use of a plectrum in electric guitar playing, commonly known as 'picking', plays a vital role in timbre modulation and articulatory precision during performance. The picking techniques employed by electric guitarists are wide-ranging, from the dynamic 'alternate picking', which alternates upward and downward movements for speed and precision, to 'sweep picking', which is optimal for smoothly executing rapid arpeggios²³. Additionally, the evolution of the technical guitar repertoire has led to the development of advanced plectrum methods, often specific to an individual guitarist's style²⁴. For composers, mastering the standardized symbolic notation of plectrum techniques, which can be omitted from the score at the author's discretion, is sufficient. Commonly, the symbols used to indicate plectrum technique are prescribed and described in the following notational conventions²⁵:

∨ = Upstroke ▣ = Downstroke

An example of upstroke and downstroke notation can be found in *Prelude No. 1* by David Laganella, as demonstrated in Figure B18.



Fig. B18: Excerpt from *Prelude No. 1* for electric guitar by Laganella (Bar 11).

The exclusive use of a plectrum typically facilitates monodic melodic lines or strummed chords.

²³ For further details, see the dedicated section.

²⁴ A plethora of guitar techniques pertain specifically to pick usage, such as pick slanting and reverse pick slanting. While these methods are intricate and central to a guitarist's skillset, they generally do not hold significant importance in the context of standard musical notation. Their execution is often left to the discretion of the performer, as they are more related to the physical execution of guitar playing rather than to the notational representation of the music.

²⁵ These symbols are commonly referenced in manuals on guitar techniques (Laganella, 2003; Burgess, 2013).

However, numerous renowned guitarists have developed distinctive styles through fingerpicking. These include the lead guitarist of Dire Straits, Mark Knopfler, Jeff Beck, and Wes Montgomery, who notably utilized his thumb (Paté et al., 2012). The technique known as 'hybrid picking' (Pearson, 2008) combines the use of a plectrum—usually held between the thumb and index finger—with the fingers, potentially involving the middle, ring, and even the little finger.

While the range of picking techniques available to electric guitarists is vast and often highly individualized, composers are not expected to master every technical nuance. In most cases, a clear musical intention—whether timbral, rhythmic, or gestural—is more valuable than detailed technical notation. Indications of picking style may be included where relevant, but can also be left to the performer's discretion, especially when collaborating with experienced guitarists who bring their own idiomatic solutions to the score. Ultimately, precision in the musical outcome is more important than prescribing exact physical technique.

3.2 Legato: Hammer-on and pull-off

When discussing legato techniques on the electric guitar, it is important to pay close attention to the specific methods used to perform them. There are two main legato techniques that produce a similar sonic effect but are executed differently. These techniques are commonly known as hammer-on and pull-off.

- **Hammer-on** is an ascending legato technique. It consists of firmly striking a fret on the fingerboard with a finger of the left hand, causing a new note to sound without plucking the string again.
- **Pull-off**, by contrast, is a descending legato technique. It is performed by plucking the string with the left hand to produce a note that is lower than the one initially fretted. This requires a precise gesture of 'pulling' or actively releasing the string downward while lifting the finger from the fret, allowing the lower note to sound.

As previously mentioned, the standard method for producing sound on the electric guitar is through the use of a plectrum. When discussing legato playing, it can be useful to draw a parallel with bowing on the violin: all the notes under a slur are performed with a single stroke of the pick on the first note, while the following notes are generated exclusively with the left hand.

In this context, the pick will move upward or downward (*upstroke* or *downstroke*) depending on the direction of the phrase and the placement of the slurs.

A well-considered distribution of slurs in guitar writing is essential, as it plays a major role in determining the fluency and expressiveness of the performance.

Intervallic range

When using legato techniques on the electric guitar, it is generally advisable to stay within a major third interval in first position, where the frets are wider and the finger stretch is greater. Between the fifth and twelfth positions, it is usually possible to reach a perfect fourth, while beyond the twelfth fret, one can often achieve a perfect fifth, thanks to the progressively narrower fret spacing²⁷.

- Legato notes should not span more than four fingers, which corresponds to a range of five semitones.
- Slurring across strings is not technically possible; legato style can be imitated, but mid-slur string changes are usually avoided for technical and expressive reasons.

Ascending and Descending Legato in Chordal Contexts

Hammer-ons and pull-offs can also be applied in chordal contexts, but they require specific technical considerations. From a performance standpoint, these techniques demand significant finger strength, especially as the number of notes in the chord increases. This can present challenges for the performer, particularly with chords involving more than two notes.

The technical complexity of executing legato on extended chords often limits its use, as it may compromise both speed and sound quality.

In chordal writing, ascending legato tends to be more effective and relatively easy when applied to two-note chords (dyads), provided that:

- the interval remains within a comfortable range, and
- the dyads are performed on adjacent strings.

The examples below present a series of easily playable ascending legato dyads in first position, using adjacent strings. These can then be transposed chromatically along the entire length of the fretboard.

²⁷ For a complete diagram and video examples of tremolo interval spans — and by extension, legato execution ranges — refer to the dedicated chapter Tremolo and Tremolo Picking.



Fig. B20a: legato dyads in first position

Video Example 3.1 – Percussive Effect of Legato with dyads

This video illustrates the percussive quality that can be achieved through legato technique when applied to triads, particularly in the middle range of the fretboard, between the 3rd and 4th strings. These positions offer a balance of clarity, resonance, and playability, making them especially effective for chordal legato gestures.



Fig. B20b: Notation of video example 3.1

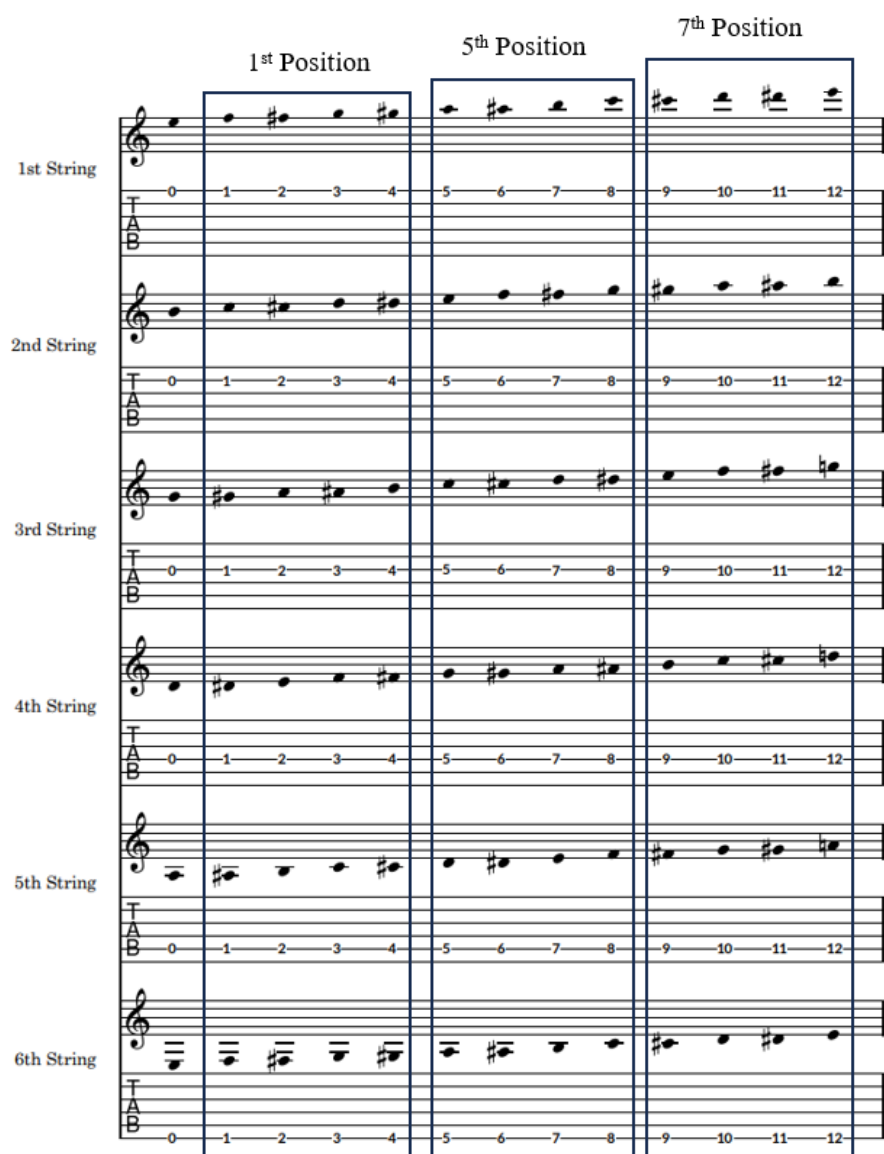
[illegible]

Fig. B21: Fretboard diagram up to 12th fret

The accompanying tablature indicates the precise fret corresponding to each pitch. After the 12th fret, the pitch sequence repeats at the octave: the 12th fret corresponds to the open string one octave higher, and the same intervallic pattern continues beyond this point.

Figure B20 also identifies three common left-hand positions on the fretboard (1st, 5th, and 7th positions), each spanning four consecutive frets. Intermediate positions follow the same principle: a four-fret range beginning from the selected base fret.

Since standard left-hand technique employs four fingers, this four-fret configuration represents the natural ergonomic framework of the instrument. The use of barré technique—pressing multiple strings with the index finger—extends this framework, allowing chordal formations that exceed the reach of four independent fingers.

For the composer, this positional logic is fundamental: chord construction and voice distribution should be conceived within these ergonomic limits to ensure playability across two to six strings.

For example, to construct a B minor chord on four strings in first position, it is sufficient to select the corresponding notes from the diagram in order to immediately assess the playability of the chord.

Figure B22 displays musical notation and tablature for a B minor chord on four strings. The diagram shows the 2nd, 3rd, 4th, and 5th strings. The 2nd string has notes B2 (open), C3 (1st fret), D3 (2nd fret), and E3 (3rd fret). The 3rd string has notes B2 (open), C3 (1st fret), D3 (2nd fret), and E3 (3rd fret). The 4th string has notes B2 (open), C3 (1st fret), D3 (2nd fret), and E3 (3rd fret). The 5th string has notes B2 (open), C3 (1st fret), D3 (2nd fret), and E3 (3rd fret). The notes B2, C3, D3, and E3 are circled in red. To the right, a small inset shows a B minor chord on a single staff, with notes B2, C3, D3, and E3.

Fig. B22 – Example of a chord on four strings, based on the position shown in Fig. B21

The following guidelines provide additional tools for chord construction, based on the diagram shown in Figure B21.

Chords Without the Use of Barré

- *Two-, three-, or four-note chords within the first four frets of a position*

The guitarist can form chords of up to four notes using only fretted strings within the designated hand position, typically covering a range of four frets. In some cases, it is also possible to reach slightly beyond this range, though with caution.

When dealing with two- or three-note chords, which require fewer fingers, the guitarist has greater freedom of extension and may occasionally reach a fret outside the standard position. These chords can range from moderate to high technical difficulty, but are generally playable, as long as they respect the physiological limits of the hand.

- *Two-, three-, or four-note chords within three consecutive frets of a given position*

Within three consecutive frets of any given position, the guitarist can easily perform any combination of notes selected by the composer from the diagram. This configuration reduces the required finger stretch and promotes agility and fluidity in harmonic writing.

- *Open chords (using open strings), ranging from two to six notes.*

Following the same principles, it is possible to build more extended chords (with five or six notes) by combining fretted and open strings. This technique allows for rich harmonic textures, such as deep basses combined with high voices (or vice versa), taking advantage of the guitar's natural resonance without increasing the technical difficulty for the performer.

An effective example of how to use open strings is to employ one of them as a pedal note, while the chord—maintaining the same finger configuration—shifts along the fretboard. This is shown in Video Example 15, which begins with an E^o7 chord in fifth position (see Fig. B23). Using the open low E on the sixth string as a pedal, the same chord shape is moved up the neck.

.

The diagram illustrates a diminished chord shape on a guitar fretboard, showing the 1st, 5th, and 7th positions. The 6th string is circled in red and labeled "Pedal Note". An arrow labeled "enharmonically" points to a musical staff showing the chord's structure with a flat and a natural sign.

Fig. B23 - Diminished chord created on the diagram and shifted along the fretboard with low E as pedal, enharmonic interpretation on the right.

Video Example 3.2 - Pedal Tone with Movable Chord Shape

This video shows how a diminished seventh chord shape can be shifted along the fretboard while keeping the low E string as a constant pedal tone. This technique, which can also be applied to other chord types, highlights the symmetry of the guitar fretboard and the possibility of generating new harmonies from a fixed shape.

Chords Using the Barré

As mentioned earlier, the barré technique allows the guitarist to use the index finger to press multiple strings at the same fret—often all six. In this way, the index functions as a movable nut, enabling a chord shape to be shifted along the fretboard while preserving its internal structure and altering its pitch.

The barré makes it possible to form complete six-note chords without relying on open strings, allowing for chromatic transposition across the entire neck.

Referring to the fretboard layout in Figure B21, the lowest major chord with a fretted bass note playable in first position is F major. This example is shown here in its standard fingering: a barré at the first fret with the index finger, while the remaining three fingers complete the chord shape.

In Figure B24, the circled notes indicate the pitches that define the resulting harmony. The square bracket marks the barré executed by the index finger across all six strings. On strings where additional fingers press higher frets, the resulting pitch is determined by those fingers rather than by the index, although the barré remains structurally engaged.

Figure B24 illustrates the construction of the F major chord in first position using a barré. The diagram shows a six-string guitar fretboard with columns for 1st, 5th, and 7th positions. The 1st position column shows the F major chord shape with a square bracket at the first fret and circled notes on the 1st, 2nd, 3rd, 4th, and 5th strings. The 5th and 7th position columns show the same shape shifted to higher frets.



Fig. B24 – Construction of the F major chord in first position using a barré

The fingering shown in Figure B24 can be shifted chromatically across the entire fretboard, maintaining the same shape while changing only its position. In this way, the guitarist can form all major chords using a barré, simply by moving the hand. This same principle applies to other types of chords (minor, diminished, etc.), as long as they are based on a fixed shape. Video Example 3.3 visually demonstrates how this chord shape can be moved along the neck to achieve different pitches without altering the fingering.

Video Example 3.3 – Chromatic Transposition of the F major chord using the same barré

This video demonstrates how the same barré chord shape used for F major in first position can be moved along the fretboard to produce all major chords chromatically, without changing finger configuration.

The Capo (Capotasto Mobile)

The capo, or capotasto mobile, is a device that is placed directly on the guitar neck, pressing down all the strings at a specific fret. Its use allows the guitarist to raise the pitch of all open strings without changing fingering, making transposition both immediate and physically simple. In practical terms, the capo acts like an artificial barré, taking the place of the index finger pressing across all six strings and allowing the performer to maintain familiar chord shapes in higher positions. For example, if a capo is placed on the 1st fret, all open strings will sound one semitone higher: the 6th string (E) becomes F, the 2nd string (B) becomes C, the 1st string (E) becomes F, and so on.

In this way, the guitarist can transpose entire pieces to a different key while maintaining the same chord shapes. This is especially useful for adapting the key to a singer's vocal range or for facilitating the use of open-position chords in other tonalities. The capo can also be applied or removed quickly during a performance, but it is important to note that it still requires a few seconds to be properly positioned. For this reason, any capo change within a piece should be carefully planned in both the composition and performance.

Table B5. Open String Transposition with Capo Placement

String	Open (No Capo)	Capo 1	Capo 2	Capo 3	Capo 4	Capo 5
6th	E	F	F# / Gb	G	G# / Ab	A
5th	A	A# / Bb	B	C	C# / Db	D
4th	D	D# / Eb	E	F	F# / Gb	G
3rd	G	G# / Ab	A	A# / Bb	B	C
2nd	B	C	C# / Db	D	D# / Eb	E
1st	E	F	F# / Gb	G	G# / Ab	A

Creative Use of Combined Capos

In addition to the traditional full capo, there are also partial capos, designed to press down only selected strings. The image in Figure B25 shows a particularly interesting example:

- a full capo on the 1st fret, acting on all strings like a fixed barré
- a partial capo on the 3rd fret, applied only to the four lowest strings

This configuration creates a hybrid setup, in which the strings pressed by the first capo function as open strings but transposed up by a semitone. At the same time, the strings selectively blocked at the 3rd fret by the partial capo alter the perceived tuning of the instrument. The result is a fixed and customized harmonic structure, which is particularly useful for:

- simulating complex open tunings
- creating drone notes or pedal tones
- producing timbral effects that are not achievable with traditional fingering

Such configurations are particularly well-suited for contemporary writing, or for achieving diatonic and modal effects with great ease of execution.



Fig. B25 – Configuration with two capos: one full capo on the 1st fret and one partial capo on the 3rd fret, pressing only the four lowest strings.

Power chords and quartal chords

Power chords are chords without the third, consisting of a perfect fifth (sometimes reinforced by the octave). On the electric guitar they represent a strongly idiomatic configuration. Their prevalence is directly related to the instrument's tuning in fourths (with the exception of the interval between the 2nd and 3rd strings), which enables fifths to be executed with mechanical consistency and ergonomic simplicity. For the same structural reason, quartal configurations feel equally natural and may incorporate open strings to produce a resonant sonority.

A well-known example is the opening riff of *Smoke on the Water* (1972) by Deep Purple, constructed from parallel perfect fourths on adjacent strings. The intervallic shape remains constant as it shifts horizontally across the fretboard, demonstrating how the tuning supports modular displacement without altering hand configuration. Beyond rock idioms, this intervallic modularity—particularly the use of fourths—offers compositional advantages in contemporary contexts, where structurally stable configurations facilitate rapid transposition.



Fig. B26 – Fretboard diagram with positions and standard notation of the *Smoke on the Water* riff.

The use of power chords is especially preferred in contexts where distortion is applied, as the absence

of the third avoids dissonant overlaps and ensures a more stable and focused sound. They are commonly used in genres such as rock, metal, and punk, where high levels of distortion are standard and sonic impact is a key element. However, the clarity and compactness of power chords can also be effectively employed in contemporary composition, including concert music, particularly when working with layered textures or seeking a harmonically direct and impactful effect. As demonstrated in the video example 5 in the section dedicated to distortions, their timbral behaviour under different levels of saturation further clarifies their relevance and versatility.

3.3 Tremolo Picking and Tremolo

On the electric guitar, tremolo picking consists of rapidly alternating the pick up and down on a single string, producing a continuous repetition of the same note. This technique can be particularly effective and, on the electric guitar, also relatively accessible thanks to the instrument's ergonomic design and the lightness of the picking motion required. The high responsiveness of the electric guitar, combined with the possibility of using distortion and reverb, allows for a dense and incisive sound with minimal physical effort.

Under favourable conditions, even a guitarist without advanced technique can achieve striking results in terms of density and timbral impact, especially on the first string. On this string, the motion of the pick is not obstructed by adjacent strings, and the hand has greater freedom to move downward. The same applies to the sixth string, where the motion is freer upward, but the first string is generally more comfortable and produces a brighter timbre. When combined with effects such as distortion and reverb, tremolo picking becomes even more powerful: the sound is extended, enriched with overtones, and retains its intensity even with a lighter attack from the right hand.

An experienced guitarist can move across strings while maintaining tremolo picking, though in such cases, the string change may be more or less noticeable depending on the player's technique. However, even when limited to a single string, tremolo can create a strong sense of movement and dramatic tension, making it an effective compositional tool.

Video Example 3.4 - tremolo picking technique

This video demonstrates the tremolo picking technique on the first string, both with and without distortion, highlighting the sonic differences and expressive potential of this technique even without advanced virtuosity.



Fig. B27 – Notation of video example 17

Tremolo

With regard to standard tremolos—that is, the rapid alternation between two notes on the same string—the maximum practical interval is approximately a major third. In the lower positions of the fretboard, sustaining this distance can be challenging, whereas from the fifth position upward, the reduced spacing between frets makes the technique easier to execute and maintain over time.

In general, the guitarist can perform tremolos on a single string using the following intervals²⁸:

*Within the first five positions on each string*²⁹:



Fig. B28 - Possible tremolos within the first five positions on each string

Within the 5th and 11th position:



Fig. B29 - Possible tremolos within the fifth and tenth position

Beyond the twelfth position, where the fretboard repeats the same notes one octave higher, the frets become smaller, and it is generally possible to reach a perfect fifth, and sometimes even wider intervals in the highest positions. However, this always depends on the performer's individual physical ability and technique.

It is important to note that all tremolos must be executed on the same string. Therefore, it is usually not necessary to specify the string when the interval clearly fits on a single string. Nonetheless, it is generally advisable to indicate the string, to avoid the guitarist performing the tremolo across two strings, which would result in reduced evenness.

3.4 Vibrato

As with many string instruments, both fretted and non-fretted, vibrato is a widely used expressive device that performers employ to add color and intensity to the sound. The guitarist can produce a simple vibrato similarly to bowed string players, by oscillating the finger parallel to the fingerboard.

²⁸ The following examples illustrate the possible tremolo intervals on the sixth string. These same intervals can be easily transposed to all other strings. For reference on positions, see the diagram in Figure B21.

²⁹ The asterisks indicate the level of difficulty: no asterisk means easy, one asterisk means challenging but manageable, and two asterisks indicate a high level of difficulty

However, unlike bowed instruments, the greater flexibility of the string on the guitar allows for a much wider vibrato range. In particular, a more pronounced ‘molto vib’. effect can be achieved by moving the string longitudinally along the neck—pulling or pushing it more aggressively either upward or downward.

Video Example 3.5 - Vibrato

This example demonstrates the difference in effect when the same phrase is performed first with standard vibrato and then with molto vibrato.

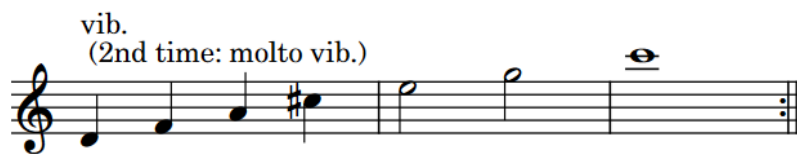


Fig. B30 – Notation of video example 3.5

3.5 Glissando

Glissando is a straightforward technique to perform on the guitar, achieved by sliding along the same string from one note to another. Since the instrument is fretted, it is not possible to produce microtones as with fretless string instruments, unless a fretless guitar is used.

Glissando notation follows the same conventions used for other string instruments. Additionally, the guitar allows for sliding not only between single notes but also across double stops and multi-note chords, provided they maintain the same finger shape, without presenting significant technical challenges.



Fig. B31 - Examples of glissando applied to a single note, a double stop, and a full chord with parallel motion

3.5 Bending

Although the acoustic principles governing string instruments have been well understood for centuries—and have been extensively analyzed in relation to both the violin and the guitar—the specific characteristics of string bending on the guitar have received further attention in contemporary research. In particular, Grimes (2014) offers a detailed explanation of the physical principles of bending in *String Theory – The Physics of String-Bending and Other Electric Guitar Techniques*, while Bader (2005) addresses computational aspects in *Bending, Damping and Coupling: Computational Mechanics of the Classical Guitar*.

String bending, a technique closely associated with the expressive potential of the electric guitar, is often compared to the human voice due to its ability to traverse microtonal intervals³⁰, reaching, in ideal areas of the fretboard, up to a major third. The technique exploits the flexibility of the string, which is laterally displaced by the performer's left hand to alter pitch. Figure B32 visually illustrates the movement of the string and the mechanics of the gesture.



Fig B32 - Graphical representation of the *bend* (left) and *bend and release* (right) techniques, illustrating the string movement.

The notation of string bending within a musical score depends on the specific aspects the composer wishes to emphasize. There is indeed a degree of flexibility in the use of different semiotic symbols to represent string bending. The examples provided illustrate the most common conventional methods used to notate this technique, offering a visual repertoire that links compositional intent with instrumental execution. Through these notational conventions, the physical manipulation of the string—bending it to reach a target pitch—is encoded into a system that is both comprehensible to the performer and clearly indicative of the desired sonic effect.

Figure B33 presents a conventional approach in which the pitch elevation is represented by an arrow extending from the original note. This graphic element indicates both the direction and the extent of the bend.



Fig. B33 – Example of Bending technique's notation with target note

The notation of string bending in the score depends on what the composer wishes to emphasize, and there is a certain degree of flexibility in the use of graphic symbols. The examples provided illustrate

³⁰ Together with an extensive selection of amplifiers, effects, and distortion possibilities, the electric guitar is capable of producing sounds that are reminiscent of the human voice, a characteristic frequently noted in popular media. For instance, Eric Clapton's rich, vibrant guitar sound and his distinctive vibrato technique have been colloquially dubbed by fellow musicians as the 'woman tone' (Grimes, 2014).

the conventional methods used to represent this technique, offering a visual repertoire that connects the composer's intention with the performer's execution. Through these notational conventions, the bending of the string to reach a specific pitch is encoded into a system that is both understandable for the performer and indicative of the desired sonic outcome. Figure B34 presents a didactic example that places standard musical notation alongside tablature. In the lower tablature staff, the performer is shown the fret to press (e.g., 8, corresponding to a G on the second string), along with an upward arrow that specifies the extent of the bend ($\frac{1}{2}$ for a semitone, *full* for a whole tone). The upper staff represents the actual pitch perceived as a result of the bend, providing a clear reference for the intended acoustic effect.

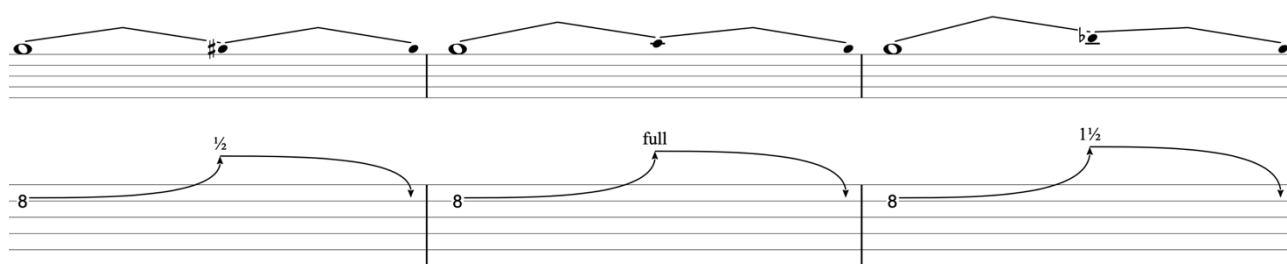


Fig. B34 - Didactic example comparing standard notation and tablature for a bend

The bending technique offers a wide range of expressive nuances and compositional possibilities. It includes several approaches that are closely tied to the physicality of the instrument and the direct interaction with the string. The main variants are outlined below, accompanied by notated examples and suggestions for notation.

Bend and release

In the meticulous precision of guitar technique, two primary articulations of string bending are commonly distinguished. The first, known as *bend and release*, is a measured and fluid gesture in which the string is bent to gradually raise the pitch, culminating in a controlled return to the original note. This method imparts a lyrical quality to the sound, enriching the expressive depth of the performance. This technique is clearly illustrated in Figure B35 and in Video Example 3.6.

 **Video Example 3.6** - This video presents a short musical phrase performed first without string bending, and then with bending applied. Both interpretations are shown in traditional notation and tablature, allowing a clear comparison of the expressive impact and visual representation of the technique.

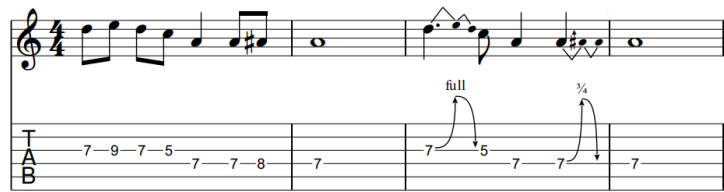


Fig. B35 – Proposed notation of video example 18

The use of $\frac{1}{2}$ to indicate a semitone bend and ‘full’ for a whole tone bend can be effectively notated in the score, as exemplified by Marco Oppedisano in *Urban Mosaic* (2002), see Figure B36.



Fig. B36: Excerpt from *Urban Mosaic* by Marco Oppedisano (Bar 13).

Pre-Bend

In contrast to the bend and release, which unfolds progressively and lyrically, the pre-bend involves bending the string to the target pitch before plucking it, followed by an immediate release as the note is played. This creates a sudden shift in pitch, giving the sound a sharper, more percussive character. Below are examples illustrating how to notate these two bending techniques, accompanied by tablature to help visualize the physical movement of the string.

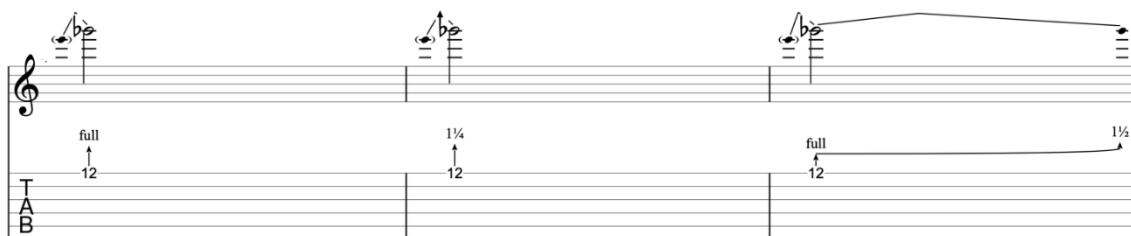


Fig. B37 - Examples of pre-bend techniques with different pitch extensions

Multiple notes bend

Multiple notes bend is a technique in which two or more notes are played and bent simultaneously on different strings. Although it is technically possible to execute bends on up to four strings at the same time, the practical application of this technique is rare, especially when more than two notes are involved. This is due both to the high level of technical difficulty and to the risk of producing unwanted dissonances. Moreover, bending multiple strings requires considerable physical effort, and for this reason the bent notes are usually limited to a maximum of two semitones. As an alternative, the whammy bar is commonly used to modulate the pitch of chords or clusters made up of three or more tones, offering greater control and sonic uniformity without the physical limitations of traditional bending.

A particularly interesting and more common variation is the two-note bend, where one note is bent while the other remains fixed. This technique is frequently employed in musical writing for its ability to produce highly expressive dissonant effects, generating tension between the two pitches that is both harmonically engaging and emotionally compelling. An extension of this approach involves bending one note while keeping two other notes fixed — that is, forming a dyad. Although this variant is slightly more unstable, as the bent string may interfere with the stability of the static dyad, it can still yield a compelling timbral effect if executed carefully. In this case, the extent of the bend should be limited (no more than two semitones) to avoid unintentionally moving the fixed strings.

Both techniques — one bent note with one fixed, or one bent note with two fixed — are illustrated in Video Example 3.7 and Figure B38.

Video Example 3.7 - Multiple-string bending

This video demonstrates two applications of multiple-string bending. The first example shows one bent note against one fixed pitch: the second shows a bent note with two fixed notes. The effect is presented in both traditional notation and tablature, highlighting the expressive tension and technical implications of each variation.

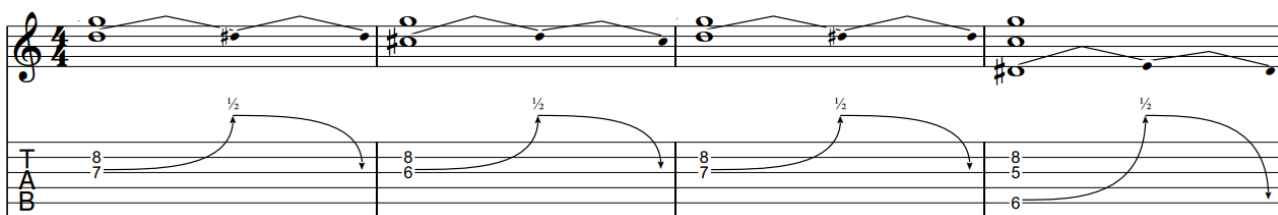


Fig. B38: Proposed notation of video 19

Bending Extension in Relation to String Tension

Due to the physical structure of the guitar and the distribution of string tension along the fretboard, the effectiveness and extent of string bending vary significantly depending on position. Near the nut — that is, between the 1st and 2nd frets — the string tension is generally higher, making bends more difficult to execute and typically limiting their range to a semitone.

Starting from the 2nd fret, bends of up to a whole tone become achievable. Between the 5th and 10th frets, conditions are generally ideal for this technique: the tension is more balanced, allowing for a bending range of a tone and a half, and in some cases even up to two whole tones, though this should be approached with caution to avoid compromising pitch accuracy or string stability.

Beyond the 12th fret, string tension tends to increase again, especially from the 15th fret onward. This results in greater physical effort required to perform extended bends, making them more technically demanding and potentially less controllable.

These guidelines are general and may vary depending on several factors, including the type of guitar, string gauge, instrument setup (action), and the player's physical strength.

Table B6. Bending Range by Fret Position

Fret Range	Approximate Bending Range
1st – 2nd fret	Up to ½ tone (semitone)
3rd – 4th fret	Up to 1 tone
5th – 10th fret	1 to 1½ tones (occasionally 2 tones)
11th – 12th fret	1 to 1½ tones (occasionally 2 tones)
13th – 15th fret	Up to 1½ tone (increased effort required)
16th fret and above	½ tone to 1 tone (technically demanding)

While bending operates through controlled variation of string tension, other techniques derive their expressive potential from the division of the vibrating string into nodal segments. These techniques do not modify pitch through lateral displacement but through selective activation of specific vibration modes. Among them, harmonics represent one of the most structurally significant resources of the electric guitar.

3.6 Harmonics

In the sonic landscape of electronics applied to the electric guitar, harmonics acquire a special allure: their timbral clarity stands out even in the densest and most distorted contexts (Spitzer et al., 2019). These natural phenomena—generated by dividing the vibrating string into proportional segments—become highly expressive musical elements on the electric guitar. When combined with effects such as distortion or delay, harmonics transcend their purely acoustic function, offering a wide palette of sonic colors ranging from the ethereal to the gritty.

The timbral character of an electric-guitar harmonic depends on its partial-tone spectrum, which can be further shaped by electronic effects. Distortion in particular amplifies the upper harmonic components, rendering the sound richer, more incisive, and more complex (Herbst, 2018). In this context, precise notation of harmonics becomes essential for the composer, as it must encode not only pitch and duration but also any effects intended to enhance resonance and timbral impact.

Electric-guitar harmonics have been analysed in relation to standing-wave patterns and the effects of distortion on harmonic structure (Herbst, 2018; Ray et al., 2021; Jain, 2021). The present discussion focuses on the practical and compositional implications of these phenomena.

Open strings Harmonics

Electric-guitar harmonics fall into two main categories: natural harmonics and artificial harmonics. Natural harmonics are produced by plucking an open string while lightly touching a specific point along its length; artificial harmonics, by contrast, require the string to be fretted (no longer ‘open’) and then plucked in such a way that a new vibrating node is created. In this section, we will concentrate on natural harmonics, while artificial harmonics will be treated separately in the following paragraph.

On the electric guitar, the second through fifth natural harmonics can be obtained on any open string, each exhibiting its own characteristic timbre. Due to the instrument’s physical and acoustic properties, some harmonics may be produced at multiple nodal points along the string. This multiplicity offers the guitarist several performance options, allowing the choice of harmonic position according to musical context or technical convenience.

The Table B6 clearly illustrates the most common positions for producing natural harmonics on open strings. It highlights the correspondence between nodal points and resulting pitches on each string, providing the composer with an immediate and effective overview for notating natural harmonics in any tuning.

Table B6. Nodal points and corresponding pitches for natural harmonics

Fret	Harmonic Type	Relative Pitch	Notes
4	Natural harmonic	2 Octaves + Major Third	weak, sensitive to touch, more difficult to produce
5	Natural harmonic	2 octaves above fundamental	Stable, strong, easy to produce
7	Natural harmonic	Octave + Perfect Fifth	Stable, strong, easy to produce
9	Natural harmonic	2 Octaves + Major Third	Weaker, slightly more difficult to produce
12	Natural harmonic	1 Octave above fundamental	The clearest and easiest to produce
16	Repeat of harmonic at fret 4	2 Octaves + Minor Third	Easy to produce
19	Repeat of harmonic at fret 7	Octave + Perfect Fifth (higher)	Stable, easy to produce

Fret	Harmonic Type	Relative Pitch	Notes
24	Repeat of harmonic at fret 12	1 Octave above fundamental	Stable, easy to produce

In accordance with standard guitar tuning (E–A–D–G–B–E), the pitches produced by natural harmonics are presented in Table B7 below. Each stave corresponds to one of the guitar’s strings, from the lowest (6th string, E3) to the highest (1st string, E5). The lower note on each staff indicates the fret at which the guitarist should lightly touch the string, while the open diamond above it represents the true harmonic pitch. This notation provides a clear guide for translating the written indication into the desired harmonic sound.

Table B7. Natural harmonics produced on each string in standard tuning.

Harmonics

The table displays the natural harmonic series for each string in standard tuning. Each row represents a string, and the notes are marked with diamond symbols. The fret numbers are indicated below the notes.

String	4°	5°	7°	9°	12°	16°	19°	24°
E3	E4	G#4	B4	C#5	E5	G#5	B5	C#6
A3	A3	C#4	E4	F#4	A4	C#5	E5	F#5
D4	D4	F#4	A4	B4	D5	F#5	A5	B5
G4	G4	B4	D5	E5	G5	B5	D6	E6
B4	B4	D5	F#5	G#5	B5	D6	F#6	G#6
E5	E5	G#5	B5	C#6	E6	G#6	B6	C#7

Table B7 shows one of the methods for indicating harmonics, but—as with all other instruments—harmonic notation may vary while yielding the same result. In many contemporary score editions, the production of harmonic tones is generally denoted by a diamond-shaped symbol (Fig. B39) or by a small circle placed above the note.

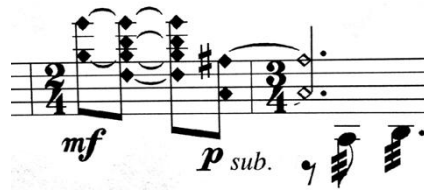


Fig. B39 - Excerpt from *12 Miniature for electric guitar* by D. Laganella (Bars 57-58)

However, the isolated use of such symbols may not accurately convey the intended harmonic pitch to the performer. Indeed, the diamond-shaped symbol indicates which note to play but often fails to reference any required transposition. Consequently, this notation demands precise identification of the corresponding string and fret, typically by placing the fret number adjacent to the notated pitch on the score (Fig. B40).



Fig. B40: Excerpt from *Loss is itself lost* by A. Noseworthy (page 1).

Such a method, while readily comprehensible to the performer, demands that the composer have a deep understanding of the fretboard's layout. When using this convention, it is essential to account for the actual resulting pitch. For example, according to Table B7, indicating a C#6 harmonic at the ninth fret of the low E string yields a pitch a perfect fifth higher—namely G#6. To prevent ambiguity, it is advisable to note in the score's annotations that harmonics are to be interpreted as overtones, as marked by the diamond symbol. A more precise approach to notating harmonics is to transcribe them according to the pitch actually heard. This technique ensures the composer's intentions are communicated accurately, eliminating any uncertainty.

An alternative notation method employs a hybrid approach, arguably the most exacting, in which the resulting pitch is written on an additional staff. An example of this system appears in Dai Fujikura's *Sparking Orbit* (Fig. B41): the sounding pitch is notated on the upper staff, while the lower staff indicates the string or node to be touched to produce the harmonic.

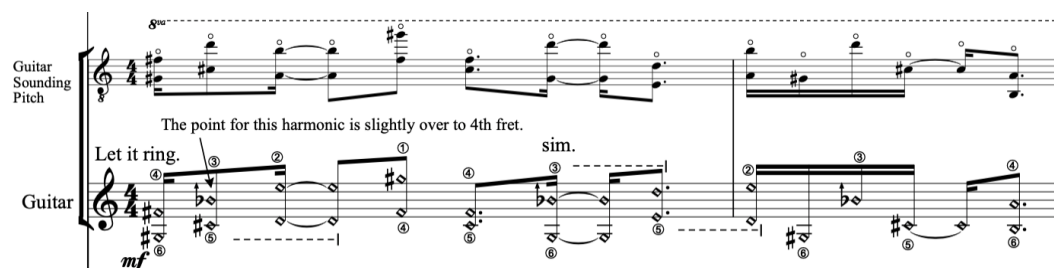


Fig. B41: Excerpt from *Sparking Orbit* by D. Fujikura (Bars 1-2)

The example in Fig. B41 could have been notated using either of the two methods shown in Table B42 yet still yield the same result; in this particular case, the composer chose to transcribe the sounding pitch with a small dot above the resulting notes, which in itself constitutes a method of harmonic notation.

The ensuing figure elucidates the trio of distinct methods prescribed for the notation of harmonics, with each method offering a different avenue to denote the identical harmonic. The choice of notation may be judiciously employed based on the exigencies presented by the score.

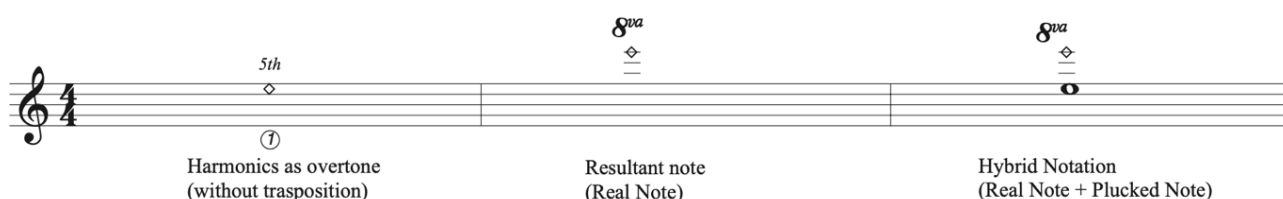


Fig. B42: Three distinct guitar notations for the same harmonic

For practical support in understanding harmonics, Video Example 3.8 provides a clear performance reference for natural harmonics, while *Study No. 1* presents a piece built entirely on natural harmonics, exploring their timbral potential through the use of distortion and delay. The complete score is available in the appendix of this manual.

Video Example 3.8

This video demonstrates the execution of natural harmonics on the fourth string, beginning at the 4th fret and extending to the 22nd fret. The harmonics are presented sequentially in order to clarify their precise nodal positions along the string and to highlight the progressive changes in timbral colour and resonance across the instrument's range.

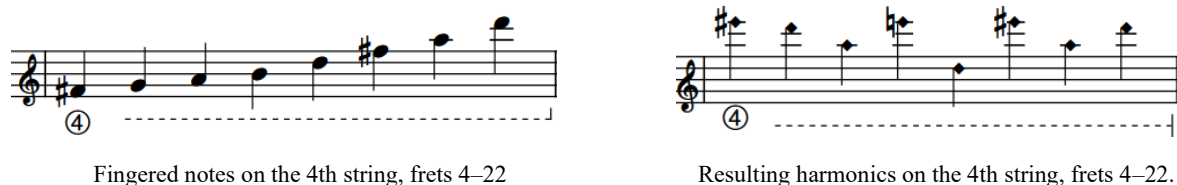


Fig. B43 – Proposed notation of video example 22

Score/Audio Example 1 – Study No. 1 (Open Harmonics)

This piece is entirely composed using natural harmonics, showcasing their full expressive and timbral potential. The composition explores harmonic tones across different strings and fret positions, enhanced by the use of distortion and delay. The full score is available in the appendix of this handbook.

Artificial Harmonics:

Given the involvement of both hands and the atypical movement required by the right hand, this technique is more demanding than the production of natural harmonics. It is essential to consider the performance speed required: fast passages can be particularly challenging when using artificial harmonics. Moreover, if the preceding section involves playing with a pick, the transition between the two techniques must be planned. The guitarist can keep the pick in the right hand while producing artificial harmonics, but a brief adjustment is needed. Therefore, it is advisable to insert a short rest or a sustained note when playing at a fast tempo before introducing artificial harmonics.

As for notation, artificial harmonics are typically indicated with diamond noteheads one octave above the natural note, as shown in Figure B44. Alternatively, a simple textual indication such as *art. harmonics* above the note to be played may be used.

Video example 3.9 – Producing artificial harmonics.

This video shows a short A minor arpeggio performed entirely using artificial harmonics, demonstrating the execution of the technique and the resulting sound.

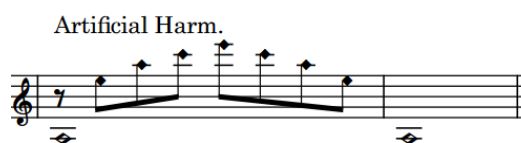


Fig. B44 - Proposed notation of video example 3.9

Pinched Harmonics

Although commonly called harmonics, Pinch Harmonics have a very different sound than the natural and artificial harmonics described in the previous paragraph. They are actually multiphonics where the fretted note and a harmonic of indeterminate pitch ring simultaneously (Laganella, 2003). Within the rock and blues guitar lexicon, Pinch Harmonics are colloquially described using terms such as 'squealing', 'Pick squeal', or 'Scream'. These terms capture the high-pitched, intense, and sometimes abrasive sound that Pinch Harmonics produce, which can be likened to a 'scratched and shrill scream'. It is difficult to attribute the invention of this technique to one guitarist in particular; it is a practice that has consolidated over time through the guitar styles of the rock guitarists of the 60s/70s who were the first to experiment with 'trick' with distorted sounds.

To produce the 'squealing,' a combined gesture is required between the plectrum and the side of the thumb of the right hand, while the root note is fretted with the left hand. In an interview for the 'Guitar World' journal Bill Gibbons describes his technique for producing Pinch harmonics: *Roll the picking fingers slightly off the edge of the plectrum and move around a bit* (Gibbson, 2013). The final result

will be the root (fretted) note with its relative overtones. For the success of these sounds, massive use of distortion is essential, possibly at a high volume, in order to facilitate the gesture of the picking hand. It is possible to perform them with a clean sound, but their effect would be ineffective because it would produce a weak sound, little audible. Also, without distortion, you need to pick the string much harder to get audible sounds, resulting in more difficulty for the guitarist.

The loudest and easiest-to-play squealings reside on the fourth and third strings around the 7th and 10th frets. Instead, they are challenging to play on the two lower strings due to their reduced thickness. On the remaining strings, they produce a more scratchy and less acute sound. Regardless of the root note, the final sound result is difficult to predict; the slightest movement of the right hand can produce more or fewer overtones with different frequencies, drastically changing the timbre. Furthermore, depending on the point of the string where the gesture is performed with the right hand, the frequency can be altered to such an extent as to produce a note other than the fretted note. For this reason, it is appropriate to think of Pitched harmonics more as a guitar effect rather than a predefined note. In general, however, the resulting sound relative to the fretted note can be 2 octaves above, 2 octaves plus a sixth above, and 3 octaves above. Regarding timbre, the squealings produced with the pick near the neck produce a warmer and rounder sound, while those closer to the bridge produce a more strident and aggressive sound.

Notation:

Being considered sounds belonging to the harmonic family, even if they cannot be considered as such, the developed symbol derives from the spelling used to indicate natural harmonics. The diamond is cut at the base obtaining a triangle (Fig. B45), which, as for natural harmonics, can be filled or left empty according to the note's duration.



Fig. B45: Excerpt from *Study No. 2* (Pitched H.)

Maintaining resonance between two or more pitched harmonics is only possible if they reside on ascending³¹ strings. Due to the movement of the right hand - which inevitably slows down the vibration of the strings higher than the one in which the harmonic resides - it is not easy to make two P.H. placed respectively on the descending strings. The following Figure (B46) clarifies the concept:

³¹ The term ascending refers to the number of strings from bottom to top, from the first to the sixth.



Fig. B46: Pitched Harmonics on different strings

Score/Audio Example 2 – Study No. 2 (Pinch Harmonics)

This piece offers a practical investigation into pinch harmonics, focusing on how variables such as fret position, right-hand motion, and pick placement affect the resulting sound. The composition illustrates how subtle changes in these parameters influence timbre, pitch, and articulation, providing a clear overview of the expressive possibilities this technique can offer in a compositional context.

3.7 Palm Muting

Palm muting is commonly regarded as one of the most frequently employed techniques by guitarists, given its capacity to affect both the attack and the overall tone of the instrument (Brian et al., 2017). It encompasses a guitar technique involving the use of the hand's side (typically, the palm) to partially dampen the guitar strings while playing. By positioning the palm near the guitar's bridge (where the strings are affixed), the guitarist can control the amount of damping applied to the strings, producing a muted, percussive sound while maintaining tonal definition. Palm muting yields a muffled, percussive, and potentially aggressive sound (especially when used with distorted guitar), with a swift note decay. This technique can be utilized to create rhythmic, pulsating textures or to add a subtle, intimate tone to otherwise powerful passages.

The palm muting technique has been described in several instructional manuals for electric guitarists, such as *The Electric Guitar Technique Bible* (Murphy, 2020) and *Rock Rhythm Guitar* by Fareri (2022). For composers, it is useful to know that this technique involves lightly dampening the strings with the palm of the right hand, near the bridge, in order to produce a more muted and percussive sound. This effect is often associated with rhythmically driven or dynamically restrained musical contexts. The result varies depending on the amount of pressure applied and the position of the palm: small adjustments can lead to different degrees of damping and, consequently, a range of timbral nuances.

In performance practice, various degrees of palm muting are often applied intuitively, even without specific notational instructions. However, further interpretative detail can be provided through verbal markings placed above the staff.

Common examples include:

- **Light P.M.** – indicates light palm muting, with minimal string damping and a relatively clear tone.
- **Heavy P.M.** – indicates more pronounced muting, resulting in a tighter, more percussive sound.
- **Variable P.M.** – suggests a dynamic variation of palm muting within a given section or phrase.

These indications, being descriptive in nature, offer the performer interpretative guidance without overly restricting expressive freedom, thus allowing the playing style to adapt to the specific requirements of the piece and/or ensemble.

Video example 3.10 – Heavy and Light Palm muting.

This video presents the same musical phrase performed twice: first without palm muting and then with light and heavy palm muting in order to highlight the difference in articulation, timbre, and dynamic character.



Fig. B47 - Proposed notation of video example 23

Notation of Palm muting

Although varying degrees of *palm muting* are often applied intuitively by performers, without explicit notation, specific indications can nonetheless be found in pedagogical manuals and art music scores. The most common convention involves the abbreviation **P.M.** followed by a horizontal line that indicates the duration of the effect, as shown in Figure B47.

Another notation method involves using cross-note heads to distinguish palm-muted notes from traditional ones, as elucidated by Jamenson (2017) in *Power Trio* (Figure B48).



Fig B48 - Excerpt from *Power Trio* (Bar 77)

These notational modes, however, does not prescribe details concerning the specific intensity with

which the palm muting should be executed. Consequently, the determination of intensity is generally delegated to the guitarist's interpretative discernment. In a more common contextualisation, performers might opt for a standard realisation of palm muting, wherein the resultant tone is clearly discernible while being aptly muffled.

Score/Audio Example 3 – Study No. 8 (Palm Muting)

This example presents the complete version of Study No. 8, focusing on the application of palm muting in a steady rhythmic context. The use of muted and non-muted phrases creates a contrast in articulation and tone, illustrating the expressive potential of the technique within a compositional framework.

Analytical Notes – Study No. 8

The analysis of *Study No. 8* from the portfolio attached to this manual provides a comprehensive illustration of specific applications related to the use of the palm muting technique, particularly identifying some areas of predominant use. The choice made in this context has been oriented towards a rather traditional application of said technique, although it is imperative to acknowledge that further fields exist in which to explore and experiment with the potentialities of this executive method.

To introduce a timbral variant in *Study No. 8*, the implementation of the wah effect was adopted. It should be said that effectual manipulation does not exert any impact on the intrinsic executive technique, neither facilitating nor obstructing the guitarist in applying palm muting³². This composition aims to explore a specific example of a unique sound quality achieved through the use of palm muting technique. This technique primarily affects the lower strings of the instrument, resulting in a distinct resonance in that range. In the specificity of the presented piece, the use of the palm muting effect on the bass component aspires to establish a diversification of voices, maintaining palm muting on the lower section and allowing the strings to resonate freely for the melody. This generates an auditory perception that simulates the simultaneous execution of two distinct instrumental entities (Fig. B49).



Fig. B49 – Excerpt from *Study No. 8*, Bars 17-20, Palm Muting and Open String Melody Application

³² For a detailed examination of the ways of using the Wah effect, reference is made to the dedicated chapter in Section Modular Effects.

Similarly, this conceptualisation was materialized by comprehensively implementing the Wah effect in the subsequent measures of the piece, an intervention that further amplifies the diversification between the two voices. This is attributable to the dominance of the Wah effect on high frequencies, which sometimes attenuates the perception of the palm-muted bass almost to the point of obliteration. Therefore, although the guitarist performs faithfully to the notation, the auditory apparatus identifies a bass with a perceived different rhythm (Fig. B50).

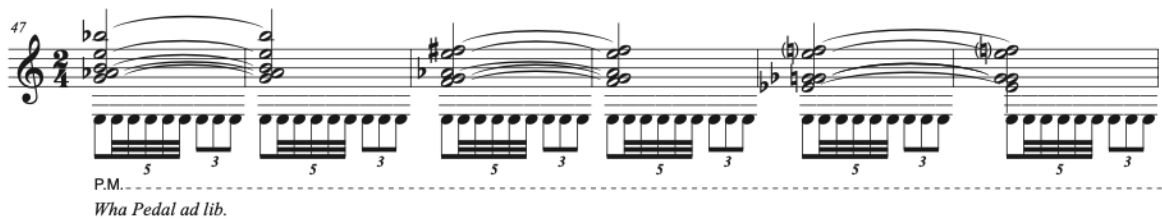


Fig. B50 - *Study No. 8*, Wah Effect Modulating Perceived Bass Rhythm (Bars 47-49)

The adoption of palm muting on the treble strings is less common. When applied to the higher-pitched strings (E, B, G), palm muting often produces a sonic effect reminiscent of violinistic pizzicato, due to the reduced sustain and pronounced percussive attack. This effect can be seen and heard in *Study No. 8*, bar 26 (see Score/Audio Example 3 and Fig. B51), where a virtuosic passage features muted treble strings.

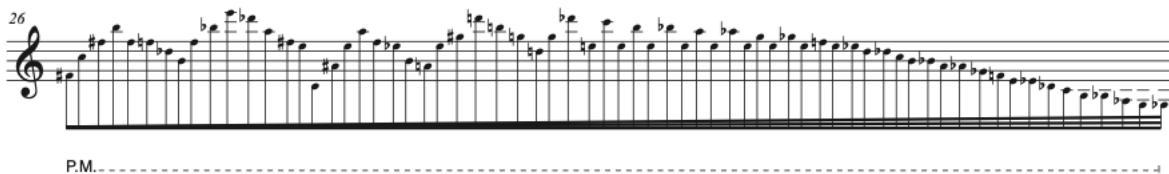


Fig. 51: Palm Muting on Higher Strings (Bar 26)

An additional variant of string muting, broadly comparable to palm muting, is the technique referred to as *percussive tone*, as described by David Laganella (2003). Similar to palm muting, this technique involves muting the strings with the right hand; however, it produces an extremely muted and dry sound, in which the pitch is barely perceptible. *Percussive tone* is typically notated by replacing the notehead with an 'x' (see Fig. B52). An application of this technique can be found in *Study No. 8*, where it appears as an isolated gesture within a rhythmically driven passage.

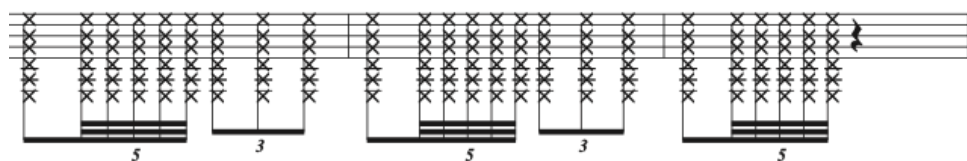


Fig. B52 - Percussive Tone technique in *Study No. 8*, (bar 57-60)

Video example 3.11 – Palm Muting on Upper Strings and Extreme Muting Variant

This video demonstrates the palm muting technique applied to the upper strings (G–B–D). The second part of the video introduces a related variant, where the right hand mutes the strings so heavily that the sound becomes extremely dry and percussive (Fig. B52), with the pitch only faintly perceptible. This comparison highlights the range of timbral outcomes achievable through different degrees of muting.

Considerations and Further Suggestions for the Use of Palm Muting:

Understanding and implementing the palm muting technique can not only enrich the intrinsic musical language of a work but also unveil new expressive horizons for musicians engaged in performing compositions. Integrating palm muting into musical compositions may require an experimental journey, dialogues with guitarists, and active, reflective listening. However, the resultant sound effects might trigger new and captivating musical trajectories, conferring renewed luminosity to the creative work.

Palm muting is a useful technique for creating contrasting rhythmic textures. For example, it can transform a section filled with open and resonant chords into a tighter, more defined rhythmic pattern. This transition introduces musical tensions, explores different dynamics, and offers alternative melodic perspectives. Additionally, palm muting can be effective in delicately exploring musical passages. In scenarios where delicacy is paramount, palm muting serves as a rhythmic backdrop that supports the arrangement without overshadowing other instruments or vocals. Instead, it discreetly propels the rhythm in an ethereal context. Moreover, in ensemble settings, palm muting facilitates intertextual dialogues among instruments. By juxtaposing a guitar's percussive timbre with other instruments, such as strings, it creates contrast and compositional interplay of significant interest and depth.

Although the palm muting technique requires a certain executive precision, it proves, in a relative framework, accessible for a professional guitarist. From the compositional standpoint, no specific and stringent considerations emerge that necessitate categorical depth. The guitarist's ability to apply palm muting through various phrasal formulations remains substantially consistent with the execution of analogous phrases enacted through more traditional guitar techniques.

To assist composers in navigating the different types, notations, and expressive applications of palm muting, the following table provides a summary of the most common variants encountered in both performance practice and notated scores. This overview is intended to serve as a practical reference when considering how to integrate palm muting into a composition.

Table B8. Palm Muting: Types, Notation and Use Cases

Label / Indication	Notational Convention	Sound Character	Typical Use	Example / Ref.
Light P.M.	P.M. + line (light context)	Light damping, tone remains clear	Subtle rhythmic control, delicate phrasing	Fig. B49; Video Ex. 3.11
Heavy P.M.	P.M. + line (accented)	Strong damping, tight and dry tone	Rhythmic pulse, distorted riffs	Fig. 49; Study No. 8, Bars 17–20
Variable P.M.	Variable P.M. (textual)	Dynamic changes across phrase	Expressive transitions, evolving texture	Suggested usage; not shown in score
Unnotated P.M.	None (left to performer)	Performer's interpretation	Common in idiomatic playing, rock/pop	Mentioned in main text
Muted Treble P.M.	P.M. on high strings (E, B, G)	Short, dry, pizzicato-like	Virtuosic passages, special articulation	Fig. B51; Study No. 8, Bar 26
Percussive Tone	x-shaped notehead	Extremely muted, pitchless articulation	Rhythmic punctuation, gesture-like elements	Fig. B52; Study No. 8, Bars 57–60

3.8 Sweep Picking and Arpeggio

Sweep picking is a technique for executing arpeggios with the plectrum, commonly employed by rock and metal guitarists to play arpeggios and melodies with one note per string (Govan, 2002). In the 1980s, this technique underwent significant development thanks to metal guitarists such as Yngwie Malmsteen and Randy Rhoads, who used sweep picking to create original and impactful expressive solutions. Their innovations went beyond merely adopting the technique: they refined it and adapted it to their personal styles (Herbst, 2017). This process of exploration and individualisation transformed sweep picking from a mere performance method into a central component of modern electric guitar language.

Today, sweep picking is recognised for its complexity and its ability to expand the expressive potential of the electric guitar. Its influence is clearly visible in the evolution of writing for the instrument, and it has become an essential element in the repertoire of every guitarist. This historical trajectory reflects the significance of the technique, which has helped define and shape how the electric guitar is played and perceived in the contemporary musical landscape.

Difference Between Traditional Arpeggio and Sweep Picking

Although often conflated, arpeggio and sweep picking are distinct techniques with clearly differentiated characteristics. Beyond their differing methods of note execution, a significant contrast lies in the selection of strings used during performance. An arpeggio involves playing the individual notes of a chord rapidly and successively, offering considerable flexibility in string choice. This technique may include notes on non-adjacent strings, depending on the desired musical effect, thereby expanding timbral possibilities and allowing for the exploration of various voicings across the fretboard.

By contrast, sweep picking is a technique closely associated with the electric guitar and the use of a plectrum. It involves executing notes exclusively on adjacent strings, facilitating the continuous and fluid motion of the picking hand. The arpeggio is thus performed either ascending or descending along neighbouring strings, allowing the pick to ‘sweep’ smoothly from lower to higher strings (or vice versa) without interruption. This intentional restriction to adjacent strings enhances the fluidity and natural connection between notes, making the technique particularly effective for fast, idiomatic figures. A further discussion of sweep picking is offered by Herbst (2017), who examined its impact on playability and expressiveness in rock and metal solos.

Virtuosic Potential and Compositional Relevance

Sweep picking is frequently associated with virtuosic performance due to the speed and precision it enables. While it has its roots in the languages of rock and metal, this technique can also find application in more experimental settings and contemporary art music, where it may be used to articulate rapid arpeggiated figures through fluid motion across adjacent strings. For composers, it is helpful to understand that sweep picking is a highly advanced technique requiring refined motor control and a strong familiarity with the layout of notes on the fretboard. Its inclusion in a composition should therefore take into account both the technical level of the performer and the desired expressive outcome.

As a distinctly guitar-based technique, sweep picking is often adapted and fingered by the guitarist according to the musical context. However, even a basic understanding of the technique on the part of the composer can be extremely valuable, allowing them to identify or shape idiomatic and virtuosic passages, while avoiding gestures that might be impractical or forced.

One important aspect concerns note distribution: when two or more notes fall on the same string, they are typically executed using legato (hammer-ons or pull-offs), avoiding re-articulation with the pick and preserving the continuity of the motion. This approach allows the pick to glide freely from one string to the next, without rhythmic or dynamic interruptions. A typical example might involve an

ascending arpeggio across five strings, with one note per string—or two in the case of internal legato—executed with a single directional sweep of the pick. When employed effectively, this technique can produce results that are both technically dazzling and musically compelling, adding drive, brilliance, or tension to a passage.

Notation:

When intending to compose arpeggios to achieve the effect of sweep picking, it is crucial to have a clear understanding of the note arrangement on the instrument's fretboard. This is to avoid using arpeggios which would require fingering on non-adjacent strings. For this reason, if a guitar is not readily available, utilising the Fretboard Diagram can be of considerable benefit. Generally, chords arranged with intervals up to a perfect fourth are relatively straightforward to execute. As the interval widens, there is a corresponding escalation in complexity. As can be observed in the example in Figure B53 taken from *Study No. 5*, the chords are primarily arranged at minor or major third intervals. Moreover, the virtuosic passage shown would be excessively difficult to perform at a sustained speed without the use of sweep picking technique.



Fig. B53: Excerpt from *Study No. 5* (Bars 7-8)

An additional distinguishing element that can aid the performer in the execution of sweep picking is the notation of the downward strum (Downstroke), indicated by the specific symbol ▼ and the upward strum (Upstroke), indicated by its corresponding symbol ▲. While these additional instructions can facilitate reading, they are not of paramount importance and can even be overlooked. This is because the guitarist will comprehend the nature of the technique and its corresponding fingering³³.

Score/Audio Example 4 – Study No. 5 (Sweep-picking)

Study No. 5 offers a practical example of sweep picking within a composition specifically written for electric guitar. The piece provides an extensive exploration of the technique, particularly in relation to its sonic impact when applied to both clean and distorted tones. In the opening section of the study, the technique is introduced using a neutral guitar tone, free of effects. This stripped-down approach allows for a clear observation of the technical mechanics in their most direct form. By contrast, the

³³ For further insights, Herbst (2017) provided a notable example of sweep picking in action by referencing Andy Timmons' *Groove or Die*. His study also explored the contrasting levels of technical difficulty between traditional arpeggio playing and sweep picking, highlighting the unique demands and expressive possibilities of each approach.

final section introduces a crunch distortion effect, providing a tonal comparison and illustrating how sweep picking can be adapted and shaped within different sound environments, thereby highlighting its versatility.

The analysis of this composition allows for a deeper understanding of the expressive possibilities of sweep picking, clearly demonstrating how the technique can enhance the expressiveness, depth, and virtuosic dimension of electric guitar performance across a range of musical contexts.

3.9 Tapping

The tapping technique constitutes a pivotal aspect of modern guitar playing, characterized by its ability to produce distinct auditory effects and facilitate virtuosic performances. This technique is executed by employing both hands to 'tap' the strings against the fretboard, which results in a percussive sound that can articulate both rhythmic and melodic elements. Historical accounts attribute the earliest form of this technique to jazz guitar virtuoso Eddie Lang in the 1920s. Lang pioneered a method where his right-hand thumb executed melodies on the fretboard while his other fingers simultaneously formed chords (Dahl, 1988). It is reasonable to think that this early rendition of two-handed tapping laid the groundwork for subsequent guitarists.

The evolution and popularisation of tapping are, however, frequently attributed to the Italian self-taught musician and radiologist Vittorio Camardese, who introduced this method in the 1965 TV show 'Chitarra Amore Mio' (Angelini, 2013). In this broadcast, he showcased various tapping techniques on a classical guitar, a performance that years later garnered significant attention. Notably, guitarist Joe Satriani discovered the video and shared it with Brian May of Queen, who expressed his admiration for Camardese's skill on his Twitter account, highlighting the moment (May, 2015).

The widespread popularisation of the tapping technique is chiefly attributed to the seminal work of Eddie Van Halen in the 1970s. His pioneering employment of this technique, especially evident in the guitar solo *Eruption* from the debut album by Van Halen (Warner Bros., 1978), marked a transformative period in the realm of guitar playing. Van Halen's innovative method not only revolutionized the technical approach to the instrument but also served as a source of inspiration for a multitude of guitarists (Waksman, 2004). This technique was further adopted and adapted by renowned guitarists such as Steve Vai, Joe Satriani, and Randy Rhoads, each contributing to its evolution and integration into diverse playing styles (Walser, 1993).

Execution of the Tapping Technique

Tapping consists of using the fingers of both hands to strike the strings directly onto the fretboard, without the traditional use of a pick. In this way, the notes are activated (or 'fretted') by a direct tap

of the fingertip against the fret, producing a clear and percussive sound. While the left hand plays notes as in standard fingering—using a combination of legato techniques (hammer-ons and pull-offs)—the right hand taps directly onto the fretboard, enabling the execution of melodic lines, arpeggios, or wide interval leaps that would otherwise be very difficult, if not impossible, to perform with a single hand.

From a compositional perspective, tapping offers numerous advantages and expressive possibilities. It is a technique that allows for the performance of virtuosic passages in a relatively fluid manner, adding an element of surprise and spectacle to the execution. The effect is particularly compelling in contexts that require rapid articulations, wide intervallic leaps, or complex figures distributed along a single string.

The use of both hands on the fretboard also helps overcome the physical limitations imposed by relying solely on the left hand, making it easier to perform intricate passages or extended intervallic stretches. In particular, as shown in Video Example 3.12 and Figure B54, very wide intervals are difficult to play quickly and accurately using conventional fingering—unless they are articulated as arpeggios. Tapping, on the other hand, makes it possible to execute such melodic leaps directly and effectively, while maintaining timbral clarity and precise articulation.

Video Example 3.12 – Tapping

This video presents the same musical phrase performed using the tapping technique, first with a clean tone (no effects) and then with distortion. The example highlights how timbre influences the perception of the gesture, demonstrating the expressive versatility of this technique



Fig. B54 – Proposed notation of video example 24

As demonstrated in Video Example 3.12, while acoustic tapping remains a fully viable technique, the use of the electric guitar—particularly when accompanied by high levels of distortion—enhances the perceptibility of legato (non-picked) notes, which naturally exhibit lower intensity. This observation aligns with the findings of Herbst (2016), who emphasizes the significant impact of distortion on the playability of the technique; a claim further supported by Walser (1993) in his analysis of Van Halen’s *Eruption*, where he highlights the role of distortion in ensuring performance fluidity.

Moreover, distortion contributes to reinforcing the timbral presence of legato notes. The integration

of tapping with effects such as distortion or delay allows for the creation of intricate and evocative sonic textures, further amplifying the virtuosic impact on the listener.

Notation and types of Tapping

There are certain technical and performance subtleties that allow for the distinction of three different types of tapping. The terminology used to classify these techniques originates from guitar-specific jargon and pedagogical sources, such as Faith (2001), as well as from scholarly contributions by authors like Herbst (2016) and Walser (1993).

However, it is important to note that this terminology can be somewhat arbitrary, as the boundaries between different types of tapping are not always clearly defined. For instance, Faith's manual refers to *two-handed tapping* both as 'two-handed tapping' and as 'cross-strings tapping.'

1. One-handed tapping is a technique that involves tapping with a single hand while using regular fingerings with the fretting hand. This technique allows for the execution of note intervals that would be impossible to reach with just one hand. When indicating this technique, it is important to remember that the picking hand holding the plectrum should move towards the fret on which the tapping is performed. Since the motion is quite wide, it is recommended to provide a pause after the tapping note unless a pull-off or hammer-on is intended with the left hand's notes. In this latter case, it is more appropriate to refer to it as two-handed tapping rather than one-handed tapping.

One-handed tapping is predominantly employed to conclude a musical phrase, melodic line, or arpeggio that ends with an interval too wide for the left hand to reach unaided. Several guitar manuals—particularly those focused on the rock genre—dedicate specific attention to this technique. In such publications, the note to be tapped by the right hand is commonly marked with symbols such as '+' or 'T' placed above the note. Examples include *Hard Rock Tapping Studies* by Faith (2001) and *Rock Guitar Tapping Technique: Learn the Two-Handed Tapping Techniques of Rock Guitar Mastery* by Brooks and Alexander (2022). These manuals typically use tablature in conjunction with traditional staff notation. Consequently, both the 'T' symbol in tablature and the '+' symbol in standard notation are widely employed to indicate tapping notes (see Fig. B55).

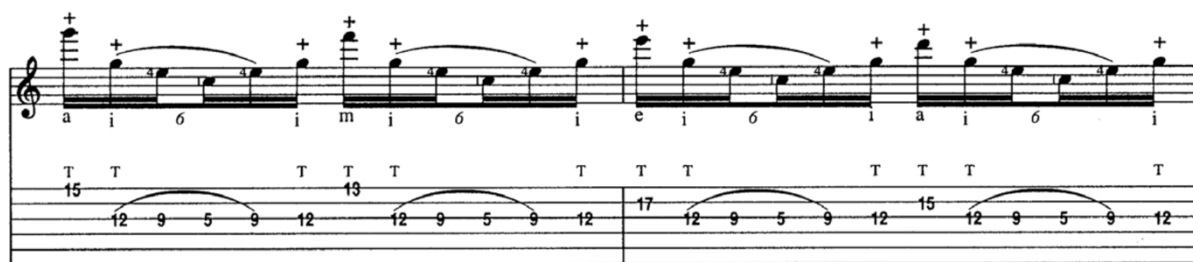


Fig. B55: Excerpt from *etude n°1* by Faith (Bars 3-4).

Video Example 3.13 – One-handed Tapping

In this video example, the note following the quintuplet would be difficult to reach at high-speed using traditional fingering. For this reason, tapping can be employed—either to facilitate the technical execution or to achieve a more percussive articulation of the note.

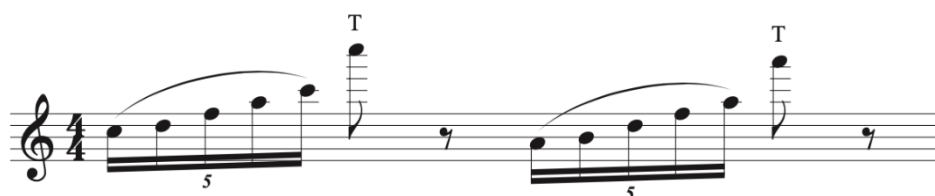


Fig B56: Notation of video example 24 (Excerpt from *study No. 4*)

2. Two-handed tapping (Tapping in conjunction with Pull-on and/or Hammer-on), involves utilising both hands to execute taps on the guitar strings. The fretting hand is responsible for executing the hammer-on and pull-off movements while the picking hand performs the taps. The notation for the right hand can be analogous to one-hand tapping notation by situating the letter T above the note for the picking hand. Meanwhile, the fingering symbols traditionally employed for ascending legato (hammer-on) and descending legato (pull-off) actions are utilized to denote the maneuvers executed by the right hand (Fig. B57).

Video Example 3.14 – Two-handed Tapping

This video illustrates three different levels of tapping complexity. The first phrase employs one-handed tapping, as the left hand does not perform any legato articulation. In contrast, the second and third phrases make use of two-handed tapping, where the left hand is responsible for executing legato passages—each phrase presenting a progressively more complex gesture.



Fig B57: Proposed notation of video example 3.14

N.B. As clearly shown in video example 3.14, the distinction between *one-handed tapping* and this second style of tapping lies primarily in the use—or absence—of pull-offs or hammer-ons executed by the left hand. This differentiation is relatively subtle and mostly terminological, as the two techniques are best understood as complementary rather than entirely separate.

3. Cross-strings tapping (Chapman Stick technique). Unlike other forms of tapping, where one hand is responsible for tapping while the other hand performs other functions, Cross-string tapping utilizes both hands for tapping to share equal responsibility on the fretboard. This technique allows each hand to produce separate musical lines autonomously or collaborate harmoniously to create intertwined arrangements. By utilizing this approach, performers can seamlessly execute a wide array of musical ideas, spanning from basslines and chords to melodies. This technique is akin to the one used for Chapman Stick, where two-handed tapping is the primary method of execution (Chapman, 1980).

Video Example 3.15 – Cross-strings tapping (Chapman Stick technique).

This video demonstrates the cross-strings tapping technique, in which both hands perform the same gesture in the same manner across different strings. This approach lends the musical phrases a distinctive percussive character.



Fig B58: Two-handed tapping notation (Bars 53-55 *Study No. 4*)

As shown in the excerpt in Figure B58, to avoid ambiguity regarding which hand performs the tapping, two distinct symbols are used. When tapping is executed with both hands, the ‘+’ symbol is typically placed above the note to indicate tapping with the left hand, while the ‘T’ symbol denotes tapping with the right hand.

4. Harmonic tapping, or Tapped Harmonics, also known as Tapped Harmonics, is an additional form of tapping technique that focuses on producing harmonics. This technique allows for the creation of both natural harmonics, which can be achieved without engaging the left hand, and artificial harmonics, which involve tapping on specific frets with the picking hand while simultaneously fretting a note with the other hand (for more information, refer to the chapter on Harmonics). In notation, harmonic tapping is typically represented by a diamond-shaped note head, akin to the notation used for harmonic indications. To further clarify the execution of harmonic tapping, the symbol T is positioned above the diamond-shaped note head, serving

as a visual cue for the performer (Fig. B59).

Video Example 3.16 - Harmonic Tapping

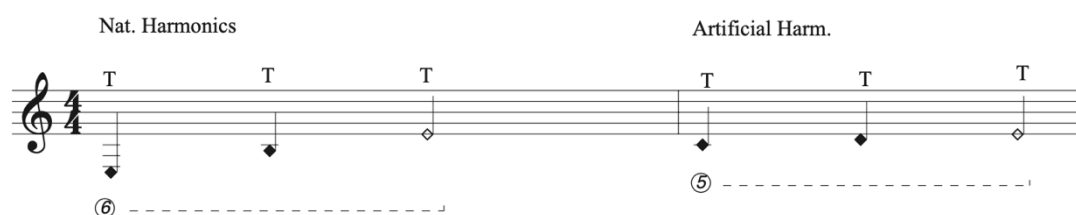


Fig. B59: Notation of video example 3.16

Harmonic tapping is particularly effective when applied to the electric guitar due to the amplification and effects available, which can further enhance the harmonic overtones generated. However, it is important to note that when using harmonic tapping in compositions, it is advisable to avoid using it without sufficient overdrive on the guitar. This is because the resulting effect may be lacklustre and difficult to hear.

Each type of tapping offers a unique sound and texture, with one-handed tapping being more focused and percussive, two-handed tapping providing a fuller, more complex sound, and harp-style tapping allowing for the creation of intricate arpeggios and chord progressions. Composers can utilise these variations in their compositions to create a wide range of sounds and textures, and by providing clear notation and guidance for the performer, they can ensure that their intentions are realised in performance. By using distinct notations for each type of tapping, composers can ensure clarity in their scores, enabling performers to execute the intended techniques accurately. It is crucial for composers and musicians to be familiar with these notations to effectively communicate and interpret the tapping passages in musical compositions.

Score/Audio Example 5 – Study No. 4 (Tapping)

In Study No. 4, various forms of tapping are showcased within the context of a musical composition. The first part of the study demonstrates the sound effect of two-hand tapping with a clean guitar tone, while the second part presents the same effect with the addition of distortion and delay. Furthermore, in the second part of the study, the two possibilities (with effects and without) are progressively alternated to highlight the substantial difference between the two modes of execution.

Tapping Disadvantages

The primary drawback associated with any form of tapping technique resides in the diminished timbral range it offers. Consequently, it is customary to employ a compressor effect or distortion to equalize note volumes and achieve a more uniform sound and to ensure the fluidity of the performance

(Walser, 1993). Given that tapping tends to generate a clean tone effect, with the initial note often sounding the loudest (a characteristic that may be undesirable in certain musical contexts or passages), careful attention must be devoted to managing dynamics when employing this technique. Another disadvantage of tapping can be attributed to the movement of the right hand. The wider the range of motion required, the more challenging it becomes to execute the musical passage, particularly at high speeds (Fig. B60).

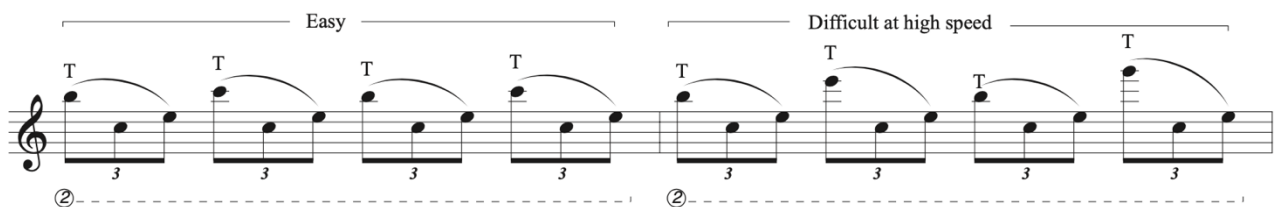


Fig. B60 - Two-handed tapping range of difficulty.

String skipping can present a challenge in terms of maintaining sound clarity, particularly when high distortion is involved. However, professional guitarists are typically capable of managing any unintended dissonances in a way that prevents passages like the one below from becoming problematic (Fig B61).



Fig. B61: Excerpt from *Study No. 4* (Bars 87-88)

3.10 Glissando

Glissandi on the electric guitar are particularly effective and relatively easy to execute. However, as the guitar is a fretted instrument, the effect will not be identical to that produced by fretless instruments, such as the violin, but will instead progress in tones and semitones, unless a fretless guitar is used.

Glissandi can be performed on a single note—especially easy for the guitarist—but also on double stops or even full chords, both ascending and descending. In the latter case, performing rapid glissandi from the first to the last fret (and vice versa) can be more challenging: the gradual reduction in fret spacing in the higher positions can make it harder to maintain chord accuracy, though it remains feasible.

In general, executing glissandi on single notes or double stops across the entire fretboard presents no significant difficulty; however, as the number of notes in the chord increases, it can become more

complex to maintain position across the full range of the instrument, particularly in the lower register where the frets are smaller. Up to double stops, even intervals greater than an octave can be executed with ease (see Video Example 3.17).

This technique is widely used in performance practice, particularly in genres such as blues, where fast glissandi are often employed to give the note a sense of drive and attack. In general, glissandi—whether fast or slow—can be played on all strings without particular difficulty.

Video Example 3.17 – Glissando

This video presents two approaches to performing a slow glissando: the first on a single note and the second on double stops, in order to more clearly highlight the resulting effect.



Fig. B62 – Notation of video example 3.17

3.11 Shredding

‘Shredding’, predominantly associated with the rock and metal genres (Herbst, 2017), epitomizes a fusion of guitar techniques executed with pronounced swiftness. Inherently grounded in improvisation, it allows guitarists to showcase their prowess through a sequence of intricate patterns, thereby highlighting the depth of their technical mastery. An empirical study by Herbst (2017) outlined how a hallmark of shredding is the utilisation of sound effects, notably distortion. Often, such distortion is synergized with delay effects to augment the perception of audacity and virtuosity, engendering a sonic ambience that heightens the audience’s astonishment. This repertoire of techniques and auditory choices encompasses alternate picking, sweep picking, tapping, bent notes, pinch harmonics, and frequent use of the vibrato bar. The significance and evolution of this style are extensively discussed in the literature on rock and metal studies, such as those by Walser (1993), and Waksman (2003b), underscoring its pivotal contribution to rock and metal musical culture.

Although shredding cannot be defined as an isolated technique but rather as a confluence of multiple technical approaches embedded in an improvisatory ethos, it has nonetheless become an idiomatic marker within the vocabulary of the modern guitarist. For this reason, it can be of relevance even to the field of art music: the term itself may be adopted by a composer not merely to borrow from rock aesthetics, but as a concise instruction to request a virtuosic passage characterized by speed, fluidity, and stylistic extremity. In this sense, shredding may function as a bridge between popular

performance practice and the notated language of contemporary art music, expanding the composer's expressive toolkit.

From a notational standpoint, two principal strategies can be employed. The first involves an explicit specification of the techniques required in the shredding section—such as sweep picking, harmonics, or whammy-bar gestures—providing the performer with precise technical guidance (Fig. B63).

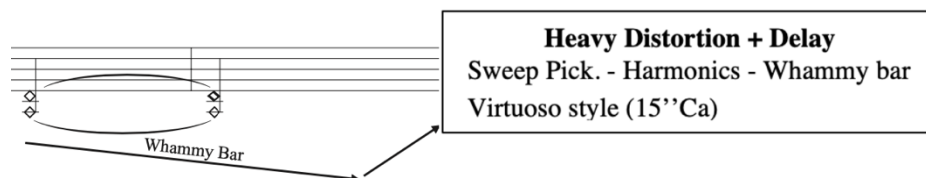


Fig. B63: Sheet music annotations detailing specific shredding techniques. (*Study No. 9*)

Alternatively, the composer may simply indicate 'shredding' in the score, thereby granting the performer autonomy to deploy any set of techniques that fall within the stylistic purview of shredding (Fig. B64). This second approach emphasizes the collaborative nature of the process, leaving space for performer agency and improvisatory flair, while still situating the passage within a recognizable framework of virtuosity.

In summary, shredding represents less a codified technique than a performative attitude, one that foregrounds virtuosity and the spectacular dimension of the electric guitar. Its inclusion in a manual for composers of art music should not be seen as an attempt to canonize a rock idiom within the classical tradition, but rather as an acknowledgment of its cultural and technical weight. By integrating shredding into the notational vocabulary, composers can invite performers to explore this dimension within a structured compositional framework, transforming what is often an improvised practice into a compositional resource of considerable expressive impact.



Fig. B64 - Notation with a general 'shredding' label, allowing guitarist stylistic discretion. (*Study No. 9*)

Audio/Score Example 6 – Study No. 9 (Shredding).

This study offers guitarists the opportunity to apply all the techniques introduced in the preceding eight studies within the framework of shredding. It encourages the performer to combine or expand upon these techniques in a virtuosic manner, reflecting the improvisatory and high-speed character typical of shredding. The score balances written passages with verbal instructions that specify the intended style, providing both structural cohesion and space for performer creativity.

4. Extended Technique

Extended techniques encompass all performance methods that deviate from the traditional use of the instrument, producing novel sounds through unconventional practices. These include, for example, percussive actions on the instrument's body, string scraping, the use of foreign objects, feedback manipulation, and direct interventions on electronic controls. In the context of guitar performance, such techniques have evolved not only within experimental or avant-garde rock music, but also in the realms of acousmatic and electroacoustic music, where the electric guitar has often been treated as a modifiable sound source rather than a mere performance instrument.

The electric guitar offers a wide range of extended techniques arising both from its physical and semi-acoustic nature and from its electronic and amplified components. This duality makes the instrument a particularly fertile ground for sonic experimentation, where every component — from the strings to the wooden body, from the pickups to the pedals — can be reinterpreted as performative material.

From an expressive standpoint, these techniques allow the performer to transcend the limits of the conventional timbral vocabulary, providing a palette of heterogeneous and, in many cases, highly evocative sounds. Their use can serve either as a decorative element or as the structural foundation of a composition.

Given the virtually unlimited potential of these practices — whose only real limitation lies in the creativity of the performer and composer — this chapter presents an overview of some of the most common extended techniques, alongside experimental solutions of an empirical nature. The aim is to provide the contemporary composer with a broader and more informed toolkit, enabling the expansion of their expressive and timbral spectrum.

4.1 Percussive Possibilities and Timbre-Based Writing

Among the extended techniques most closely tied to the physicality of the instrument, percussive practices represent a significant expressive resource for the electric guitar. Owing to its combined electronic and mechanical configuration, the instrument offers a wide range of surfaces, materials, and components that can be activated through unconventional gestures, generating distinctive timbres and novel articulations.

The notation of timbre, as a perceptual parameter, presents inevitable complexities: there is no standardized system capable of exhaustively representing its nuances. In the case of the electric guitar, this challenge is further amplified by the presence of pickups, effects, and dynamic controls, all of which can drastically alter the sonic outcome depending on where, how, and with what intensity the instrument is struck. Additionally, the possibility of acting on external parameters—such as reverb,

delay, or equalisation—further expands the instrument’s expressive potential.

Score/Audio Example 7 – Study No. 3 (Percussive-based composition)

Study No. 3 offers composers a range of percussive possibilities, together with a concrete proposal for their application and notation. Conceived as both a practical and analytical framework, it explores the percussive potential of the electric guitar through a timbral and non-conventional approach, proposing a model for experimenting with sounds obtained by striking different parts of the instrument and integrating its physical and electronic parameters.

Notation and Use of Percussive Elements

Following the principle that timbre is generated through the interaction between a resonator and an exciter, *Study No. 3* employs four main resonators (body, bridge, pickups, and strings) and two exciters (right hand and left hand). In practical terms, not all areas of the guitar respond in the same way to percussion: for example, the electric guitar, lacking a resonating chamber, is less sensitive to strikes on the body compared to acoustic instruments, yet it exhibits a high degree of responsiveness in the vicinity of the pickups. To enhance the resonant response of the body, the strings are allowed to vibrate, being indirectly set in motion by the percussive gesture. To further enrich the timbral effect, the study employs a large-hall reverb, a delay set to double the metronome marking (120 bpm), and heavy distortion.

To represent the different percussive actions in the score—namely, the specific points where the instrument should be struck—a multi-layer notation system has been adopted. The lower staff, consisting of four lines, assigns each line to a specific area of the instrument (e.g., body, pickups, strings, bridge), as illustrated in Figure B65.

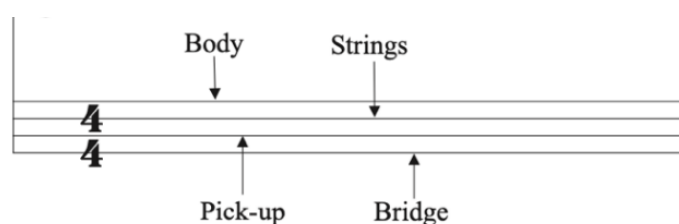


Fig. B65 – Lower Staff Mapping (*Study No. 3*)

The upper staff is a traditional five-line staff, but it does not include fretted notes; instead, it provides indications for open strings or muted strings, using dedicated symbols to distinguish between the two cases (see Figure B66). Since muting the strings at different positions on the fretboard produces distinct timbral effects, the position is indicated by Roman numerals, enabling the guitarist to achieve the desired result.

Applications and Perspectives of Percussive Elements

Timbre, being linked not only to the instrument itself but also to the acoustic environment and the listener's perception (McAdams, 2013), resists any single, definitive codification. Nevertheless, *Study No. 3* provides a practical reference mapping for the exploration of percussive techniques on the electric guitar, offering a valuable tool for the contemporary composer.

This mapping should not be seen as a limitation but rather as a starting point for personal developments or adaptations. For instance, one might specify the exact string to be struck, or experiment with the use of external objects as exciters (e.g., sticks, metal picks, superballs). Such explorations can significantly contribute to the evolution of the compositional language for the electric guitar, opening up new timbral and expressive territories.

4.2 Jack Cable as a Sound Generator

Within the landscape of extended techniques aimed at exploring and expanding the sonic potential of the electric guitar, the use of the jack cable stands out for its ability to generate unique, noise-based sound effects. It is not merely a means of connection between the guitar and amplification, but rather an autonomous sound generator in its own right.

The buzzing that occurs when a jack cable is plugged into a guitar amplifier—particularly in the presence of distortion—is generally regarded as an undesirable noise and is usually eliminated through shielding, filtering, or impedance adjustments. However, in a creative context, this phenomenon can be exploited as a sonic resource. Such buzzing can be attributed to a combination of factors: the use of distortion in the guitar's signal processing circuitry, as discussed by Hong (2008), can lead to intentional signal clipping, thereby contributing to its formation; the impedance characteristics of the cable, particularly its capacitance, can influence the system's frequency response, further accentuating the effect (Paiva, 2011); and the nonlinear response of diodes, a key component in many distortion pedals, can also play a role in generating this sound (Lindley, 2000). If the jack is disconnected from the guitar, the buzzing tends to be further amplified.

The idea of repurposing a technically imperfect element as compositional material has already attracted the interest of several contemporary composers, drawn to the aesthetics of noise and the expressive potential of such sounds. A notable example is composer Fausto Romitelli, who employed this technique in his piece *TV Trash Trance* (2002). In this work, Romitelli manipulates the jack cable to produce unique percussive sounds, striking the guitar strings with it (min. 0:00–1:30), creating a soundscape that foregrounds the instrument's electrical component and enhances its unconventional timbral possibilities.

Score/Audio Example 8 – Study No. 6 (Jack Cable Technique)

Study No. 6 provides an example of how the jack cable can be treated as a fully autonomous expressive instrument. A second cable is connected to an independent channel of the amplifier or mixer, allowing for the use of dedicated effects as well as independent operation without interrupting the guitar's sound. In this way, the cable becomes a standalone instrument, engaging in a contrapuntal dialogue with the electric guitar.

In the context of *Study No. 6*, the jack cable transcends its original function as a signal transmission device and is transformed into an innovative percussive instrument, contributing to the expansion of the electric guitar's expressive and timbral possibilities. The proposed implementation demonstrates the versatility of this component and its potential—already widely explored in the field of electronic music—to inspire new compositional ideas, also thanks to its constant availability in the hands of any electric guitarist. In this piece, the cable is no longer merely a means of connection but a genuine instrument engaged in a contrapuntal dialogue with the electric guitar.

Video Example 4.1 – Jack Cable Technique

This video demonstrates the 'jack-playing' technique employed in Study No. 6, in which the cable is treated as an independent instrument within a percussive framework. The lower part of the connector is held between the palm and the four fingers of the right hand, leaving the thumb free. The thumb plays a central role in sound generation: contact with the jack tip introduces electrical interference, which the loudspeakers transform into a disruptive sonic output. When the thumb is lifted, the interference ceases and the output is interrupted. The video also shows how the jack can be struck against the strings, producing percussive metallic noises that further extend the timbral range of the technique.

This 'jack-playing' technique offers the possibility of creating rhythms, including complex ones, based exclusively on electrical noise. Manipulating the thumb's contact with the jack allows for precise shaping of the temporal and dynamic properties of the sound, generating rhythmic patterns and temporal structures with strong expressive impact. The use of the volume pedal further expands control, enabling extremely subtle dynamic nuances.

A particularly interesting feature—easily adaptable to other compositional contexts—is the integration of a pedal-based flanger effect dedicated to the jack's channel. Combined with the volume pedal, the flanger proves highly effective in sections where it is alternately activated and deactivated: activation from silence creates the perception of the temporary entrance of a new instrument (see Fig. B69). The effects chain dedicated to the jack can be freely expanded and experimented with, without

interfering with the main sound of the electric guitar.

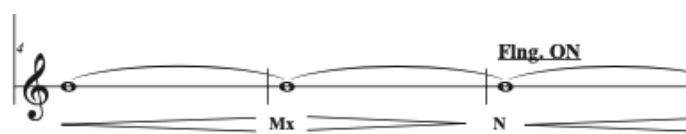


Fig. B69 - Flanger usage in *Study No. 6*

To ensure clarity in the score and allow for a precise representation of dynamics, a two-layer notation system has been adopted: one staff for the electric guitar and one for the jack (Fig. B70).



Fig. B70: two-layer system (*Study No. 6*)

Note: Since the right hand is occupied with managing the jack, performing simultaneous plucking with the same hand requires considerable technical development from the guitarist and should therefore be taken into account during the writing process. In *Study No. 6*, this situation never occurs, as the entire piece is performed using the tapping technique (described in the relevant chapter). However, if one wishes to include sections employing traditional techniques, it will be necessary to provide moments in which the jack cable is temporarily set aside.

Study No. 6 can be regarded as a compositional model for integrating the jack cable as a fully autonomous instrument. The two-voice counterpoint between guitar and jack adds a layer of complexity and originality, opening up new possibilities for timbral and structural exploration in contemporary electric guitar writing. The potential of this technique is broad and adaptable to different contexts: one can experiment with dedicated effect chains, employ multiple jack cables connected to independent channels, alternate simultaneous or alternating interventions between guitar and jack, or integrate the jack with external objects as excitors. These approaches can significantly expand the expressive possibilities of the instrument, providing the composer with additional creative resources.

4.3 Pick scrape

The *pick scrape* technique is widely used among guitarists, particularly in rock and metal genres, and does not require advanced technical skills. It consists of rubbing the edge of the pick along the length of the strings, usually starting near the bridge and moving towards the neck, or vice versa.

This technique is most often applied to the lower strings — sixth, fifth, and fourth (E, A, and D in

standard tuning) — as on these the effect is more shrill, abrasive, and resonant. This is because these strings are *wound strings*, wrapped with a metal wire (usually nickel-plated steel or stainless steel) that creates an irregular surface. The friction of the pick against the windings produces a distinctive ‘scraping’ sound rich in noise components and high harmonics.

On the thinner, unwound strings (*plain steel strings*), *pick scrape* is still possible, but the effect changes significantly: the smooth surface does not produce the same frictional noise, resulting in a less abrasive texture and reduced projection. In such cases, effects such as distortion, overdrive, or compression can be used to make the sound more audible. Using the technique on plain strings can be interesting when a subtler and more controlled effect is desired, avoiding the powerful and aggressive impact typical of wound lower strings.

Compositional and Notational Considerations

From a compositional perspective, *pick scrape* can be used in various ways:

- **Linear** – a single continuous gesture along one or more strings.
- **Fragmented** – several short scrapes separated by rests or other musical events.
- **Directional** – ascending (from bridge to neck) or descending, with timbral variations depending on the execution point.

In terms of notation, there is no universally standard method. A common approach is to use a diagonal line above the staff or textual instructions such as ‘pick scrape’ or ‘scratch strings with pick’, optionally specifying the strings involved and the direction of movement.

A notable example of pick scrape notation can be found in *Vampyr!* (1984) by Tristan Murail. In the excerpt shown in Fig. B71, the technique is indicated through irregular diagonal lines crossing the affected strings, suggesting the continuous movement of the pick along their length. Murail combines this notation with progressive dynamic markings (from *piano* to *forte*), *rallentando* indications (*RALL...*), and specific left-hand finger positions marked with circled numbers. The effect is further enhanced by slurs that fragment the line, suggesting multiple and directional executions of the gesture.

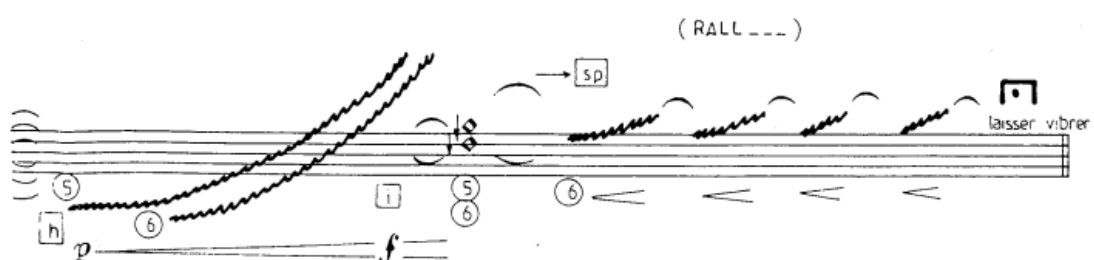


Fig. B71 - Notation of the pick scrape in *Vampyr!* by Tristan Murail

It is worth noting that the notation does not merely indicate ‘pick scrape’ but incorporates several performance details: the exact strings (numbers inside circles), direction of movement, dynamic variations, and the indication to let the sound resonate (*laissez vibrer*). This approach demonstrates that, in the absence of a universal standard, visual clarity and contextual detail are essential to effectively convey the composer’s intended timbral and gestural outcome to the guitarist.

Video Example 4.2 – Pick scrape

This video presents different ways of performing the pick scrape technique, from low to high strings, highlighting how the choice of string influences the timbre and intensity of the effect. Both linear and fragmented examples are shown, providing an overview of the main performance possibilities of this technique.

4.4 Snap/Bartók Pizzicato

Analogous to string instruments, the guitar can also perform the so-called Bartók pizzicato (or snap pizzicato), produced by firmly pulling the string upward and letting it snap back against the fingerboard. The violent impact of the string generates a distinctive sound, combining the pitch of the note with a dry, percussive component.

From a performance perspective, the technique does not present significant difficulties, but it is not suitable for very rapid passages. On the electric guitar, thanks to amplification, the resulting sound is particularly incisive and tends to belong to a dynamic range starting from *forte* and above. The technique can be applied effectively to all strings, but with one caveat: as one moves toward the higher register, the shorter vibrating length of the string reduces the amplitude of vibration and consequently the overall power of the sound.

Regarding notation, in popular music contexts the Bartók pizzicato is sometimes confused with the term *slap* — referring to the well-known funk technique on the electric bass —, but in a score its most common representation is the symbol shown in Fig. B72, consisting of a circle crossed by a vertical line. This sign is historically associated with Béla Bartók, who employed the technique extensively, particularly in his Fourth String Quartet (1928), from which it takes its name.



Fig. B72 - Standard notation symbol for snap/Bartók pizzicato

Video Example 4.3 – Bartók Pizzicato

This video demonstrates the execution of the Bartók pizzicato (or snap pizzicato) on the electric

guitar. The examples highlight its percussive quality across different strings, showing how the sound varies in intensity depending on register and dynamic range.

4.5 Behind the bridge/neck

The *behind the bridge* technique consists of plucking the strings in the portion located between the bridge and the anchoring point on the body of the instrument. The resulting sound is extremely metallic, high-pitched, and percussive, with a very short resonance. Since this section of the string lies within the magnetic field of the pickups, the sound is effectively amplified and can therefore be further processed with effects such as reverb, delay, or modulation. The timbral result is reminiscent of a microtonal glissando or of thin metallic bells, and it can be exploited either as a coloristic resource or for rapid rhythmic articulations.

It should be noted that not all electric guitars provide enough string length between the bridge and the tailpiece to allow for *behind the bridge* playing. This technique is possible, for example, on models with extended bridges (such as certain Fender Jazzmaster and Gibson), whereas instruments with more compact bridges or locking systems (such as Floyd Rose) do not allow for an effective application of the technique.

The ‘behind’ the nut technique (between the nut and the tuning pegs) displays particular characteristics: this portion of the string lies outside the effective magnetic field of the pickups and is therefore only partially captured. As a result, the sound often appears faint and is accompanied by the vibrations produced when plucking behind the bridge or above the neck, especially when using high levels of distortion and gain. In these cases the amplified sound is more a by-product of the overall resonance than a pure tone of that string segment. To obtain the unaltered sound of these points it is advisable to amplify them with contact or ambient microphones; otherwise, one has to accept a more subtle and sometimes barely audible sonic outcome. Despite these limitations, the technique can still enrich the palette of timbral nuances and add performative gestures to a composition.

Video Example 4.4 – Behind the Bridge and Behind the Nut Techniques

This video compares the effect of plucking the strings behind the bridge and behind the nut, first under high gain and distortion and then without amplification. The contrast highlights how amplification emphasizes the resonance and sympathetic vibrations, while the unamplified version reveals the faint, acoustic quality of these string segments.

4.6 Feedback

In the context of the electric guitar, *feedback* refers to the self-sustaining resonance that occurs when the sound emitted by the amplifier re-enters the guitar–pickup–environment system and sets the

strings back into vibration. The resulting sound may stabilize on recognizable pitches or unfold as a more complex and unstable resonance. From a compositional perspective, it is useful to consider feedback not merely as an effect, but as a performative condition: its outcome depends on the interaction between performer, instrument, amplification, and space. For this reason, it is often more effective to specify conditions and sonic objectives rather than rigidly fixed pitches. This perspective, now widely shared among feedback practitioners, emphasizes concepts such as *agency*, *instrumental coupling*, and *complexity*: the role of the composer is to design the context and guide the system toward a recognizable outcome, while accepting a degree of performative negotiation (Magnusson, Kiefer and Ulfarsson 2022).

Essential notation and performance practice

The most common way of producing feedback is by moving the instrument closer to the amplifier. The sonic outcome, however, is difficult to predict: small changes in distance or angle between the guitar and the speaker affect which part of the spectrum emerges and how stable it becomes. The acoustic environment also plays a significant role: moving to a different venue alters the balance of the phenomenon noticeably. In addition, simply leaving some strings open or muting them with the hand modifies the behaviour of the feedback, since this changes the number of available resonances and thus the harmonics that can be activated. For these reasons, the score should provide tolerances and allow the performer a degree of adjustment.

A useful practical model can be found in Shai Cohen's *Who Pulls the Strings* (Fig. B73). The verbal indication 'move closer to the guitar amp in order to create a feedback,' the arrow marking the temporal development of the action, and the coordination with dynamics and timbral colour (for example *sul ponticello*) demonstrate how instruction, duration, and intended result can be integrated in a clear way. Micro-adjustments remain the responsibility of the performer, but the musical direction is unambiguous.

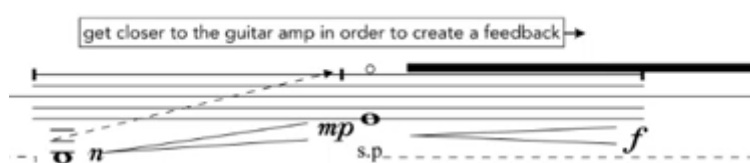


Fig. B73 - Feedback indication in the score of *Who Pulls the Strings* by Shai Cohen

Alongside the standard feedback obtained through the direct interaction between guitar and amplifier, there are practices that involve the use of external objects as mediators of the phenomenon. In such cases, the object functions as an exciter or as an interference within the magnetic field of the pickups, generating resonances and feedback with distinctive characteristics. A notable example is *Trash TV*

Trance by Fausto Romitelli (2002), where the composer prescribes the use of an electric razor placed near the strings and pickups to produce controlled and repeatable feedback (Fig. B74). The constant vibration of the electromechanical device excites the strings and, through the pickups, creates a hybrid sound situated between instrumental resonance and electronic noise. This solution is not merely a technical expedient but rather a deliberate aesthetic gesture: feedback here is *designed* and rendered reliable through an external device.



Fig. B74: Feedback indication using an electric razor in *Trash TV Trance* by Fausto Romitelli (2002)

Similar practices can be found in the performances of Keith Rowe, guitarist of the AMM collective, who developed a vocabulary based on the use of radios, springs, metallic objects, and everyday devices placed directly on the instrument's body or in proximity to the pickups. In this context, feedback is not conceived as a predictable effect, but rather as a field of constantly shifting resonances, where the external object becomes an integral part of the sonic discourse (Rowe, 2004).

Video Example 4.5 - Guitar–amplifier feedback

The video demonstrates three types of feedback: a standard resonance, a variant that emphasizes upper partials, and another producing different tonal colours. It also shows how the overall intensity of feedback can be shaped using the guitar's volume knob. The examples underline how feedback, while partially steerable, remains an inherently unpredictable sonic phenomenon.

Observation on feedback

Writing for feedback means defining conditions and sonic objectives while accepting a controlled degree of performative negotiation. The score should not attempt to eliminate the contingency of the guitar–amplifier–environment system but rather channel it toward recognizable and musically functional outcomes. Where reliability is required, filters and level control should be specified; where the focus is on emergent complexity, the framework should instead provide clear boundaries and tolerances. This balance is consistent with contemporary feedback practice (Magnusson, Kiefer and

Ulfarsson 2022; Ferguson, Johnston and Martin 2013).

4.7 The Use of the Violin Bow

Historical background

The use of the violin bow on the electric guitar emerged in the 1960s as a gesture of experimentation and spectacle. Eddie Phillips, guitarist of the British band *The Creation*, is often remembered as one of the first to introduce it in a rock context, employing it in tracks such as *Making Time* (1966) and *Painter Man* (1966), where the bow contributed to defining the band's sonic identity. A few years later, Jimmy Page of Led Zeppelin made the technique iconic, particularly in performances of *Dazed and Confused* (1969), where the visual impact of the gesture was combined with unprecedented sonorities: continuous glissandi, dark drones, metallic resonances. These experiences, although situated within a popular context, opened the way to a broader interest that in subsequent years was taken up by experimental guitarists and avant-garde composers. The bow, originally a spectacular element, can also serve as a genuine tool to expand the timbral palette of the electric guitar.

Technical Aspects

From a performance perspective, bowing presents certain practical challenges due to the nature of metal strings. A considerable amount of rosin must be applied in order for the bow hairs to generate sufficient friction; otherwise, the sound remains weak or unstable. Amplification and the use of effects—particularly distortion, reverb, and delay—are essential to achieve convincing sustain and to enrich the sound projection.

The resulting timbres are highly diverse:

- long continuous drones, reminiscent of string instruments yet with more ethereal qualities.
- harmonics produced by combining bowing with light left-hand pressure at nodal points.

There are, however, specific limitations linked to the flat fingerboard of the guitar. Unlike bowed string instruments, this feature prevents the use of single inner strings with the violin bow, since it is not possible to isolate them by tilting the bow. Only the outer strings (the sixth and the first) can be individually reached through a slight inclination of the bow. At the same time, this flatness of the fingerboard makes it possible to bow several strings simultaneously, so that chords of up to six notes can be produced with relative ease. The dynamic range remains less controllable than on a violin, and the horizontal position of the instrument makes the gesture less natural. Furthermore, since the bow is not a tool traditionally used by guitarists, one can expect a lack of intonation unless supported by many hours of dedicated practice. Nevertheless, these constraints can stimulate creative uses of the bow as a generator of effects and textures rather than as a vehicle for traditional melodic playing.

Notation and Score Writing

In most cases, it is sufficient to indicate *arco* above the staff, specifying the string involved or the contact area (near the bridge, over the pickups). Additional instructions may concern pressure (light, heavy, scratchy) or the desired effect (harmonics, glissando, sound on the pickguard). In some cases, continuous graphic lines are used to represent bow movement, for example in extended glissandi.

From a compositional standpoint, the bow offers the possibility of placing the electric guitar in timbral territories closer to classical instruments, yet with a rawer and more unstable character. Possible applications include:

- extended sonic textures built with bow and delay, capable of creating suspended atmospheres;
- gestural contrasts between plucked passages and bowed sections, producing sharp timbral fractures;
- percussive or noise-based use of the bow, exploiting contact with muted strings or unconventional parts of the instrument;
- bow-and-pedal combinations, where the physical gesture is enriched by electronic saturation and resonance.

Video Example 4.6 – Violin Bow

The video demonstrates the use of a violin bow on the electric guitar, first applied to the sixth string, then to the first string, and finally across chords. It presents examples of continuous drones, glissandi, harmonics, and noise-based sounds obtained by varying the bow's pressure and contact point. The example illustrates both the performance gesture and the resulting timbral outcomes.

4.8 Prepared guitar

The electric guitar offers multiple possibilities for preparation. Analogous to the prepared piano, although with obviously more limited means, objects of various kinds—plastic, paper, clothespins—can be placed between the strings in order to produce percussive effects and diverse timbral modifications. These practices make it possible to radically transform the sonic identity of the instrument, generating metallic, dry timbres or unexpected resonances that considerably expand the compositional palette.

Preparation is not limited to the insertion of foreign objects: it can also extend to direct interventions on the strings (such as the use of alternative materials or the manipulation of string tension) or on the electrical circuit, where the imagination of the composer and performer represents the only real boundary. It is no coincidence that Harry Partch (1901–1974), through his radical instrumental

inventions and timbral experiments, had already demonstrated how the preparation of instruments could serve as a privileged path for the exploration of new and unprecedented sonorities.

A significant example of the use of the prepared electric guitar in art music is also provided by the research of composer Camilo A. Méndez San Juan. In his article *The Guitar as a Laboratory for Experimentation* (2020), Méndez discusses several works in which the guitar is treated as a field of timbral and structural exploration, including *Volpi/Formentera* for prepared bass clarinet and prepared electric guitar, where the physical and timbral intervention on the instruments becomes an integral part of the compositional process (Méndez, 2020).

Video Example 4.7 – Simple Preparation on the Lower Strings

This video presents a basic method of preparation in which an object is inserted between the two lower strings (E and A), covering the first and second frets. The remaining strings are left free and can be played normally. Even the prepared strings can be played from the third fret upwards, making it possible to alternate fretted notes with the open string. This produces a distinctive percussive alternation between the muted resonance of the prepared segment and the clarity of the unprepared string.

4.9 The bottleneck

The bottleneck is a rigid cylinder, traditionally made of glass or metal, worn on one of the fingers of the left hand—usually the ring or middle finger—and it allows the player to glide along the strings, producing continuous glissandi. The technique at the core of this approach is connected glissando, which enables seamless movement from one note to another, generating a highly expressive, vocal-like effect. One of the most distinctive features of the bottleneck sound is sustain: rather than being plucked and released, the note is carried and modulated along the fretboard. This makes possible a type of continuous vibrato that resembles the expressiveness of the human voice more than what can be achieved through regular finger pressure. Vibrato performed with a bottleneck is typically wider, deeper, and more flexible, allowing for subtle and nuanced shaping.

From a performance perspective, the bottleneck allows the guitarist to play single notes on all strings, but it presents notable limitations when it comes to double stops and chords. Since it is a rigid object held parallel to the fretboard, it can only produce combinations of notes located at the same fret. Therefore, it is not possible to play chords in which the notes fall on different frets. For this reason, the bottleneck is especially effective for fourth intervals across adjacent strings (due to the guitar's natural tuning in fourths), as well as third intervals between the second and third strings, which represent an exception in the instrument's tuning system. It is also well suited for playing double

stops and chords across different strings, as long as the notes lie on the same fret. For a more detailed overview of the actual possibilities on the instrument, see the diagram in Figure B21, previously used to illustrate chord construction.

In the traditional approach, the bottleneck is worn on the ring or middle finger of the left hand, theoretically leaving the other three fingers free to perform fingerings on nearby frets. However, this possibility is quite limited in practice: the traditional slide is bulky, takes up space on the fretboard, and hinders the movement of the other fingers, thereby reducing the performer's technical freedom. To overcome this limitation, alternative devices have been developed, such as the so-called *ring slide*—a more compact version designed to fit around the middle segment of the middle finger. Compared to a traditional bottleneck, this smaller slide cannot be used to play full chords, but it allows the guitarist to retain full functionality of all fingers for standard fretting. Thanks to this solution, performers can switch flexibly between chords, barre shapes, and conventional passages, while seamlessly incorporating expressive inflections like glissandi or vibrato with the slide, without needing to change hand position or technique during performance.



Fig. B75 – Comparison between a compact ring slide (left), worn on the middle finger and allowing greater freedom for traditional fingering, and a traditional bottleneck slide (right), which occupies more space and limits finger mobility.

Although the slide is commonly associated with blues music and instruments specifically designed for this technique—such as slide guitars, which often feature higher string action to facilitate smooth gliding—its creative use extends well beyond these traditional contexts, finding applications in art music and contemporary experimental practices. A notable example is *TV Thrash Dance* (2002) by Fausto Romitelli, in which the slide is employed in an unconventional manner: a drumstick is used as a bottleneck by the right hand, scraped across the strings to produce glissandi and gritty textures. Later, a metal bottleneck is introduced, this time held in the left hand, leaving the right hand free for other performance gestures. This approach illustrates how the slide technique can be reimagined as a flexible and expressive tool, capable of transcending traditional boundaries and contributing to the creation of extended techniques.

Video Example 4.8 – Bottleneck - Slide and Free-Hand Gestures

This video clarifies a gesture derived from Fausto Romitelli's practice, where a foreign object is used as a slide. Here, a pencil replaces the drumstick, scraped across the strings to create glissandi and abrasive textures, while the right hand remains free to perform additional performance gestures. This illustrates both the adaptability of the slide technique and its potential to expand the expressive role of the performer.

5. Modular Effects

Within the expansive realm of electric guitar performance, the auditory experience bestowed upon the listener emerges as the aggregate result of an elaborate interplay among various elements, including the guitar itself, interconnecting cables, pickups, a suite of effects and pedals, and amplifiers. Notably, the effects and pedals, in concert with amplifiers, play a crucial role in molding the tonal characteristics of the electric guitar, providing the potential for profound alteration of the fundamental signal. It is understandable that a composer who is not a guitarist may lack a deep familiarity with the domain of guitar effects; nevertheless, these components are fundamentally tied to the quintessence of guitar artistry. In the modern era, it is uncommon to find electric guitarists, across both popular and classical genres, who do not make extensive use of effects. As elucidated in previous chapters, composers who are non-guitarists have harnessed these effects to enrich their compositions with a more variegated tonal palette or to forge acoustic landscapes in which the electric guitar integrates harmoniously with classical instruments. The application of distortion to enhance the robustness of sound and echo and delay to create ethereal tones are illustrative of such usage.

This chapter provides an analysis of guitar effects and pedals, highlighting their substantial role in shaping the instrument's sonic output. It explores techniques and technologies used to create diverse auditory nuances through timbral modifications. These effects can turn the guitar's signal into a uniquely original soundscape. The industry offers a broad spectrum of effects, enabling a wide range of sonic experimentation due to the potential combinations available. Such diversity permits guitarists to craft distinctive sonic identities, with the strategic sequencing of effects being crucial in establishing a personalized sound. In recognition of this field's breadth, the chapter will examine the most acclaimed effects, which are fundamental for anyone composing for electric guitar. It will also introduce the notation systems employed across the nine studies and the fugue for electric guitar included in the portfolio attached to this handbook, as well as examples from the electric guitar's repertoire within both concert and popular music genres, together with audio examples.

5.1 Distortion

Historical background: from accident to compositional tool

Distortion, as it is understood today, emerged through a series of unplanned discoveries and technical accidents. The earliest documented instances date back to the 1940s and 1950s, when malfunctioning amplifiers or damaged equipment produced an 'unclean' sound. What was initially regarded as a technical flaw soon became a defining feature of rock and roll. The often-cited *Rocket 88* (1951), credited to Jackie Brenston and his Delta Cats, provides one of the first examples, where the distorted sound resulted from an amplifier damaged during transport (Palmer, 1981).

By the mid-1950s, artists such as Chuck Berry with *Maybellene* (1955) and Muddy Waters with *Mannish Boy* (1955) began to deliberately exploit distortion as a means of enhancing the power of the electric guitar (Prial, 2009). This ‘imperfection’ was transformed into a resource for producing a fuller and more robust sound, decisively distinguishing the electric guitar from its acoustic counterpart and aligning it with the rebellious identity of the emerging rock idiom.

In the 1960s and 1970s, distortion evolved into a compositional and performative language in its own right. Psychedelic and hard rock cultivated a culture of sonic experimentation in which distortion became central. Jimi Hendrix is perhaps the most iconic figure: tracks such as *Purple Haze* (1967) and *Voodoo Child* (1968) pushed the limits of amplification and effects technology, combining modified amplifiers and the newly introduced pedals to achieve highly saturated and aggressive timbres. This period also witnessed the creation of equipment that would become legendary, including the Fuzz Face pedal and the Marshall Super Lead amplifier, both of which helped to define the sound of subsequent generations (Shapiro, 1992).

By the 1980s and 1990s, with the rise of heavy metal, distortion had become indispensable. Bands such as Metallica, Slayer, and Pantera pursued increasingly dense and violent textures, making distortion an essential component of their sound. Works like Metallica’s *Master of Puppets* (1986) and Slayer’s *Raining Blood* (1986) exemplify this intensification (Christe, 2003). During this period, the market for distortion pedals expanded dramatically, producing an abundance of models that allowed guitarists to refine their timbral identity with ever greater precision.

Beyond rock and metal, distortion also infiltrated other genres such as jazz, electronic music, and contemporary classical composition. In these contexts, distortion is not conceived merely as an effect, but as a structural resource. Composers such as Fausto Romitelli, in *Trash TV Trance* (2002), employ heavily distorted guitars to create dense, noisy textures that radically redefine the role of the instrument. Similarly, Dai Fujikura’s *Abandoned Time* (2006) and Steven Mackey’s orchestral works demonstrate how distortion can be integrated within the classical ensemble, functioning not as a coloristic ornament but as an active, dynamic element in dialogue with the orchestra.

Thus, distortion—born as a technical accident—has become both a cultural symbol and a compositional tool. Its evolution from flaw to aesthetic principle illustrates the electric guitar’s unique position at the intersection of popular and art music and underlines the necessity for composers to understand its sonic and expressive potential.

Notation

Like other switch-activated pedal effects, distortion does not have a standardized notation in musical scores and is typically indicated through textual instructions. Examples of this practice can be found,

for instance, in Steven Mackey's *Tuck and Roll* (2000) and Fausto Romitelli's *Trash TV Trance* (2002), shown in Figures B76 and B77 respectively.



Fig. B76: Excerpt from *Trash TV Trance* by F. Romitelli (Bar 1)

Fig. B77: Excerpt from *Tuck and Roll* by Steve Mackey (bar 25)

However, if a composer desires more precision, they may choose a pedal that allows for the adjustment of distortion levels. In such cases, a percentage scale may be employed to denote distortion in the score, ranging from 0% to 100%, as illustrated in Figure B78 from *Zap's Init* (2008) by Claude Ledoux.

Fig. B78: Excerpt from *Zap's Init* (Bar 8).

It is evident that countless intermediate degrees of distortion exist, ranging from minimal intensity up to 100%. However, dividing them into three categories proves useful in providing composers with a practical and functional reference. In the *9 Studies and Fugue for Contemporary Electric*

Guitar accompanying this work, distortion is therefore classified into three primary levels: Crunch Distortion, Medium Distortion, and Heavy Distortion. Specific details are presented in the following table.

Table B9. Specific details about distortion.

Distortion Level	Description	Gain	Tone
Crunch Distortion	Often associated with vintage rock and blues guitar sounds. Produces a mild saturation that gently breaks up the tone, highlighting harmonics.	Low-Medium	Often adjusted to emphasize mid frequencies.
Medium Distortion	An intermediate level of distortion, commonly used in classic rock and hard rock. Offers a greater saturation compared to crunch, giving a fuller and more aggressive sound.	Medium-High	Often balanced but can be adjusted to emphasize either high or low frequencies.
Heavy Distortion	The highest level of distortion, often linked to genres like metal and hardcore. Produces a very dense saturation, with a very powerful and aggressive sound.	Very High	Often adjusted to emphasize low frequencies for a deeper, powerful sound.

Categorizing distortion into three general levels allows for flexibility in adjustment, based on the given indications, the musical piece's characteristics, and the performer's personal preference. For instance, in the context of *Study No. 1* focused on harmonics, ‘heavy’ distortion was chosen to accentuate the intrinsic properties of the harmonics. This kind of distortion indeed significantly amplifies the intensity of the harmonic, making it more prominent and facilitating its execution.

In general, the nature of heavy distortion implies a marked emphasis on every single note. Therefore, it is essential to consider that a melody subjected to this mode of distortion will assume a particularly full sonority. If applied to complex structures, like counterpoint, heavy distortion could produce an overloaded sound effect, making the listening experience potentially muddled and less defined. On the other hand, if the goal is to create a clear and distinguishable texture while retaining a distorted sonority, it would be advisable to opt for ‘crunch’ distortion or adjacent levels, as demonstrated in *Study No. 8* where there’s an accompanied melody (Fig. B79). his contrast between clarity and

overload can also be heard in Video Example 5.1 which demonstrates the effect of different distortion levels on resonant chords.



Fig. B79: Excerpt from *Study No. 8* (Melody with crunch distortion)

Video Example 5 - Melodic Fragment with Three Levels of Distortion

Demonstration of the three levels of distortion: crunch, medium, and heavy. The video illustrates how each level affects timbre, articulation, and resonance, showing their application in both single melodic lines and more complex textures.

Video Example 5.1 - Resonant Chords under Distortion

This video illustrates the impact of distortion on resonant chords, comparing crunch, medium, and heavy levels. The example highlights how increasing saturation emphasizes each pitch, transforming the harmonic field: with crunch, chords retain clarity and transparency, while with heavy distortion they become denser and more unstable, often producing a muddled sonic effect.

Video Example 5.2 - Distortion with Power Chords

This video demonstrates the use of power chords with distortion, illustrating how their intervallic structure (root and fifth) ensures clarity and stability even under high levels of saturation. The example highlights how distortion enhances their compactness and resonance, making them particularly effective in dense or rhythmically driven passages. As discussed in the chapter on chords, the absence of the third prevents dissonant overlaps, allowing power chords to remain clear and impactful.

Video Example 5.3 – Distorted Palm Muting and Power Chords

This video demonstrates the use of palm muting applied to power chords under distortion. The example highlights how the technique produces a tighter, more percussive attack, reducing resonance and preventing harmonic overlapping. By dampening the strings near the bridge, the guitarist obtains a compact and rhythmically incisive sound, which is particularly effective when distortion would otherwise blur the clarity of sustained chords. This effect, closely related to the discussion on power chords, illustrates how articulation can shape distorted textures into precise and controlled gestures.

5.2 Delay

Historical background

The conceptual underpinnings of delay effects were initially realized through tape-based echo devices in the 1950s, such as the Echoplex and the Roland Space Echo. These machines used a loop of magnetic tape to record and play back the original signal with a time delay, creating a repeating echo effect that could be adjusted for various lengths (Välimäki et al., 2012). In the formative period of *musique concrète*, pioneers like Pierre Schaeffer, as well as Karlheinz Stockhausen, were known for their innovative use of complex arrangements that often-included extensive tape loops and numerous recording and playback devices (Gehlhaar, R. 1998). These arrangements were employed to intricately manipulate live performances or ensemble pieces during the processing stage.

As technology progressed, the cumbersome and maintenance-heavy tape echoes gave way to solid-state and digital delay pedals in the 1970s and 1980s. The advent of the bucket brigade device (BBD) chips allowed for the creation of portable and more reliable analog delay pedals, such as the Electro-Harmonix Memory Man and the Boss DM-2 (Carson, 2020) which provided a warmer and distinctive echo sound due to the nature of analog circuitry. The digital revolution brought about a seismic shift in delay pedal technology. Digital delays, like the famous TC Electronic 2290, emerged in the 1980s, providing crystal-clear repeats and a more pristine echo compared to their analog predecessors. The precision and versatility of digital delay units also allowed for the integration of more complex features such as tap tempo, modulation, and programmable presets, enabling artists to craft intricate soundscapes with ease.

Main feature and notation:

In the domain of audio processing, a delay apparatus functions by capturing an input auditory signal and subsequently retransmitting it following a delineated temporal interval. This mechanism can engender an echoic effect, or, when calibrated with an extended temporal delay, can rearticulate the sound several seconds subsequent to its initial generation. A quintessential delay processor quantifies its impact in milliseconds, with a span of 500 milliseconds representing the temporal equivalence of one-half second. It is noteworthy that certain delay units possess a threshold on the extendable delay time, commencing at intervals ranging from 500 to 700 milliseconds (Brewster, 2003, p. 33).

Among the plethora of models available on the market, the Boss Digital Delay DD-6 is acclaimed as a paragon of delay devices, often integral to the effect chains of contemporary guitarists. While this model serves as an exemplar, it is imperative to acknowledge that the majority of delay devices are characterized by at least three pivotal parameters: level, feedback, and time. These serve as manipulable variables that allow musicians to sculpt the temporal and textural aspects of sound. The

level parameter controls the output volume of the delayed signal, enabling subtle background echoes or prominent repeated phrases. The feedback parameter determines the number of times the delayed signal is reiterated, ranging from a single echo to a sustained series of repeats, thus creating a complex, layered texture. The time control knob is crucial as it defines the delay duration, measured in milliseconds (ms), and directly influences the rhythmic and melodic interplay of the echoes.

Table B10: Delay Parameters.

Parameter	Function	Typical Range
Level	Controls the output volume of the delayed signal, allowing for subtle background echoes or prominent repeated phrases.	Varies with device
Feedback	Determines the number of times the delayed signal is reiterated, which can range from a single echo to sustained repeats, creating a complex, layered texture.	Single echo to sustained repeats
Time	Defines the delay duration, measured in milliseconds (ms), which directly influences the rhythmic and melodic interplay of the echoes.	Measured in milliseconds (ms)

In the configuration of delay effects within the realm of sound engineering, the volume parameter may be considered ancillary, typically calibrated to be commensurate with the levels of other effects unless a deliberate auditory prominence or attenuation of the delayed signal is desired. However, the remaining parameters—feedback and time—are quintessential in dictating the characteristics of the delay effect as desired in musical scores. These parameters are pivotal in conveying the precise delay effect intended by the composer or sound engineer.

The 'slap-back echo/delay,' a term coined by Sam Phillips for the unique echo effect used by Elvis Presley, exemplifies a minimalist approach to delay settings with short echo durations (Halmrast, 2019, p. 137). In achieving uniformity in sound engineering, it is customary to adhere to standardized parameters that reflect the intended acoustic effect. Brewster (2003, p. 33) highlights such standardisations, which are instrumental in establishing a structured categorisation of delay effects. These effects are broadly classified into three types: slap-back, moderate, and long delays, each defined by tailored settings of volume, feedback, and delay time. These classifications provide a foundational framework for composers and sound engineers. Indeed, these terms are found in the literature to indicate specific types of delay, as exemplified by Tim Brady's work *Simple Loops in Complex Times* (2020). In this piece, the composer employs the terms 'slap delay' and 'moderate delay,' in conjunction with the time parameter, referenced respectively in Figure B80 and Figure B81.



Fig. B80 - Excerpt from *Simple loops in complex times* by Tim Brady (Bars 1-2)³⁴



Fig. B81: Excerpt from *Simple loops in complex times* (II Mov. Bars 19-20)³⁵

In the context of compositional practice, it is useful to consider some typical delay settings, not as fixed rules but as practical references that may provide inspiration and ideas. The following table presents three common configurations: Slap Back, Moderate Delay, and Long Delay. Each is characterized by different feedback and time values, which directly influence the rhythmic and expressive perception of the sound.

Table B11. Common settings with indicative values for volume, feedback, and delay time.

Effect Type	Volume	Feedback	Time
Slap Back	5	0,1~ 0.2	0.1 ~ 0.2
Moderate Delay	5	0.3~0.5	0.4~0.6
Long Delay	5	0.1~0.2	0.7~ 1s

Video Example 5.4 - Demonstration of delay application

Demonstration of the three delay types—Slap Back, Moderate Delay, and Long Delay—corresponding to the configurations listed in the Table B11. The video illustrates how each setting alters the rhythmic articulation and spatial impression of the guitar sound.

Through the manipulation of delay parameters, a spectrum of auditory effects can be engineered with precision. A notable instance is the adjustment of the 'time' parameter to its maximum value, which results in a significant delay. This delay is instrumental in achieving synchronisation with previously

³⁴ Brady, T. (2021) *Simple Loops in complex time* I Mov., [0:00], *Actions speak louder*. [Spotify]. Available at: <https://open.spotify.com/intl-it/track/1L2rQOD3LOWtGQ2ZCOVpJ6> (Accessed: 01 March,2024)

³⁵ Brady, T. (2021) *Simple Loops in complex time* II Mov., [1:02], *Actions speak louder*. [Spotify]. Available at: <https://open.spotify.com/intl-it/track/4y9tq6wm2heQufPRZPQox> (Accessed: 01 March,2024)

played musical segments, thus enhancing harmonic complexity. Stefano Taglietti's work in *Rocking Up* exemplifies the customisation of delay parameters, where a one-second delay and threefold repetition/feedback, termed '3 volte' in Italian, establish a contrapuntal structure akin to a canon (see Fig. B82)³⁶.

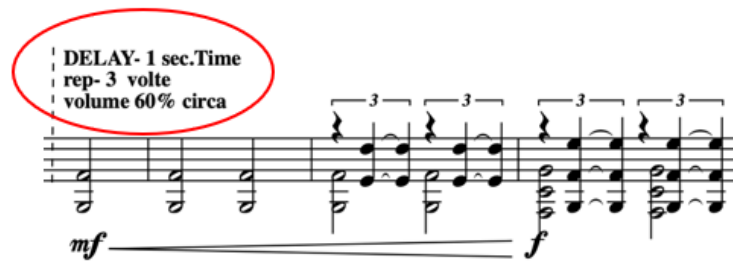


Fig. B82: Excerpt from *Rocking up* (bars 77-80)

In the subsequent portions of the score, Taglietti emphasizes the intent to construct a canon through the application of Delay. This is articulated via the Italian verbal instruction 'Delay realizzazione tempo lungo-battimenti in forma di canone' (translates as 'Delay in the long-time beats in the form of a canon'), as illustrated in Figure B83. The composer affords the artist discretionary control over the Delay parameter, provided that the outcome adheres to the canonical form.



Fig 83: Excerpt From *Rocking Up* by Stefano Taglietti (Bars 106-107)

In the *9 Studies and Fugue for Electric Guitar*, the delay magnitude was calibrated using the indicated parameters as a starting point. These settings were explicitly specified at the beginning of each piece, allowing for precise adjustments tailored to each study. For example, in the first study the Moderate Delay setting was employed (see Table B11), while in studies three and six the parameters were adjusted to approximate a Long Delay. To ensure fidelity in performance, it is recommended that these parameters be verbally notated within the score, thus providing clear instructions for the intended delay effects. In this way, not only is the composer's intended timbral and temporal design preserved, but the studies themselves also serve as practical examples of delay application. They demonstrate how different levels of feedback and delay time can be integrated into varied musical contexts, offering composers additional references and inspiration for their own creative work.

³⁶ Taglietti, S. (2016) 'Rocking Up', [5:25], *Music from a Parallel World, Vol. 4: New Music for Electric Guitar*. [Spotify]. Available at: <https://open.spotify.com/intl-it/track/77FEj6NeOTKS5544AjJIWr> (Accessed: 26 February, 2024)

5.3 Loopers

Historical Background

Repeating patterns throughout technological devices is not a new concept in composing music; Pierre Schaeffer used gramophone records to capture sound effects in the late 1940s (Battier, 2007). Karlheinz Stockhausen's experiments with tape recording, layering, and manipulating sound during the 1950s are now famous in music history (Warner, 2017). The minimalist works of Terry Riley and Steve Reich with magnetic tape in the 50s - 60s already exploited the loop as a resource for their compositions³⁷. The guitarists were not outdone in this kind of experiment; in the mid-'50s, the guitarist Les Paul used a complex system of tape-reel linked to produce loops during live show. The echo of guitarists and composers' experiments with any recording device led the music industry to pay more attention to the new trend. The invention of the transistor and the production of effects produced by a clipping circuit completely changed the way of making music using recordings. Recording pedal-operated devices have made that experiments with multitrack recording were no longer limited to studio recording, and performances, both on and off stage, have become more technically creative as recording and performance practices are trending towards each other.

Terry Riley was the first musician to use tape loops and delay/feedback by developing the Time Lag Accumulator system, the prototype for the live looping technology we use today (Marchini et al., 2017). Since then, the music technology industry has made giant steps in improving devices to meet the needs of composers and guitarists. At the end of the 80s, the popularity of such devices comes to its culmination. The first mass-produced loop pedals appeared in the early 1990s, such as the Lexicon Jam-Man and the Echoplex Digital Pro and surely have encouraged the use of obsessive loops that are often used to accompany the listener in a voyage within a hypnotic world. The increasing use of such devices on stage has gradually blurred the boundaries between the recording studio and live performance, offering composers new opportunities and perspectives on composing music. Over the years, the practice of looping gave birth to a hybrid of studio and performance practices, and the continually evolving state of such practices offered a fertile terrain for different compositional ideas. A composition for electric guitar that undoubtedly represents a perfect hybrid of studio and performance practices, and stands out in terms of popularity, is *Electric Counterpoint* by Steve Reich. Another notable work is *Import/export - suite for global trash* by Gabriel Prokofiev (2008).

Main features

The methodologies for musical composition utilizing loop stations are as diverse as the electronic

³⁷ In *Come out* (1966) by Steve Reich the phrase 'Come out to show them' is obsessively repeated by a looper for the entire course of the composition.

devices employed in their operation. Comparable to other guitar effects, analogous outcomes can be achieved with computer-based software solutions. Notable examples of such software, capable of emulating a virtual loop station, include Data, Max/Msp, and Ableton Live, with the latter being prominently used by composers in the electronic music domain. Ableton Live facilitates the assembly of over a hundred separate audio tracks, each potentially augmented with a variety of effects. While many composers may exhibit a preference for computer software, electric guitarists predominantly opt for loop pedals. Consequently, for the purposes of this analysis, the discussion will be confined to floor pedals exclusively.

A digital loop station constitutes an electronic mechanism that captures an audio signal within a digital repository, subsequently perpetuating the playback of this recorded sound. The market offers an array of products, each exhibiting a unique amalgamation of functionalities and interface designs, ranging from elementary looping capabilities to intricate effects processing. However, a unifying characteristic across these devices is the incorporation of a start/stop recording system, typically actuated by a foot pedal. The real-time construction of audio layers enables a solitary artist to simulate a sound mass that is denser and more complex—polyphonic or monophonic—than what the natural limitations of their instrument would typically permit. Such technology empowers composers to craft compositions ranging from a singular monodic loop to an ‘Ensemble effect,’ using just one guitar or a different instrument.

The principal distinction among looper models is demarcated by the number of pedals provided. This specification is crucial as it may constrain not only the quantity and length of the recordings but also, and perhaps more critically, the synchronisation among multiple loops. Although single-switch loop pedals offer varied recording and stopping functionalities through different actions—such as a single tap, tap and hold, or double tap—the absence of at least one additional switch impedes the nuanced control over each loop. This limitation can be surmounted either by the integration of an additional external pedal or by employing a more sophisticated device that comes equipped with multiple switches, such as the RC 50 or RC300 by Boss (see Fig. B84). The RC300, in particular, boasts three pairs of switches, enabling the artist to manage distinct recordings independently, thereby expanding the compositional and live performance landscape.



Fig. B84: Loop station RC – 300

To thoroughly comprehend the extensive capabilities of loop stations within musical composition, and to subsequently formulate a precise and comprehensive system of notation, it is imperative to delve into the intricacies of their features. The Boss RC-300 Loop Station serves as an exemplar, owing to its multifaceted functionality and widespread adoption among musicians.

Composers need to acquaint themselves with the operational intricacies of such devices, as this knowledge is foundational to harnessing their full potential. The RC-300's architecture includes multiple pedals, each assignable to distinct tracks, thereby permitting an elaborate orchestration of loops. Its interface facilitates the independent control of each loop, allowing for intricate layering and real-time manipulation of sound. In addition, the device's ability to store and recall multiple loops expands the possibilities for complex compositions and live performances. Each loop can be tailored in terms of volume, decay, and more, offering composers a high degree of control over the texture and dynamics of their music.

Recording on Single track³⁸:

The utilisation of a single-track loop station represents the foundational modality of this technology's application. This process is initiated when the musician engages the Rec/Play footswitch, signalling the onset of the recording phase. Subsequently, all sonic output from the instrument connected to the looper is captured, digitized, and stored. Activation of the footswitch for a second time triggers the microprocessor to commence playback of the recorded audio segment, which is then subject to continuous overdubbing. This overdubbing persists in a loop until the execution of a command to

³⁸ For more detailed explanation of the single-track recording capabilities and other features of the RC-300 Loop Station, see BOSS (2011). RC-300 Loop Station Owner's Manual. Available at: https://www.boss.info/global/support/by_product/rc-300/owners_manuals/

cease playback is delivered via the stop switch. The operational sequence is delineated in the following schematic representation.

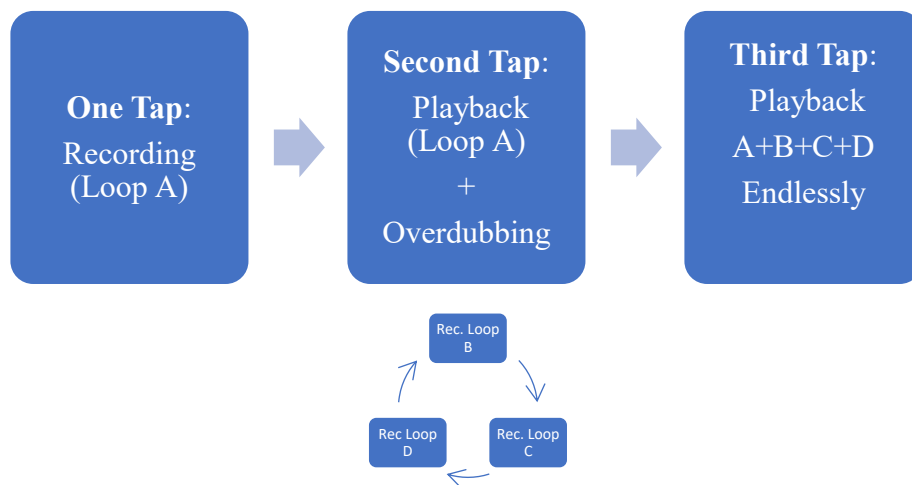


Fig. B85: Loop station RC-300 recording process on single track

Recording on multiple tracks:

The capacity for recording across multiple tracks provides a heightened level of control over individual tracks, which may be ceased, overdubbed, or desynchronized discretely. This multifaceted control is instrumental in composing across an expansive tessitura, thereby unlocking a plethora of possibilities for the intricate weaving of musical voices that can be manipulated with meticulous precision. Specifically, the feature of track asynchrony enables the initiation of a musical phrase at any juncture within a pre-recorded loop, facilitating the strategic placement of this ‘movable’ phrase to meet the compositional needs. For example, in a scenario where two tracks are synchronized and a third is asynchronous, repositioning the asynchronous track at variable intervals can yield diverse contrapuntal structures, contingent upon the placement of the movable phrase. The subsequent illustration elucidates this principle:

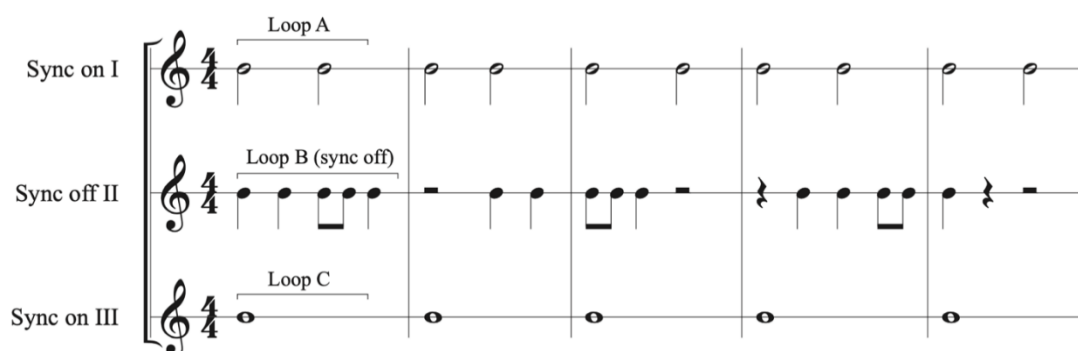


Fig. B86: Asynchronous track manipulation in contrapuntal composition

The functional scope of the Boss RC-300 Loop Station transcends the rudimentary operations of

looping, empowering the composer with the capacity to fundamentally transform a composition's structure through the introduction of temporal shifts, pitch modulation, and an extensive array of sound-altering effects. One noteworthy feature of this device, meriting particular attention within the context of compositional techniques for loopers, is the ability to play a track in reverse. This reverse functionality facilitates the generation of a retrograde version of a melodic line, wherein the device inverts the physical contour of the notes, while preserving the rhythmic integrity and the temporal duration. Consequently, the output is a precise inversion of the original pattern, both physically and musically, yielding an altered sonic texture that may possess compelling applications within the domain of contemporary music composition.

Notation

Composers select their notational methods according to aesthetic preferences or practical needs, which may be rooted in traditional practices or innovative explorations. Verbal indications are commonly observed in contemporary literature, as exemplified by Tim Brady's *Simple Loops in Complex Time* (2020), where precise annotations dictate the timing of loop recording and overdub execution (Fig. B75)

Play opening loop 2X - then close, then let play 1X, then overdub all other loops 2X (as written)

♩ = 126

Start Loop HERE to overlap
2nd guitar overdub of loop ⑤
Tim Brady

Close loop after 2X NPU - turn down 30%

Fig. B87: Excerpt from *Simple Loops in Complex Time* By Tim Brady (Bars 1-5)

An alternative methodology involves notating a previously recorded loop within the score itself. This strategy enhances the readability of complex compositions, particularly those with intricate layers of vocal interaction. It allows performers to visually track and align with the specified musical line, facilitating the synchronisation of rhythms as needed. Cesare Saldicco's *Spire VI* serves as an illustrative example of this practice, as can be seen in Figure B88.

III. Primordiale... [♩ = 80]

Chit. 76 20''

PLAY STOP REC [reverse mode w/ pitch -12] STOP

82

Chit.

Loop machine

PLAY LOOP

[fino alla fine!]

Fig. B88: Notational representation of a pre-recorded loop as employed in Cesare Saldicco's *Spire VI*

Another method is to include all loops—initial and overdubbed—in the score, documenting each instance of playback. This gives a clear visual representation of the layers of sound that are being amplified. This level of detail is particularly beneficial in orchestral settings, providing conductors with a complete picture of all the musical elements in play. For example, in the author's piece *External Links* (unpublished), a piece for electric guitar and flute, loops are notated on a separate staff within the score. The piece starts with a direction to record a loop, which is then marked as 'Loop A' (refer to Fig. B89).

Poco più calmo

48

Fl.

pp

5

[Rec. Loop A]

Clean

E.Gtr.

mp

Fig. B89: Excerpt from *External links* (Bars 48-50)

Subsequently, an emergent staff within the score is dedicated to the playback of loops (see Fig. B90).

Fig. B90: Excerpt from *External links* (bars 69-72)

As the composition progresses, the score directs the recording of an additional loop, superimposed upon loop A, which will be designated as 'Loop B'.

Fig. B91: Excerpt from *External links* (bars,73-75)

As the loops converge, they are transcribed onto the dedicated loop stave, engendering a notation of increased density that accurately delineates the sonic output emanating from the speakers.

Fig. B92: Excerpt from *External links* (Bars 96-99)

The notational method discussed for documenting loops within musical compositions offers distinct advantages and some limitations. On the positive side, this approach allows for a precise visual representation of complex sonic layers as they are played back, affording performers and conductors

a clear understanding of the temporal and textural interplay between loops. The added loop stave serves as a map, guiding the performer through the intricate process of layering loops in real time, which is especially beneficial for pieces that require exact synchronicity and coordination.

However, this method can also introduce certain challenges. The density of notation may become overwhelming, potentially hindering the readability of the score, especially for performers who are not accustomed to such detailed notational systems. Moreover, the necessity for additional staves can result in larger and more cumbersome scores, which can be impractical in certain performance settings. Ultimately, the adoption of this notational system should be carefully weighed against the specific requirements and constraints of each composition and performance context.

5.4 Flanger

Historical background

Flanger is an audio process which entails the combination of two identical audio signals, with one signal delayed by a small, gradually changing amount, usually lesser than 20 milliseconds. This results in an output signal characterised by constructive and destructive interference (Hartman, 1978). This alternating amplification and cancellation lead to a distinct comb filter effect, manifesting as a series of peaks and troughs in the frequency spectrum, hence creating a 'swooshing' or 'jet plane' like sound.

During the 1950s and 1960s, the concept of 'flanging' emerged in conjunction with recording techniques that employed magnetic tapes. Recording studios frequently utilized two identical tape recorders, both of which were mixed onto a third tape to produce the final track (Patoukas, 2019, p. 26). Both feeder machines had to play in synchrony to ensure the final recording sounded accurately. However, if, for any reason, whether intentional or inadvertent, one of the tapes momentarily slowed down, this would introduce a delay between the two signals, resulting in a tonal and phase variation in the ultimate recording (White, 2003). Tony Fisher's song, *The Big Heart* (1959), can be referenced as one of the early instances of this flanging sound effect, generated by two tape recorders that simply refused to stay synchronized.

In the 1950s, Les Paul, the renowned guitarist and innovator, experimented with manipulating magnetic tape speeds and is widely credited as the pioneer of this sonic effect (Paul and Cochran, 2005). However, the exact origin of the term 'flanging' remains a topic of debate. Some argue that the term originated from the act of pressing on the tape's edge (flange) to intentionally alter its speed, thereby achieving the desired effect. Conversely, the Beatles' producer, George Martin, claimed that John Lennon coined the term during the recording sessions for the *Revolver* album (Martin, 1994). Regardless of the veracity of these claims, it is undeniable that tape speed manipulation was the sole

method to achieve the flanging effect during the 1950s and 1960s. It was only with the advent of solid-state technology in the 1970s, coupled with the availability of compact delay circuits, that it became possible to replicate the flanging effect electronically through specific devices.

Main feature and notation:

Similarly, to other effects it may be beneficial for composers to include handwritten notes or annotations in the score to indicate the use of a flanger. Alternatively, abbreviations such as ‘Flng.’ could be used, as demonstrated in Figure B93.



Fig. B93: Excerpt from *Study No. 6* (Bars 8-9)

Composers aiming to achieve a specific flanger effect must nonetheless consider some fundamental parameters inherent in every device, be it a pedal or otherwise. Among the various parameters available in different models on the market, there are three that most significantly influence the resultant effect: Speed/Rate, Depth, and Width. Each of these parameters can be adjusted according to the musician's needs and the desired sound. The interplay of these parameters allows for a vast range of sonic possibilities, making the flanger one of the most versatile and widely used effects in shaping the sound of the electric guitar and other instruments.

The following table provides a general overview of the three primary parameters and their impact on the flanger effect. It is crucial to emphasize that the actual perception and the produced effect can vary depending on the specific equipment used, audio quality, and other factors. Therefore, direct practice and experimentation are paramount for a comprehensive understanding and effective use of these parameters in composition.

Table 12. Overview of the three primary parameters for the Flanger effect.

Parameter	Description	Characteristics	Practical Application
Rate/Speed	Determines the speed of the flanging effect's oscillation.	A high rate produces a fast, vibrant sound; a low rate yields a slow, undulating sound.	A high rate creates a spatial sound, while a low rate adds depth without excessive oscillations.

Depth	Controls the intensity of the effect.	Greater depth results in a profound sound; lesser depth results in a lighter, subtle sound.	High depth provides a dramatic and piercing effect, beneficial in musical instances where one desires the flanger effect to take center stage. A reduced depth offers a subtle touch of color to the sound without overwhelming it.
Width/Breadth	Indicates the range of the oscillation. (Specifically, how far the oscillation shifts).	Greater width provides a broad range of sounds; lesser width narrows the effect.	High width produces an enveloping sound, while reduced width focuses the effect within a tonal range, providing a more controlled and defined sound.

Quintessential examples of its 'swirling' sound can be found in the intros of *Nobody's Fault but Mine* (Led Zeppelin, 1976) and *Hear About It Later* (Van Halen, 1981). Empirical exploration has revealed that the following effect parameters are used in these tracks:

Table B13. Effect Parameters in *Nobody's Fault but Mine* and *Hear About It Later*.

	Rate/speed	Depth/Intensity	Width
Nobody's Fault but Mine	4/10	3/10	4/10
Hear About It Later	5/10	5/10	5/10

The flanger effect, a well-established technique within popular music, has found less frequent application in the realm of concert music for the electric guitar. However, *Impurity Chain* (2018), composed by Beka Simms and recorded by guitarist/composer Andrew Noseworthy, serves as a notable example where the use of the flanger effect is prominent and sustained for most part of the piece.³⁹ Within this composition, the composer adeptly integrates the flanger effect alongside other effects such as delay, reverb and distortion (Fig. B94), resulting in the creation of a mesmerizing sonic landscape. In *Impurity Chain*, the composer has opted to utilize the flanger effect ad libitum, providing solely verbal indications of its activation and deactivation.

³⁹ Bekah Simms *Impurity chain* (2018) is available on Spotify at <https://open.spotify.com/intl-it/track/70molgk9otyTBZi0zTEPor>.

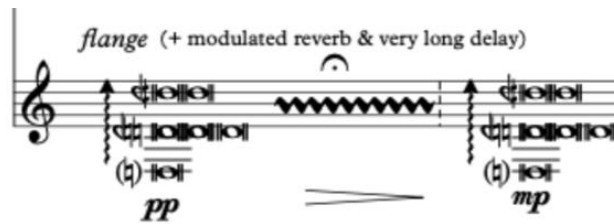


Fig. B94: Excerpt from *Impurity Chain* Flanger integrates with effects from *Impurity Chain* (Bars 1-2)

🎧 Score/Audio Example 9 - Flanger application in *Study No. 6*

Study No. 6 makes extensive use of the flanger effect to create a pronounced 'swirling' texture. In the score this is indicated as 'swirling sound ad lib', while the accompanying audio example demonstrates how variations in speed, intensity, and width shape the effect in performance. A detailed description of these parameters, together with the specific values used, is provided to guide the performer and ensure consistency in realizing the intended sound.

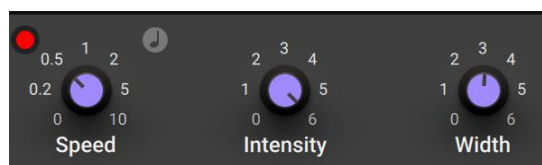


Fig B95 - Flanger parameters used in *Study No. 6*.

5.5 Wah Pedal

Historical Background

In 1966, Warwick Electronics innovators Del Casher and Bradley J. Plunkett introduced a pioneering effects pedal that emulated the dynamic sound modulation traditionally achieved by trumpet players using a mute within their instrument's bell (Wilmering et al., 2020). The wah-wah pedal manipulates the resonance frequency of a band-pass filter, altering the pitch along the spectrum in response to its positional adjustments. Before this technology was available on the market, custom-made versions had already been in circulation since the 1950s. Chet Atkins, an iconic guitarist, is recognized for pioneering the recording of a track with a comparable apparatus. His ingenuity led him to repurpose a DeArmond volume pedal, substituting its volume potentiometer for a tone-control mechanism, allowing shifts from lower to higher frequencies (Palmer, 1981).

The wah-wah pedal's transformative impact on contemporary music, particularly through its association with Jimi Hendrix's innovative works, has attracted scholarly attention. Specifically, Shapiro, H. & Mayer, R. (2009) provide a detailed guide to the guitarist's equipment. The introduction

of the wah-wah pedal, capable of simulating the tonal modulations of the human voice, signified a notable innovation in the auditory landscape of the late 1960s. Hendrix's utilisation of this effect not only popularized it but also created new paradigms of guitar expression. His tracks, *Purple Haze* and *Voodoo Child (Slight Return)* exemplify the application of the wah-wah effect, with the latter delivering an exceptional auditory experience. It begins with a solitary guitar utilizing muted strings, eventually leading into the song's iconic riff, enhanced by the wah-wah pedal's modulation (Hendrix, 1968, 0:00-0:30). The Vox V847A wah-wah pedal, used by Hendrix (Shapiro and Heatley, 2009) demonstrates the enduring significance of this technology, which, despite modifications, retains the unique sound that characterizes Hendrix's *Voodoo Child*. Furthermore, Hendrix's innovative use of the wah-wah pedal in songs such as *Voodoo child* and *Purple Haze* positioned him as an early adopter and experimenter of the effect. The narrative of the wah-wah pedal's history is also intertwined with Hendrix's brother, the late Walter Vaughan, who is posthumously recognized for his contributions to the development of the first wah-wah pedal and his influential role in many of Hendrix's initial recordings (Loscos & Aussenac, 2005).

The legacy of the wah-wah effect, pioneered by Jimi Hendrix, remained prominent into the 1980s, notably embodied in the work of artists such as Slash. This esteemed guitarist for Guns N' Roses is acclaimed for his adept utilisation of the wah-wah pedal, frequently incorporating a rack-mounted Dunlop Cry Baby DCR-2SR with an additional external foot controller to craft his unique sound. The persistent popularity of the wah-wah pedal highlights its crucial role as an instrument for musical innovation and artistic expression. A quintessential use of the wah-wah pedal by Slash can be observed in the acclaimed guitar solo of *Sweet Child o' Mine*, where the effect is employed in conjunction with heavy distortion. This guitarist produces rapid and rhythmically diverse passages that create a distinctive and evocative effect, emblematic of the rock music vernacular of the 1980s and 1990s (Guns N' Roses, 1987, 3:02-3:36).

The sustained popularity of the Wah pedal has catalysed its evolution and technological advancement throughout the 1990s, driven by collaborative efforts between technologists and guitarists to innovate and refine this type of effect. A case in point is the development of the Bad Horsie wah pedal, a joint effort by Bill Wenzloff, Scott Flesher of Morley—a company dedicated to guitar effects technology—and the virtuoso guitarist Steve Vai (Morley Products, 2023). This pedal is notable for its switchless operation and unique Contour mode, features that set it apart from traditional Wah pedals. The Bad Horsie is engaged by foot pressure and disengages upon release, eschewing the manual toggle switch. The Contour mode allows for nuanced adjustments of the pedal's frequency and tone, affording a broader spectrum of sound customisation. Steve Vai's usage of the Bad Horsie pedal, particularly in the eponymous track (Vai, 1995), exemplifies the integration of the Wah pedal with a vibrato bar to

render an aggressive tone, demonstrating the expansive expressive capabilities of electric guitar effects in crafting a compelling musical narrative.

Main feature and Notation

The Wah pedal, mirroring a volume control's functionality, equips guitarists with a broad array of sound modulation capacities. It engenders dynamic expression, traversing from nuanced subtleties to emphatic modulations. The pedal operates across a spectrum, with variable positions eliciting distinct tonal effects. The Wah pedal's hallmark is its unique tonal oscillation, known as 'wah-wah,' engendered through its operation—whereby musicians modulate pitch and timbre by varying the degree of pedal engagement. The 'Wah' effect is produced by full depression for higher frequencies, while the 'wu' sound manifests upon release, linked to lower frequencies. Within these parameters, a myriad of effects can be achieved, demonstrating the pedal's versatility.

Musical notation offers various approaches that can be tailored to the degree of interpretive freedom desired by the performer. Dai Fujikura's composition for electric guitar, trumpet, and trombone, *Three* (Ricordi, 2019), showcases an inventive notational strategy for the Wah pedal. This semi-free notation embodies the pedal's functional essence, reminiscent of the modulatory effects achieved by trumpet players using a mute. The notational system incorporates a secondary staff embellished with a wavy line, suggesting the Wah pedal's movement, thus granting a moderate scope for interpretative discretion (Fig. B95). This dual-mode notation, which combines verbal instructions with graphic elements, strikes a balance between precision and expressive liberty, guiding performers in manifesting the Wah effect while permitting individual artistic input within the framework established by the composer.

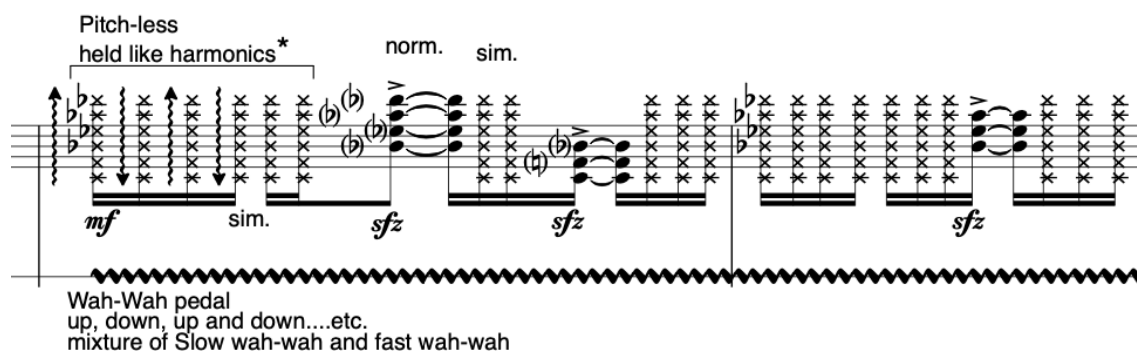


Fig. B96: Notational Wah pedal schema with verbal cues, wavy line in *Three* by Dai Fujikura

This dual-mode notation, which combines verbal instructions with graphic elements, strikes a balance between precision and expressive liberty, guiding performers in manifesting the Wah effect while permitting individual artistic input within the framework established by the composer. Nonetheless, for instances requiring less interpretive freedom and greater executional exactitude, the notational

system employed for mute indications in brass instruments can be adapted, wherein a '+' symbolizes the mute's application and a 'o' its removal (Fig. B97). Analogously, in Wah pedal notation, a '+' could denote full pedal engagement, and a 'o' (circle) its disengagement.

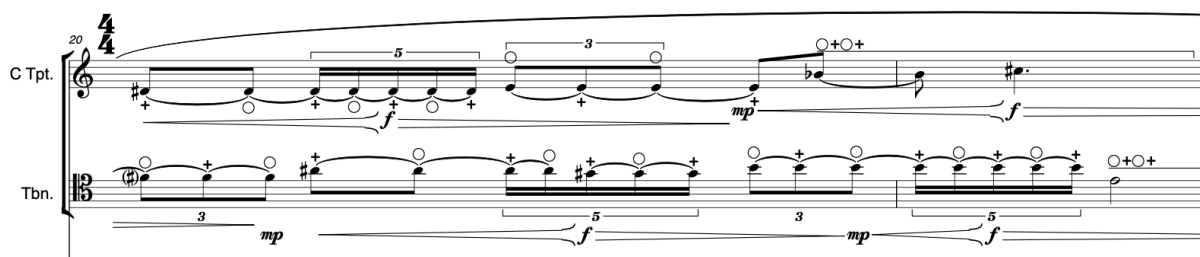


Fig B97: Notation for mute adaptable to Wah pedal

5.6 E-Bow

The E-Bow, colloquially termed for the 'Electronic Bow', constitutes an innovation by the electronic engineer Greg Heet in 1969. Following its invention, the device was unveiled to the public in 1976 and subsequently patented in 1978 (Heet Sound Products, s.d.; Ultimate Guitar, 2023). This device empowers guitarists to elicit sustained and elongated tones akin to those produced when a bow traverses the strings of classical stringed instruments like violins and cellos. Such an effect is facilitated by a magnetic field which provokes the perpetual vibration of the guitar strings, thereby effacing the initial attack of the note and emulating the sonority of a bowed violin. The handheld synthesizer enables the generation of a potent, perpetual sustain enriched with harmonics, thus significantly altering the timbre of the guitar and yielding a spectrum of textures and tonal transitions not typically achievable with the instrument alone.

The most rudimentary yet efficacious application of this apparatus entails its alignment over a singular string, which sustains oscillation until such time as the E-Bow is retracted or its function ceases. This operation engenders a form of feedback loop, albeit one characterized by enhanced modulation and predictability. Engaging the E-Bow upon a solitary string does not exact considerable constraints upon the dexterity of the left hand, thereby permitting the execution of a diverse array of established techniques. Techniques such as glissando ('slide') and tremolo ('trill') are particularly efficacious when utilized in conjunction with the E-Bow, engendering aural effects of notable distinction within this framework.

The latest iteration of the E-bow device features two distinct operational modes, as detailed in the E-bow manual (Ebow.com). Users can switch between these modes using a switch located on the device's backside (Fig. B98). These modes modify how the E-Bow's magnetic field interacts with the guitar strings, resulting in different acoustic effects.



Fig.B98: E-Bow switch (images from Wikimedia Commons)

The first mode, called the ‘standard mode’, emphasizes the fundamental frequency of the note. In this mode, the sound produced is closer to that of a traditional pick, albeit with the capacity to sustain the note indefinitely, thanks to the magnetic field generated by the E-Bow.

The second mode, referred to as the ‘harmonic mode’, accentuates the note's upper harmonics. This produces a more ethereal and bright sound, as the harmonic frequencies are amplified compared to the fundamental.

A notable feature of the E-Bow is the ability to switch between two modes without interrupting the played note. For instance, a guitarist might begin playing a note in standard mode and then switch to harmonic mode while the note is still sounding. This action changes the note's timbre and colour, transitioning from a traditional sound to one that is brighter and more vibrant, all the while maintaining the same pitch. This feature provides an additional layer of expressivity and variety within a composition that utilizes the E-Bow.

Universal Musical Notation: Standards and Practices

Despite a considerable uptake of the device by contemporary composers⁴⁰, there exists no standardized methodology for its notation within musical scores.

Various artists have been pioneering the development of explanatory semiotic symbols to denote the gestures associated with the infinite sustain achievable through the E-bow. Evidently, such symbols serve predominantly an aesthetic function. It is feasible to compose for the device by simply specifying that a given sequence should be executed with the E-bow, as suggested by Laganella in the example (Fig. B99).

⁴⁰ Noteworthy instances include Fausto Romitelli's utilisation of the E-bow within *Trash TV Trance* (2002), Marco Oppedisano's integration of the device in *Urban Mosaic* (2002), and George Lentz's incorporation of it in *Ingwe* (2009), among others.

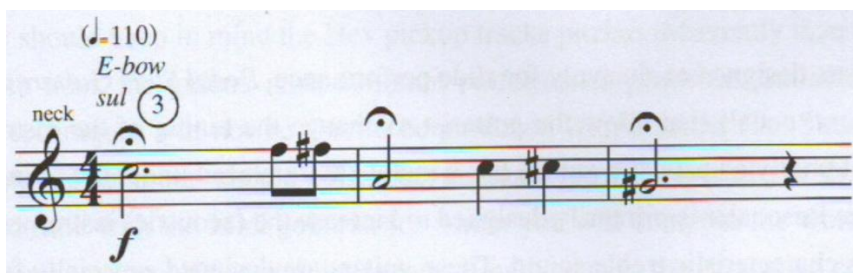


Fig. B99: Excerpt from *Miniature for electric guitar* (Laganella, 2003)

However, for the so-called ‘Aleatory’ pieces, which do not have exact note values, there is a common notation for the device that expresses the duration and attack of the note. For example, the composer Ben Zucker used a black line in his piece (2016) to represent the infinite sustain of the E-bow. He also found a solution to indicate the two device settings: standard mode and harmonics.



Square-shaped notes are played using an e-bow. A circle over the note indicates the e-bow to be set to the harmonics setting. The note is to be held for the duration indicated by the line (according to the spatial notation).

Fig. B100 Excerpt from *Uigtrui* (Pg.1)

In the harmonic mode, the E-bow adds harmonics to every note played up to the high registers, where it increases the E-bow sustain range. In the standard mode, the sound is more natural.

Audio/Score Example 10 – Study No. 7 (e-bow)

Study No. 7 provides a practical example of how the E-bow can be employed and notated within a score. In this piece the E-bow is used extensively in different ways, serving both as a tool for sustained resonance and as a means of creating contrasting timbral effects. The example illustrates how clear notation can guide the performer through these varied applications, offering composers a model for integrating the E-bow into their own works.

In *Study No. 7*, the approach adopted employs the use of traditional notation, where the E-Bow's standard mode is indicated by the symbol Φ , while the harmonic mode is represented by the symbol $\emptyset$. Various legato systems are also used to denote the 'virtual bowings', alongside verbal indications to specify certain sonic effects. These particular notations, which contribute to clarifying the composer's expressive and technical intentions, will be analysed in greater detail in the subsequent paragraphs. This type of notation enables the incorporation of the E-Bow's unique performance techniques within a traditional notational framework, facilitating the performer's understanding and execution.

E-Bowings:

The infinite sustain is not the only effect the E-Bow can provide. There are also other colours and ranges of sound that can be incorporated into a composition, which often leads to the device being likened to a traditional violin bow. However, this comparison is somewhat contrived, as the agility and interaction with the string are slower and significantly different from the techniques and expressions a professional violinist can achieve with a traditional bow. Yet, some techniques do bear a resemblance to bowing in violin playing. The E-Bow can mimic the typical bowings of string instruments; an effect achieved through a longitudinal movement along the instrument's string. This technique differs from the transverse movement made by players of bowed instruments, such as violinists, to modify the bow stroke. Within the realm of guitar playing, the bowing simulation is performed by moving the E-Bow in a horizontal orientation relative to the string.

Referring to this practice, one can observe how the use of legato can be an effective method to indicate the virtual bowings. This notation system reflects the traditional approach used for bowed instruments. Empirical evidence of this can be seen in Bars 5 and 6 of the *Study No. 7*, where the same musical phrasing, applied with different bowings, can produce a substantially different effect, as illustrated in Figure B101. Therefore, the exploration of the varied sonorities in *Study No. 6* underlines the significance of the E-Bow's movement in determining the final sonic effect, suggesting that further studies and experimentation could explore the subtle differences in tone produced by variations in the E-Bow's movement.



Fig. B101: Excerpt from *Study No. 7* (Bars 5-6)

Dynamics:

In the context of dynamic sound articulation, the E-Bow introduces a series of unique expressive possibilities in the realm of electric guitar. This device indeed allows for the manipulation of a note's dynamics even after its generation, a feature generally unavailable to guitarists, yet inherent to stringed instruments and, more prominently, wind instruments. However, unlike the latter, which must inevitably halt the sound emission due to the performer's pulmonary limitations, unless employing circular breathing, the E-Bow provides the extraordinary ability to modulate the dynamics of a single note for a theoretically unlimited period.

Furthermore, with the implementation of the mode selector (standard and harmonic mode), it grants

the performer the capacity to further manipulate the timbre and dynamics of an ongoing note. An exemplary demonstration of this ability is depicted in the introduction to *Study No. 7*, where a single note is guided through the entire dynamic range and experiments with both emission modes without ever interrupting the sound propagation (Fig. B102). While in this particular example the note is sustained for only 30-40 seconds, it is essential to underscore that the E-Bow would allow for the continuation of such exercise for an indefinite period, thereby offering unlimited potential for sonic exploration.

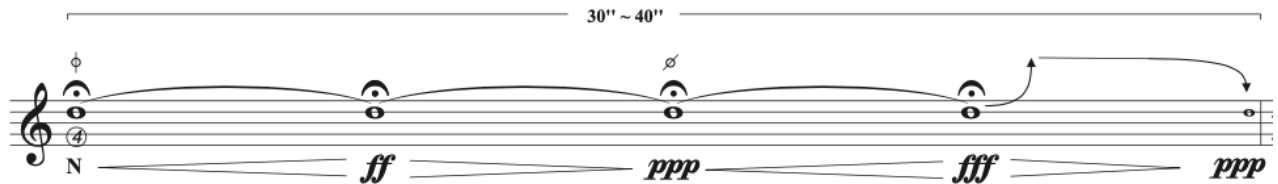


Fig B102: Dynamic Range Ebow - *Study No. 7* (Bar 1)

Arpeggio

Arpeggio practice is certainly feasible with the use of the E-Bow across all ranges of the guitar. However, compared to the use of a traditional bow, some notable limitations arise. The main obstacle is of a dynamic nature: the operating mode of the E-Bow results in difficulty executing an arpeggio that maintains constant dynamics across the transition from string to string. Indeed, the E-Bow tends to initiate the note emission at a relatively low dynamic, which then progressively increases after a brief lapse of time. This phenomenon creates a wave-like effect on the dynamics of the entire arpeggio, resulting in a distinctive sonic effect associated with E-Bow usage. If one were to attempt to transcribe the resulting actual dynamics of each individual note in an arpeggio, such as that in the first measure of *Study No. 7*, the transcription would resemble Figure B103.



Fig. B103: Excerpt from *Study No 7* (Bar 1)

However, it is important to note that this dynamic restriction is also partly linked to the performer's skill, who can, to various degrees, mitigate the wave-like effect generated by the E-Bow. As the E-Bow is a tool of a modular nature, not all guitarists possess full mastery over it, and significant practice and experience are required to fully exploit its potential. Consequently, for effects that may present some realisation difficulties, consulting a professional guitarist might be advisable.

An example of the effect that can be generated by string transition is offered in the second part of *Study No. 7*, where there is an alternation with a pedal note on different strings (Fig. B104).



Fig. B104: Pedal point in *Study No 7*

Spiccato

A spiccato effect with the E-Bow is achieved through direct action on the strings, producing a percussive and detached sonority comparable to bowed spiccato. In notation, conventional string indications such as staccato or staccatissimo may be used (Fig. 105).



Fig. B105: Spiccato example from *Study No. 7* (Bars 18-20)

It is crucial to emphasise that, in a context parallel to that of the violin, the use of spiccato primarily serves as an interpretative tool at the performer's disposal, frequently employed effectively for the rendition of musical passages notated as staccatissimo. If the composer wishes to ensure a specific interpretative choice is adopted, they may insert a written indication to that effect. This form of indication represents the most common manifestation of a specific spiccato instruction, which may be marked with terms such as 'spiccato', 'bouncing bow', or similar expressions that evoke the same concept.

Woodwinds effects:

An emulation akin to that of a flute can be achieved on the guitar by entirely lowering the tone knob and utilizing notes from the upper register. Similarly, the sound of a clarinet or French horn can be replicated by positioning within their characteristic tessitura and damping the strings with the palm of the right hand. Throughout my investigation, I encountered a dearth of explicitly notated instructions in the literature for electric guitar detailing these effects. Nevertheless, while composing *Study No. 7*, it became apparent that descriptive terminology, such as 'imitating the flute' or 'dulled guitar tone,' and for imitating the Clarinet, 'slight palm muting,' is beneficial for composers aiming to delineate these specific effects within the score. Such an approach furnishes performers with lucid directives regarding the utilisation of the E-Bow to attain the intended timbral nuances.

For instance, in *Study No. 7*, notation was employed to denote ‘imitating the clarinet’ (Fig. B106), accompanied by instructions within the piece's notes detailing how to accomplish this effect. This involved applying slight palm muting and reducing the guitar's tone knob.

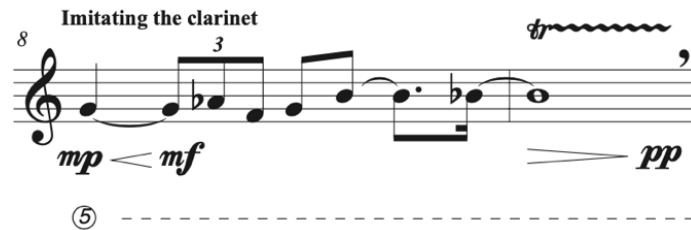


Fig. B106: Clarinet effects - Excerpt from *Study No. 7* (Bars 8-9)

Similarly, the technique of ‘Imitating the flute’ (Fig. B107) was indicated in the score, with an accompanying explanation on achieving this effect by lowering the guitar's tone and utilizing notes from the higher register.

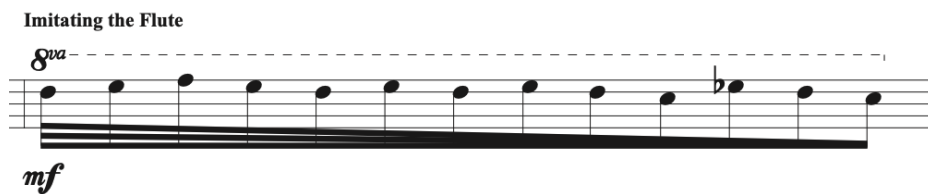


Fig. B107: Flute effect - Excerpt from *Study No. 7* (Bars 8-9)

Video example 5.5 – Demonstration of E-bow technique

This video demonstrates the basic functioning of the E-bow in both normal and harmonic modes. A musical phrase is first presented using the standard (normal) mode, followed by the harmonic mode. The video also includes examples of spiccato-like articulation and arpeggiated figures produced with the device.

Principal Limitations of E-Bow Usage in Composition:

In the endeavor to integrate the E-Bow into compositional works, it is imperative to recognize certain constraints inherent in its utilisation. While these limitations do not negate the device's unique contribution to musical structure and dynamics, they shape the context in which it can be effectively employed. The following table delineates the primary constraints encountered when using the E-Bow in composition, providing insights into the practical aspects of its application and performance implications. Understanding these boundaries is essential for both composers and performers to fully harness the potential of the E-Bow in their creative endeavors.

Table B14: Possible constraints when using the E-Bow in composition

Limitation Category	Description	Implications for Performance
E-Bowings	The agility and interaction with the string are slower compared to traditional bows. Techniques resemble bowing in violin playing but are distinct due to the longitudinal movement of the E-Bow.	The E-Bow's movement affects the final sonic effect; the nuances in tone produced by variations in E-Bow movement are significant.
Dynamics	The E-Bow allows dynamic modulation post-note generation, unlike traditional string or wind instruments. However, it cannot reproduce the immediate dynamic change possible with wind instruments.	Dynamic modulation is possible for an indefinite period, offering potential for extended sonic exploration.
Arpeggio	Difficulty maintaining constant dynamics across strings; a wave-like dynamic effect is inherent due to how the E-Bow initiates note emission.	Performer skill can mitigate the dynamic inconsistency; significant practice required for mastery.
Spiccato	Direct action on strings produces a percussive, detached sound. Notation similar to string music is used to indicate spiccato.	Interpretative tool for musical passages, with written indications for specific interpretive choices.
Woodwinds Effects	Imitation of woodwind instruments is possible by manipulating the guitar's pitch and string dampening.	Descriptive terms in the score guide the performer to achieve desired timbral effects.
Changing Strings	Rapid tempo transitions between strings may result in a wave-like effect.	The effect's concealment is contingent on the guitarist's proficiency.
Extension	The E-Bow is limited to individual pitches and cannot be used for chords.	Limited use on the uppermost pitches of the guitar's range.
Chords	The E-Bow is limited to individual pitches and cannot be used for chords.	Restricts the harmonic complexity that can be achieved using the E-Bow.

5.7 Volume Pedal

As described in Chapter 1.1, the electric guitar is equipped with onboard volume knobs, which can also be used during performance to adjust dynamics. However, this solution presents a clear

limitation, as the guitarist must momentarily release one hand from the strings in order to operate the control, interrupting fluidity and precision in execution.

The volume pedal serves as a pivotal dynamic instrument for electric guitarists, enabling an expanded range of expression. This device grants performers the capacity to modulate their guitar's output volume in real-time, thus facilitating fluid volume transitions without the necessity of manual adjustments to the guitar's onboard volume control. Positioned within the signal path, the volume pedal empowers musicians to effectuate polished volume swells and gradual diminuendos, to modulate crescendos with precision, and to inject nuanced dynamics into their playing. Although the volume pedal does not alter the timbre as conventional effects units do—since its influence is purely on dynamics—the range of its utilisation is nonetheless tied to dynamic modulation. An exemplar of its potential was demonstrated by Yarema in 1983, who introduced a manual volume control apparatus for the electric guitar that enabled a violin-esque sonority while performing (Yarema, 1983).

The notation for employing a volume pedal adheres to conventional dynamics, often indicated by a hairpin, and may be accompanied by dynamic markings such as 'forte' or 'fortissimo'. A distinctive addition to this spectrum of dynamics is the symbol 'N', representing 'no sound', which extends the dynamic range to complete silence. This is exemplified in Laganella's *Miniature for electric guitar*, (Fig. B108) where illustrates the practical application of the volume pedal to achieve an effect of silence.



Figure B108: Excerpt from Laganella's *Miniature for electric guitar* (Bars 56-58).

The volume pedal can also be used to mask the initial attack of a note. The pedal is lowered to mute, the note is struck, and the volume is then raised, producing a sustained tone without an audible attack. In Study No. 1, the symbol 'MX' indicates maximum volume. This application is illustrated in Fig. B108.



Fig. B108: Excerpt from *Study No. 1* (Bar 2)

5.8 Octaver

An Octaver adds one or more signals transposed by an octave above or below the original pitch. Most units allow the balance between the dry signal and the added octaves to be adjusted, producing results that range from subtle reinforcement to more layered textures. Some models also permit independent control of individual octaves, for example emphasising the lower octave for greater weight or the upper octave for increased brightness. The octaver may therefore be used to enrich melodic lines or to simulate multi-register textures.

Video Example 5.7 – Octave

This video demonstrates the use of the octaver effect, showing how it can add both lower and higher octave layers to the original signal. The example illustrates the possibility of blending the dry signal with the added octaves, highlighting how different settings affect the overall texture and sonic character.

5.9 Other modular effects

The realm of modular effects for the electric guitar has seen expansive growth, with a plethora of effects now saturating the market. An exhaustive listing would necessitate a dedicated study, particularly considering the common practice of combining multiple effects to forge a signature sound. Further complexity is introduced with the incorporation of amplifiers and multi-effect processors, both digital and analog, which serve to broaden the sonic landscape to near limitless potential.

Nonetheless, there are pertinent resources available that, despite not being expressly written from a composer-centric perspective, are of considerable utility to composers seeking to delve into the nuances of electric guitar effects. Notable among such texts are *The Ultimate Guitar Tone Handbook* by Bobby Owsinski (2011) and *Guitar Tone and Effects* by David M. Brewster (2010). These resources offer comprehensive analyses of various effects, such as tremolo, and provide practical advice for achieving diverse tonal qualities through the adept application of effect pedals. These insights are invaluable for composers aiming to enrich their musical vocabulary with the nuanced articulations possible with electric guitar effects.

Table B15 provides a brief overview of other commonly used effects. While not exhaustive, this list offers composers a practical reference to further expand their palette of sonic possibilities, highlighting how different devices can shape timbre, dynamics, and texture in distinctive ways.

Table B15. Additional Common Effects for Electric Guitar

Effect	Brief Description
Chorus	Doubles and slightly detunes the signal, creating the impression of multiple instruments playing together.
Phaser	Splits the signal and modulates the phases, producing a swirling, psychedelic effect.
Tremolo	Modulates the volume of the signal at a regular rate, resulting in rhythmic pulsations.
Reverb	Simulates the natural resonance of acoustic spaces, from small rooms to large halls.
Octaver / Pitch Shifter	Adds copies of the signal transposed by octaves or other intervals, enriching harmony and texture.
Compressor	Reduces dynamic range by evening out levels, useful for sustain and greater control.
Ring Modulator	Multiplies the signal with a carrier frequency, producing inharmonic, metallic, and experimental textures.
Envelope Filter (Auto-Wah)	Reacts dynamically to the player's attack, shaping the tone in a vowel-like or 'quacking' manner.

General Conclusions

The present research aimed to provide an articulated set of critical and operative resources to improve the understanding of the electric guitar as a compositional instrument, integrating historical and aesthetic perspectives with technical and performative ones. Through the analysis of its development and of the existing literature, the study clarified the evolution of the instrument and identified its principal stylistic nuances. The examination of its various contexts of use, particularly in relation to the relationship between popular music and art music, highlighted the need for a more circumscribed terminology, here defined as Concert Electric Guitar (CEG), understood not as a rigid category but as a descriptive tool useful for articulating such distinctions. It also emerged that this terminology presents structural ambiguities and intrinsic conceptual fragilities, linked to the historically and culturally fluid nature of the instrument.

In parallel, the study systematically addressed the operative dimensions of writing, analysing the instrument's technical possibilities, the management of timbral variation, and the principal performance modes employed in contemporary composition for electric guitar. The intention was to provide composers with a solid operative foundation, useful both for repertoire analysis and for the design of new works. Among the principal results are the identification of recurring stylistic characteristics and compositional strategies specific to writing for the CEG, as well as a deeper understanding of the use and articulation of instrumental techniques. To this is added the formalisation of notational solutions in the score that expand the instrument's possibilities of writing. These outcomes strengthen the academic understanding of the electric guitar within a compositional context and at the same time provide concrete reference tools for contemporary composers and performers.

Methodological Foundation

By placing in dialogue the performative experience of the electric guitar in classical contexts and its use in popular contexts, and by highlighting their structural and functional differences, it was possible to clarify which elements depend primarily on performance practice and which can instead be formalised in the score. This distinction made it possible to address more consciously the difficulties typically encountered by composers who are not guitarists, in particular the challenge of writing for an unfamiliar instrument while at the same time articulating complex musical ideas in an idiomatic and technically accessible manner.

Although a body of manuals focused on performance practice exists and a production aimed at composers is progressively developing, the pedagogical framework specifically oriented towards writing within a defined aesthetic foundation remains in a phase of consolidation. It therefore became necessary to offer a reference capable of guiding the composer in consciously adopting a specific

artistic perspective, distinguishing among different possible stylistic domains, just as the same instrument may belong to different traditions.

A domain that is still consolidating does not affect only the expansion of the repertoire, understood as the mere production of new works, but concerns above all the decision-making quality of the compositional process. In the absence of explicit criteria, the repertoire tends to expand indistinctly; when such criteria are defined and organised, however, the composer can assign the instrument a precise and conscious identity within each individual work. The research intervened precisely at this point, making such criteria explicit and operative and strengthening a compositional practice that is fully decision-based and structurally oriented.

In this sense, the research question — how the definition of the Concert Electric Guitar constitutes an operative framework that enables the composer to exercise conscious control over the degree of integration or separation in relation to the Popular Electric Guitar — finds its answer in the definition of the CEG itself. It does not respond solely to a theoretical need but provides a concrete operative reference. The identified criteria offer composers a measure through which to orient themselves, making it possible to choose consciously when to approach the models of the Popular Electric Guitar, when to distance themselves from them, and when to position themselves in an intermediate zone. The CEG does not impose a direction but makes explicit a field of possibilities within which the composer can exercise decision-making control over the degree of integration or separation in relation to the PEG.

Technical Verification and Compositional Application

In the absence of clearly defined criteria of formal regulation established in Part A of this study, the technical cataloguing presented in Part B would have remained purely descriptive; in light of such criteria, however, it assumes a structural and compositional function. In the handbook, practices often associated with the PEG are reinscribed within the CEG and illustrated through examples drawn from the relevant concert repertoire: the interaction with pedals and modular systems, for instance, is not treated as an accessory or merely timbral domain, but as an integral component of formal construction. Likewise, the notation of extended techniques is addressed as a means of stabilising gesture within the structure of the work, making explicit the relationship between action, sound, and form.

In this sense, the compositional appendix, consisting of nine studies and a fugue, represents the practical verification of this theoretical and technical framework. The percussive technique articulated across two staves in *Study No. 3* is not a simple graphic solution, but a device for organising distinct gestural layers according to a structured logic, at the same time constituting an

example of radical distancing from the PEG. The inclusion of a fugue in the portfolio demonstrates that the electric guitar can sustain an articulated contrapuntal construction, foregrounding its polyphonic dimension beyond its customary timbral or gestural perception and consciously recalling a form of classical derivation. At the same time, *Study No. 9*, based on the reworking of shredding, shows how a gesture strongly associated with popular tradition can significantly reduce the distance from the PEG. These three examples, although representing only a portion of the overall corpus, make evident a principle that runs through the entire appendix: the possibility of consciously modulating the degree of integration or distance in relation to the models of the CEG and the PEG. In this sense, the works do not merely apply techniques but put into practice different levels of proximity and separation, thereby also responding to the second research question concerning the control of the degree of compositional integration between the two domains.

In this way, theory, systematisation, and compositional practice do not constitute separate levels, but moments within a single process. The definition of the domain, the formalisation of its tools, and their creative application mutually reinforce one another, configuring the Concert Electric Guitar not only as an object of analysis, but as an operationally practicable field.

In light of this, the third research question — how to organise techniques, gestural vocabularies, and notational solutions into a clear and accessible system for composers who wish to write for the Concert Electric Guitar — finds its answer in the very structure of the handbook and the appendix. The proposed organisation does not merely catalogue possibilities but integrates them into a conceptually coherent system that supports an aesthetically controlled compositional practice.

Research Contribution

The contribution of this research lies in the systematic articulation of a conceptual and operative framework in which the Concert Electric Guitar constitutes the core of a compositional aesthetic whose scope extends to engagement with the Popular Electric Guitar. Without proposing a normative redefinition of the instrument, the study has made explicit formally verifiable criteria which, although present in many contemporary compositional practices, often remained implicit or fragmented. The formalisation of the notion of the Concert Electric Guitar does not aim to fix a definitive identity, but to provide an interpretative framework applicable both to repertoire analysis and to the design of new works.

In summary, the contribution may be reduced to three principal points:

- The stabilisation of the Concert Electric Guitar as a musicological term and concept that is operatively definable.

- The development of a practical aesthetic orientation that allows writing to be consciously positioned along the relational spectrum between CEG and PEG.
- The expansion of the repertoire through works that implement and verify the identified theoretical and operative principles.

The practice-based approach adopted throughout the study, which does not separate theory and practice but places them in reciprocal relation, contributes to the consolidation of a field that is still in development. Within the context of art music, the electric guitar continues to occupy a dynamic position in which the negotiation between cultural heritage, technology, and formal control remains open. For this reason, the model proposed here does not present itself as a closure of the field, but as a tool for further developments, both on the compositional and pedagogical levels, within an academic context in which interest in the instrument is progressively expanding.

Perspectives for Future Developments

The definition of the Concert Electric Guitar as a distinct compositional domain required analytical choices and deliberate delimitations. Not all repertoires and trajectories were included. The repertoire for large ensembles of electric guitars nevertheless remains an area of considerable relevance that could be further explored in future research, particularly in light of the continued evolution of this practice, as demonstrated by the compositional activity of Tim Brady. Through the project *Instruments of Happiness*, Brady has developed a body of works for large formations of electric guitars, exploring their spatial, timbral, and collective potential within large-scale performative contexts, as in *As Many Strings as Possible, Playing: Symphony No. 9* (2018) and *La Grande Accélération: Symphony No. 12* (2018/2024). Although such projects are situated in a liminal zone with respect to the domain of the Concert Electric Guitar as defined in this study, they nonetheless confirm the vitality and expansion of this specific repertorial field.

Moreover, several contemporary composers, including David Lang (1957), Julia Wolfe (1958), Richard Barrett (1959), Michael Fiday (1961), Michael Gordon (1956), Van Stiefel (1965), and Andrew McKenna (1974), were only briefly mentioned or not discussed in depth. Their contributions to the electric guitar repertoire would merit further critical investigation. A comprehensive analysis of such works would, however, have exceeded the limits of the present research; consequently, representative scores were selected in order to delineate the evolving domain of composition for the electric guitar. Through the analysis of the repertoire examined and through correspondence with many of the cited composers, it was nonetheless possible to identify specific instrumental techniques and a range of notational strategies. Although certain composers and works were not included in the historical overview of Section A, their use in the second part of the thesis, the handbook, proved

useful in illustrating specific techniques through excerpts drawn from larger-scale compositions.

The expansion of the repertoire, the growing academic interest, and the emergence of dedicated educational pathways indicate that the instrument is progressively acquiring a structured presence within the contemporary context. Such development will require not only new works, but also the continued refinement of notational, technical, and pedagogical practices, in dialogue with the evolution of performance practices and compositional research.

Within this framework, the present research positions itself as a contribution to an ongoing process. The techniques explored, the proposed solutions, and the composed works do not exhaust the instrument's possibilities but offer a verifiable point of departure for further developments. The future evolution of the Concert Electric Guitar will depend not only on the capacity of composers and performers to continue experimenting, systematising, and redefining their practices, but also on their ability to transmit these acquired insights to future generations. The continuity of this field will therefore be both artistic and pedagogical, requiring the development of critical and educational tools capable of rendering this compositional domain increasingly accessible, intelligible, and operationally practicable for future composers and guitarists.

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APPENDIX

Scores: Nine Studies and a Fugue for Concert Electric Guitar

Preface and Notational Guidelines

The collection is conceived as a cyclic structure in which each study develops from material introduced in the preceding one. Recurring musical motifs, both melodic and rhythmic, establish continuity across the cycle. The principal theme undergoes processes of fragmentation, inversion, and variation, gradually unfolding until it appears in its complete form in the final fugue, where it assumes the role of the subject. Each study may be performed independently, yet the full cycle constitutes an integrated composition of approximately 30–35 minutes, exploring a broad range of timbral and technical possibilities.

This collection begins with a detailed technical overview of each individual piece. The initial section clarifies the notational methods employed for a variety of techniques, encompassing both traditional and extended approaches. While some of these notational conventions serve as preliminary guidelines—allowing for potential elaboration or refinement by the composer or performer—others adhere to established norms, providing industry-accepted methods for denoting specific techniques.

Study No. 1 (Open strings Harmonics):

In the first Study, the principal elements employed are the resonant natural harmonics located on the 4th, 5th, 7th, 9th, 12th, 16th, 19th, and 24th frets across each of the six strings. During the composition of Study No. 1, a flexible notation approach was adopted. In most cases, harmonics are notated according to their resulting pitch, without indicating the fundamental note, in order to preserve visual clarity and facilitate performative immediacy. However, at certain fret positions that generate non-tempered partials — such as the 9th fret — the notation prioritises the physical position on the instrument rather than strict acoustic pitch accuracy, acknowledging the harmonic's primarily timbral function.

Study No. 2 (Pinched Harmonics):

Although commonly called harmonics, Pinch Harmonics have a very different sound than the natural and artificial harmonics. They are actually multiphonics where the fretted note and a harmonic of indeterminate pitch ring simultaneously.

Since pinched harmonics can be considered part of the harmonic family due to their shared fundamental principle of emphasizing specific overtones of a note, it was therefore logical in *Study No. 2* to develop a symbol derived from the notation used for natural harmonics. The diamond shape was modified by cutting its base to form a triangle (Fig. C1), which, like natural harmonics, can be filled or left empty depending on the note's duration.



Fig. C1: Excerpt from *Study No. 2* (Pitched Harmonics).

***Study No. 3* (Percussive/Timbre-based composition):**

In *Study No. 3*, four resonators (body, bridge, pickups and strings) and two exciters (right and left hand) are used. To enhance the sonic impact of the vibration, *Study No. 3* employs a ‘large hall’ reverb, a delay set at double the metronome indication (120 bpm), and a heavy distortion. Moreover, to further diversify the resulting effect of the percussive strikes, an extensive application of the vibrato arm is presented, enabling posterior manipulation in relation to the percussion. A deliberate decision was made to leave the alteration of pitch through the vibrato arm unspecified, providing only general indications such as ‘halfway’ or ‘all way down’, which are often interpreted as an invitation for the performer to exercise expressive liberty.

To represent the various percussive parameters, it was deemed appropriate to use a two-layer notation system. The traditional staff will indicate the position where the strings are stopped using Roman numerals. The second staff, instead, represents the exact point where percussion is applied. Therefore, the first line represents the bridge, the second represents the pickup, the third represents percussion on the strings, and the fourth represents the body (see Fig C2).

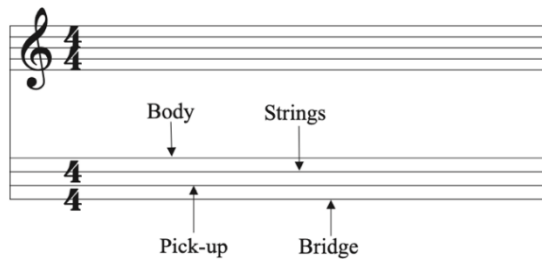


Fig. C2: Resonator notation in *Study No.3*.

Furthermore, since muted strings at different positions on the fretboard produce different effects, the position at which the strings are stopped is indicated using Roman numerals.

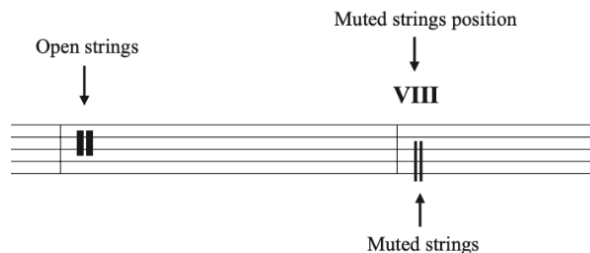


Fig. C3: Symbols in *Study No 3*.

In the second part of *Study No. 3*, percussion produces natural harmonics on the corresponding frets. As both hands are required for this gesture, it is effective to transform the two layers into single lines for representation (Fig. C4). The upper line represents the left hand, while the lower line indicates the right hand. The frets on which to act are indicated by numbers.

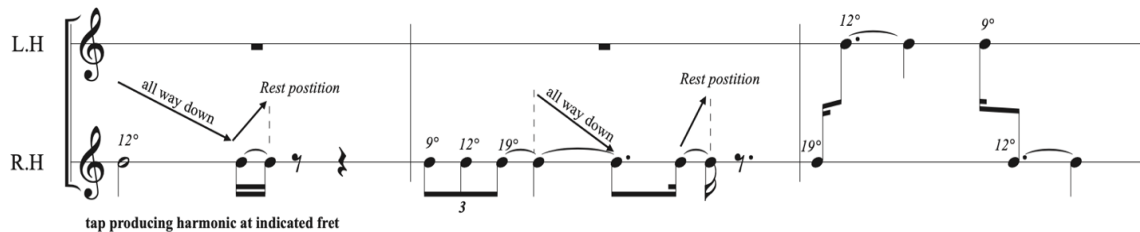


Fig. 4: Harmonics percussion notation (Measures 131-133)

Study No. 4 (Tapping):

In *Study No. 4* tablature the singular symbol utilized to indicate tapping with the right hand was T positioned above the note. When tapping is performed using both the right and left hands, the + symbol is commonly used above the note to denote the execution of the technique with the left hand, while the T symbol is employed for tapping with the right hand (Fig. C5).



Fig C5: Two-handed tapping notation (Measures 53-55 *Study No. 4*).

Study No. 5 (Sweep Picking):

Arpeggio and sweep picking, though often conflated, possess distinct characteristics. Beyond their differing note execution methods, a significant contrast lies in the string selection utilized during performance. In contrast to traditional arpeggios, which, although equally playable on the electric guitar, are more commonly associated with classical guitar and the use of right-hand fingers, sweep picking is distinguished by the use of a plectrum and the execution of notes exclusively on adjacent strings, facilitating the smooth and uninterrupted flow of the pick. This technique involves playing the arpeggio across neighbouring strings, either ascending or descending, allowing the pick to sweep from higher to lower strings or vice versa. By confining the note selection to adjacent strings, sweep picking emphasizes the fluidity and seamless connectivity between the arpeggio notes. As can be observed in the example in Figure 6, the chords used in *Study No. 6* are primarily arranged at minor or major third intervals. The virtuosic passage shown would be excessively difficult to perform at a sustained speed without the use of sweep picking technique.



Fig. C6: Excerpt from *Study No. 5* (Bars 7-8).

As shown in Figure 6, a distinctive element used to help the performer identify sweep picking is the notation of the downward strum (Downstroke) indicated by the specific symbol ▣ and the upward strum (Upstroke), indicated by its corresponding symbol V.

***Study No. 6* (Jack Cable technique):**

To perform *Study No. 6*, an additional independent jack cable is required, alongside the one used to connect the guitar to the amplifier. This extra cable should be routed to a separate amplifier channel, mixer input, or a second speaker. This setup allows the jack cable to function as an independent sound source, enabling the application of dedicated effects and its standalone use without interfering with the guitar's output.

The bottom facet of the jack connector is held between the palm and four fingers of the right hand, leaving the thumb free. The thumb plays a crucial role in generating sound: when it makes contact with the jack's tip, it introduces electrical interference, which is then transformed into a disruptive sound through the loudspeakers. Conversely, retracting the thumb stops the interference, silencing the sound.

A key aspect of the piece is the use of a flanger effect applied to the jack's signal path. When combined with a volume pedal, this effect becomes particularly expressive, especially in passages that alternate between flanger activation and deactivation, indicated in the score as *Flng. Off* or *Flng. On*. Additionally, the signal chain of the jack channel can be expanded with other effects, encouraging experimentation while preserving the guitar's tonal integrity.

For clarity in notation, the score employs a two-layer system: one for the electric guitar and one for the jack, ensuring precise dynamic representation.

Note: Since the right hand is engaged in manipulating the jack, plucking the strings with the same hand is impractical. As a result, the performer is encouraged to use tapping or legato techniques throughout the piece.

***Study No. 7* (E-Bow):**

The use of an E-Bow is essential for performing *Study No. 7*. The piece requires switching between the two distinct operational modes available on the device. Users can toggle between these modes

using the switch located on the back of the E-Bow.

These modes alter how the E-Bow's magnetic field interacts with the guitar strings, creating different acoustic effects:

- Standard mode emphasizes the fundamental frequency of the note.
- Harmonic mode enhances the note's upper harmonics.

In the score, the standard mode is indicated by the symbol Φ , while the harmonic mode is represented by $\emptyset$.

Legato with the E-bow:

Various legato markings indicate virtual bowings, meaning that different phrasing choices can produce distinct sonic effects—similar to how different bowing techniques shape the character of a phrase on a bowed instrument.

When a passage includes a legato marking, it means the phrase can be played without moving the E-Bow, keeping it fixed in position over the string.

While the E-Bow can mimic bowing techniques of string instruments, its approach differs:

- On a violin, sound is produced by moving the bow side to side (transversely) across the string.
- With an E-Bow, variations are created by moving it along the length of the string (longitudinally).

In electric guitar playing, when non-legato notes are played on the same string, this bowing effect is achieved by shifting the E-Bow horizontally along the string to shape articulation and phrasing.

Other effects with the E-bow:

Study No. 7 explores various effects achievable with the E-Bow. Some of these effects are indicated verbally as follows:

- **Imitating the Clarinet** – Apply slight palm muting and lower the guitar's tone knob.
- **Imitating the Flute** – Maximize the guitar's tone knob and use notes from the higher register.
- **Cello-like spiccato** – Lightly bounce the E-Bow on the string, briefly touching it with the device.

Study No. 8 (Palm Muting):

Study No. 8 primarily utilizes palm muting, which is indicated in the score with the standard abbreviation **P.M.**

Another technique featured is the percussive tone. Similar to palm muting, this technique mutes the strings, but instead of using the palm, the right hand is used to completely dampen the sound. Unlike palm muting, the percussive tone produces an extremely muted effect, making the note almost unrecognizable. In the score, this technique is notated by replacing the note with an x (see Fig. C7).

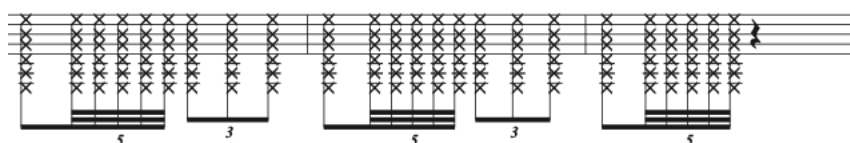


Fig. C7: Percussive Tone technique in *Study No. 8*, (Measures 57-60).

In *Study No. 8*, the Wah pedal is notated using a graphical representation of its movement:

- The symbol '+' indicates the pedal in the closed position (minimum effect).
- The symbol 'o' indicates the pedal fully open (maximum effect).

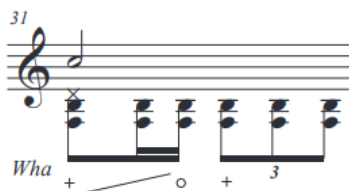


Fig. C8: Wah pedal notation in *Study No. 8* (Measure 31).

Study No. 9 (Shredding):

The ninth piece of this collection aims to provide guitarists with an opportunity to utilize all the techniques covered in the preceding eight studies. It allows for freedom in expressing creativity and technical prowess, which is typical when employing the shredding technique. Guitarists can either apply patterns from the earlier studies or innovate upon them in a virtuosic manner. Structurally, this study incorporates written elements to maintain cohesion throughout the collection, facilitating a smooth transition to the final piece. These written components are supplemented with verbal instructions specifying the style in which the shredding should be execute.

Fugue for Concert Electric Guitar

The final piece of the collection focuses on exploring the polyphonic capabilities of the instrument through an advanced counterpoint technique utilizing three distinct voices. Notably, a clean electric timbre has been deliberately selected, avoiding the use of additional effects. This decision prioritizes clarity and articulation, which are crucial for handling the complexity of the piece's polyphony. The compositional technique employed in this fugue follows the structure of a fugue, albeit with some flexibility regarding traditional scholastic rules. While maintaining a certain degree of freedom in composition with respect to these aspects, the interaction between the subject and the countersubject adheres to classical norms, preserving the essential form of the fugue. Consequently, the composition transcends mere stylistic exercise, serving as empirical evidence of the technical and timbral benefits conferred by the electric guitar within the domain of advanced counterpoint.

I

(Open Strings Harmonics)

② = 1/4 up

Slowly and Freely

Heavy Dist. + Medium Delay

E. Guitar

The musical score is written for an electric guitar in 6/8 time. It consists of six staves of music, each containing various techniques and notations:

- Staff 1:** Starts with a triplet of eighth notes (marked ③) on the open strings. This is followed by a series of notes with slurs and ties. A dynamic marking *f* is present. The staff ends with a double bar line and the notation "N" followed by a dashed line and "Mx".
- Staff 2:** Continues the melodic line with slurs and ties. A "Palm Mute" instruction is written above the staff. A triplet of eighth notes (marked ③) is shown. A dynamic marking *f* is present.
- Staff 3:** Features a triplet of eighth notes (marked ③) and a series of notes with slurs and ties. A dynamic marking *f* is present. The staff ends with a double bar line.
- Staff 4:** Starts with a triplet of eighth notes (marked ③) and a series of notes with slurs and ties. A dynamic marking *f* is present. The staff ends with a double bar line.
- Staff 5:** Continues the melodic line with slurs and ties. A dynamic marking *f* is present. The staff ends with a double bar line.
- Staff 6:** Features a triplet of eighth notes (marked ③) and a series of notes with slurs and ties. A dynamic marking *f* is present. The staff ends with a double bar line.

Additional notations and markings include:

- "Tap on 12th producing harmonics" with a plus sign (+) below the staff.
- "let ring" with a dashed line above the staff.
- "W.B Half way" with a curved arrow pointing to a note.
- "5th" and "9th" indicating fret positions.
- "3" indicating a triplet.
- "6'' ~ 8''" and "3'' ~ 4''" indicating string bends.

[illegible]

II (Pinched Harmonics)

Moderato ritmico ♩. = 46

Heavy Dist. + Medium Delay

The musical score is written for guitar in 3/8 time. It consists of nine staves of music. The first staff begins with a forte (*f*) dynamic and a triplet of eighth notes. The second staff features a triplet of eighth notes and a section marked 'Whammy Bar' and 'Ad Lib.' with a triplet of eighth notes. The third staff includes a triplet of eighth notes and a section marked 'P.M.'. The fourth staff starts with a fortissimo (*ff*) dynamic and a triplet of eighth notes. The fifth staff contains a quintuplet of eighth notes and a triplet of eighth notes. The sixth staff shows a change in time signature to 4/4. The seventh staff features a quartuplet of eighth notes. The eighth staff continues the melody. The ninth staff, starting at measure 81, includes a section marked 'Tambora on the bridge' and ends with a double bar line.

III

(Percussive based composition)

Poco Lento ♩ = 60

Heavy Dist.

Delay (F.back 0,3/0,4) (Time 0,4/0,6)

Body

f

VIII

Body

mp

f

mp

slowly all way down

Body

p

f

mf

Rest position

Harm 5° fret

Ad lib.

Ad Lib.

Body

f

ff

mp

Harm 7° fret

all way down

Ad Lib.

all way down

Ad Lib.

Body

f

mf

7th 5th

W.B ad lib. at this rythm

9th

Body

f *ff* *mf* *mp*

Half way down

Body

f *ff* *mf* *mp*

all way down

Rest position

L.H.

R.H.

all way down

Rest position

tap producing harmonic at indicated fret

12° 9° 12° 19° 12° 9° 12° 19° 12° 9°

L.H.

R.H.

all way down

Rest position

12° 9° 7° 12° 9° 19° 9° 7° 5° 12° 19°

L.H.

R.H.

Tap ad lib. along the fretboard

W.B ad lib. (around half way down)

12° 12° 9° 9° 7° 7° 7° 5° 12° 12° 9° 9° 9° 9° 5°

L.H. R.H.

12° Change fret ad libitum

Rest p

Change fret ad libitum

L.H. R.H.

6" ~ 8" Accelerando insensibilmente

12° 19° slowly all way down

Body

Rest position

Body

Half way down Ad lib.

Body

Ad lib. slowly all way down Rest position

IV

(Tapping)

Vivace

Clean Tone

The musical score is written for a single melodic line in 7/4 time. It begins with a treble clef and a key signature of one sharp (F#). The tempo is marked 'Vivace' and the tone is 'Clean Tone'. The score is divided into measures, with measure numbers 3, 5, 7, 9, 11, 13, and 15 indicated at the start of their respective lines. The notation includes various tapping techniques, marked with 'T' above the notes, and triplets, marked with a '3' below the notes. A dynamic marking of *f* (forte) is present at the beginning. A dashed line with a circled '3' indicates a specific tapping pattern. A section starting at measure 13 is marked 'Poco accel.' (Poco accelerando). The score concludes with a final measure marked 'a tempo'.

f ③

Poco accel.

a tempo

17

20

23

25

28

31

N

Mx ⑤

④

⑤

Più Lento e libero

34

p

rit. ----- *accel.* -----

38

RH

mf

Tempo I

41 *f*

44

47

50

53

56

59

62

Heavy dist. Più Mosso

75

The musical score is written on a single staff. It begins with a treble clef and a key signature of one sharp (F#). The first section, labeled 'Heavy dist.', consists of five measures of eighth-note triplets. The notes in the triplets are: G4, A4, B4; G4, A4, B4; G4, A4, B4; G4, A4, B4; and G4, A4, B4. The fifth measure is followed by a measure with a whole rest. An arrow labeled 'Ad lib.' points to the right from the end of the first section. The second section, labeled 'Più Mosso', begins with a double bar line and a 4/4 time signature. It contains four measures of eighth-note triplets. The notes in the triplets are: G4, A4, B4; G4, A4, B4; G4, A4, B4; and G4, A4, B4. The fourth measure is followed by a double bar line with repeat dots. A circled '3' is placed below the first triplet in the second section, and a dashed line extends to the right.

78

②

The first system of the musical score for 'The Little Boat' is written in treble clef with a key signature of one flat (B-flat). It consists of three measures of music, each containing a triplet of eighth notes. The first measure starts with a treble clef and a key signature change to one flat. The second measure has a repeat sign. The third measure has a repeat sign and a key signature change to one sharp (F#).

87 T

Ad lib.

V

(Sweep Picking)

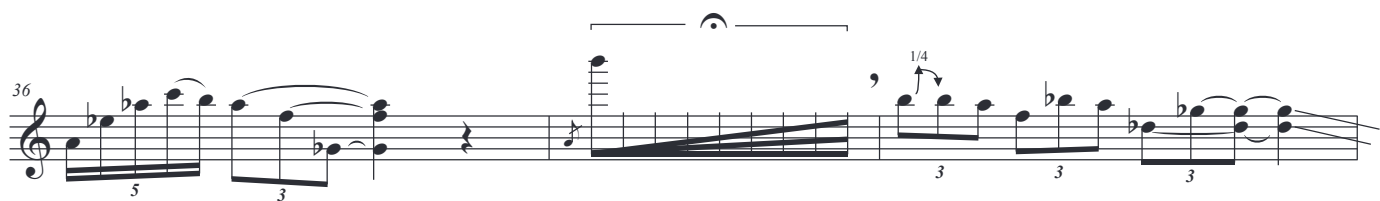
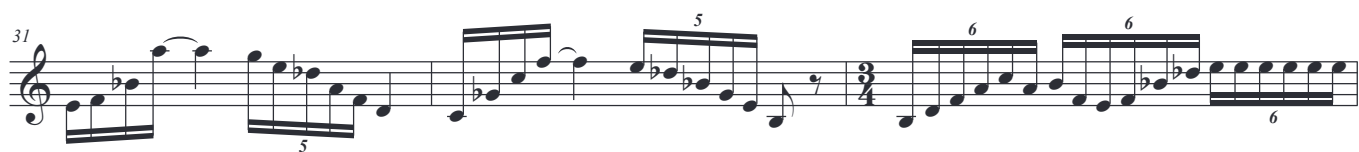
Mosso ♩ = 86-90

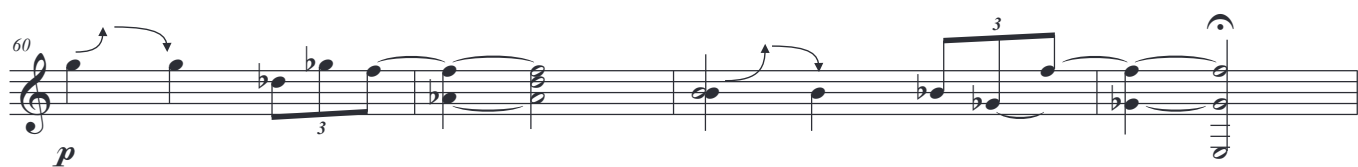
Clean Tone

The musical score is written for guitar in 4/4 time, marked Mosso (86-90 BPM). It begins with a *mf* dynamic and a *Clean Tone* instruction. The first staff contains measures 1-3, featuring a sweep picking pattern with a triplet and a *cantabile* section. The second staff (measures 4-6) continues the sweep picking with a triplet and a *mp* dynamic. The third staff (measures 7-9) includes a triplet and a *f* dynamic. The fourth staff (measures 10-11) features a *p* dynamic and a *f* dynamic. The fifth staff (measures 12-14) includes a *f* dynamic and a *p* dynamic. The sixth staff (measures 15-17) features a *f* dynamic and a *p* dynamic. The seventh staff (measures 18-19) includes a *f* dynamic and a *p* dynamic. The eighth staff (measures 20-21) features a *f* dynamic and a *p* dynamic. The score concludes with a double bar line and repeat signs.



Crunch Distorsion





VI

(Jack Cable)

Agitato ♩ = 70

Medium Distorsion

Long Delay: (F.back 0,3 - Time 0,7)

Flanger: Swirling effect ad lib.

[illegible]

15

J.C.

18

J.C.

Fling. ON

21

Serape Pick

J.C.

Fling. OFF

N Mx

24

J.C.

27

J.C.

Fling. ON

30

J.C.

Fling. ON

Fling. OFF

33

J.C.

Fling. ON

Fling. OFF

ff

37

J.C.

ff

40

J.C.

Fling. OFF

42

J.C.

Fling. ON

$\frac{1}{4}$

Delay OFF

45

J.C.

Fling. OFF

48

J.C.

Delay ON

51

J.C.

Fling. ON

54

J.C.

Fling. OFF

Fling. ON

59

J.C.

VII

(E - bow)

30" ~ 40"

N *ff* *ppp* *fff* *ppp*

Quasi lento (♩ = c. 46)

2

p *mf* *ppp*

5

p *pppp*

④

8

Imitating the clarinet

mp *mf* *pp* *mf*

⑤

13

Turn up the tone knob

Imitating the Flute

pp *mf*

⑥

15

8va

pp *mf*

⑦

18

Spiccato like a cello

Poco accel.

pp *mf*

⑧

Più mosso ♩ = 60

22

sfz f

25 

28

Musical notation for measures 28-31. Measure 28: Treble clef, 4/4 time, key of D major. Notes: D4 (quarter), E4 (quarter), F#4 (quarter), G4 (quarter), A4 (quarter), B4 (quarter), C5 (quarter), D5 (quarter). Measure 29: Treble clef, 4/4 time, key of D major. Notes: D4 (quarter), E4 (quarter), F#4 (quarter), G4 (quarter), A4 (quarter), B4 (quarter), C5 (quarter), D5 (quarter). Measure 30: Treble clef, 4/4 time, key of D major. Notes: D4 (quarter), E4 (quarter), F#4 (quarter), G4 (quarter), A4 (quarter), B4 (quarter), C5 (quarter), D5 (quarter). Measure 31: Treble clef, 4/4 time, key of D major. Notes: D4 (quarter), E4 (quarter), F#4 (quarter), G4 (quarter), A4 (quarter), B4 (quarter), C5 (quarter), D5 (quarter).

34

37  Musical notation for measures 37-40. Measure 37: Treble clef, B-flat key signature, quarter notes G4, A4, B4, A4, G4. Measure 38: Treble clef, B-flat key signature, quarter notes F4, E4, D4, C4, B3. Measure 39: Treble clef, B-flat key signature, quarter notes A3, G3, F3, E3, D3. Measure 40: Treble clef, B-flat key signature, quarter notes C3, B2, A2, G2, F2.

40

Example 10

42

15'' ~ 20''

Example 10: Musical notation for a melodic line. The notation includes a treble clef, a key signature of one sharp (F#), and a time signature of 15'' ~ 20''. The melody consists of a series of eighth and quarter notes, followed by a fermata over a half note. The notation is presented on a single staff.

VIII

(Palm Muting)

Marziale ♩ = 52

Crunch Dist.

Musical score for "Wha Pedal ad lib." in 2/4 time. The score is written for a single melodic line on a treble clef staff. The key signature has one sharp (F#). The piece begins with a 3-measure rest, followed by a series of eighth-note patterns with triplets and quintuplets. The tempo is marked "P.M." (Piano Moderato). The score includes various musical notations such as slurs, ties, and dynamic markings. The piece concludes with a final cadence.

Musical score for "Wha Pedal ad lib." in 2/4 time. The score is written for a single melodic line on a treble clef staff. The key signature has one sharp (F#). The piece begins with a 3-measure rest, followed by a series of eighth-note patterns with triplets and quintuplets. The tempo is marked "P.M." (Piano Moderato). The score includes various musical notations such as slurs, ties, and dynamic markings. The piece concludes with a final cadence.

27

P.M.-----

P.M.-----

P.M.-----

31

Wha

P.M.-----

35

P.M.-----

39

P.M.-----

43

P.M.-----

P.M.-----

P.M.-----

3

47

P.M.-----

Wha Pedal ad lib.

53

P.M.-----

57

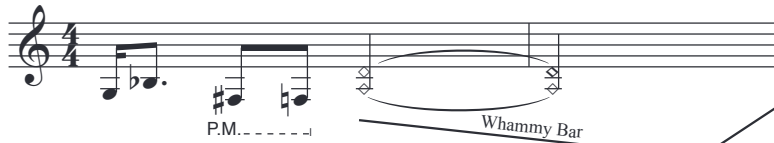
P.M.-----

IX

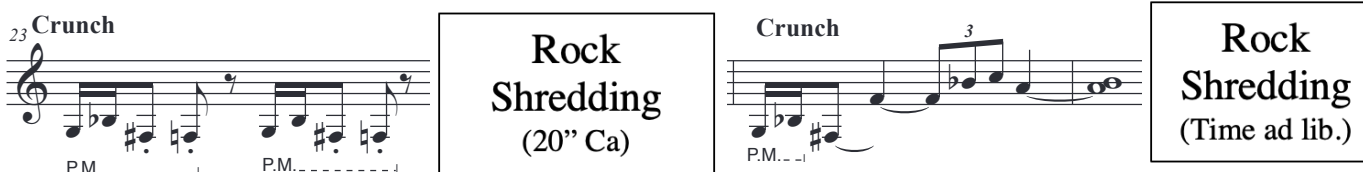
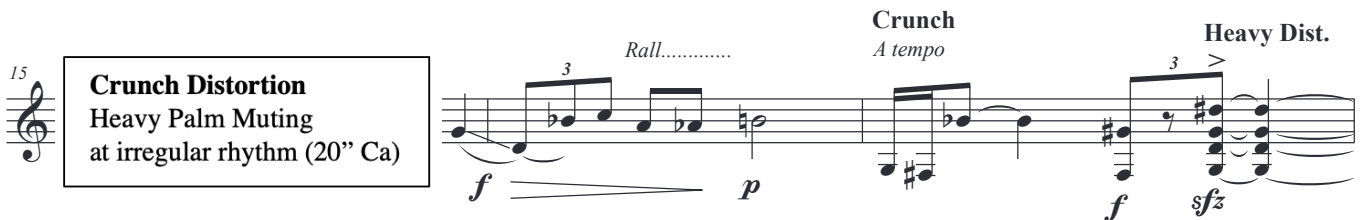
(Shredding)

Libero ♩ = 60

Crunch Dist.



Heavy Distortion + Delay
Sweep Pick. - Harmonics - Whammy bar
Virtuoso style (15'' Ca)



X

(Fugue for E-Guitar)

Clean tone

16

18

20

22

26

29

32

34