

IN SEARCH OF THE “TRUE” SOUND OF AN ARTIST:

A STUDY OF RECORDINGS BY MARIA CALLAS



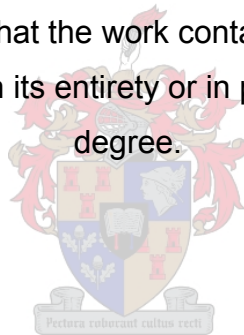
Thesis presented in partial fulfilment of the requirements for the
degree of Master of Philosophy (Music Technology) in the
Faculty of Arts, Stellenbosch University.

APRIL 2006

Supervisor: Mr. T Herbst
Co-supervisor: Prof. HJ Vermeulen

DECLARATION

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously, in its entirety or in part, submitted it at any university for a degree.



.....

Adriaan Fuchs

.....

Date

ABSTRACT

Modern digital signal processing, allowing a much greater degree of flexibility in audio processing and therefore greater potential for noise removal, pitch correction, filtering and editing, has allowed transfer and audio restoration engineers a diversity of ways in which to “improve” or “reinterpret” (in some cases even drastically altering) the original sound of recordings. This has led to contrasting views regarding the role of the remastering engineer, the nature and purpose of audio restoration and the ethical implications of the restoration process.

The influence of audio restoration on the recorded legacy of a performing artist is clearly illustrated in the case of Maria Callas (1923 - 1977), widely regarded not only as one of the most influential and prolific of opera singers, but also one of the greatest classical musicians of all time. EMI, for whom Callas recorded almost exclusively from 1953 - 1969, has reissued her recordings repeatedly, continually adapting their sound “to the perceived preferences of the record-buying public” (Seletsky 2000: 240). Their attempts at improving the sound of Callas’s recordings to meet with the sonic quality expected of modern recordings, as reissued in the latest releases that form part of EMI’s Callas Edition, Great Recordings of the Century (GROTC) and Historical Series, have resulted in often staggeringly different reinterpretations of the same audio material that bear no resemblance to previous CD or LP incarnations or “evince no consolidated conviction about exactly how Callas’s voice *should* sound.” In essence, some commentators argue that the “Callas sound” we hear on recent CD releases is not necessarily exactly as the great diva might have sounded.

The purpose of this study is to consider the influence of audio restoration and remastering techniques on the recorded legacy of Callas, by illustrating the sometimes startlingly different ways in which her voice has been made to sound, examining and comparing the way in which different remasterings of the same audio material can vary in quality, as well as demonstrating how vastly different sonic reinterpretations of a single recording can affect our perception of an artist’s “true” sound. To this end, various reissues of six different complete opera recordings, including four studio recordings: *Tosca* (1953), *Lucia di Lammermoor* (1953), *Norma* (1954), *Madama Butterfly* (1955), as well as two “live” performances of *Macbeth* (1953) and *La Traviata* (1958), have been evaluated and compared, using the “true” sound of Callas’s voice as reference in comparing the different remasterings. Pitch and frequency spectrum analysis was used to confirm or support any subjective claims and observations and further analysis performed with the aid of a specialised Matlab algorithm.

OPSOMMING

Moderne digitale seinprossesering bied kragtige en veelsydige moontlikhede vir die verwerking van klankseine. Die groter potensiaal vir ruisverwydering, toonhoogte verstelling, filtrering en redigering van opnames bied klankingenieurs 'n wye verskeidenheid van maniere om die oorspronklike klank van opnames te verbeter, te interpreteer en soms ingrypend te verander. Dit het aanleiding gegee tot teenstrydige en uiteenlopende menings oor die funksie van die klankrestourasie-ingenieur, die aard en doel van klankrestourasie en die etiese gevolge van die restourasieproses.

Die invloed van klankrestourasie op die klanknalatenskap van 'n uitvoerende kunstenaar kan duidelik bestudeer word in die geval van Maria Callas (1923 – 1977), algemeen aanvaar as een van die mees invloedryke en grootse klassieke musici van alle tye. Die platemaatskappy EMI, vir wie Callas feitlik uitsluitlik vanaf 1953 tot 1969 opgeneem het, het haar klankopnames reeds verskeie kere heruitgereik en die klank daarvan deurlopend aangepas om aanklank te vind by die “veronderstelde voorkeure van die publiek” (Seletsky 2000: 240). EMI se pogings om die klank van Callas se opnames te verbeter om aan die klankvereistes van moderne opnames te voldoen, het ontaard in dikwels aangrypend verskillende interpretasies van dieselfde audio materiaal wat geen ooreenkomste toon met vorige laserskyf of langspeelplaat uitgawes nie, asook “geen vasgestelde oortuigings openbaar oor hoe Callas se stem presies moet klink nie.” Sommige critici argumenteer dat die “Callas klank” wat ons op hedendaagse CD uitgawes hoor, nie noodwendig klink soos wat Callas werklik geklink het nie.

Die doel van hierdie studie is om die invloed van klankrestourasie op die klanknalatenskap van Callas te bestudeer deur die verskillende wyses waarop die klank van haar stem aangepas is te illustreer, die verskille in klankkwaliteit tussen verskillende uitgawes van dieselfde materiaal te ondersoek en te vergelyk, asook te demonstreer hoe uiteenlopend verskillende interpretasies van 'n enkele opname die persepsie van 'n kunstenaar se “ware” klank kan affekteer. Vir hierdie doel is verkeie uitgawes van ses verskillende volledige opera opnames, insluitend vier studio opnames van onderskeidelik *Tosca* (1953), *Lucia di Lammermoor* (1953), *Norma* (1954) en *Madama Butterfly* (1955), asook twee “lewendige” opnames van *Macbeth* (1952) en *La Traviata* (1958) bestudeer deur Callas se “ware” klank as maatstaf te gebruik om die onderskeie opnames te vergelyk. Toonhoogte- en frekwensie spektrum analise, asook analise deur middel van 'n gespesialiseerde Matlab algoritme, is deurlopend gebruik om enige subjektiewe gevolgtrekkings en waarnemings te staaf.

ACKNOWLEDGEMENTS

Writing a thesis concerning one of the greatest musicians of all time, an opera singer whose artistry has been compared to that of Michelangelo, who has been hailed as a goddess, labelled a “living legend” and termed “immortal,” has proven both an enormously rewarding experience and an incredibly daunting undertaking, not least because of Callas’s stature and influence, but also because so much has already been written about her. Even so, there still remains much to be said and so much more to be learned.

Over the past few months I’ve acquainted myself with as many Callas recordings as I could lay my hands on. The process of endless comparisons between different reissues of the same recording was at times emotionally draining and incredibly tiring.

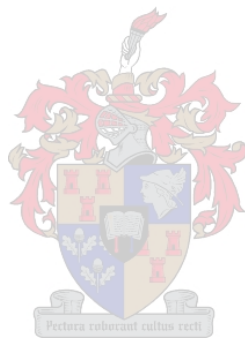
To my supervisor, Mr. Theo Herbst, my sincere thanks for all your insight, advice and continuous support and to my co-supervisor, Prof. Hendrik Vermeulen, a warm-hearted word of thanks for your interest and time, especially with regards to the development of the Matlab analysis algorithm.

I would also like to extend my gratitude to a number of individuals who have in one way or another contributed to the study:

- Acáma Fick, who assisted in the initial listening process and whose interest, comments and advice regarding the study is greatly appreciated.
- Magdalena Oosthuizen, who proofread sections of the text.
- Barbara Robinson, who, as a generous gift, supplied me with several valuable LP sets of Callas recordings.
- Helmut Meijer, who gave of his time in checking and confirming my observations during the listening phase.
- Tim Lengveld, who transferred the original LP’s to CD.
- My friends and family, to whom I extend my deepest gratitude for their continued support and encouragement.

“Music is so great that the more you learn, the more you realise how little you know. We are interpreters, not geniuses; we serve music.”

Maria Callas (cited in Rosenberg 2003)



dove cessa la lingua
comincia la Musica, ha
detto il fantastico Hoffmann.
E veramente la Musica è
una cosa troppo grande
per poterne parlare. Ma
si può servirla sempre,
invece, e sempre rispettata
con umiltà. Cantare, per
me, non è un atto d'orgoglio,
ma solo un tentativo
d'elevazione verso quei
cieli dove tutto è armonia.

Maria Meneghini
Callas

"Music starts where language stops, as ETA Hoffmann said. This is true, but although music is something too big to be talked about, it can be served forever and respected with humility. Singing, for me, is not an act of pride, but merely an attempt to rise towards those heights where everything is harmony."

Maria Callas (cited in Gara 1958: 27)

TABLE OF CONTENTS

Declaration	<i>ii</i>
Abstract	<i>iii</i>
Opsomming	<i>iv</i>
Acknowledgements	<i>v</i>
Table of Contents	<i>viii</i>
List of Figures	<i>xiii</i>
List of Tables	<i>xix</i>
Photo Credits	<i>xxi</i>
Compact Disc Track Listing	<i>xxii</i>

CHAPTER 1: INTRODUCTION

1.1) Background	1
1.2) The Ethics Of Audio Restoration	2
1.3) Copyright Law	3
1.4) Maria Callas – Influence And Legacy	4
1.5) The Influence Of Audio Restoration On The Recorded Legacy Of Maria Callas	6
1.6) Aims And Objectives Of This Study	8
1.7) Motivation For The Study	8
1.8) Research Design	9
1.9) Research Methodology	10
1.10) Sources	12
1.11) Problems Specific To This Study	13
1.12) Technical Specifications Of Equipment And Processes Used In The Study	14
1.13) Chapter Outline	24

CHAPTER 2: “TO SAVE HISTORY NOT REWRITE IT:” HISTORICAL REISSUES AND THE ETHICS OF AUDIO RESTORATION

2.1) Introduction	26
2.2) The Ethics Of Audio Restoration	27
2.3) Overview Of The Transfer And Remastering (Rerecording) Process	29
2.4) Copyright Law And The Reissue Of Sound Recordings	34
2.5) Authenticity Of Historical Performance	37

CHAPTER 3: THE VOICE OF THE CENTURY

3.1)	Historical Precedents	40
3.2)	Beginnings	42
3.3)	Vocal Characteristics	45
3.4)	Vocal Decline	49
3.5)	Conclusion	55

CHAPTER 4: A BRIEF OVERVIEW OF CALLAS RECORDINGS ON EMI

4.1)	Recorded Output	57
4.2)	Callas On LP (1950's - 1980's)	58
4.3)	The First CD's (1984 - 1990)	60
4.4)	EMI Classics (1991 - 1996)	61
4.5)	The Callas Edition (1997)	62
4.6)	Remastering The Mono Opera Recordings	63
4.7)	The Stereo Opera Recordings	64
4.8)	Recital Discs	65
4.9)	"Live" Recordings	67
4.10)	New Releases	69
4.11)	Reissues On Naxos Historical	72



CHAPTER 5: TOSCA (1953)

5.1)	Introduction	73
5.2)	Background To The Present Recording	75
5.3)	Release History	76
5.4)	Discrepancies In Pitch	78
5.5)	Track Timings	80
5.6)	Pitch Analysis	81
5.7)	Comparison Of The Different Remasterings	100
5.8)	Frequency Spectrum Analysis	104
5.9)	Matlab Analysis	118
5.9.1)	Case 1: "Lo dici male" from "Ora stammi a sentir" (LP & 1997).....	118
5.9.2)	Case 2: "Vissi d'arte" from "Vissi d'arte" (LP & 1997).....	122

CHAPTER 6: LUCIA DI LAMMERMOOR (1953)

6.1)	Introduction	126
6.2)	Transforming <i>Lucia</i> And Revitalising <i>Bel Canto</i>	127
6.3)	Vocal Approach	129
6.4)	Release History	130
6.5)	Track Timings	131
6.6)	Pitch Analysis	132
6.7)	Comparison Of The Different Remasterings	151
6.8)	Frequency Spectrum Analysis	155
6.9)	Matlab Analysis	169
6.9.1)	Case 1: “Dolor” from “Verranno a te sull’aure” (LP & 1997)	169
6.9.2)	Case 2: “Dolor” from “Verranno a te sull’aure” (LP & GROTC)	173

CHAPTER 7: NORMA (1954)

7.1)	Introduction	177
7.2)	Vocal Challenges	178
7.3)	Release History	180
7.4)	Comparison Of The Different Remasterings	181
7.5)	Frequency Spectrum Analysis	189
7.6)	Matlab Analysis	201
7.6.1)	Case 1: “Sediziose voci” from “Sediziose voci” (LP & 1997)	201
7.6.2)	Case 2: Noise sample from “A bello a me ritorna” (LP & 1997)	205

CHAPTER 8: MADAMA BUTTERFLY (1955)

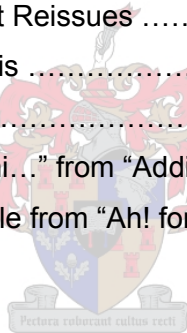
8.1)	Introduction	209
8.2)	Performance History	211
8.3)	Vocal Characterisation	212
8.4)	Comparison Of The Different Remasterings	214
8.5)	Frequency Spectrum Analysis	218
8.6)	Matlab Analysis	224
8.6.1)	Case 1: “Che tua madre” from “Che tua madre” (1985 & 1997)	224

CHAPTER 9: MACBETH (1952)

9.1)	Introduction	228
9.2)	Vocal Challenges	230
9.3)	Comparison Of The Different Remasterings	231
9.4)	Frequency Spectrum Analysis	235
9.5)	Matlab Analysis	242
9.5.1)	Case 1: Noise sample from “Nel dì della vittoria” (1993 & 1997)	242

CHAPTER 10: LA TRAVIATA (1958)

10.1)	Introduction	246
10.2)	Performance History	248
10.3)	Callas’s <i>Traviata</i> On Record	249
10.4)	The “Lisbon <i>Traviata</i> ”	250
10.5)	Comparison Of The Different Reissues	252
10.6)	Frequency Spectrum Analysis	256
10.7)	Matlab Analysis	265
10.7.1)	Case 1 - “Ah! tutto fini...” from “Addio del passato” (1987 & 1997):	265
10.7.2)	Case 2 - Noise sample from “Ah! fors’è lui” (1987 & 1997):	267



CHAPTER 11: CONCLUSION

11.1)	Summary Of Findings	271
11.1.1)	Pitch Differences	273
11.1.2)	Editing Errors	273
11.1.3)	Remastering Remasterings	274
11.1.4)	The Ethics Of Audio Restoration	275
11.1.5)	Other Aspects Discussed In The Study	275
11.2)	Areas For Future Study	276
11.3)	In Closing	276

REFERENCE LIST

1)	Book Publications	281
2)	Journal Articles	282

3) Electronic Sources	283
4) Compact Disc Sleeve Notes	285
5) Vocal Scores	286
6) Audio-Visual Resources	286
ADDENDUM A: DISCOGRAPHY OF RECORDINGS BY MARIA CALLAS RELEASED ON EMI ...	287
Complete Opera Recordings	288
Studio Recitals	298
“Live” Concert Performances	303
ADDENDUM B: GLOSSARY OF MUSICAL AND VOCAL TERMINOLOGY	308
ADDENDUM C: GLOSSARY OF AUDIO AND TECHNICAL TERMINOLOGY	314
ADDENDUM D: MATLAB SOURCE CODE	328



“She was the last great artist. Just think – this woman was nearly blind, and often sang standing a good hundred-and-fifty-feet from the podium. But her sensitivity! Even if she could not see, she sensed the music and always came in exactly with my downbeat. When we rehearsed she was so precise, already note-perfect. But she had a habit that annoyed her colleagues: even in rehearsal she always sang full voice and it obliged them to do so as well. Most singers are stupid and try to save themselves, but a rehearsal is a kind of hurdle. If on a track you must run a mile, you don’t practice by running half a mile... I remember we had a dress rehearsal in Cologne of *La Sonnambula* at ten in the morning and she sang her entire role full voice; that night we did the première! She was not just a singer, but a complete artist. It’s foolish to discuss her as a voice. She must be viewed totally – as a complex of music, drama, movement. There is no one like her today. She was an aesthetic phenomenon.”

Antonino Votto – Conductor (cited in Stassinopoulos 1980: 95 – 96).

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

- Figure 1.1: “I am not an angel and do not pretend to be. That is not one of my roles. But I am not the devil either. I am a woman and a serious artist, and I would like so to be judged” (Tarrant 2003).
- Figure 1.2: Madame Biki, the famous Milanese fashion designer noted: “The revelation of her beauty as a woman was as important as her artistic success, if not more so” (Gage 2001: 64).
- Figure 1.3: Diagrammatical overview of the research methodology.
- Figure 1.4: Diagrammatical overview of the Matlab analysis algorithm.
- Figure 1.5: Plot of Y1 and Y2 (time-shift visible) of phrase “Ambizioso spirito” from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 1.6: Plot of cross-correlation ($R_{Y_1Y_2}$) between Y1 and Y2 (for entire waveforms) of phrase “Ambizioso spirito” from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 1.7: Plot of shifted waveforms (Y1 and Y2) of phrase “Ambizioso spirito” from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 1.8: Plot of normalised amplitude of Y1 vs. Y2 of phrase “Ambizioso spirito” from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 1.9: Plot of time-shifted windows of phrase “Ambizioso spirito” from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 1.10: Plot of lag or time-shift required for optimum match for each window of phrase “Ambizioso spirito” from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 1.11: Plot of transfer function of phrase “Ambizioso spirito” from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 1.12: “When I sang, people suddenly loved me” (Pahlen 1973: 213).

CHAPTER 2: “TO SAVE HISTORY NOT REWRITE IT” – HISTORICAL REISSUES AND THE ETHICS OF AUDIO RESTORATION

- Figure 2.1: The original recording process and the options for restoration and reproduction.
- Figure 2.2: The process history of a sound recording.

CHAPTER 3: THE VOICE OF THE CENTURY

- Figure 3.1: Callas with her erstwhile teacher Elvira de Hidalgo (1960).
- Figure 3.2: Callas with life-long mentor Tullio Serafin.
- Figure 3.3: Callas with soprano Elizabeth Schwarzkopf.
- Figure 3.4: Callas as Medea (Dallas, 1958).
- Figure 3.5: The famous photo of Callas (in a chinchilla coat - a gift from Onassis) caught between her husband, Meneghini (on the right) and future lover, Onassis (on the left) at 3am, following a party hosted by Onassis in her honour.

CHAPTER 4: A BRIEF OVERVIEW OF CALLAS RECORDINGS ON EMI

- Figure 4.1: Callas in the recording studio.

CHAPTER 5: TOSCA (1953)

- Figure 5.1: “Vissi d’arte” - Covent Garden (London), 1964.
- Figure 5.2: Callas with Walter Legge and Victor de Sabata during the *Tosca* recording sessions – La Scala (Milan), 1953.
- Figure 5.3: Callas (*Tosca*) in the 1964 Covent Garden production, directed by Franco Zeffirelli.
- Figure 5.4: Victor de Sabata and Walter Legge, with Callas, Giuseppe Di Stefano and Tito Gobbi, during the *Tosca* recording sessions - La Scala (Milan), 1953.

- Figure 5.5: Callas (Tosca) singing “Vissi d’arte” - Covent Garden (London), 1964.
- Figure 5.6: Callas (Tosca) and Tito Gobbi (Scarpia) - Covent Garden (London), 1964.
- Figure 5.7: Callas, Giuseppe Di Stefano and Tito Gobbi during the *Tosca* recording sessions - La Scala (Milan), 1953.
- Figure 5.8: Callas (Tosca) - Covent Garden (London), 1964.
- Figure 5.9: Logarithmic frequency spectrum analysis (1997, GROTC & Naxos) of “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).
- Figure 5.10: Logarithmic frequency spectrum analysis (LP, 1997 & Naxos) of “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).
- Figure 5.11: Logarithmic frequency spectrum analysis (1985 & 1997) of “Così” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).
- Figure 5.12: Linear frequency spectrum analysis (1985 & 1997) of the phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).
- Figure 5.13: Logarithmic frequency spectrum analysis (LP, 1985, 1997, GROTC & Naxos) of the phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).
- Figure 5.14: Logarithmic frequency spectrum analysis (LP & 1997) of the phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).
- Figure 5.15: Logarithmic frequency spectrum analysis (LP & GROTC) of the phrase “Io quella lama gli piantai nel cor” from “Ah! Franchigia a Floria Tosca,” Act III of *Tosca* (1953 recording).
- Figure 5.16: Linear frequency spectrum analysis (LP & 1985) of the phrase “Trionfal” from “E non giungono,” Act III of *Tosca* (1953 recording).
- Figure 5.17: Logarithmic frequency spectrum analysis (1985, 1997 & GROTC) of the phrase “Trionfal” from “E non giungono,” Act III of *Tosca* (1953 recording).
- Figure 5.18: Logarithmic frequency spectrum analysis (1997 & Naxos) of the phrase “Trionfal” from “E non giungono,” Act III of *Tosca* (1953 recording).
- Figure 5.19: Plot of Y1 and Y2 (time-shift visible) of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).
- Figure 5.20: Plot of cross-correlation ($R_{Y_1Y_2}$) between Y1 and Y2 (for entire waveforms) of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).
- Figure 5.21: Plot of time-shifted waveforms (Y1 and Y2) of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).
- Figure 5.22: Plot of normalised amplitude of Y1 vs. Y2 of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).
- Figure 5.23: Plot of time-shifted windows of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).
- Figure 5.24: Plot of lag or time-shift required for optimum match for each window of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).
- Figure 5.25: Plot of transfer function of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).
- Figure 5.26: Plot of Y1 and Y2 (time-shift visible) of phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).
- Figure 5.27: Plot of cross-correlation ($R_{Y_1Y_2}$) between Y1 and Y2 (for entire waveforms) of phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).
- Figure 5.28: Plot of time-shifted waveforms (Y1 and Y2) of phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).
- Figure 5.29: Plot of normalised amplitude of Y1 vs. Y2 of phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording). Figure 5.30: Plot of time-shifted windows of phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).
- Figure 5.31: Plot of lag or time-shift required for optimum match for each window of phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).
- Figure 5.32: Plot of transfer function of phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).

CHAPTER 6: LUCIA DI LAMMERMOOR (1953)

- Figure 6.1: Callas (Lucia) singing the famous “Mad Scene” - La Scala (Milan), 1954.
- Figure 6.2: Callas (Lucia) – La Scala (Milan), 1954.
- Figure 6.3: Callas (Lucia) with conductor Herbert von Karajan - Staatsoper (Berlin), 1955.

- Figure 6.4: Callas as Lucia - State Fair Music Hall (Dallas), 1959.
- Figure 6.5: Callas (Lucia) - La Scala (Milan), 1954.
- Figure 6.6: Linear frequency spectrum analysis (1985, 1997 & GROTC) of the phrase "in estasi" from "Quando rapito in estasi," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.7: Logarithmic frequency spectrum analysis (1997, GROTC & Naxos) of the phrase "Parmi" from "Quando rapito in estasi," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.8: Linear frequency spectrum analysis (1985, 1997 & GROTC) of the phrase "Ah!" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.9: Linear frequency spectrum analysis (1997, GROTC & Naxos) of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.10: Linear frequency spectrum analysis (GROTC & Naxos) of the phrase "Miei so spiri ardenti" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.11: Logarithmic frequency spectrum analysis (1985, 1997 & GROTC) of Callas singing from "Ardon gli incensi," Act III of *Lucia di Lammermoor* (1953 recording).
- Figure 6.12: Logarithmic frequency spectrum analysis (LP, 1997 & Naxos) of Callas singing from "Ardon gli incensi," Act III of *Lucia di Lammermoor* (1953 recording).
- Figure 6.13: Logarithmic frequency spectrum analysis (1985 & 1997) of the phrase "Ardon gli incensi" from "Ardon gli incensi," Act III of *Lucia di Lammermoor* (1953 recording).
- Figure 6.14: Linear frequency spectrum analysis (LP, 1985, 1997, GROTC & Naxos) of noise sample from "Ardon gli incensi," Act III of *Lucia di Lammermoor* (1953 recording).
- Figure 6.15: Logarithmic frequency spectrum analysis (1985, 1997 & GROTC) of noise sample from "Ardon gli incensi," Act III of *Lucia di Lammermoor* (1953 recording).
- Figure 6.16: Logarithmic frequency spectrum analysis (LP, 1985, 1997 & GROTC) of noise sample from "Ardon gli incensi," Act III of *Lucia di Lammermoor* (1953 recording).
- Figure 6.17: Plot of Y1 and Y2 (time-shift visible) of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.18: Plot of cross-correlation ($R_{Y_1Y_2}$) between Y1 and Y2 (for entire waveforms) of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.19: Plot of time-shifted waveforms (Y1 and Y2) of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.20: Plot of normalised amplitude of Y1 vs. Y2 of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.21: Plot of time-shifted windows of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.22: Plot of lag or time-shift required for optimum match for each window of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.23: Plot of transfer function of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.24: Plot of Y1 and Y2 (time-shift visible) of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.25: Plot of cross-correlation ($R_{Y_1Y_2}$) between Y1 and Y2 (for entire waveforms) of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.26: Plot of time-shifted waveforms (Y1 and Y2) of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.27: Plot of normalised amplitude of Y1 vs. Y2 of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.28: Plot of time-shifted windows of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.29: Plot of lag or time-shift required for optimum match for each window of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).
- Figure 6.30: Plot of transfer function of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).

CHAPTER 7: NORMA (1954)

- Figure 7.1: Callas (Norma) in the 1964 Zeffirelli production at the Opéra, Paris.
- Figure 7.2: Début at the Metropolitan: Callas (Norma) - Metropolitan Opera (New York), 1956.
- Figure 7.3: Callas (Norma) - Metropolitan Opera (New York), 1956.

- Figure 7.4: Callas (Norma) - Opéra (Paris), 1964.
- Figure 7.5: Callas (Norma) - Opéra (Paris), 1964.
- Figure 7.6: Callas (Norma) and Mario del Monaco (Pollione) - Metropolitan Opera (New York), 1956.
- Figure 7.7: Franco Corelli (Pollione) and Callas (Norma) - Opéra (Paris), 1964.
- Figure 7.8: Callas (Norma), in the 1964 Zeffirelli production at the Opéra, Paris.
- Figure 7.9: Logarithmic frequency spectrum analysis (LP & stereo LP) of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).
- Figure 7.10: Logarithmic frequency spectrum analysis (LP, 1997, GROTC & Naxos) of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).
- Figure 7.11: Linear frequency spectrum analysis (LP, 1985, 1997, GROTC & Naxos) of opening chord of “A bello a me ritorna,” Act I of *Norma* (1954 recording).
- Figure 7.12: Linear frequency spectrum analysis (1997 & GROTC) of Callas singing in “A bello a me ritorna,” Act I of *Norma* (1954 recording).
- Figure 7.13: Linear frequency spectrum analysis (1985 & 1997) of phrase “Fremi pure” from “Vanni si, mi lascia indegno,” Act I of *Norma* (1954 recording).
- Figure 7.14: Linear frequency spectrum analysis (1985, 1997 & GROTC) of noise sample from “Casta Diva,” Act I of *Norma* (1954 recording).
- Figure 7.15: Logarithmic frequency spectrum analysis (1985, 1997 & GROTC) of noise sample from “Casta Diva,” Act I of *Norma* (1954 recording).
- Figure 7.16: Linear frequency spectrum analysis (LP, 1985, 1997, GROTC & Naxos) of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).
- Figure 7.17: Logarithmic frequency spectrum analysis (LP & Naxos) of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).
- Figure 7.18: Plot of Y1 and Y2 (time-shift visible) of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).
- Figure 7.19: Plot of cross-correlation ($R_{Y_1Y_2}$) between Y1 and Y2 (for entire waveforms) of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).
- Figure 7.20: Plot of time-shifted waveforms (Y1 and Y2) of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).
- Figure 7.21: Plot of normalised amplitude of Y1 vs. Y2 of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).
- Figure 7.22: Plot of time-shifted windows of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).
- Figure 7.23: Plot of lag or time-shift required for optimum match for each window of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).
- Figure 7.24: Plot of transfer function of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).
- Figure 7.25: Plot of Y1 and Y2 (time-shift visible) of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).
- Figure 7.26: Plot of cross-correlation ($R_{Y_1Y_2}$) between Y1 and Y2 (for entire waveforms) of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).
- Figure 7.27: Plot of time-shifted waveforms (Y1 and Y2) of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).
- Figure 7.28: Plot of normalised amplitude of Y1 vs. Y2 of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).
- Figure 7.29: Plot of time-shifted windows of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).
- Figure 7.30: Plot of lag or time-shift required for optimum match for each window of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).
- Figure 7.31: Plot of transfer function of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).

CHAPTER 8: MADAMA BUTTERFLY (1955)

- Figure 8.1: Callas (Madama Butterfly) - Civic Opera (Chicago), 1954.
- Figure 8.2: Callas (Madama Butterfly) - Civic Opera (Chicago), 1954.
- Figure 8.3: Callas (Madama Butterfly) - Civic Opera (Chicago), 1954.

- Figure 8.4: Linear frequency spectrum analysis (1987 & 1997) of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).
- Figure 8.5: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).
- Figure 8.6: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Morta” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).
- Figure 8.7: Logarithmic frequency spectrum analysis (1987 & 1997) of violin solo from “Vogliateme bene,” Act I of *Madama Butterfly* (1955 recording).
- Figure 8.8: Plot of Y1 and Y2 (time-shift visible) of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).
- Figure 8.9: Plot of cross-correlation ($R_{Y_1Y_2}$) between Y1 and Y2 (for entire waveforms) of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).
- Figure 8.10: Plot of time-shifted waveforms (Y1 and Y2) of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).
- Figure 8.11: Plot of normalised amplitude of Y1 vs. Y2 of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).
- Figure 8.12: Plot of time-shifted windows of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).
- Figure 8.13: Plot of lag or time-shift required for optimum match for each window of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).
- Figure 8.14: Plot of transfer function of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).

CHAPTER 9: MACBETH (1952)

- Figure 9.1: Callas (Lady Macbeth) - La Scala (Milan), 1952.
- Figure 9.2: “Callas: Who needs the Met?” - Front-page of the *New York Post*, 7 November, 1958.
- Figure 9.3: Callas (Lady Macbeth) - La Scala (Milan), 1952.
- Figure 9.4: Logarithmic frequency spectrum analysis (1993 & 1997) of phrase “Ambizioso spirito” from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 9.5: Logarithmic frequency spectrum analysis (1993 & 1997) of phrase “Ah!” from “Vieni! t’affretta!,” Act I of *Macbeth* (1952 “live” recording).
- Figure 9.6: Logarithmic frequency spectrum analysis (1993 & 1997) of phrase “ministri infernale” from “Or tutti sorgete,” Act I of *Macbeth* (1952 “live” recording).
- Figure 9.7: Linear frequency spectrum analysis (1993 & 1997) of noise sample from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 9.8: Logarithmic frequency spectrum analysis (1993 & 1997) of noise sample from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 9.9: Plot of Y1 and Y2 (time-shift visible) of noise sample from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 9.10: Plot of cross-correlation ($R_{Y_1Y_2}$) between Y1 and Y2 (for entire waveforms) of noise sample from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 9.11: Plot of time-shifted waveforms (Y1 and Y2) of noise sample from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 9.12: Plot of normalised amplitude of Y1 vs. Y2 of noise sample from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 9.13: Plot of time-shifted windows of noise sample from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 9.14: Plot of lag or time-shift required for optimum match for each window of noise sample from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).
- Figure 9.15: Plot of transfer function of noise sample from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).

CHAPTER 10: LA TRAVIATA (1958)

- Figure 10.1: Callas (Violetta) and Ettore Bastianini (Giorgio Germont) in Act II of the famous production directed by Luchino Visconti - La Scala (Milan), 1955.

- Figure 10.2: Callas (Violetta) and Ettore Bastianini (Giorgio Germont) - La Scala (Milan), 1955. Of this photo, Galatopoulos (1966) wrote “the hands cry too.”
- Figure 10.3: Callas (Violetta) and Ettore Bastianini (Giorgio Germont) - La Scala (Milan), 1955.
- Figure 10.4: Callas as the dying Violetta, with Silvio Maionica as Doctor Grenvil - La Scala (Milan), 1955.
- Figure 10.5: Callas (Violetta) - Teatro Nacional de São Carlos (Lisbon), 1958.
- Figure 10.6: Callas (Violetta) - La Scala (Milan), 1955.
- Figure 10.7: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Destand omi all’amor” from “Ah! fors’è lui,” Act I of *La Traviata* (1958 “live” recording).
- Figure 10.8: Linear frequency spectrum analysis (1987 & 1997) of phrase “Follie! Follie!” from “Sempre libera,” Act I of *La Traviata* (1958 “live” recording).
- Figure 10.9: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Follie! Follie!” from “Sempre libera,” Act I of *La Traviata* (1958 “live” recording).
- Figure 10.10: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Lunge da lei...” from “Lunge da lei,” Act II of *La Traviata* (1958 “live” recording).
- Figure 10.11: Linear frequency spectrum analysis (1987 & 1997) of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).
- Figure 10.12: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).
- Figure 10.13: Logarithmic frequency spectrum analysis (1987 & 1997) of noise sample from “Ah! fors’è lui,” Act I of *La Traviata* (1958 “live” recording).
- Figure 10.14: Plot of Y1 and Y2 (time-shift visible) of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).
- Figure 10.15: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).
- Figure 10.16: Plot of normalised amplitude of Y1 vs. Y2 of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).
- Figure 10.17: Plot of lag or time-shift required for optimum match for each window of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).
- Figure 10.18: Plot of transfer function of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).
- Figure 10.19: Plot of Y1 and Y2 (time-shift visible) of noise sample from “Ah! fors’è lui,” Act I of *La Traviata* (1958 “live” recording).
- Figure 10.20: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of noise sample from “Ah! fors’è lui,” Act I of *La Traviata* (1958 “live” recording).
- Figure 10.21: Plot of time-shifted waveforms (Y1 and Y2) of noise sample from “Ah! fors’è lui,” Act I of *La Traviata* (1958 “live” recording).
- Figure 10.22: Plot of normalised amplitude of Y1 vs. Y2 of noise sample from “Ah! fors’è lui,” Act I of *La Traviata* (1958 “live” recording).
- Figure 10.23: Plot of lag or time-shift required for optimum match for each window of noise sample from “Ah! fors’è lui,” Act I of *La Traviata* (1958 “live” recording).
- Figure 10.24: Plot of transfer function of noise sample from “Ah! fors’è lui,” Act I of *La Traviata* (1958 “live” recording).

CHAPTER 11: CONCLUSION

- Figure 11.1: *La Divina*
- Figure 11.2: Greeting the applause - Metropolitan Opera (New York), 1956

ADDENDUM A: DISCOGRAPHY OF RECORDINGS BY MARIA CALLAS RELEASED ON EMI

- Figure A1: Recording *Norma* with Christa Ludwig (Adalgisa), 1960.
- Figure A2: In the recording studio.
- Figure A3: Callas (Medea) – Covent Garden (London), 1959.

LIST OF TABLES

CHAPTER 5: TOSCA (1953)

Table 5.1:	Reissues of the 1953 recording of <i>Tosca</i> used in this study.
Table 5.2:	Total duration of <i>Tosca</i> (1953 recording).
Table 5.3:	Track timings from Act I, <i>Tosca</i> (1953 recording).
Table 5.4:	Track timings from Act II, <i>Tosca</i> (1953 recording).
Table 5.5:	Track timings from Act III, <i>Tosca</i> (1953 recording).
Table 5.6:	Pitch Analysis - "Ah Finalmente" from Act I, <i>Tosca</i> (1953 recording).
Table 5.7:	Pitch Analysis - "Dammi i colori... Recondita armonia" from Act I, <i>Tosca</i> (1953 recording).
Table 5.8:	Pitch Analysis - "Ora stammi a sentir" from Act I, <i>Tosca</i> (1953 recording).
Table 5.9:	Pitch Analysis - "Or lasciami al lavoro" from Act I, <i>Tosca</i> (1953 recording).
Table 5.10:	Pitch Analysis - "Mia gelosa" from Act I, <i>Tosca</i> (1953 recording).
Table 5.11:	Pitch Analysis - "E buona la mia" <i>Tosca</i> from Act I, <i>Tosca</i> (1953 recording).
Table 5.12:	Pitch Analysis - "Ed io venivo a lui tutta dogliosa" from Act I, <i>Tosca</i> (1953 recording).
Table 5.13:	Pitch Analysis - "Ha più forte sapore" from Act II, <i>Tosca</i> (1953 recording).
Table 5.14:	Pitch Analysis - "O galantuomo" from Act II, <i>Tosca</i> (1953 recording).
Table 5.15:	Pitch Analysis - "Orsu, Tosca parlate" from Act II, <i>Tosca</i> (1953 recording).
Table 5.16:	Pitch Analysis - "Vissi d'arte" from Act II, <i>Tosca</i> (1953 recording).
Table 5.17:	Pitch Analysis - "Io tenni la promessa" from Act II, <i>Tosca</i> (1953 recording).
Table 5.18:	Pitch Analysis - "E morto" from Act II, <i>Tosca</i> (1953 recording).
Table 5.19:	Pitch Analysis - "Mario Cavaradossi..." from Act III, <i>Tosca</i> (1953 recording).
Table 5.20:	Pitch Analysis - "Amaro sol per te m'era il morire" from Act III, <i>Tosca</i> (1953 recording).
Table 5.21:	Release phases of the various reissues of <i>Tosca</i> used in this study and the colours used to represent them in the spectrum analysis examples.

CHAPTER 6: LUCIA DI LAMMERMOOR (1953)

Table 6.1:	Reissues of the 1953 recording of <i>Lucia di Lammermoor</i> used in this study.
Table 6.2:	Total duration of <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.3:	Track timings from Act I, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.4:	Track timings from Act II, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.5:	Track timings from Act III, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.6:	Pitch Analysis – "Percorrete le spiagge vicine" from Act I, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.7:	Pitch Analysis – "Tu sei turbato!...E n'ho ben donde" from Act I, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.8:	Pitch Analysis – "Il tuo dubbio è omai certezza" from Act I, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.9:	Pitch Analysis – "Regnava nel silenzio" from Act I, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.10:	Pitch Analysis – "Quando rapito in estasi" from Act I, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.11:	Pitch Analysis – "Sulla tomba che rinserra" from Act I, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.12:	Pitch Analysis – "Verranno e te sull'aure" from Act I, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.13:	Pitch Analysis – "Moderato... Lucia fra poco a te verrà" from Act II, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.14:	Pitch Analysis – "Soffriva nel pianto" from Act II, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.15:	Pitch Analysis – "Per te d'immenso giubilo... Per poco fra le tenebre" from Act II, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.16:	Pitch Analysis – "Chi mi frena in tal momento" from Act II, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.17:	Pitch Analysis – "Ah!... Deh cessate quel contento!... Dalle stanze ove Lucia" from Act III, <i>Lucia di Lammermoor</i> (1953 recording).
Table 6.18:	Pitch Analysis – "Oh giusto cielo!... Il dolce suono" from Act III, <i>Lucia di Lammermoor</i> (1953 recording).

- Table 6.19: Pitch Analysis – “Ohimè! Sorge il tremendo” from Act III, *Lucia di Lammermoor* (1953 recording).
 Table 6.20: Pitch Analysis – “Ardon gli incensi; splendon le sacre faci” from Act III, *Lucia di Lammermoor* (1953 recording).
 Table 6.21: Release phases of the various reissues of *Lucia di Lammermoor* used in this study and the colours used to represent them in the spectrum analysis examples.

CHAPTER 7: NORMA (1954)

- Table 7.1: Reissues of the 1954 recording of *Norma* used in this study.
 Table 7.2: Release phases of the various reissues of *Norma* used in this study and the colours used to represent them in the spectrum analysis examples.

CHAPTER 8: MADAMA BUTTERFLY (1955)

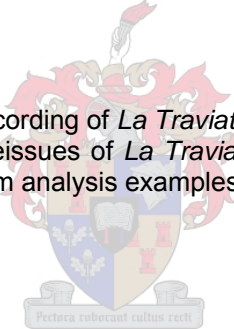
- Table 8.1: Reissues of the 1955 recording of *Madama Butterfly* used in this study.
 Table 8.2: Release phases of the two reissues of *Madama Butterfly* used in this study and the colours used to represent them in the spectrum analysis examples.

CHAPTER 9: MACBETH (1952)

- Table 9.1: Reissues of the 1952 “live” recording of *Macbeth* used in this study.
 Table 9.2: Release phases of the two reissues of *Macbeth* used in this study and the colours used to represent them in the spectrum analysis examples.

CHAPTER 10: LA TRAVIATA (1958)

- Table 10.1: Reissues of the 1958 “live” recording of *La Traviata* used in this study.
 Table 10.2: Release phases of the two reissues of *La Traviata* used in this study and the colours used to represent them in the spectrum analysis examples.



“Today there is a new style of talking about *basso profondo*, *basso cantabile*, *basso baritone*, like soprano *leggiere*, *soprano spinto*, soprano I-don’t-know-what... It is soprano – basta! Once upon a time one soprano sang *Norma*, *Puritani*, *Sonnambula*, *Lucia* – the same woman. In fact, I have a programme at home that announces Maria Malibran for *Sonnambula* and *Fidelio* on the same night. It’s only a matter of technique. If you were an instrumentalist, you couldn’t say that you did not have the top notes, or the low notes. Similarly, as a singer you must have all the notes, whether they are high or low.”

Maria Callas, during the Juilliard Master Classes (cited in Fairman 1983: 955)

PHOTO CREDITS

The photos that appear in the text were obtained from the following sources. Page numbers listed below refer to the original sources and, where possible, the original photographer is indicated in brackets.

Maria Callas – Opéra. l’Avant Scène – Number 44, October, 1982. Part of Ses Récitals 1954 – 1969 (EMI 2C 165-54178/88):

- Figure 1.5: p. 23
- Figure 3.1: p. 12
- Figure 5.8: p. 35 (Erio Piccagliani)
- Figure 7.8: p. 98 (Erio Piccagliani)

CD Booklet of *Lucia di Lammermoor* (1953) – EMI (66441)

- Figure 6.3: p. 2 (Erio Piccagliani)
- Figure 6.4: p. 37 (Frank Abe’s Photograph Collection, Maria Callas International Club).

Callas: La Divina – Stelios Galatopoulos. 1966. JM Dent & Sons, London.

- Figure 6.1: p. 82-83
- Figure 9.3: p. 82-83
- Figure 10.2: p. 82-83

The Callas Legacy (Fourth Edition) – John Ardoin. 1995. Amadeus Press, Portland, Oregon.

- Figure 8.2: p. 110-111 (Santiago Rodriguez)

CD Booklet of *Tosca* (1953) – EMI Great Recordings of the Century (62890)

- Figure 5.1: p. 31 (Zoë Dominic)
- Figure 5.2: p. 35 (Erio Piccagliani)
- Figure 5.3: p. 10 (Houston Rogers)
- Figure 5.4: p. 190 (Erio Piccagliani)
- Figure 5.5: p. 14 (Houston Rogers)
- Figure 5.7: p. 4 (Erio Piccagliani)

CD Booklet of *Norma* (1960) – EMI 66428

- Figure 7.4: p. 18 (Erio Piccagliani)
- Figure 7.7: p. 12 (Erio Piccagliani)

CD Booklet of *Norma* (1954) – EMI 56271

- Figure 11.2: p. 144 (Paul Seligman)

The remaining photos were obtained from the following Internet sources:

- <http://www.cs.princeton.edu/~san/sopranos.html>
- <http://www.callas.it/english/foto.html>

COMPACT DISC TRACK LISTING

COMPACT DISC I

- Track 1: Extract from "Io son l'umile ancella" from Act I of *Adriana Lecouvreur* (1986 remastering)
Track 2: Extract from "Io son l'umile ancella" from Act I of *Adriana Lecouvreur* (1997 remastering)
Track 3: Extract from "D'Amore al dolce impero" from Act II of *Armida* (1997 remastering)
Track 4: Extract from "D'Amore al dolce impero" from Act II of *Armida* (2002 remastering)
Track 5: Extract from "Or tutti sorgete" from Act I of *Macbeth* (1997 remastering)
Track 6: Extract from "Or tutti sorgete" from Act I of *Macbeth* (2002 remastering)
- Track 7: 1985 remastering (EMI Classics) - "Ah! Piuttosto giù mi avvento!" from Act II of *Tosca*
Track 8: 1997 remastering (EMI Callas Edition) - "Ah! Piuttosto giù mi avvento!" from Act II of *Tosca*
- Track 9: Original 1953 LP's (Columbia) - "Io quella lama gli piantai nel cor" from Act III of *Tosca*
Track 10: 1985 remastering (EMI Classics) - "Io quella lama gli piantai nel cor" from Act III of *Tosca*
Track 11: 1997 remastering (EMI Callas Edition) - "Io quella lama gli piantai nel cor" from Act III of *Tosca*
Track 12: 2002 remastering (EMI GROTC) - "Io quella lama gli piantai nel cor" from Act III of *Tosca*
Track 13: 2002 remastering (EMI Historical) - "Io quella lama gli piantai nel cor" from Act III of *Tosca*
Track 14: 2004 remastering (Naxos Historical) - "Io quella lama gli piantai nel cor" from Act III of *Tosca*
- Track 15: Original 1953 LP's (Columbia) - "Diedi gioielli..." from "Vissi d'arte," Act II of *Tosca*
Track 16: 1985 remastering (EMI Classics) - "Diedi gioielli..." from "Vissi d'arte," Act II of *Tosca*
Track 17: 1997 remastering (EMI Callas Edition) - "Diedi gioielli..." from "Vissi d'arte," Act II of *Tosca*
Track 18: 2002 remastering (EMI GROTC) - "Diedi gioielli..." from "Vissi d'arte," Act II of *Tosca*
Track 19: 2002 remastering (EMI Historical) - "Diedi gioielli..." from "Vissi d'arte," Act II of *Tosca*
Track 20: 2004 remastering (Naxos Historical) - "Diedi gioielli..." from "Vissi d'arte," Act II of *Tosca*
- Track 21: Original 1953 LP's (Columbia) - "Trionfal..." from Act III of *Tosca*
Track 22: 1985 remastering (EMI Classics) - "Trionfal..." from Act III of *Tosca*
Track 23: 1997 remastering (EMI Callas Edition) - "Trionfal..." from Act III of *Tosca*
Track 24: 2002 remastering (EMI GROTC) - "Trionfal..." from Act III of *Tosca*
Track 25: 2002 remastering (EMI Historical) - "Trionfal..." from Act III of *Tosca*
Track 26: 2004 remastering (Naxos Historical) - "Trionfal..." from Act III of *Tosca*
- Track 27: Original 1953 LP's (Columbia) - "Lo dici male..." from Act I of *Tosca*
Track 28: 1985 remastering (EMI Classics) - "Lo dici male..." from Act I of *Tosca*
Track 29: 1997 remastering (EMI Callas Edition) - "Lo dici male..." from Act I of *Tosca*
Track 30: 2002 remastering (EMI GROTC) - "Lo dici male..." from Act I of *Tosca*
Track 31: 2002 remastering (EMI Historical) - "Lo dici male..." from Act I of *Tosca*
Track 32: 2004 remastering (Naxos Historical) - "Lo dici male..." from Act I of *Tosca*
- Track 33: 1985 remastering (EMI Classics) - Tape squeal before "Vissi d'arte" from Act II of *Tosca*
Track 34: 1997 remastering (EMI Callas Edition) - Tape squeal before "Vissi d'arte" from Act II of *Tosca*
Track 35: 2002 remastering (EMI GROTC) - Tape squeal before "Vissi d'arte" from Act II of *Tosca*
Track 36: 2002 remastering (EMI Historical) - Tape squeal before "Vissi d'arte" from Act II of *Tosca*
- Track 37: Original 1954 LP's (Columbia) - "Verranno a te sull'aure..." from Act I of *Lucia di Lammermoor*
Track 38: 1989 remastering (EMI Classics) - "Verranno a te sull'aure..." from Act I of *Lucia di Lammermoor*
Track 39: 1997 remastering (EMI Callas Edition) - "Verranno a te sull'aure..." from Act I of *Lucia di Lammermoor*
Track 40: 2004 remastering (EMI GROTC) - "Verranno a te sull'aure..." from Act I of *Lucia di Lammermoor*
Track 41: 2004 remastering (EMI Historical) - "Verranno a te sull'aure..." from Act I of *Lucia di Lammermoor*
Track 42: 2005 remastering (Naxos Historical) - "Verranno a te sull'aure..." from Act I of *Lucia di Lammermoor*

- Track 43: Original 1954 LP's (Columbia) - "Regnava nel silenzio..." from Act I of *Lucia di Lammermoor*
- Track 44: 1989 remastering (EMI Classics) - "Regnava nel silenzio..." from Act I of *Lucia di Lammermoor*
- Track 45: 1997 remastering (EMI Callas Edition) - "Regnava nel silenzio..." from Act I of *Lucia di Lammermoor*
- Track 46: 2004 remastering (EMI GROTC) - "Regnava nel silenzio..." from Act I of *Lucia di Lammermoor*
- Track 47: 2004 remastering (EMI Historical) - "Regnava nel silenzio..." from Act I of *Lucia di Lammermoor*
- Track 48: 2005 remastering (Naxos Historical) - "Regnava nel silenzio..." from Act I of *Lucia di Lammermoor*
- Track 49: Original 1954 LP's (Columbia) - "Quando rapito in estasi" from Act I of *Lucia di Lammermoor*
- Track 50: 1989 remastering (EMI Classics) - "Quando rapito in estasi" from Act I of *Lucia di Lammermoor*
- Track 51: 1997 remastering (EMI Callas Edition) - "Quando rapito in estasi" from Act I of *Lucia di Lammermoor*
- Track 52: 2004 remastering (EMI GROTC) - "Quando rapito in estasi" from Act I of *Lucia di Lammermoor*
- Track 53: 2004 remastering (EMI Historical) - "Quando rapito in estasi" from Act I of *Lucia di Lammermoor*
- Track 54: 2005 remastering (Naxos Historical) - "Quando rapito in estasi" from Act I of *Lucia di Lammermoor*
- Track 55: Original 1954 LP's (Columbia) - Cadenza to "Ardon gli incensi" from Act III of *Lucia di Lammermoor*
- Track 56: 1989 remastering (EMI Classics) - Cadenza to "Ardon gli incensi" from Act III of *Lucia di Lammermoor*
- Track 57: 1997 remastering (EMI Callas Edition) - Cadenza to "Ardon gli incensi" from Act III of *Lucia di Lammermoor*
- Track 58: 2004 remastering (EMI GROTC) - Cadenza to "Ardon gli incensi" from Act III of *Lucia di Lammermoor*
- Track 59: 2004 remastering (EMI Historical) - Cadenza to "Ardon gli incensi" from Act III of *Lucia di Lammermoor*
- Track 60: 2005 remastering (Naxos Historical) - Cadenza to "Ardon gli incensi" from Act III of *Lucia di Lammermoor*
- Track 61: 1997 remastering (EMI Callas Edition) - "Ah sì, fa' core, abbracciami" leading into "Ma di'... l'amato giovane" from Act II of *Norma*
- Track 62: 2005 remastering (Naxos Historical) - "Ah sì, fa' core, abbracciami" leading into "Ma di'... l'amato giovane" from Act II of *Norma*
- Track 63: Original 1954 LP's (Columbia) - "Sediziose voci" from Act I, Scene One of *Norma*
- Track 64: 1970's Reprocessed stereo LP's (His Master's Voice) - "Sediziose voci" from Act I, Scene One of *Norma*
- Track 65: 1997 remastering (EMI Callas Edition) - "Sediziose voci" from Act I, Scene One of *Norma*
- Track 66: 2003 remastering (EMI GROTC) - "Sediziose voci" from Act I, Scene One of *Norma*
- Track 67: 2005 remastering (Naxos Historical) - "Sediziose voci" from Act I, Scene One of *Norma*

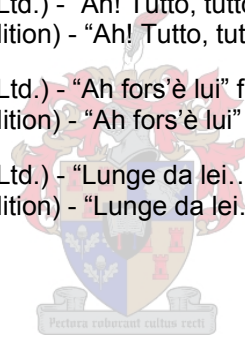
"For me, she was *il melodramma* – total rapport between work, music and action. It was no fabricated legend. In my entire experience of the theatre, I know of no artist like Callas."

Carlo Maria Giulini (cited in Stassinopoulos 1980: 104)

COMPACT DISC II

- Track 1: Original 1954 LP's (Columbia) - "Casta Diva" from Act I, Scene One of *Norma*
Track 2: 1970's Reprocessed stereo LP's (His Master's Voice) - "Casta Diva" from Act I, Scene One of *Norma*
Track 3: 1985 remastering (EMI Classics) - "Casta Diva" from Act I, Scene One of *Norma*
Track 4: 1997 remastering (EMI Callas Edition) - "Casta Diva" from Act I, Scene One of *Norma*
Track 5: 2003 remastering (EMI GROTC) - "Casta Diva" from Act I, Scene One of *Norma*
Track 6: 2005 remastering (Naxos Historical) - "Casta Diva" from Act I, Scene One of *Norma*
- Track 7: Original 1954 LP's (Columbia) - "A bello a me ritorna" from Act I, Scene One of *Norma*
Track 8: 1970's Reprocessed stereo LP's (His Master's Voice) - "A bello a me ritorna" from Act I, Scene One of *Norma*
Track 9: 1985 remastering (EMI Classics) - "A bello a me ritorna" from Act I, Scene One of *Norma*
Track 10: 1997 remastering (EMI Callas Edition) - "A bello a me ritorna" from Act I, Scene One of *Norma*
Track 11: 2003 remastering (EMI GROTC) - "A bello a me ritorna" from Act I, Scene One of *Norma*
Track 12: 2005 remastering (Naxos Historical) - "A bello a me ritorna" from Act I, Scene One of *Norma*
- Track 13: 1985 remastering (EMI Classics) - "No, non tremare" from Act I, Scene Two of *Norma*
Track 14: 1997 remastering (EMI Callas Edition) - "No, non tremare" from Act I, Scene Two of *Norma*
Track 15: 2003 remastering (EMI GROTC) - "No, non tremare" from Act I, Scene Two of *Norma*
Track 16: 2005 remastering (Naxos Historical) - "No, non tremare" from Act I, Scene Two of *Norma*
- Track 17: 1985 remastering (EMI Classics) - "Vanne, sì, mi lascia, indegno" from Act I, Scene Two of *Norma*
Track 18: 1997 remastering (EMI Callas Edition) - "Vanne, sì, mi lascia, indegno" from Act I, Scene Two of *Norma*
Track 19: 2003 remastering (EMI GROTC) - "Vanne, sì, mi lascia, indegno" from Act I, Scene Two of *Norma*
Track 20: 2005 remastering (Naxos Historical) - "Vanne, sì, mi lascia, indegno" from Act I, Scene Two of *Norma*
- Track 21: 1987 remastering (EMI Records Ltd.) - "Un bel dì vedremo" from Act II of *Madama Butterfly*
Track 22: 1997 remastering (EMI Callas Edition) - "Un bel dì vedremo" from Act II of *Madama Butterfly*
- Track 23: 1987 remastering (EMI Records Ltd.) - "Che tua madre" from Act II of *Madama Butterfly*
Track 24: 1997 remastering (EMI Callas Edition) - "Che tua madre" from Act II of *Madama Butterfly*
- Track 25: 1987 remastering (EMI Records Ltd.) - "Tienti la tua paura" from "Un bel dì vedremo," Act II of *Madama Butterfly*
Track 26: 1997 remastering (EMI Callas Edition) - "Tienti la tua paura" from "Un bel dì vedremo," Act II of *Madama Butterfly*
- Track 27: 1987 remastering (EMI Records Ltd.) - "Tu? tu? piccolo Iddio!" from Act II of *Madama Butterfly*
Track 28: 1997 remastering (EMI Callas Edition) - "Tu? tu? piccolo Iddio!" from Act II of *Madama Butterfly*
- Track 29: 1987 remastering (EMI Records Ltd.) - "Vogliatemi bene, un bene piccolino" from Act I of *Madama Butterfly*
Track 30: 1997 remastering (Callas Edition) - "Vogliatemi bene, un bene piccolino" from Act I of *Madama Butterfly*
- Track 31: 1993 remastering (EMI Classics) - "O figli, o figli miei!" from Act IV, Scene One of *Macbeth*
Track 32: 1997 remastering (EMI Callas Edition) - "O figli, o figli miei!" from Act IV, Scene One of *Macbeth*
- Track 33: 1993 remastering (EMI Classics) - "Vieni! t'affretta!" from Act I, Scene One of *Macbeth*
Track 34: 1997 remastering (EMI Callas Edition) - "Vieni! t'affretta!" from Act I, Scene One of *Macbeth*
- Track 35: 1993 remastering (EMI Classics) - "Perché mi sfuggi" from Act II, Scene One of *Macbeth*
Track 36: 1997 remastering (EMI Callas Edition) - "Perché mi sfuggi" from Act II, Scene One of *Macbeth*

- Track 37: 1993 remastering (EMI Classics) - "Or tutti sorgete, ministri infernale" from Act I, Scene Two of *Macbeth*
- Track 38: 1997 remastering (EMI Callas Edition) - "Or tutti sorgete, ministri infernale" from Act I, Scene Two of *Macbeth*
- Track 39: 1993 remastering (EMI Classics) - "Ambizioso spirto..." from Act I, Scene Two of *Macbeth*
- Track 40: 1997 remastering (EMI Callas Edition) - "Ambizioso spirto..." from Act I, Scene Two of *Macbeth*
- Track 41: 1987 remastering (EMI Records Ltd.) - Prelude to Act I of *La Traviata*
- Track 42: 1997 remastering (EMI Callas Edition) - Prelude to Act I of *La Traviata*
- Track 43: 1987 remastering (EMI Records Ltd.) - "Dammi tu forza, o cielo!" from Act II, Scene One of *La Traviata*
- Track 44: 1997 remastering (EMI Callas Edition) - "Dammi tu forza, o cielo!" from Act II, Scene One of *La Traviata*
- Track 45: 1987 remastering (EMI Records Ltd.) - "Teneste la promessa" from Act III of *La Traviata*
- Track 46: 1997 remastering (EMI Callas Edition) - "Teneste la promessa" from Act III of *La Traviata*
- Track 47: 1987 remastering (EMI Records Ltd.) - "Gioire!...di voluttà... ne vortici," from Act I of *La Traviata*
- Track 48: 1997 remastering (EMI Callas Edition) - "Gioire!...di voluttà... ne vortici," from Act I of *La Traviata*
- Track 49: 1987 remastering (EMI Records Ltd.) - "Amami Alfredo" from Act II, Scene One of *La Traviata*
- Track 50: 1997 remastering (EMI Callas Edition) - "Amami Alfredo" from Act II, Scene One of *La Traviata*
- Track 51: 1987 remastering (EMI Records Ltd.) - "Ah! Tutto, tutto finì" from Act III of *La Traviata*
- Track 52: 1997 remastering (EMI Callas Edition) - "Ah! Tutto, tutto finì" from Act III of *La Traviata*
- Track 53: 1987 remastering (EMI Records Ltd.) - "Ah fors'è lui" from Act I of *La Traviata*
- Track 54: 1997 remastering (EMI Callas Edition) - "Ah fors'è lui" from Act I of *La Traviata*
- Track 55: 1987 remastering (EMI Records Ltd.) - "Lunge da lei..." from Act II, Scene One of *La Traviata*
- Track 56: 1997 remastering (EMI Callas Edition) - "Lunge da lei..." from Act II, Scene One of *La Traviata*



"Beauty. Something beautiful. Intensity, expression, everything. She was a monstrous phenomenon. Almost a sickness – the kind of actress that has passed for all time."

Luchino Visconti (cited in Stassinopoulos 1980: 111)

CHAPTER 1

INTRODUCTION

“Callas’s art, fortunately, is inexhaustible, even if her recordings are not. She has given us a lifetime’s work to be grateful for, learn from, and wonder at. The proof is tangible. It is in these pages. It is on her recordings. We are in her debt forever. Opera has new possibilities thanks to her. It is up to us to embrace them. After Callas, there is no turning back.”

Terrence McNally (cited in Ardoin 1995: *xiv*)

1.1) BACKGROUND:

Sound recordings have preserved musical performances and captured the art of individual performers ever since Thomas Edison (1847 - 1931) made the very first sound recording of himself reciting "Mary had a little lamb" on a tinfoil cylinder phonograph on 6 December, 1877. The introduction of digital¹ audio media such as the Compact Disc (CD) and Digital Audio Tape (DAT) in 1982 and 1987 respectively, brought with it a heightened general awareness and expectation of sound quality in every type of sound recording. As recording companies scrambled to transfer their back catalogues to CD in order to take advantage of the new possibilities provided by the digital medium, an upsurge of interest in historical and nostalgic performances was created which led to a growing need for the restoration or “rerecording” of degraded sound sources.² These sources ranged from the earliest recordings made on wax cylinders in the nineteenth century, through disc recordings such as 78 RPM’s,³ Long Playing Records (LP’s), etc. and magnetic tape recording technology, which has been available since the 1950’s (Godsill & Rayner 1998: 1).

¹ Digital: Computer technology where information is captured, represented and manipulated as a series of numbers (usually binary). Thus, digital music equipment use microprocessors to store, retrieve and manipulate sound information in the form of numbers, enabling editing and manipulation of the sound data in ways that are impossible with electromechanical (analogue) sound systems.

² Audio Degradation: Degradation of an audio source should be considered as any undesirable modification to the audio signal that occurs as a result of (or subsequent to) the recording process. For example, in a recording made direct-to-disc from a microphone, degradation could include noise in the microphone and amplifier as well as noise in the disc cutting process. Further noise may be introduced by imperfections in the pressing material, transcription to other media or wear and tear of the medium itself.

³ RPM (Revolutions Per Minute): The amount of revolutions per minute of a phonograph recording, a measurement of the speed at which the recording should be played. Some common record speeds are 33.33 RPM or 45 RPM for LP’s, 78.26 RPM for most so called lateral 78’s (like Victor), 78.8 RPM for Edison Lateral’s, 80 RPM for Edison Diamond Discs and 160 RPM for Edison Cylinder recordings.

Recent advances in audio restoration and remastering⁴ technology has lead to the development of powerful algorithms and sophisticated techniques for the treatment of degraded sound sources, such as those implemented in the CEDAR (Computer Enhanced Digital Audio Restoration) and NoNoise audio restoration systems. These products have greatly benefited the boom of historical reissues, making old and deteriorated sound sources appealing even to the mainstream listener. The increasing demand for reissues of historical recordings, and more specifically recordings of classical music performances, can be attributed to a number of factors, most notably the continued allure of legendary artists (such as Callas) and the enormous costs involved in recording and producing new records.

1.2) THE ETHICS OF AUDIO RESTORATION:

Modern digital audio signal processing, allowing a much greater degree of flexibility in processing and therefore greater potential for noise⁵ removal, pitch correction, filtering⁶ and editing, has furthermore allowed transfer and audio restoration engineers a diversity of ways in which to “improve” or “reinterpret” (in some cases even drastically altering) the original sound of recordings. This has lead to contrasting views regarding the role of the remastering engineer, the nature and purpose of audio restoration and the ethical implications of the restoration process. Already in 1980, William D. Storm identified two “legitimate directions” or types of rerecording: 1) the sound preservation of audio history, defined as “the perpetuation of the sound of an original recording as it was initially produced and heard by the people of that era,” and 2) the sound preservation of an artist, “the perpetuation of the true sound of a performer” (Schüller 1991: 1014 & Orcalli 2001: 308).

The art of audio restoration has indeed become so exacting, that transfers and remasterings of historical recordings are now evaluated and compared in academic courses, as in, for example, the “Performance Practice on Record” course presented at King’s College in London,⁷ where transfers of the same recording by different remastering engineers are compared, such as those of Mark Obert-Thorn (Naxos) and Andrew Walter (EMI)⁸ of the Elgar Violin Concerto with the composer conducting.

⁴ Remastering: The process of creating a new “master” (the entity duplicated to make a product, i.e. sound recording, video cassette, DVD, etc.).

⁵ Noise: Unwanted disturbances superimposed upon a signal that tend to obscure its information content.

⁶ Filter: A device for attenuating selected frequencies from the sound spectrum of a signal and perhaps (in the case of a resonant filter) increasing the level of other frequencies. Filtering is the process of using a filter on a signal.

⁷ The reader is referred to the King’s College, London “Performance Practice on Record” website at <http://www.kcl.ac.uk/kis/schools/hums/music/dlw/PPR/index.html>.

⁸ Electric & Music Industries Ltd (EMI) was founded in June 1931, when during the Great Depression, shareholders of the Columbia Graphophone Company and the Gramophone Company agreed to merge and form a new undertaking (Martland 2005).

1.3) COPYRIGHT LAW:

To further complicate matters, the lapse of the fifty-year European Union copyright has legitimised “unofficial” LP transfers of studio recordings, resulting in numerous reissues from independent record labels of recordings made prior to 1955. The sound in these reissues is often of inferior quality or vastly different from other releases of the same material. To the general public, who are unaware of this fact, these cloned recordings are often more appealing since they are sold at cheaper prices than counterparts from major record companies. Sadly, the inferior qualities of these transfers often do a great injustice toward the performing artists, the recorded performances and the music being performed.

The influence of audio restoration on the recorded legacy of a performing artist is clearly illustrated in the case of Maria Callas (1923 - 1977), widely regarded not only as one of the most influential and prolific of opera singers, but also one of the greatest classical musicians of all time - “the greatest artist of the world,” as Leonard Bernstein described her (cited in Gage 2001: *xiv*).



Figure 1.1: “I am not an angel and do not pretend to be. That is not one of my roles. But I am not the devil either. I am a woman and a serious artist, and I would like so to be judged” (Tarrant 2003).

1.4) MARIA CALLAS – INFLUENCE AND LEGACY:⁹

Callas's iconic status is unique amongst opera singers and classical musicians. Hailed by her fans and the press as "La Divina" (the goddess), the "prima donna assoluta" (the supreme *prima donna*¹⁰) of our times and "La voix du siècle" (the voice of the century), her fame has spread far beyond the usual limits attributed to the world of classical music, turning her into "a living legend, a multi-faceted myth," as one prominent writer described her (Roubinet 2000).

The enormous influence of Callas's singing, incomparable artistry and musicianship, have forever changed the way we perceive opera, the *bel canto*¹¹ repertory and certain roles such as Norma, Violetta, Tosca and Lucia, which are inextricably linked to her. Like Feodor Chaliapin (1873 - 1938) before her, Callas's performances displayed the same dramatic credibility and searing intensity. She was more than just an opera singer, she was a singing actor.¹² She invested her performances with the maximum dramatic intensity in which she experienced the character's body and soul, always using the music and the score as her guide and inspiration (Matheopoulos 1991: 14). Due to her "commitment and creative collaboration with the musical personas of the composers whose scores her performances illuminated", Seletsky (2000: 240) considers her "the perfect embodiment of musico-rhetorical ideals described in theoretical writings dating from as early as 1600."

"We are talking about an Artist of the calibre of Michelangelo or Nijinsky."

Franco Zeffirelli (cited in Lewens & Mitchell 1999)

⁹ As a biographical study of Maria Callas is not included in this thesis due to the fact that it falls beyond the scope of the research project, the aim of the following section is to provide a brief overview of her enormous contribution to opera and her importance and influence as a musician, while also providing an introduction to her art. Those persons who would like to learn more about Callas's life, are referred to the biographical sources listed in the reference list.

¹⁰ Prima Donna: From the Italian for "first lady." Originally, in 18th century operas, the singer of the principal female role of an opera. It is distinguished from *primo uomo*, the leading male singer, as well as *seconda donna*, the second female singer. During the 19th century, however, the term came to mean a conceited, jealous, capricious operatic star, "an outrageous *grand dame*, 'exacting, torrential and exasperating,' and often lazy, greedy, stupid, conceited and 'impossible' as well" (Mayhew, cited in Christiansen 1986: 9).

¹¹ Bel Canto: Literally "beautiful singing." The Italian vocal technique of the early-18th to middle 19th century, with its emphasis on purity of tone and brilliant vocal display, rather than overtly dramatic expression or romantic emotion. Associated especially with the operas of Bellini, Donizetti and Rossini. Vocal agility, beauty of sound and *legato* phrasing, with faultless technique, are the principle foundations.

¹² When a reporter asked Callas about her new career as an "actress," following her appearance as Medea in the 1970 non-operatic film version by Pier Paolo Pasolini (1922 - 1975), Callas reportedly replied that she has always thought of herself as being an actress.

Callas's emphasis on the text and the dramatic situation being portrayed on stage, rather than purely beautiful singing, was largely responsible for splitting the operatic camp in two – those who are stimulated by and veer towards the dramatic aspects of opera, and those who respond primarily to the purely musical side of opera. In reference, some opera critics speak of the “Callas Revolution,” while others jokingly refer to BC and AC – “before Callas” and “after Callas.” The famous Spanish soprano¹³ Montserrat Caballé, noted that Callas “opened a door for us, for all the singers in the world, a door that had been closed. Behind it was sleeping not only great music, but great ideas of interpretation. She has given us the chance, those who follow her, to do things that were hardly possible before her” (cited in Levine 2003: 117),” while the mezzo-soprano Teresa Berganza (cited in Matheopoulos 1991: 251), stated that “Callas was the first to turn opera into real theatre and show that the more one brings out the drama in opera, the stronger the music emerges. No one since has ever touched her”.

In 1991, Terrence McNally (cited in Ardoin 1995: *xiii*) questioned whether without Callas's recordings, she would still have existed as forcefully in our hearts and imaginations as she does today. Forty years after her last stage appearances, and twenty-eight years after her death, Callas remains more vivid than most sopranos today. “She was definitely the last of the great divas,” said Tony Locantro, EMI producer, “and her reputation continues to grow because, quite frankly, there's no one on the scene today that comes within a mile of the sort of excitement she generated on a regular basis” (Bamberger 1997: 118).

The French conductor René Leibowitz (cited in Levine 2003: 109), as recorded in Jean-Paul Sartre's journal *Les temps modernes*, stated that “the extraordinary success of Maria Callas appears, at first glance, one of the strangest phenomena in the world of performance of our time. Unique among sopranos, the reputation of this prodigious singer has crossed the limits normally set for even the most prestigious and great operatic artists. Other singers, of course, have succeeded in provoking enthusiastic reactions and even in unleashing passion, but this has always been within the relatively limited confines of opera lovers. The case of Callas is completely different. Her name today is familiar even to those who have no real contact with opera nor with the art of singing in general.”

In 1995, John Ardoin noted that “If anything, [Callas's] influence and the high standards she set for herself as a singer cast an even longer shadow over the music world today than when she was alive. Four documentary films have been made of her tempestuous life, countless magazine articles and at least thirty-two books have tried to explain her magic and magnetism, and her recordings – studio and ‘live’ – are reissued on compact discs. Why? Why this obsession with an artist who was criticized

¹³ Soprano: From the Italian *sopra*, meaning “above.” The highest register of the female voice, with a range of (approximately) C₄ upwards for two octaves.

throughout her life as a flawed singer with an odd sound, a soprano whose career ended in an ill-advised concert tour undertaken with a broken voice, a woman who turned her back on hard-won, extraordinary artistic achievements for a nine-year liaison with one of the world's wealthiest men, Aristotle Onassis, only to wind up as "the other woman" when he married Jacqueline Kennedy? The answer is not as difficult as you might think. It is to be found in Callas's ability to excite the imagination. Hers may not have been an easy voice to listen to, but it was an impossible one to forget. In its dark, hollow recesses, it held the essence of theatre, just as her haunting, slow-movement gestures onstage were a mirror that reflected drama and music" (1995: 209).

Callas has without a doubt become an "icon," a "cult figure." Recent EMI publicity material labelled her "Callas - the legend." Her post-humous influence is not only limited to opera or to music for that matter, but has crossed over into other art forms and media. The ballet dancer Vladimir Malakhov, for example, who was introduced to Callas's recordings by his teacher at the Bolshoi School of Ballet, recently observed that "I try to dance the way Callas sings. Her voice was so clear with lots of personality and individuality" (cited in Mandel 1998: 62), while a major advertising campaign by computer giant Apple Macintosh not too long ago included Callas among such "daringly independent thinkers" as Mahatma Gandhi, Martha Graham, Albert Einstein and Winston Churchill.

1.5) THE INFLUENCE OF AUDIO RESTORATION ON THE RECORDED LEGACY OF MARIA CALLAS:

EMI, for whom Callas recorded almost exclusively from 1953 - 1969, has reissued her recordings several times, continually adapting their sound "to the perceived preferences of the record-buying public" (Seletsky 2000: 240). Their attempts at improving the sound of Callas's recordings, as reissued in the latest releases that form part of EMI's Callas Edition, Great Recordings of the Century (GROTC) and Historical Series, have resulted in often staggeringly different reinterpretations of the same audio material that bear no resemblance to previous CD or LP incarnations or "evince no consolidated conviction about exactly how Callas's voice *should* sound" (Seletsky 2000: 240).

Even today, critics often refer to the fact that Callas's voice was not in itself particularly "beautiful." Forced to meet with the sonic quality expected of modern recordings, these latest incarnations, especially the recent remasterings of the earlier monophonic¹⁴ recordings, have been subjected to noise removal, filtering and compression¹⁵ that have resulted in the "erosion of genuine, original vocal

¹⁴ Mono (Monophonic): An audio signal or a wave file that contains only one unique channel of sound information.

¹⁵ Compression: The process of reducing the amplitude range of an audio signal by reducing the peaks and boosting the low levels according to a specific ratio of the signal's input level to output level, thereby decreasing its dynamic range.

characteristics” (Seletsky 2000: 252). By filtering out certain frequencies¹⁶ in the middle to upper frequency range to alleviate the tape hiss¹⁷ and surface noise present in these early recordings, and (in some instances) trying to improve the definition and focus in these recordings by removing all acoustic space, the warmth¹⁸ and presence¹⁹ in Callas’s voice is suppressed and further attention drawn to those characteristics of her voice that were so severely criticised, even during her prime years. In essence, some commentators argue that the Callas we hear on recent CD releases is not necessarily exactly as the great diva might have sounded.

Negligence on the part of EMI’s remastering engineers have furthermore resulted in gross editing and pitching errors that in some cases show no regard for artistic or interpretive subtleties. As will be seen,



these errors compromise the value and historical accuracy of EMI’s latest Callas releases and jeopardise not only the individual artistry of those involved in the making of these recordings, but also negatively affect the musical works being performed.

Figure 1.2: Madame Biki, the famous Milanese fashion designer noted: “The revelation of her beauty as a woman was as important as her artistic success, if not more so” (Gage 2001: 64).

¹⁶ Frequency: The rate of vibration or cycles per second of a sound, measured in Hertz (Hz). Hertz is a unit for the measurement of frequency, named after Heinrich Rudolph Hertz (1857 - 1894), a German physicist. 1 Hertz = 1 cycle per second. The frequency range of human hearing is from 20 Hz to 20 kHz (20,000 Hz). Frequency determines the pitch of a sound. A cycle consists of movement from a starting point, through both negative and positive amplitude, and back to its starting point.

¹⁷ Hiss: A form of random, additive background noise, generally perceived as ‘hiss’ by the listener and common to all analogue measurement, storage and recording systems. It appears at the top end of the audio spectrum, usually above 5kHz and is generally composed of electrical circuit noise, irregularities in the storage medium and ambient noise (such as for ex. air conditioning units) from the recording environment. The combined effect of these sources is generally treated during a single noise removal process, although a “pure” restoration should strictly not treat the ambient noise, which might be considered part of the original “performance.”

¹⁸ Warm: A subjective term describing good bass, adequate low frequencies or adequate fundamentals relative to harmonics. A sound that is not “thin.” Also indicates spaciousness, with adequate reverberation at low levels.

¹⁹ Presence: A sense that the instrument or voice is present in the listening environment. Synonyms are edge, punch, detail, closeness and clarity. For most instruments, a sense of “presence” can be attributed to good or emphasised frequency response around 5 kHz.

1.6) AIMS AND OBJECTIVES OF THE STUDY:

The purpose of this study is to consider the influence of audio restoration and remastering techniques on the recorded legacy of Maria Callas, by illustrating the sometimes startlingly different ways in which her voice has been made to sound, examining and comparing the way in which different remasterings of the same audio material can vary in quality, as well as how vastly different sonic reinterpretations of a single recording can affect our perception of an artist's "true" sound.

In a general sense, the study aims to create a greater awareness regarding the role of the remastering engineer and the care that must be taken in preserving the recorded sound of an artist, advocating Storm's belief that where a certain individual performing artist is involved, the nature and purpose of audio restoration should be the sound preservation of an artist, "the perpetuation of the true sound of a performer" (Schüller 1991: 1014). As will be seen, the powerful possibilities provided by recent technological advances in audio restoration equipment and processes can be detrimental if not used responsibly.

1.7) MOTIVATION FOR THE STUDY:

The severe lack of research and scholarship documenting the effect of audio restoration on the recorded legacy and sound preservation of an artist must be considered the prime motivation behind this study. The author's interest in, appreciation of and affinity for the unique genius and artistry of Maria Callas and the field of audio restoration also played a significant role in the conceptualisation of the research project.

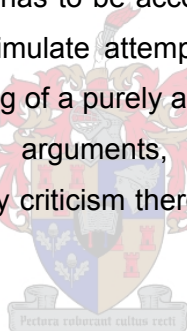
If the question may be asked why Callas was chosen as the basis for this study, the reasons are simple. Apart from the author's affinity to her artistry already mentioned above, other decisive factors include Callas's enormous output of sound recordings from which a large number of possible comparisons could be made and her status as one of the most prolific and influential opera singers of all time, a fact that places the choice and influence of any reinterpretations or sonic modifications made by remastering engineers to her recordings in a very serious light. The large number of readily available releases, transfers and remasterings of her recordings that are to be found in general circulation was also a prime consideration in deciding to base the present study on this particular artist.

1.8) RESEARCH DESIGN:

The study is subject to both aesthetic and technical considerations that demand not only a thorough understanding of music, opera and singing, Callas's life and art, the ethics of audio restoration, copyright law and reissues of historical sound recordings, but also knowledge of the technical processes and techniques of audio restoration, remastering, digital signal processing and frequency spectrum²⁰ analysis. As a result, the research project is difficult to define according to a single research design or methodology. The lack of previous studies of this nature, inadequate scholarship and core literature on the subject, has meant that the author used his own initiative in conceptualising a research design and methodology that would best suit the multi-disciplinary needs of the research project.

Dietrich Schüller (1991: 1016) stated that:

“From a scholarly point of view, it has to be accepted that new technology and new listening behaviour will always stimulate attempts to reinterpret old recordings by modern technological means. Being of a purely artistic nature, these attempts cannot really be criticized by scholarly arguments, unless the attempt postures the reinterpretation as the original. Any criticism therefore, has to be based upon artistic and aesthetic arguments”



Using Schüller's statement as reference point, the present study accordingly places its focus on the aesthetic and subjective evaluation and comparison of various Callas recordings, taking into account musical and artistic considerations (such as the unique characteristics of Callas's voice, the placement of soloists, brightness²¹ or transparency of the sound, etc.) and using these as criteria in comparing the various remasterings. Pitch and frequency spectrum analysis, in addition to descriptions regarding the technical processes involved in audio restoration serve to support or validate any aesthetic or subjective claims and observations.

The process of evaluating and comparing various reissues of selected Callas recordings was performed by using the individual sound of Callas's voice as the main criteria in assessing the different reissues and by referencing Callas's "true" sound against the perceived or reinterpreted sound produced by the different remasterings. To this end, a study of Callas's voice, its vocal characteristics

²⁰ Frequency Spectrum: The distribution of frequencies within the audio bandwidth.

²¹ Bright: An adjective describing a greater proportion of high-frequency components in a sound source or a reverberant space. The harmonics are strong relative to the fundamentals.

and flaws, is of great importance and included as part of the study in order to fully comprehend the extent to which remastering engineers have revised the sound of her voice from one version of a single recording to the next. Reviews of individual recordings, comments by vocal experts and opera critics are included throughout the thesis to create a better understanding of Callas's "true" voice, while providing a useful overview of her artistic development and career, importance and legacy as a performing artist.

As mentioned above the study is rooted in and demands an understanding of various disciplines. These include investigations into and discussions of the ethics, nature and purpose of audio restoration, an overview of the remastering process and the role of the remastering engineer. Copyright law and its implication to the reissue of historical recordings is considered, as well as the authenticity of historical recordings, with specific reference to two fraudulent pirated recordings of Callas in "live" performances: *Norma* (Trieste, 1953) and *Turandot* (Buenos Aires, 1949), presented as complete recordings, but in actual fact composites from commercial and other pirate recordings.

1.9) RESEARCH METHODOLOGY:

The study was conducted over a period of approximately 15 months according to a premeditated schedule. The highly multi-disciplinary nature of the study, however, demanded a fluid research methodology that could be adapted or expanded as the research progressed. As a result, many of the different phases of the research project overlapped and were executed concurrently, making it difficult to connect an estimated time frame to each phase of the research methodology. Observations and findings were documented as the research progressed. A diagrammatical overview of the research methodology is provided in Figure 1.3.

Preliminary research included a comprehensive scholarship review on every subject related to the study, including any material that shed light on Callas's art, life and recordings. The technical aspects of the research demanded familiarisation with the fundamental concepts, approaches and various applications of audio restoration, remastering techniques, the ethics of audio restoration, as well as copyright law and the implications thereof as regards the release of historical recordings.

The next phase consisted of sourcing as many Callas recordings as could possibly be found, listening, comparing and selecting recordings that would serve well the purposes of comparison between different reissues of the same material.

This was followed by the lengthy and exhausting process of comparing those recordings that were selected in the previous phase. This process actually consisted of various mini-phases that were structured according to the individual operas selected for evaluation (dates in brackets indicate year of recording) - *Tosca* (1953), *Lucia di Lammermoor* (1953), *Norma* (1954) and *Madama Butterfly* (1955), in addition to two “live” performances of *Macbeth* (1952) and *La Traviata* (1958). Once initial comparisons and evaluations were completed, the entire process (for all the above recordings) was repeated on a different sound system and the initial findings re-evaluated were necessary.

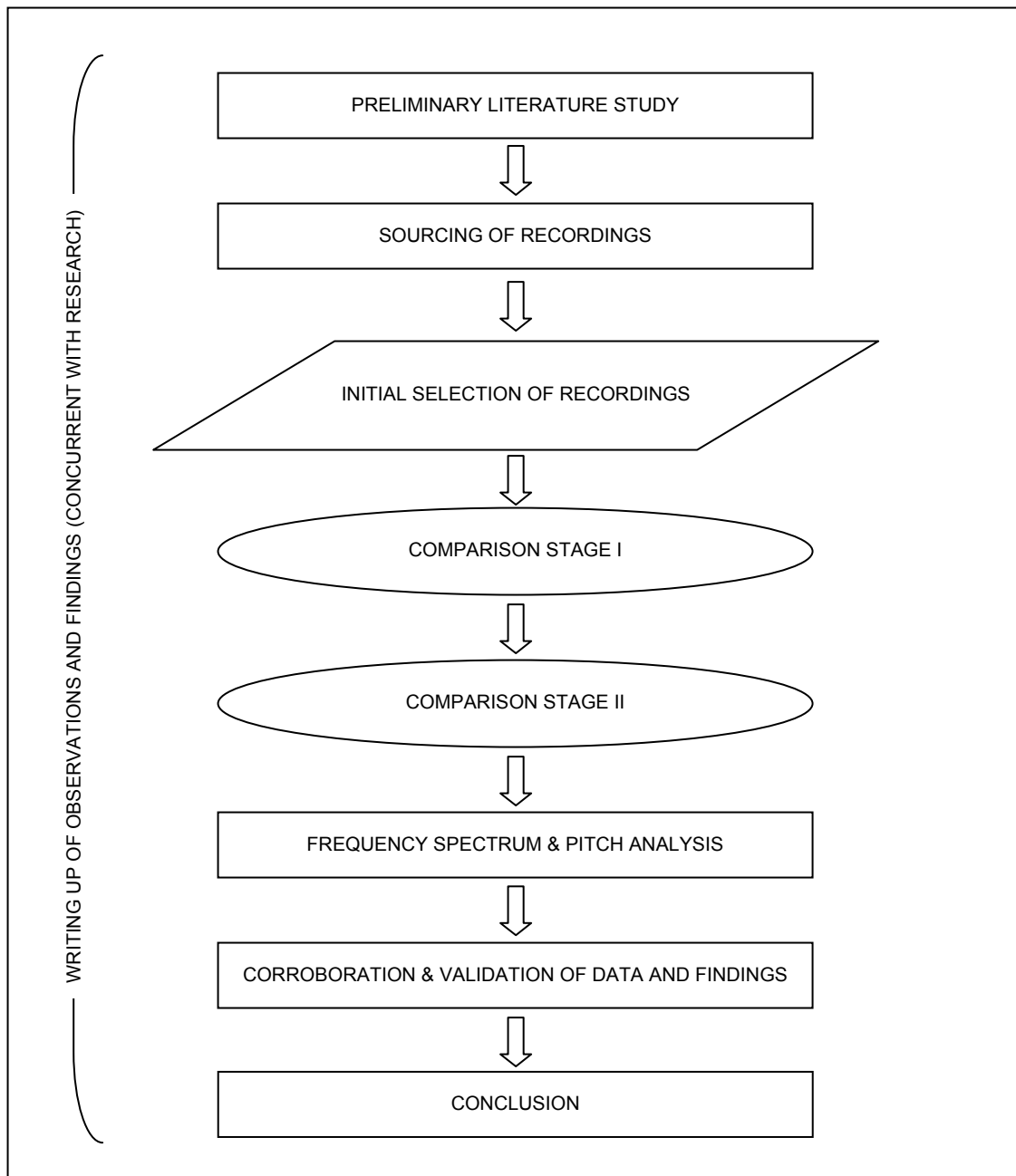


Figure 1.3: Diagrammatical overview of the research methodology.

The next phase consisted of collecting and incorporating technical data, i.e. frequency spectrum and pitch analysis, with the aim of validating any subjective or aesthetic claims that had already been documented.

The following phase comprised the validation of information provided in the thesis, confirming data, sources and findings.

The final step in the research process included drawing together results, interpreting findings and writing the concluding chapter.

1.10) SOURCES:

The primary sources used in this study are the numerous reissues of Callas recordings, released either on EMI or Naxos, that were used in comparing the different remasterings.

The recordings used for comparison are listed in the text and were sourced from various record stores, libraries (such as the US Konservatorium Music Library, which contains a considerable collection of Callas LP's), imported from overseas or obtained from acquaintances. Recordings were primarily selected based on observations and comments made by Dr. Robert E. Seletsky in his articles, "Callas at EMI: Remastering and Perception" (2000) and "A Callas Recording Update" (2005). A leading Callas scholar, Seletsky has made a comprehensive study and evaluation of the majority of Callas's recordings, detailing the differences from one reissue to the next, while comparing, not from an aesthetic or musical point of view, but rather from a technical perspective, the sound of various releases. His is the only other study (to the best of the author's knowledge) that has focussed on the differences between remasterings of Callas recordings.

Seletsky has also assisted Mark Obert-Thorn, the remastering engineer responsible for the Naxos transfers of the Callas EMI recordings, in identifying editing mistakes and pitch problems in the various EMI releases that have subsequently been addressed in the Naxos transfers. His influential and unique position with regards to the reissue and current scholarship of Callas recordings render his views and observations of prime importance to the present study, especially with regards to the overview of Callas's EMI recordings, presented in Chapter 4.

A multitude of secondary sources were consulted that included any reviews, journal articles, books, compact disc sleeve notes or electronic sources that shed light on Callas's life, art and recordings.

Special mention should also be made of a number of specialists who were consulted regarding different facets of the study. These persons should also be considered “sources” and are duly thanked in the Acknowledgements.

The notation examples provided with the pitch analysis tables in Chapters 5 and 6 and the frequency spectrum graphs in Chapters 5 to 10 were obtained from vocal scores of the various operas discussed in these chapters. These examples were transcribed in Finale 2004 (version 2004a.r1, 2003)²² for inclusion in the present study. For more information regarding the vocal scores used, please consult the Reference List provided at the end of this study.

Definitions and explanations of terms, abbreviations or foreign language words are provided as footnotes in the text with the first occurrence of such words. These definitions are also included in the Glossary of Musical and Vocal Terminology (Addendum B) and the Glossary of Audio and Technical Terminology (Addendum C).

1.11) PROBLEMS SPECIFIC TO THIS STUDY:

The majority of recordings used for comparison in this study were imported from overseas sources (such as second-hand record stores or Amazon.com) often resulting in lengthy delays while waiting for orders to arrive. One particular order arrived nearly two months late.

The process of repeated listening, first during the initial selection process (involving thorough and attentive listening to different reissues of the same complete opera recording) and secondly during the evaluation, comparison and analysis of selected audio extracts, proved incredibly exhausting, mentally and emotionally. In order to remain attentive and objective in comparing different reissues, listening sessions had to be structured with much needed rest periods in-between (for both ears and mind!).

“After the war, an enormous revolution took place in opera because of two people: Wieland Wagner, who totally changed the approach and emphasis of the physical aspects of stage direction, and Maria Callas, who took her talent almost to the point of masochism to serve her work and find its meaning.”

John Vickers (cited in Levine 2003:34).

²² Finale is a music-scoring programme developed by MakeMusic! Inc.

1.12) TECHNICAL SPECIFICATIONS OF EQUIPMENT AND PROCESSES USED IN THE STUDY:

The original LP's of the 1953 *Tosca*, *Lucia di Lammermoor* and 1954 *Norma* recordings discussed in Chapters 5 - 7 had to be digitalised, i.e. transferred from LP to CD, so that these sources could be used in pitch and frequency spectrum analysis and to facilitate repeated listening over a lengthy period of time. The transfer process had to be performed without applying any additional signal processing that might influence the frequency content of these recordings. Noise reduction²³ techniques, therefore, had to be avoided. Below is a brief summary of the equipment used in the transferral process:

Transfer Turntable:

Roksan Xerxes with Rega RB300 Tone Arm and Denon DL-103 Broadcast Transfer MC Cartridge

Transfer Pre-Amplifier:

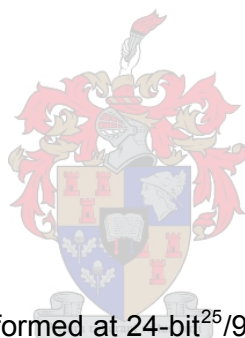
Vanguard One

Cabling:

Van Den Hul D102 Mark 3

A/D Converter:

Apogee PSX-100



Analogue²⁴ to digital conversion was performed at 24-bit²⁵/96 kHz²⁶ to circumvent the possible effects of LP filtering at a sampling rate of 44.1 kHz. A Texas Instruments SRC4194 Asynchronous Sample Rate Converter was used to convert the signal to 24-bit/44.1 kHz before going into Sequoia.

²³ Noise Reduction: Signal processing designed to attenuate noise components within an audio system.

²⁴ Analogue: From the term "analogous," meaning "similar to." Analogue processes record or monitor events in a continuous manner, converting them into similarly continuous mechanical or electronic representations of the original phenomena. In analogue audio and video recording, a signal is represented and stored as a continuously varying electrical or mechanical representation of the input signal, for example on magnetic tape or a phonograph record. Such systems furthermore amplify and process these signals using continuous voltages and/or currents (whose value could be expressed as an irrational number at any point in time) that are not quantised. An analogue audio recording is therefore represented by a continuous curve, whereas a digital recording is based on discrete samples, which approximate the corresponding analogue amplitudes.

²⁵ Bit: Abbreviation for Binary digiT. The smallest possible unit of information used in computers or other digital systems. Bits are numerically represented as either a 1 or a 0 (representing for ex. on/off, yes/no, etc.). Digital audio is encoded in large numbers or "words," that are used to represent the voltage level (amplitude) of an analogue signal. Words are made up of a certain number of bits, usually 8, 12, or 16 bits long. The amount of bits that make up a word is called the bit resolution and determines the number of voltage levels possible in representing the signal's amplitude. Each added bit represents a theoretical improvement of about 6dB in the signal-to-noise ratio of a signal.

²⁶ kHz: Kilohertz (thousands of Hertz).

Captured into Sequoia in 32-bit float format with a sample rate of 44.1 kHz.

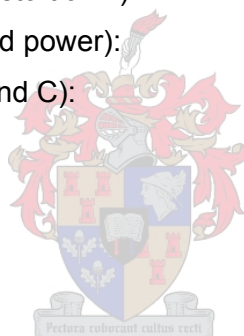
The signal word length was lowered to 16-bit using triangular probability density function dither. No noise shaping, whatsoever, was performed.

The process of comparing the different remasterings was performed in two stages. A purposeful decision was taken by the author to compare the different reissues not in an ideal listening environment that featured the best monitors or playback equipment, but rather in a setup that would not be uncommon in a general home environment – the listening environment in which CD's are generally listened to.

The first evaluation and comparison phase was performed on a sound system comprising a NAD T751 Surround Sound Receiver, NAD T531 DVD/VCD/CD Player and Mission 77e Loudspeakers.

NAD T751 Surround Sound Receiver:

Power Output ($8 \Omega^{27}$ within rated distortion ²⁸):	2 x 70W
Total Harmonic Distortion ²⁹ (at rated power):	0.08%
Sensitivity ³⁰ and Impedance ³¹ (R and C):	200mv/50k Ω
Frequency Response:	5 - 20,000 Hz \pm 0.8 dB ³²
Signal-To-Noise Ratio ³³ -	
Ref 60W / 8 Ω :	96dB (IHF A)
Ref 1W / 8 Ω :	80dB (IHF A)



²⁷ Ohm (Ω): A unit of measurement for electrical resistance or impedance, where the electromotive force of one volt maintains a current of one Ampère. Named after Georg Simon Ohm (1789 - 1854), a German physicist.

²⁸ Distortion: In general terms, any inaccurate representation of the input sound signal, including clipping of the waveform at its maximum amplitude, overload, unwanted harmonic frequency content, etc.

²⁹ Total Harmonic Distortion (THD): An audio measurement specification used to determine the accuracy with which a device can reproduce an input signal at its output. THD describes the cumulative level of the harmonic overtones that the device being tested adds to an input sine wave.

³⁰ Sensitivity: The amount of output for a given input. In RF receivers, the amount of input signal a device requires in order to produce a reference quality of output.

³¹ Impedance: Acoustical impedance is the total opposition provided by acoustical resistance and reactance to the flow of an AC signal. The unit is the acoustical ohm (Ω).

³² Decibel (dB): The standard measurement unit used to logarithmically express the relative difference or relative loudness (sound pressure level, SPL) of sounds. One decibel is equal to one-tenth (1/10) of a Bel, a measurement unit created in 1928 by researchers at Bell Laboratories and named after Alexander Graham Bell (1847 - 1922). Generally, 0 dB is the maximum possible amplitude value of a waveform, without clipping.

³³ Signal-To-Noise Ratio: A measure of signal strength relative to background noise. Often written as S/N or SNR, signal-to-noise ratio is usually measured in decibels (dB) and is given by the formula below, where the incoming signal strength is measured in microvolts (V_s) and the noise level, also in microvolts, is V_n :

$$S/N = 20\log_{10}(V_s/V_n)$$

Ideally, the signal strength should be greater than the level of noise. The S/N would therefore be positive. If $V_s = V_n$, then the S/N would be 0. Where the S/N is negative, reliable signal transmission is generally not possible.

NAD T531 DVD/VCD/CD Player:

Frequency Range:	4 Hz – 20 kHz
Signal-To-Noise Ratio:	More than 100dB
Dynamic Range:	More than 95dB
Total Harmonic Distortion:	0.008%

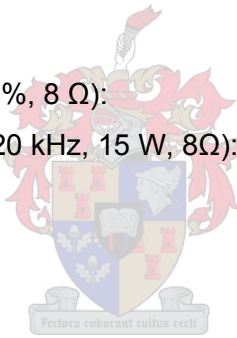
Mission 77e Loudspeakers:

Frequency Response:	50Hz – 20kHz \pm 3dB
Sensitivity:	88dB/1w/1m
Impedance:	8 ohm compatible

This was followed by a secondary stage of comparison, performed on a Pioneer A 109 Stereo³⁴ Amplifier, Pioneer PD-217 Compact Disc Player and Sennheiser HD200 Headphones. The specifications are listed below:

Pioneer A-109 Stereo Amplifier:

Continuous Power Output (THD 0.1%, 8 Ω):	30 W
Total Harmonic Distortion (20 Hz - 20 kHz, 15 W, 8 Ω):	0.08%
CD Input Sensitivity/Impedance:	200 mv/50 k Ω
CD Frequency Response:	5 Hz to 100 kHz $^{+0}_{-3}$ dB
Signal-To-Noise Ratio -	
IHF short circuit, A network:	106 dB
DIN, continuous power/50 mW:	91 dB/71 dB

**Pioneer PD-217 Compact Disc Player:**

Frequency Response:	2 Hz – 20 kHz
Signal-To-Noise Ratio:	98 dB or more
Dynamic Range:	96 dB or more
Total Harmonic Distortion:	0.003% or less

³⁴ Stereo (Stereophonic): An audio signal or a wave file that contains two channels of sound information enabling the discrete positioning of left and right sounds.

Sennheiser HD200 Headphones:

Frequency Response (-10 dB/1 kHz):	12 – 22,000 Hz
Impedance:	64 Ω
Characteristic SPL ³⁵ (at 1 kHz, 1 V _{rms}):	106 dB
Total Harmonic Distortion (at 1 kHz, 100 dB SPL):	<0.3%

Audio extracts provided on the CD's that accompany this study were digitally extracted from the original CD sources as 44.1 kHz, 16-bit audio .WAV³⁶ files, thereby eliminating any digital to analogue conversions and keeping the signal as intact as possible. These .WAV files were then imported in Audacity (version 1.2.3, programme build date: 17 November 2004),³⁷ edited and exported as .WAV files which were then burned to disk.

Pitch analysis was done in Audacity from the same digitally extracted 44.1 kHz, 16-bit audio .WAV sound files. Enhanced Auto-correlation,³⁸ along with a Hanning window³⁹ and an FFT (Fast Fourier Transform)⁴⁰ size of 2048 samples was used throughout.

³⁵ Sound Pressure Level (SPL): The acoustical energy (air displacement) of a sound source, measured in decibels above a reference pressure level of 0.0002 microbars (the minimum threshold of human hearing).

³⁶ WAV: An uncompressed, PCM (Pulse Code Modulation) audio file format used by Windows. Typically encountered as "filename.wav."

³⁷ Audacity is a free digital audio editor, developed by a team of volunteer software developers from around the world. It is downloadable from <http://audacity.sourceforge.net>.

³⁸ Enhanced Auto-Correlation: Auto-correlation is a common method used for determining the frequencies of periodic signal components or for extracting a signal from noise. It works by comparing the signal with time-delayed versions of itself: for a periodic signal, the correlation will be high whenever the delay is a multiple of the period. The enhanced auto-correlation algorithm eliminates random factors from the auto-correlation data, leaving only the most useful information. The algorithm is as follows:

1. Compute the auto-correlation of the input signal.
2. Use the Fast Fourier Transform (FFT) to compute the power spectrum of the auto-correlation results.
3. Take the cube root of each element in the power spectrum, then apply the inverse Fourier transform. The result after this step is called the cube root auto-correlation. Clip this data at zero (replace negative entries with zeros).
4. Time-dilate the resulting signal by a factor of two, using linear interpolation. Subtract the dilated version from the original, again clipping the result at zero. The final result is the enhanced auto-correlation.

Steps 2 and 3 (converting the auto-correlation into the cube root auto-correlation) rescales the data to make it better suited to pitch extraction. Step 4 eliminates "echoes" of the auto-correlation peaks, leaving only the first peak from each frequency component. This results in a single high peak corresponding to the strongest frequency of the input.

³⁹ Hanning window: Named after the Austrian meteorologist Julius von Hann (1839 - 1921), the Hanning window/function is a general purpose window for the analysis of continuous signals, boasting the best overall filter characteristic of the most common window types. Also known as the raised cosine window, the Hanning window of length N is defined by:

$$h(k) = \frac{1}{2}(1 - \cos(2\pi k/N))$$

⁴⁰ Fast Fourier Transform (FFT): The FFT process is a standard method for analysing sounds, based on Jean Baptiste Joseph Fourier's (1768 - 1830) theory, which states that any waveform can be represented by an infinite sum of sine and cosine functions, plus a finite number of terms which describe the waveform's harmonics. FFT uses these mathematical relationships to resolve complex waveforms into a series of fundamental frequencies, allowing signals in the time domain to be represented in the frequency domain.

Frequency spectrum analysis was performed on a number of selected extracts, short phrases or noise samples from the same digitally extracted .WAV files as above, using Cool Edit Professional 2.0 (version 2095.0, 2002).⁴¹ In most cases, one or two noise samples were analysed as these contain a broad spectrum of more-or-less equally strong frequency components, most clearly showing the effects of any filters that might have been applied to the signal.

In order to eliminate loudness⁴² differences, extracts from the various remasterings were normalised⁴³ to 0 dB prior to performing the frequency spectrum analysis. A Hanning window with a FFT (Fast Fourier Transform) size of 16384 samples was used throughout.

The colours of the various frequency spectrum examples are the same in each of the selected examples, except in the case of the 1954 recording of *Norma*, discussed in Chapter 7, where a green plot alternately represents the two LP versions. In each chapter, the colours used to represent the various releases are clearly indicated.

Additional signal processing and analysis was performed in Matlab 6.5⁴⁴ (1994-2005), using an algorithm based on the cross-correlation function.⁴⁵ This algorithm is explained with the aid of the diagram shown in Figure 1.4.

The phrase “Ambizioso spirito” from Lady Macbeth’s Act I recitative “Nel dì della vittoria” from *Macbeth* (1952 “live” recording) is used in conjunction with Figure 1.4 to illustrate the different graphs produced by the algorithm. Please refer to Chapter 9 for further Matlab analysis examples from *Macbeth*.

⁴¹ Cool Edit, originally developed by Syntrillium Software (www.syntrillium.com) has been licensed by Adobe and is currently commercially available as Adobe Audition.

⁴² Loudness: The subjective impression of the intensity of a sound.

⁴³ Normalisation: The process of boosting the highest peak of a waveform to a certain percentage or dB level, without clipping (distortion), thereby raising or lowering all other peaks accordingly. This maximizes resolution and minimizes certain types of noise.

⁴⁴ MATLAB, developed by MathWorks, Inc. (www.mathworks.com), is a “high-level language and interactive environment that enables you to perform computationally intensive tasks faster than with traditional programming languages such as C, C++, and Fortran.”

⁴⁵ Cross-Correlation: Cross-correlation (or cross-covariance) is the process of correlating (comparing) a known or reference signal with an unknown one. It is a function of the relative time between the two signals and is sometimes referred to as the “sliding dot product.” Cross-correlation has applications in digital signal processing, pattern recognition and cryptanalysis.

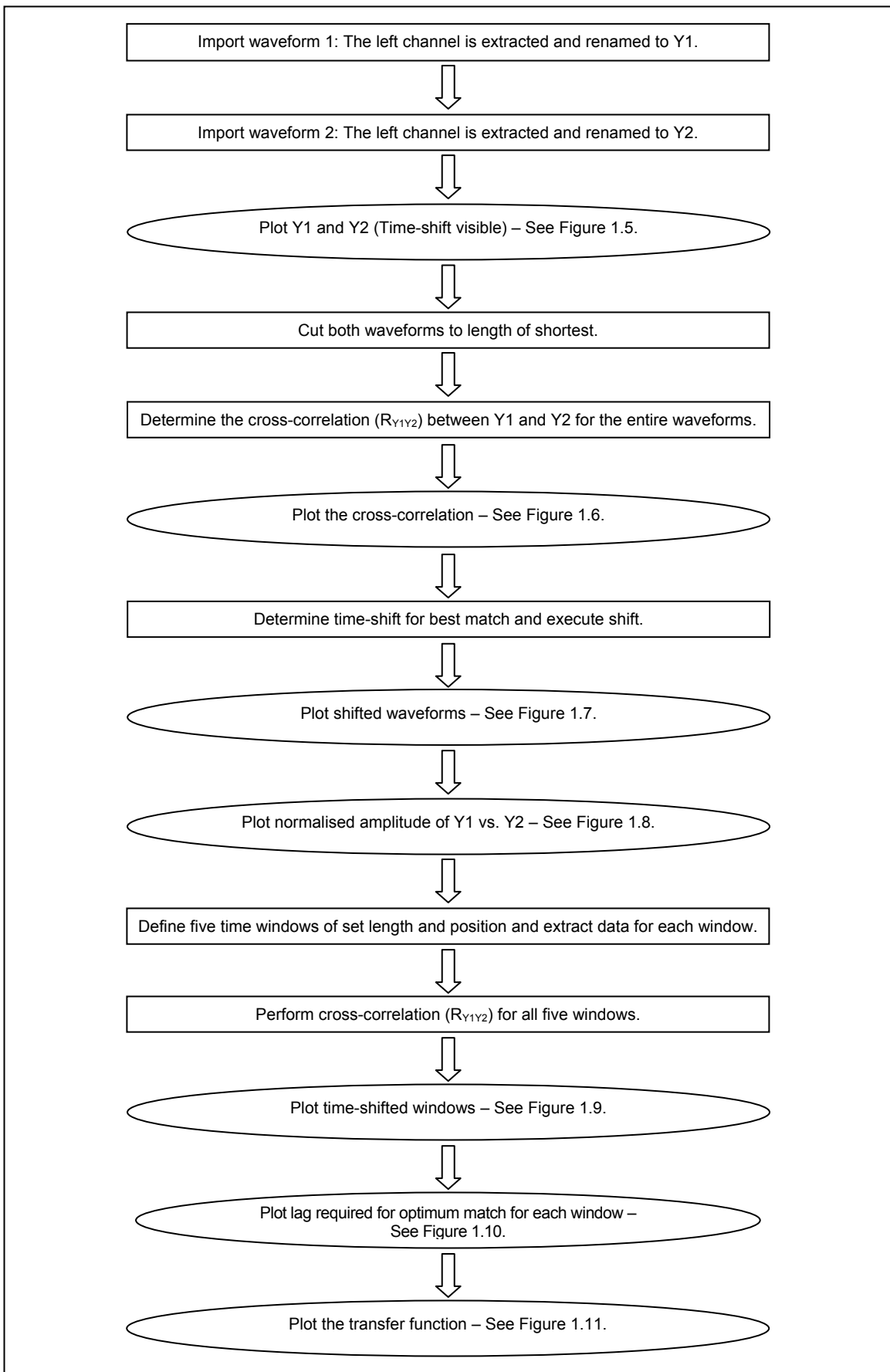


Figure 1.4: Diagrammatical overview of the Matlab analysis algorithm.



Maria Callas

(1923 – 1977)

First, the two waveforms that are to be compared using the cross-correlation function are imported into Matlab. Though the original recordings were actually recorded in mono, the audio data is stored in a stereo format on the CD, the digitally extracted .WAV files therefore containing two identical channels of audio information. As a result, and to simplify the analysis process, only one channel of audio data is required for correlation.¹ The left channels of waveform 1 and 2 are extracted and renamed to Y1 and Y2.

Y1 (blue) and Y2 (green) are then plotted. In all the Matlab analysis graphs, Y1 is always the earlier of the two remasterings indicated at the top of the graph (in this particular case it is the 1993 remastering of *Macbeth*). As Figure 1.5 shows, the time-shift (difference in length) between the two waveforms becomes visible.

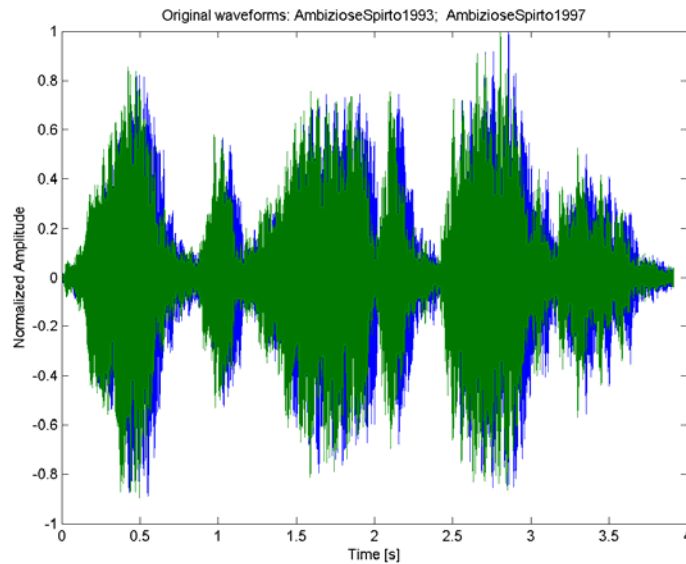


Figure 1.5: Plot of Y1 and Y2 (time-shift visible) of phrase “Ambizioso spirito” from “Nel di della vittoria,” Act I of *Macbeth* (1952 “live” recording).

Next, Y1 and Y2 are cut to the length of the shortest waveform and the cross-correlation (represented as R_{Y1Y2}) calculated for the entire length of both Y1 and Y2. The cross-correlation is then plotted (Figure 1.6):

¹ Correlation: In digital signal processing, correlation is the process of comparing one signal with another in order to determine how similar these signals are. The correlation function is a weighted moving average, and is given by the equation:

$$R(n) = \sum x(k) * y(n + k)$$

The correlation algorithm works as follows:

1. One signal is shifted with respect to the other.
2. Each element of one signal is multiplied by the corresponding element of the other.
3. The multiplied values are integrated.

If one signal is of length m and the other signal is of length n, then (m * n) multiplications are necessary to calculate the whole correlation function. Correlation is at a maximum when two signals are similar in shape and “unshifted” with respect to each other.

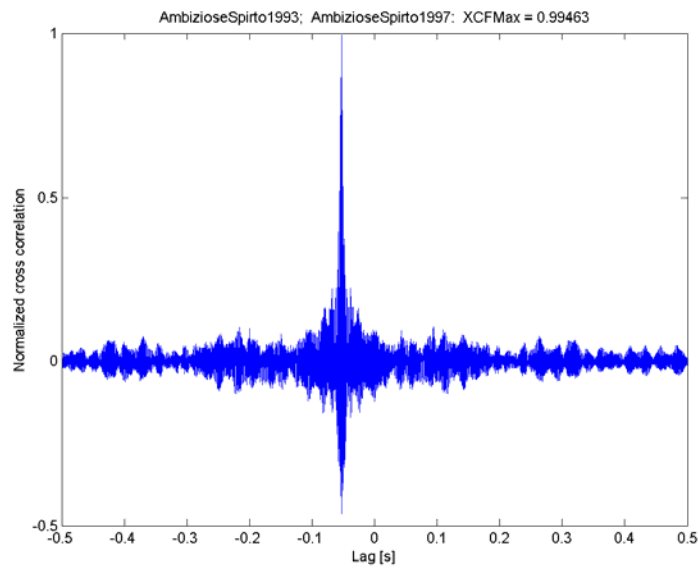


Figure 1.6: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of phrase “Ambizioso spirito” from “Nel di della vittoria,” Act I of *Macbeth* (1952 “live” recording).

The amount of correlation between Y1 and Y2 is indicated at the top of the graph as XCFMax. The closer this number is to 1, the better the correlation between the two waveforms, i.e. a correlation number of 1 indicates a perfect match. In Figure 1.6, the amount of correlation for this excerpt is indicated as 0.99463, i.e. excellent correlation exists between the two waveforms, indicating little difference between the two remasterings for this particular section.

The following step entails the calculation of the time-shift required for the best match between Y1 and Y2. The shift is then executed and the two waveforms plotted. Figure 1.7 shows that the two waveforms match very well.

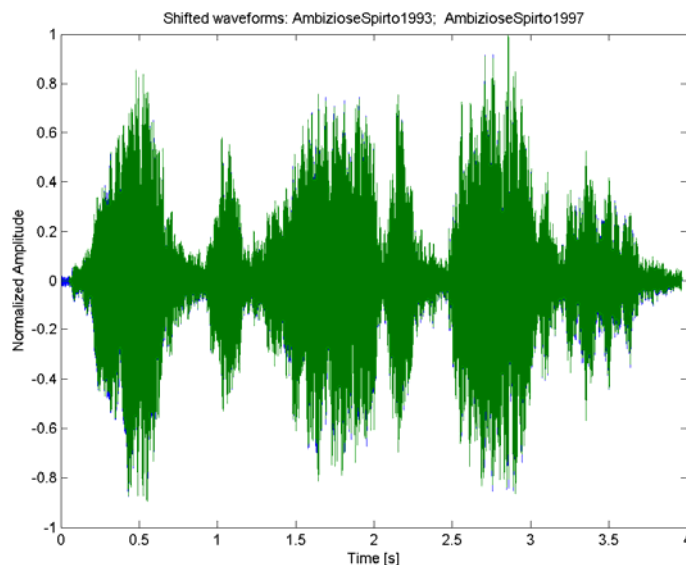


Figure 1.7: Plot of time-shifted waveforms (Y1 and Y2) of phrase “Ambizioso spirito” from “Nel di della vittoria,” Act I of *Macbeth* (1952 “live” recording).

Next, the instantaneous magnitudes of Y1 and Y2 are plotted against each other, as in Figure 1.8. If Y1 and Y2 were exactly the same, the graph would show a straight diagonal line from the bottom left-hand corner across to the top right-hand corner. Here, the magnitudes of the two waveforms do not correspond exactly, explaining the slight diversions.

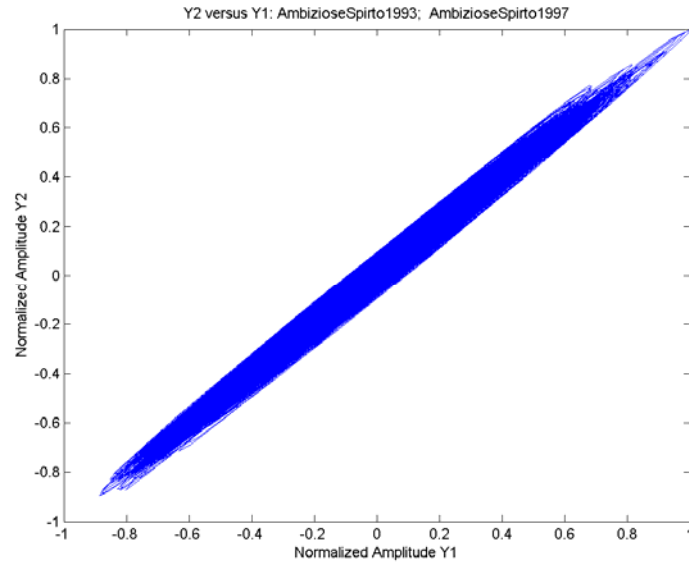


Figure 1.8: Plot of normalised amplitude of Y1 vs. Y2 of phrase “Ambizioso spirito” from “Nel di della vittoria,” Act I of *Macbeth* (1952 “live” recording).

The following step entails the selection of five time windows of set length and position. Audio data is extracted for each window and cross-correlation (R_{Y1Y2}) performed for all five windows. Each of these windows are then time-shifted to obtain the best match and the shifted windows plotted (Figure 1.9).

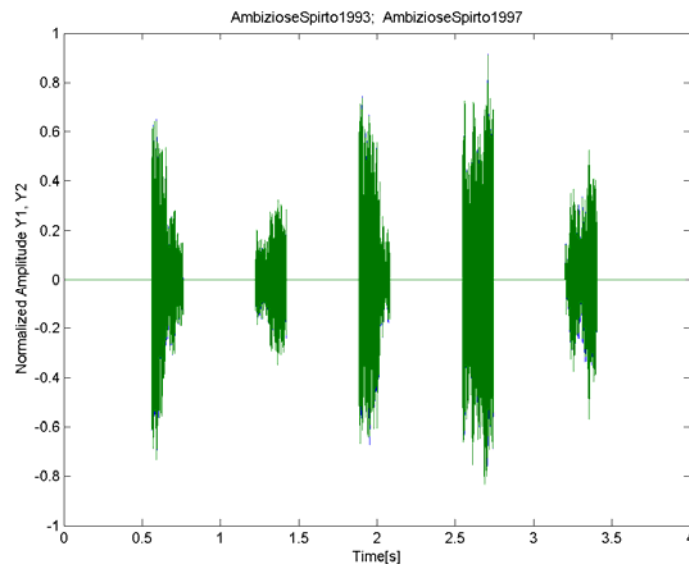


Figure 1.9: Plot of time-shifted windows of phrase “Ambizioso spirito” from “Nel di della vittoria,” Act I of *Macbeth* (1952 “live” recording).

Next, the lag or time-shift required for the optimum match for each window is plotted. In this example, Y1 and Y2 were very similar to start with, and so the time-shift required to best match the two waveforms is very close to zero, as the straight line in Figure 1.10 indicates.

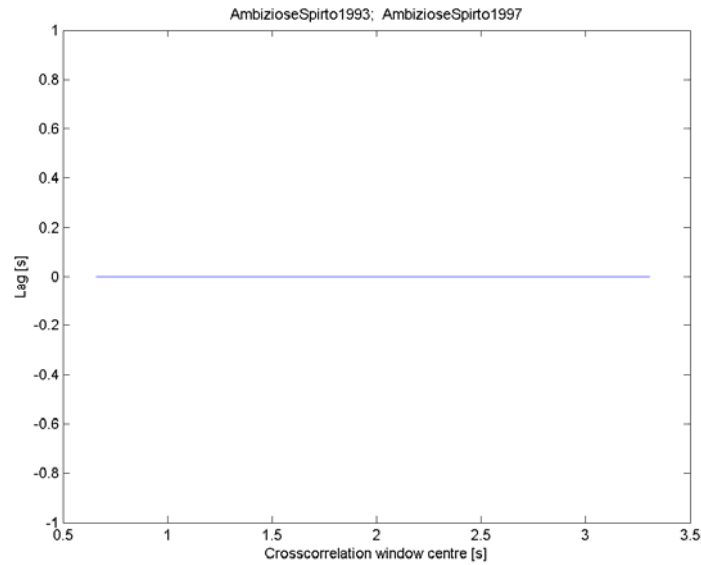


Figure 1.10: Plot of lag or time-shift required for optimum match for each window of phrase “Ambizioso spirto” from “Nel di della vittoria,” Act I of *Macbeth* (1952 “live” recording).

In the final step, the transfer function² of Y1 and Y2 is plotted (Figure 1.11). In this algorithm, the complex-valued transfer function (magnitude and phase) relates the input signal spectrum to the output signal spectrum in the Fourier domain. The first graph plots the difference in amplitude (logarithmic scale) against frequency, while the second graph shows the difference in phase against frequency. As can be seen, a shelving filter effect with low frequency boost is visible in the first graph at approximately 3 - 10 Hz, while a slight dip at 60 Hz indicates filtering to remove traces of an electrical hum present in the signal. The second graph shows that there is virtually no frequency-dependent difference in the phase of the two remasterings. This implies that no time-stretching, and thus, pitch-shifting, has been performed.

² Transfer Function: In its simplest form, the transfer function is a mathematical representation of the total change incurred from one system to another, i.e. the relation between the input and output of a linear time-invariant system. For continuous-time signals, the transfer function is often written as:

$$H(s) = Y(s)/X(s)$$

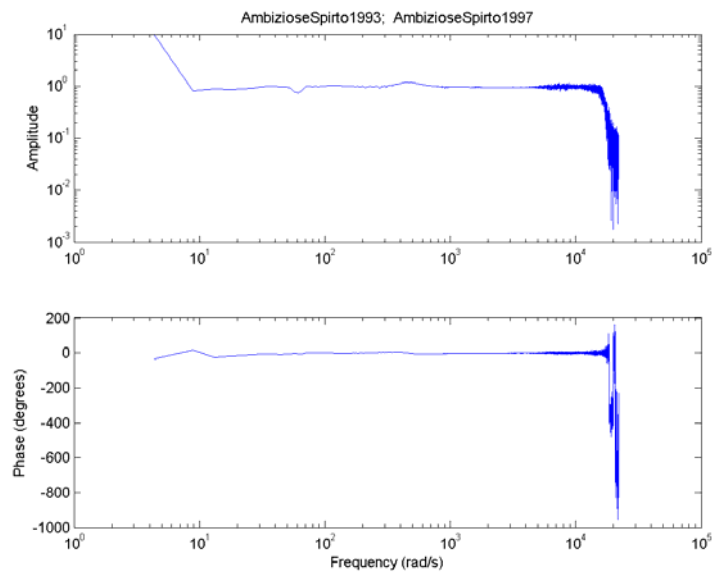


Figure 1.11: Plot of transfer function of phrase “Ambizioso spirito” from “Nel di della vittoria,” Act I of *Macbeth* (1952 “live” recording).

1.13) CHAPTER OUTLINE:

Chapter 1 introduces the research project by contextualising the study, discussing its aims and objectives, as well as providing an overview of the research design and methodology. The chapter furthermore describes the various sources employed, includes a brief summary of problems encountered during the research process, a technical description of the specifications and processes of the computer software used for the purposes of frequency spectrum and pitch analysis and the audio equipment used in comparing the various reissues. The chapter concludes with a structural outline of the thesis.

Chapter 2 concerns the reissue of historical recordings and the ethics of audio restoration. It provides a descriptive overview of the transfer and remastering (rerecording) process, examines the nature and purpose of audio restoration, the role of the remastering engineer and discusses the issue of authenticity in historical sound reissues of Callas. Copyright law and its implication to the reissue of historical recordings is also considered.

Chapter 3 is a study of Callas’s unique, yet highly flawed voice, its vocal characteristics, strengths and weaknesses. The chapter traces Callas’s vocal development and eventual vocal decline.

Chapter 4 provides a brief overview of Callas’s recorded legacy that focuses on her recordings for EMI, her principal recording affiliation.

Chapters 5 – 10 form the main body of the research project, providing a comparison and evaluation of different remasterings of six selected recordings of Callas in complete opera performances: *Tosca* (1953), *Lucia di Lammermoor* (1953), *Norma* (1954) and *Madama Butterfly* (1955), in addition to two “live” performances of *Macbeth* (1952) and *La Traviata* (1958) [dates in brackets indicate year of recording]. These recordings are discussed individually in Chapters 5 – 10, respectively. Each chapter traces Callas’s performing and/or recording history of the opera, her influence on and vocal approach toward the role being portrayed and any other important background information on the relevant performance or recording. A technical discussion of each recording is then provided, followed by a detailed comparison and evaluation of each reissue, using pitch analysis (in Chapters 5 and 6) and frequency spectrum analysis to underline and support subjective claims. As a last step in the analysis process, selected extracts from the various reissues are analysed using a Matlab algorithm.

A conclusion is provided in **Chapter 11**, detailing the findings and results of the study and suggestions regarding possible areas of future research.

Apart from the obligatory **Reference List** (Chapter 12), the thesis also includes four **Addenda**, consisting of a discography of recordings by Callas released on EMI, a glossary of musical and vocal terminology, a glossary of audio and technical terminology, as well as the Matlab source code used in analysing the various examples.



Figure 1.12: “When I sang, people suddenly loved me” (Pahlen 1973: 213)

CHAPTER 2

“TO SAVE HISTORY, NOT REWRITE IT:” HISTORICAL REISSUES AND THE ETHICS OF AUDIO RESTORATION

“Trying to ascertain what the original sound recording or artists were supposed to sound like is no trivial matter, since the industry under study has always thrived on mystifying the public. From the earliest days of the industry, marketing of sound recordings has been governed as much by profit margins and patent rights as the quest for the ultimate in fidelity.”

William Storm (cited in Orcalli 2001: 310)

2.1) INTRODUCTION:

Nowadays, fewer and fewer record labels are investing in new opera recordings. Recently, *Gramophone* magazine (Jeal 2005: 25) published an article concerning a new recording of *Tristan und Isolde*, heralded as “one of the last truly starry studio recordings we can expect to hear,” with Plácido Domingo in the role of Tristan, Nina Stemme as Isolde and Antonio Pappano conducting the Orchestra of the Royal Opera, Covent Garden. In the article, Peter Alward, long-standing president of EMI Classics who left the company last year after 34 years, is quoted as saying that “when I started my job, we made 110 recordings a year. When I left it was just over 40. There’s no question that the studio-only, audio-only opera recording is coming to an end. Today, people listen with their eyes. If you want to go it alone and make an opera in the studio, with all the bells and whistles, you’re talking half a million quid. Maybe £300,000 if it’s Verdi and you can get it on two or three discs. If, however, you can go into co-production with a television broadcaster and an opera house, you can probably bring in a DVD for under £100,000. Which for a company that doesn’t derive any public funding is a very important factor.” According to Alward, EMI has no more studio recordings planned that he knows of. “I think that if you had a virtually unstageable work of immense musical importance, and there was a way of making it work financially, there would be a case for recording it. But as for the standard repertory, I would be surprised.” When asked whether record companies are under any kind of obligation to support young artists, Alward responded that it is a legitimate concern, but “that there are

economic factors. What has changed, sadly, is not only public taste, but public attention span. People are far more fickle these days. They are far less likely to follow, long-term, one artist's career, and they haven't the time or interest to listen to a full-length piece. Realistically, if tenor X comes along tomorrow and starts a career similar to Plácido's [Domingo], he doesn't have a snowball in hell's chance of being able to preserve [in sound] even a fraction of what Plácido has."

Though the restoration and reissue of historical recordings, especially 78 RPM discs recorded between 1900 and 1948, initially started as a niche specialisation area, the late 1980's CD boom provided a market for these records that eventually became an industry unto itself, as independent labels vied with major recording companies to issue the finest transfers of legendary performances (Smith 2002: 20). Since then, the number of historical reissues that have appeared is simply staggering: "It used to be rare for any month's top five recordings not to include at least a couple of reissues," notes Michael Oliver (cited in Smith 1999: 52), veteran broadcaster/author and editor of *Gramophone's International Opera Collector* quarterly. "Today, it's rare when they're not all reissues."

The reason behind the increasing number of reissues is not only, as mentioned above, the cost involved in producing new recordings, but also the allure of vintage musical performances and the continued legacy of artists such as Callas. According to Smith (1999: 52), historical reissues are not only cheaper than producing new and often redundant opera productions, but also "fits consumer demand, especially when it comes to finicky tastes in singing." They also provide consumers and audiophiles¹ alike access to sought-after recordings by legendary artists and musicians – in versions that often sound better than the original releases. "Even for the budding collector," states Smith (1999: 52), "it is apparent that these vocal legends – such as the iconic Maria Callas – can outdraw the living talent pool (Plácido Domingo and Luciano Pavarotti notwithstanding)... While some voices may fade away once in the ether, it's likely that those of Callas, Björling and Domingo will be sought out as long as people listen to opera."

2.2) THE ETHICS OF AUDIO RESTORATION:

Advances in modern audio technology have, of course, greatly benefited the boom of historical reissues. Remastering technology has improved immensely in recent years, making old and deteriorated tapes appealing even to the mainstream listener. Modern audio signal processing, in both

¹ Audiophile: A term that is generally used to refer to someone "who loves sound" and is concerned with achieving high-quality results in the recording and playback of music. Audiophile values can perhaps best be described by the belief that "the sound of music, unamplified and occurring in a real space is a philosophic absolute against which may be judged the performance of devices designed to reproduce music" (Wikipedia 2005).

the analogue and digital domains, have allowed transfer engineers a diversity of ways in which to “improve” or “reinterpret” the sound of original recordings, ranging from conventional analogue bandpass filtering, dynamic noise filters and transient² noise suppressors (“declickers”) to elaborate digital algorithms that suppress background noise.

With the ability to drastically alter the original sound of a recording during remastering or “rerecording,” several ethical implications regarding the role of the remastering engineer and the nature and purpose of audio restoration have been raised and remain pertinent, also to the current study. The first person to study these implications from a theoretical point of view was William D. Storm, at the time Assistant Director of the Thomas A. Edison Re-recording Laboratory Syracuse University Libraries, in his 1980 paper entitled “The Establishment of International Rerecording Standards.”

Storm identified two “legitimate directions” or types of rerecording: 1) the sound preservation of audio history, defined as “the perpetuation of the sound of an original recording as it was initially produced and heard by the people of that era,” and 2) the sound preservation of an artist, “the perpetuation of the true sound of a performer” (Schüller 1991: 1014; Orcalli 2001: 308).

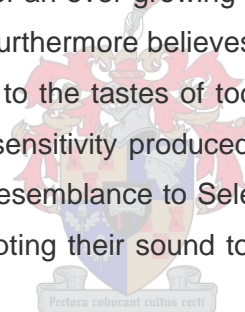
The first type of rerecording aims to offer a “historically faithful reproduction of the original recording by extracting the sound content according to the historical conditions and technology of the era in which it was produced,” while documenting “the quality of sound reception offered by the recording and reproducing systems of the time” (Orcalli 2001: 308). This “archival” type of rerecording therefore, proposes the minimum of intervention from the transfer engineer: “to save history, not rewrite it,” as Storm would later write in 1988. Accordingly, the aim of audio history preservation “is to hear first how records originally sounded to the general public.” Hence, on an operational level, it implies the use of original and optimum playback equipment. According to Godsill and Rayner (1998: 2), an ideal restoration reconstructs the original sound source exactly as received by the transducing equipment (microphone, acoustic horn, etc.). An example of such a restoration methodology was followed by the British independent label, Nimbus, who has earned high praise for its transfers of historic recordings. Nimbus’s *Primo Voce* series mixes “cutting-edge technology with old-fashioned care,” by rerecording old 78’s obtained from private libraries or public archives. The records are played via an acoustic-horn gramophone with a thorn needle and the playback recorded with a room ambience that “more often than not had been absent in the original recording” (Smith 1999: 52). Another more “purist” example is the Japanese Opus Kura label, which transfers 78 RPM records from a range of different sources,

² Transient: Any of the non-sustaining, non-periodic frequency components of a sound, usually of brief duration and higher amplitude than the sustaining components occurring near the onset of the sound (attack transients).

using the most quiet surfaces, then keeping the sound virtually unchanged and without applying any further processing or filtering (Breunig 2004: 1332).

According to Storm (cited in Orcalli 2001: 308), “the knowledge acquired through audio-history preservation provides the sound engineer with a logical place to begin the next step – the search for the ‘true’ sound of an artist.” Type II restoration differs essentially from Type I in the use of “playback equipment other than that originally intended” (Storm, cited in Orcalli 2001: 308) and represents a conceptual leap that transcends the limits of a historically faithful reproduction of the original recording. Despite Storm’s objectives of standardising the procedures of rerecording, the Type II definition by default implies a margin of interpretation of the recording.

Orcalli (2001: 309) wrote that, “despite its clear specificity, audio restoration fits into the more general discussions which are common to all operations of artistic preservation and which can be summarized in the interrogative already put by the art historians: whether restoration is a moment of pure preservation of the works that have come down to us, or whether it should be oriented toward their ‘adaptation’ to the new uses and tastes of an ever-growing public, to the various cultural policies, and to the new technological scenarios.” He furthermore believes that many of the historical reissues being produced today, are reissued according to the tastes of today’s listeners, “who have inevitably been conditioned by the changes in auditive sensitivity produced by the current standards of high fidelity” (2001: 310), a statement bearing close resemblance to Seletsky claim that EMI has reissued Callas’s recordings many times, continually “adapting their sound to the perceived preferences of the record-buying public” (Seletsky 2000: 240).



2.3) OVERVIEW OF THE TRANSFER AND REMASTERING (RERECORDING) PROCESS:

Following the work of Storm, Dietrich Schüller realised that the “true” sound of an artist undergoes several manipulations, beginning with the acoustic imprint of the hall, to the alterations brought about by the *tonmeister*.³ He therefore tried to define the aims of rerecording by approaching the problem from a different methodological point of view, namely “to analyse what the original [sound] carrier represents, technically and artistically, and to start from that analysis in defining what the various aims of rerecording might be” (Schüller 1991: 1014).

Figure 2.1 (adapted from Schüller 1991: 1015) depicts the original recording process and the options for restoration and reproduction.

³ Tonmeister: From the German, literally translated as “tone master.” The term was originally used by Deutsche Grammophon to describe the function performed by a professional recording (sound) engineer.

According to Schüller (1991: 1014), the “true” sound of an artist, including all the parameters of his artistic interpretation, is captured during performance. The acoustics of the recording location also greatly influence the “true sound.” This is the first level of the recording process.

The next level is that of the *tonmeister*, who adds a second level of interpretation by applying several “intentional” alterations. These include the application of various technical processes (choice and placement of microphones, equalisation,⁴ reverberation,⁵ mixing and editing), and results in what he and/or the producer thinks is a satisfactory recording.

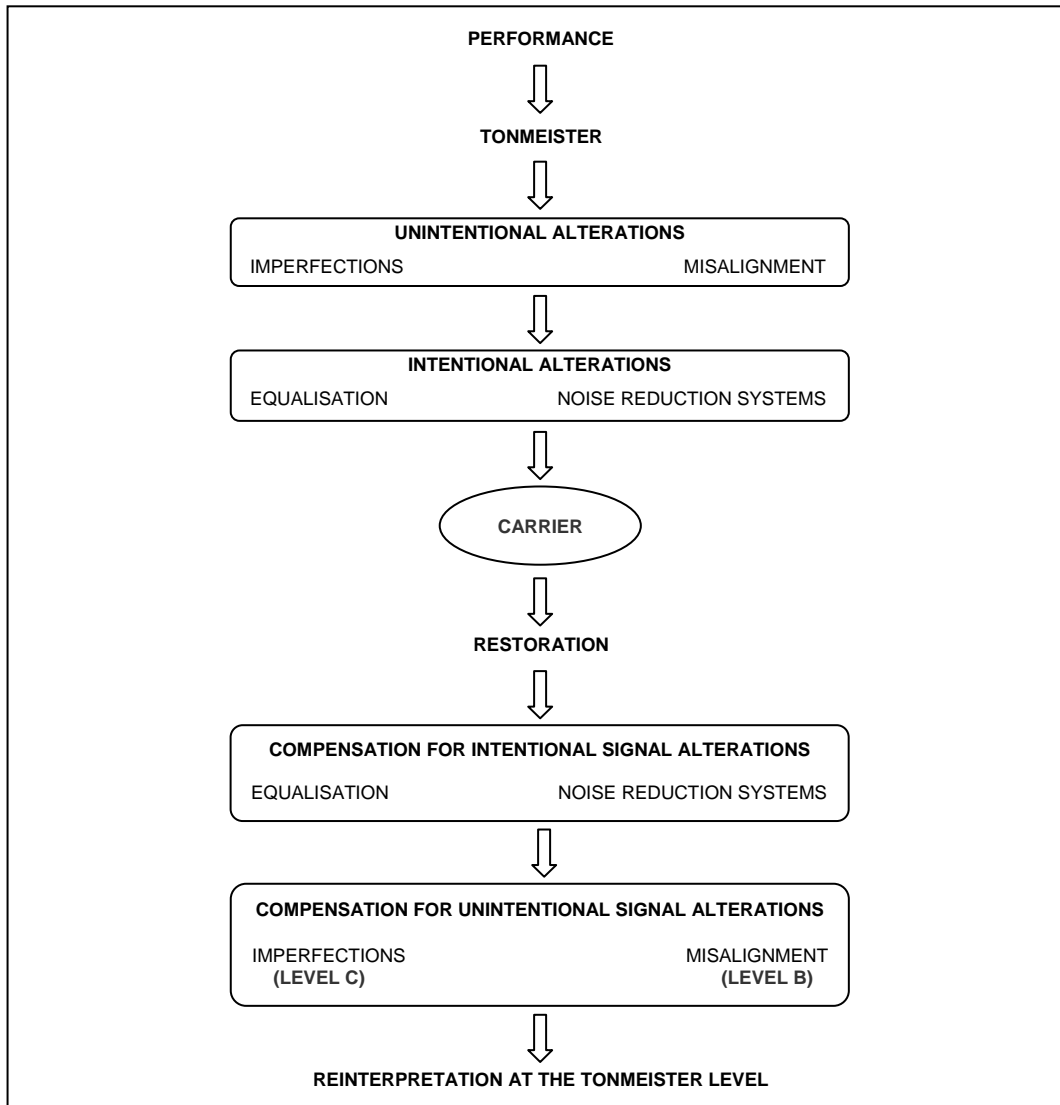


Figure 2.1: The original recording process and the options for restoration and reproduction.

⁴ Equalisation (EQ): Equalisation is the process of increasing or decreasing the amplitude of audio signals at a specific frequency band relative to the signals at other audio frequencies.

⁵ Reverberation (“Reverb”): The persistence of a sound in an acoustic space, in the form of multiple reflected sound waves, after the original source has ceased. Also, the process whereby the acoustical reflections of a room or concert hall are reproduced artificially, with devices such as tapped delay lines working in conjunction with mixing and phase shifting devices or algorithms to add depth and warmth to recorded sounds.

Before being recorded onto the sound carrier, the recorded signal is subject to unintentional and intentional technical alterations. According to Schüller (1991: 1014), there are two kinds of unintentional alterations:

- A) The first group of unintentional alterations can be attributed to imperfect recording techniques of the time, resulting in various distortions caused by the uneven movement of the recording medium and/or poor signal-to-noise ratio.
- B) Misalignment of the recording equipment (ex. wrong speed, deviation from the vertical cutting angle as is often found in cylinders) or misalignment of the recording heads resulting in wrong track positions and azimuth errors⁶ on magnetic tape.

Intentional alterations include recording equalisation and noise reduction systems.

Though the carrier may be in perfect condition, deterioration over time is inevitable, whether as a result of age, frequency of use or mishandling. Dirt, as well as physical and chemical deterioration, affects the playback of recorded sound in various ways, including clicks,⁷ pops, loss of signal and distortion.

Schüller (1991: 1015) breaks the rerecording process down into the following steps:

- 1) Choice of specimen to be rerecorded: Rerecordings should be made only from the original carrier or master, never from a rerecording which may have been subject to unknown manipulations. In the case of a mass-produced carrier, the copy with the least deterioration should be used.
- 2) Restoration of the carrier: Great care must be taken in cleaning or minimizing dirt and physical or chemical deterioration, so as not to cause any further deterioration or damage to the original carrier.

⁶ Azimuth Errors: When analogue magnetic tapes are recorded or reproduced, the respective tape head should ideally be perpendicular to the direction of the tape movement. If, during the playback or recording process, the respective head is sloped away from the desired angle, it is said to be off-normal or off-Azimuth, and as a result, two types of signal degradation can occur. The first results in the loss of high-end frequency response. The second effect produces a phase shifting of one channel with respect to the other, thereby "smearing" the sound image.

⁷ Clicks: A generic, localised type of degradation of finite duration that occurs at random positions in the waveform and is common to many audio media. Clicks are perceived in a number of ways by the listener, ranging from tiny 'tick' noises which can occur in any recording medium, including modern digital sources, through to the characteristic 'scratch' and 'click' noise associated with most analogue disc recording methods. Clicks are typically the result of specks of dirt and dust adhering to the grooves of a gramophone disc or granularity in the material used for pressing such a disc. Further click-type degradation may be caused through damage to the disc in the form of small scratches on the surface. Similar artifacts are encountered in other analogue media, including optical film sound tracks and early wax cylinder recordings, although magnetic tape recordings are generally free of clicks. Ticks can occur in digital recordings as a result of poorly concealed digital errors and timing problems. Peak-related distortion, a result either of overload distortion during recording or wear and tear during playback, can give rise to a similarly perceived click effect.

- 3) Choice of playback equipment: Equipment must fully comply with the format-specific parameters of the original carrier. Schüller (1991: 1015) states that it is “a false though widespread belief that equipment used at the time of the production of the carrier is the best for rerecording. Generally, the opposite is true: mechanical and, where applicable, electrical parameters of modern equipment sometimes exceed those of older equipment by several orders of magnitude... The only case where the use of original equipment is justified is in the exotic aim to reconstruct the sound of a historical recording as it was heard originally: audio history in the full sense of William Storm’s Type I rerecording.”
- 4) Compensation for intentional signal alterations: During the rerecording process, equalisation of intentional signal alterations have to be made, while corrections of unintentional signal alterations may be made (Schüller 1991: 1015). Compensation for intentional signal alterations involves the choice of the correct playback equalisation, which is problematic as, before the international adoption of the RIAA curve,⁸ various recording equalisations were used in both LP and 78 RPM recordings. Whenever the correct equalisation is unknown, a general or most probable standard should be used, ex. a 250 or 500 Hz crossover between constant amplitude and constant velocity for electrically cut disks. Flat equalisation (implying constant velocity) has become standard in the case of acoustical recordings (Schüller 1991: 1015).
- 5) Compensation for misaligned recording equipment: Recordings should be checked for misalignment of recording equipment, for ex. tape heads (azimuth errors) and to compensate for these.
- 6) Compensation for unintentional signal alterations: This is the equalisation used to compensate for non-linear frequency response, caused by imperfect historical equipment and the elimination of rumble, needle noise or tape hiss. Transient noise suppression also falls under this category with many sophisticated noise reduction systems that have been developed to enhance the signal-to-noise ratio.
- 7) Reinterpretation at the tonmeister level: This final step involves “all the manipulations that alter the sound at the tonmeister level,” such as subjective equalisation, adding reverberation, stereophonic “rechanneling” or reprocessing of monophonic recordings and also in some cases, the complete remix of original multitrack master tapes. These manipulations are, according to Schüller (1991: 1016), “intentional attempts to reinterpret the historical performance at an artistic level.”

⁸ RIAA Curve: A specific equalisation characteristic standardised by the RIAA (Recording Industry Association of America) that provides approximately 15 dB of cut at 20 Hz and 20 dB of boost at 20 kHz (relative to flat response at 1 kHz) when the records are made. Upon playback, the reciprocal EQ curve is applied in the preamp (Davis and Jones 1989: 153).

Schüller (1991: 1016) states that “historical faithfulness” can refer to various levels:

- A) The recording as it was heard in its time (Storm’s Audio History Type I)
- B) The recording as it has been produced, precisely equalized for intentional recording equalisations, compensated for eventual errors caused by misaligned recording equipment and replayed on modern equipment to minimize replay distortions (steps 1 - 5) – the most commonly used standard.
- C) The recording as produced, but with additional compensation for recording imperfections caused by the recording techniques of the time (steps 1 - 6).

Schüller (1991: 1016) strongly believes that reinterpretation of a recording at the creative level of the *tonmeister* is entirely different from producing a historically faithful reproduction. “From a scholarly point of view, it has to be accepted that new technology and new listening behaviour will always stimulate attempts to reinterpret old recordings by modern technological means. Being of a purely artistic nature, these attempts cannot really be criticized by scholarly arguments, unless the attempt postures the reinterpretation as the original. Any criticism therefore, has to be based upon artistic and aesthetic arguments” (Schüller 1991: 1016).

Another view regarding the role of the remastering engineer is offered by Breunig (2004: 1332), who states that “although transfer engineers exercise a degree of intervention – changing the apparent reverberation characteristics of the original material, for example – the aim should be to do as little as possible, yet provide a comfortable listening experience” (Breunig 2004: 1332). Breunig is of the opinion that Mark Obert-Thorn (who transferred the 1953 *Tosca*, *Lucia* and *Puritani* Callas sets from LP for the Naxos Historical label) and Ward Marston (who was responsible for transferring the 1952 *Gioconda* and 1953 *La Traviata* recordings from LP, also for the Naxos label) follow this credo. Obert-Thorn, in the CD booklets to his Naxos transfers, describes himself as a “moderate interventionist” rather than a “purist” or “re-processor,” unlike those who apply significant additions and make major changes to the acoustical qualities of old recordings. “His philosophy is that a good transfer should not call attention to itself, but rather allow the performances to be heard with the greatest clarity.” Marston on the other hand simply states that his ultimate goal is to “to make the music he remasters sound as natural as possible and true to life by ‘lifting the voices’ off old recordings. His aim is to promote the importance of preserving old recordings and make available the works of great musicians who need to be heard.”

The CEDAR Audio Ltd. website (www.cedar-audio.com) states that, according to the archival viewpoint, the audio restoration engineer should present the listener with the most authentic reproduction of the original sound that can be obtained. The commercially minded engineer, however,

may attempt to “generate a new recording more appropriate to its intended use. This use could be, for example, to please the public palate, or to represent accurately the sound of an era. Every restoration has its own criteria.”

Figure 2.2 appears on the CEDAR Audio Ltd. website and provides another view of the recording process proposed by Schüller in figure 2.1 above.

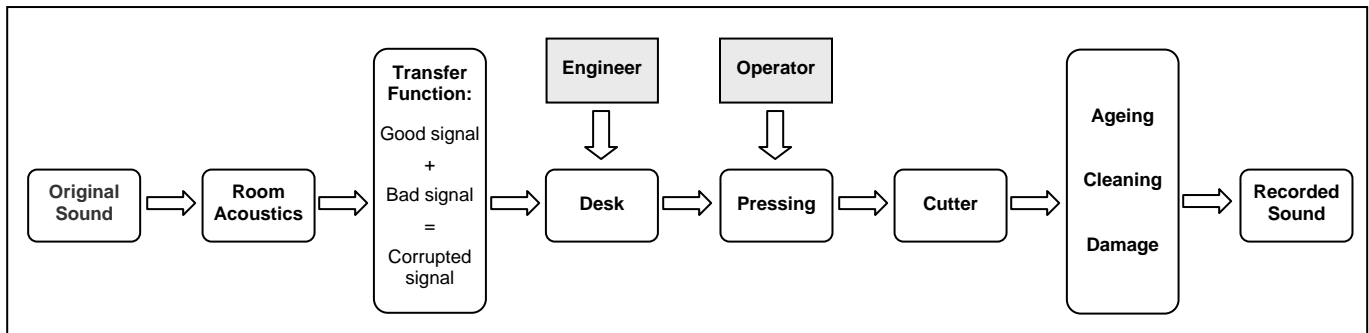


Figure 2.2: The process history of a sound recording.

2.4) COPYRIGHT LAW AND THE RE-ISSUE OF SOUND RECORDINGS:

The lapse of the fifty-year European Union copyright⁹ has legitimised “unofficial” LP transfers of studio recordings. In Europe copyright protection lasts only 50 years from the end of the year of recording or first publication,¹⁰ compared with 95 years in the USA. This means that anyone in Europe can legally reissue a recording if 50 years have passed since the year of first publication. This law applies to commercial recordings, broadcasts or privately recorded performances and holds true even in the case of recordings that were originally produced and released in the USA. The 50-year expiry of copyright only applies to the copyright owned by the corporation or record label that issued the recording and not to the music that was recorded.

In the United States, federal copyright protection for sound recordings was not available until 1972. Any recording made before 1972 is currently protected until the year 2067, while recordings made after 1972 remain under copyright for 95 years from the date of recording.

⁹ According to Gasaway (2001: 217) and Albanese & MacQueen (1999: 42) copyright is the exclusive, legally secured right to publish, sell and reproduce the substance and form of a literary, artistic or musical work and the benefits derived there from. Copyright protects the right of the author, the form of expression, not facts or ideas. To obtain copyright on a work, it must be original and must be fixed in a tangible medium of expression.

¹⁰ This means that if, for example, a recording was made in 1948 and first published in 1998, it will still be protected under European Unions copyright law until 2048.

When literary, artistic or musical works are not under copyright, they are said to be in the “public domain.” There are three types of work that fall into this category: 1) material on which the copyright has expired, 2) material on which the author never claimed copyright and 3) in the US, material produced by the government (Gasaway 2001: 218).

Interestingly, a record company that reissues historical recordings does not automatically acquire any copyright of its own, except the CD cover art and programme notes which are of course protected as independent works, if they qualify as such. In some European countries, the actual reissued sound as such, however, does not necessarily acquire any new protection, no matter how much restoration work the company has invested in restoring the material, just as a restorer of paintings does not receive copyright on the restored art works. Only by adding new sounds to a recording, such as for example replacing the piano accompaniment on a recording with full orchestral backing, would a company create a new, protected recording (Gronow 1999: 169). This means that a third party wishing to reissue the same public domain recording could use either an original pressing or a CD reissue as the source of the new publication.

Though expiring copyrights mean cheaper recordings for consumers and greater variety to choose from, they obviously do not bode well for major record companies who stand to lose millions in revenue. “The public sees icons like Mickey Mouse¹¹ and thinks that the companies must by now have made their money,” noted Neil Turkewitz (cited in Tommasini 2003a), the executive vice-president international of the Recording Industry Association of America (RIAA), which has strongly advocated copyright protection. “With 9 out of 10 sound recordings losing money, very few materials wind up generating the revenues that sustain an entire system. The amount of money put back into production by the record companies is enormous. It’s extremely risk-intensive.” Gronow (1999: 169) however, states that should the production of historical reissues ever get to the point of being an economical threat to European record companies, or if the competition between reissue companies becomes too great, new European legislation might be passed on this matter.

¹¹ The Walt Disney Company lobbied intensively in favour of the Copyright Extension Act, which was passed by the US Congress in 1998, thereby adding a further 20 years to copyright. The reason for this was that Mickey Mouse, as portrayed in his first animation film, *Steamboat Willie*, would have entered the public domain in 2003 (Gasaway 2001: 218).

Although the distribution of reissues of recordings that have entered the public domain are theoretically limited to Europe, record stores and outlets in the US and across the world routinely stock foreign imports or offer to order items from abroad (such as for example, Amazon.com). The influx of foreign imports into the US has already led to talks within the American record industry over the possibility of erecting a customs barrier to stop foreign imports, especially as the lapse of the 50-year European copyright deadline is approaching the heyday of US rock 'n' roll. According to Turkewitz, the import of those products would be an act of piracy. "The industry is regretful that these absolutely piratical products are being released" (cited in Tommasini 2003a). While the RIAA is trying to persuade the European Union to extend copyright, the association will "try to get these products blocked," noted Turkewitz, citing that US customs officials "have the authority to seize these European recordings even in the absence of an injunction brought by the copyright owners."

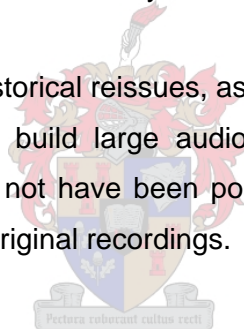
Though expiring copyrights have already led to numerous reissues of recordings of such historically important artists as the violinist Jascha Heifetz (1901 - 1987), the jazz cornetist Bix Beiderbecke (1903 - 1931) and singers such as Marlene Dietrich (1901 - 1992) and Edith Piaf (1915 - 1963), recordings made during the 1950's are "viewed as being of another order" (Tommasini 2003a), not least because of the enormous developments in recording techniques during this period, especially the introduction of the LP during the early part of the decade and later the development of stereo recording techniques. Mono LP's from the 1950's are prized by both classical and jazz audiophiles for the specific sound qualities associated with the analogue vinyl medium. Artistically, the decade coincided with the "golden years" of opera legends such as Callas and Renata Tebaldi (1922 - 2004), the heyday of rock 'n' roll heralded by recordings of Little Richard (b. 1932), Chuck Berry (b. 1926) and Elvis Presley (1935 - 1977), as well as enormous outbursts of creativity from seminal jazz figures such as Thelonius Monk (1917 - 1982), Ella Fitzgerald (1917 - 1996) and Miles Davis (1926 - 1991).

The "if you can't beat 'em, join 'em" strategy followed by EMI in its licensing of unauthorized Callas recordings from an outside source such as Marcal Records is not without precedent (please refer to Chapter 4). Numerous record labels have forged agreements with external sources of historic audio material, especially radio and performance archives. Naxos has released various reissues of recordings taped from historic Metropolitan Opera broadcasts (although these are only available outside of the US because of copyright limitations), while RCA has formed a new alliance with the Vienna State Opera to release recordings from its archive, most notably a Karajan *La Bohème* and an important Lorin Maazel performance of Alban Berg's *Lulu*. Smith (1999: 52) maintains that "for a long time, these places sat on their material, often because it was extraordinarily difficult to negotiate rights with organisations and musician's unions. But, perhaps because of the growing pirate market, the owners of copyright material thought it best to release it themselves so they could maintain control."

Michael Cuscuna, president of Mosaic Records, a speciality label that releases critically praised reissues of classic jazz recordings, stated in Tommasini (2003a) that they have had to contend with cheap competition from other independent record labels, who not infrequently release recordings “just dumped off the original 78’s. That the recording exists in such an inferior state hurts the music.” He furthermore stated that some European record companies simply wait for a reissue to come out in the United States, then copy it and appropriate the photographs (Tommasini 2003a). “Yet, consumers still go for the cheaper product. It’s discouraging. We’ve got to get the major labels to take a stand.”

The distribution of out-of-copyright recordings over the Internet also poses a major threat. “Once copyrighted works enter the public domain,” noted Prof. Lawrence Lessig of Stanford Law School (cited in Tommasini 2003a), “a wide range of copies – high quality and low – will quickly be available, always and for free.” The Callas recordings, according to Lessig, “will be taken and put into a million different content spheres. They will be encouraged and sold in ways not done now.” In accordance with American copyright law, it is illegal to download material protected in the United States regardless of the legal status of that material in any other country.

One benefit brought about by cheaper historical reissues, as suggested by Brylawski (2002), has been that public libraries have been able to build large audio collections of important musicians and recording artists, which otherwise might not have been possible, either due to inaccessibility or the expense of obtaining or maintaining the original recordings.



2.5) AUTHENTICITY OF HISTORICAL PERFORMANCES:

The practice of issuing fraudulent recordings as genuine historical performances is of great importance when discussing the ethics of audio restoration. For this reason, two specific cases with reference to Callas are mentioned here. Obviously, such practices stand in stark contrast in the pursuit of historical faithfulness and the search for the “true” sound of an artist. In addition, please refer to Chapter 9 for a discussion of the authenticity of a “live” 1952 performance of *Macbeth*.

The first recorded sample of Callas’s voice in performance is to be found in two excerpts from a triumphant 1949 season at the Teatro Colón in Buenos Aires of *Turandot* and *Norma*. An extended scene from Act II of *Turandot*, supposedly taken from Callas’s Buenos Aires debut of 20 May 1949, a performance featuring Callas (*Turandot*), Mario del Monaco (*Calaf*), Virgilio Tavini (*Altoum*), Helena Arizmendi (*Liù*) and the conductor Tullio Serafin, was first issued in France in May 1984 by Rodolphe Productions on a three-LP album (12413/14/15) entitled *Les Inédits de Maria Callas*, and currently

available on Eklipse EKR CD 44. Upon its release, rumours started circulating that the excerpt might be a hoax – a composite made from commercial recordings of the opera by Callas and Del Monaco that had been doctored with static, applause, other extraneous noises and volume drop-outs (aimed at masking interpretive details) in order to simulate a “live” broadcast, in addition to altering the pitch. This was, however, never proven, until 1999, when Milan Petkovic made an in-depth study and analysis of the extract, proving that it was indeed a fake. Two surviving extracts from Act III (about two minutes in length), have, however, been accepted as authentic. According to Petkovic, they originate either from one of the four *Turandot* performances of May and June 1949, or from Act III of 9 July 1949, all performed at the Teatro Colón.

Petkovic (2002) revealed that all of Callas’s music on the Rodolphe set was copied either from her 1954 EMI recording of “In questa reggia” or her complete 1957 EMI *Turandot*, while Del Monaco’s was taken from his Decca recording of the opera. What Rodolphe did, for example, in “In questa reggia” was to alternate sections of the 1954 and 1957 Callas versions, abbreviating notes, filtering out frequencies, reversing the phase¹² and adding background noise.

During the only portion to be sung in unison by the two protagonists, Turandot and Calaf, (including their *fortissimo* high C) Turandot’s words are unclear, sounding unlike Callas. Petkovic (2000) states that this section originates from the left channel of the Decca stereo recording, in which Del Monaco’s voice predominates over that of Inge Borkh. A precise comparison between the two versions (Decca and Rodolphe) reveals that the soprano in question is Borkh, not Callas, and that the sound of the female voice had been deliberately blurred!

According to Petkovic (2002) the hoax ultimately fails because Callas’s voice in the Rodolphe set is too thin and lightweight for 1949 and unlike other recordings Callas made during 1949. Her heavier, fuller, pre-1953 sound is, however, present in the genuine Act III fragments. Callas’s phrasing, unique colouration and inflexions on certain words, syllables and phrases, compared with the later studio recordings, are furthermore identical, while her earlier musical *portamento* was musically different from the type she employed after 1953.

In late 1991, the Italian record label Melodram released what appeared to be a complete “live” recording from 19 November 1953 of Bellini’s *Norma*, featuring Callas (Norma), Franco Corelli (Pollione), Boris Christoff (Oroveso), Elena Nicolai (Adalgisa), Bruna Ronchini (Clotilde), Raimondo

¹² Phase: The relationship in time between two versions of the same periodic waveform (such as a sound wave). When two waveforms are out-of-phase with one another, amplitude peaks may not coincide and “phase cancellation” will occur, altering the quality of the sound.

Botteghelli (Flavio) and the orchestra and chorus of the Teatro Giuseppe Verdi, Trieste, conducted by Antonino Votto. According to Petkovic (2000) the CD release of this “live” performance (CDM 26031) had been announced in the press earlier in the year and eagerly awaited by many Callas enthusiasts. As far as is known, however, a recording of this performance has not survived intact, with only portions of it having previously been published on LP and CD.

As many suspected, the Melodram issue was in fact a composite of different “live” Callas recordings, achieved by replacing the missing (and some existing) recorded sections from other sources, without giving any due credit. Petkovic (2000) speculates that Melodram’s intentions might have been to present the listener with a “virtually complete recording of Bellini’s opera,” an attempt to “reconstruct” the complete performance, not to produce a “forgery” such as the *Turandot* Act II excerpt mentioned above. Even so, Melodram was dishonest not to indicate that their “reconstruction” drew substantially from other sources (less than half the music offered on their release was authentic Trieste material), unless they issued the recording without being aware of that fact.

According to Petkovic (2000), the list of sources used for the Melodram issue were as follows:

- 1) Buenos Aires, 17 June 1949: Callas, Barbieri, Vela, Rossi-Lemeni. Conductor: Tullio Serafin
- 2) Trieste, 19 November 1953: Callas, Corelli, Nicolai, Christoff. Conductor: Antonino Votto
- 3) RAI Rome, 29 June 1955: Callas, Del Monaco, Stignani, Modesti, Cavallari. Conductor: Tullio Serafin
- 4) Milan, 7 December 1955: Callas, Del Monaco, Simionato, Zaccaria, Carturan. Conductor: Antonino Votto
- 5) Rome, 2 January 1958: Callas, Corelli, Pirazzini, Neri, De Palma. Conductor: Gabrielle Santini
- 6) Rome, 4 January 1958: Cerquetti, Corelli, Pirazzini, Neri, De Palma. Conductor: Gabrielle Santini

Though the Melodram release has been discontinued, it can still be found in stores selling used and second-hand CD’s. All known and genuine Trieste material (approximately 93 minutes) can be found on a release by Divina Records (DVN-3).

“I want to give a little happiness, even if I haven’t had much for myself. Music has enriched my life and, hopefully – through me, a little – the public’s. If anyone left an opera house feeling more happy and at peace, I achieved my purpose.”

Maria Callas (cited in Stancioff 1988: 258)

CHAPTER 3

“THE VOICE OF THE CENTURY”

“It has been suggested, and not without reason, that Callas’s voice ‘had less going for it than any other voice that has achieved international celebrity via the phonograph – a medium that necessarily puts a premium on timbral endowment, since it cannot directly transmit physical and dramatic qualities.’ Yet it was a voice that was better than beautiful, for it was a voice which once heard could not be easily forgotten. It haunted and disturbed as many as it thrilled and inspired, and it was the very personal colours of her voice, combined with its deficiencies, which made her sound so strikingly individual.”

John Ardoin (1995: 205)

3.1) HISTORICAL PRECEDENTS:

Encompassing almost three octaves, the range of Callas’s voice was impressive to say the least. In the Bolero from Verdi’s *I vespri siciliani*, Callas touches on a low F-sharp (F \sharp_3), and in Rossini’s *Armida*, a high F (F $_6$). Hers was an individual voice that did not correspond to any of the categories that voices are divided into¹ and which cannot be compared with the voice of any other singer during the twentieth century. In fact, one would have to go back to the early nineteenth-century, when composers such as Rossini, Bellini and Donizetti were composing operas for singers such as Giuditta Pasta (1798 - 1865) and Maria Malibran (1808 - 1836), singers who possessed a similar voice to Callas. Pasta’s range was from A $_3$ to D $_6$, with, as reports would have it, a powerful lower register.² It was for her that Bellini wrote *Norma* and *La sonnambula* and for whom Donizetti wrote *Anna Bolena* – operas which would become closely associated with Callas. Appreciated as much for their acting as their extraordinary singing abilities, Pasta and Malibran, like Callas, had naturally flawed voices, uneven and with a stridency on some high notes.

¹ The closest description used to describe Callas’s voice is termed a *soprano drammatico d’agilità*, that is to say, a voice with an enormous range, capable of great virtuosity and tremendous agility, accomplished simultaneously with dramatic accentuations which give it a very moving quality of tone, but lacking somewhat in volume compared with an ordinary dramatic soprano (Galatopoulos 166: 100).

² Register: A series of consecutive voice tones of equal or similar *timbre*, which can be distinguished from an adjoining series of tones. Various opinions exist as to the classification of vocal registers, with some scholars dividing the voice into as many as five different registers (Miller 1986), while others, such as Reid (1985), speak of only two primary registers, the “chest voice” and “head voice,” all other registers being a mixture of these two. The present study will concur with Reid’s view.

In 1824, Stendhal, who could just as well have been speaking of Callas, wrote that Giuditta Pasta...

“possesses the rare ability to be able to sing contralto³ as easily as she can sing soprano. I would suggest... that the true designation of her voice is mezzo-soprano,⁴ and any composer who writes for her should use the mezzo-soprano range... while still exploiting, as it were incidentally and from time to time, notes which lie within the more peripheral areas of this remarkably rich voice. Many notes of this last category are not only extremely fine in themselves, but have the ability to produce a kind of resonance and magnetic vibration, which, through some still unexplained combination of physical phenomena, exercises an instantaneous and hypnotic effect upon the soul of the spectator.”

Stendhal goes on to point out that Pasta's voice was...

“not all moulded from the same *metallo*, as they would say in Italy; and this fundamental variety of tone produced by a single voice affords one of the richest veins of musical expression which the artistry of a great *cantatrice*⁵ is able to exploit... A large number of other outstanding singers of the old school long ago demonstrated how easily an apparent defect might be used to bring about a most fascinating touch of originality. In fact, the history of the art might tend to suggest that it is *not* the perfectly pure, silvery voice, impeccably accurate in tone throughout every note of its compass, which lends itself to the greatest achievements of impassioned singing. No voice whose timbre is completely incapable of variation can ever produce that kind of opaque, or as it were, suffocated tone, which is at once so moving and so natural in the portrayal of certain instants of violent emotion or passionate anguish” (Ardoin 1995: 204).

Malibran, for whom Bellini revised *I Puritani*, also had a voice that sat naturally low, but through rigorous technical exercises had extended her range upwards and downwards so that her compass ranged over three octaves, from D₃ to D₆. Her voice, which was not of first-rate quality and in character *contralto*, was weakest in the middle tones. Notes in this area of the voice were often called “dead

³ Contralto: The lowest female voice, with a normal range of (approximately) G₃ to G₅.

⁴ Mezzo-Soprano: Literally “half-soprano.” The designation for a female voice midway between soprano and contralto, with a range from (approximately) F₃ to B₅. It is a voice type whose tonal characteristics are weightier than those of the dramatic soprano, yet lighter than those of the *contralto*. Several operatic roles written for sopranos are traditionally sung by and better suited to mezzo-sopranos, ex. Dorabella in *Così fan tutte*, Carmen, Oktavian in *Der Rosenkavalier*, the Composer in *Ariadne auf Naxos*.

⁵ Cantatrice: Female singer.

spots,” and she tried to conceal these through various forms of execution, modification and ornamentation. Callas’s voice presented the same problems and it has often been suggested that, like Pasta and Malibran, she was truly a mezzo-soprano whose training gave her an extended upper register. “What is my actual *tessitura*?⁶ I am a *soprano leggiera*,” Callas (cited in Pilichos 1997) once noted. “My world is that of Rossini, Donizetti and Bellini.”

Callas’s ability to sing, with equal ease, mezzo-soprano and soprano roles, accounts for her successful appearances in so many long-forgotten and neglected nineteenth-century operas. When one takes into consideration the fact that during the nineteenth-century theatre stages projected almost half way into the auditorium and that orchestras were comparatively small and usually a tone lower than today’s large, higher-pitched orchestras, it makes Callas’s achievements so much the greater, for nowadays, much more volume is required than was the case during the nineteenth-century. Callas however, saw nothing remarkable about her vocal versatility. “I don’t know whether it is unique,” she once noted (cited in Lawton 1988). “I think it’s not. I’m just doing what once upon a time was done. Once upon a time, sopranos were considered sopranos – not light or heavy or medium or whatever you call it. A soprano was supposed to do every kind of opera. It’s like a violinist, a pianist has to perform any kind of music.”

“Mine is a big destiny...”

Maria Callas (cited in Davidson 1998)



3.2) BEGINNINGS:

With her début in 1939 at the age of 15 as Santuzza in Mascagni’s *Cavalleria Rusticana*, a member of the chorus described Callas’s voice as “a real dramatic soprano⁷ in the middle of her range, a mezzo in the lower notes, and a lyric soprano⁸ at the top” (cited in Steane 2001). In his book, *Prima Donna – A History*, Rupert Christiansen (1986: 305) noted that “Callas’s natural vocal colour, as a Hellenophile friend of mine pointed out, can be heard on any Greek island when the peasant women start shouting

⁶ Tessitura: Literally “texture.” A term used to describe the average pitch or general “lie” of an *aria* or vocal part. A vocal part can be taxing despite the absence of extraordinarily high or low notes, due to the prevailing range or *tessitura*.

⁷ Dramatic Soprano: A powerful, dark and heavy soprano voice capable of sounding over a large orchestra, with marked declamatory and histrionic ability suitable for forceful, dramatic operatic roles.

⁸ Lyric Soprano: A light, focused soprano voice, easily produced and with a pleasant *cantabile* style, capable of sustaining long, flowing lines. The lyric soprano is not required or expected to carry over a large orchestra, nor expected to sing in a very high range.

at each other. Peremptory, black, strident but vibrato-less, it is the sound of tragic absolutes, quite different from the dark tints of Italian *morbidezza*, let alone the sweet warblings of a Galli-Curci.”⁹

Callas’s first mentor was the Spanish *coloratura* soprano¹⁰ Elvira de Hidalgo (1888 - 1980), who schooled her in the techniques of *bel canto*. Though *bel canto* is literally translated as “beautiful singing,” the term implies much more.¹¹ Through rigorous technical training in scales, runs, *abellimenti* (embellishments) and *legato*¹² singing, de Hidalgo taught Callas how to keep her voice “on the breath,” light and flexible, extending her already impressive vocal range, while brightening and colouring her *timbre*. Callas’s study with de Hidalgo left her in the unique position of having a great dramatic voice, capable of singing the heavy dramatic repertory such as Turandot, Gioconda and Isolde, but who was also trained to sing *coloratura*¹³ roles such as Rosina, Lucia and Gilda. “[De Hidalgo] knew I was a very heavy voice, but she knew also that such heavy voices should be kept limber” (Callas, cited in Lawton 1988: 158).



Figure 3.1: Callas with her erstwhile teacher Elvira de Hidalgo (1960).

Callas made her professional operatic debut in 1941 as Beatrice in Suppé’s *Boccaccio*. This was followed shortly thereafter by roles as Floria Tosca in Puccini’s *Tosca* (at the age of nineteen in 1942!),¹⁴ Martha in d’Albert’s *Tiefland* and as Leonora in Beethoven’s *Fidelio*. Her Italian debut came in 1947 in the title role of Ponchielli’s *La Gioconda*. The conductor of that performance was the Italian *maestro* Tullio Serafin (1878 - 1968), who invited her to Venice for the 1947/48 season, where she

⁹ The famous Italian *coloratura* soprano Amelita Galli-Curci (1882-1963).

¹⁰ Coloratura Soprano: The *coloratura* soprano is the highest of all female voice types, with an approximate range from C₄ to G₆. It is characterised by extreme agility in executing rapid scale passages.

¹¹ Callas herself described *bel canto* as “a specific training of the voice, the development of a technique for making full use of it as a player of the violin or the flute is trained to make full use of his instrument” (cited in Stassinopoulos 1980: 28). Later on, she added that “*bel canto* is a method of singing, a sort of straitjacket you must put on. You learn how to approach a note, how to attack it, how to form a *legato*, how to create a mood, how to breathe so that there is a feeling of only a beginning and ending. In between, it must seem as if you have taken only one big breath, though in actuality there will be many phrases with many little breaths. Above all, *bel canto* is expression. A beautiful sound alone is not enough” (Ardoin 1987: 3).

¹² Legato: From the Italian verb “legare,” meaning to bind or tie. The performance of music so that there is no perceptible pause between notes, i.e. the smooth passage from one note to another as opposed to *staccato*. In vocal music, *legato* passages are sung in one breath.

¹³ Coloratura: A term derived from the German “Koloratur.” The elaborate and agile ornamentation or embellishment of a melody, either extemporised or written, with runs, *cadenzas*, trills, roulades and the like. The term later came to apply to singers specialising in roles requiring great vocal agility and with an extraordinary developed higher register, hence *coloratura soprano* or *soprano leggiera*.

¹⁴ During the first fortnight of her performances as Tosca at the Royal Theatre in Athens in September 1942, Callas sang every other evening, which, according to Steane (1986) was “an extraordinary feat and probably accomplished at a price.”

sang *Isolde* and *Turandot*, followed shortly thereafter by her first *Norma*. Serafin, who possessed a profound understanding of the Italian *bel canto* tradition, taught Callas her authority of phrasing and attack, the value of a pause, and the way to shape a recitative.¹⁵ In her own words, he “showed me that there was a reason for everything, that even *fioriture*¹⁶ and trills... have a reason in the composer’s mind, that they are the expressions of the *stato d’animo* of the character. He taught me exactly the depth of music... I really drank all I could from that man” (cited in Christiansen 1986: 307).

The turning point in Callas’s career came during the 1948/49 season at the Fenice Theatre in Venice, when, while appearing as Brünnhilde in Wagner’s *Die Walküre*, she was asked by Serafin to sing Elvira in Bellini’s *I Puritani*, substituting for an indisposed Margherita Carosio. Though she objected at first, thinking her voice too heavy, Callas trusted Serafin and agreed. She had eight days to learn the complicated role of Elvira – one of the most demanding *coloratura* roles in the repertoire – in-between performances in *Die Walküre*, singing the “mighty, dramatic declamations of Brünnhilde on Wednesday and Friday,” while spending “all the time in between on Elvira’s trills, runs and roulades” (Stassinopoulos 1980: 63). The final performance of Brünnhilde was sung on the same day as the dress rehearsal of *I Puritani*. “Maria sang one of the highest coloratura parts and a couple of hours later she was singing... one of the most formidable dramatic roles in all opera” (Stassinopoulos 1980: 63). Two days later, on 19 January 1949, Callas, who was twenty-five, triumphed as Elvira. The Venetian critic Mario Nordi (cited in Levine 2003: 116) wrote that “a few days ago, a few were taken aback to read the name of a magnificent Brünnhilde, *Isolde* and *Turandot* announced in the role of Elvira. Last night everyone heard her and even the most sceptical had to admit that Maria Callas achieved a miracle... The warmth and expressiveness of her Elvira cannot be found in the fragile, transparent coldness of all other Elviras.”



Figure 3.2: Callas with life-long mentor Tullio Serafin.

¹⁵ Recitative: From the Italian *recitativo*. Declamatory passages designed to imitate and emphasise the natural inflections of speech. It is used especially in opera and oratorio to carry the action or plot from one *aria*, ensemble or chorus to another. In the *recitative*, the purely musical principles of vocal melody, phrase and rhythm are largely disregarded, being replaced by speech-like reiteration of the same note, slight inflections, irregular rhythms, purely syllabic treatment of the text, etc.

¹⁶ Fioritura: From the Italian for “flowering.” The florid vocal embellishment of the melody of an operatic aria, either written out or improvised.

Callas's performance as Elvira caused a furore and she quickly became the talk of Italy. For the first time in decades¹⁷ there was a dramatic soprano capable of singing florid roles. As the great stage director Franco Zeffirelli (b. 1923) noted after her death: "What she did in Venice was really incredible. You need to be familiar with opera to realise the size of her achievement that night. It was as if someone asked Birgit Nilsson, who is famous for her great Wagnerian voice, to substitute overnight for Beverly Sills, who is one of the top *coloratura* sopranos of our time" (Stassinopoulos 1980: 63). As Stassinopoulos furthermore points out, Serafin and Callas's "gamble had not merely succeeded: it marked the turning point in her career. A singer among singers was being transformed into the singer of the century."

A couple of days after the Venice *Puritani*, Callas was off to Palermo to sing Brünnhilde. A week later she was in Naples to sing four performances of *Turandot* and immediately thereafter travelled to Rome to sing Kundry in Wagner's *Parsifal*. After the success of her Venice *Puritani*, however, Callas gradually stopped singing the heavier repertoire and started to concentrate on the *bel canto* repertoire of Rossini, Bellini and Donizetti in order to "do good for the voice" (Levine 2003: 117). To this day, she remains one of the few singers in history whose repertoire has encompassed everything from Mozart to Wagner, Donizetti to Verdi.



3.3) VOCAL CHARACTERISTICS:

The basic quality of Callas's voice, according to Legge (cited in Schwarzkopf 1982: 198), was "luxurious, the technical skill phenomenal..." This was especially evident in her high *coloratura*: "Even in the most difficult *fioriture* there were no musical or technical difficulties in this part of the voice which she could not execute with astonishing, unostentatious ease. Her chromatic runs, particularly downwards, were beautifully smooth and *staccatos*¹⁸ almost unfailingly accurate, even in the trickiest intervals.¹⁹ There is hardly a bar in the whole range of nineteenth-century music for high soprano that seriously tested her powers..."

Callas's voice was by nature flawed. It divided into three very distinct, rather than perfectly knit, registers for the top, middle and bottom of her range. This imperfection led some commentators to

¹⁷ Not since Lilli Lehmann (1848 - 1929), who sang Constanze, the Queen of the Night, Norma, Violetta, Brünnhilde and Isolde, has any soprano been able to pull off a similar feat in singing such a variety of roles.

¹⁸ Staccato: From the Italian, "detached." A method of performance indicated by a dot placed over a note, calling for a reduction of its written duration so that it is shortened or "detached" from its successor by half or more of its value.

¹⁹ Callas's complete mastery over descending chromatic scales led commentators to label such passages the "Callas string of pearls" (Levine 2003: 137).

remark that she sang with three separate “voices.”²⁰ It was only in quick music, particularly descending scales, that Callas managed in joining these three “incompatible” voices into a unified whole. Prior to 1960, though, she disguised the audible “gear changes” with masterly skill. Ardoin (cited in Gage 2001: 36) remarked that “there were very basic physiological flaws in her voice from the beginning that could never be overcome. She disguised them, she made them look like they were part of the singing and she did this by incredible willpower, by constant studying and work.”

Callas’s top notes were brilliant, sometimes “to the point of stridency” (Ardoin 1995: 204) with a certain cutting edge or “steel.”²¹ Quite unique is the way she attacks notes “head on.” Instead of “approaching” a note from above or below with a “lift” and subtly shaping it, smoothing it out to make it sound more beautiful, she hits the note straight in its centre. “She sings through the centre of notes, fusing them together with her molten *legato*” noted Ardoin (1995: 64), while the critic Germaine Greer was of the opinion that “Callas actually screams. She is doing the one thing that every soprano is told not to do: she doesn’t float the top note, she goes straight through like a knife” (Davidson 1998).

With her debut at the Metropolitan Opera in New York on October 29, 1956 in Bellini’s *Norma*, the *New York Times* reported that Callas “flashed a sword-like power [in her upper register] that is already legend” (cited in Gage 2001: 10). Even so, the quality of her top notes could at times be unpredictable - a note produced “effortlessly and solidly one night might come out shrill and ragged three nights later” (Levine 2003: 112). As a result, Callas “often referred to her voice as an animal she couldn’t tame, and try though she did, it would betray her. ‘The Voice was answering tonight,’ she would say after a performance, or ‘the Voice was not obeying tonight’” (Levine 2003: 112). Following her Metropolitan debut, the *New York Times*’s critic, Howard Taubman, called Callas’s voice “puzzling... Occasionally, [her voice] gives the impression of having been formed [more] out of sheer will power than natural endowments...” (cited in Green 1998: 66), while Galli-Curci thought Callas’s voice “tortured” (cited in Green: 66).²² Christiansen (1986: 327) also refers to the “unnatural strain” which singers such as Pasta, Viardot, Fremstad and Callas have had to exert on their voices in order to

²⁰ In the foreword to Ardoin’s *Callas at Juilliard*, the Italian conductor Nicola Rescigno, a long-time friend and collaborator of Callas, remarked that “Callas has very often been accused of having three voices. Nonsense! She had three hundred. Every role she portrayed had a special voice, and within that particular *timbre* she would constantly change colours to convey the message of the composer” (Ardoin 1987: *xii*).

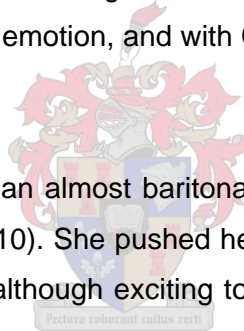
²¹ Steel: An adjective describing vocalised sounds whose hard, “edgy” tonal characteristics result from excessive force and from tongue and throat constriction. “Steely” singing can invariably be traced to an energised chest register driven too high in the tonal range, causing the throat to stiffen.

²² Ernest Legouvé (cited in Gattey 1979: 42) noted in his memoirs that he once overheard Maria Malibran practicing for a performance of Rosina in Rossini’s *The Barber of Seville*: “Every now and then she stopped short to scold her own voice, saying, ‘Obey me, I’ll make you obey me!’”

encompass certain roles. He notes, however, that had they been more cautious, their audiences would have been the poorer.

Callas's middle register has been referred to as "reedy," "veiled"²³ and "covered," but it was also her most expressive range.²⁴ Christiansen (1986: 311), for example, thought the "unmistakable grainy tone of the middle voice more resonant with emotion than anything [he has] ever heard in music." Contributing largely to Callas's distinct sound was an odd resonance in the mouth, similar to a buzz,²⁵ "as if she were singing into a bottle"²⁶ (Legge cited in Schwarzkopf 1982: 198). "She sounds as though she's singing with potatoes in her mouth," was how one co-singer described her Italian début in *La Gioconda* at Verona in 1947 (cited in Davidson 1998), while John Freeman (cited in Petkovic 2002), noted in a 1952 *Opera News* that the "masked tone" in Callas's middle register makes her at times sound as if she was singing "with a mouthful of hot marbles." Legge believed that this peculiar resonance "came from the extraordinary formation of her upper palate, shaped like a Gothic arch, not the Romanesque arch of the normal mouth." This "bottled-up"²⁷ or "muzzled" sound makes her voice instantly recognizable and she used this "flaw" to great advantage. As Ardoin (1995: 3) noted: "it was a voice that was uniquely armed to convey emotion, and with Callas one was rarely able to separate her voice from what she expressed with it."

The bottom range of Callas's voice had an almost baritone quality when she put pressure on lower notes for dramatic effect (Levine 2003: 110). She pushed her chest voice²⁸ up to a G₄²⁹ when she felt the text or drama would gain by it, and although exciting to the listener, was not particularly healthy,



²³ Veiled: An adjective describing vocalised sounds whose breathy tonal characteristics are produced by improper register and resonance adjustments.

²⁴ "It is this [veiled] quality which Maria Callas uses so superbly in producing the suffocating tone that makes her portrayals of moments of passionate sadness and anguish so unbearably moving" (Galatopoulos 1966: 101).

²⁵ Buzz: A tonal "buzz" is attributable to any or a combination of the following three sources: 1) a good, but approximate tuning of the laryngeal pharynx, 2) a slightly nasal quality imposed on the former condition and 3) pressure variations that result from puffs of air that escape during every undulating movement of the focal folds. A "buzzy" tone quality is generally considered undesirable and according to Reid (1995: 56), "is not an ascription applicable to the tones produced by great singers, which are clear ringing and well defined."

²⁶ Callas's voice was, as Ardoin (1995: 3) mentions, at times, a sound not unlike George Bernhard Shaw's famous description of a cello: "A bee buzzing in a stone jug."

²⁷ Bottled-Up: A phrase used to describe tones that are the product of pharyngeal constriction, and which therefore appear to be "caught," "swallowed" or "bottled up" in the throat; "throaty."

²⁸ Chest Voice: A term commonly used to refer to the lowest register of human voice, or to those tone qualities that respond to high levels of intensity in the lower pitch ranges. The term "chest voice" is actually a misnomer, as the sympathetic vibrations produced by the chest voice are not produced or resonated in the chest cavity, as commonly believed, but rather in the laryngeal pharynx. Any other vibrations experienced in the thoracic region are the result of bone conduction or other transmitting agents.

²⁹ During her master classes at the Julliard School of Music in 1971/1972, Callas pushed her chest voice up to B_{b4}, singing sections of the baritone aria "Cortigiani, vil razza dannata" from *Rigoletto* in demonstration to baritone Sung-Kil Kim.

especially if one considers that the *passagio*,³⁰ between the head³¹ and chest register for tenors³² and sopranos, usually lies between E to G above middle C (C₄).

Legge (in Schwarzkopf 1982: 198) noted that Callas's *legato* line was better than any other singer because "she knew that a *legato* must be like a telegraph wire or telephone wire, where you can see the line going through and the consonants are just perched on it like the feet of sparrows." He also notes that Callas had an unusually long rib cage for a woman of her height, which, along with her well-trained intercostal muscles, gave her the ability to sing and shape extraordinary long phrases in one breath without visible effort. Her superb *legato* line was always shaped by her vision of the meaning of the music. "Whatever [Callas's] vocal shortcomings," wrote Henry Pleasants, "she has reminded us that a long vocal line with a simple, unobtrusive accompaniment, or a brisk *cabaletta* delivered with conviction and scintillating virtuosity, are empty only if left empty by singers. To the singer of truly creative disposition they offer a scaffolding within which may be fashioned a musical edifice of the loveliest proportions, of compelling beauty and overpowering drama."

Callas excelled in the art of ornamentation as no other artist before or after her. Her taste, elegance and intensely musical use of ornamentation in all its forms – "the weighting and length of every *appoggiatura*,³³ the smooth incorporation of the turn in melodic lines, the accuracy and pacing of her trills, the seemingly inevitable timing of her *portamentos*,³⁴ varying their curve with enchanting grace and meaning," these along with the other "innumerable exquisite felicities – miniscule *portamentos* from one note to its nearest neighbour, or over widespread intervals – and changes of colour that were pure magic" were, according to some, the most admirable of her qualities as an artist (Legge in Schwarzkopf 1982: 199).

³⁰ Passagio: From the Italian for "passageway." The point or "break" at which the voice makes a transition from the chest voice to the head voice. In sopranos and tenors, the passagio usually lies between the notes E, F and G above middle C (C₄).

³¹ Head Voice: Tone qualities produced through the coordinate activity of both register mechanisms, the chest register and the *false* *setto*, but with the *false* *setto* strongly dominant. It so-called because the singer experiences a sensation of the voice vibrating in the head cavities.

³² Tenor: From the Italian "tenore," translated as "holding." The highest natural male voice with an approximate range from C below middle C upwards for two octaves. The term developed from the early polyphony (c. 1200 to 1500) as the vocal part that carries the *cantus firmus* and is therefore the basis for the addition of other vocal parts. Originally it was called the *vox principalis*, but later became known as the tenor part, in connection with the development of melismatic *organum*, in which the notes of the *cantus* were drawn out and sustained or "held."

³³ Appoggiatura: Leaning note. A term derived from the Italian verb "appoggiare" (to lean or support). A grace note inserted before a note, to support or emphasise a melodic or harmonic progression. It is as important as the note on which it "leans," from which it normally takes half the time-value (two-thirds the time-value if the supporting note is dotted).

³⁴ Portamento: From the Italian verb "portare," meaning to carry. A practice by which singers gradually slide from one note to another through all the intermediate pitches without a break.

3.4) VOCAL DECLINE:

Many reasons have been put forward to explain the premature and rapid decline of Callas's voice.³⁵ Her most persistent (and controversial) vocal problem was, as some called it, a "wobble"³⁶ – a "distinct fluctuation of the tone, a variation of the pitch, an undulation" (Levine 2003: 112), which appeared on sustained notes above G₅. It occurred as early as 1941, while Callas was appearing in *Boccacio* (Edwards 2001: 36) and again during her performances in Mexico City at the Palacio de las Bellas Artes, 1950 & 1951. After 1955, however, the "wobble" became increasingly pronounced. It was not a form of *vibrato*, a technique used by all singers and some instrumentalists as a means of expression and emphasis, which implies a slight variation of tone. "By 1960," as Levine (2003: 112) points out, "it was frequently awful – a note flapping in the wind, strident and outside of the correct pitch, which could wind up anywhere."³⁷

As mentioned earlier, the inherent physiological flaws in Callas's voice, was something which was impossible to overcome and by 1955 had probably started to catch up with her, irrespective of how well she tried to disguise the deficiencies in her voice. Notes Gage (2001: 36): "By nearly superhuman effort she almost always managed to force her voice where it did not go easily... After years of gruelling performances, even her talent and will could not make her vocal chords behave." According to Ardoin (cited in Gage 2001: 36), Callas's difficulty in sustaining a top C could be attributed to physiological vocal shortcomings: "B, B-flat, was no problem, but above that it was very difficult for her – the physiological machinery just wasn't there. But she knew this, and she knew as she got older it would get even harder and harder for her to sustain her reputation." In the *Callas Legacy*, Ardoin (1995: 8) furthermore notes that "this primal note for a soprano [a top C], often lay out of balance with the rest of Callas's voice even in her salad days. With no difficulty she could handle C-sharp or B, but C itself was frequently a fearsome hurdle. It could always be touched, but sustaining it, especially at *forte*,³⁸ was physically and mentally more a matter of will than technique."

³⁵ Green (1998: 66) stated that "Callas's technique, dazzling as it could be, was always to an extent incomplete. That incompleteness, together with her unbelievably broad repertory and the pressures to which she subjected herself, killed the voice in fifteen years, but at its best the technique served nobly an unexcelled vision of character in *bel canto* opera." The author, however, believes that, considering the fact that Callas's voice consisted of three separate registers, it was her voice, not her technique, which was "incomplete" or naturally flawed, because what and how Callas managed to do what she did with her voice, her technique, was amazing. As Legge (cited in Schwarzkopf 1982: 198) stated, her "technical skill was phenomenal."

³⁶ Wobble: An erratic and uncontrolled tonal movement in which neither the periodicity nor the amplitude of the sound waves produced are related to the particular pitch-intensity being sung. There are distinct physiological and qualitative differences between the wobble and other characteristic tonal movements such as the *vibrato* and *tremolo*. The perfectly even pulsations of the *vibrato* are desirable when called for, while the *tremolo* and wobble result from poor muscular co-ordination and indicate the presence of muscular interference and compensatory tensions. The wobble results from an overly dominant chest register forced too high in the tonal range, a fault that disrupts the stability of the laryngeal suspension.

³⁷ Legge, cited in Schwarzkopf (1982: 199), was even less kind: "But... can you, dear reader, swear that you have never winced at or flinched from some of her high notes, those that were more like pitched screams than musical sounds? Or those she waved at you like Isolde's scarf, so unsteady they could be mistaken for laboured trills? They were brave triumphs of will, but remote from the beauty that the term *bel canto* implies."

³⁸ Forte: From the Italian for "strong," i.e. loud (abbr. *f*). *Fortissimo* (*ff* or *fff*) means very loud.

Gage (2001: 36-37) relates how Callas had once asked the mezzo-soprano Giulietta Simionato, a life-long colleague and friend, why her voice should wobble out of control:

“I’ve already asked Hidalgo and others,’ Callas said. ‘Why does the natural and the flat always dance?’ Simionato’s answer was that Maria had not conserved her voice in her youth. ‘I told her, “You sang strong operas, like *Cavalleria* and *Tosca*, but you needed to sing, not yell.” But the poor girl inexperienced, yelled. You could see that she had injured the diaphragm³⁹ to a certain point that she couldn’t sustain her breath. The diaphragm is a muscle, like an elastic. Forcing this muscle, she had totally impoverished it. There was no more elasticity. And so that note, the “natural” and the “flat,” danced, because the diaphragm could no longer support it. When you lose the elasticity, there is nothing more you can do. Neither rest nor study. Nothing. “You have sung many operas too strongly,” I told her, “and not only that, you were too young!” She protested, “But it was necessary! My mother made me do it and I obeyed.””



Figure 3.3: Callas with soprano Elisabeth Schwarzkopf.

Legge (cited in Schwarzkopf 1982: 200-201) mentions that Callas ran into a patch of vocal difficulties as early as 1954. “During the *Forza*⁴⁰ recording the wobble had become so pronounced that I told her if we dared publish the records Angel and EMI would have to give away a seasickness pill with every side, which we could not afford. She took this to heart and worked hard on steadying down the wide pulse in her voice. She had several of her best years ahead of her.” One night, Callas insisted on having supper with Legge and his wife, the famous German soprano Elisabeth Schwarzkopf. “Callas walked in [the restaurant]... pecked my wife’s cheeks

and without sitting down said, ‘Show me how you sing top A’s and B’s and make a *diminuendo* on them. Walter says mine make him seasick.’ When Schwarzkopf demurred, Callas, ignoring the astonished diners, sang with full voice the notes that were giving her trouble, while Schwarzkopf felt her diaphragm, lower jaw, throat and ribs. Waiters froze in their stride, while guests turned to watch and hear the fun. Within minutes Schwarzkopf was singing the same notes while Callas prodded her in the same places to find out how she kept those notes steady. After twenty minutes or so she said, ‘I think I’ve got it. I’ll call you in the morning when I’ve tried it out,’ and sat down to supper. She did call the next day to say it worked, but the recording shows the cure was not complete.”

³⁹ Diaphragm: The large muscle that forms the partition between the chest cavity and the abdominal cavity, separating the respiratory and digestive systems.

⁴⁰ Verdi’s *La forza del destino*, recorded in Milan on August 17 – 27, 1954 for EMI.

Callas's sudden and dramatic weight loss between 1953 and 1954, when she was thirty, has become an integral part of the Callas legend. As Gage (2001: 65) points out, many people who can't even name a single opera Callas sang are aware of the fact that she transformed herself from obese *prima donna* into a thin fashion icon. She did this over a period of eighteen months on a stringent diet of salads and raw meat and ended up losing more than eighty pounds. Callas, the consummate actress, felt that in order to be convincing as some of the more fragile heroines she portrayed, such as for example Violetta in *La Traviata* or Cio-Cio-San in *Madama Butterfly*, she had to lose the excess weight.⁴¹ In a 1967 interview with Edward Downes, she commented: "...I was tired of playing a game like – for instance – playing a beautiful young woman, and I was a heavy, uncomfortable woman finding it difficult to move around."



Figure 3.4: Callas as Medea (Dallas, 1958).

During her 1953 performances of *Medea* at La Scala, Callas realised that her excessive weight was hampering her performances as the child-murdering princess: "My first instinct was to say that the face is too fat and I can't stand it, because I needed the chin for expression in certain very hard phrases, cruel phrases or tense phrases. And I felt – as the woman of the theatre that I was and am – that I needed these necklines and the chinlines to be very thin and very pronounced."

Was Callas's dramatic weight loss to blame for her increasing vocal difficulties? According to Pahlen (1973: 207), "every voice is, and must be, adapted to the physique of its owner, whose physical size and the resonance possibilities this allows play an extremely important part in singing. If a singer has geared her voice to the size of her body, and the basis of that voice, the resonance space, is suddenly reduced a great deal, the voice may well not find sufficient support any more. Also drastic slimming of this kind may weaken the whole body, which indirectly will have a negative effect on the voice. As a result, singers are generally loath to take slimming cures, and should only do so under the most careful supervision of experts who know something about both medicine and singing."

Christiansen (1986: 308), however, thinks the weight-loss idea "absurd... Muscular control, not bulk, is the key to healthy vocal production." Ardoin (1995: 80), with reference to the 1954 *La forza del destino*

⁴¹ According to Edwards (2001: 115), Callas, after seeing Audrey Hepburn in the film *Roman Holiday*, asked the great Italian director Luchino Visconti (1906 - 1976), if she too could be beautiful if she had a body like Hepburn's. "You would be too thin," he answered. "But beautiful?" she replied. "Well, you would be a truer *Traviata*, who after all is dying of consumption." "This," notes Edwards, "was all he needed to say. The next day she placed herself on a rigid diet, no pasta, no bread, and no alcohol. She ate only one meal at midday, despite her strenuous schedule."

recording mentioned above, argues that the tenuousness of Callas's upper range cannot be ascribed to her famous loss of weight from which she was emerging at this time. "As we have seen, her top could be precarious in her bulky days, just as it would be rock solid later when she was even slimmer. So much more was involved in how her voice responded; it was a combination of the inherent physical characteristics of her vocal chords, her own state of health and her mental well-being or unrest."

As the Callas legend grew, so too did her fears and insecurities. Her perfectionism led to greater anxiety, no performance ever being good enough anymore (though it is doubtful whether in her mind any performance ever met with her own exacting standards).⁴² Every fear, anxiety, insecurity and upheaval in her personal life started to have an instant, audible effect on her voice. "Much of her [vocal] difficulty," noted Christiansen (1986: 309), "stemmed from her psychology: what Walter Legge referred to as her 'superhuman inferiority complex' and her obsessive quest for self-improvement which must have started in her sad childhood efforts to win her mother's love." Callas herself once said that "only a happy bird can sing," and on another occasion: "It is not my voice which is sick, it is my nerves" (Stassinopoulos 1980: 188).

Many critics have claimed that Callas's going from the heavy repertoire to the lighter *bel canto* roles prepared the way for her vocal undoing. As Maria Caniglia states in Rasponi (1984: 242): "I remember Callas singing *Ifigenia in Tauride*, the lovely but heavy Gluck score, and then two or three weeks later *La sonnambula*, which requires incredible agility... No one can do this and not pay a heavy price for it later." Also, the wide range of roles that Callas sang no doubt played a large part in the loss of her voice and explains her tragically short heyday. William Ashbrook (in Parker 1994: 448) is of the opinion that "there is no doubt that damage was inflicted on her voice by the ill-considered range of roles that she threw herself into too soon. *Kundry* (even in Italian), *Gioconda*, and *Elvira* (in *I puritani*) are parts with contradictory requirements even for a healthy natural voice, and in a very real sense, Callas's voice was to some extent manufactured. In a few years the loss of steadiness at the top could no longer be disguised."

Another reason which has been put forward for Callas's rapid vocal decline was the serious sinus infections that began to plague her during the late 1950's. Her extremely painful sinusitis aggravated the instability and hardness of production in her top register, especially after 1959, causing her to force her voice. As a result, she damaged her abdominal muscles sometime during 1961.⁴³ In December of that year she sang three performances of *Medea* at La Scala, but was in such agonizing pain from a

⁴² "I'm never satisfied," Callas herself once said. "I'm personally incapable of enjoying what I have done well because I see so magnified the things I could have done better" (Gage 2001: 38).

⁴³ Galatopoulos (1966: 108) also mentions a hernia, for which Callas had to have an operation, which developed near her appendix and weakened her greatly.

severe case of sinusitis that she had to have an operation in between the last two performances on 14 and 20 December, in order to make it possible for her to sing the final performance. In 1962 she returned to La Scala for two performances of *Medea* on 29 May and 3 June. During rehearsals her sinus trouble returned, which made singing high or long notes excruciatingly painful. On opening night, as she stepped on stage to sing her first line “*Io? Medea!*” (I? Medea!), her voice cracked. The rest of the performance was, as Stassinopoulos (1980: 212) describes it, a “superhuman effort.” The following day the newspapers were filled with unfavourable reviews and many agreed that “the voice of the century” was in shreds. “It was unbearably sad to watch,” wrote the French critic Pierre-Jean Rémy, “her voice on the point of giving out, she somehow struggled through the part” (cited in Gage 2001: 232). It was the last time that Callas performed at La Scala. The following year she realized that serious work was needed to “retrain” her voice. During 1962 to 1963, she started working, in her own words, “from the beginning, like a student” (Ardoin 1995: 169).

Many people have also blamed Callas’s fateful love affair with the charismatic Greek shipping tycoon Aristotle Onassis (1904 - 1975) as the cause of her vocal undoing. But was Onassis to blame for the vocal difficulties that Callas had developed?

Callas and Onassis had met for the first time in 1957, but it was only during a cruise on Onassis’s yacht, the *Christina*, in 1959, that Callas fell in love with Onassis. Some biographers even speculate that it was the first time that she really fell in love - her husband at the time, the Italian industrialist Giovanni Battista Meneghini (1895 - 1981), was 28 years her senior and more of a father figure than an object of romantic interest for the young Callas. Having conquered the operatic world, her desire to perform had been steadily decreasing. She was getting tired of the arduous schedule and constant work that had been a part of her life since adolescence. She was “thrilled to give up the gruelling rehearsals, the nights of studying *libretti*,⁴⁴ the strenuous daily vocal exercises, the terrible stage fright before every performance, and the merciless criticisms whenever she missed a single note” (Gage 2001: 224). She also fully understood the perils and risks of her growing reputation, a reputation that was becoming harder and more difficult to sustain. “I would like to be Maria,” she said in one interview, “but there is also *La Callas*” (Giles 1999: 50).



Figure 3.5: The famous photo of Callas (in a chinchilla coat - a gift from Onassis) caught between her husband, Meneghini (on the right) and future lover, Onassis (on the left) at 3am, following a party hosted by Onassis in her honour.

⁴⁴ Libretto (-i): From the Italian, meaning “little book(s).” The text of a vocal work, such as an opera, oratorio, etc. The author is known as the “librettist.”

“It is a matter of loving my kind of voice or not. Some people say I have a beautiful voice. Some people say I have not. It is a matter of opinion. Some people say I have a unique voice, and some people say it’s just a whole big lie. That is also a matter of opinion. The only thing I can say is that people who don’t like me can just not come and hear me. Because I – when I don’t like something – I just don’t bother about it.”

Maria Callas (cited in Levine 2003: 112)

“I am a passionate artist and a passionate human being,” Callas had once told a British interviewer. “I believe in self-discipline and self-control. If you want to live in harmony with yourself, you have to work. Work very hard. I don’t agree with Descartes: ‘I think therefore I am.’ My motto is ‘I work therefore I am’” (cited in Gage 2001: 38). Now, only a few years later, Callas’s outlook on life and her ambitions had drastically changed. In a 1960 interview Callas stated that “I didn’t say yes to L’Opéra for *Medea*, didn’t say yes to La Scala, to Covent Garden. I no longer have a desire to sing. I wish to live, to live like any other woman... to have a baby. I’m thirty-six years old, with no one in my life, and I do not even know if I am capable of giving the day to a being [i.e. giving birth].” Callas was willing to give up her career, her singing, everything, in order to have a child and to be a doting wife to Onassis, whom she firmly believed would marry her after her separation from Meneghini. “You cannot serve two masters,” she told director Franco Zeffirelli. “All she wanted was to be with Onassis, to be his wife, his woman, his mistress. If he had not pushed her to go on singing, as a kind of showcase for himself, she probably would have stopped altogether” (Zeffirelli, cited in Stassinopoulos 1980: 182).

With Onassis, Callas would spend hours aboard the *Christina* swimming, sun-bathing, staying up late into the night talking, dancing and drinking” (Gage 2001: 225).

“After each of her increasingly rare performances, Callas would rush back to the sanctuary of the *Christina* and her ‘pasha’. Like Onassis, she felt more at home on the ship than anywhere else on earth. She didn’t practice on board; she didn’t even think about singing, and of course the neglect of her voice would only hasten the decline of her failing powers. Once, after a three week cruise, on the *Christina*, Princess Grace [of Monaco] scolded Maria for not having practiced once. Franco Zeffirelli, visiting her in the Paris apartment that Onassis had rented for her...later recalled that he also accused Maria of not practicing. It was clear she hadn’t touched a piano keyboard for months, he told her. ‘How do you know?’ Maria asked. I said ‘Look at your fingernails,’ and she... made a beautiful gesture with her hands, like a little girl, and said, ‘Yes, all right, but I’ve been distracted...I am trying to fulfil my life as a woman” (Gage 2001: 224).

As Callas spent more and more time with Onassis, her stage appearances decreased dramatically, until, by 1962, they ceased altogether and it was only at the occasional charity concert or recital that the public could still see Callas perform.

What is certain, though, is that Callas's rapid vocal decline was the inevitable result of "so many years devoted exclusively to performing at the highest levels" (Roubinet 2000). She lived through everything she sang with terrifying intensity, and on-stage became the character she was portraying - psychologically, physically and vocally.⁴⁵ "Callas gives you the cry of pain," stated Germaine Greer, "and what's amazing about it, is her control. She never loses it... She builds up the tension until the wire is so tight and plangent. But there is no relief and the sound becomes more and more desolate" (in Davidson 1998).

3.5) CONCLUSION:

Much has been written regarding the intrinsic beauty (or lack thereof) in Callas's voice. Many argue that her voice was ugly, shrill, "covered," etc., unable to produce the velvety tones of counterparts such as Renata Tebaldi. Others are of the opinion that Callas had indeed a beautiful voice, if by beautiful one implies singing sweetly, something that she certainly could do if the music, text and dramatic situation required it. Galatopoulos (1966: 104) argues that one should rather speak of "beautiful singing" and not of "a beautiful voice... It is like comparing a violinist playing on a Stradivarius with Kreisler playing an ordinary violin." Dramatic expression, rather than sweetness of tone or natural beauty of voice is more important in a singing artist, and is ultimately the key to understanding the genius of Callas's artistry.

Callas was not concerned with beautiful singing *per se*. She sang everything and anything she wanted to, in the manner she thought most appropriate to the character, the music and the text, leading her erstwhile teacher Elvira de Hidalgo to remark that "Maria abused her God-given gifts" (Levine 2003: 130). When Galatopoulos asked Tullio Serafin shortly before his death in 1968, whether he thought Callas's voice ugly or beautiful, he replied that her voice was the most beautiful sound that he had ever heard because it was always true. "I remember well the voice of Medea, Violetta, Lucia. Then there was Norma, Isolde, Amina. I could go on. I have known many of Callas's voices. Do you know I have never really considered whether her voice was ugly or beautiful. I only know that it was the right voice."

⁴⁵ Following Callas's death, the *New York Times* critic, Harold Schonberg, wrote that "Callas triumphed because of brains and temperament rather than intrinsic beauty of voice... Everything she did was musically and dramatically interesting... Others merely sang. Callas lived her roles" (cited in Gage 2001: 239).

According to Legge (in Schwarzkopf 1982: 199), Callas often remarked how “some of the texts we have to sing are not distinctive poetry. I know that to convey the dramatic effect to the audience and to myself I must produce sounds that are not beautiful. I don’t mind if they are ugly, as long as they are true.” As Callas herself noted:

“It is not enough to have a beautiful voice. What does that mean? When you interpret a role, you have a thousand colours to portray - happiness, joy, sorrow, fear. How can you do this with only a beautiful voice? Even if you sing harshly sometimes, as I have frequently done, it is a necessity of expression. You have to do it, even if people will not understand. But in the long run they will, because you must persuade them of what you are doing.”

Her detractors are quick in pointing out that while many singers have had successful careers spanning as long as three decades, Callas’s “prime” lasted a mere decade, some even arguing that she reached her peak between 1951-1955, and from there everything went downhill. And yet, it is important to remember that Callas’s operatic début was in 1939 at the age of fifteen, in other words, her career stretched from 1939 till 1965, when she appeared for a final time as Tosca at Covent Garden on 5 July of that year (her “come-back” in the ill-fated concert tour of 1973 is best forgotten). True, with her death in 1977, at the age of fifty-four, she should still have been singing magnificently, but as is often the case, genius is quick lived. As the well-known *New York Times* music critic Harold C. Schonberg (cited in Gage 2001: 376) noted after her death: “Her career was short and towards the end she was displaying only the shreds of a voice... But for some 15 years after 1947 she was a symbol fired into the very psyche of the opera-goer... She drove her audiences wild; she had a kind of electrical transmission that very few musicians have ever approached... Callas, dead at 53, blazed through the skies and was burned out very early. But what years those were!”

“Eugenio Gara once, in writing of Callas, invoked this apt Chinese proverb: ‘Who rides atop the tiger can never get off.’ When one considers the recorded evidence of Callas’s career, and charts the splendours, triumphs, audacity, and dangers of her ride, a compelling conclusion emerges: with so wide a repertoire and so intense an involvement with her roles, there is no doubt that Callas demanded more from her voice than it could comfortably deliver. Yet a parallel conclusion is equally clear: had she put herself in less peril, had she taken fewer chances or remained within safer limits, she would never have been Callas. You cannot achieve as she achieved by halfway measures.”

John Ardoin (1995: 203)

CHAPTER 4

A BRIEF OVERVIEW OF CALLAS RECORDINGS ON EMI¹

“Some in the company say we should be throwing roses on the Aegean Sea every year. Callas keeps the lights on here.”

Mike Farlow – Vice-President of EMI Classics (cited in Tommasini 2003a)

4.1) RECORDED OUTPUT:

Almost thirty years after her death, Callas remains EMI's biggest selling classical artist, with her recordings accounting for about 5% of EMI's yearly classical sales – more than any other classical artist on that division's current roster (Farlow, cited in Tommasini 2003a) and quite possibly more than any other classical artist ever. In 1997, the total sales figures of her recordings were estimated at 30 million discs to date and 750,000 CD's per annum (Loukakos 1997 & Gage 2001: *xix*). “It's amazing,” noted Farlow, “those records just keep selling.”

Callas's enormous output of recorded material is no doubt a result of the tremendous pressure that she exacted on herself, and consequently, her voice. The years from 1949 (her first commercial discs) to 1973/74 (her “farewell” tour) have yielded in sound thirty-four of her forty-seven roles complete, excerpts from an additional seven, as well as a potpourri of other material. In total, Callas recorded 23 complete operas for EMI. During her prime years, from 1953 - 1960, she produced two to four operatic sets per year. All her recordings from this period, except the *Cetra Traviata* (1953) and *Ricordi Medea* (1957), were made under the supervision of Walter Legge (1906 - 1979), Artist and Repertory Director of EMI's Columbia label.

It was Legge who was responsible for signing Callas to an exclusive recording contract with EMI in July 1952, following a year of exhausting negotiations. Callas was at the time still under contract with Cetra, a small Italian recording company, and as Ardoin (1995: *xv*) accurately points out, she was one of the first musicians of the 20th century whose achievements were captured in every modern recording format – 78 RPM records, LP's and CD's.

¹ The present chapter should be read in conjunction with Addendum A, a discography of Callas recordings released on EMI as part of the Callas Edition.

Callas's first recording was Elvira's "Qui la voce" from Act II of Bellini's *I puritani*. It was recorded by the Cetra label from 8 - 10 November 1949, and released as one of three 78's, the other two featuring "Casta Diva" from *Norma* and the "Liebestod" (sung in Italian) from *Tristan und Isolde*. Her first commercial discs shocked and surprised as many as it fascinated. "It not infrequently happens," wrote John Steane (1992: 151), "that the music in which one first hears a great singer becomes almost totally identified in the mind with that voice and that art. For many record-collectors it must have been so when they bought, in the last years of the old 78's, an aria² from *I puritani*, itself something of a rarity in those days, sung by a soprano whose name meant nothing unless through remote hearsay. It was also a long name, and at first one could not be sure of having it right. What became abundantly clear on first listening to the record was that this was a name that simply had to be remembered, and a more attentive look at the label afterwards established its syllables in correct order. Maria Meneghini Callas: new to us then, and never to be forgotten." Ardoin (1995: 5), commenting on her first 78 RPM recordings, noted that "there are few examples in singing where so absolute a command of voice is wedded with such equality to such agility and justness of dramatic statement. The wonder of that feat is doubled, coming from a woman of twenty-five."

4.2) CALLAS ON LP (1950's - 1980's):

Callas made the switch from Cetra to EMI "at a crucial moment in the recording industry – it was heading full steam into the era of the long-playing record and growing up in terms of promotion and packaging." Callas contributed a great deal to the emergence of the LP as a "fully developed artistic medium" Ardoin (1995: 63).

The earliest Callas LP recordings were characterised by an extraordinarily intimate, warm and "human" sound. As with other early mono LP releases, however, the recorded sound was often small, "boxy," constricted and did not favour the orchestra. According to Seletsky (2000: 241), those who have heard Callas "live" say that "the original [LP] pressings best capture the voice they remember, most accurately revealing its 'rainbow' of colouristic complexity."

As the mastering and pressing techniques of EMI and Angel (EMI's American subsidiary) gained in sophistication, sonic distinctions started appearing between different LP pressings. Seletsky (2000: 241), cites as an example a pressing of the 1954 *Norma*, pressed from stampers with the suffixes "1N" to "4N," that was sweeter but less articulate than a set pressed from later stampers. Furthermore, sets often combined different pressings, leading to subtle differences in sound even between sides of an LP.

² Aria: An elaborate composition for solo voice with instrumental accompaniment.

When Angel founder Dario Soria left EMI in December 1957, the new directors apparently decided to consolidate Angel sound, modelling it either on stereo sonority or what they imagined the American record buyers preferred. Mono Angel LP's were remastered, probably from second-generation tapes, and pressed in the United States by EMI/Capitol. Sonically, these pressings featured a more spacious³ orchestral sound, but a blurred and distant-sounding Callas (Seletsky 2000: 241).

Eventually, the mono 1953 *Lucia* and 1954 *Norma* were discontinued with the release of stereo remakes, but were soon after reissued under the Seraphim label (Angel's budget-priced series). The introduction of new masterings during the late-1950's and early-1960's introduced editing errors and careless omissions, such as the first note of Act II in the Angel *Madama Butterfly* and the ten-second opening timpani in the Seraphim *Lucia*. With the late-1950's US pressings, vinyl and surface quality began a steady decline. In addition, the 1960's and early-1970's Angel pressings introduced considerable dynamic compression, which, according to Seletsky (2000: 242), was absent in the original pressings.

The 1970's Angel LP pressings are characterised by a bright, lean sound that treated the voices with greater immediacy (though sometimes lacking warmth) and, according to Seletsky (2000: 242), revealed for the first time noticeable tape hiss in Callas recordings, no doubt brought about by the increased middle-upper frequencies. Seven more full-priced monophonic Callas sets were discontinued, all of them eventually remastered and reissued as Seraphim releases, except *Turandot*.

During the 1970's and early 1980's, European EMI affiliates devised two completely different methods of "updating" Callas's monophonic recordings. EMI Italiana and British EMI/HMV issued most of them in electronically reprocessed stereo (at full price), while in the US, the same operas were reissued in their original mono incarnations on budget Seraphim. British EMI/HMV, French EMI, German EMI and Toshiba/EMI, however, produced mono remasterings that sounded remarkably like the original pressings – "sweet, articulate and complex, but with more refinement and realistic orchestral sound, most satisfyingly revealing the full potential of the original tapes" (Seletsky 2000: 242). New masterings of the stereo recordings were also improved: the reverberant sound of the 1959 *Lucia* and 1960 *Norma* was corrected, as was the compression and colourlessness of the 1959 *La Gioconda* (Seletsky 2000: 243).

³ Spacious: A subjective term relating to the positive characteristic that describes the sense of space present around the instruments and vocalists. Synonymous with "open" and "airy."

4.3) THE FIRST CD'S (1984 – 1990):

With the advent of compact disc technology during the mid-1980's, Callas was one of the first modern artists to have her entire commercial output transferred to the new digital medium, and since then all of her extant pirated recordings have also been issued on CD. In 1995, Ardoin (1995: xv) wrote that:

“On compact disc [Callas's] voice emerges with greater fullness, presence and range. Comparing the LP edition with the CD equivalent of Callas's EMI recordings of, for example, *Aida* and *Rigoletto*, with their boxed-in, constricted sound, is a potent reminder of how much compression and compromise was involved in the production stages between the studio performance and the pressing of the LP's. Hearing Callas on CD brings one as close as is humanly possible to owning copies of the master tapes. It also allows one to experience whole acts without interruption, which in turn brings greater focus to Callas's dramatic insights and increases the impact of her performances. The non-commercial recordings benefit perhaps even more from the CD format because of the generally poor quality of vinyl used for the LP pressings of this broadcast and transistor material.”

The first generation CD's of Callas's studio recordings appeared between 1984 and 1990. They reproduced the extremely close miking of EMI's 1950's recordings, in some cases even exaggerating it. Fogel (1984) stated that much of Callas's tonal unsteadiness was emphasised by EMI's too close miking and firmly believes that Callas's reputation was damaged “by the generally admired Walter Legge's inability to see (or hear) how much better her art could have been served by miking at a great distance.” Comparisons between EMI and “pirate” recordings of “live” performances made at comparable times in her career support this argument. According to Fogel, no singer's voice was meant to be heard from five or ten feet away and record producers in general seem unable to recognise that close miking is not vocally flattering, especially with regards to Callas's problematic voice, a matter which will be examined in greater detail later in this study.

The first generation of CD's preserved and enhanced the breadth and richness of Callas's vocal timbre and musical expression. “Callas invariably sounds larger than life,” notes Seletsky (2000: 243), “projecting an exciting, palpable presence. Her slimmed 1954 to 1957 sound also comes closer to her 1953 voice, not at all an objectionable quality. Interestingly, the opposite is true of most later LP pressings, where Callas's earlier voice seems closer to her post-1953 sound.” EMI's apparent instinct was to try and replicate the sound of the original master tapes insofar as possible, as for example in the case of the 1954 *Norma*, pressed in Japan during 1985, which according to Seletsky (2000: 243),

faithfully reproduced the dark⁴ sweetness of the earliest LP's. Unfortunately, however, EMI also introduced new audio restoration techniques in an attempt to reduce the tape hiss present on the original master tapes, thereby slightly compromising the high frequency content on these initial CD's somewhat, most notably the 1956 *Trovatore* and 1953 *Tosca*.

Sections deleted from the last acts of *Forza* and *Gioconda* in all LP editions, for the sake of length, are restored and are heard for the first time in these CD's.

4.4) EMI CLASSICS (1991 – 1996):

Callas CD's underwent slight sonic alterations at the time EMI/Angel became "EMI Classics." According to Seletsky (2000: 243), these changes were the result of slight re-equalisation. EMI never alluded to them, or modified their catalogue numbers. The EMI Classics CD's of the early-mid 1990's are generally more spacious, brighter and more transparent than the earlier CD's, which were "heavier" in sound. Initial CD pressings that were muffled⁵ or opaque benefit most from the added brightness and transparency of the new remasterings. Sonic differences are also notable in pressings from different firms (ex. EMI Swindon, EMI Uden, Nimbus and Sonopress) and locations (Japan, UK, Holland, US and Germany). According to Seletsky (2000: 254), the Japanese pressings are sweeter, British CD's darker, Dutch CD's bright and focused, American CD's clear and bright, though sometimes lacking in warmth and German CD's the most present and close.

Seletsky (2000: 244) also noted that the pitch level of EMI's mono Callas pressings has been incrementally lowered over the years. The LP's of the 1960's are slightly flatter than the original pressings, while the Angel and Seraphim releases of the 1970's are frequently flatter still. The first CD's generally contain the lowest pitch levels. These discrepancies are fortunately less than a quarter of a tone. Though the lack of absolute pitch consistency may have been a result of speed-drift in 1950's recording equipment caused by changes in tape tension, it may also be that the original LP's were deliberately mastered slightly sharp to compensate for heavy tracking weights of the time and

⁴ Dark: The opposite of "bright," indicating weak high frequencies.

⁵ Muffled: A subjective term describing audio that sounds as though it is "covered with a blanket." Muffled sounds are usually characterised by weak high or upper-mid range frequencies.

later to accommodate the drag of in-play record-cleaning devices such as “wet-play”⁶ or the “Dust-Bug.”⁷ With the advent of CD, the lower pitch remained unchanged. Despite this, there are some complete “anomalies:” the first LP pressing of the 1959 stereo *Gioconda*, for example, is flatter than all subsequent issues, the pitch level of side two of the 1960’s Angel *Forza del destino* is lower than the rest of the set, a mastering defect, while the 1960’s Angel *Butterfly* and 1970’s pressing of the 1953 *Tosca* are flatter than either the original LP’s or the CD’s.

4.5) THE CALLAS EDITION (1997):

In 1997, to mark the twentieth anniversary of Callas death, EMI reissued its entire Callas catalogue in a newly remastered, attractively packaged “Callas Edition,” with some new, informatively written essays, chronologies of her appearances in each of her recorded roles, rare photographs, libretti and (in the European pressings) translated essays and libretti in French and German. The Callas Edition also included 11 recital discs, some additional “live” material never before released officially, a few items from EMI’s archives that were issued for the very first time (including a two-disc set of rarities) and a number of opera-highlight discs drawn from the complete sets. As initially released, the Callas Edition featured 31 complete opera releases, numbering 27 different operas, with *Cavalleria Rusticana* and *I pagliacci* packaged together in a single set, three *Lucia*’s and two each of *Norma*, *Traviata* and *Tosca*. The pricing of the opera sets were (are still) a mix between full- and mid-priced sets, with black packaging for the former and blue for the latter.

By 1997, Callas’s earliest studio recordings could be termed “historical” recordings. Instead of opting for a genuine restoration of the original master tapes, EMI decided to “modernise” the sound, as they had decades earlier with the sound of the 1970’s Angel LP’s. “Unlike any prior issuance, the newest versions evince no consolidated conviction about exactly how Callas’s voice *should* sound. The lack of forethought is apparent: whereas the first generation CD’s of Callas’s studio recordings were issued between 1984 and 1990, the Callas Edition appeared practically overnight in late 1997, a few entries released in 1998” (Seletsky 2000: 244).

⁶ “Wet playing” is an accepted, though rather controversial, method of cleaning LP’s. It refers to the playback of LP’s in a “wet” state by flooding the surface with a suitable (normally alcohol-based) cleaning solution (such as Lencoclean) during playback, thereby lifting dirt present in the grooves into suspension, improving the tracking of the stylus and greatly reducing surface noise. According to some critics, however, wet playing actually damages the groove walls of an LP. They argue that during normal LP playback, the friction of the (hard) diamond stylus against the (soft) vinyl groove causes the vinyl to heat up, actually deforming the groove wall. After a short while, the groove wall cools and returns to its original shape. If the LP is played wet, however, the fluid acts as a coolant, preventing the deformation process and thereby causing the stylus to permanently damage the groove walls.

⁷ The “Dust bug” was a tracking device developed by the firm of Cecil E. Watts Ltd. It was fixed to the LP turn-table, sweeping away dust particles from the LP surface and removing static charge during playback.

Whereas the sonic differences within the first generation CD releases were analogous to those between the original LP's, the remastered sound of the Callas Edition releases were entirely a result of the individual engineer's attitudes and levels of proficiency. Four EMI remastering engineers were responsible for remastering the Callas Edition: Allan Ramsay, Simon Gibson, Paul Baily and Andrew Walter.

Viewed as a whole, the Callas Edition remasterings are tremendously disappointing. Voices are either placed too close or sound too far back, distanced, often sounding thin,⁸ harsh and tight.⁹ In general, the new reissues lack the colour, warmth, sweetness and "human" sound that, according to Seletsky (2000: 245), have always characterised the Callas recordings. Also, there are noticeable differences in the various pressings. The Dutch/EU pressings of the Callas Edition have greater warmth and presence, if less transparency, and sound closer to the earlier CD's than the US pressings, the contrast doubtless a result of post-mastering equalisation.

4.6) REMASTERING THE MONO OPERA RECORDINGS:

According to Seletsky, the remastering engineers at EMI seem to have given priority to creating a greater transparency of instrumental texture in the monophonic remasterings. In so doing, however, the fullness and complexity of Callas's voice is sacrificed. "Even during her greatest years, Callas's detractors often alleged that her vocal tone lacked 'beauty;' by suppressing its warmth and presence, many new mono masterings do her voice a real disservice by making such accusations into self-fulfilled prophecies" (Seletsky 2000: 248).

Ramsay's monophonic remasterings include *I puritani* (1953), *Cavalleria Rusticana* (1953) and *Pagliacci* (1954) [released as one set], *Tosca* (1953), *Madama Butterfly* (1955), *Il Trovatore* (1956), *Un ballo in maschera* (1956) and *Turandot* (1957). Seletsky (2000: 245) is of the opinion that Ramsay's remasterings frequently have an artificial transparency. The US versions are "strangely dark at times," with strident¹⁰ upper frequencies. Though the *Puritani* has improved spaciousness and instrumental detail, Callas's early 1953 voice, loses some vibrancy, colour and presence when

⁸ Thin: Little or no bass output. Could also describe fundamentals that are weak compared with the number of harmonics.

⁹ Tight: An expression describing the sound picked up by a microphone placed very close to the recorded source. Also good low-frequency transient response and detail.

¹⁰ Strident: A subjective description that refers to too much treble or high-frequency output, making the sound shrill and harsh.

compared with previous CD incarnations. The overload distortion¹¹ in *Cavalleria* is accentuated by a “harsh, tight new sound,” while the voices in *Pagliacci* are distanced, cold and surrounded by an unnatural ambience. The US pressing of the *Turandot* remastering “imparts a bizarre, exotic, glittering instrumental transparency while orchestrally overwhelming Callas, whose sound is remote and muted,¹² her consonants unclear, almost as though she were turned away from the microphone” (Seletsky 2000: 246).

Gibson’s remasterings of monophonic EMI sets – *Lucia di Lammermoor* (1953), *Norma* (1954), *La forza del destino* (1954), *Il Turco in Italia* (1954), *Aida* (1955), *La bohème* (1956), *La sonnambula* (1957) and *Manon Lescaut* (1957) are strikingly different from Ramsay’s. They frequently “have even less room acoustic than the original LP’s, sounding close but airless, often muted and sometimes harsh” (Seletsky 2000: 247). In the *Forza* and *Aida*, tape hiss has been almost completely removed, resulting in noticeable upper-frequency loss. Consequently, in the *Forza*, Callas’s voice is “veiled¹³ and dark, these characteristics highlighted by the overemphasised bass and colourless new acoustic” (Seletsky 2000: 247), while in the *Manon Lescaut*, “the lack of acoustic space reduced the warmth and tenderness of Callas’s lower and middle registers heard on the LP’s and earlier CD’s.”

Baily was responsible for only one monophonic opera, the 1955 recording of *Rigoletto*, whose remastering is harsh. It also contains, as noted by Seletsky (2000: 247) another uninformed editing decision: the suppression of the sibilant in “sarà” on the climatic high B of “Caro nome,” changing the text from “tuo sarà” into the meaningless “tuo arà.” Despite EMI’s assurances that the problem will be corrected, no amendment has yet been made (Seletsky 2005: 387).

4.7) THE STEREO OPERA RECORDINGS:

Seletsky (2000: 248) is of the opinion that remasterings of the stereo operas are more successful. Not only is the cloudiness of Callas’s later voice somewhat mitigated, but the “wobble”¹⁴ also seems, at least, less pronounced.

¹¹ Overload: The distortion that occurs when an applied signal exceeds the level at which the system will produce its maximum output level.

¹² Muted: A subjective term indicating a rolled-off, depressed or dull midrange and treble.

¹³ Veiled: Vocalised sounds whose breathy tonal characteristics are produced by improper register and resonance adjustments.

Ramsay was responsible for three stereo opera reissues: *Il barbiere di Siviglia* (1957), *Lucia di Lammermoor* (1959) and *La Gioconda* (1959) – all of which have balance problems, the orchestral sound overwhelming and transparent. Callas’s voice is too thin in *Barbiere* and *Lucia*, and in *Gioconda*, it has a muted and distant quality that emphasises its encroaching decline (Seletsky 2000: 248).

The 1957 recording of *Medea* was remastered by Baily with “brilliance and immediacy.” However, notes Seletsky (2000: 248), the “rich envelope of sound” in Callas’s 1957 voice, present in all earlier releases, is lacking.

According to Seletsky (2000: 249), Walter achieves very musical results, but like Baily, was only responsible for two of Callas’s complete operas – the stereo remakes of *Norma* (1960) and *Tosca* (1964). Though the remastered *Norma* has “less incisiveness than the first CD version, it is sweeter and achieves a lovely transparency without hollowness,” remarkably similar to the fine English EMI/HMV LP mastering of the early 1980’s (Seletsky 2000: 249), while the *Tosca* is provided more “cushion” than the previous CD incarnation to compensate for its inherent sonic rawness.

“During the ten years of her unquestioned reign, between 1949 and 1959, [Callas] bestowed upon the lost souls of the world – disorientated and bewildered by the war – more music, more art, more humanity and warmth than any other individual of this century.”

Attila Csampai - Italian musicologist (cited in Gage 2001: xiv)

4.8) RECITAL DISCS:

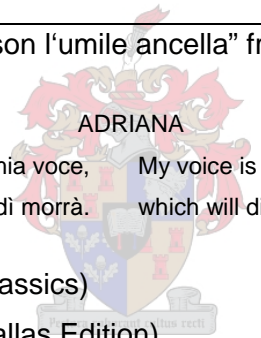
EMI have restored the contents of the original recital LP’s on the new recital discs, a major improvement over the earlier CD’s, which contained very confusing “mixing and matching” in order to maintain full price playing times of 70 minutes. For EMI’s latest reissues of the 1954 *Puccini Arias* and 1958 *Verdi Arias I* recitals in the “Great Artists” and “Legend” series, EMI returned to the confusing practice of filling out original LP contents with chronologically unrelated material (Seletsky 2005: 388).

Baily was responsible for the *Puccini Arias* (1954), *Lyric and Coloratura Arias* (1954) and *Verdi Arias III* (1964, 1965 & 1969) recital discs. The first two were remastered with sweetness, though with less vocal opulence or clarity than earlier versions. As initially released, the two identical channels of the

Puccini Arias were accidentally remastered 1/2500th of a second out of phase with one another. As it was recorded monophonically, pressing the mono button on an amplifier during playback should have had no effect, but due to the fact that the two channels are slightly out of sync with each other, doing so resulted in distortion.

On the original *Lyric and Coloratura Arias* recording, Callas's glottal sounding release of the final note in "Io son l'umile ancella" from Cilea's *Adriana Lecouvreur*, is succeeded by four little clicks that almost sound as if Callas is clicking her tongue in disapproval, followed by a brief exhalation at the end of the track. In the 1997 remastering, Baily has improved the glottal-sounding release and removed the clicks and exhalation (as can be heard in Example 4.2). The presence of these extraneous noises on releases prior to 1997 is perplexing, as they are not difficult to remove. According to Seletsky (2000: 249), EMI does not intend to restore the original sound, "thereby permanently altering a historical document." Unlike the other recital remasterings, *Verdi Arias III* is often saturated and bass-heavy, presenting Callas's voice less attractively than previous releases of the same material.

Example 4.1: Extract from "Io son l'umile ancella" from Act I of *Adriana Lecouvreur*



ADRIANA
Un soffio è la mia voce, My voice is a breath
che al nuovo dì morrà. which will die on the morrow.

CD 1 Track 1: 1986 remastering (EMI Classics)

CD 1 Track 2: 1997 remastering (EMI Callas Edition)

Gibson's remasterings include *Callas at La Scala* (1955), *Mad Scenes* (1958), *Verdi Arias II* (1963), *Rossini and Donizetti Arias* (1964), *Mozart, Beethoven and Weber Arias* (1963), *Callas à Paris I* (1961) and *Callas à Paris II* (1963). Apart from *Callas at La Scala*, Gibson handled the majority of the stereo recital discs, most of which (except the first Verdi recital album and the *Mad Scenes* disc) were recorded after Callas's vocal prime. Whereas the 1960's stereo recital LP's and first generation CD's exposed her vocal difficulties, Gibson's new remasterings, with lighter, thinner and more blended sound, are kinder to her voice, even if, as Seletsky (2000: 249) states, they may not be as honest or compelling. Despite a loss of vocal lushness, the new remasterings generally call attention to the "shapely phrasing and away from the cloudy vowels, registral gear-shifts and upper voice problems" (Seletsky 2000: 249). Both French recitals, the *Mozart, Beethoven and Weber Arias* and the *Donizetti and Rossini Arias* were mastered slightly sharper than earlier LP versions or the earlier CD's, and, despite EMI's assurances that corrections will be made, the pitch problems have remained unaddressed.

Verdi Arias I (1958), originally issued as *Verdi Heroines*, was remastered by Walter and *The EMI Rarities*, a 2-CD set of studio takes recorded between 1953 and 1969 that do not belong anywhere else, was remastered by Ramsay.

4.9) "LIVE" RECORDINGS:

Even with the most sophisticated audio restoration equipment at its disposal, EMI has not been able to solve or improve many of the problems in its reissues of "live" Callas performances. In addition, EMI has, regrettably, not located the best sources or bothered to correct the distortion and pitch inaccuracies that plague these releases.

EMI's 1990 release of the famous 1955 Berlin *Lucia di Lammermoor* under Karajan, mastered by Baily, is extremely bright and the singers are heard with a close, focused presence that, unfortunately, also accentuates the overload distortion in the "Mad Scene." By comparison, Ramsay's 1997 remastering has less vocal core and an electronic sounding edge. Although the "Mad Scene" distortion is reduced, so too is the colour, weight and volume of Callas's voice.

Baily's 1990 remastering of the 1955 Scala *Traviata* under Giulini, and Ramsay's new version, are distorted, strident and lacking in bass. Both EMI versions of the "live" *Anna Bolena* (1957), Gibson's 1993 mastering and its 1997 incarnation, are a semi-tone low in pitch and muffled in sound as a result of poor source selection (Seletsky 2000: 251). The source tape for Gibson's 1993 remastering of the Carnegie Hall *Pirata* (1959) begins a semitone flat, coming up to pitch gradually over the course of half an hour, in addition to unpleasant overload distortion. The new mastering by Ramsay has similar problems and less presence. According to Seletsky (2000: 251), the original *Pirata* tape, made in-house by hired sound professionals, is conserved in an opera archive and it is surprising that EMI did not seek it out. The 1998 release of *Ifigenia in Tauride* (1957), mastered by Gibson, is distorted and unfocused, its poor quality incomprehensible, considering that inexpensive LP versions had crisp, clear sound (Seletsky 2000: 251).

The 2-CD set *Live in Concert* comprises the complete Amsterdam concert of July 1959, selections from four RAI concerts (1951, 1952, 1954 and 1956), the 1957 Athens "Liebestod" and the controversial "Nina Foresti" audition from the 1935 Major Bowes Amateur Hour radio programme, with

all references to the name of “Nina Foresti” omitted.¹⁵ Several orchestral and ensemble passages have been deleted from the selections of the four RAI concerts. EMI also only includes one aria from both the 1951 and 1956 concerts. Pitch analysis has corroborated Seletsky’s claim that the 1954 “D’Amore al dolce impero” from Rossini’s *Armida* is nearly a semitone high, while most of its orchestral introduction has been excised. Compared with the 2002 EMI release (from a different and more reliable sound source) the differences in pitch are clearly audible.

Example 4.2: Extract from “D’Amore al dolce impero” from Act II of *Armida*

ARMIDA

D’Amore al dolce impero	To Love’s sweet power
Natura ognor soggiace.	Nature is always subject.
Dov’è quell’alma audace	Where is there an audacious soul
che non apprezzi Amor?	that has no regard for Love?

CD 1 Track 3: 1997 remastering (“Maria Callas – Live in Concert“)

CD 1 Track 4: 2002 remastering (“Maria Callas – Live in Rome 1952 & San Remo 1954“)



Figure 4.1: Callas in the recording studio.

¹⁵ The earliest known recording of Maria Callas dates from 7 April 1935, when, at the age of eleven (!), she sang “Un bel di vedremo” from *Madama Butterfly* on the Major Bowes Amateur Hour broadcast under the pseudonym of “Nina Foresti.” She had appeared under a false name, presumably invented to prevent her father’s knowing, for he disapproved of his wife’s domineering ambitions regarding Callas’s musical career. The “Foresti” audition (given a D rating by the Bowes staff with the note, “faint possibility for future”) revealed a weak, yet mature sounding singing voice unlike anything known to be like Callas. Her speaking voice, however, in a brief interview with Bowes before the audition, bears a striking resemblance. To complicate matters, Callas denied ever singing under any name but her own, although she later confided to her friend Nadia Stancioff that “When I was a kid, I took part in a singing competition. My father didn’t like the idea because I was too young. In fact, my mother raised my age to sixteen so that I could qualify. I called myself Anita Duval. That way my father wouldn’t find out. Afterwards I switched to Nina Foresti. I thought that sounded more like an opera singer.” The fact that Foresti, Duval and Callas were one and the same person was also later confirmed by Callas’s cousin, Stephen Linakis, in his book *Diva: Life and Death of Maria Callas* (Ardoin 1995: 2).

4.10) NEW RELEASES:

Over the years, EMI has had to contend with various independent record labels that have released unauthorised or “pirate” recordings of Callas in “live” opera and concert performances. In 2002, however, the looming expiration of copyright on EMI’s extensive Callas selection forced the company to strike a deal with an independent Milan-based record label, Marcal Records (“Mar-Cal” for Maria Callas), previously trading as Diva,¹⁶ the largest producer of unofficial Callas recordings, in order to ensure EMI’s continued presence in the market.¹⁷ According to Tommasini (2003a), the “expected crush of material entering the public domain has already sent... EMI Classics into a shotgun marriage with a renegade label that it had long tried to shut down to protect its lucrative Callas discography.”

Subsequently, EMI have added to its catalogue a significant number of “live” (or rather “pirated”) opera and concert performances, sourced primarily from Marcal, recordings that, in the past, it was trying to suppress. In doing so, EMI has, apart from the obvious financial benefits, secured an opportunity to present newly remastered versions of these recordings to the widest possible audience and to copyright “high-quality material that, for years after falling into the public domain, had been making the rounds in multiple pirated editions lacking any real semblance of quality control” (Mandel 2004: 32). It would seem that EMI is hoping that their quality presentation will draw Callas fans from cheaper alternatives. As added incentive, EMI are selling their new releases at mid-price.

This was, however, not the first time that EMI had added previously unauthorised recordings to their holdings. Already in 1980, the company had issued on LP the so-called “Lisbon *Traviata*” of 1958, after its initial plan of a Callas *Traviata* of its own had been foiled by the soprano’s contractual obligation that she not re-record the opera for a number of years following her 1953 studio account for Cetra (please refer to the discussion of that particular recording in Chapter 10). Later, EMI would provide an even better alternative to the Lisbon *Traviata* with the 1997 release of its 1955 La Scala *Traviata*, conducted by Carlo Maria Giulini. As was the case with *Traviata*, there are various other instances of operas that Callas never recorded in the studio complete (ex. *Anna Bolena*, *Macbeth*, *Il*

¹⁶ In 1999, Jackie Callas claimed sole proprietorship over Callas’s “live” performances and had her lawyers send threatening letters to small independent labels issuing “live” Callas recordings. As Seletsky (2005: 389) states, the participation of many other artists in these performances made Jackie Callas’s claims ludicrous. Although ignored by most, some of these record labels were intimidated enough to heed her threats. Along with a business partner by the name of Sakkaris, Jackie Callas founded the Sakkaris/Diva record label, which issued CD’s of “live” Callas performances that were according to Seletsky (2005: 389), “ineptly cloned” from other labels such as Hunt/Arkadia, Legendary, Rodolphe and Melodram. Due to the poor sound quality of the releases, the enterprise was eventually terminated, but reconstituted in 2001 by Jackie Callas as Marcal Investments.

¹⁷ According to Richard Lyttelton, president of classics and jazz for EMI Recorded Music, EMI was in opposition to Diva for many years. “But there has been an irresistible pull for us to work together.” With this deal, as Lyttelton explained, EMI “wanted to try to legitimise the market” for these “live” Callas recordings, “rather than try to suppress it” (cited in Tommasini 2003a).

pirata, *Poliuto* and *Iphigenia en Tauride*) and other instances where the “live” performances are preferable to her studio recordings (ex. *La sonnambula*, *Un ballo in maschera* and *Medea*). The latter had been studio recorded in 1957 not by EMI itself, but by Ricordi, a set subsequently licensed by EMI and released as part of the Callas Edition. Ricordi recently, however, did not renew EMI’s licence, and the set has been discontinued.¹⁸

Following EMI’s deal with Marcal in early 2002, the company later that year issued a batch of “live” material to mark the 25th anniversary of Callas’s death, including four complete operas and five concert discs sourced from Marcal. These were the electrifying 1953 La Scala *Medea* conducted by Bernstein, a 1955 La Scala *Andrea Chénier* (the only occasion on which Callas sang the role of Maddalena di Coigny), a *La sonnambula* from 1955, conducted by Bernstein and *Un ballo in maschera* from the 1957 La Scala season. Of the *Sonnambula*, Bernstein would later remark that it was “the closest to a perfect opera performance I’ve ever witnessed,” and during rehearsals wrote to his wife “Callas is greater than ever. She has shrunk to a pinpoint, and is positively beautiful, even offstage. We had our first reading today and she made me cry” (cited in Milazzo 2003: 219). The 2002 recital releases comprised “Live in Rome 1952 & San Remo 1954,” “Live in Milan 1956 & Athens 1957,” a “Rehearsal in Dallas 1957,” for a concert to celebrate the inauguration of the Dallas Civic Opera on 21 November 1957 – “one of the most valuable documents of Callas’s art” (Milazzo 2003: 220), “Live in Paris 1958” and “Live in London 1958 & 1959.”

Last year, to mark the 80th anniversary of Callas’s birth, EMI released four more opera sets and five more concert discs: the 1951 Mexico City *Aida* from Callas’s second Mexico season which contains the extended high E-flat (seven seconds in length!) that Callas interpolates at the end of the “Triumphal Scene,” the 1964 Covent Garden *Tosca*; the 1952 *Norma* - Callas’s Covent Garden début - and the 1957 Cologne *La sonnambula*, which Ardoin (1995: 122) referred to as “a mythic night in Callas’s career, where voice, intent and technique were in miraculous balance.” The new recital discs were of concerts “Live in Hamburg 1959,” “Live in Stuttgart 1959,” “Live in Amsterdam 1959,” “Live in London 1961 & 1962” and “Live in Paris 1963 & 1976.”

The new EMI/Marcal releases are, according to Seletsky (2005: 390), “re-EQ’s, usually inferior, of pre-existing CD sources,” their track placement and timings often identical to editions on Myto, Verona, Hunt/Arkadia, Melodram, Gala/Movieplay and others.

¹⁸ BMG apparently now owns the rights to the studio *Medea*, but they have not yet reissued it (Seletsky 2005: 390).

The 1953 La Scala *Medea*, for example, was copied from the out-of-print Verona CD set. Though the sound is muffled, it replaces the now discontinued 1957 studio *Medea* in the Callas Edition. The 1952 Covent Garden *Norma* (taken either from Verona or AS-Disc) is a few minutes too long because of noticeable downward speed drift – it is spread over three compact discs, while consistently pitched versions on Melodram and Legato are on two discs. Seletsky (2005: 390) states that the 1957 Scala *Un ballo in maschera* is drawn from a source where the first phrase is missing and the second phrase copied in its place, making the opera appear to open with two identical phrases in subdominant harmony. Golden Melodram’s version contains no such error. EMI has produced a good mastering of the 1955 Scala *Sonnambula*, which is copied from Myto (with identical timings). Also, the 1951 Mexico City *Aida*, copied from an out-of-print Melodram set (all the Spanish announcements are identically deleted/faded) is an improvement in that EMI consolidated the first two acts on one 79’30” disc. Seletsky (2005: 390) states that EMI also “abbreviated some of Melodram’s infamous faked applause loops, though inadvertently retaining part of one that inaccurately overlaps a few notes in the final scene of Act IV.”

Concerning the new “live” recital releases, Seletsky (2005) states that many of the new issues are based on “awful CD sources.” The 1952 RAI recital, for example, has already appeared in EMI’s 1997 *Live in Concert* set from a far superior source (please refer to Example 4.4). The EMI release of the 27 February 1962 London concert has been cloned from Movieplay, as the final *cabaletta*¹⁹ of the *Anna Bolena* scene is missing in both versions. The only other CD version, on Melodram, taken from a more complete copy of the original source, includes it (although Melodram bizarrely splices in the missing end of the *Macbeth* aria from the 1952 Scala performance).

Example 4.3: Extract from “Or tutti sorgete” from Act I of *Macbeth*

LADY MACBETH

Duncanò sar\` qui?	Duncan will be here?
Qui? Qui la notte?	Here? Here for the night?
Or tutti sorgete, ministri infernale	Now arise, all you ministers of hell,
che al sangue incorate,	who incite,
spingete i mortali!	spur mortals to bloodshed!

CD 1 Track 5: 1997 remastering (“Maria Callas – Live in Concert”)

CD 1 Track 6: 2002 remastering (“Maria Callas – Live in Rome 1952 & San Remo 1954”)

¹⁹ Cabaletta: From the Italian “cavata,” meaning “extraction.” The final section of an elaborate *aria* or duet, where the music settles to a quick, uniform rhythm.

4.11) REISSUES ON NAXOS HISTORICAL:

LP transfers of Callas recordings, most notably from Naxos, are appearing on the heels of each copyright expiration. To date, Naxos has released their own versions of the 1953 *Lucia, Puritani* and *Tosca*, the 1954 *Norma*, the 1952 Cetra *Gioconda* and the 1953 Cetra *La Traviata*. Mark Obert-Thorn has been responsible for transferring the EMI sets, while Ward Marston handled the Cetra recordings.

In his 2005 “Callas Recording Update,” Seletsky (2005: 388) stated that the “ubiquitous use of the CEDAR declipping process, with its side-effect of ‘hearing’ upper-octave transients as noise and subtly erasing them, is no problem with 78’s, which seldom have much high-frequency content. CEDAR’s unpredictable characteristic, however, is a distinct problem with full-range LP’s.” According to Seletsky, Obert-Thorn’s LP transfers are warm and do not suffer from the same shrillness²⁰ that mar some of the EMI Callas Edition reissues. In contrast with EMI releases, his transfers are consistently pitched and correct many long-standing editing errors that are found in EMI versions. Even so, “an overzealous use of CEDAR and perhaps personal preference, have resulted in the diminution of midrange clarity and a dulled upper range, with loss of transparency and articulation. It appears that Obert-Thorn’s complete elimination of surface noise via overly aggressive interventionist processing impedes the advantages of faithful LP sound, even if EMI’s often metallic sound and careless errors certainly cannot be deemed preferable” (Seletsky 2005: 388).

Seletsky also believes that the upper frequencies in Marston’s LP transfers of the 1952 *Gioconda* are likewise “rolled-off,”²¹ losing much of the forward,²² crisp, transparent sound heard on the original Cetra LP’s and states that “I would have preferred a brighter, more articulate sound even at the cost of retained surface noise” (Seletsky 2005: 389).

Marston’s exceptional transfer of the Cetra *Traviata* is, however, in Seletsky’s opinion “clearer, sweeter, more transparent and exciting than any other remastering of the recording” (2005: 389). As in his earlier article, “Callas at EMI: Remastering and Perception,” published in the *Opera Quarterly* in 2000, Seletsky reiterates his belief that with few exceptions, “Callas’s studio recordings are best experienced on vinyl, the older the pressing, the better.”

²⁰ Shrill: An “edgy,” piercing vocal tone quality, caused by a high laryngeal position (i.e. throat constriction) and a consequent spreading of the oropharynx (the pharyngeal cavity directly behind the mouth, directly above the laryngeal pharynx and directly below the nasopharynx).

²¹ Roll-Off: The attenuation of signal components beyond a specified frequency, at a gradually increasing rate.

²² Forward: A subjective term that refers to vocals, male and female, which are considered very prominent, almost as if the singer was standing close to the listener. Can also be used as a negative term – if singers sound too close it may indicate that the midrange is boosted or exaggerated.

CHAPTER 5

TOSCA (1953)

“The supreme Callas recording.”

Walter Legge (cited in Schwarzkopf 1982: 197)

TOSCA

Opera in three acts by Giacomo Puccini (1858 - 1924)

Libretto: Luigi Illica and Giuseppe Giacosa based on a play by Victorien Sardou

Floria Tosca	Maria Callas (soprano)
Mario Cavaradossi	Giuseppe Di Stefano (tenor)
Scarpia	Tito Gobbi (baritone)
Angelotti	Franco Calabrese (bass)
Sacristan	Melchiorre Luise (bass)
Spoletta	Angelo Mercuriali (tenor)
Sciarrone	Dario Caselli (bass)
Shepard	Alvaro Cordova (boy soprano)

Orchestra and Chorus of La Scala Opera House, Milan

Chorus Master: Vittore Veneziani

Conductor: Victor De Sabata

Recorded in the Teatro alla Scala, Milan on 10 - 14, 16 and 18 - 21 August 1953, for EMI.

Producer: Walter Legge

Balance Engineer: Unknown

5.1) INTRODUCTION:

Few recordings can claim the legendary status attributed to this performance of *Tosca*. More than fifty years after it was first recorded, various releases and reissues later (its latest incarnation appeared in 2004), it is still considered *the* definitive recording of Puccini's opera and one of the greatest recordings ever made. As David Patmore (2004) noted: "To hear this recording is to witness not only a great moment in operatic history, but also a realisation of Puccini's score that has never been equalled." According to Ardoin (1995: 69), it is a "complete theatrical experience" and in the special world of opera on disc, belongs to the "handful of sets that by general consent [are considered] ideal."

Tosca was a role that was closely associated with Callas and her influence continues to cast a long shadow on the opera. It proved her first great operatic success when she sang the role for the first time in August 1942 in Athens and also her last, when she made her final operatic appearance at Covent Garden on 5 July 1965. In total, it is a role she sang 37 times. Even so, she considered it one of her least favourite roles, though it is difficult to understand why. In a 1967 interview with Edward Downes, Callas remarked that the role of *Tosca* is “not that great... In the first act [she] is a nervous girl that is always complaining,” and that “*Vissi d’arte*” (*Tosca*’s only aria in the opera) “should be cut out...because it stops completely the action.” Perhaps her first 1942 production was also to blame for leaving its mark: “We rehearsed for three months,” she was later to comment. “I got so tired that even today that opera occupied the last place on my scale of preferences.”

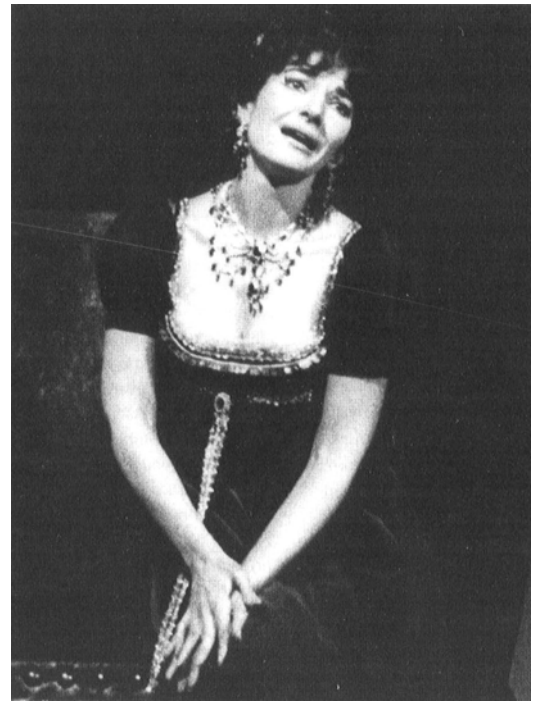


Figure 5.1: “*Vissi d’arte*” - Covent Garden (London), 1964.

Patrick Giles, in an article entitled “Leap of Faith: Embracing *Tosca*” that appeared in *Opera News* in 1999, stated that there were two performances of *Tosca* that permanently elevated Puccini’s opera above the realm of frivolity and disdain: the unquiet desperation of Callas’s *Tosca* and the chilling ruthlessness of Tito Gobbi’s *Scarpia*, in the 1964 Covent Garden production that was captured on video (Act II only) and remains as harrowing as ever even after repeated samplings, as well as Callas’s two 1965 Metropolitan Opera *Tosca*’s, of which Irving Kolodin wrote, “When the stage was cleared for action... everyone knew why Callas was Callas.” The only drawback to these performances, according to Giles, was that they set such a daunting standard. Thirty-five years later, “no *Tosca* or *Scarpia* has surpassed them – and it’s beginning to look like no one ever will.”

Regarding her interpretation of *Tosca*, Huck (1984: 176) wrote that “the qualities that set Callas apart from so many other great singers [was] the ability to convey emotion with her voice and the readiness to think a character’s thoughts during performance. Great acting does not mean looking pretty or moving deftly about the stage; it means the willingness to merge your personality with the character you are impersonating. What the Callas recordings have always established is that this singer could achieve that identification and deliver it through her voice alone. [Each of Callas’s *Tosca* recordings] offers its own fresh insights into the character and her predicament. Especially when interacting with another character, Callas’s *Tosca* is of the moment, and how she says what she says belongs to that particular moment.”

“Callas’s *Tosca* [at the Royal Opera House] is superb. All that we look for – the beauty, the quickness of response, the womanliness, the sudden flares and flickers over her steady love, the anguish, the courage – all are there. And so is something else which cannot be defined – it has to do with bearing and gesture, and timbre, and phrasing, and utterance of the words, all combined – the mysterious qualities which not only make her Callas, but also make every heroine she portrays distinct and indelible.”

Andrew Porter - *Financial Times*, 22 January 1964 (cited in Edwards 2001: vii)

5.2) BACKGROUND TO THE PRESENT RECORDING:

Legge and EMI worked Callas hard in 1953, the first full calendar year of their new contract. This recording of *Tosca* was the fourth recording Callas made for EMI’s Columbia label (Angel Records in the US) that year and also the first of her two studio recordings of the opera.¹ According to John Steane (1986), it dates from “what was probably the best phase of Callas’s career. Her voice and art were then, in 1953, probably at their best point of equilibrium. The art itself was growing almost by the hour, and the voice, its natural beauty matured and mellowed, was still an obedient instrument.”



Figure 5.2: Callas with Walter Legge and Victor de Sabata during the *Tosca* recording sessions – La Scala (Milan), 1953.

Whereas the previous 1953 recordings of *Lucia di Lammermoor*, *I Puritani* and *Cavalleria Rusticana* were conducted by Tullio Serafin, *Tosca* was conducted by the then musical director of La Scala, Victor De Sabata. Apart from superb performances from all the principals involved, it is largely due to de Sabata’s influence and unique realisation of Puccini’s powerful score that this, his only studio opera recording, has earned its iconic status.²

¹ Callas’s second recording of *Tosca* (in stereo), dates from 1964. It was reportedly meant as the soundtrack for a film of the opera, to be directed by Franco Zeffirelli, which never materialised. The recording, conducted by Georges Prêtre, features Carlo Bergonzi and Tito Gobbi as Mario Cavaradossi and Scarpia, respectively, and was recorded from 3 - 14 December, 1964 in Paris.

² Conrad L. Osborne, in his assessment of the recording in *The Metropolitan Opera Guide to Recorded Opera* (London, 1993), cited in Osborne (2002), wrote that “de Sabata shows the essential operatic understanding – that of how each accent, each rhythmic event, each melodic scrap or harmonic tint, can be used without distortion or undue highlighting to help impel the dramatic moment, to build the dramatic arch and maintain suspense. The power of his *Te Deum* is unequalled in my experience, and in the confrontations of Act 2 the conductor unleashes orchestral storms that are all the more vicious for being so disciplined and focused.”

De Sabata, who had served under Arturo Toscanini, was unrelenting in his perfectionism.³ According to Legge, the *Te Deum* finale to Act 1 took two sessions (six hours) to record, with Tito Gobbi having to repeat some passages as many as thirty times, changing the inflections and colours even on individual syllables before the conductor was satisfied (cited in Schwarzkopf 1982: 197). Callas, though, had arrived in superb voice, and was extremely well prepared. It was only for her final words of Act II, “E avanti a lui tremava tutta Roma” (“All Rome trembled before him”), that she was put through De Sabata’s “grinding mill” for half an hour – “time well spent” according to Legge. Having used “miles of tape,” Legge requested that De Sabata help during the editing process in selecting what was to be used in the finished master tape. He replied: “My work is finished. We are both artists, I give you this casket of uncut jewels and leave it entirely to you to make a crown worthy of Puccini and my work” (cited in Schwarzkopf 1982: 197).

Technically, too, the recording is an absolute *tour de force*. Legge managed in recording the outstanding performances of all involved in excellent sound, with a depth⁴ and atmosphere unusual for the period. Tosca’s Act I entry, for example, with its three cries of “Mario!,” was experimented with endlessly to achieve optimal spatial results within the limitations of mono sound, recorded separately and then spliced together on the master tape.

At the time, EMI had a contractual collaboration with La Scala, which stipulated that they would employ the resources of La Scala (choir, orchestra and venue) for their recordings. Except for *Lucia* (which was recorded with the choir and orchestra of the *Maggio Musicale Fiorentino* and recorded in the *Teatro Comunale* in Florence) and *I Puritani* (which was recorded in the *Basilica di Santa Eufemia* in Milan), *Tosca*, like *Cavalleria Rusticana*, was recorded at La Scala. This, however, proved a problematic recording venue acoustically.

5.3) RELEASE HISTORY:

This recording of *Tosca* was first issued in December 1953 as Columbia 33CX 1094-95 and in the US as Angel 3508. Following various LP versions (including a simulated stereo version), the recording appeared in 1984 in its first CD incarnation, released as EMI 47175 and in the US as 47174, followed by a second CD remastering in 1992 – EMI 64422. In 1997, *Tosca* appeared in the EMI Callas Edition (EMI 56304), in a new remastering by Allan Ramsay. In 2002, the recording was released as part of EMI’s “Great Recordings of the Century” (GROTC) series (EMI 62890), again with a new remastering by Allan Ramsay. This was the first time that EMI had offered the performance at less than full price. Having lost a lawsuit in the US in an attempt to stop the release

³ De Sabata once said of the experience of conducting: “I have in my mind a million notes and every one which is not perfect makes me mad” (Osborne 2002).

⁴ Depth: The apparent relative distances of various instruments or voices as perceived by the listener.

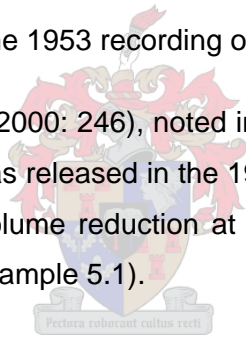
of out-of-copyright recordings from their catalogue, EMI decided to release their own budget-priced versions of those recordings that have entered the public domain. Thus followed their latest budget release in 2003 as part of the Historical series (EMI 85644), stating on the CD's that the recording was "Digitally Remastered At Abbey Road Studios From The Original Tapes." The GROTC and Historical releases are both based on the same remastering. Naxos was the first record company to release their own version of the recording in 2004 (8.110256-57), which was painstakingly transferred from various LP sets by Mark Obert-Thorn, after the recording fell out of copyright.

Table 5.1 provides a complete listing of the recordings used in comparing the different remasterings:

RELEASE	DATE OF REMASTERING	CATALOGUE NO.	REMASTERING ENGINEER
Columbia LP	1953 ⁵	33J CX 1094-95	N/A
EMI Classics (Highlights)	1985	CDM 7 64422 2	Unknown ⁶
EMI Callas Edition	1997	5 56304 2	Allan Ramsay
EMI GROTC	2002	5 62830 2	Allan Ramsay
EMI Historical	2002	5 85644 2	Allan Ramsay
Naxos Historical	2004	8.110256-57	Mark Obert-Thorn

Table 5.1: Reissues of the 1953 recording of *Tosca* used in this study.

Callas scholar, dr. Robert E. Seletsky (2000: 246), noted in his article "Callas at EMI: Remastering and Perception," that the 1953 *Tosca*, as released in the 1997 EMI Callas Edition, contains several editorial corrections, particularly the volume reduction at *Tosca*'s "Ah! Piuttosto giù mi avvento!" during her Act 2 scene with *Scarpia* (Example 5.1).



Example 5.1: "Ah! Piuttosto giù mi avvento!" from Act II of *Tosca*

SCARPIA

Mia! Mia! Sì, t'avrò!... Mine! Mine! Yes, I will have you...

TOSCA (running toward the window)

Ah! Piuttosto giù mi avvento! Ah! I'll jump out first!

SCARPIA (coldly)

In pegno il Mario tuo mi resta! I hold your Mario in pawn!

TOSCA

Ah! miserabile... L'orribil mercato! Oh, wretch... Oh, ghastly bargain...

CD 1 Track 7: 1985 remastering (EMI Classics)

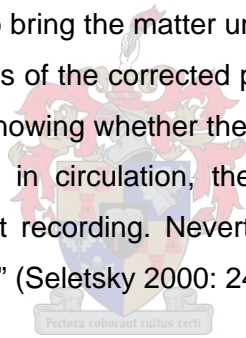
CD 1 Track 8: 1997 remastering (EMI Callas Edition)

⁵ Though the original Columbia LP set was released in Britain in December 1953, the LP's used for comparison in this study were pressed in South Africa. No release date is indicated on the cover or the actual LP's, though it would probably have been pressed either in 1954/5. The catalogue number and cover art is exactly the same in both versions.

⁶ Prior to 1997, no remastering engineers are credited by EMI for the remasterings of the Callas recordings.

Seletsky was also the first to point out that *Tosca*, as initially released in 1997, contained a “profoundly disturbing example of engineering recklessness.” EMI’s Allan Ramsay, who was responsible for the 1997 Callas Edition remastering of this recording, “corrected” what he presumed to be an editing error but is, in fact, “an interpretive subtlety that Callas incorporated into both her recordings of *Tosca* and all “live” performances following the first recording. At her entrance, she calls Mario’s name three times, each more insistent than the previous one, to indicate her approach. The third and last “Mario!” is preceded by an agogic pause and is then elongated; it is also the loudest and the closest - the only one of the three that Callas sings at a normal distance from the microphone. Without consulting other Callas versions - including EMI’s own second Callas *Tosca*, Ramsay deleted the third “Mario!” perhaps because it contains a slightly audible thump or sounded too different from the other two, and replaced it with a copy of the second. He then deleted the spaces, so that the three calls emerge dovetailed and identical, all spatial effect and musical subtlety removed. The effect is reminiscent of a defective, repeating CD. With the original third “Mario” replaced and its surrounding musical time eliminated, Di Stefano’s voice jumps in early, the initial sibilant of his reply “Son qui” cropped.”

Seletsky contacted EMI in June 1998 to bring the matter under their attention. Though the passage was finally restored in April 1999, copies of the corrected pressing were not identified. Prospective purchasers at the time had no way of knowing whether the copy in hand contained the error or not. “With thousands of inaccurate copies in circulation, the damage is done, creating a strange anomaly in the history of an important recording. Nevertheless, one must be grateful that EMI made the correction, however belatedly” (Seletsky 2000: 247).



5.4) DISCREPENCIES IN PITCH:

That, however, was not the last controversy to surround this iconic recording. Mark Obert-Thorn’s producer’s note in the Naxos Historical release (given here in full) sparked various new debates:

“This classic performance, arguably the finest studio recording of a complete opera ever made, has never been out of the catalogue in the past half century, and has been reissued many times in various formats. As Callas scholar Dr. Robert E. Seletsky has noted, however, no previous release, including EMI’s latest “Great Recordings of the Century” CD incarnation, has been free from mastering or editing problems.

The original LPs featured pitch discrepancies between and even within sides. There were also bad edits and sudden, obtrusive volume fluctuations. On EMI’s three CD issues, some of these problems were corrected in one edition and then undone in the

next, while other, new editing errors crept in (for ex. the change to the three “Mario!”s in Tosca’s Act I entrance on the first Callas Edition pressings). The most recent GROTC transfer compounded the problems by pitching the recording noticeably flat, an error which, in addition to adding nearly a minute and a half to the running time of this relatively brief opera, also affects the listener’s perception of tempi and vocal *timbres*.

For the present transfer, I assembled no fewer than ten LP copies of the set, and spent the greater part of eight weeks transferring, listening, comparing and re-doing the project until I was satisfied with the results.”



Figure 5.3: Callas (Tosca) in the 1964 Covent Garden production, directed by Franco Zeffirelli.

The question of correct pitch is obviously of considerable importance. Christopher Howell, who reviewed the Naxos release in the February issue of Music Web International (Howell 2004b), claimed that the Naxos transfer is pitched at $A = 438\text{Hz}$, which makes it fractionally lower than the internationally accepted standard pitch of $A = 440\text{Hz}$. In response, Mark Obert-Thorn stated that he pitched the recording at $A = 440\text{Hz}$, using a precision Korg Autochromatic Tuner to check the pitch during the transferral process. According to Obert-Thorn, the EMI GROTC release and the new EMI budget release, which is based on the same remastering, “both start out at $A = 436\text{Hz}$ – much lower than any major orchestra would have tuned in 1953, and lower than EMI themselves pitched the recording in their first two CD traversals.” He furthermore claims that the

original LP’s start at about $A = 441\text{Hz}$ but vary thereafter, going down considerably in pitch during the end of Side 2 (the first part of Act II) (cited in Howell 2004b).

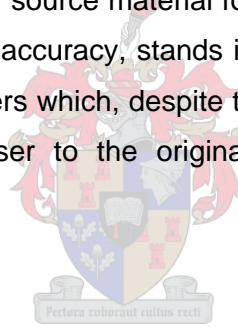
Following Howell’s and Obert-Thorn’s remarks, Seletsky (cited in Howell 2004b) noted that...

“Most of the original Columbia/Angel EMI releases (and other Italian recordings) were actually sharp, either because of recording equipment, LP mastering decisions, or simple day-to-day pitch inconsistencies at opera houses.

The 1953 *Tosca*, as played on the original LP’s at 33.3 RPM, beginning at $A = 440/1\text{Hz}$, is among the lowest-pitched of that epoch’s Italian operatic recordings. Throughout the recording, however, the pitch deviates from the first measurement. Mr.

Obert-Thorn's painstaking, minute corrections to solidify pitch at A = 440Hz throughout *Tosca*, about which he and I had much discussion, is actually a first. It is doubtful that the oboe gave the same 'A' at every recording session, but by making the entire recording consistent at the standard modern 'A,' Mr. Obert-Thorn has, at least, minimized the rather extreme variations throughout the recording that probably don't reflect the sessions as much as speed drift in 1950's recording equipment. That EMI never addressed the issue throughout their various *Tosca* incarnations, all made with the luxury of the original tapes, is inexcusable. As noted, the 2002 EMI incarnation in the "Great Recordings of the Century" series, and its recently released, cheaply packaged twofer version, is the latest irresponsible act: beginning almost a quarter-tone low, the speed drift from the old tapes played on new equipment yields pitch levels that not only start very flat, but vary so wildly throughout as to make one blush. Clearly EMI now treats Callas as nothing more than a commodity, undeserving of such simple artistic courtesies as the correct or consistent pitching of her work.

While transfers made from original tapes have the possibility of yielding purer results, EMI's generally poor treatment of source material for Callas's *oeuvre* since 1997, with regard to pitch and overall sonic accuracy, stands in sharp contrast to the care taken in these first legitimate LP transfers which, despite the limits of the LP and LP transfer technology, ironically come closer to the originally envisioned result than EMI's careless tape transfers."



5.5) TRACK TIMINGS:

The track timings of the various versions of *Tosca* are shown in Table 5.3 – 5.5. These timings represent the actual duration of the various tracks, excluding pauses at the beginning and end of tracks, such as at the beginning or end of an act. The timings given in Table 5.3 – 5.5 therefore differ greatly from the track timings given in the CD booklets of the respective releases. Shaded tracks indicate greatest variation in timing between the different versions and also those tracks used for pitch analysis.

As can be seen, the track timings for the 2002 GROTC and 2003 EMI Historical releases are exactly the same, owing to the fact that both issues are of the same mastering. Table 5.2 shows the total duration of the entire recording for all six releases:



Figure 5.4: Callas, Giuseppe Di Stefano and Tito Gobbi during the *Tosca* recording sessions - La Scala (Milan), 1953.

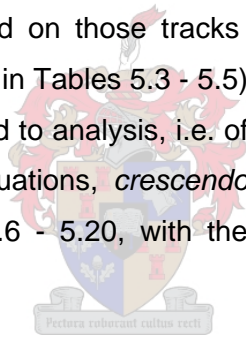
ACT	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
ACT I	42:18	N/A	42:28	42:50	42:50	42:14
ACT II	39:25	N/A	39:34	39:55	39:55	39:32
ACT III	25:29	N/A	25:35	25:45	25:45	25:39
TOTAL DURATION:	107:12	N/A	107:37	108:30	108:30	107:25

Table 5.2: Total duration of *Tosca* (1953 recording).

Table 5.2 indicates that the total duration of the GROTC release is indeed longer than previous EMI releases or the 2004 Naxos reissue, though not quite the “minute and a half” claimed by Obert-Thorn and Seletsky.

5.6) PITCH ANALYSIS:

To test the claims made by Seletsky and Obert-Thorn regarding the pitch differences of the various reissues, pitch analysis was performed on those tracks that showed the greatest variations in timing (these tracks are slightly shaded in Tables 5.3 - 5.5). From each of these tracks a number of notes were selected that are best suited to analysis, i.e. of reasonable duration, consistent in pitch and without *portamenti*, intensity fluctuations, *crescendo/decrescendo*,⁷ etc. The results of the pitch analysis are shown in Tables 5.6 - 5.20, with the selected notes circled in the notation examples.



The results of the pitch analysis support the track timings listed in Tables 6.3 - 6.5, proving that the 2002 EMI remastering, as released in the EMI GROTC and Historical reissues, is pitched slightly flat compared with the original LP's, previous EMI CD versions or the Naxos Historical release.



Figure 5.5: Victor de Sabata and Walter Legge, with Callas, Giuseppe Di Stefano and Tito Gobbi, during the *Tosca* recording sessions - La Scala (Milan), 1953.

⁷ Crescendo: Increasing in volume. Opposite of *decrescendo* (also known as *diminuendo*).

Track	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
1. <i>Ah! Finalmente!</i>	2:00	N/A	2:00	2:03	2:03	2:00
2. <i>E sempre lava!</i>	2:13	N/A	2:13	2:14	2:14	2:12
3. <i>Sante ampolle! Il suo ritratto!</i>	1:12	N/A	1:13	1:14	1:14	1:13
4. <i>Dammi i colori... Recondita armonia</i>	4:21	N/A	4:21	4:24	4:24	4:20
5. <i>Gente là dentro!</i>	1:09	1:09	1:09	1:10	1:10	1:09
6. <i>Mario! Mario! Mario!... Son qui!</i>	2:01	2:02	2:01	2:03	2:03	2:01
7. <i>Ora stammi a sentir</i>	3:08	3:08	3:08	3:10	3:10	3:07
8. <i>Or lasciami al lavoro</i>	1:46	1:46	1:46	1:47	1:47	1:44
9. <i>Ah, quegli occhi... Quale occhio al mondo</i>	1:33	1:33	1:33	1:34	1:34	1:34
10. <i>Mia gelosa!</i>	3:34	3:33	3:31	3:35	3:35	3:34
11. <i>È buona la mia Tosca</i>	3:28	N/A	3:29	3:31	3:31	3:27
12. <i>Sommo giubilo, Eccellenza!</i>	1:21	N/A	1:22	1:23	1:23	1:21
13. <i>Un tal baccano in chiesa!</i>	3:41	N/A	3:42	3:43	3:43	3:41
14. <i>Tosca? Che non mi veda</i>	2:48	N/A	2:46	2:50	2:50	2:48
15. <i>Ed io venivo a lui tutta dogliosa</i>	3:43	N/A	3:43	3:46	3:46	3:43
16. <i>Tre sbirri, una carrozza</i>	4:20	N/A	4:20	4:23	4:23	4:20
Total Timing:	42:18	N/A	42:28	42:50	42:50	42:14

Table 5.3: Track timings from Act I, *Tosca* (1953 recording).

Track	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
1. <i>Tosca è un buon falco!</i>	3:01	N/A	3:03	3:05	3:05	3:02
2. <i>Ha più forte sapore</i>	1:11	N/A	1:11	1:16	1:16	1:11
3. <i>O galantuomo, come andò la caccia?</i>	1:05	N/A	1:06	1:01	1:01	1:04
4. <i>Meno male!</i>	2:29	N/A	2:29	2:31	2:31	2:29
5. <i>Ov'è Angelotti?</i>	2:46	N/A	2:47	2:47	2:47	2:45
6. <i>Ed or fra noi parliam da buoni amici</i>	1:07	N/A	1:07	1:08	1:08	1:07
7. <i>Sciarrone, che dice il Cavalier?</i>	2:50	N/A	2:49	2:51	2:51	2:51
8. <i>Orsù, Tosca, parlate</i>	3:24	N/A	3:24	3:27	3:27	3:25
9. <i>Floria!...Amore</i>	1:25	1:25	1:25	1:26	1:26	1:25
10. <i>Vittoria! Vittoria!</i>	1:14	1:14	1:15	1:15	1:15	1:14
11. <i>Salvatelo!...lo?..Voi!</i>	2:10	2:10	2:11	2:11	2:11	2:10
12. <i>Se la giurata fede debbo tradir...Già mi struggea l'amor</i>	2:11	2:11	2:11	2:11	2:11	2:10
13. <i>Come tu mi odi!</i>	1:23	1:24	1:24	1:25	1:25	1:25
14. <i>Vissi d'arte</i>	3:13	3:13	3:12	3:15	3:15	3:14
15. <i>Vedi, le man giunte io stendo a te!</i>	3:10	3:10	3:10	3:11	3:11	3:11
16. <i>Io tenni la promessa</i>	1:59	1:59	2:00	2:03	2:03	2:00
17. <i>Tosca, finalmente mia!</i>	1:05	1:06	1:06	1:06	1:06	1:06
18. <i>È morto! Or gli perdono!</i>	3:42	3:42	3:44	3:46	3:46	3:43
Total Timing:	39:25	N/A	39:34	39:55	39:55	39:32

Table 5.4: Track timings from Act II, *Tosca* (1953 recording).

Track	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
1. <i>Io de' sospiri</i>	2:46	N/A	2:46	2:48	2:48	2:48
2. <i>Lento (Le campane suonano mattutino)</i>	2:46	N/A	2:48	2:48	2:48	2:47
3. <i>Mario Cavaradossi? A voi...</i>	4:01	N/A	4:02	4:04	4:04	4:02
4. <i>E lucevan le stelle</i>	2:45	2:46	2:46	2:47	2:47	2:46
5. <i>Ah! Franchigia a Floria Tosca</i>	2:32	2:32	2:32	2:34	2:34	2:33
6. <i>O dolci mani mansuete e pure</i>	1:28	1:28	1:28	1:28	1:28	1:28
7. <i>Senti, l'ora è vicina</i>	1:29	1:30	1:30	1:29	1:29	1:29
8. <i>Amaro sol per te m'era il morire</i>	1:53	1:54	1:53	1:54	1:54	1:55
9. <i>E non giungono</i>	2:24	2:25	2:25	2:26	2:26	2:25
10. <i>Come è lunga l'attesa!</i>	2:14	2:14	2:14	2:15	2:15	2:15
11. <i>Presto! Su, Mario!</i>	1:11	1:11	1:11	1:12	1:12	1:11
Total Timing:	25:29	N/A	25:35	25:45	25:45	25:39

Table 5.5: Track timings from Act III, *Tosca* (1953 recording).



EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33J CX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
<p><i>VIVACE COME PRIMA</i></p>  <p>vol- to.</p>	283 Hz	N/A	279 Hz	278 Hz	278 Hz	284 Hz
	471 Hz	N/A	471 Hz	466 Hz	466 Hz	474 Hz

Table 5.6: Pitch Analysis – “Ah Finalmente” from Act I, *Tosca* (1953 recording).




EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 <p><i>rall.</i> Dammi i co-</p>	220 Hz	N/A	219 Hz	217 Hz	217 Hz	221 Hz
 <p>ni- a</p>	333 Hz	N/A	333 Hz	329 Hz	329 Hz	335 Hz
 <p>To- — sca sei</p>	472 Hz	N/A	472 Hz	467 Hz	467 Hz	474 Hz

Table 5.7: Pitch Analysis – “Dammi i colori... Recondita armonia” from Act I, *Tosca* (1953 recording).





EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33J CX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 can- to,	703 Hz	702 Hz	700 Hz	693 Hz	693 Hz	702 Hz
 ten- to?	628 Hz	628 Hz	628 Hz	622 Hz	622 Hz	632 Hz
 spet- ta? ni- doa noi	626 Hz	625 Hz	624 Hz	617 Hz	617 Hz	627 Hz
 bor,	648 Hz	648 Hz	641 Hz	641 Hz	642 Hz	645 Hz

Table 5.8: Pitch Analysis – “Ora stammi a sentir” from Act I, *Tosca* (1953 recording).

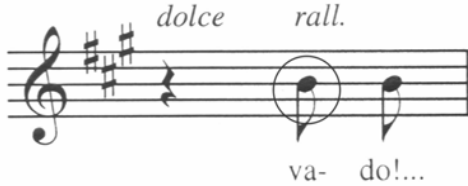


EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 <p><i>dolce rall.</i> va- do!...</p>	495 Hz	492 Hz	491 Hz	486 Hz	486 Hz	495 Hz
 <p><i>quasi a piacere</i> Ri- di? Que-</p>	600 Hz	597 Hz	598 Hz	590 Hz	590 Hz	601 Hz
 <p>Gui- ra!</p>	526 Hz	524 Hz	525 Hz	521 Hz	521 Hz	528 Hz

Table 5.9: Pitch Analysis – “Or lasciami al lavoro” from Act I, *Tosca* (1953 recording).

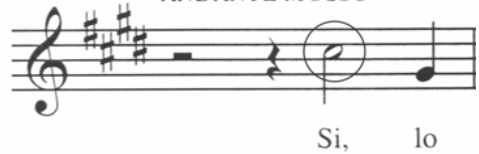
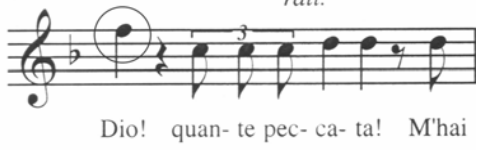

EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
<p><i>ANDANTE MOSSO</i></p>  <p>Si, lo</p>	575 Hz	568 Hz	568 Hz	564 Hz	564 Hz	577 Hz
<p><i>rall.</i></p>  <p>Dio! quan- te pec- ca- ta! M'hai</p>	712 Hz	714 Hz	713 Hz	706 Hz	706 Hz	715 Hz
 <p>ne- ri!...</p>	555 Hz	555 Hz	555 Hz	550 Hz	550 Hz	556 Hz

Table 5.10: Pitch Analysis – “Mia gelosa” from Act I, *Tosca* (1953 recording).

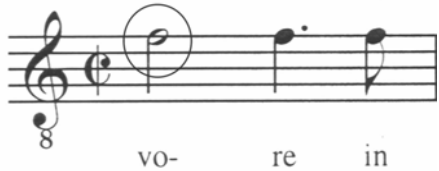

EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 <p>vo- re in</p>	713 Hz	N/A	714 Hz	705 Hz	705 Hz	721 Hz
 <p><i>deciso con energia</i> stas- se, vi sal- ve-</p>	497 Hz	N/A	493 Hz	489 Hz	489 Hz	496 Hz

Table 5.11: Pitch Analysis – “E buona la mia” *Tosca* from Act I, *Tosca* (1953 recording).




EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 <p>ANDANTE MESTO</p> <p>io ve- ni- vo-a</p>	677 Hz	N/A	677 Hz	670 Hz	670 Hz	678 Hz
 <p>Oh qual so- spet- to!</p>	716 Hz	N/A	715 Hz	709 Hz	709 Hz	715 Hz
 <p>do- na...</p>	394 Hz	N/A	393 Hz	386 Hz	386 Hz	394 Hz

Table 5.12: Pitch Analysis – “Ed io venivo a lui tutta dogliosa” from Act I, *Tosca* (1953 recording).





EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 <p>po- re... — la con- qui- sta vio</p>	271 Hz	N/A	269 Hz	268 Hz	268 Hz	268 Hz
 <p>tar- ra, ne oro sco- po di</p>	279 Hz	N/A	279 Hz	276 Hz	276 Hz	279 Hz
 <p><i>f</i> Bra- mo.- La</p>	337 Hz	N/A	335 Hz	331 Hz	331 Hz	336 Hz
 <p>O...</p>	361 Hz	N/A	358 Hz	354 Hz	354 Hz	359 Hz

Table 5.13: Pitch Analysis – “Ha più forte sapore” from Act II, *Tosca* (1953 recording).



EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 <p>ca- sa...</p>	666 Hz	N/A	658 Hz	653 Hz	653 Hz	658 Hz
 <p>ge- sto</p>	443 Hz	N/A	441 Hz	437 Hz	437 Hz	443 Hz

Table 5.14: Pitch Analysis - “O galantuomo” from Act II, *Tosca* (1953 recording).



EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 <p>nul- la! ah!... — do- vrei men- tir?</p>	901 Hz	N/A	897 Hz	891 Hz	891 Hz	905 Hz
 <p>piu,... — ah! non pos- — so</p>	711 Hz	N/A	711 Hz	704 Hz	704 Hz	709 Hz

Table 5.15: Pitch Analysis – “Orsu, Tosca parlate” from Act II, *Tosca* (1953 recording).





EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 vis- si d'a	633 Hz	633 Hz	633 Hz	626 Hz	626 Hz	630 Hz
<i>con grande sentimento</i> <i>p</i> Sem- pre... — con fe — sin- 	462 Hz	462 Hz	463 Hz	457 Hz	457 Hz	461 Hz
<i>f</i> tar,... — Nel- <i>p</i> 	628 Hz	627 Hz	627 Hz	622 Hz	622 Hz	625 Hz
 gnor, ah,...	879 Hz	869 Hz	869 Hz	868 Hz	868 Hz	872 Hz

Table 5.16: Pitch Analysis – “Vissi d’arte” from Act II, *Tosca* (1953 recording).



EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 <p><i>a tempo</i> lui.</p>	596 Hz	594 Hz	594 Hz	587 Hz	587 Hz	592 Hz
 <p><i>pp</i> Si.</p>	570 Hz	562 Hz	564 Hz	556 Hz	556 Hz	562 Hz

Table 5.17: Pitch Analysis - “Io tenni la promessa” from Act II, *Tosca* (1953 recording).



EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 <p>E mor- to!</p>	297 Hz	297 Hz	297 Hz	294 Hz	294 Hz	296 Hz
 <p>E avanti a lui tre- ma- va tut- ta Ro- ma!</p>	275 Hz	274 Hz	274 Hz	272 Hz	272 Hz	273 Hz

Table 5.18: Pitch Analysis - "E morto" from Act II, *Tosca* (1953 recording).



EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 <p>ca- ra.</p>	293 Hz	N/A	292 Hz	290 Hz	290 Hz	293 Hz
<p><i>dolcissimo espressivo</i></p> 	506 Hz	504 Hz	505 Hz	503 Hz	503 Hz	503 Hz

Table 5.19: Pitch Analysis – “Mario Cavaradossi...” from Act III, *Tosca* (1953 recording).



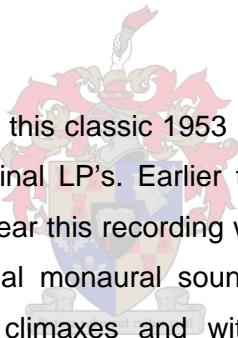
EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1953 33JCX 1094-5	EMI Highlights Release date: 1985 EMI 7 64422 2	EMI Callas Edition Release date: 1997, corrected 1999 EMI 5 56304 2	EMI Great Recordings of the Century Release date: 2002 EMI 5 62890 2	EMI Historical Release date: 2003 EMI 5 85645 2	Naxos Historical Release date: 2004 Naxos 8.110256-57
 <p>-si- re... —</p>	424 Hz	423 Hz	424 Hz	418 Hz	418 Hz	422 Hz
 <p>sfe- re di- — le- gue-</p>	554 Hz	555 Hz	555 Hz	550 Hz	550 Hz	552 Hz

Table 5.20: Pitch Analysis – “Amaro sol per te m’era il morire” from Act III, *Tosca* (1953 recording).

5.7) COMPARISON OF THE DIFFERENT REMASTERINGS:

According to Seletsky (2000: 246), the new sound of the 1953 *Tosca*, as released in the 1997 Callas Edition (EMI 5 56304 2), has “spaciousness, exuding a certain excitement not unlike some of the later LP versions, but the voices are thinner, less present, and colder.” He later commented (in Howell 2004a) that this version “sounds like the best LP’s without compression, and there’s no extra resonance or strange stuff. As this version and the best mono LP’s have much in common, it certainly must be a better representation of the original tapes than GROTC. Moreover, it was mastered by the same man, Allan Ramsay, who apparently decided to create a modernised sound for his GROTC version in 2002.” In his 2005 article “A Callas Recording Update,” Seletsky (2005: 387), added that the 2002 *Tosca* sounds vocally distant and artificially lush, while previously corrected sudden dynamic shifts at some edit points are back.⁸ “One should avoid this multi-marketed muddle, and seek the corrected EU Callas Edition version (EMI 56304), if available” (Seletsky 2005: 387).

Other critics have expressed different opinions regarding the 2002 GROTC release. Henry Fogel (2002) noted...



“After at least two CD transfers of this classic 1953 *Tosca*, EMI has finally issued one that sounds as good as the original LP’s. Earlier transfers were hard-toned,⁹ even fiercely so. Now, finally, we can hear this recording with its full sonic impact, and what an experience it is. EMI’s original monaural sound was warm, clear,¹⁰ and richly coloured, with no distortion at climaxes and with a reasonable voice-orchestra balance. The perspective is a fairly close-up one, and the voices may be a bit more forward than they would be in an opera house, but the overall sound picture is one that allows us to enjoy this remarkable performance without even thinking about the engineering. A responsible customer-friendly corporate ethic would suggest that EMI offer to replace previous CD transfers with this new one and at no cost. Don’t hold your breath!”

Robert J. Farr (2004) was of the opinion that “whilst the GROTC issue was acoustically clearer than the original LP’s, it sounded artificial to my ears. The [Naxos] remastering by Mark Obert-Thorn [8.110256-57] is the first time I have listened to this performance with pleasure. And that is after fifty years of trying and having owned various of the previous efforts.” Andrew Farach-Colton, in his review for *Gramophone* magazine (2002: 79), noted that whilst the 1997 remastering

⁸ It is unclear to which “edit points” Seletsky is referring to. The incongruously loud volume of *Tosca*’s “Ah! Piuttosto giù mi avventò!” mentioned above was, at least, not repeated in the 2002 GROTC reissue.

⁹ Hard: A subjective term, describing too much upper midrange frequencies, usually around 3 kHz.

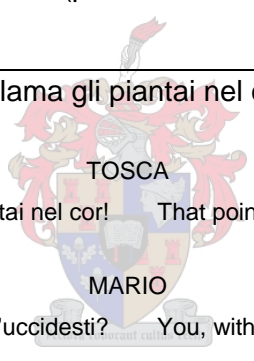
¹⁰ Please refer to the entry for “Transparent” in the glossary provided in Addendum C.

“sacrificed sonic presence for an improved sense of spaciousness,” the “sinewy sound quality” of the original master has been restored by Ramsay in the GROTC transfer.

The original Tosca LP’s exhibit a depth and warmth consistent with other LP masterings used in this study. (The particular LP set used for comparison in this study has, however, been slightly damaged from overplay and the use of too heavy a needle, resulting in excessive surface noise, crackle¹¹ and added distortion). Though the lower frequency range and bass is impressive, Callas’s top register has a sharp-edged ring, often sounding thin and harsh¹² (as can be heard in the extract from “Vissi d’arte” below).

The *New Penguin Guide to Compact Discs and Cassettes* (March et al. 1988: 836) described the 1985 CD version as bringing “an extension of range at both ends of the spectrum, with a firm, full bass to balance the extra brightness and clarity in the treble.” The sound exhibits a warm ambience, sweet¹³ and natural, the vocal image well placed and without fuzziness as in the 1997 remastering. Of the present recording, this is the most satisfying remastering, without any of the harshness encountered in later incarnations (please refer to Example 5.2).

Example 5.2: “Io quella lama gli piantai nel cor” from Act III of *Tosca*



TOSCA
Io quella lama gli piantai nel cor! That pointed blade I drove into his heart!

MARIO
Tu, di tua man l'uccidesti? You, with your own hand you killed him?

- CD 1 Track 9: Original 1953 LP's (Columbia)
- CD 1 Track 10: 1985 remastering (EMI Classics)
- CD 1 Track 11: 1997 remastering (EMI Callas Edition)
- CD 1 Track 12: 2002 remastering (EMI GROTC)
- CD 1 Track 13: 2002 remastering (EMI Historical)
- CD 1 Track 14: 2004 remastering (Naxos Historical)

¹¹ Crackle: Randomly distributed, high density, small amplitude, short duration, additive impulsive disturbances, similar to the noise produced by a “chip-fryer” or the sound made by Rice Krispies after adding milk. Crackle is usually the result of a fungus that eats the vegetable matter contained in old 78 RPM records, leaving millions of pock-marks on the surface of the disc that create impulsive disturbances in the signal, thereby producing a characteristic crackly surface noise. It can, however, also be caused by slight imperfections in the record playing surface due to the use of coarse grain fillers in the record composition or by gas bubbles that occur in the surface as the record “cured” after the stamping process.

¹² Harsh: The description of a sound as “harsh” implies too much upper midrange frequencies or peaks in the frequency response between 2 and 6 kHz.

¹³ Sweet: An adjective describing a sound that is not strident or piercing, with flat high-frequency response and low distortion. The high-end frequency spectrum is extended to 15 or 20 kHz and is not over-emphasised.

The 1997 Callas Edition remastering is admirable. Vocally more distant than the GROTC version, it comes closest to the earlier CD set. The sound is warm, though slightly fuzzy and unfocused, but with depth and greater ambience, a result of slightly increased reverberation (as can be heard for instance in Example 5.4 and 5.5). Callas, whose top sounds thin on occasion, is nevertheless presented with presence and excitement.

EMI's 2002 Great Recordings of the Century (GROTC) and 2003 Historical Series releases are based on the same remastering, and therefore the following comments are applicable to both reissues. The sound is indeed "artificially lush" as Seletsky (2005) noted (compare for example the extract "Diedi gioielli.." from "Vissi d'arte," Example 5.3), with a closely placed vocal image that accentuates any harshness or shrillness in Callas's voice (Example 5.4). Musical subtleties in Callas's interpretation (*portamenti*, *mezza voce*,¹⁴ etc.) are obscured by the highly compressed sound, which, though adding to the drama, treats the singers unkindly. Tape hiss is also greatly accentuated, as can be heard in Example 5.3.



Figure 5.6: Callas (Tosca) singing "Vissi d'arte" - Covent Garden (London), 1964.

Example 5.3: "Diedi gioielli..." from "Vissi d'arte," Act II of *Tosca*

TOSCA

Diedi gioielli della Madonna al manto,	Jewels I brought for the Madonna's mantle,
e diedi il canto agli astri,	and songs for the stars in heaven
al ciel, che ne ridean più belli.	that they shone forth with greater radiance.
Nell'ora del dolore perché,	In this hour of distress, why,
perché, Signor,	why, oh Lord,
perché me ne rimunerì così?	why dost Thou repay me thus?

- CD 1 Track 15: Original 1953 LP's (Columbia)
- CD 1 Track 16: 1985 remastering (EMI Classics)
- CD 1 Track 17: 1997 remastering (EMI Callas Edition)
- CD 1 Track 18: 2002 remastering (EMI GROTC)
- CD 1 Track 19: 2002 remastering (EMI Historical)
- CD 1 Track 20: 2004 remastering (Naxos Historical)

¹⁴ Mezza Voce: Literally "half voice." Denotes singing softly, with a restrained volume of tone, as if "under the breath," referring not only to the amount of volume, but also to a different quality from that when singing full voice.

Example 5.4: "Trionfal..." from Act III of *Tosca*

TOSCA & MARIO

Trionfal di nova speme l'anima freme in celestial crescente ardor.	Triumphant, the soul trembles with new hope in heavenly increasing ardour.
Ed in armonica vol già l'anima va all'estasi d'amor.	And in harmonious flight the spirit soars to the ecstasy of love.

- CD 1 Track 21: Original 1953 LP's (Columbia)
- CD 1 Track 22: 1985 remastering (EMI Classics)
- CD 1 Track 23: 1997 remastering (EMI Callas Edition)
- CD 1 Track 24: 2002 remastering (EMI GROTC)
- CD 1 Track 25: 2002 remastering (EMI Historical)
- CD 1 Track 26: 2004 remastering (Naxos Historical)

The 2004 Naxos Historical reissue is characterised by severe surface noise resulting from the source LP's. Obert-Thorn's remastering, however, has a warm and radiant ambience with an excellent balance between soloists and orchestra, the voices well placed. Compare for instance the extract "Lo dici male" from Act I:

Example 5.5: "Lo dici male..." from Act I of *Tosca*

TOSCA

Lo dici male. Lo dici male.	How faintly you say it!
Non la sospiri, la nostra casetta che tutta ascosa nel verde ci aspetta?	Do you not long for our little house that is waiting for us, hidden in the grove?
Nido a noi sacro, ignoto al mondo inter, pien d'amore e di mister?	Our refuge, sacred to us and unseen by the world, protected with love and mystery?
Al tuo fianco sentire per le silenziose stellate ombre, salir le voci delle cose!	Oh, at your side to listen there to the voices of the night as they rise through the starlit, shadowed silences.

- CD 1 Track 27: Original 1953 LP's (Columbia)
- CD 1 Track 28: 1985 remastering (EMI Classics)
- CD 1 Track 29: 1997 remastering (EMI Callas Edition)
- CD 1 Track 30: 2002 remastering (EMI GROTC)
- CD 1 Track 31: 2002 remastering (EMI Historical)
- CD 1 Track 32: 2004 remastering (Naxos Historical)

Seletsky (2000: 252) pointed out an important technical glitch in the 1985 and 1997 remasterings: just before "Vissi d'arte," a tape squeal in the 1985 remastering and its 1997 successor is clearly

audible (please refer to Example 5.6 below), but absent in the 2002 remastering, released in the EMI GROTC and Historical series (the only editions to state explicitly that they were “Digitally Remastered At Abbey Road Studios From The Original Tapes”). The presence of the tape squeal glitch seems to support Seletsky’s suspicion that the 1997 Callas Edition reissues were remastered, not from the original analogue tapes, but rather from 1980’s DAT’s, i.e. that they are in fact remastered versions of earlier remasterings.

Example 5.6: Tape squeal before "Vissi d'arte" from Act II of *Tosca*

CD 1 Track 33: 1985 remastering (EMI Classics)

CD 1 Track 34: 1997 remastering (EMI Callas Edition)

CD 1 Track 35: 2002 remastering (EMI GROTC)

CD 1 Track 36: 2002 remastering (EMI Historical)

5.8) FREQUENCY SPECTRUM ANALYSIS:

Frequency spectrum analysis was performed on a number of selected extracts, short phrases or noise samples from the various *Tosca* reissues, each providing a multitude of possible comparisons. The selected extracts comprised the following:

- 1) “Lo dici male” from “Ora stammi a sentir,” Act I
- 2) “Stassera” from “Ora stammi a sentir,” Act I
- 3) “Cosi” from “Vissi d’arte,” Act II
- 4) “Diedi fiori agli altar” from “Vissi d’arte,” Act II
- 5) “Vissi d’arte” from “Vissi d’arte,” Act II
- 6) “Io quella lama gli piantai nel cor” from “Ah! Franchigia a Floria Tosca,” Act III
- 7) “La prima” from “Ah! Franchigia a Floria Tosca,” Act III
- 8) “Trionfal” from “E non giungono,” Act III

The results of the frequency spectrum analysis were carefully compared and evaluated. From the above extracts, a further selection was made. These selected examples are discussed below.

The frequency spectrum graphs are either logarithmic or linear. The x-axis (left to right) represents frequency (measured in Hz), while the y-axis (bottom to top) corresponds to the amplitude of the corresponding frequency (measured in dB) on the x-axis.

The colours used to represent the various releases are as follows:

RELEASE PHASE	COLOUR
Original LP's (1953)	Green
EMI Classics (1985)	Red
EMI Callas Edition (1997)	Blue
EMI Great Recordings of the Century (GROTC)/ EMI Historical (2002 & 2004)	Yellow
Naxos Historical (2004)	Purple/Pink

Table 5.21: Release phases of the various reissues of *Tosca* used in this study and the colours used to represent them in the spectrum analysis examples.

Figure 5.9 shows the logarithmic frequency spectrum analysis for the 1997 Callas Edition, 2002 GROTC/EMI Historical and 2004 Naxos releases of the phrase “Lo dici male” from “Ora stammi a sentir,” Act I. As can be seen, the Naxos release has the most prominent lower frequency content, no doubt a result of its transfer from LP, explaining the “warmth” of this release. The Naxos remastering is also relatively stronger in the middle range, from approximately 4000 to 11000 Hz. In the upper frequency range, both the GROTC/EMI Historical and 1997 remasterings contain more prominent frequencies than the Naxos reissue, whose upper-frequencies start to decrease dramatically from about 7000 Hz. The GROTC/EMI Historical remastering contains stronger lower frequencies than the 1997 remastering (a possible explanation for the fact that Callas’s voice sounds at times “thin” in the 1997 version), though the latter is stronger in the middle frequency range. Figure 5.18, this time of the phrase “Trionfal” from Act III, again demonstrates the greater lower frequencies (up to about 500 Hz) of the Naxos reissue versus the 1997 remastering. In the middle frequency range the two versions seem more or less equal, but notice how (from approximately 10000 Hz), the 1997 Callas Edition version has the greatest upper frequencies.

The next example, Figure 5.10, again of the “Lo dici male” extract, depicts the logarithmic frequency spectrum analysis for the LP, 1997 and Naxos reissues. At approximately 660 Hz and 1000 Hz there are prominent peaks in the 1997 release. The graph shows the weaker upper frequency content of the 1997 and Naxos releases compared with the original LP’s, except at the very high end of the spectrum where the 1997 remastering



Figure 5.7: Callas (*Tosca*) and Tito Gobbi (*Scarpia*) - Covent Garden (London), 1964.

appears more prominent. The relatively weaker upper frequency content of the 1997 and Naxos releases is verified by Figures 5.13 (providing an overall comparison of all the different releases) and Figure 5.14. Both graphs show the frequency spectrums of the phrase “Vissi d’arte” from Act II, where the more prominent high- and low-end frequency content of the original LP version, compared with the 1997 release, is clearly visible. Figure 5.14 furthermore shows a very strong filtering effect at about 95 Hz in the 1997 release.

A comparison between the frequency content of the 1997 Callas Edition and 1985 CD remastering is provided in figures 5.11 and 5.12 of the phrases “Cosi” and “Vissi d’arte,” both from Tosca’s Act II aria “Vissi d’arte,” respectively. As these examples show, the 1985 CD version contains relatively stronger lower frequencies (again explaining the fact that Callas’s voice sounds at times “thin” in the 1997 version), with more or less equally strong frequency content in the middle range and again stronger frequency content in the upper range. An interesting tapering away of the highest frequency content occurs in all the 1980’s CD remasterings from about 20000 Hz. This is best demonstrated by Figure 5.12, which also shows clear signs of the use of a notch filter in the 1997 Callas Edition remastering at approximately 6900 Hz and 14400 Hz (compare also Figures 5.13 and 5.14), as well as a slight increase in the strength of the uppermost frequencies above 17000 Hz, perhaps as a result of an aliasing¹⁵ effect.

Figure 5.16 depicts the frequency content of the original LP’s and 1985 CD remastering in the phrase “Trionfal” from “E non giungono,” Act III. From approximately 4400 Hz to 9000 Hz the LP’s boast the strongest frequencies, though from about 10000 Hz to 20000 Hz the 1985 release contains the more prominent frequency content. Please note again the tapering away of the highest frequencies in the 1985 CD version from about 20000 Hz. The flat high-frequency response of the 1985 remastering is visible in both spectrum graphs, explaining the “sweet” sound of this release.

The difference in the frequency spectra of the original LP’s and GROTC/EMI Historical release is shown in Figure 5.15. Here, a very strong tonal component can be seen with the fundamental frequency (at approximately 800 Hz) and several harmonics above that. The graph furthermore shows the greater lower and upper frequency ranges of the LP version compared with the 2002 GROTC/EMI Historical remastering (compare as well Figure 5.13). The thin and occasionally harsh quality of Callas’s top register in the LP’s can be attributed to the very prominent upper midrange frequency content and peaks in the frequency response between 2000 and 6000 Hz (compare for instance Figures 5.10, 5.13 and 5.14).

¹⁵ Aliasing: Noise that occurs from sampling a high-frequency sound at a sample rate that is less than what is required to accurately represent that frequency. A certain sampling rate can only represent a frequency equal to half its rate (the Nyquist frequency).

Figure 5.17 provides a comparison of the three EMI CD releases – the 1985, 1997 and GROTC/EMI Historical remasterings. As can be seen, the GROTC/EMI Historical release clearly contains the most prominent lower frequency content compared with the other releases, though in the middle frequency range the three versions are more or less equal. The 1985 reissue, however, contains the greatest high frequency content, explaining the “brightness” of this release. At the very high end of the spectrum, though, the frequencies taper away dramatically.



Figure 5.8: Callas (Tosca) - Covent Garden (London), 1964.

“She gulps down the wine for quick courage, and then stands mesmerised by the sight of the knife, putting the glass down slowly as the thought of murder passes inexorably into her mind. Only at the last second does the animal release itself, the tension held in her hand clasped over the top of the glass” (Christiansen 1984: 314).

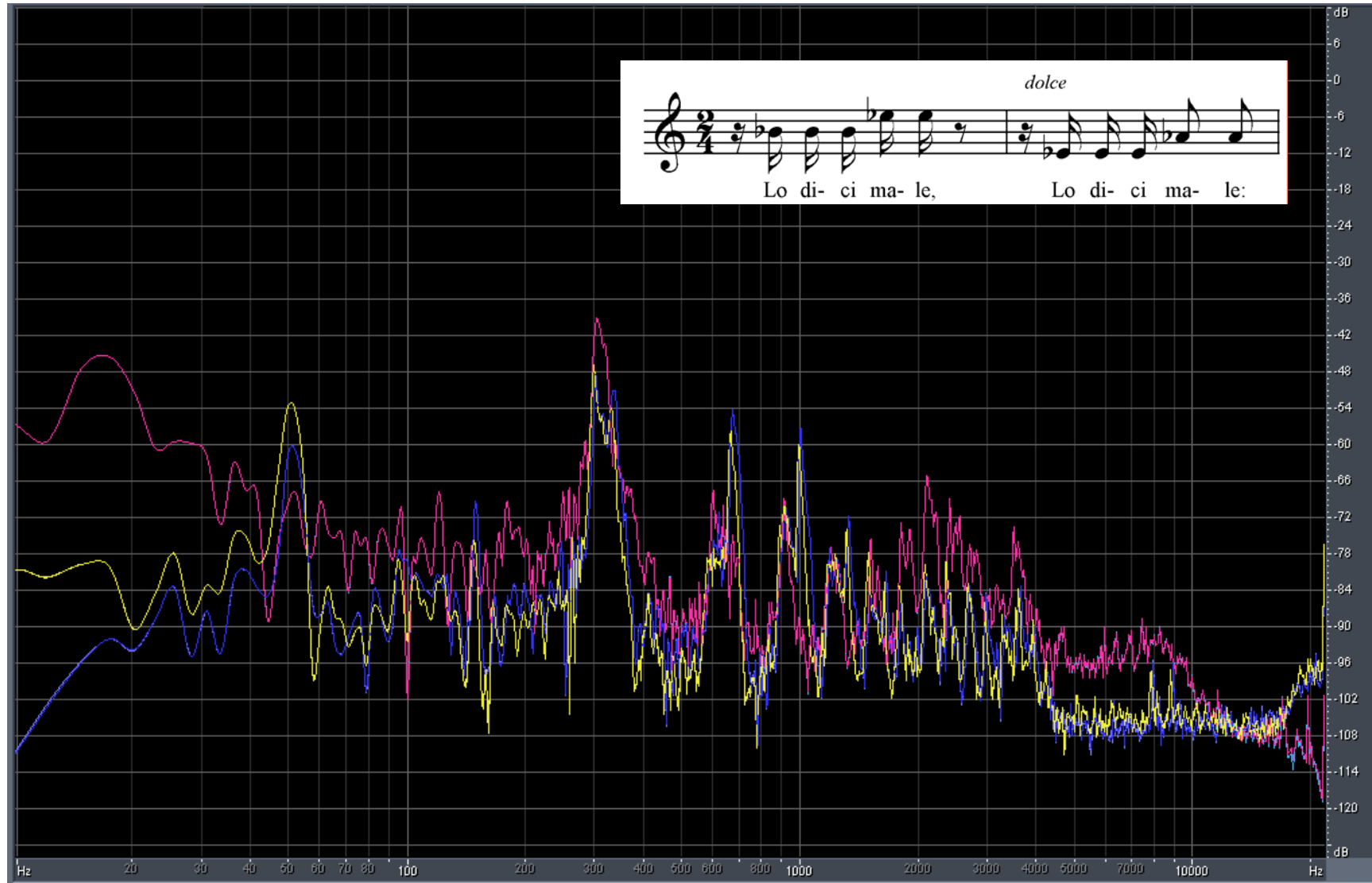


Figure 5.9: Logarithmic frequency spectrum analysis (1997, GROTC & Naxos) of “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).

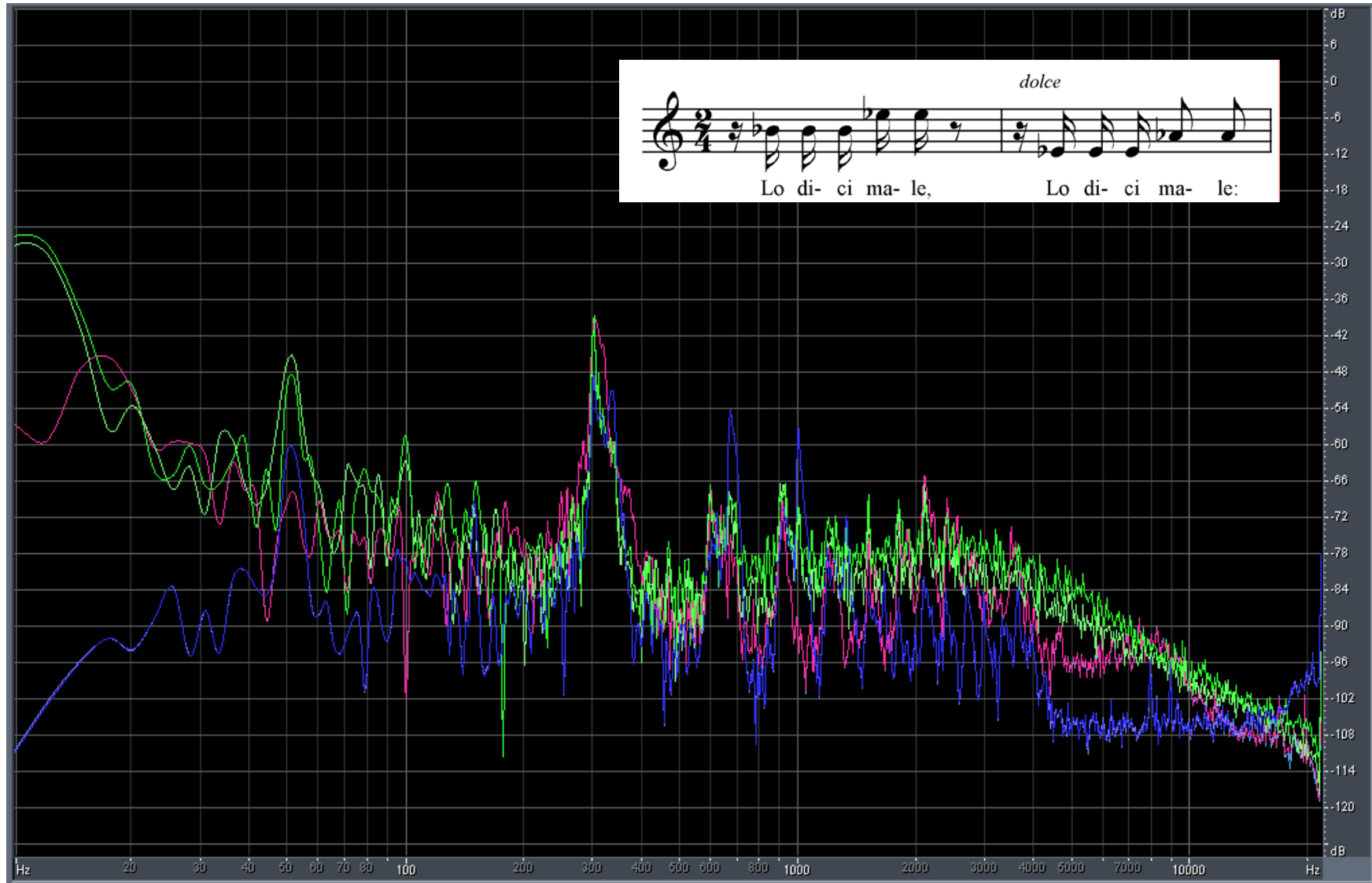


Figure 5.10: Logarithmic frequency spectrum analysis (LP, 1997 & Naxos) of “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).

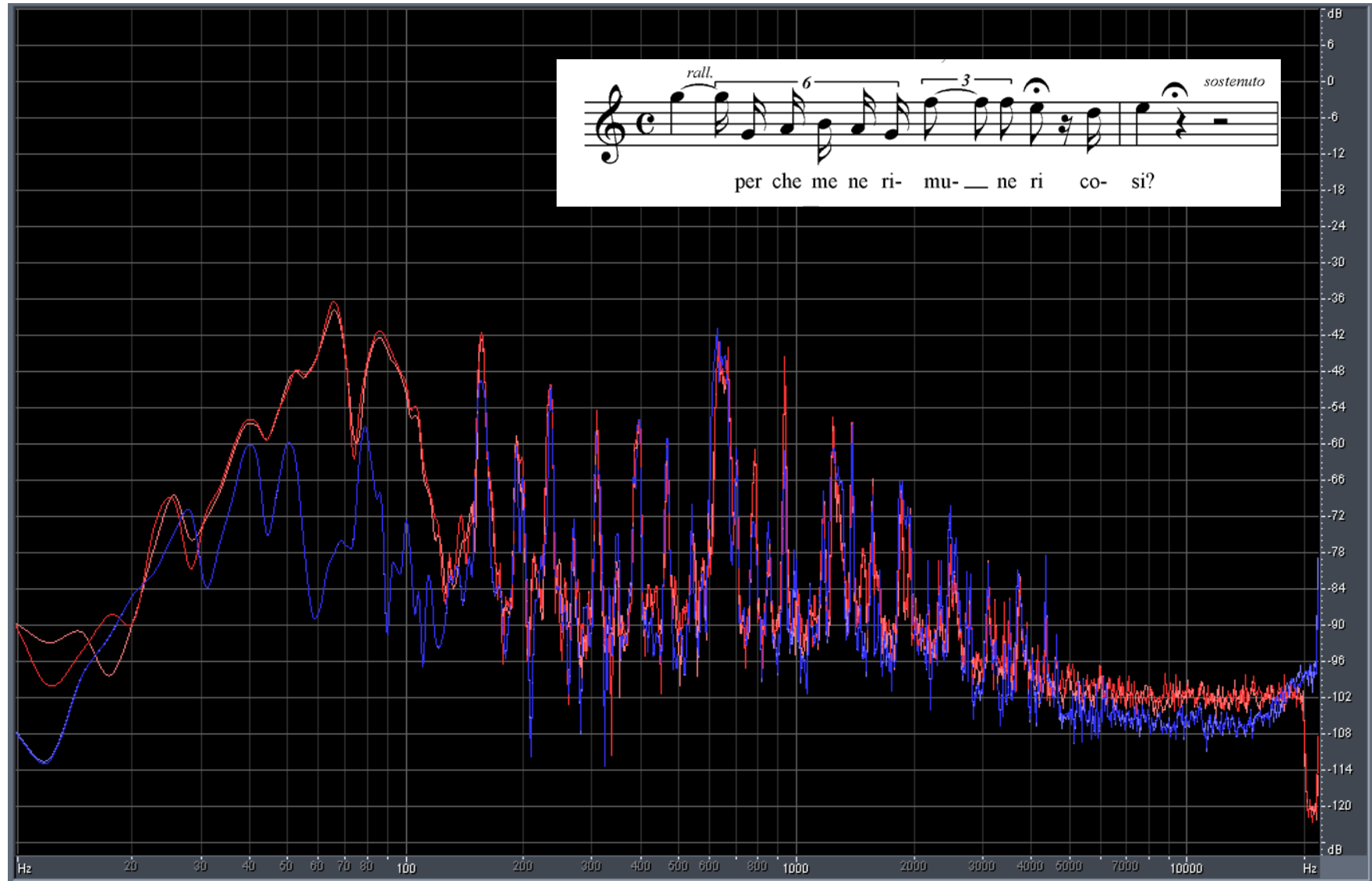


Figure 5.11: Logarithmic frequency spectrum analysis (1985 & 1997) of “Cosi” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).

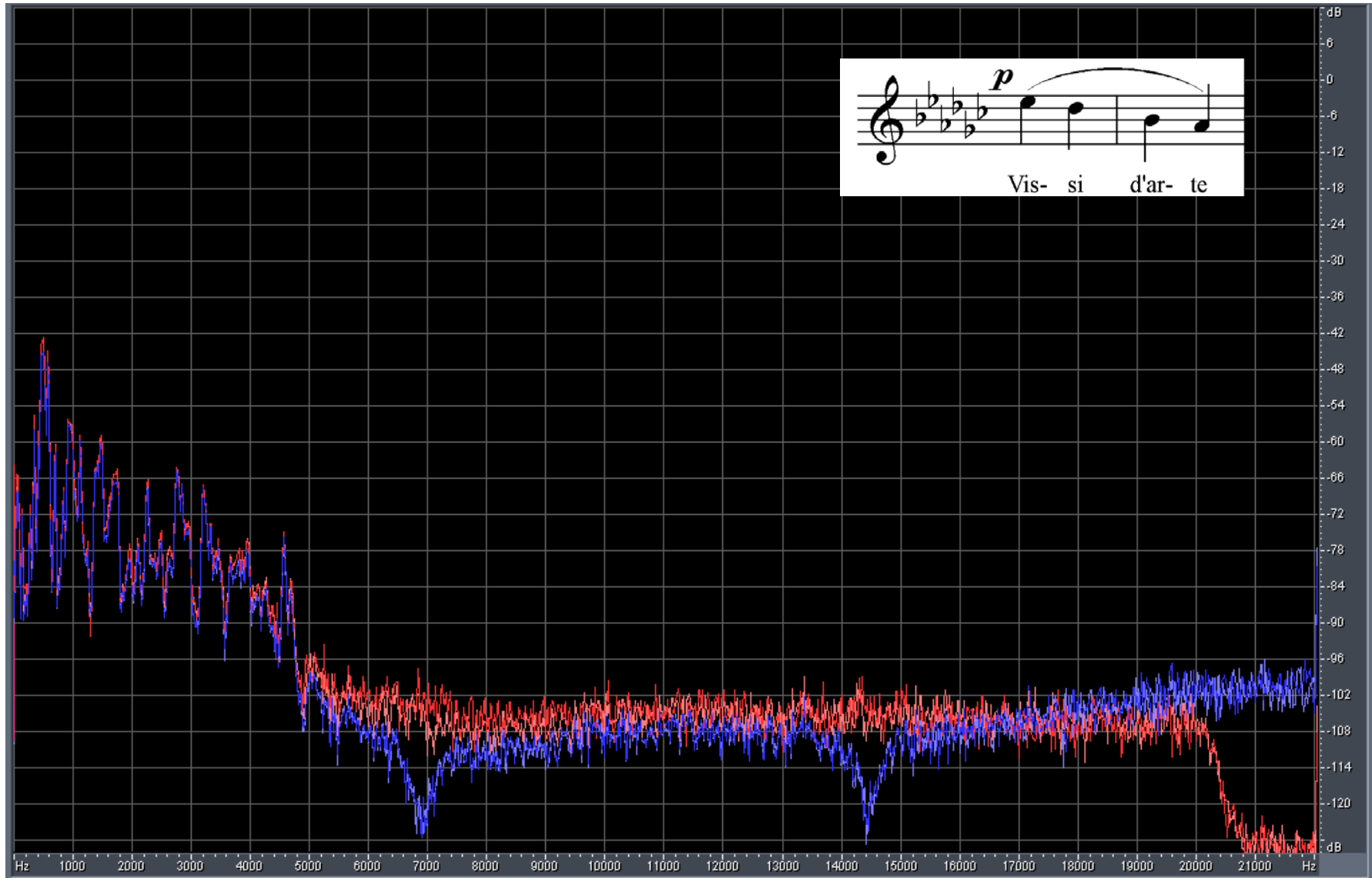


Figure 5.12: Linear frequency spectrum analysis (1985 & 1997) of the phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).

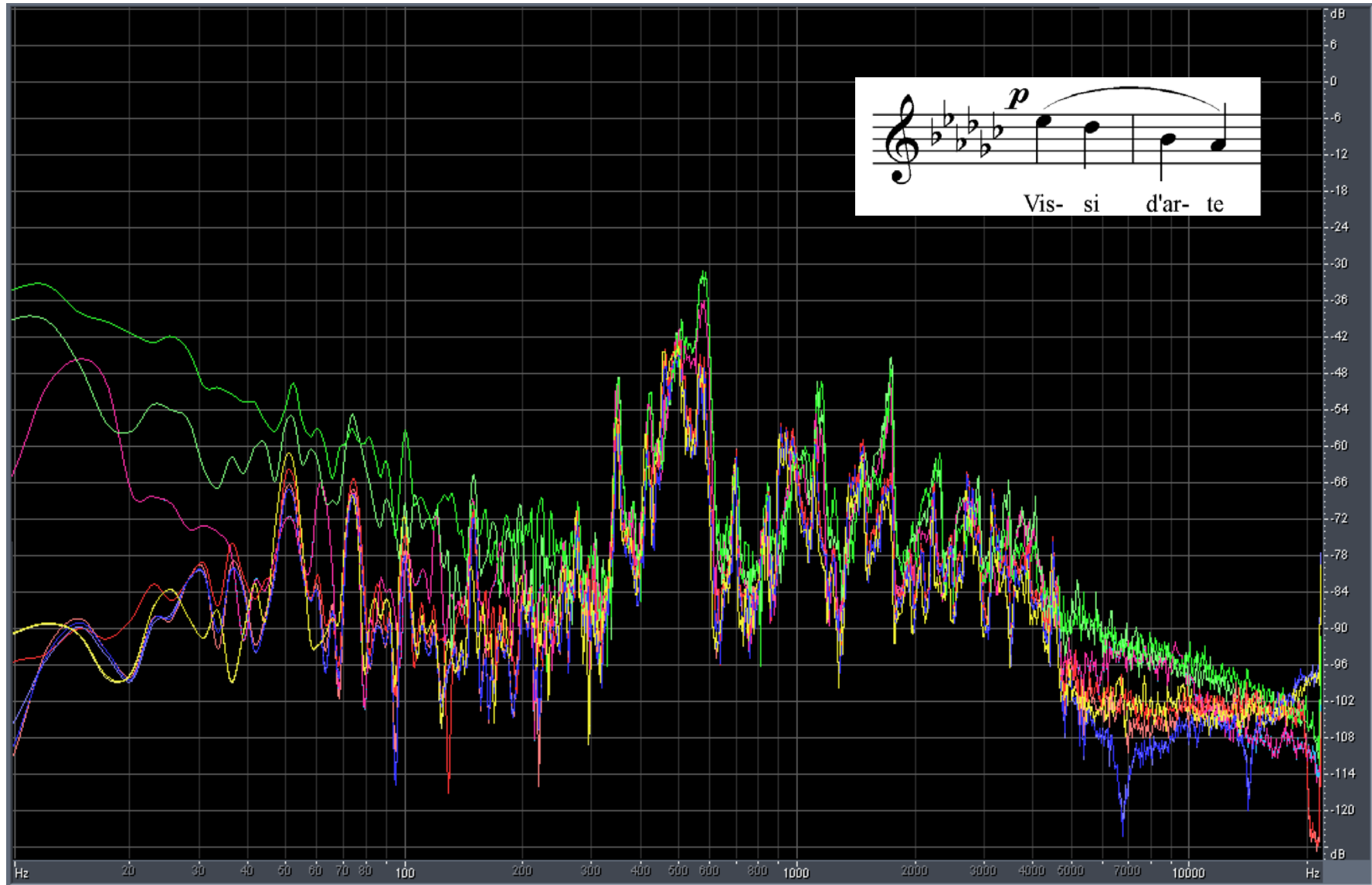


Figure 5.13: Logarithmic frequency spectrum analysis (LP, 1985, 1997, GROTC & Naxos) of the phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).

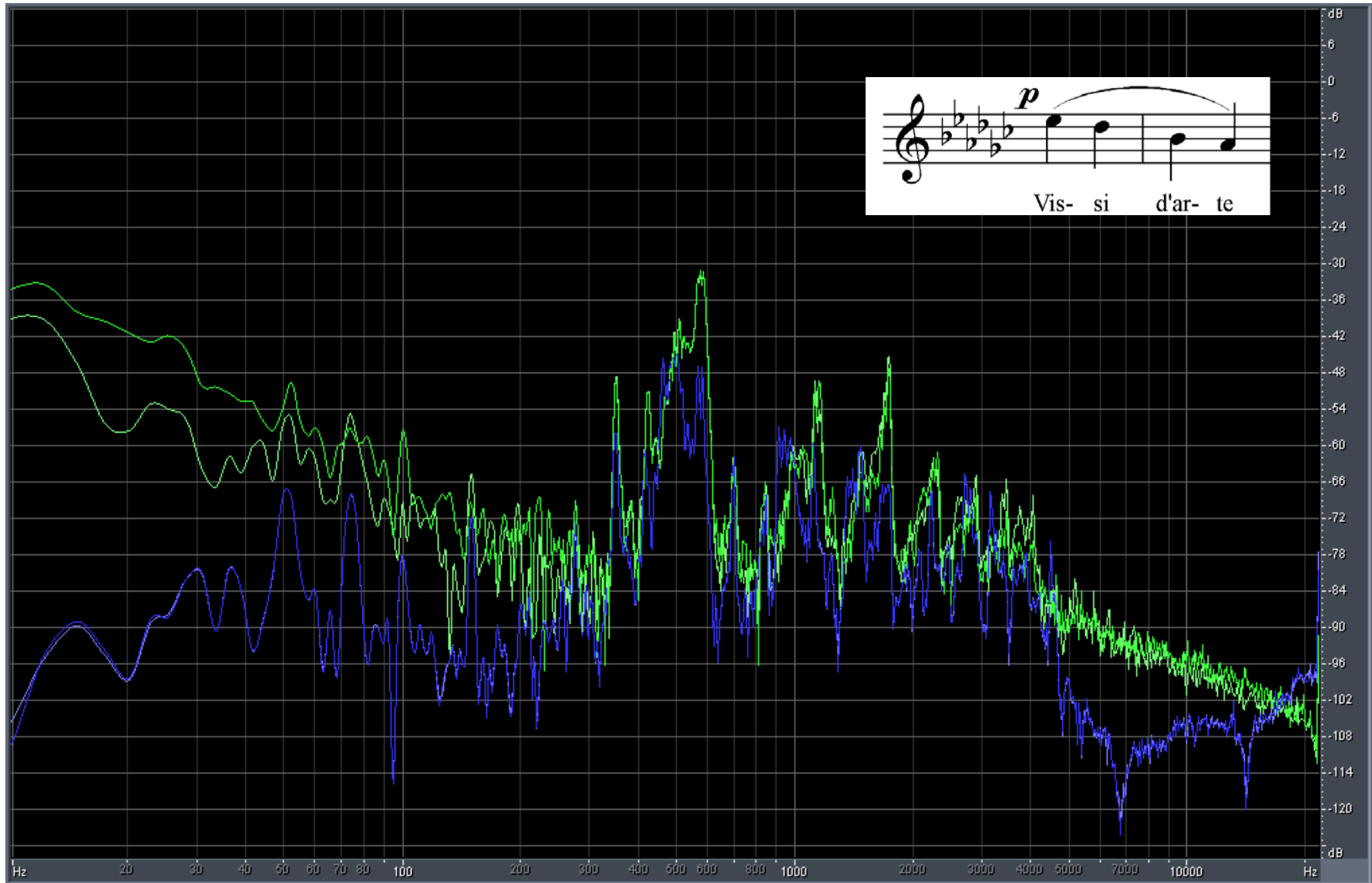


Figure 5.14: Logarithmic frequency spectrum analysis (LP & 1997) of the phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).

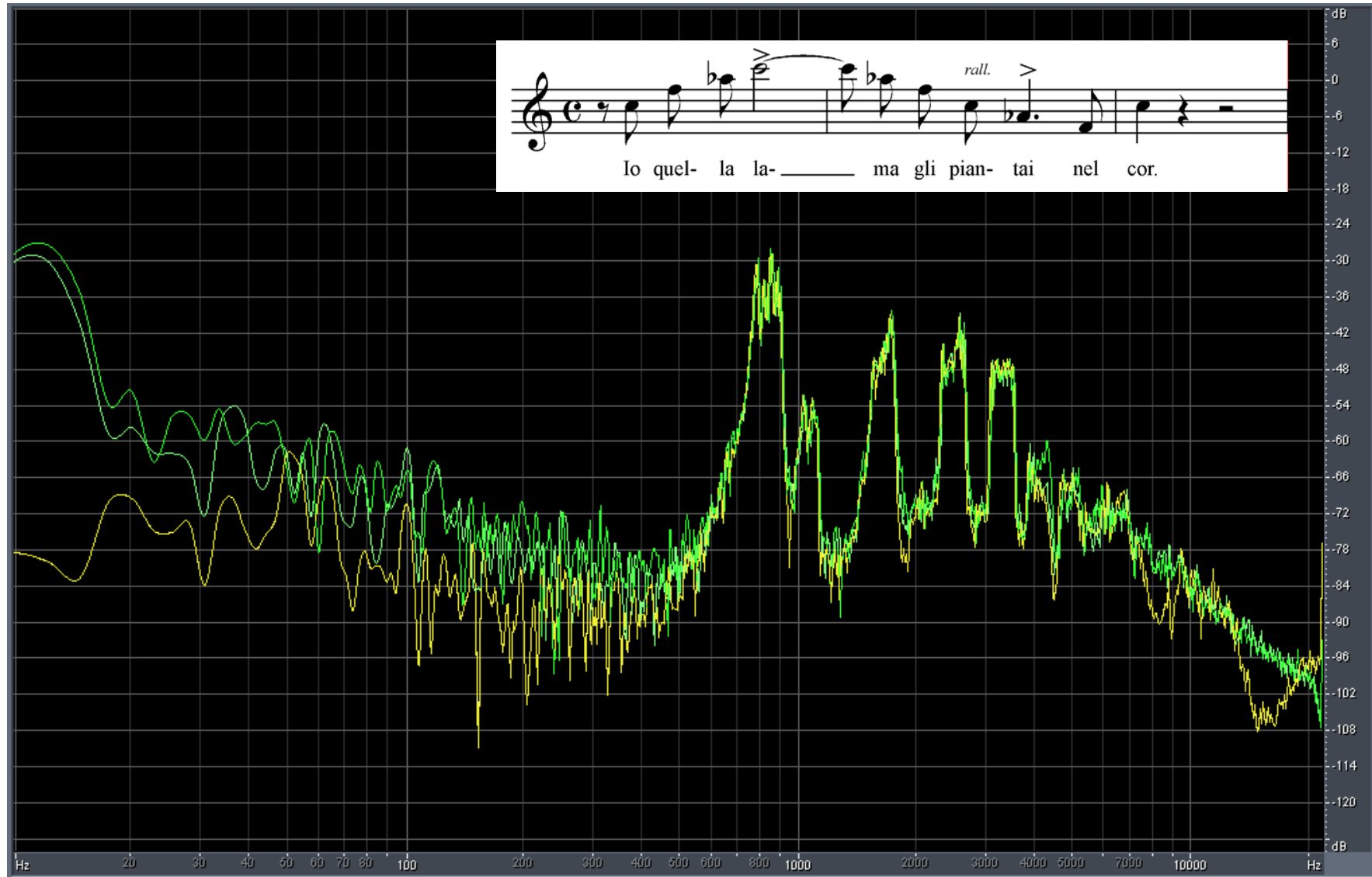


Figure 5.15: Logarithmic frequency spectrum analysis (LP & GROTC) of the phrase “lo quella lama gli piantai nel cor” from “Ah! Franchigia a Floria Tosca,” Act III of *Tosca* (1953 recording).

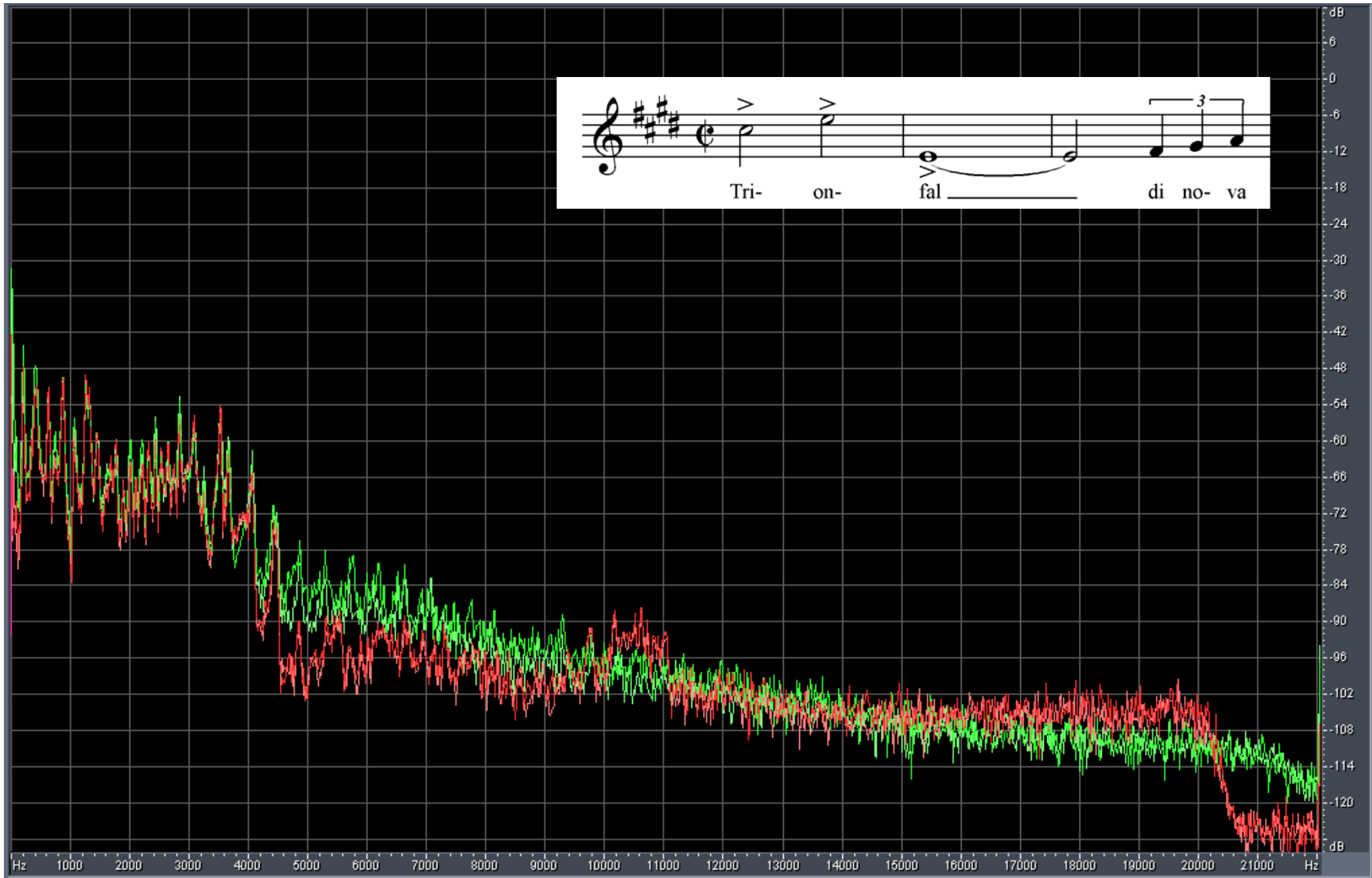


Figure 5.16: Linear frequency spectrum analysis (LP & 1985) of the phrase “Trionfal” from “E non giungono,” Act III of *Tosca* (1953 recording).

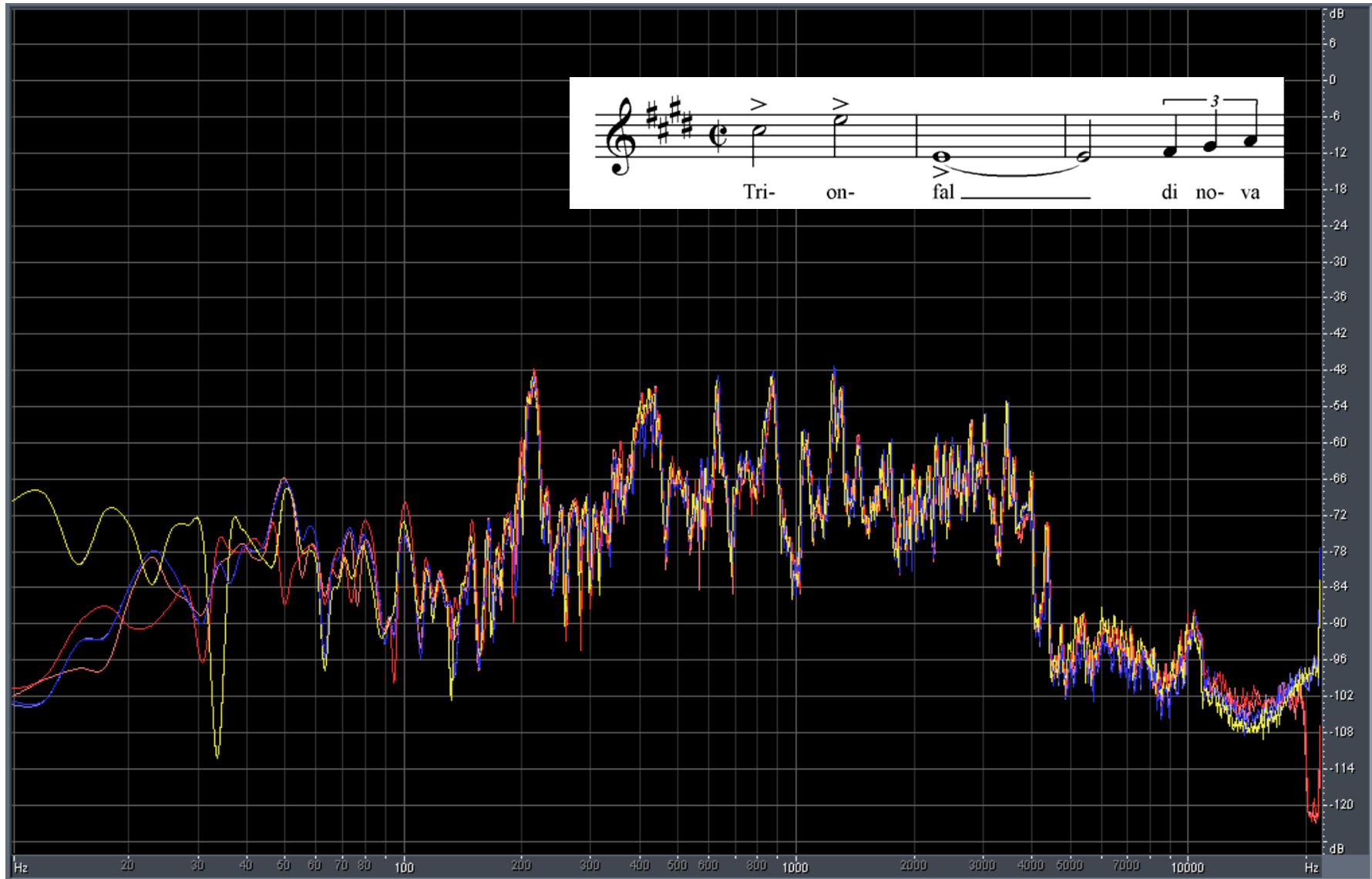


Figure 5.17: Logarithmic frequency spectrum analysis (1985, 1997 & GROTC) of the phrase “Trionfal” from “E non giungono,” Act III of *Tosca* (1953 recording).

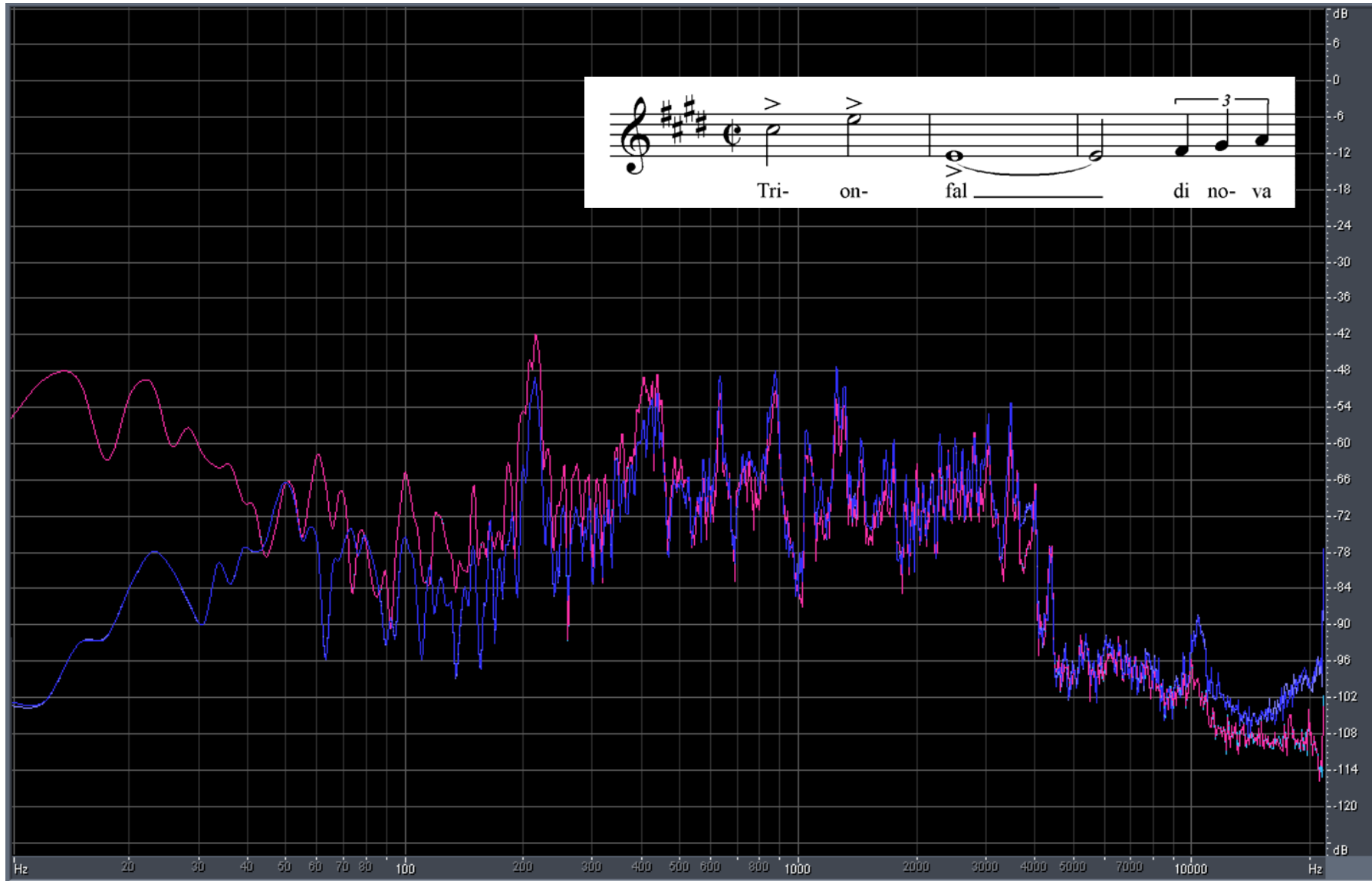


Figure 5.18: Logarithmic frequency spectrum analysis (1997 & Naxos) of the phrase “Trionfal” from “E non giungono,” Act III of *Tosca* (1953 recording).

5.9) MATLAB ANALYSIS:

The following graphs show the results obtained from the Matlab analysis performed on selected audio extracts from *Tosca* (1953 recording). For a complete overview and explanation of the algorithm used in analysing the selected examples, please refer to Chapter 1.

5.9.1) CASE 1: “LO DICHI MALE” FROM “ORA STAMMI A SENTIR” (LP & 1997):

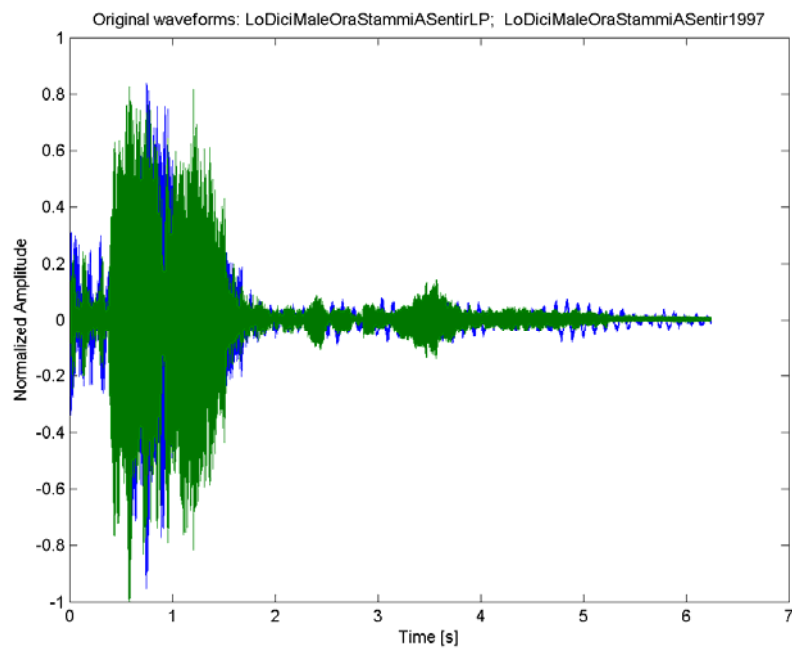


Figure 5.19: Plot of Y1 and Y2 (time-shift visible) of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).

The cross-correlation graph (Figure 5.20) indicates bad correlation between Y1 and Y2 (0.2534). A shift of approximately -0.17 s is needed to obtain the best correlation.

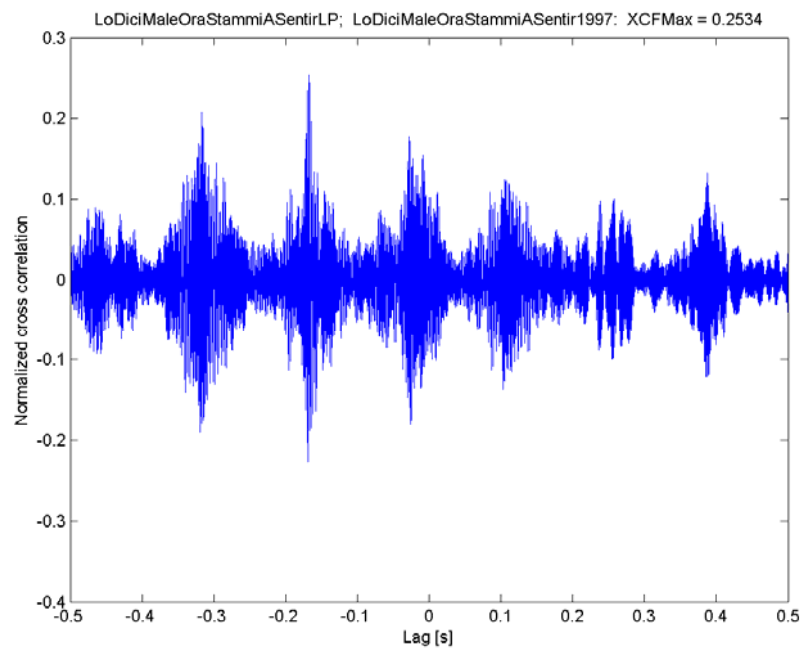


Figure 5.20: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).

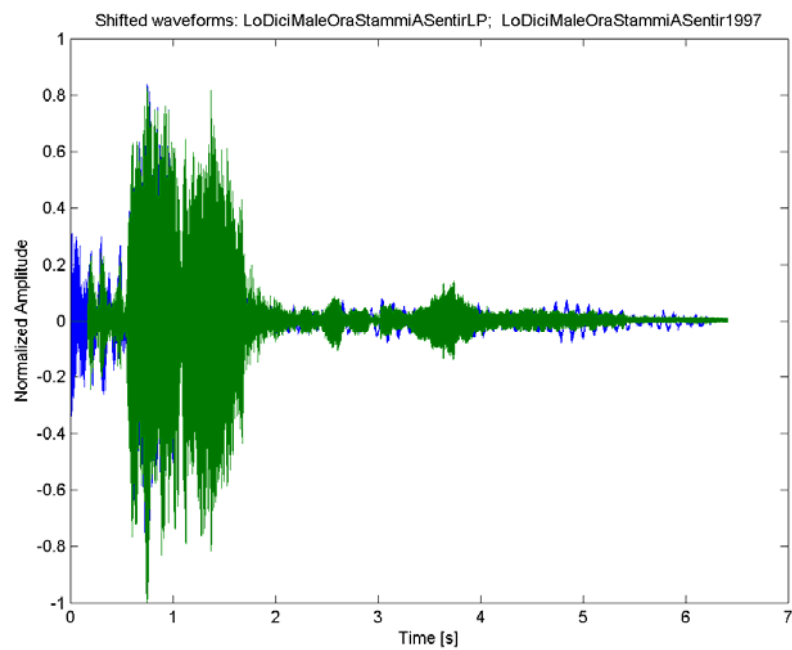
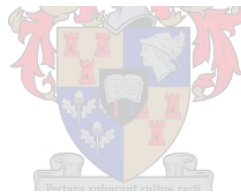


Figure 5.21: Plot of time-shifted waveforms (Y1 and Y2) of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).

Figure 5.22 indicates that the instantaneous magnitudes of Y1 and Y2 obviously do not correspond.

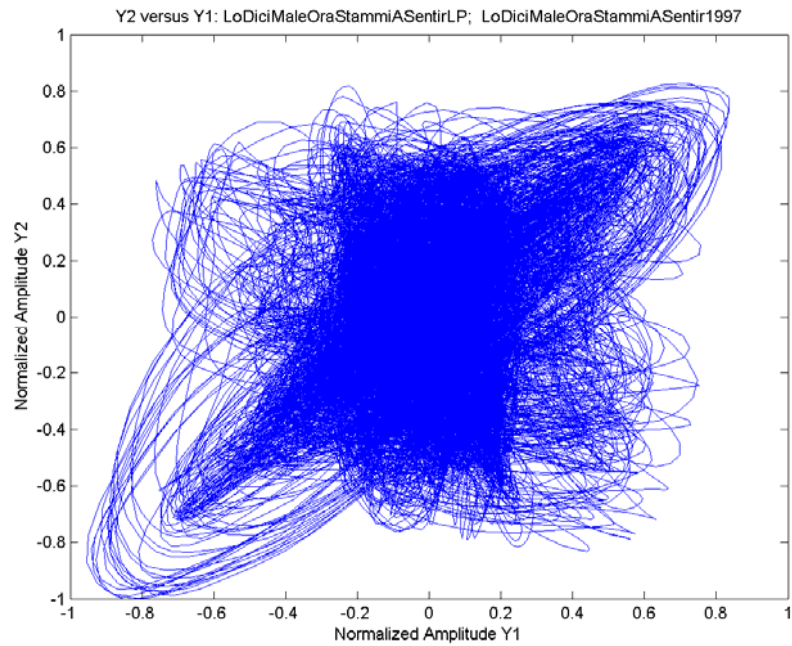


Figure 5.22: Plot of normalised amplitude of Y1 vs. Y2 of phrase "Lo dici male" from "Ora stammi a sentir," Act I of *Tosca* (1953 recording).

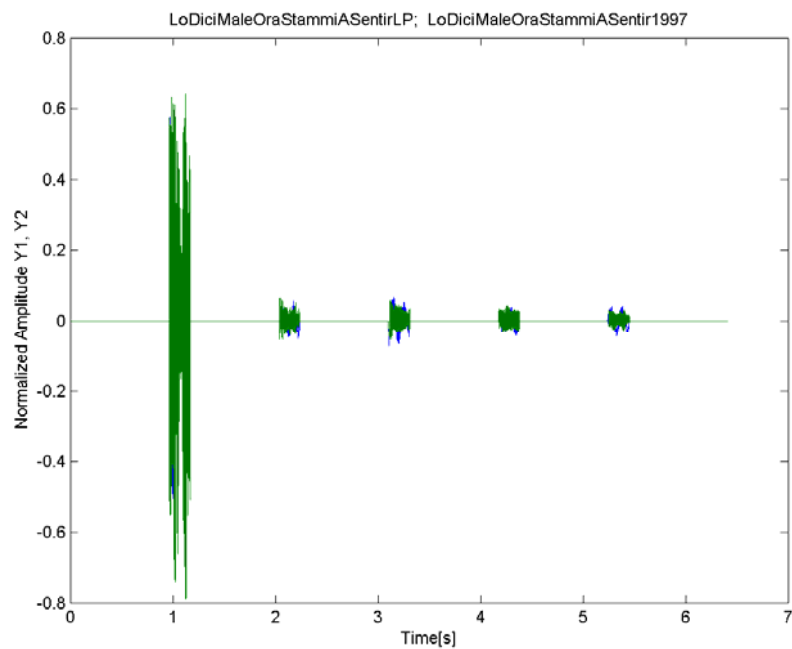


Figure 5.23: Plot of time-shifted windows of phrase "Lo dici male" from "Ora stammi a sentir," Act I of *Tosca* (1953 recording).

The fifth window in Figure 5.23 requires the largest amount of time-shift (approximately 0.009 s) in order to achieve the best match, as can be seen in Figure 5.24. The lag differences between the various windows indicate that pitch and/or time-shift processing has possibly been applied to the signal.

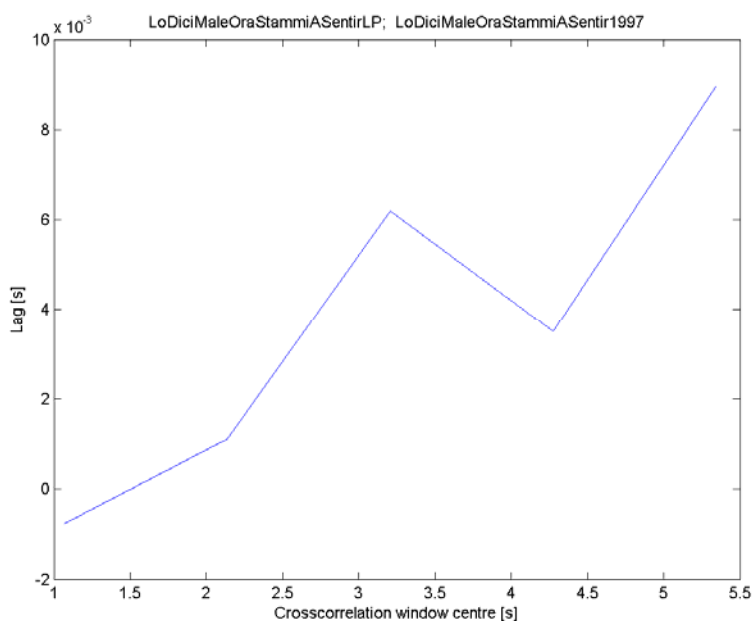


Figure 5.24: Plot of lag or time-shift required for optimum match for each window of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).

The transfer function graph (Figure 5.25) shows clear filtering effects in the low-mid frequency range, especially in the region of 120 Hz, 300 Hz, 400 Hz and 700 Hz. The very prominent 8-10 Hz rumble¹⁶ present in the LP version (on which the other frequency content is superimposed) can be clearly seen as a distinct peak at 8-10 Hz in the top graph (compare Figure 5.10).¹⁷ There is also a reasonably large frequency-dependent difference in the phase of Y1 and Y2 from approximately 600 Hz, as can be seen in the bottom graph.

¹⁶ Rumble: A low frequency noise, typically below 50 Hz, which is often found on records and/or associated with use of a turntable. It can be caused by seismic effects during the mastering process or during playback. More likely, however, it is a result of noise produced by the turntable as the record is spun on the platter. Typically, this noise is from the motor, and the resulting vibrations are captured by the stylus as “rumble.”

¹⁷ The exact cause of the 8-10 Hz rumble in all the LP versions used in this study is not known. It is highly unlikely that it is a result of the 50 Hz power supply frequency. Another possibility would be that it is a result of a small mechanical vibration in the LP turntable used in transferring the LP’s to CD. According to Tim Lengveld (personal communication, 5 & 6 March 2006), the 8-10 Hz rumble, a form of low frequency noise, could originate from the centre bearing, drive pulleys or belts used in the LP turntable, as well as from irregularities in the record disc itself. “One way to reduce rumble is to make the turntable (and lathe) very heavy, so that it acts as a mechanical low-pass filter, but even with the best turntables a lot of rumble tends to be generated by warped records or pressing irregularities sometimes visible as ‘bobbles’ in the surface.” According to Enjoythemusic.com (2005), turntable rumble is a very low frequency noise usually caused by the main turntable bearing due to poor bearing lubrication.

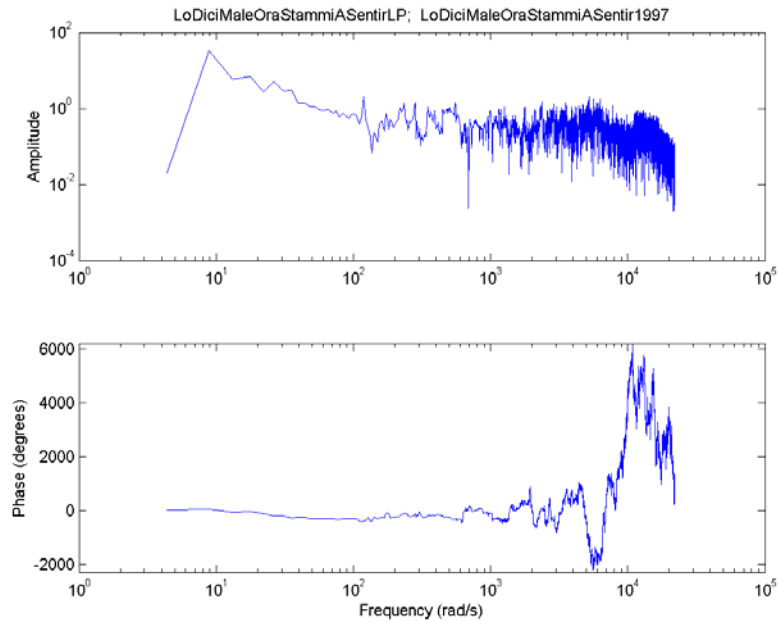


Figure 5.25: Plot of transfer function of phrase “Lo dici male” from “Ora stammi a sentir,” Act I of *Tosca* (1953 recording).

5.9.2) CASE 2: “VISSI D’ARTE” FROM “VISSI D’ARTE” (LP & 1997):

The 8-10 Hz rumble evident in the LP version can be seen in the periodicity of Y1 (blue waveform) in Figure 5.26.

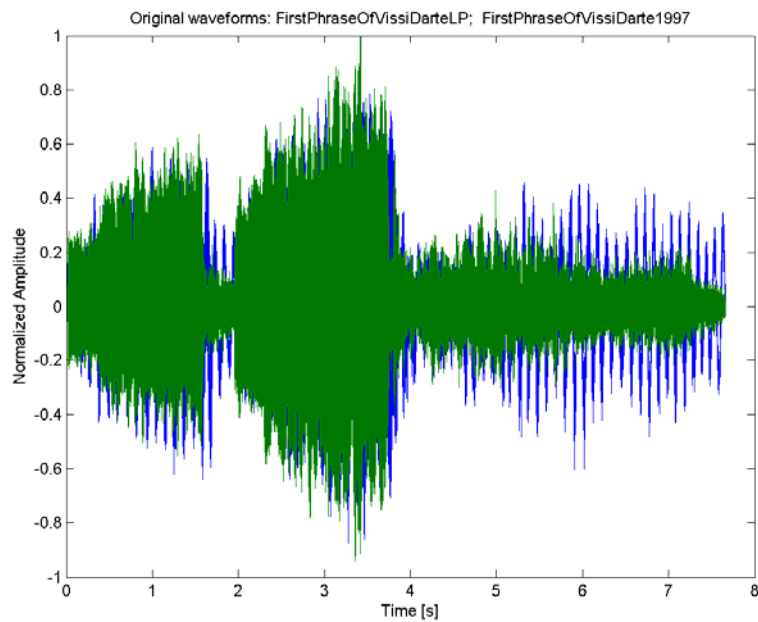


Figure 5.26: Plot of Y1 and Y2 (time-shift visible) of phrase “Vissi d’arte” from “Vissi d’arte,” Act II of *Tosca* (1953 recording).

The amount of correlation between Y1 and Y2 is indicated in Figure 5.27 as 0.19721, i.e. there is extremely weak correlation between the two waveforms.

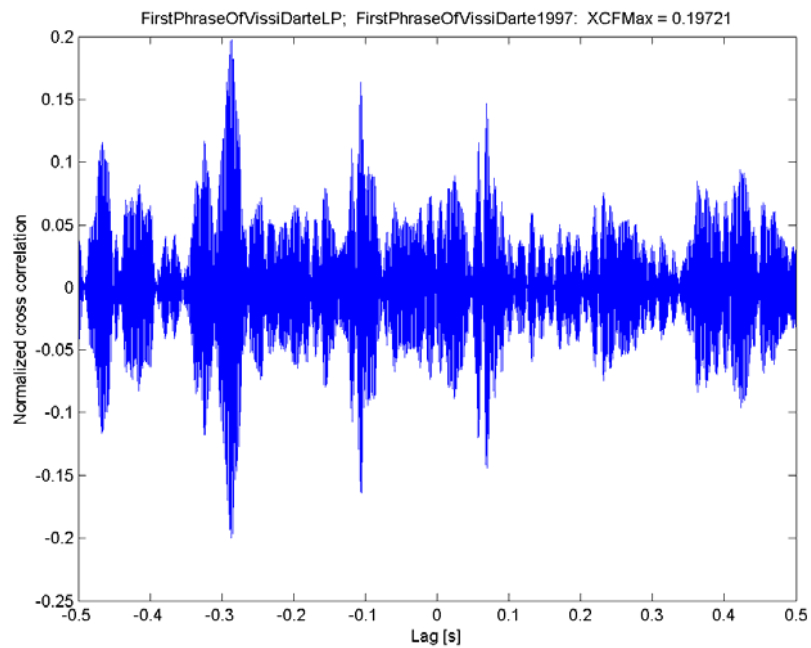


Figure 5.27: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of phrase "Vissi d'arte" from "Vissi d'arte," Act II of *Tosca* (1953 recording).

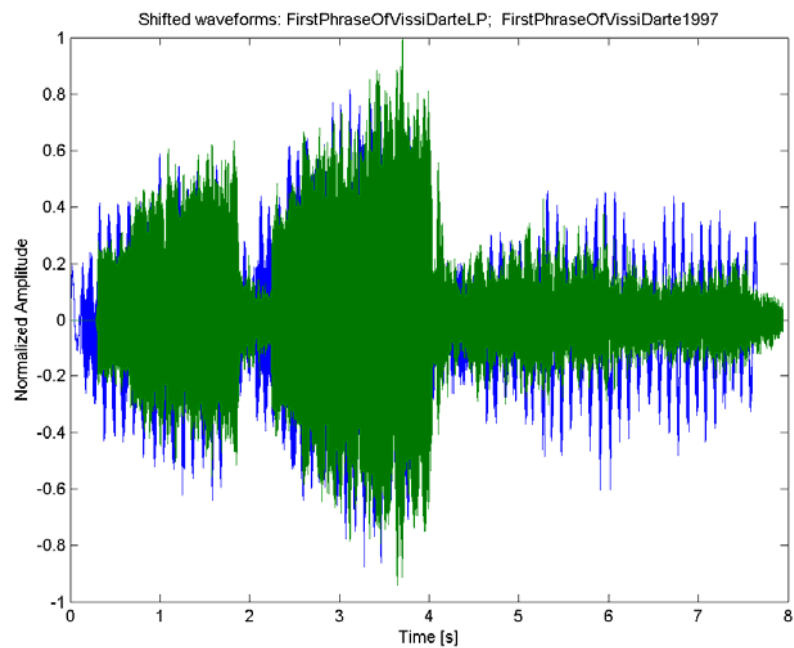


Figure 5.28: Plot of time-shifted waveforms (Y1 and Y2) of phrase "Vissi d'arte" from "Vissi d'arte," Act II of *Tosca* (1953 recording).

The instantaneous magnitudes of Y1 and Y2, plotted against each other in Figure 5.29, clearly do not correspond.

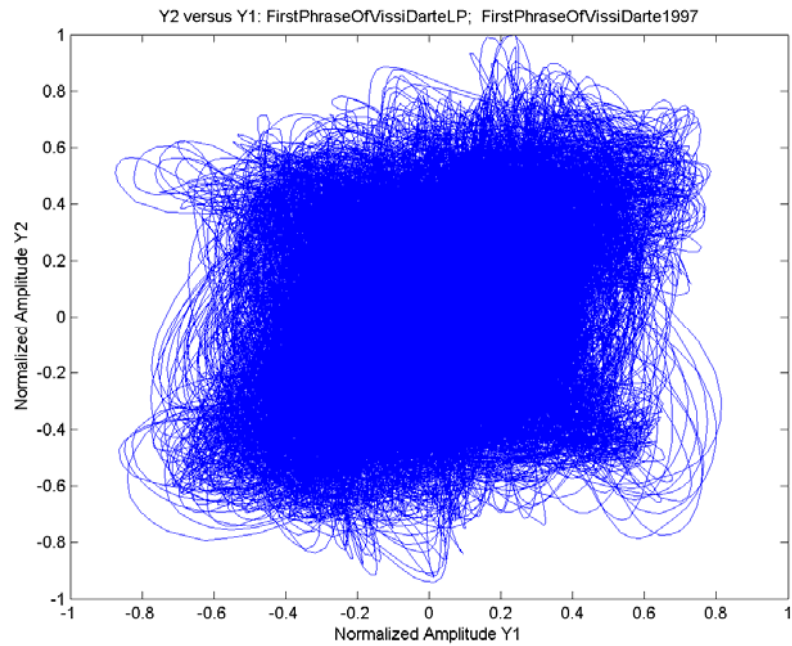


Figure 5.29: Plot of normalised amplitude of Y1 vs. Y2 of phrase "Vissi d'arte" from "Vissi d'arte," Act II of *Tosca* (1953 recording).

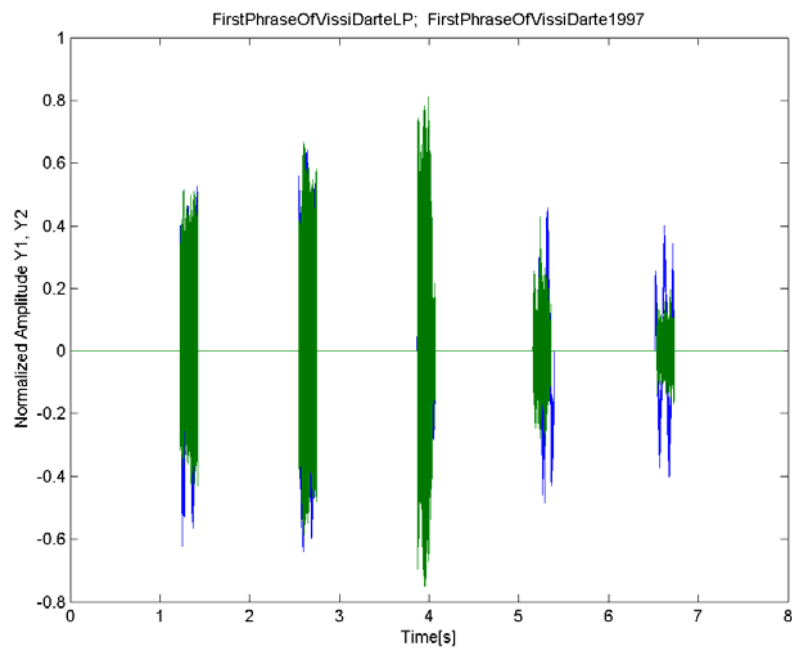


Figure 5.30: Plot of time-shifted windows of phrase "Vissi d'arte" from "Vissi d'arte," Act II of *Tosca* (1953 recording).

Figure 5.31 shows that a maximum shift of approximately -0.035 s is needed to best match the fourth window in Figure 5.30 above, while a time-shift of approximately 0.015 s is needed to match the fifth window.

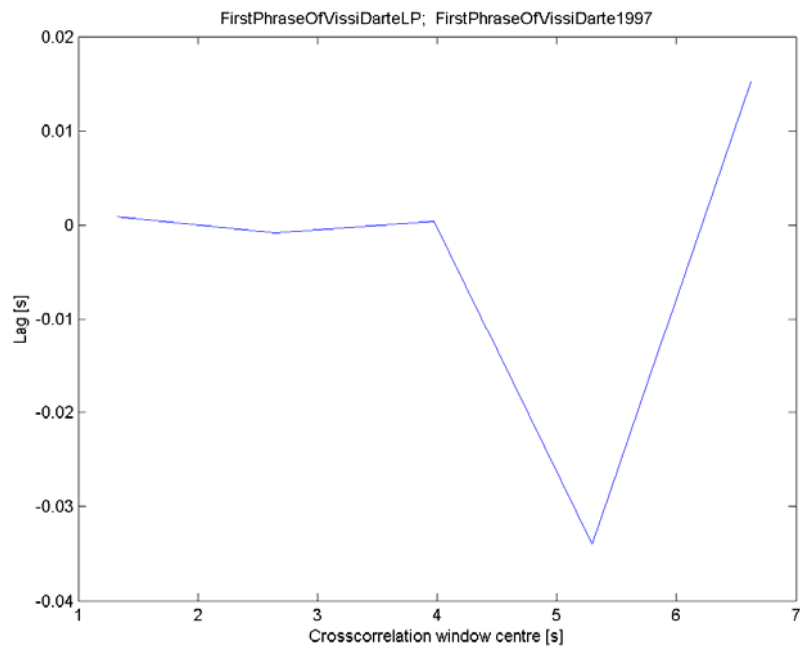


Figure 5.31: Plot of lag or time-shift required for optimum match for each window of phrase "Vissi d'arte" from "Vissi d'arte," Act II of *Tosca* (1953 recording).

As in Figure 5.25 above, the transfer function graph (Figure 5.32) shows clear filtering effects in the low-mid frequency range. The 8-10 Hz rumble present in the LP version can again be seen as a peak at 8-10 Hz in the top graph (compare Figure 5.13 and 5.14). There is large frequency-dependent difference in the phase of Y1 and Y2 above 100 Hz, as can be seen in the bottom graph.

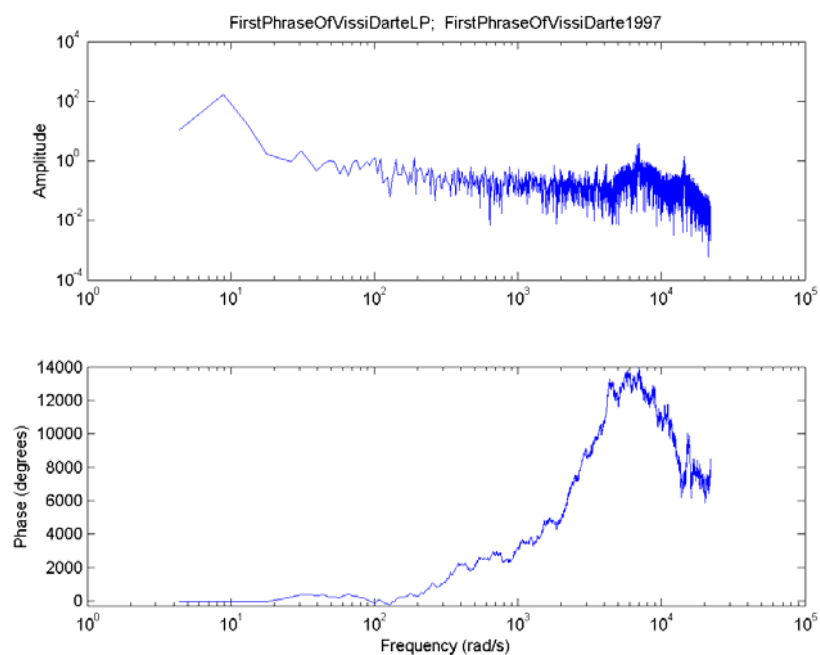


Figure 5.32: Plot of transfer function of phrase "Vissi d'arte" from "Vissi d'arte," Act II of *Tosca* (1953 recording).

CHAPTER 6

LUCIA DI LAMMERMOOR (1953)

“One of the towering operatic experiences of its time.”

John Ardoin (1995: 46)

LUCIA DI LAMMERMOOR

Opera in three acts by Gaetano Donizetti (1797 - 1848)

Libretto: Salvatore Cammarano after the novel *The Bride of Lammermoor* by Sir Walter Scott

Lucia	Maria Callas (soprano)
Edgardo	Giuseppe Di Stefano (tenor)
Enrico	Tito Gobbi (baritone)
Raimondo	Raffaele Arié (bass)
Arturo	Valiano Natali (tenor)
Alisa	Anna Maria Canali (mezzo-soprano)
Normanno	Gino Sarri (tenor)

Orchestra and Chorus of the Maggio Musicale Fiorentino, Florence

Chorus Master: Andrea Morosini

Conductor: Tullio Serafin

Recorded in the Teatro Comunale, Florence on 29 & 30 January and 1, 3, 4 and 6 February 1953.

Producer: Dino Olivieri

Balance Engineer: Oswaldo Varesco

6.1) INTRODUCTION:

Donizetti's *Lucia di Lammermoor* was the first complete opera that Callas recorded for EMI, though it was only released after *I Puritani* (released in November 1953) and *Tosca* (released in December 1953). Angel records released the recording in the USA in January 1954, followed shortly thereafter by Columbia records who issued the recording in Britain in March 1954. *Lucia* was produced by EMI's Italian subsidiary and recorded in Florence's Teatro Comunale, the acoustics of which Walter Legge considered “antimusical and inimical.” As was the case with the other recordings Callas made with EMI before Legge took over as producer, the original master tapes suffered from volume overload, distortion, drop-outs¹ and electronic clicks. Legge's decision

¹ Drop-Out: A momentary loss or reduction of signal level, often due to imperfections on the surface of an analogue tape, tracking errors during tape playback, etc.

to delay the release of *Lucia* was motivated by the fact that he wanted “Angel’s first Callas recording to be a revelation, for her sake and for Angel’s reputation for quality,” which had yet to be established. *I Puritani* was also “the first fruit of EMI’s contractual collaboration with La Scala – a double *coup* – though it was recorded in a Milan basilica [the Basilica di Santa Eufemia]” (Legge in Schwarzkopf 1982: 196). In a letter to Dario Soria of Angel records, Legge furthermore stated that “*Tosca* is so far superior to both *Puritani* and *Lucia* that I beg you in your own interest to hold up the other operas until *Tosca* is published” (cited in Scott 2005b).

6.2) TRANSFORMING *LUCIA* AND REVITALISING *BEL CANTO*:

This recording of *Lucia* is important for a number of reasons. As stated above, it was the first recording Callas made with EMI. It was also the first time that Legge brought together the team of Callas, Di Stefano, Gobbi and Serafin, who would make so many memorable opera recordings during the 1950’s. Yet, of greater historical importance, was the sensation caused by Callas’s performance (and to a lesser extent the contribution of Serafin) when this recording was first issued: “I remember when Callas’s *Lucia* was first issued throughout the opera world she created one of the greatest *furores* in a career that for a few years was an unending sequence of *furores*,” noted Michael Scott (2005b), while Philip Hope Wallace, in his review of the recording for *The Gramophone* (cited in Scott 2005b), testified that he was so carried away with what he heard, he had to go out in the garden and cool off.² It is not an overstatement to say that with this recording, Callas single-handedly revitalised and transformed our understanding of the art of florid *bel canto* singing and reinstated *Lucia* to its rightful place in the operatic pantheon. As (Ardoin 1995: 63) noted:



Figure 6.1: Callas (*Lucia*) singing the famous “Mad Scene” - La Scala (Milan), 1954.

“Though nearly forty years have passed since this *Lucia* was recorded, and though numerous other versions have followed (including a second [stereo version] by Callas), it remains the most satisfying performance of the work on commercial discs and is now a glory of the CD era as well. The word “perfect” is too facile and imprecise a description of Callas’ performance; yet it is the word that springs first to mind because

² The previous year, at a performance of *Lucia* at the Palacio de las Bellas Artes in Mexico City on 10 June 1952, Callas received a twenty-minute ovation and sixteen curtain calls after the “Mad Scene,” a record in the history of the Palacio de las Bellas Artes. The audience’s reaction was so overwhelming, that the radio announcer apparently had to shout to be heard over the demonstration in the auditorium.

of her unerring vocal poise and the splendid balance maintained throughout between the opera's musical and theatrical elements."

By 1953, *Lucia* was only remembered as a vehicle for "light-voiced" and "self-indulgent" *coloratura* sopranos and was less regularly staged than at any time in its history, not having been performed at Covent Garden since 1925 (though it was still occasionally presented at the Metropolitan Opera in New York) and ranked below such lesser known *opera serie* by Donizetti as *Anna Bolena* and *Lucrezia Borgia* (Osborne 2004). *Coloratura* sopranos such as Amelita Galli-Curci (1882 - 1963), Lily Pons (1895 - 1976) and Toti dal Monte (1893 - 1975) lavished in the vocal fireworks demanded by the famous "Mad Scene." In his book, *Maria Callas – A Musical Biography*, Robert Levine (2003: 197) stated that "*Lucia* had become little other than a showcase for sopranos with bell-like tones until Callas came along. At the opera's earliest performances, audience members wept at Lucia's plight; by the 1940's, audiences sat politely and waited for the *coloratura* acrobatics, culminating in what had better turn out to be a perfectly placed high E-flat."

Herbert von Karajan, whose production of *Lucia* with Callas was to take Milan, Berlin and Vienna by storm in 1954-56, recalled seeing a performance of *Lucia* by Toscanini's La Scala company during his student days in Vienna:

"The first opera they did was... *Lucia di Lammermoor*. This made a big impression on me because *Lucia* was regarded as second-class music. Because Toscanini was coming, we studied the piece and played it in class, and I thought, "how can such a great man play this music?" Then I heard Toscanini play it, and I knew that there was not bad music, only bad conducting and playing. It was incredible. The secret was to play it so that it didn't sound vulgar" (Green 1998: 65).

Toscanini, according to Karajan, played *Lucia* "with the same devotion and meticulousness he might lavish on *Parsifal*" (cited in Green 1998: 65).

Lucia was the role with which Callas had the strongest initial identification early in her career and with which, according to John Ardoin (1995: 46), "Callas wrought her greatest revolution in the operatic theatre." She brought new dramatic and tragic elements to the role while still remaining true to Donizetti's style, thereby "translating the impact the opera initially had into something comprehensible today" (Scott 2005b).³ "After decades during which the role had been mishandled by light-voiced and self-indulgent sopranos," noted Ardoin (1995: 46), "Callas returned an epic

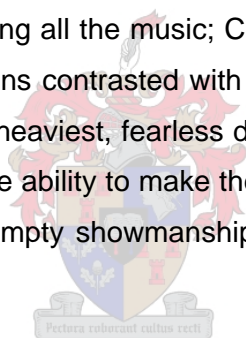
³ Interestingly, Callas's perceptions of *Lucia* arose from Donizetti's music, and not from Scott's novel on which the opera is based. She had in fact not read Scott. "It's not important," she said, "for it is the music that matters. The "Mad Scene" is the result of Donizetti's genius and not of the novel. These literary works are the springboard, but what really matters is what the composer does with them" (Green 1998: 66).

sense of its tragic stature by her penetrating psycho- and musico-analysis of the character. In her voice and care, Lucia emerged at once credible and with a previously unsuspected human dimension.”⁴ Milnes (cited in Levine 2003: 201) noted that Callas’s 1953 recording of *Lucia* is “an object lesson in how to build a character out of notes and syllables. “

6.3) VOCAL APPROACH:

Callas’s vocal approach to the role of Lucia was cast unashamedly in the *lirico spinto*⁵ style, with “lower pitch, immaculately sculpted phrasing and word-pointing, and a vibrantly expressive use of ornament that harked back... to the manner of such great Rossini-inspired singers as Isabella Colbran (1785-1845), Malibran and Pasta” (Osborne 2004). He also notes her “flawless, richly drawn legato sound – the bedrock of her performance,” while Ardoin (1995: 64) refers to her “molten legato.” Though still executing the *coloratura* with unerring accuracy, Callas uses “a stunning weight of tone and breadth of phrasing” (Scott 2005b).

“Great *coloratura* sopranos can sing all the music; Callas sings it superbly, but there’s so much more: smooth declarations contrasted with emotional eruptions, control over dynamics from the lightest to the heaviest, fearless delivery of the most difficult music, careful attention to the text and the ability to make the vocal acrobatics an integral part of Lucia’s madness rather than empty showmanship. These all add up to something miraculous.” (Levine 2003: 201).



Of the present recording, Farr (2005) commented that Callas “uses a great variety of colour and tone to portray Lucia’s various situations, emotions and ultimate madness... In the totality of her interpretation there are times when a slight tonal unevenness between the registers is evident, but unlike in the 1959 stereo remake, Callas’s voice does her bidding here.” He furthermore refers specifically to the “Mad Scene,” noting how Callas “goes through her full repertoire starting with covered, even occluded, half-voice and then moving, via a high girlish tone, into full *spinto* richness and then clear-toned *coloratura* with pin-point accuracy and a pure concluding high E-flat that runs down my spine.”

⁴ Rumour has it that after a performance of *Lucia* at La Scala, Dal Monte, the reigning Lucia of the interwar years, visited Callas in her dressing room, confessing in tears that she now realised that she had sung the role for all those years without having understood what it was all about. (Steane 1989: 10).

⁵ *Spinto (Lirico spinto)*: Derived from the Italian verb “spingere,” meaning to “push” or to “urge on.” It identifies a lyric voice leaning towards the dramatic, i.e. usually a tenor or soprano voice that has been “pushed” into more forceful singing, but without the tonal intensity of its dramatic counterpart. Cio-Cio-San in Puccini’s *Madama Butterfly* is an example of a *spinto* soprano role.

Ardoin (1995: 64) refers to the “Mad Scene” as the zenith of this recording – “singularly rich in tempo and ripe in meaning... The opening pages are couched in that dazed, somnolent sound Callas often employed in setting an atmosphere...” According to him, “Callas brought a new, far-reaching dimension to the [“Mad Scene”] *cadenza*.⁶ With her, the momentum of the drama did not stop to wait out an irrelevant vocal display. Rather it continued to flow; Callas made the *cadenza* the apogee of what had gone before and used it to give meaning to what would follow (Ardoin 1995: 40).”

The critic Cynthia Jolly, writing about the 1954 La Scala production of *Lucia*, ascribed “Callas’s supremacy,” according to Steane (1989: 11), as “a magnificently tempered artistic courage... a heart-rending poignancy of timbre which is quite unforgettable.” In his article “Callas and *Lucia*,” published in the *Opera Quarterly*, London Green (1998: 65-71) stated that “Callas shocked the operatic world into a re-evaluation of the work. She offered a voice filled with colours and shadows, unequalled musical and dramatic sensitivity, and the energy and conviction to search out the greatest in the *bel canto* repertory. She sensed the cost of her effort. Half-knowing the answer, she once asked an interviewer, ‘When you first heard my *Lucia*, did you *like* it?’”



Figure 6.2: Callas (*Lucia*) – La Scala (Milan), 1954.

6.4) RELEASE HISTORY:

Lucia was first issued as Columbia 33JCX 1131-32 in Britain and in the US as Angel 3503. Various LP versions followed, including a simulated stereo version. The first CD remastering, made in 1989, was released in 1989 as EMI 69980 and in 1992 as EMI 64420. In 1997, *Lucia* was released as part of EMI’s Callas Edition (EMI 66438), featuring a new remastering by Simon Gibson.

In 2004, the recording was remastered by Andrew Walter and released as part of EMI’s Great Recordings of the Century (GROTC) series (EMI 62764) and, as competition for Naxos’ budget release earlier this year, reissued in EMI’s Historical series (EMI 86197). Like the other recent EMI budget releases, this last version states on the CD cover that it was “Digitally Remastered At Abbey Road Studios From The Original Tapes.” The Naxos version (8.110131-32), released in early 2005, was transferred from the best portions of five LP copies and remastered by audio

⁶ Cadenza: A passage or section of varying length in the style of a brilliant improvisation, usually inserted near the end of a composition or *aria*, giving the performer a chance to exhibit his technical mastery.

restoration engineer and producer Mark Obert-Thorn (who was also responsible for the other Naxos transfers of Callas's EMI recordings).

The various versions of the 1953 *Lucia di Lammermoor* used in this study, are listed below:

RELEASE	DATE OF REMASTERING	CATALOGUE NO.	REMASTERING ENGINEER
Columbia LP	1954 ⁷	33JCX 1131-32	N/A
EMI Classics (Highlights)	1989	CDM 7 64420 2	Unknown ⁸
EMI Callas Edition	1997	5 66438 2	Simon Gibson
EMI GROTC	2004	5 62764 2	Andrew Walter
EMI Historical	2004	5 86197 2	Andrew Walter
Naxos Historical	2005	8.110131-32	Mark Obert-Thorn

Table 6.1: Reissues of the 1953 recording of *Lucia di Lammermoor* used in this study.

6.5) TRACK TIMINGS:

In the CD booklet of the Naxos release, Mark Obert-Thorn stated in his Producer's Note that:

“Like the other Callas recordings made before the arrival of Walter Legge as her producer, the master tape has numerous problems including volume overload, distortion, dropouts and electronic clicks. The distortion on the original LP's is not as severe as it is on the most recent EMI CD edition (compare, for example, the 'Mad Scene'), while computerized declipping has eliminated nearly all the clicks from the present transfer. Additionally, the slightly flat pitch of the EMI CD version has been corrected here.”

Obert-Thorn's statement regarding the incorrect pitching of the EMI budget release was corroborated by Seletsky (2005: 387), who stated that “all of EMI's 1953 *Lucias* on CD begin low in pitch, drifting upward through the opera.”

To test the claims made by Obert-Thorn and Seletsky, the track timings of the various reissues were compared. These timings are compiled in Tables 6.3 - 6.5 and represent the actual duration of the various tracks, excluding pauses or silences at the beginning and end of tracks, as for example at the beginning or end of an act or scene. As a result, the timings listed in Tables 6.3 - 6.5 differ greatly from the track timings given in the CD booklets of the respective releases. Shaded tracks indicate greatest variation in timing between the different versions and also those tracks used for pitch analysis.

⁷ Though the original Columbia LP set was released in Britain in January 1954, the LP's used for comparison in this study were pressed in South Africa. No release date is indicated on the cover or the actual LP's, though it would probably have been pressed either in 1954 or 1955. The catalogue number and cover art is exactly the same in both versions.

⁸ Prior to 1997, no remastering engineers are credited by EMI for the remasterings of the Callas recordings.

The 2004 GROTC and EMI Historical releases are based on the same remastering and therefore feature the same track timings. Table 6.2 shows the total duration of the entire recording for all six releases:

ACT	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
ACT I	37:46	N/A	38:14	38:13	38:13	37:58
ACT II	30:28	N/A	30:51	30:51	30:51	30:25
ACT III	40:30	N/A	41:01	41:00	41:00	40:29
TOTAL DURATION:	108:44	N/A	110:06	110:04	110:04	108:52

Table 6.2: Total duration of *Lucia di Lammermoor* (1953 recording).

According to Table 6.2, the timings of the 1997 and 2004 EMI versions are virtually identical. The 2005 Naxos release is approximately 6 seconds longer than the original LP version. A considerable difference of 01:21 exists between the original LP's and the EMI versions.

6.6) PITCH ANALYSIS:

Seletsky and Obert-Thorn's claim regarding the "slightly flat pitch" of all previous EMI CD releases of the 1953 *Lucia*, necessitated pitch analysis of the various reissues, using those tracks that showed the greatest variations in timing (these tracks are slightly shaded in Tables 6.3 - 6.5). From each of these tracks a number of notes were selected that are best suited to analysis, i.e. notes of reasonable duration, consistent in pitch and without *portamenti*, intensity fluctuations, *crescendo/decrescendo*, etc. The results of the pitch analysis are shown in Tables 6.6 - 6.20, with the selected notes circled in the notation examples.

Analogous to the track timings listed in Tables 6.3 - 6.5, the results of the pitch analysis prove that the EMI CD versions are pitched slightly flat when compared with the original LP's or the Naxos Historical release.

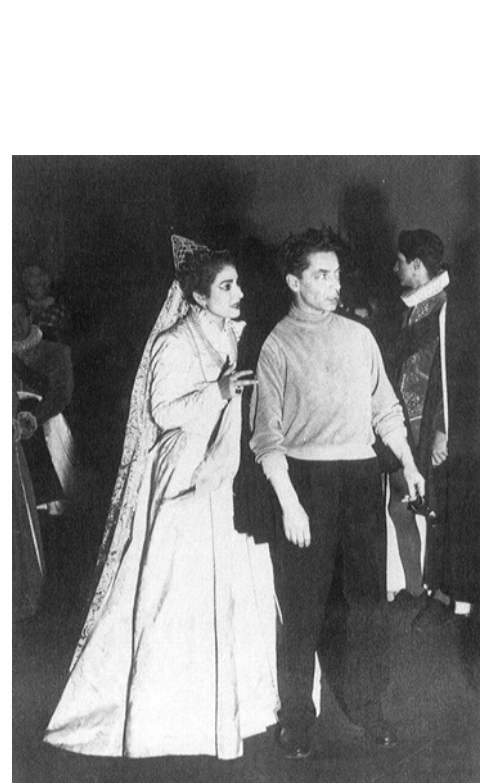


Figure 6.3: Callas (Lucia) with conductor Herbert von Karajan - Staatsoper (Berlin), 1955.

Track	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
1. <i>Preludio</i>	02:08	N/A	02:09	02:10	02:10	02:08
2. <i>Percorrete le spiagge vicine</i>	02:23	N/A	02:26	02:26	02:26	02:24
3. <i>Tu sei turbato!...E n'ho ben donde</i>	03:10	N/A	03:13	03:12	03:12	03:10
4. <i>Cruda, funesta smania</i>	02:19	N/A	02:21	02:21	02:21	02:19
5. <i>Il tuo dubbio è omai certezza</i>	02:08	N/A	02:10	02:10	02:10	02:07
6. <i>La pietade in suo favore</i>	01:35	N/A	01:36	01:36	01:36	01:35
7. <i>Maestoso</i>	02:37	N/A	02:39	02:39	02:39	02:37
8. <i>Ancor non giunse?</i>	01:33	N/A	01:34	01:34	01:34	01:33
9. <i>Regnava nel silenzio</i>	04:01	04:04	04:04	04:02	04:02	04:01
10. <i>Quando rapito in estasi</i>	03:53	03:54	03:54	03:57	03:57	03:54
11. <i>Egli s'avanza</i>	02:36	N/A	02:38	02:38	02:38	02:36
12. <i>Sulla tomba che rinserra</i>	02:55	02:57	02:57	02:56	02:56	03:09
13. <i>Qui di sposa eterna fede</i>	01:33	01:34	01:34	01:34	01:34	01:32
14. <i>Ah, talor del tuo pensiero</i>	00:45	00:45	00:46	00:45	00:45	00:45
15. <i>Verranno e te sull'aure</i>	04:10	04:13	04:13	04:13	04:13	04:10
Total Timing:	37:46	N/A	38:14	38:13	38:13	37:58

Table 6.3: Track timings from Act I, *Lucia di Lammermoor* (1953 recording).

Track	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
1. Moderato... Lucia fra poco a te verrà	03:08	N/A	03:12	03:11	03:11	03:09
2. Appressati, Lucia	01:09	01:10	01:10	01:10	01:10	01:09
3. Il pallor funesto, orrendo... A ragion mi fe' spietato	02:40	02:42	02:42	02:42	02:42	02:40
4. Nobil sposo... Cessa, cessa!	01:12	01:13	01:13	01:13	01:13	01:12
5. Soffriva nel pianto	03:21	03:23	03:23	03:22	03:22	03:20
6. Che fia?... Suonar di giubilo	01:22	01:24	01:24	01:24	01:24	01:23
7. Se tradirmi tu potrai	01:55	01:56	01:56	01:56	01:56	01:54
8. Per te d'immenso giubilo... Per poco fra le tenebre	03:38	N/A	03:40	03:40	03:40	03:36
9. Dov'è Lucia?... Qui giungere or la vedrem	01:57	01:58	01:58	01:59	01:59	01:57
10. Ecco il tuo sposo	02:11	02:12	02:12	02:12	02:12	02:10
11. Chi mi frena in tal momento	03:31	03:35	03:34	03:35	03:35	03:30
12. T'allontana, sciagurato... Rispettate in me di Dio	01:06	N/A	01:07	01:07	01:07	01:06
13. Sconsigliato! In queste porte chi ti guida?	02:06	N/A	02:08	02:08	02:08	02:07
14. Esci, fuggi, il furor che m'accende	01:12	N/A	01:12	01:12	01:12	01:12
Total Timing:	30:28	N/A	30:51	30:51	30:51	30:25

Table 6.4: Track timings from Act II, *Lucia di Lammermoor* (1953 recording).

Track	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
1. <i>D'immenso giubilo</i>	01:44	N/A	01:47	01:47	01:47	01:44
2. <i>Ah!... Deh cessate quel contento!... Dalle stanze ove Lucia</i>	03:19	N/A	03:22	03:22	03:22	03:18
3. <i>Oh! Qual funesto avvenimento!</i>	02:46	N/A	02:47	02:47	02:47	02:44
4. <i>Oh giusto cielo!... Il dolce suono</i>	03:25	03:26	03:28	03:27	03:27	03:23
5. <i>Ohimè! Sorge il tremendo</i>	03:24	03:27	03:27	03:28	03:28	03:23
6. <i>Ardon gli incensi; splendon le sacre faci</i>	05:22	05:26	05:25	05:25	05:25	05:25
7. <i>Spargi d'amaro pianto</i>	03:45	03:48	03:48	03:47	03:47	03:45
8. <i>Maestoso... Tombe degli avi miei</i>	04:05	N/A	04:08	04:08	04:08	04:05
9. <i>Fra poco a me ricovero</i>	03:27	N/A	03:30	03:30	03:30	03:28
10. <i>O, meschina! O, fato orrendo!</i>	03:01	N/A	03:02	03:02	03:02	03:01
11. <i>Dove corri, sventurato?</i>	01:04	N/A	01:05	01:05	01:05	01:04
12. <i>Tu che a Dio spiegasti l'ali</i>	02:43	N/A	02:45	02:45	02:45	02:44
13. <i>Che facesti?</i>	02:25	N/A	02:27	02:27	02:27	02:25
Total Timing:	40:30	N/A	41:01	41:00	41:00	40:29

Table 6.5: Track timings from Act III, *Lucia di Lammermoor* (1953 recording).

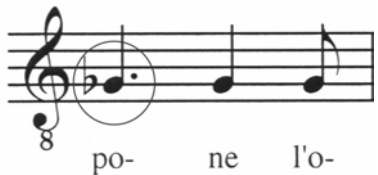

EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
	185 Hz	N/A	183 Hz	183 Hz	183 Hz	185 Hz
	350 Hz	N/A	345 Hz	345 Hz	345 Hz	353 Hz

Table 6.6: Pitch Analysis – “Percorrete le spiagge vicine” from Act I, *Lucia di Lammermoor* (1953 recording).



EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 stel- la...	280 Hz	N/A	276 Hz	276 Hz	276 Hz	280 Hz
 fre- mo! Ne tu sco- vri- sti il sedut-	267 Hz	N/A	265 Hz	265 Hz	265 Hz	267 Hz

Table 6.7: Pitch Analysis – “Tu sei turbato!...E n’ho ben donde” from Act I, *Lucia di Lammermoor* (1953 recording).



EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 Oh	292 Hz	N/A	288 Hz	289 Hz	289 Hz	296 Hz
<i>a tempo</i>  M'o- di.	217 Hz	N/A	214 Hz	214 Hz	214 Hz	219 Hz

Table 6.8: Pitch Analysis – “Il tuo dubbio è omai certezza” from Act I, *Lucia di Lammermoor* (1953 recording).




EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 <p><i>p</i> Re- gna- va nel ___ si-</p>	701 Hz	693 Hz	694 Hz	693 Hz	693 Hz	703 Hz
 <p>me, ah!</p>	704 Hz	697 Hz	697 Hz	697 Hz	697 Hz	707 Hz
 <p>Ah... si, di san- gue ros- seg-</p>	897 Hz	885 Hz	885 Hz	885 Hz	885 Hz	896 Hz

Table 6.9: Pitch Analysis – “Regnava nel silenzio” from Act I, *Lucia di Lammermoor* (1953 recording).




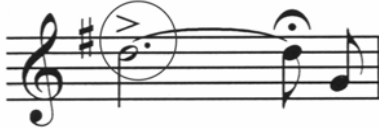
EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 Quan- do ra- pi- to in	584 Hz	580 Hz	580 Hz	580 Hz	580 Hz	582 Hz
 fan- ni miei ___ di- ___	630 Hz	621 Hz	621 Hz	621 Hz	621 Hz	624 Hz
 me, ___	1003 Hz	989 Hz	989 Hz	988 Hz	988 Hz	995 Hz
 pian ___ to	584 Hz	581 Hz	581 Hz	581 Hz	581 Hz	581 Hz

Table 6.10: Pitch Analysis – “Quando rapito in estasi” from Act I, *Lucia di Lammermoor* (1953 recording).




EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 <p>pet- to; un piu no- bi- le, piu</p>	799 Hz	788 Hz	788 Hz	789 Hz	789 Hz	799 Hz
 <p>san- to d' ogni voto e un puro a-</p>	585 Hz	577 Hz	578 Hz	578 Hz	578 Hz	586 Hz
 <p>ce- di a</p>	629 Hz	619 Hz	619 Hz	619 Hz	619 Hz	637 Hz

Table 6.11: Pitch Analysis – “Sulla tomba che rinserra” from Act I, *Lucia di Lammermoor* (1953 recording).




EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
Moderato assai  ran- no a	705 Hz	697 Hz	697 Hz	700 Hz	700 Hz	711 Hz
<i>accel.</i>  lor, ah!	856 Hz	846 Hz	847 Hz	846 Hz	846 Hz	859 Hz
 di do-	623 Hz	617 Hz	617 Hz	618 Hz	618 Hz	626 Hz

Table 6.12: Pitch Analysis – “Verranno e te sull’aure” from Act I, *Lucia di Lammermoor* (1953 recording).




EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
<p>(seduto presso un tavolino)</p>  <p>Tre- man- te l'as-</p>	220 Hz	N/A	217 Hz	218 Hz	218 Hz	221 Hz
 <p>nuo- va ch'e- gli s'ac- ce- se d'al- tra</p>	254 Hz	N/A	257 Hz	254 Hz	254 Hz	255 Hz
 <p>-ci- a spreg- ne- ran- no il cieco a-</p>	298 Hz	N/A	298 Hz	295 Hz	295 Hz	300 Hz

Table 6.13: Pitch Analysis – “Moderato... Lucia fra poco a te verrà” from Act II, *Lucia di Lammermoor* (1953 recording).



EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 <p>-fri _____ va nel</p>	527 Hz	519 Hz	519 Hz	520 Hz	520 Hz	525 Hz
 <p>cor _____ l'i</p>	558 Hz	553 Hz	553 Hz	553 Hz	553 Hz	564 Hz

Table 6.14: Pitch Analysis – “Soffriva nel pianto” from Act II, *Lucia di Lammermoor* (1953 recording).




EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 <p>po la:</p>	300 Hz	N/A	294 Hz	296 Hz	296 Hz	302 Hz
 <p>cor, a te ne</p>	295 Hz	N/A	291 Hz	291 Hz	291 Hz	295 Hz
 <p>tel- lo e di- fen-</p>	368 Hz	N/A	364 Hz	365 Hz	365 Hz	371 Hz

Table 6.15: Pitch Analysis – “Per te d’immenso giubilo... Per poco fra le tenebre” from Act II, *Lucia di Lammermoor* (1953 recording).


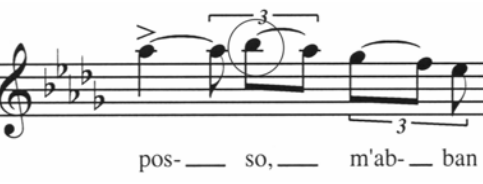
EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 <p>mos- so! t'amo, in</p>	295 Hz	292 Hz	292 Hz	291 Hz	291 Hz	295 Hz
 <p>pos- so, m'ab- ban</p>	938 Hz	928 Hz	928 Hz	930 Hz	930 Hz	940 Hz

Table 6.16: Pitch Analysis – “Chi mi frena in tal momento” from Act II, *Lucia di Lammermoor* (1953 recording).



EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 <p>stan- ze o- ve Lu-</p>	242 Hz	N/A	238 Hz	239 Hz	239 Hz	245 Hz
 <p>dis- se, e nel</p>	178 Hz	N/A	176 Hz	176 Hz	176 Hz	181 Hz

Table 6.17: Pitch Analysis – “Ah!... Deh cessate quel contento!... Dalle stanze ove Lucia” from Act III, *Lucia di Lammermoor* (1953 recording).




EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 vo- ce!...	620 Hz	615 Hz	615 Hz	615 Hz	615 Hz	623 Hz
 -gar- do! io ti son	517 Hz	508 Hz	508 Hz	509 Hz	509 Hz	516 Hz
 quan _____ to,	460 Hz	455 Hz	455 Hz	455 Hz	455 Hz	464 Hz

Table 6.18: Pitch Analysis – “Oh giusto cielo!... Il dolce suono” from Act III, *Lucia di Lammermoor* (1953 recording).





EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 <p>gar- do, a</p>	619 Hz	613 Hz	613 Hz	613 Hz	613 Hz	622 Hz
 <p><i>con forza</i> di', non a-</p>	585 Hz	579 Hz	579 Hz	579 Hz	579 Hz	587 Hz
 <p><i>con forza</i> Ah! Ah!</p>	590 Hz	582 Hz	582 Hz	582 Hz	582 Hz	592 Hz
 <p>che si sen- te e non si</p>	369 Hz	364 Hz	364 Hz	364 Hz	364 Hz	369 Hz

Table 6.19: Pitch Analysis – “Ohimè! Sorge il tremendo” from Act III, *Lucia di Lammermoor* (1953 recording).





EXTRACT	FUNDAMENTAL FREQUENCY (MUSICAL PITCH)					
	Columbia LP Release date: 1954 33JCX 1131-32	EMI Highlights Release date: 1989 CDM 7 64420 2	EMI Callas Edition Release date: 1997 EMI 5 66438 2	EMI Great Recordings of the Century Release date: 2004 EMI 5 62764 2	EMI Historical Release date: 2004 EMI 5 86197 2	Naxos Historical Release date: 2005 Naxos 8.110131-32
 <p>Ar- don gl'in-</p>	584 Hz	579 Hz	579 Hz	579 Hz	579 Hz	586 Hz
 <p>a me — ti</p>	624 Hz	616 Hz	616 Hz	617 Hz	617 Hz	625 Hz
 <p>O-</p>	626 Hz	618 Hz	618 Hz	619 Hz	619 Hz	625 Hz
 <p>ciel cle- men- te un</p>	494 Hz	489 Hz	489 Hz	488 Hz	488 Hz	496 Hz

Table 6.20: Pitch Analysis – “Ardon gli incensi; splendon le sacre faci” from Act III, *Lucia di Lammermoor* (1953 recording).

6.7) COMPARISON OF THE DIFFERENT REMASTERINGS:

The sound of the original LP's release is slightly fuzzy and unfocussed (as in Example 6.4), the orchestra at times distant and muffled. Callas, however, sounds present, natural and articulate. Although her top sounds somewhat piercing⁹ at times, the lower register is warm and sweet (Example 6.4). The LP's have little of the harshness that characterise later EMI CD versions, but also lack the sonic impact and excitement of these later versions (Example 6.3).

The greater definition and articulation of the CD medium compared with LP is immediately apparent when comparing the 1989 CD version with the earlier LP version. According to the *New Penguin Guide to Compact Discs and Cassettes* (March et al. 1989: 137), the 1980's CD transfer treats the voices with greater presence, although the acoustic remains "boxy"¹⁰ within the limited confines of mono sound. The balance between soloists and orchestra is excellent, with a well-defined Callas. Though the electronic clicks and crackle of the original tapes are audible, there is little harshness and no distortion in the sound (Example 6.1). The 1989 CD remastering has less bass than the original LP incarnation, but the sound is still amazingly warm and "velvety," the orchestral textures transparent and clear (Examples 6.2 and 6.3).

Example 6.1: Extract from "Verranno a te sull'aure" from Act I of *Lucia di Lammermoor*

LUCIA

Verranno a te sull'aure i miei sospiri ardente, udrai nel mar che mormora l'eco dei miei lamenti.	On the breeze will come to you my ardent sighs, you will hear in the murmuring sea the echo of my laments.
Pensando ch'io di gemiti mi pasco e di dolor, spargi un'amara lagrima su questo pegno allor, ah, su questo pegno, ecc.	When you think of me living on tears and grief, then shed a bitter tear on this ring, ah, on this ring, etc.

EDGARDO

Verranno a te sull'aure i miei sospiri ardente, ecc. On the breeze will come to you my ardent sighs, etc.

CD 1 Track 37: Original 1954 LP's (Columbia)

CD 1 Track 38: 1989 remastering (EMI Classics)

CD 1 Track 39: 1997 remastering (EMI Callas Edition)

CD 1 Track 40: 2004 remastering (EMI GROTC)

CD 1 Track 41: 2004 remastering (EMI Historical)

CD 1 Track 42: 2005 remastering (Naxos Historical)

⁹ Piercing: An adjective describing a sound that is strident, hard on the ears, screechy, having sharp, narrow peaks in the frequency response around 3 to 10 kHz.

¹⁰ Boxy: A subjective description of a sound having resonances as if the music were enclosed in a box.

The 1997 Callas Edition release proved the most satisfying of those recordings compared in this study. The remastering has a warm, rich¹¹ ambience and spaciousness, though it is still not as “weighty”¹² as the original LP’s, as can be heard in Callas’s lower register or the added “oomph” of low-lying orchestral passages (Example 6.3). Ultimately, this remastering proves the best sounding CD representation of Callas’s voice across the frequency spectrum. The balance between the soloists and orchestra is exemplary and most of the extraneous noises present on the master tape and earlier releases have been removed. As in the 1989 remastering, the sound is commendably clear and the orchestral textures transparent (Example 6.1).

Example 6.2: Extract from “Regnava nel silenzio” from Act I of *Lucia di Lammermoor*

LUCIA

Regnava nel silenzio alta la notte e bruna...	At dead of night, in the silent darkness...
colpia la fonte un pallido	a pallid ray of eerie moonlight
raggio di tetra luna...	fell upon the fountain...
quando un sommesso gemito	when a low moan
fra l'aure udir si fè	was heard on the breeze,
ed ecco, ecco su quel margine,	and there, there on the verge,
l'ombra mostrarsi a me... Ah!	the spectre appeared to me... Ah!

- CD 1 Track 43: Original 1954 LP's (Columbia)
- CD 1 Track 44: 1989 remastering (EMI Classics)
- CD 1 Track 45: 1997 remastering (EMI Callas Edition)
- CD 1 Track 46: 2004 remastering (EMI GROTC)
- CD 1 Track 47: 2004 remastering (EMI Historical)
- CD 1 Track 48: 2005 remastering (Naxos Historical)

As the EMI Great Recordings of the Century and Historical releases are based on the same 2004 remastering, the following comments are applicable to both. Tape hiss is much more prominent in these releases (as in the extract from “Regnava nel silenzio” in Example 6.2), with highly audible electronic clicks and crackle, though the supposed distortion in the “Mad Scene” to which Obert-Thorn referred, is not as prominent as one would have imagined (Example 6.4). As in other GROTC remasterings of Callas recordings, the sound is “artificially lush,” with a very closely placed, larger-than-life sounding Callas, though the orchestra is less present. Fortunately, the acoustic image is not

¹¹ Rich: A sound that contains strong fundamentals relative to harmonics, with good low-frequency response, not necessarily extended, but with adequate response around 100 to 300 Hz. The opposite of “thin.”

¹² Weighty: A subjective description of a sound having good low-frequency response below 50 Hz.

as dry¹³ as in other GROTC Callas releases. There is an occasional harshness, stridency and a metallic, piercing ring in Callas's top notes (absent in earlier remasterings), although she still sounds clear and articulate (compare the extract from "Quando rapito in estasi" in Example 6.3).

Example 6.3: "Quando rapito in estasi" from Act I of *Lucia di Lammermoor*

LUCIA

Quando rapito in estasi del più cocente ardore, col favellar del core mi giura eterna fé, ecc.	When, lost in ecstasy of ardent passion, with the language of the heart he swears eternal love, etc.
gli affanni miei dimentico, gioia diviene il pianto, parmi che a lui d'accanto si schiuda il ciel per me, ecc.	I forget my sorrows and joy dries my tears, and it seems that when I am near him, heaven opens for me, etc.

CD 1 Track 49: Original 1954 LP's (Columbia)

CD 1 Track 50: 1989 remastering (EMI Classics)

CD 1 Track 51: 1997 remastering (EMI Callas Edition)

CD 1 Track 52: 2004 remastering (EMI GROTC)

CD 1 Track 53: 2004 remastering (EMI Historical)

CD 1 Track 54: 2005 remastering (Naxos Historical)

The Naxos release, transferred from the original LP's, is characterised by severe surface noise (compare for instance Example 6.2). In comparison with the other Naxos transfers of Callas recordings, this release is disappointing, though the flat pitch of the EMI versions have been improved and the clicks and crackle of the original master tapes admirably removed (as can be heard in Example 6.2). Farr (2005) stated that "whilst Mark Obert-Thorn has worked his usual miracles to give a well-balanced and easy-on-the ear sound, even he cannot obviate some overload distortion present on the master tapes... Today, for a very modest price, all lovers of *bel canto* operas and their performance on record can listen and make their own judgement on what was, without doubt, a seminal recording of the genre. For me this is Callas's finest recording in terms of interpretation allied to security of singing and this remastering accords it full justice."

The sound of the Naxos release, like the original LP's, is without the increased definition and clarity of later CD versions and there is a sharp brightness, occasional harshness or shrillness and raw edge to Callas's upper register, as in the extract from "Quando rapito in estasi" (Example 6.3). Callas is placed

¹³ Dry: An adjective describing a sound or recording that lacks reverberant information.

forward, with the orchestra slightly more to the back. Interestingly, the Naxos release has audible tape print-through¹⁴ in the “Mad Scene” cadenza (Example 6.4).

Example 6.4: Cadenza to “Ardon gli incensi” from Act III of *Lucia di Lammermoor*

- CD 1 Track 55: Original 1954 LP’s (Columbia)
- CD 1 Track 56: 1989 remastering (EMI Classics)
- CD 1 Track 57: 1997 remastering (EMI Callas Edition)
- CD 1 Track 58: 2004 remastering (EMI GROTC)
- CD 1 Track 59: 2004 remastering (EMI Historical)
- CD 1 Track 60: 2005 remastering (Naxos Historical)



Figure 6.4: Callas as Lucia – State Fair Music Hall (Dallas), 1959.

¹⁴ Tape Print-Through: Print-through is the undesired, low-level transfer of magnetic fields from one layer of analogue tape to another. When a signal is recorded on analogue tape, the magnetisation of the tape causes external magnetic fields to appear symmetrically on either side of the tape coating. This can result in a weak imprint of magnetic information to be transferred from one layer of a tape to the other, in effect transferring a weak copy of the signal backwards or forwards along the tape. This is sometimes heard as, so-called, pre- or post-echo. Pre-echo or pre-print, is the print-through signal that is on the outer tape layer, i.e. it precedes the recorded signal. Post-echo or post print, is when the print-through signal follows the recorded signal. Tape print-through can affect any type of analogue tape, though some brands of magnetic tape have a greater potential for print-through. This is measured by what is called the signal-to-print ratio and remains constant for a given reel of tape, regardless of the recorded signal strength. The signal-to-print ratio is a function of the recorded wavelength (tape speed divided by the frequency) and the thickness of the tape. In order to minimize print-through, magnetic tape should be stored “oxide in” and “tail-end out,” i.e. the tape should be wound so that its oxide coating side points towards the music that was recorded earlier, tapes should be rewound before playback, stored at a temperature between 70 - 80° F, strong magnetic fields should be avoided near analogue tape and magnetic tape with good signal-to-print ratio should be used.

6.8) FREQUENCY SPECTRUM ANALYSIS:

Frequency spectrum analysis was performed on a number of selected extracts, short phrases or noise samples from the various *Lucia di Lammermoor* reissues, each providing a multitude of possible comparisons. The selected extracts comprised the following:

- 1) "Parmi" from "Quando rapito in estasi," Act I
- 2) "Pianto" from "Quando rapito in estasi," Act I
- 3) "In estasi" from "Quando rapito in estasi," Act I
- 4) "Miei so spiri ardenti" from "Verranno a te sull'aure," Act I
- 5) "Ah!" from "Verranno a te sull'aure," Act I
- 6) "Dolor" from "Verranno a te sull'aure," Act I
- 7) "Ardon gli incensi" from "Ardon gli incensi," Act II
- 8) Florid passage from cadenza to "Ardon gli incensi," Act II
- 9) Noise sample from "Ardon gli incensi," Act II

The results of the frequency spectrum analysis were carefully compared and evaluated. From the above extracts, a further selection was made. These selected examples are discussed below.

The frequency spectrum graphs are either logarithmic or linear. The x-axis (left to right) represents frequency (measured in Hz), while the y-axis (bottom to top) corresponds to the amplitude of the corresponding frequency (measured in dB) on the x-axis.

The colours used to represent the various releases are as follows:

RELEASE PHASE	COLOUR
Original LP's (1954)	Green
EMI Classics (1989)	Red
EMI Callas Edition (1997)	Blue
EMI Great Recordings of the Century (GROTC)/ EMI Historical (2004)	Yellow
Naxos Historical (2005)	Purple/Pink

Table 6.21: Release phases of the various reissues of *Lucia di Lammermoor* used in this study and the colours used to represent them in the spectrum analysis examples.

Figure 6.6 shows a linear representation of the frequency spectrum of the phrase “in estasi” from “Quando rapito in estasi,” Act I. As can be seen, the middle-upper frequency content of the 1989 and GROTC/EMI Historical releases is relatively more prominent than the 1997 Callas Edition remastering. This is confirmed by two other graphs, Figures 6.11 and 6.13. Both the 1989 and 1997 reissues show a tapering away of the highest frequencies, the result of a high-pass shelving filter, from approximately 20000 Hz.

Figure 6.11, a short extract of Callas singing a florid passage from “Ardon gli incensi,” Act III, exhibits a very strong tonal component, with the fundamental frequency at approximately 1100 Hz (visible as a sharp peak) and several harmonics above that. It furthermore shows the greater lower and upper frequency content of the GROTC/EMI Historical version in comparison with the other two remasterings (compare as well Figure 6.8). At approximately 80 Hz, a sharp filtering effect has been applied in the 1997 release, while in the 1989 remastering, a similar filtering can be seen in the region of 160 Hz. Again, the 1989 incarnation contains relatively greater bass and treble frequencies than the 1997 release. Figure 6.13, a logarithmic frequency spectrum graph of the phrase “Ardon gli incensi,” from the aria “Ardon gli incensi,” Act III, again indicates the relatively more prominent low and mid-frequency content of the 1989 release compared with the 1997 version. Also, at 70 - 80 Hz it seems that filtering has once again been applied in the Callas Edition.

The relatively stronger upper frequency range and prominent peaks in the 2000 to 6000 Hz frequency response evident in the GROTC/EMI Historical remastering (and to a lesser extent) Naxos release (visible in Figures 6.6 - 6.9, 6.11, 6.12, 6.15 and 6.16 especially), account for the slight harshness and stridency in these releases.

As Figure 6.7, a logarithmic spectrum analysis of the phrase “Parmi” from “Quando rapito in estasi,” Act I clearly shows, the Naxos remastering is still, relatively speaking, the strongest contender in the lowest frequency range below 80 Hz compared with the 1997 Callas Edition and 2004 GROTC/EMI Historical reissues (compare also Figure 6.16). In contrast to Figures 6.6, 6.11 and 6.13 discussed above, here the 1997 Callas Edition contains the greatest frequency content in the 80 Hz - 8000 Hz frequency range. There is a sharp dip, a result of filtering, at 47 Hz in the GROTC/EMI Historical remastering and at 94 Hz in the Naxos release. In the upper frequency range above 8000 Hz, the GROTC/EMI Historical version is relatively more prominent than both the 1997 and Naxos releases.

Figure 6.9 is a linear representation of the phrase “dolor” from “Verranno a te sull’aure,” Act I. It displays the same characteristics as Figure 6.7, showing how in the middle frequency range the three versions – 1997, GROTC/EMI Historical and Naxos – are similar, though the GROTC/EMI Historical boasts relatively slightly stronger upper frequencies (compare as well Figure 6.10). The only exception

occurs at approximately 19800 Hz where there is a sharp peak in the Naxos remastering (the result of an aliasing problem) that is also visible in Figures 6.7, 6.10, 6.12, 6.14 and 6.16. Also, from about 17400 Hz, the Naxos release contains comparatively greater high frequencies than the 1997 version.

The frequency spectrum of the original 1954 LP release versus the 2004 Naxos transfer and 1997 Callas Edition is represented by Figure 6.12. Here the relatively stronger frequencies of the LP and Naxos releases in the low and high frequency ranges, compared with the 1997 remastering, is clearly evident. At 80 Hz there is a big dip in the 1997 version.

Figure 6.14 is a linear representation of a noise sample from “Ardon gli incensi” from Act I. Figure 6.16 is a logarithmic graph of the same extract. Please note that the low-lying frequency spectrum of the original LP release in these examples is slightly deceiving, as a very prominent 8-10 Hz LP rumble superimposed on the signal (visible in the audio waveform) has resulted in the signal not being boosted to its highest level during the normalisation process, but rather to the highest level of the 8-10 Hz rumble (which is strictly inaudible!). Please refer to Chapter 5, p. 121, fn 17 for an explanation of the possible causes for this particular phenomenon. Interestingly, the Naxos reissues, transferred from LP, though with a better SNR, also show a very strong peak at approximately 8-10 Hz in Figures 6.7, 6.12 and 6.16. Apart from the relatively more prominent lower frequencies of the LP, Naxos and GROTC/EMI Historical releases compared with the 1989 and 1997 reissues, the GROTC/EMI Historical release also contains (from approximately 12000 Hz) the strongest upper frequency content (see also Figure 6.15) of these versions three versions. From 8000 to 14000 Hz, there is clear dip in the frequency content of the Naxos reissue. The less prominent lower frequency content of the 1989 and 1997 Callas Edition remasterings evident in Figures 6.15 and 6.16 might explain the transparency and clear sound of these releases.



Figure 6.5: Callas (Lucia) - La Scala (Milan), 1954.

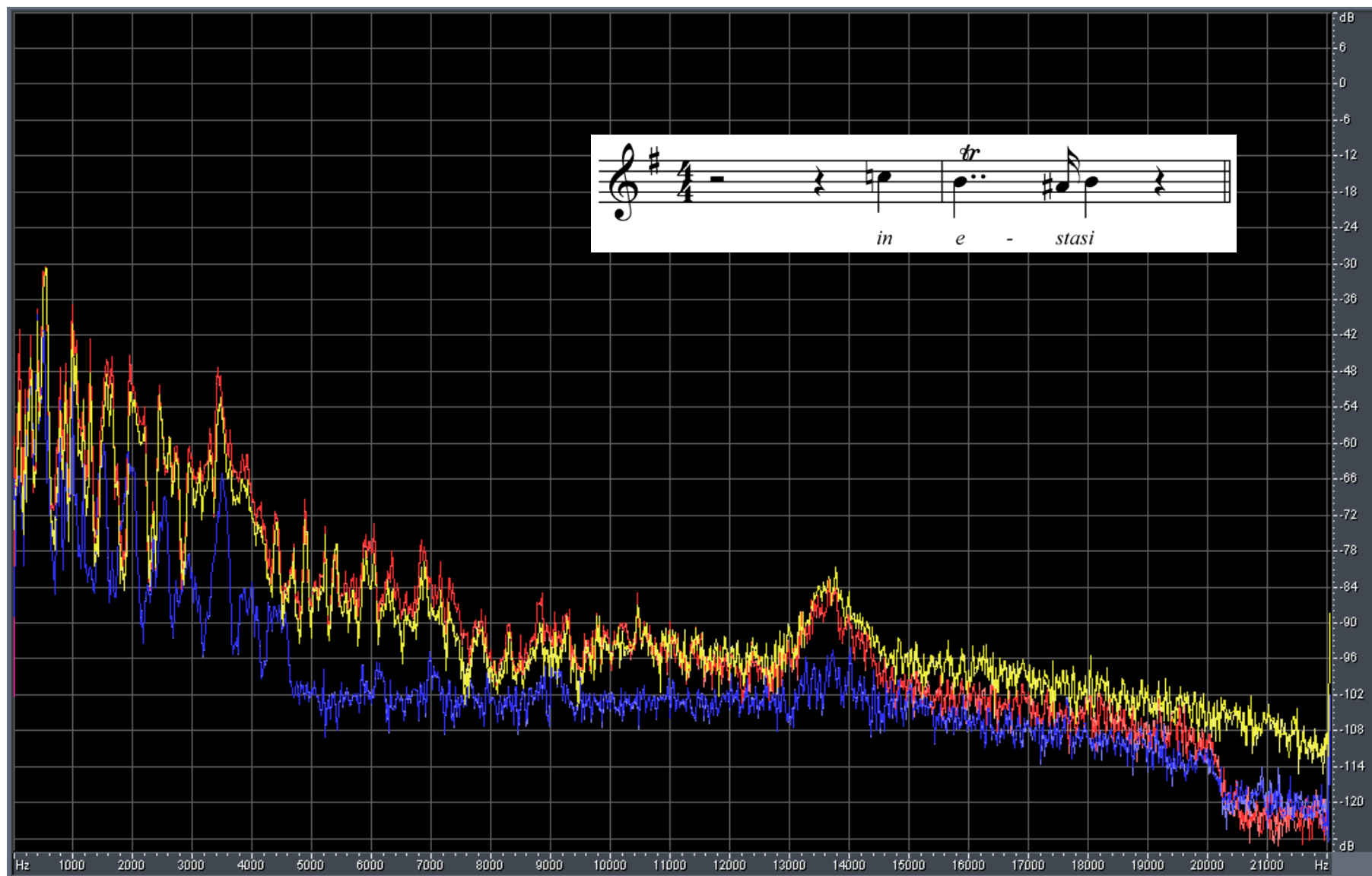


Figure 6.6: Linear frequency spectrum analysis (1989, 1997 & GROTC) of the phrase “in estasi” from “Quando rapito in estasi,” Act I of *Lucia di Lammermoor* (1953 recording).

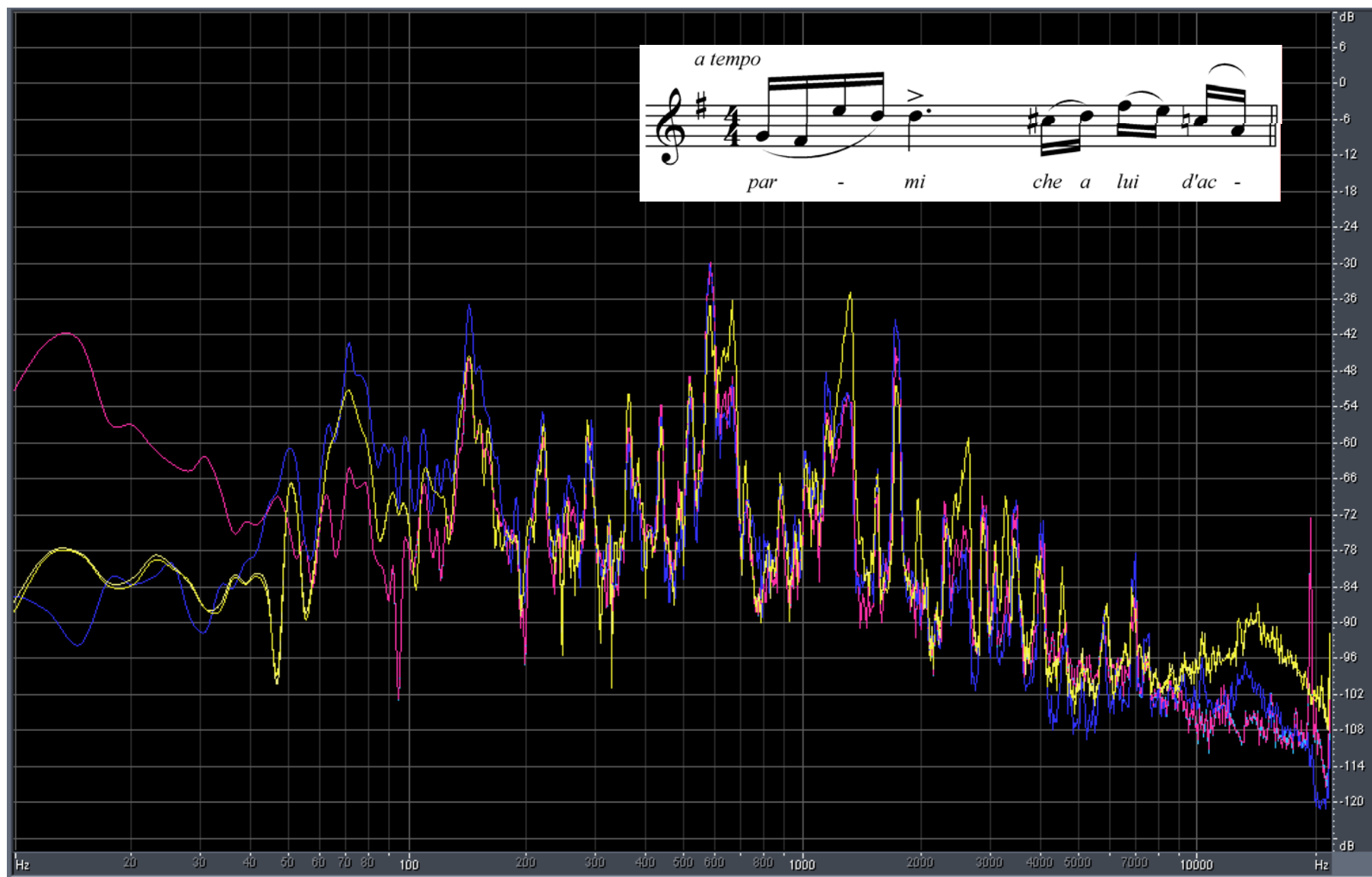


Figure 6.7: Logarithmic frequency spectrum analysis (1997, GROTC & Naxos) of the phrase “Parmi” from “Quando rapito in estasi,” Act I of *Lucia di Lammermoor* (1953 recording).

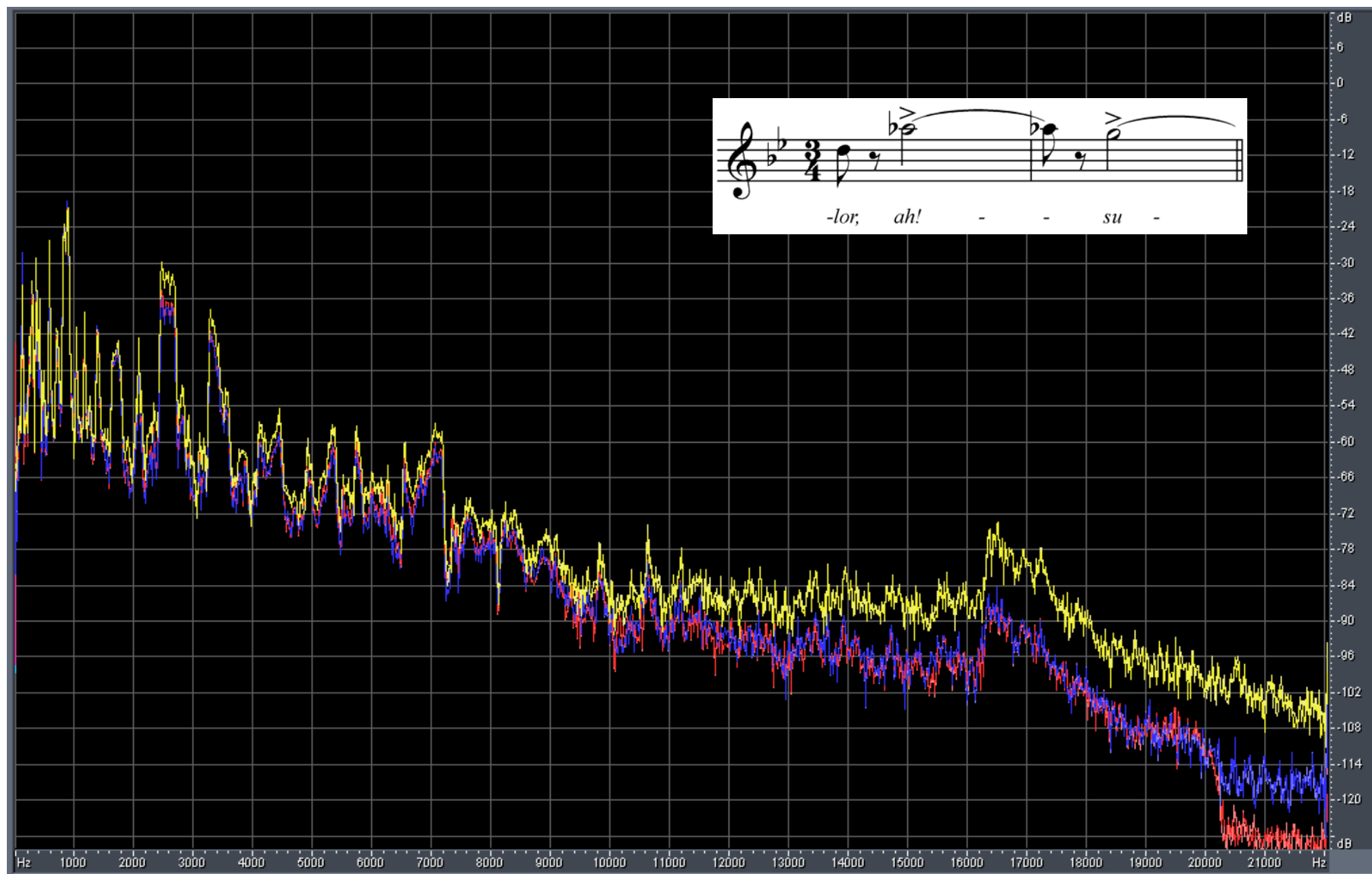


Figure 6.8: Linear frequency spectrum analysis (1989, 1997 & GROTC) of the phrase “Ah!” from “Verranno a te sull’aure,” Act I of *Lucia di Lammermoor* (1953 recording).

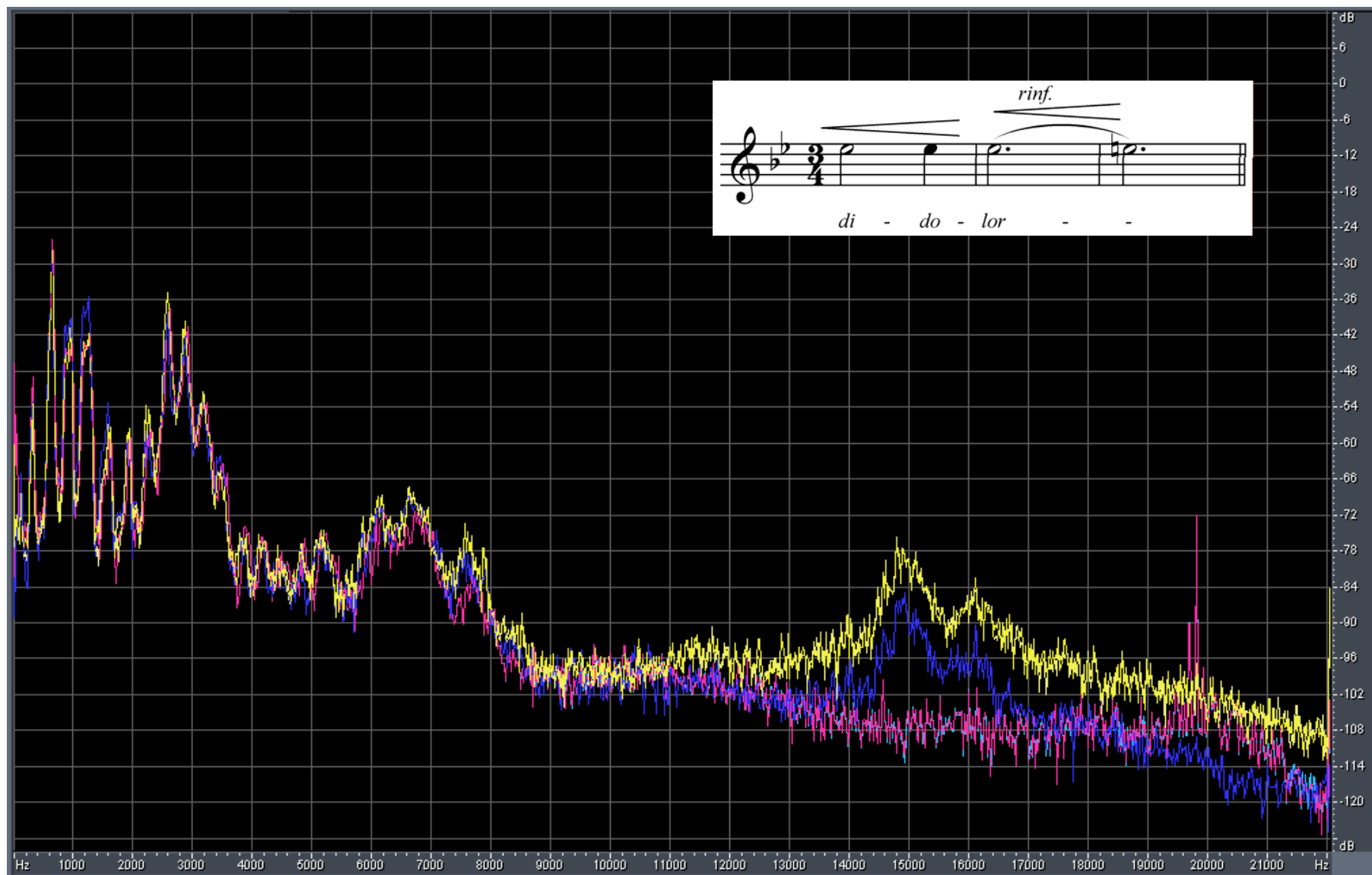


Figure 6.9: Linear frequency spectrum analysis (1997, GROTC & Naxos) of the phrase “dolor” from “Verranno a te sull’aure,” Act I of *Lucia di Lammermoor* (1953 recording).

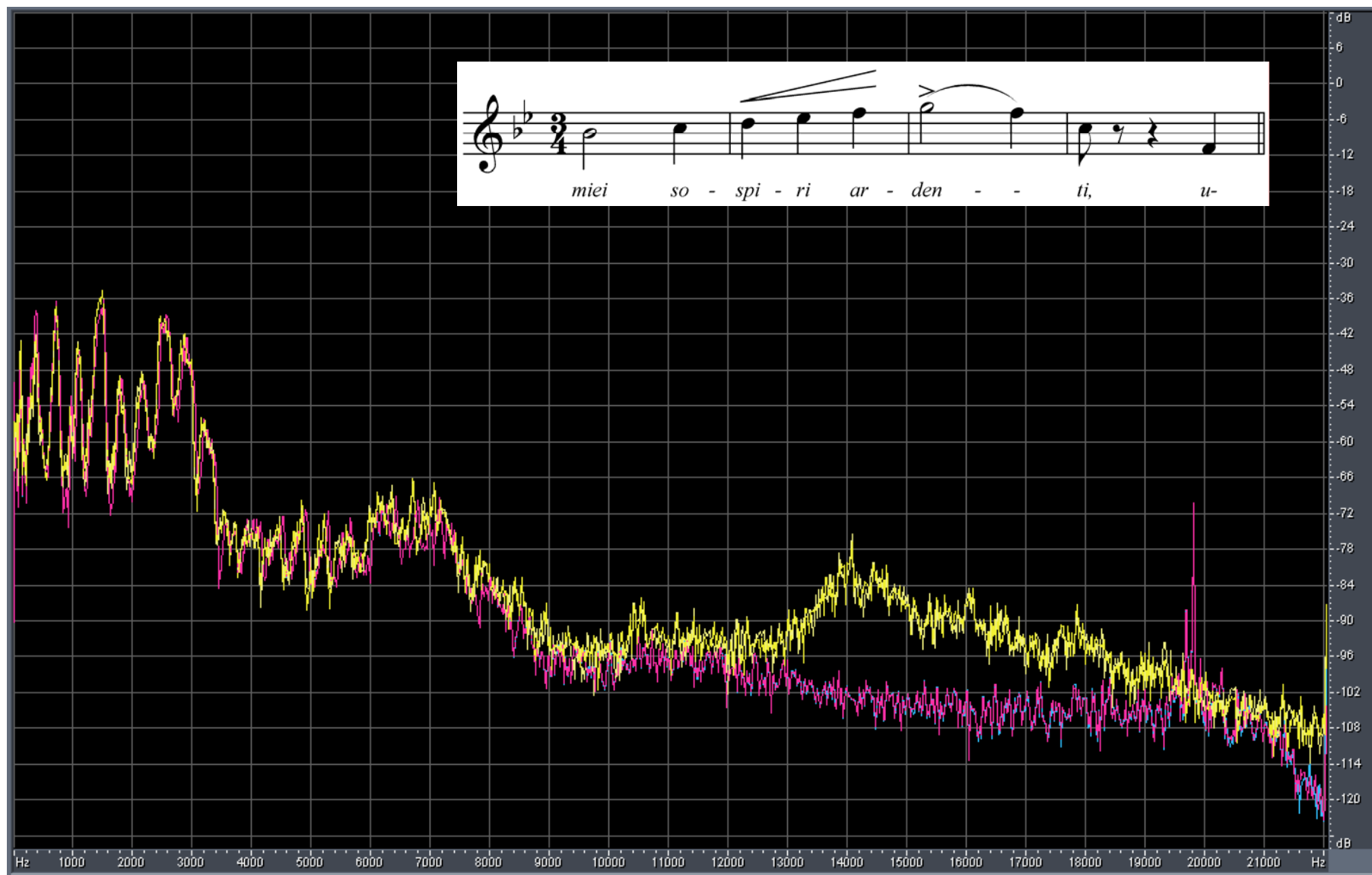


Figure 6.10: Linear frequency spectrum analysis (GROTC & Naxos) of the phrase “Miei so spiri arden- - ti,” Act I of *Lucia di Lammermoor* (1953 recording).

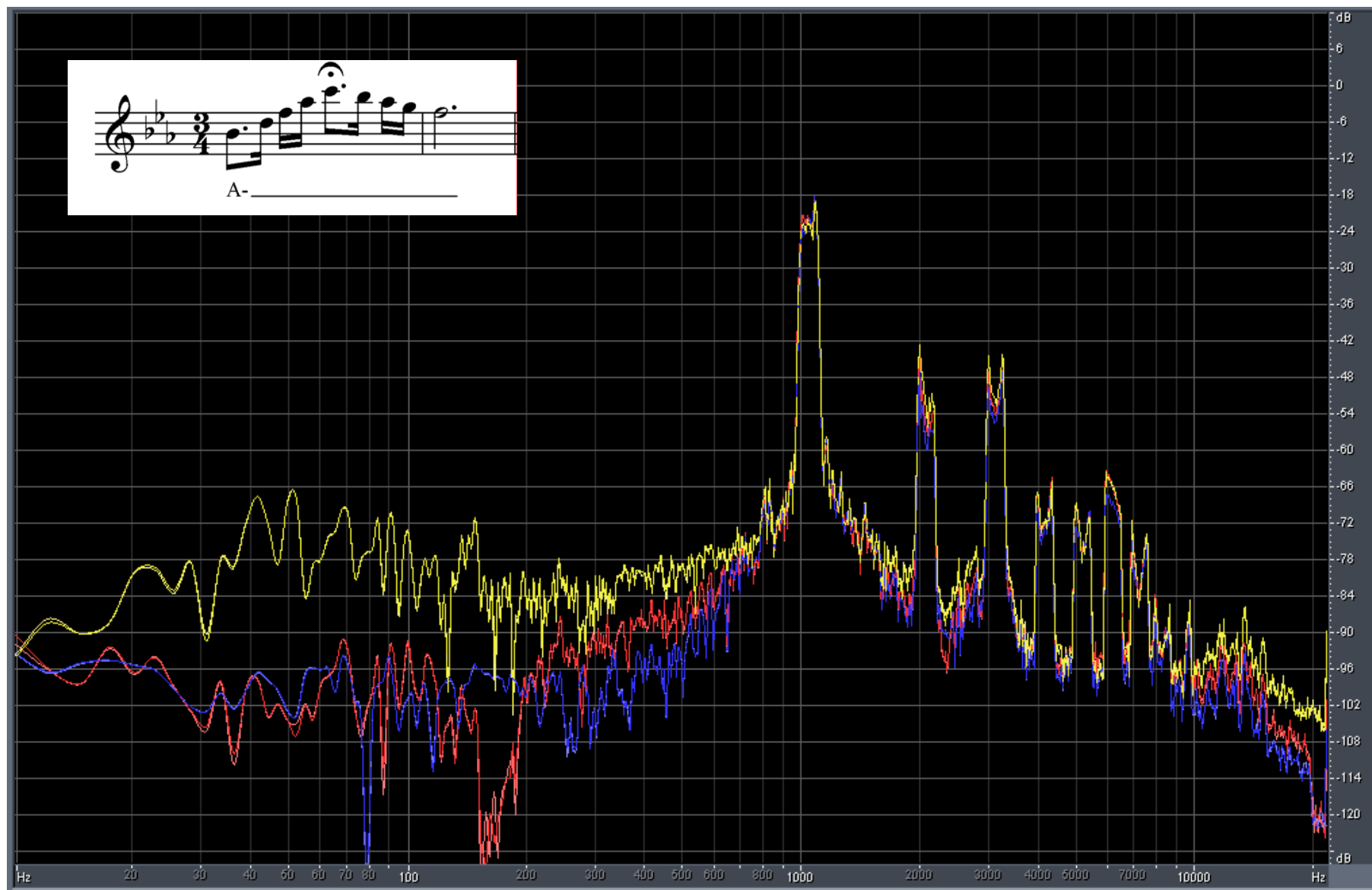


Figure 6.11: Logarithmic frequency spectrum analysis (1989, 1997 & GROTC) of Callas singing from “Ardon gli incensi,” Act III of *Lucia di Lammermoor* (1953 recording).

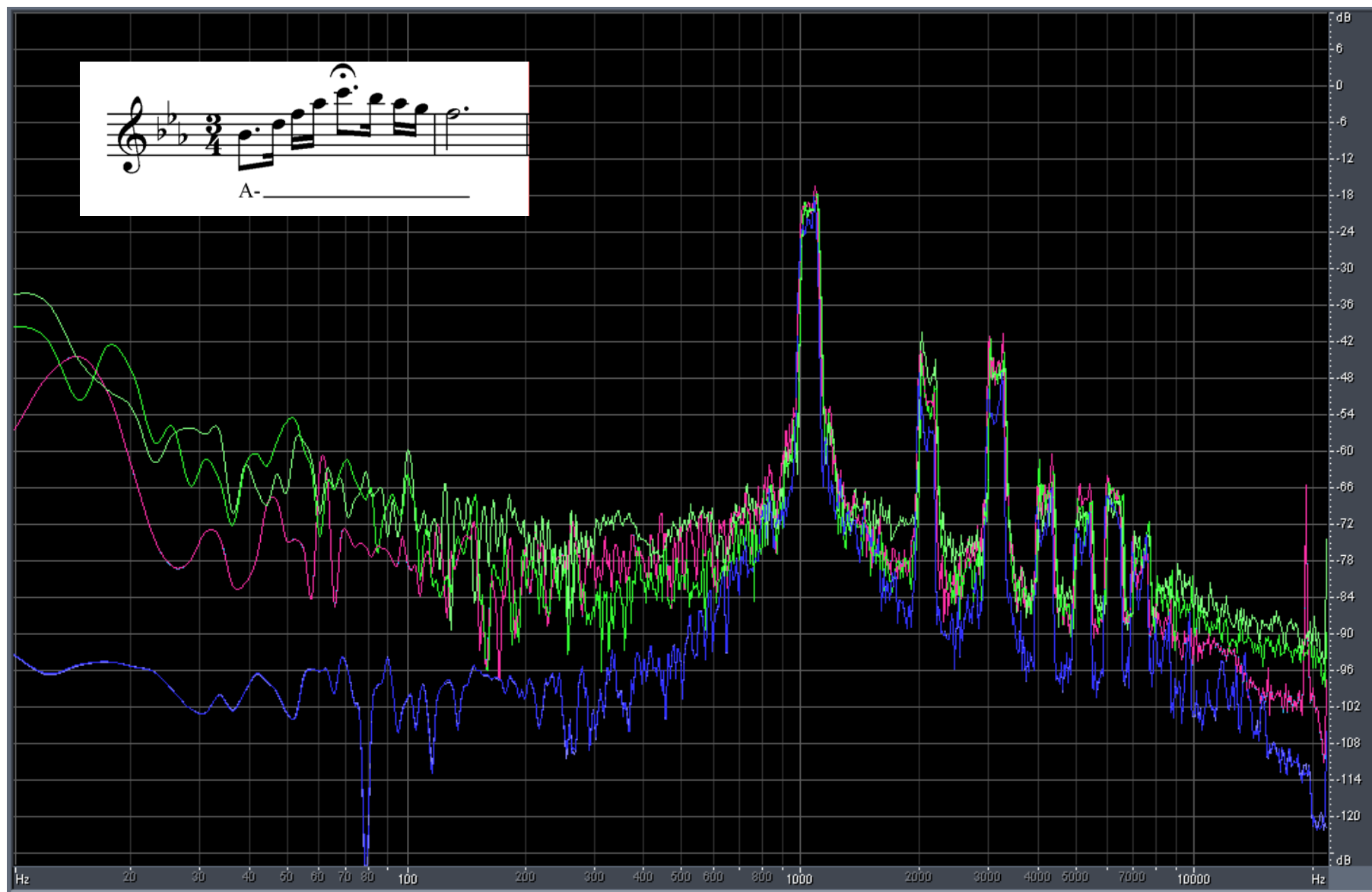


Figure 6.12: Logarithmic frequency spectrum analysis (LP, 1997 & Naxos) of Callas singing from “Ardon gli incensi,” Act III of *Lucia di Lammermoor* (1953 recording).

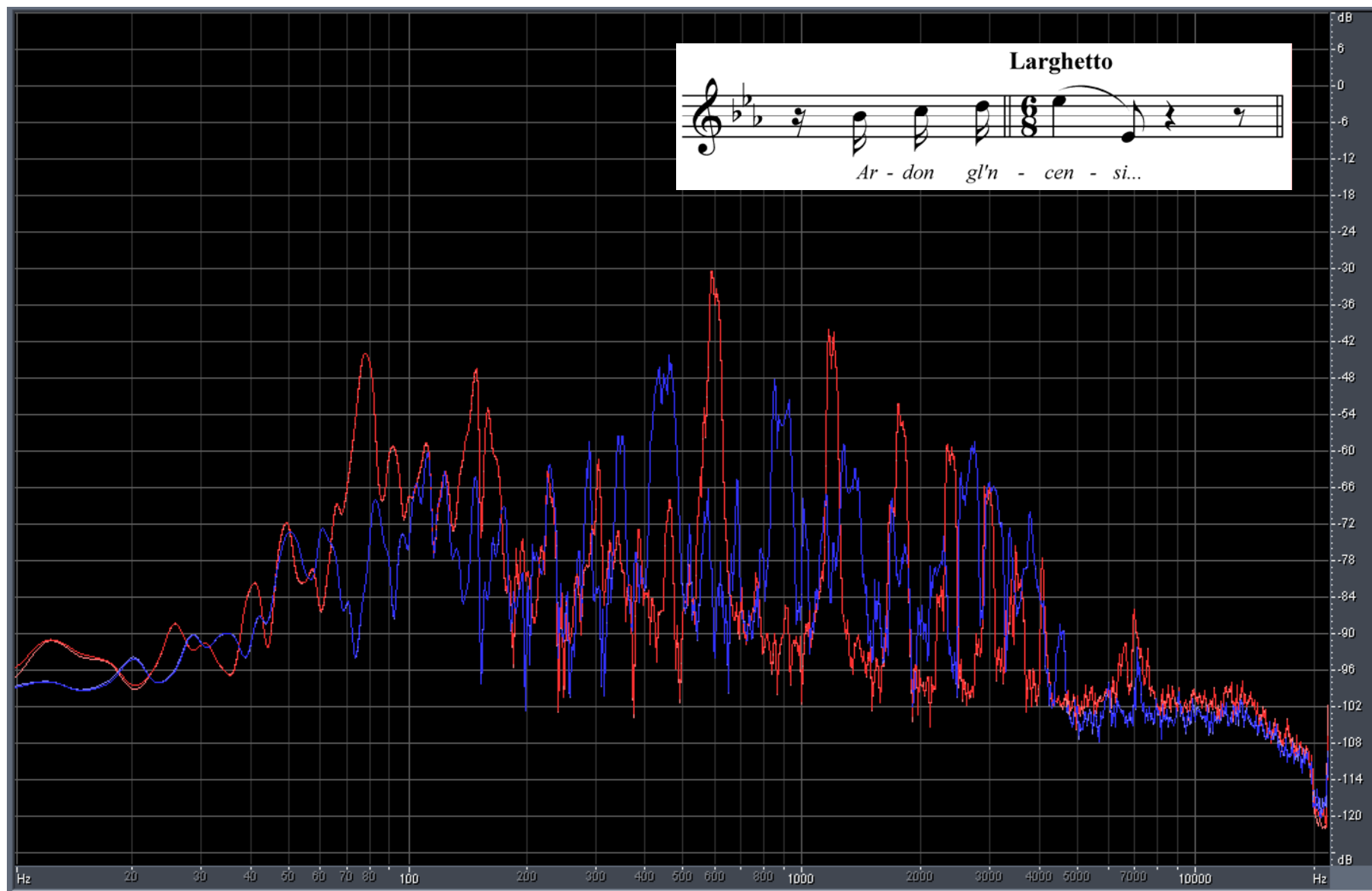


Figure 6.13: Logarithmic frequency spectrum analysis (1989 & 1997) of the phrase “Ar don gli incensi” from “Ar don gli incensi,” Act III of *Lucia di Lammermoor* (1953 recording).

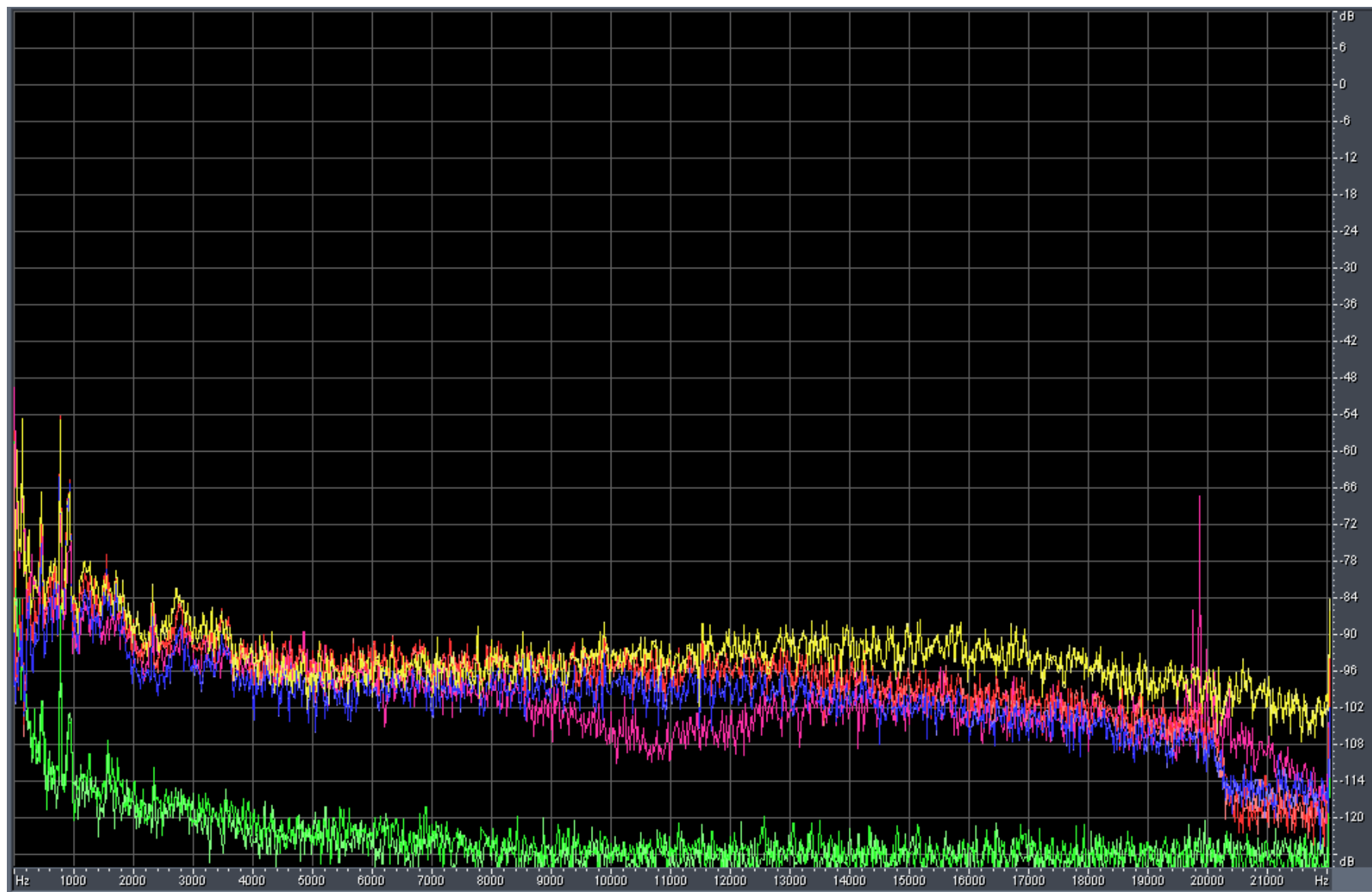


Figure 6.14: Linear frequency spectrum analysis (LP, 1989, 1997, GROTC & Naxos) of noise sample from “Ardon gli incensi,” Act III of *Lucia di Lammermoor* (1953 recording).

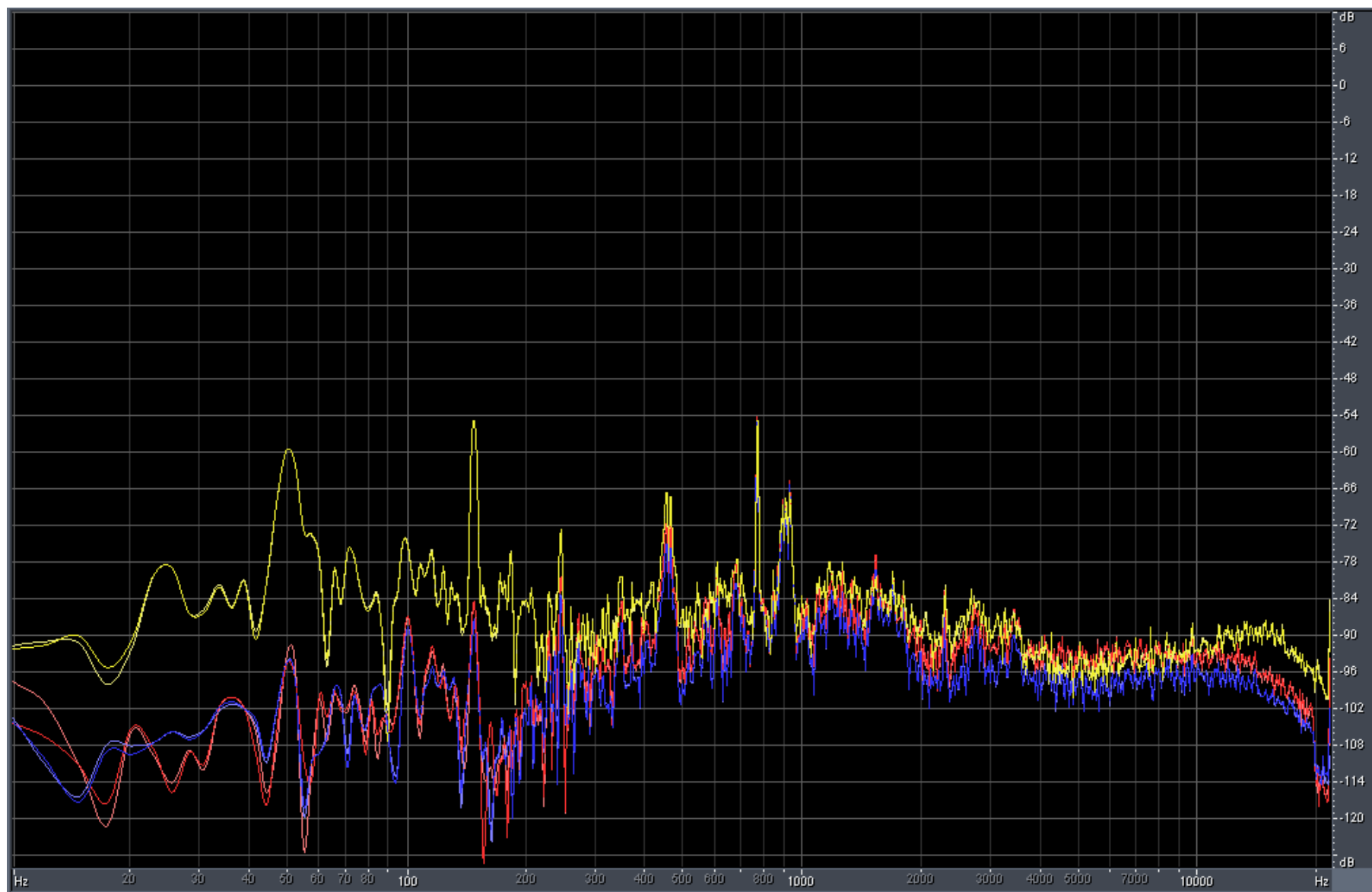


Figure 6.15: Logarithmic frequency spectrum analysis (1989, 1997 & GROTC) of noise sample from “Ardon gli incensi,” Act III of *Lucia di Lammermoor* (1953 recording).

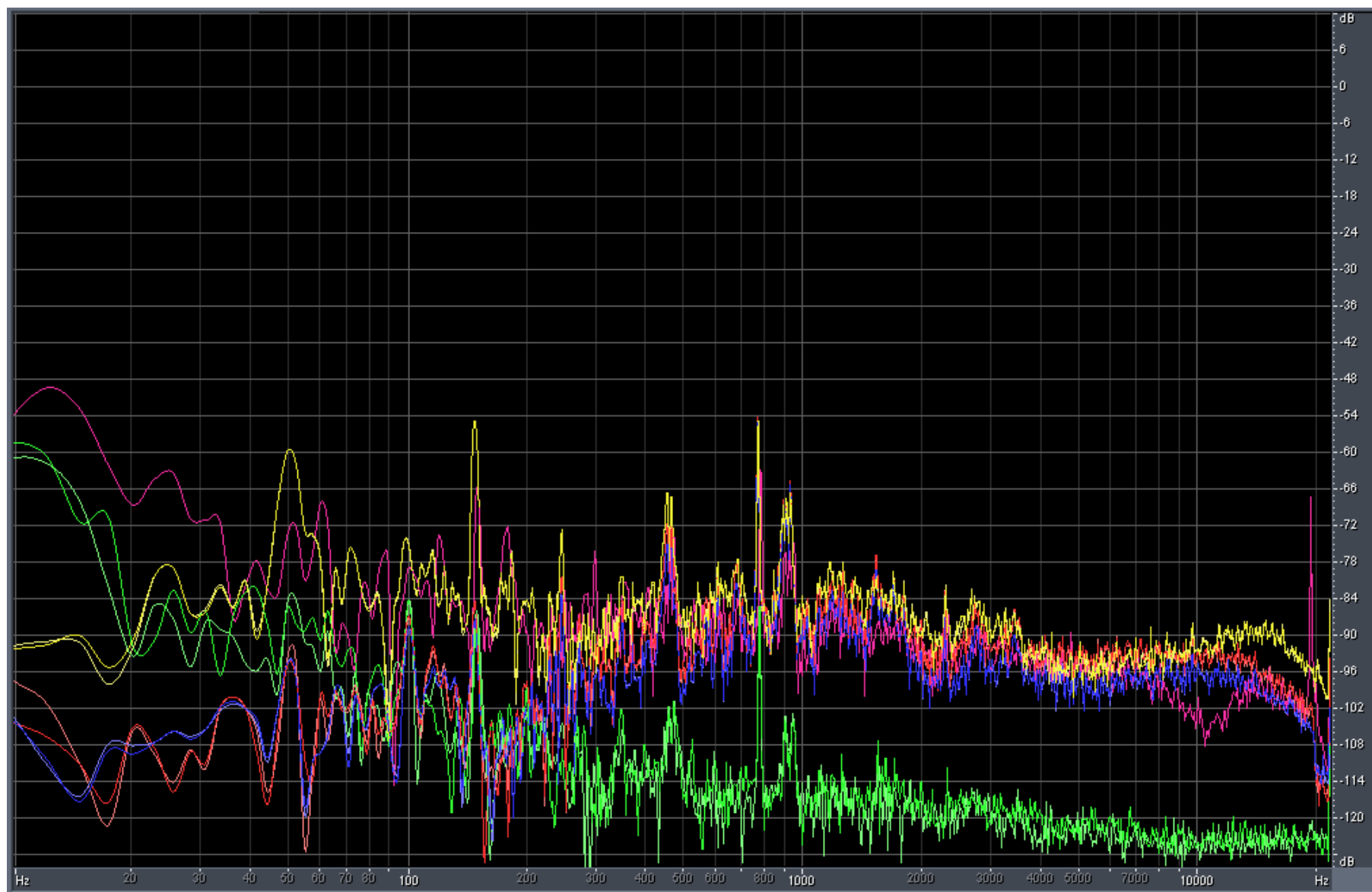


Figure 6.16: Logarithmic frequency spectrum analysis (LP, 1989, 1997, GROTC & Naxos) of noise sample from “Ardon gli incensi,” Act III of *Lucia di Lammermoor* (1953 recording).

6.9) MATLAB ANALYSIS:

The following graphs show the results obtained from the Matlab analysis performed on selected audio extracts from *Lucia di Lammermoor* (1953 recording). For a complete overview and explanation of the algorithm used in analysing the selected examples, please refer to Chapter 1.

6.9.1) CASE 1: “DOLOR” FROM “VERRANNO A TE SULL’AURE” (LP & 1997):

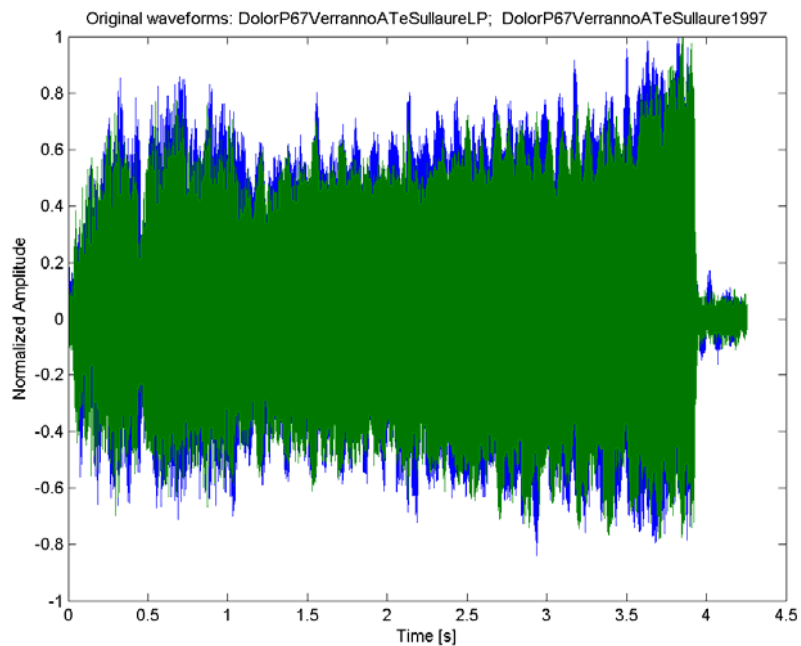


Figure 6.17: Plot of Y1 and Y2 (time-shift visible) of the phrase “dolor” from “Verranno a te sull’aure,” Act I of *Lucia di Lammermoor* (1953 recording).

The cross-correlation graph (Figure 6.18) indicates extremely weak correlation between Y1 and Y2 (0.16158), with a very small shift of approximately 0.18 s needed to best match the two waveforms.

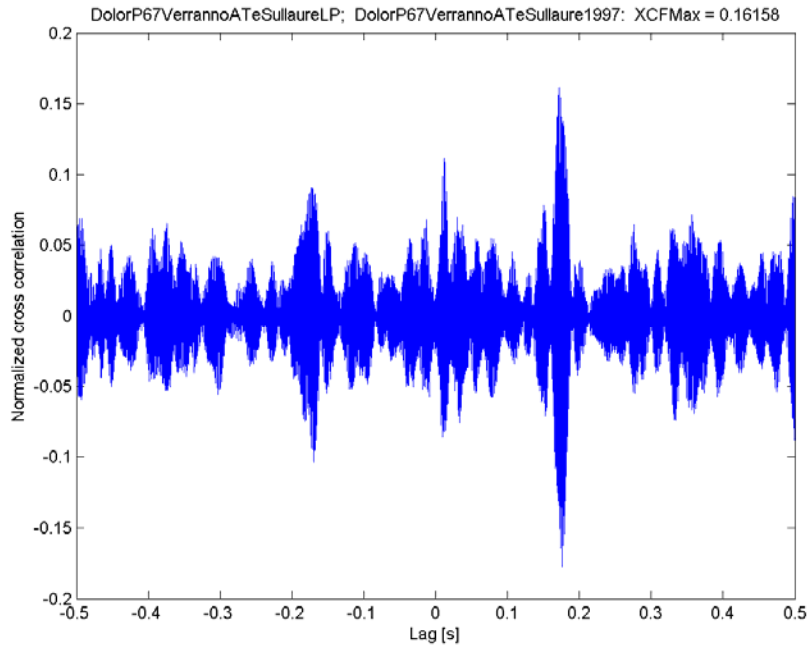


Figure 6.18: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).

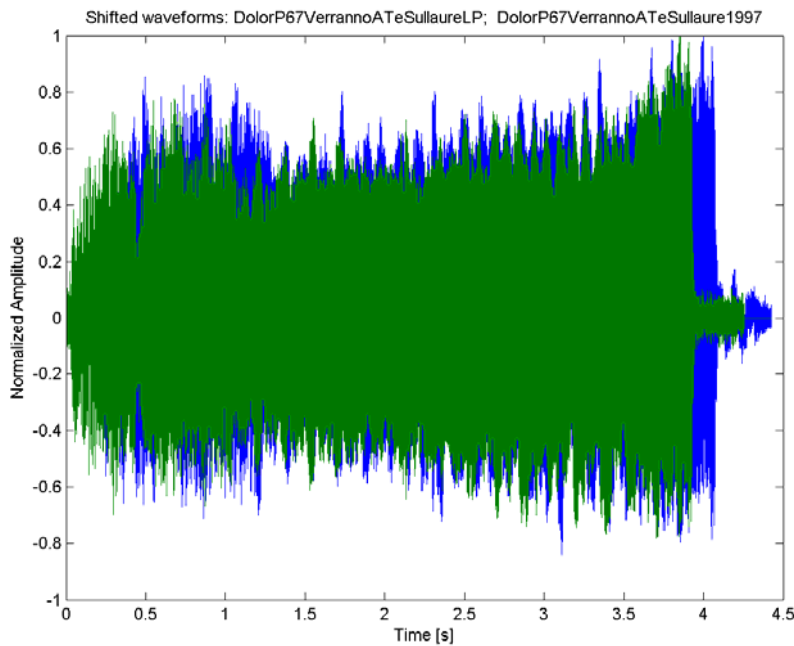


Figure 6.19: Plot of time-shifted waveforms (Y1 and Y2) of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).

As can be seen in Figure 6.20, the instantaneous magnitudes of Y1 and Y2 do not correspond at all.

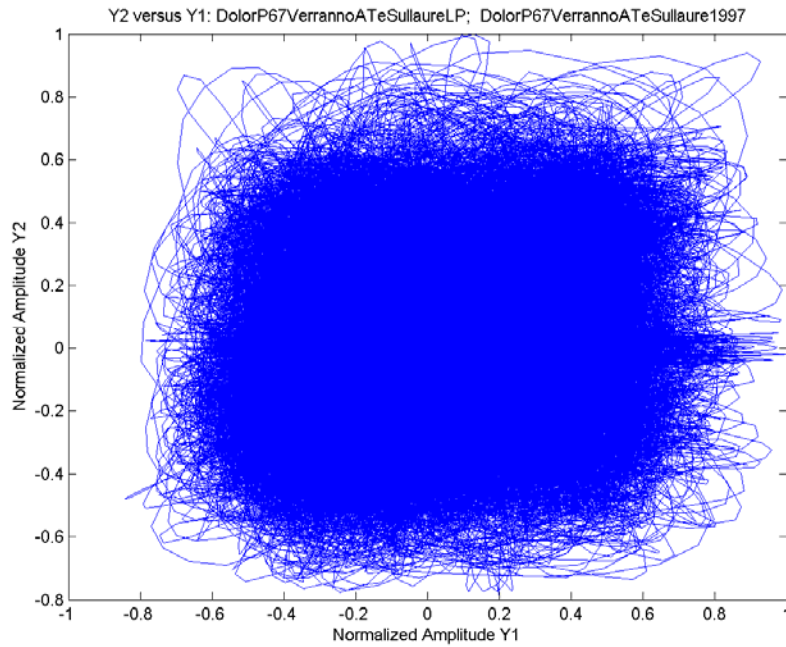


Figure 6.20: Plot of normalised amplitude of Y1 vs. Y2 of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).

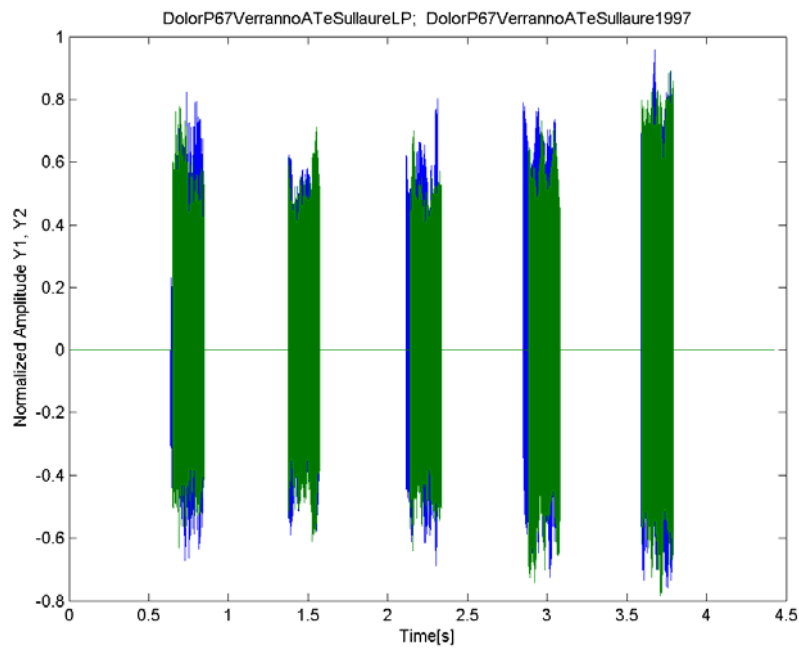


Figure 6.21: Plot of time-shifted windows of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).

As indicated in Figure 6.22, a maximum shift of approximately 0.033 s is required to match Y1 and Y2 in the fourth window of Figure 6.21 most accurately.

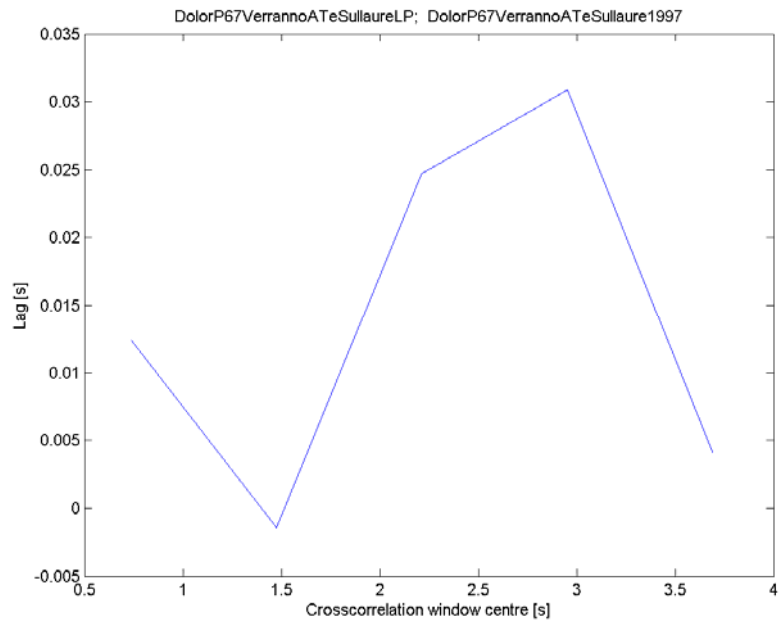


Figure 6.22: Plot of lag or time-shift required for optimum match for each window of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).

The transfer function graph (Figure 6.23) clearly indicates a very strong 8-10 Hz frequency component (no doubt a rumble in the LP version, as seen in Chapter 5 with the LP version of *Tosca* - please refer to Chapter 5, p. 121, fn 17). The graph further shows clear filtering effects at approximately 60 Hz (to remove traces of an electrical hum) and in the region of 90 - 100 Hz. The second graph shows that there is reasonable frequency-dependent difference in the phase of the two remasterings, especially after 120 Hz.

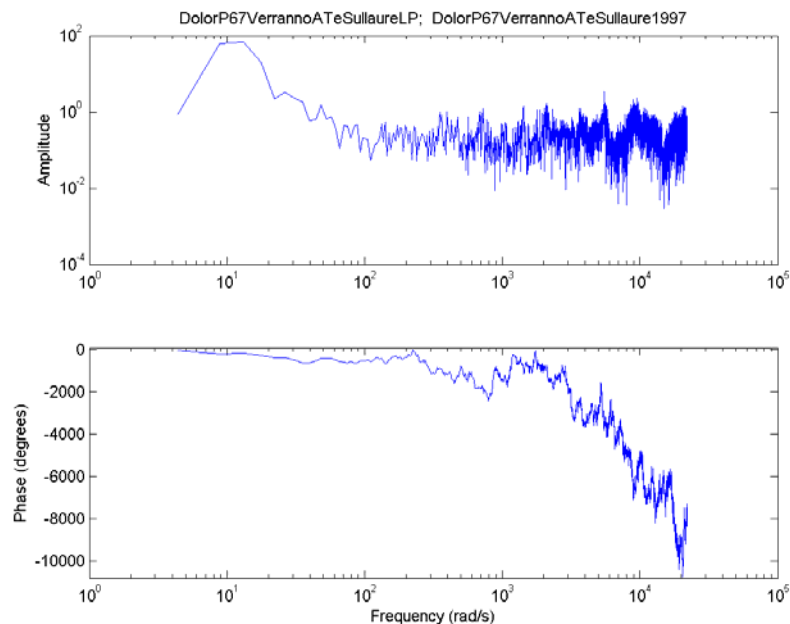


Figure 6.23: Plot of transfer function of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).

6.9.2) CASE 2: "DOLOR" FROM "VERRANNO A TE SULL'AURE" (LP & GROTC):

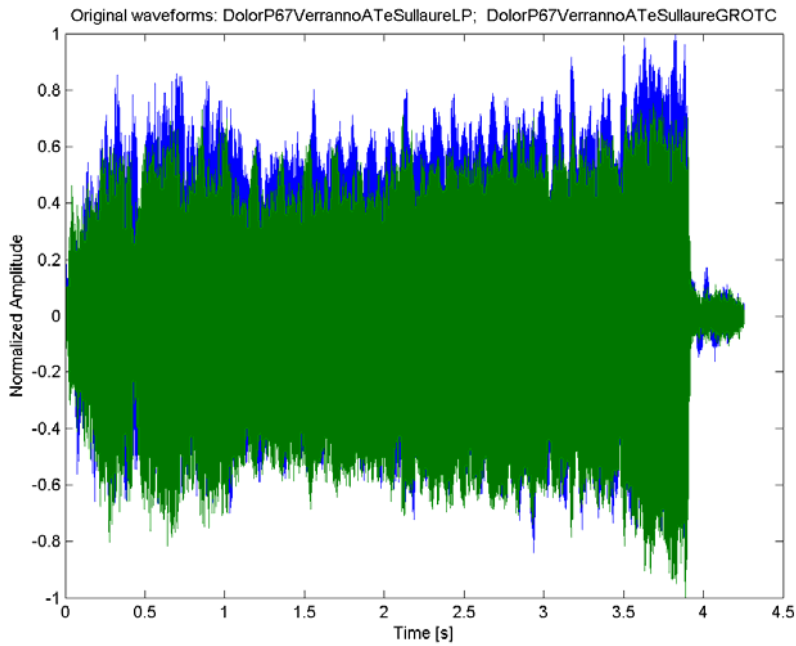


Figure 6.24: Plot of Y1 and Y2 (time-shift visible) of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).

Figure 6.25 shows very bad correlation between Y1 and Y2 (0.11553).

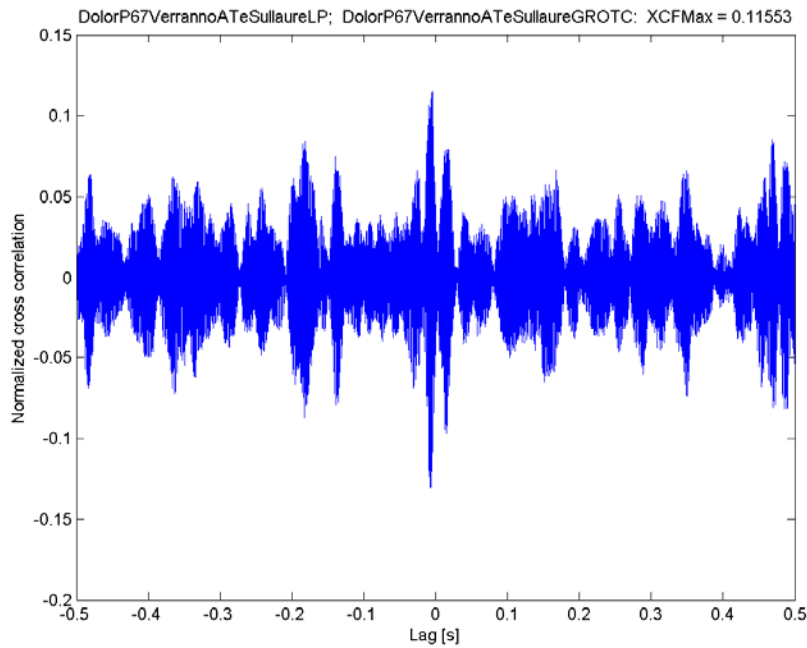


Figure 6.25: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).

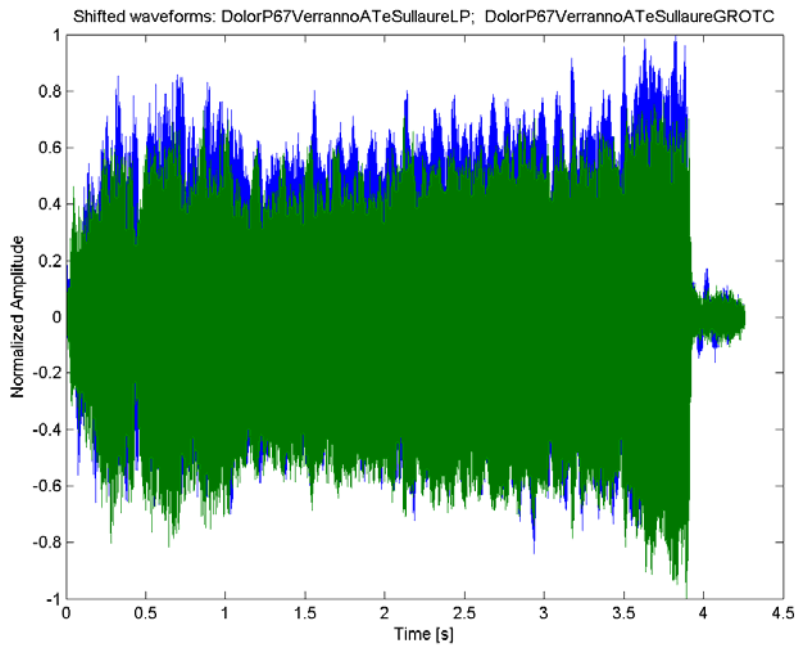


Figure 6.26: Plot of time-shifted waveforms (Y1 and Y2) of the phrase “dolor” from “Verranno a te sull’aure,” Act I of *Lucia di Lammermoor* (1953 recording).

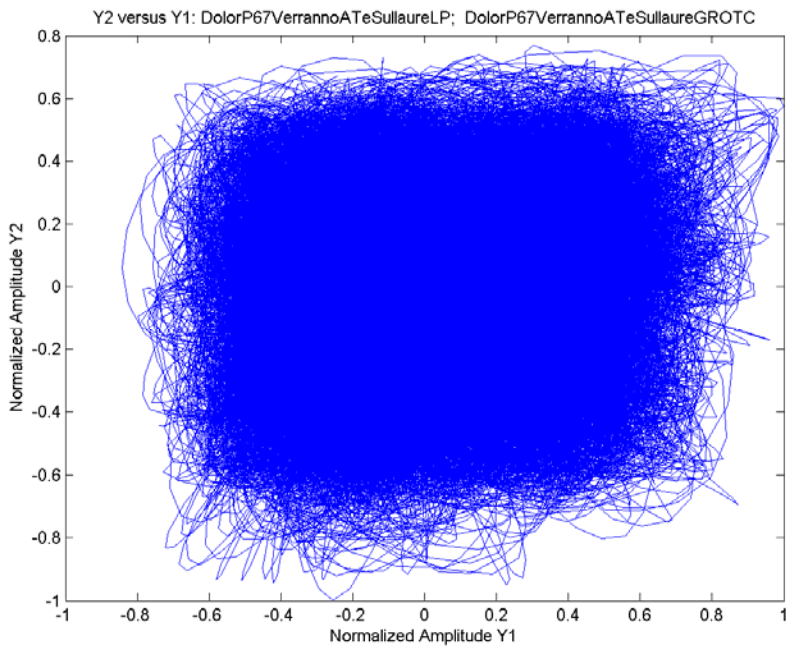


Figure 6.27: Plot of normalised amplitude of Y1 vs. Y2 of the phrase “dolor” from “Verranno a te sull’aure,” Act I of *Lucia di Lammermoor* (1953 recording).

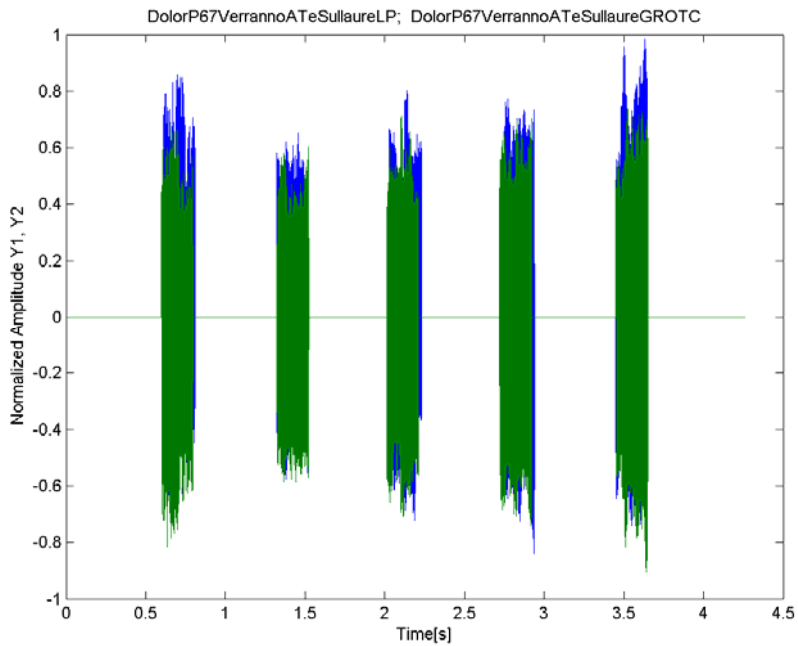


Figure 6.28: Plot of time-shifted windows of the phrase “dolor” from “Verranno a te sull’aure,” Act I of *Lucia di Lammermoor* (1953 recording).

The second window in Figure 6.28 requires a time-shift of approximately 0.0035 s in order to achieve the most accurate match, while the fourth window requires a shift of about -0.019 s, as can be seen in Figure 6.29.

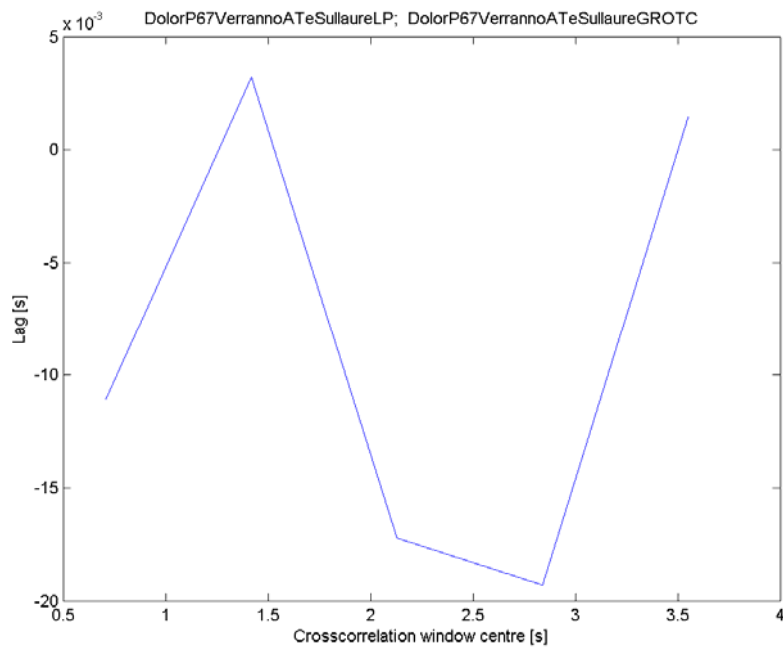


Figure 6.29: Plot of lag or time-shift required for optimum match for each window of the phrase “dolor” from “Verranno a te sull’aure,” Act I of *Lucia di Lammermoor* (1953 recording).

As in Figure 6.23 above, the transfer function graph (Figure 6.30) shows clear filtering effects in the low-mid frequency range, including a big dip in the region of 50 - 60 Hz (to remove an electrical hum) and again at approximately 260 Hz and 800 Hz. The 8-10 Hz rumble present in the LP version, can again be seen as a peak at 10 Hz in the top graph. There is large frequency-dependent difference in the phase of Y1 and Y2 above 100 Hz, as can be seen in the bottom graph.

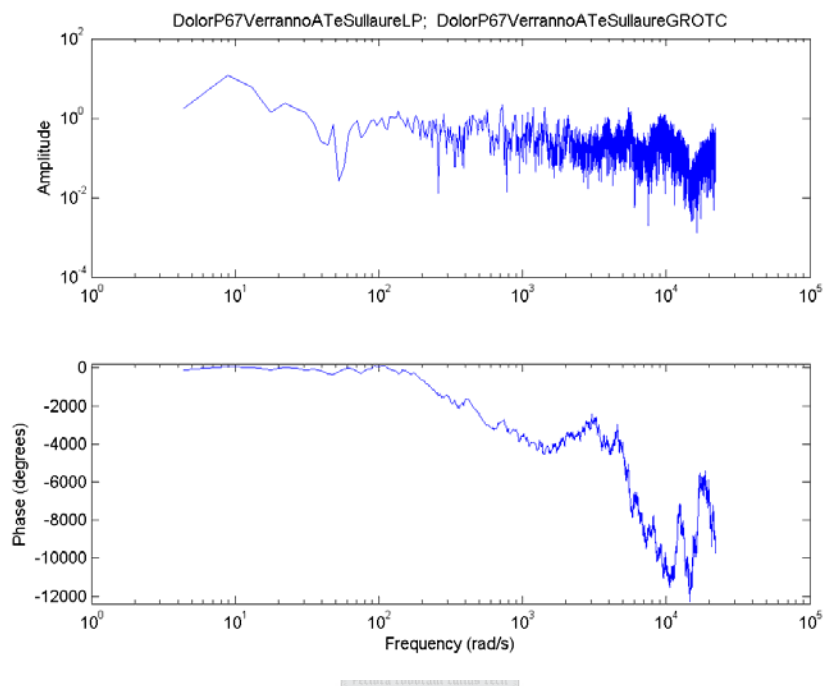


Figure 6.30: Plot of transfer function of the phrase "dolor" from "Verranno a te sull'aure," Act I of *Lucia di Lammermoor* (1953 recording).

CHAPTER 7

NORMA (1954)

“As Norma, Maria created the maximum of what opera can be. In a lifetime, one can see many great things in the theatre. But Maria Callas in *Norma*, what is there to compare to that?”

Franco Zeffirelli (cited in Gage 2001: 219)

NORMA

Opera in two acts by Vincenzo Bellini (1801 - 1835)
Libretto: Felice Romani

Norma	Maria Callas (soprano)
Pollione	Mario Filippeschi (tenor)
Adalgisa	Ebe Stignani (mezzo-soprano)
Oroveso	Nicola Rossi-Lemeni (bass)
Flavio	Paolo Caroli (tenor)
Clotilde	Rina Cavallari (soprano)

Orchestra and Chorus of La Scala Opera House, Milan
Chorus Master: Vittore Veneziani
Conductor: Tullio Serafin

Recorded in the Cinema Metropol, Milan on 23 April - 3 May 1954, for EMI.
Producer: Walter Legge
Balance Engineer: Unknown

7.1) INTRODUCTION:

If there is one role for which Callas will be remembered especially, it is as the high priestess of the Druids in Bellini's operatic masterpiece, *Norma*. She sang the role more times than any other – a total of 92 performances between 1948 and 1965 and it became her trademark role. Callas identified absolutely with the character of Norma, once noting that “Norma resembles me in a certain way. She seems very strong and ferocious at times. Actually she is not, even though she roars like a lion,” and even told the critic Jacques Bourgeois in 1968, with great seriousness, that “Bellini wrote *Norma* for me” (Stancioff 1988: 127). Steane (1986) stated that “*Norma* was the opera in which Callas's greatness was most completely exercised; for the opera itself, Callas was the artist who regained for it an honourable and central place in the schedules of the great houses.”

7.2) VOCAL CHALLENGES:

Norma is considered one of the most difficult and taxing soprano roles, musically and dramatically, ever written – “the Everest of the *bel canto* repertory.”¹ As Callas admitted to Jay Harrison of the *New York Herald* in 1956 (cited in Levine 2003: 129), Norma is “the most difficult role in my repertory; the more you do it, the less you want to.” Of the role’s legendary difficulties, Steane (1986) wrote that:

“The role of Norma has a special place in the repertoire of the dramatic soprano, rather comparable to Otello in that of the heroic tenor. One notable difference is that Otello does not have to sing scales and semi-quaver runs as though he were Rossini’s Count Almaviva in disguise. Nor does his part take him above the stave too often: and, while it is highly desirable for him to have a sound *legato* style at command, he can still make a considerable effect without it. A successful Norma has to cope with further difficulties. The voice itself is constantly exposed, the whole range tested, the sheer beauty of timbre being no less requisite than the power. Without orchestral covering, it has to carry a responsibility seldom required of it in later Verdi and still more rarely in Wagner. All of this, moreover, is no more than the preliminary qualifying round. It is a great role for the singing-actress, both in its details and in the sum of its tragic grandeur. A fine discrimination of shades is involved in recitative, and the depths of the tragedy have to be sounded through notes that, to a casual reader of the score, may suggest little beyond a charming melodious sadness. Not surprisingly, great Normas are rare.”

During the early twentieth century, the role of Norma was traditionally assigned to heavier, dramatic sopranos. Yet Norma’s music is centred mainly in the upper regions of a soprano’s natural range, therefore lying very high for a dramatic voice, with several crucial high C’s. “Very few of the Wagnerian/Verdian, *verismo*-era² dramatic sopranos had the kind of easy high C’s that could be dynamically modulated and



Figure 7.1: Callas (Norma) in the 1964 Zeffirelli production at the Opéra, Paris.

¹ Lilli Lehmann (1848 - 1929), herself a great Norma, claimed that she would rather sing five Brünnhildes than one Norma.

² Verismo: Literally “realism.” An Italian operatic school of the late 19th century that followed the literary realism of Zola, Flaubert and Ibsen. Instead of the idealistic *librettos* of earlier operas, realistic and contemporary subjects from everyday life were chosen, often embellished with sordid, violent elements. *Coloratura* arias and other features of earlier Italian opera were abandoned in favour of a more melodramatic recitative that was more naturalistic. Mascagni’s *Cavalleria Rusticana* (1890), Leoncavallo’s *Pagliacci* (1892), Giordano’s *Fedora* (1898) and Charpentier’s *Louise* (1900) are the prime examples of veristic opera.

expressively sung; nor did they possess the kind of fluid *bel canto* technique to do justice to the music” (Rishoi 2001: 536). Over the years several concessions have been made to heavier voices, for example, the transposition of the "Deh! con te" and "Mira, o Norma" duets, which are usually performed in lower keys to suit a mezzo-soprano Adalgisa and a dramatic soprano Norma. According to Rishoi (2001: 536), experience has shown that Norma is “best suited to a *lirico-spinto* voice with an exceptional technique. If the score's potential is to be effectively realized, we must have a singer who is not only a superb vocal actress, but who is also able to do justice to the extremely demanding figurations and passagework and who is conversant with the style of ornamentation that Bellini would have expected her to add.” John Ardoin (1995: 10) commented that “long before Callas’s entry upon the international scene, Norma had been reduced to a staid, classic figure, one at times more Gluckian than Bellinian. Sopranos before Callas who infused the part with dramatic substance often lacked the schooling to do full justice to the role’s elaborate vocal lines. Others, who could command the intricacies of Norma’s music, did so with a coolness that left much of the character unrealised. Callas returned a heroic stance to the part without sacrificing musical values; we can well believe that her balance between drama and agility came the closest in modern terms to those qualities of Giuditta Pasta which had led Bellini to craft *Norma* expressly for that unique artist” (Ardoin 1995: 10).

When Callas emerged as the reigning Norma in the 1950’s, her vocal approach to the role was markedly different from that of her predecessors in that it displayed a much keener sense of the Bellinian style while still observing traditional cuts and keeping ornamentation at a minimum. What distinguishes Callas's Norma, according to Rishoi (2001: 540), “is the great care with which she undertakes all those crucial ‘little notes’ that so distinguish the printed vocal line. Because of her rigorous schooling, she was able not only to dispatch difficult scalework with panache (her descending scales were unerringly accurate) but also to contour the line artfully. The give-and-take of dynamics, fluent tapering of phrases and application of timbral colour are all features that make the Callas Norma an arrestingly individual impersonation. Her ability to interiorise an emotion and give a distinctive voice to the character by bending, reducing, straightening, shading, or darkening the tone remains unique.” The American soprano Shirley Verrett once noted that when she saw Callas as Norma at the Metropolitan Opera in 1956, she was totally floored. “It was not just her acting, but the way she acted with the voice. Every note was meaningful. The shape of the musical phrase and the dramatic gesture were linked. From then on I thought, this is what opera should be” (cited in Tommassini 1997).



Figure 7.2: Debut at the Metropolitan: Callas (Norma) - Metropolitan Opera (New York), 1956.

Joan Sutherland (b. 1926) considers herself deeply indebted to Callas and the standards she set. She first encountered Callas when she sang Clotilde to her Norma in the 1952 Covent Garden production. Ebe Stignani, the great veteran Italian mezzo-soprano, was singing Adalgisa, and Sutherland remembers being “bowled over by these two women, especially by Callas whose performance was fabulous! It hit you right between the eyes. I shall never forget the impact of her singing in ‘Casta Diva,’ of that glorious voice pouring on and on. I remember thinking, “how does the woman do it?” How does she manage to maintain her voice at such a level and at such an intensity? If I did that, I’d be finished!” (Matheopoulos 1991: 206).

7.3) RELEASE HISTORY:

Callas’s first studio *Norma* was recorded between 23 April and 3 May 1954 at the Cinema Metropol in Milan (La Scala was being used at the time for a production of *Tosca* featuring Renata Tebaldi), receiving mixed reviews when it was released later that year. Philip Hope-Wallace (cited in Osborne 2003) noted in *Gramophone* that those who cared for “fine” singing would occasionally suffer a certain “anxiety and strain” as they listened to the recording. He paid tribute to Callas the interpreter, however, stating that “the musicianship of her ‘Casta Diva’ leaves most of the versions I know as non-starters, the *glissando*³ passages in the *cabaletta* shortly afterwards are breathtaking. Norma’s anguish when she finds out that she is betrayed, the reproachful dignity and biting scorn of her scenes with the wretched Pollione and her hieratic magnanimity in dealing with her rival – all these are truly wonderful. She also makes you hear the music for the first time.”

To date, the recording has been released in six major incarnations: the initial 1954 mono LP release (33JCX 1179-1181), a reprocessed stereo LP dating from the 1970’s (SLS 5115), the first CD version, released in 1985 (EMI 47303 and in the US as EMI 47303), the 1997 Callas Edition (EMI 56271), remastered by Allan Ramsay, the 2003 Great Recordings of the Twentieth Century (GROTC) remastering by Ian Jones (EMI 62638) and a 2005 LP transfer released on Naxos Historical (8.110325-27).

³ Glissando: An Italian term that refers to the execution of rapid scales by a sliding movement.

7.4) COMPARISON OF THE DIFFERENT REMASTERINGS:

The 1954 recording of *Norma* had troublesome sound from the beginning. As was the case with other early recordings Callas made with the Italian EMI team (especially *I Puritani* and *Lucia di Lammermoor*), the “original master tapes contained overload distortion, electronic clicks and thump-like sounds in some of Callas’s louder passages” (Obert-Thorn 2003). The recording is also characterised by very close miking of the singers, which increases the “boxy” mono sound and which is made worse by the unresponsive, “lifeless” acoustic of the Cinema Metropol in Milan. The close miking furthermore accentuates the metallic⁴ edge in Callas’s upper register and increases the effect of harshness in certain passages, as can be heard in Example 7.5 (“No, non tremare”) and Example 7.6, the finale of Act I (“Vanne, sì, mi lascia, indegno”).

Seletsky was the first to note a long standing editing error in all previous releases of both the 1954 and 1960 recordings of *Norma*. In Act I, Scene Two, the Norma-Adalgisa duet “Ah sì, fa’ core, abbracciami” concludes by way of three evenly spaced chords that lead into the succeeding “Ma di... l’amato giovane.” In the initial LP version, a side-break was introduced after the second chord. The engineers for all subsequent EMI CD versions did not realise that the break was mechanically necessary rather than musically motivated and replicated the break with a five-second silence between the second and third chords (Seletsky 2000: 254). The 2005 Naxos release is the first reissue of this recording to correct this gap of five seconds.

Example 7.1: “Ah sì, fa’ core, abbracciami” leading into “Ma di... l’amato giovane”
from Act II of *Norma*

CD 1 Track 61: 1997 remastering (EMI Callas Edition) with five-second silence

CD 1 Track 62: 2005 remastering (Naxos Historical) with five-second silence corrected

What the above example in effect implies, is that every CD release of *Norma* has been transferred from 1980’s DAT’s and not from the original master tapes, if, as Seletsky (2005: 388) speculates, these even still exist.

⁴ Metallic: An adjective describing a sound whose “hard” and “bright” tonal characteristics are the result of a rigid pharyngeal adjustment and a predominance of high partials (many of which are inharmonic, i.e. noise) within its harmonic spectrum.

A list of the recordings used in comparing the different remasterings is provided in Table 7.1:

RELEASE	DATE OF REMASTERING	CATALOGUE NO.	REMASTERING ENGINEER
Columbia LP	1954 ⁵	33JCX 1179-1181	N/A
His Master's Voice LP (reprocessed stereo)	1970's ⁶	SLS 5115	David Pickett
EMI Classics (Highlights)	1985	CDM 7 64419 2	Unknown ⁷
EMI Callas Edition	1997	5 56271 2	Simon Gibson
EMI GROTC	2003	5 62638 2	Ian Jones
NAXOS Historical	2005	8.110325-27	Mark Obert-Thorn

Table 7.1: Reissues of the 1954 recording of *Norma* used in this study.

The sound of the original LP release was warm and sweet, if somewhat reserved. The voices are well placed, although the orchestra and chorus sound at times rather distant (compare for instance the “A bello a me ritorno” extract in Example 7.4). The remastering nevertheless sounds natural, presenting the best sounding Callas of the various recordings mentioned above and seems the most unprocessed of the various releases (as can be heard in “Casta Diva,” Example 7.3).

The reprocessed stereo LP version, however, sounds “electronic,” with an artificial edge and a strange, unnatural haze or aura around the voices. The very close miking is further accentuated by the



Figure 7.3: Callas (*Norma*) - Metropolitan Opera (New York), 1956.

very forward and off-centre placing of the voices, which tend to sound harsh (sometimes even distorting) and which treats the singers unkindly, especially Nicola Rossi-Lemeni (Oroveso), who sounds hollow and unrefined (Example 7.2). The sound is more bass heavy in this release, sometimes to the point of being boomy.⁸ Callas's voice sounds thin and cold. An attempt was also made to improve the dead acoustic of the original recording by adding artificial reverberation (compare for example “Sediziose voci” in Example 7.2 below or “A bello a me ritorno” in Example 7.4). Though probably revolutionary at the time, the added reverberation removes any sense of realism. Measured by today's standards, it sounds unnatural.

⁵ Though the original Columbia LP set was released in Britain in 1954, the LP's used for comparison in this study were pressed in South Africa. No release date is indicated on the cover or the actual LP's, though it would probably have been pressed either in 1954 or 1955. The catalogue number and cover art is exactly the same in both versions.

⁶ The exact year of remastering and release date is unknown.

⁷ Prior to 1997, no remastering engineers are credited by EMI for the remasterings of the Callas recordings.

⁸ Boomy: Excessive bass around 125 Hz. Also poorly damped low frequencies or low-frequency resonances.

Example 7.2: “Sediziose voci” from Act I, Scene One of *Norma*

NORMA

Sediziose voci, voci di guerra	Are there those who dare to raise seditious voices,
avvi che alzar si attenta presso all'ara del Dio?	warlike voices, before the altar of God?
V'ha chi presume dettar responsi	Who dares to question the inspired words
alla vegente Norma,	of prophetic Norma,
e di Roma affrettar il fato arcano?	seeking to hasten the fate of Rome?
Ei non dipende da poter umano.	That will not come through human efforts.

OROVESO

E fino a quando oppressi ne vorrai tu?... How long then, must we remain oppressed by Rome?...

CD 1 Track 63: Original 1954 LP's (Columbia)

CD 1 Track 64: 1970's Reprocessed stereo LP's (His Master's Voice)

CD 1 Track 65: 1997 remastering (EMI Callas Edition)

CD 1 Track 66: 2003 remastering (EMI GROTC)

CD 1 Track 67: 2005 remastering (Naxos Historical)

The original CD incarnation proves the most satisfying of all the CD releases, with the possible exception of the Naxos set, where the balance between orchestra and soloists is ideal. The greater dynamic range and “spaciousness” which the CD medium provides is audible and yet, does not lead to distortion or harshness. Callas sounds more “intimate,” present and natural. (Example 7.3).

The 1997 EMI Callas Edition release is characterised by a strange fuzziness or haze to the sound, considerably increased reverberation and ambience. As a result, the sound is slightly unfocused and lacking in definition, especially in terms of the orchestra and chorus (compared to the GROTC release discussed below). The sound is bright, with added presence, though one is immediately aware of the forward placing of the voices, Callas sounding close and prominent (Example 7.3). According to Seletsky (2000: 247) the “initial CD *Norma* reflected the natural vocalism and sweet sound of the earliest LP's,” whereas the 1997 release “has a new hardness, but without added articulation – a covered, brittle sound with a boomy bass.”

Example 7.3: “Casta Diva” from Act I, Scene One of *Norma*

NORMA

Casta Diva, che inargenti	Chaste goddess, who dost bath in silver
queste sacre antiche piante...	these ancient, hallowed trees...

CD 2 Track 1: Original 1954 LP's (Columbia)

CD 2 Track 2: 1970's Reprocessed stereo LP's (His Master's Voice)

CD 2 Track 3: 1985 remastering (EMI Classics)

CD 2 Track 4: 1997 remastering (EMI Callas Edition)

CD 2 Track 5: 2003 remastering (EMI GROTC)

CD 2 Track 6: 2005 remastering (Naxos Historical)

The controversial 2003 Great Recordings of the Twentieth Century (GROTC) release sounds dry and superficial, with an audible loss of depth and ambience apparent in the sound and with accentuated tape hiss and noise. All acoustic space is removed, producing as Seletsky (2005: 387) stated, “a harsh, compressed sound devoid of context,” that accentuates the overload distortion of the original master tapes. Though adding definition and crispness⁹ to the sound, enhancing especially the orchestral and choral sound (as for example in the finale of Act I, “Vanne, sì, mi lascia, indegno,” Example 7.6, where the strings benefit from an added “bite” and the chorus is much more present compared with the 1997 and Naxos releases), the dry acoustic image works less successfully with regards to the soloists, accentuating the close miking of the original recording (as in “Casta Diva,” Example 7.3). The recitatives, as with “Sediziose voce” (Example 7.2) for instance, where the lack of acoustic space is most notable, is musically unsatisfying. Callas more often than not sounds harsh, shrill and strident, vocally “raw” and over-exposed. Compare for example the extracts from “A bello a me ritorna” (Example 7.4) and “No, non tremare” (Example 7.5) below.



Figure 7.4: Callas (*Norma*) - Opéra (Paris), 1964.

⁹ Crisp: A subjective term relating to extended high-frequency response.

Example 7.4: “A bello a me ritorna” from Act I, Scene One of *Norma*

NORMA

Ah! bello a me ritorno	Ah! Bring back to me
del fido amor primiero,	the beauty of our first love.
e contro il mondo intiero	Then, against the world itself
difesa a te sarò.	I shall be your defence.
Ah! bello a me ritorna	Ah! Bring back to me
del raggio tuo sereno,	the peace and warmth of love,
e vita nel tuo seno,	and in that love I shall find again
e patria e cielo avrò	life, fatherland and Heaven itself.

CHORUS

Ma irato, sì, il Dio t'affretta	But a wrathful god is hastening
Che il Tebro condannò.	to condemn the power of Rome.

- CD 2 Track 7: Original 1954 LP's (Columbia)
- CD 2 Track 8: 1970's Reprocessed stereo LP's (His Master's Voice)
- CD 2 Track 9: 1985 remastering (EMI Classics)
- CD 2 Track 10: 1997 remastering (EMI Callas Edition)
- CD 2 Track 11: 2003 remastering (EMI GROTC)
- CD 2 Track 12: 2005 remastering (Naxos Historical)



Figure 7.5: Callas (Norma) - Opéra (Paris), 1964.

Example 7.5: “No, non tremare” from Act I, Scene Two of *Norma*

NORMA

No, non tremare, o perfido!	Do not tremble, faithless man,
No, non tremar per lei,	no, not for her -
essa non è colpevole,	she is not to blame,
il malfattor tu sei!	the guilty one is you.
Trema per te, fellon!...	Tremble for yourself, traitor -
pei figli tuoi, per me!	for your children, for me!

ADALGISA

Che ascolto? What are you saying?

CD 2 Track 13: 1985 remastering (EMI Classics)

CD 2 Track 14: 1997 remastering (EMI Callas Edition)

CD 2 Track 15: 2003 remastering (EMI GROTC)

CD 2 Track 16: 2005 remastering (Naxos Historical)

The 2005 Naxos Historical release, transferred from two 1950's-era British LP pressings, which according to transfer engineer Mark Obert-Thorn “seem to provide the most open and un-gimmicked sound” of several editions he had to work from, places the sound image somewhat back, thereby treating the voices more kindly and making them less exposed, though the orchestra and chorus sounds at times recessed and muffled. The Naxos transfer sounds natural and warm, with an amazing body and depth to the sound, especially in the lower registers (Example 7.3). The sound is without harshness, but contains highly distracting surface noise (fluctuating in volume and intensity), hiss and other artifacts.¹⁰ An audible loss of upper frequencies (possibly a result of noise reduction) is also noticeable. Robert J. Farr (2005) noted that “Obert-Thorn, with his usual estimable care and skill, achieves a quality of reproduction on these CD's that to my ears is superior to that which EMI, the owner of the master tapes, has thus far obtained. The solo voices are clear and forwardly balanced without depriving the orchestral contribution of its due.” Obert-Thorn has also managed to reduce the overload distortion of the choral climaxes, as can be heard in the finale to Act I, “Vanne, sì, mi lascia, indegno.” (Example 7.6).

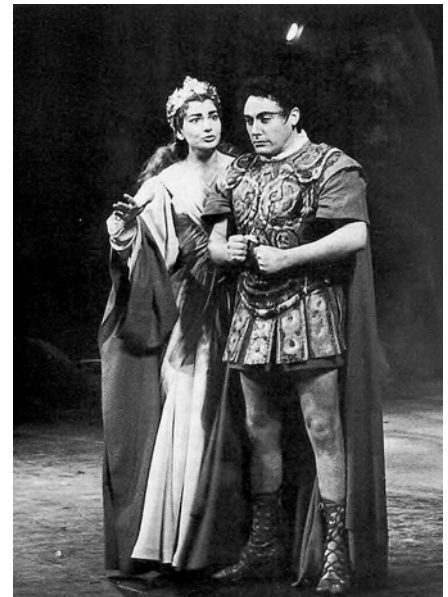


Figure 7.6: Callas (Norma) and Mario del Monaco (Pollione) – Metropolitan Opera (New York), 1956.

¹⁰ Artifacts: An extraneous noise or distortion introduced into a sound recording as a result of defects or limitations in the hardware and/or processing algorithms used in the sequence of recording a signal to its final reproduction.

Example 7.6: "Vanne, sì, mi lascia, indegno" from Act I, Scene Two of *Norma*

NORMA

Vanne, sì, mi lascia indegno: Leave me, yes, worthless man!
figli oblia, promesse, onore. Forget your children, your promises, your honour.
Maledetto dal mio sdegno Cursed by my disdain, you will find
non godrai d'un empio amore. no joy in your sinful love.
Te sull'onde e te sui venti, Over the seas, borne on the winds,
seguiranno mie furie ardenti; my burning hatred will pursue you.
maledetta, e notte e giorno, Night and day my fury
ruggirà d'intorno a te. will rage around you.

POLLIONE

Fremi pure, e angoscia eterna Hate me if you will. Let your fury
pur m'impredhi il tuo furore! invoke eternal anguish upon me!
Questo amor che mi governa The love which is now my master
è di te, di me maggiore. is greater than you or I.
Dio non v'ha che mali inventi No god could ever fashion
de' miei mali più cocenti. greater suffering than mine.
Maledetto io fui quel giorno Cursed was that day
che il destin t'offerse a me. when fate gave me to you.

ADALGISA

Ah! non fia ch'io costi Never allow that I may be
al tuo cor sì rio dolore. the cause of such pain in your heart.
Mari e monti sian frapposti Seas and mountains forever
fra me sempre e il traditore. will divide me from the traitor.
Soffocar saprò I lamenti, I shall stifle my cries
divorar I miei tormenti; and swallow my anguish;
morirò, perché ritorno I shall die to bring back
faccia il crudo ai figli e a te. this cruel man to his children and to you.

NORMA

Maledetto del mio sdegno, ecc. Cursed by my disdain, etc.

Continued overleaf...

CHORUS

Norma, all'ara! Norma, to the altar!
In tuon feroce, The voice of Irminsul
d'Irminsul tuonò la voce, has thundered.
Norma al sacro altar! Norma, to the sacred altar!

NORMA

Ah, suon di morte, va, Ah, the sound of death, go,
per te qui pronta ell'è! it is ready for you here!

ADALGISA

Ah, suon di morte s'intima, a te, Ah, the sound of death calls you,
va, per te qui pronta ell'è! go, it is ready for you here!
Fuggi! Fly!

POLLIONE

Ah, qual suon! Sì, la sprezzo, Ah, that sound! Yes, I defy death,
ma prima mi cadrà il tuo Nume al piè. but first your god shall fall at my feet.

CD 2 Track 17: 1985 remastering (EMI Classics)

CD 2 Track 18: 1997 remastering (EMI Callas Edition)

CD 2 Track 19: 2003 remastering (EMI GROTC)

CD 2 Track 20: 2005 remastering (Naxos Historical)



Figure 7.7: Franco Corelli (Pollione) and Callas (Norma) - Opéra (Paris), 1964.

7.5) FREQUENCY SPECTRUM ANALYSIS:

Frequency spectrum analysis was performed on a number of selected extracts, short phrases or noise samples from the various *Norma* reissues, each providing a multitude of possible comparisons. The selected extracts comprised the following:

- 1) "Sediziose voci" from "Sediziose voci," Act I
- 2) Noise sample from "Sediziose voci," Act I
- 3) "Diva" from "Casta Diva," Act I
- 4) Noise sample from "Casta Diva," Act I
- 5) Opening chord from "A bello a me ritorna," Act I
- 6) Florid passage from "A bello a me ritorna," Act I
- 7) Noise sample from "A bello a me ritorna," Act I
- 8) Noise sample from "Ma di, l'amato giovine," Act I
- 9) "No, non tremare" from "Ma di, l'amato giovine," Act I
- 10) "Vanni si, mi lascia indegno" from "Vanni si, mi lascia indegno," Act I
- 11) "Fremi pure" from "Vanni sì, mi lascia, indegno," Act I

The results of the frequency spectrum analysis were carefully compared and evaluated. From the above extracts, a further selection was made. These selected examples are discussed below.

The frequency spectrum graphs are either logarithmic or linear. The x-axis (left to right) represents frequency (measured in Hz), while the y-axis (bottom to top) corresponds to the amplitude of the corresponding frequency (measured in dB) on the x-axis.

The colours used to represent the various releases are as follows:

RELEASE PHASE	COLOUR
Original LP's (1954)	Green
Reprocessed Stereo LP's (1970's)	Purple/Pink
EMI Classics (1985)	Red
EMI Callas Edition (1997)	Blue
EMI Great Recordings of the Century (GROTC) (2003)	Yellow
Naxos Historical (2005)	Purple/Pink

Table 7.2: Release phases of the various reissues of *Norma* used in this study and the colours used to represent them in the spectrum analysis examples.

In the first example, shown in Figure 7.9, a logarithmic representation of the phrase “Sediziose voci” from Norma’s opening recitative “Sediziose voci,” Act I, the relatively more prominent mid-frequency content of the reprocessed stereo 1970’s LP remastering (purple/pink) compared with the original 1954 LP release (green) is clearly visible. The differences between the two frequency plots indicate that the 1970’s version was subject to processing which has severely affected its frequency content. A clear filtering effect can be seen in the 1970’s remastering at approximately 90 Hz.

Figure 7.10 is another logarithmic representation, also of the “Sediziose voci” extract. In the mid-upper frequency range from approximately 3000 Hz, the Naxos remastering proves relatively stronger (compare as well Figure 7.11). The original LP and Naxos remasterings contain the most prominent lower frequency content, explaining the warmth of these releases. The original LP, 1997 and GROTC releases show a filtering effect at 60 Hz, no doubt an attempt to remove any traces of an electrical hum¹¹ that might have been present in the original recording. The graph furthermore shows a slight “dip” in the upper frequency range of the 1997 Callas Edition and GROTC releases from approximately 13600 to 19000 Hz. This is also evident in Figure 7.12. As in the *Lucia di Lammermoor* release discussed in the previous chapter, the Naxos remastering shows a sharp peak at about 19000 Hz (this can also clearly be seen in Figures 7.11, 7.16 and 7.17), an aliasing effect of frequencies that have “folded over.”

The linear frequency representation of the opening chord of “A bello a me ritorna” from Act I is shown in Figure 7.11. In this example, the relatively strong upper frequency range of the Naxos release can be seen. Also visible is the characteristic tapering away of the highest frequencies from approximately 20000 Hz in the 1985 CD remastering (see also Figure 7.13 and 7.14). From about 20600 Hz the 1997 Callas Edition and GROTC remasterings are the most prominent. The comparatively greater upper frequency content of the 1997 Callas Edition and GROTC incarnations (as well as in Figures 7.14 - 7.16), might explain the bright and occasionally harsh qualities in Callas’s top register evident in these releases.

Figure 7.14 shows the linear frequency spectrum graph of a noise sample from “Casta Diva,” Act I. When compared alongside Figure 7.15, a logarithmic representation of the same extract where the highest peaks of the three spectrums match at approximately 33 Hz, the 1997 remastering clearly contains the relatively stronger frequency content. The 1985 CD remastering and GROTC versions are quite similar, the 1985 remastering, however, slightly more prominent, except in the highest

¹¹ Hum: A category of noise found in recordings as a result of improper shielding or grounding of audio components. As hum is harmonically related to the AC power supply that powered the recording gear, it usually appears as a 50 Hz (US) or 60 Hz (European) “hum” or low-order harmonic in the 100 - 120 Hz range.

frequency range from approximately 17000 Hz, where the GROTC features the most prominent frequencies.

Clearly visible on Figure 7.15 is a filtering effect at 40 and 60 Hz in the 1985, 1997 & GROTC releases, with the GROTC version exhibiting the greatest filtering effect. In the lowest frequency range (below 60 Hz), the three versions are very similar, especially the 1985 remastering and 1997 Callas Edition, but from 80 Hz upwards, the relatively more prominent frequency content of the 1997 version is once again confirmed.



Figure 7.8: Callas (Norma), in the 1964 Zeffirelli production at the Opéra, Paris.

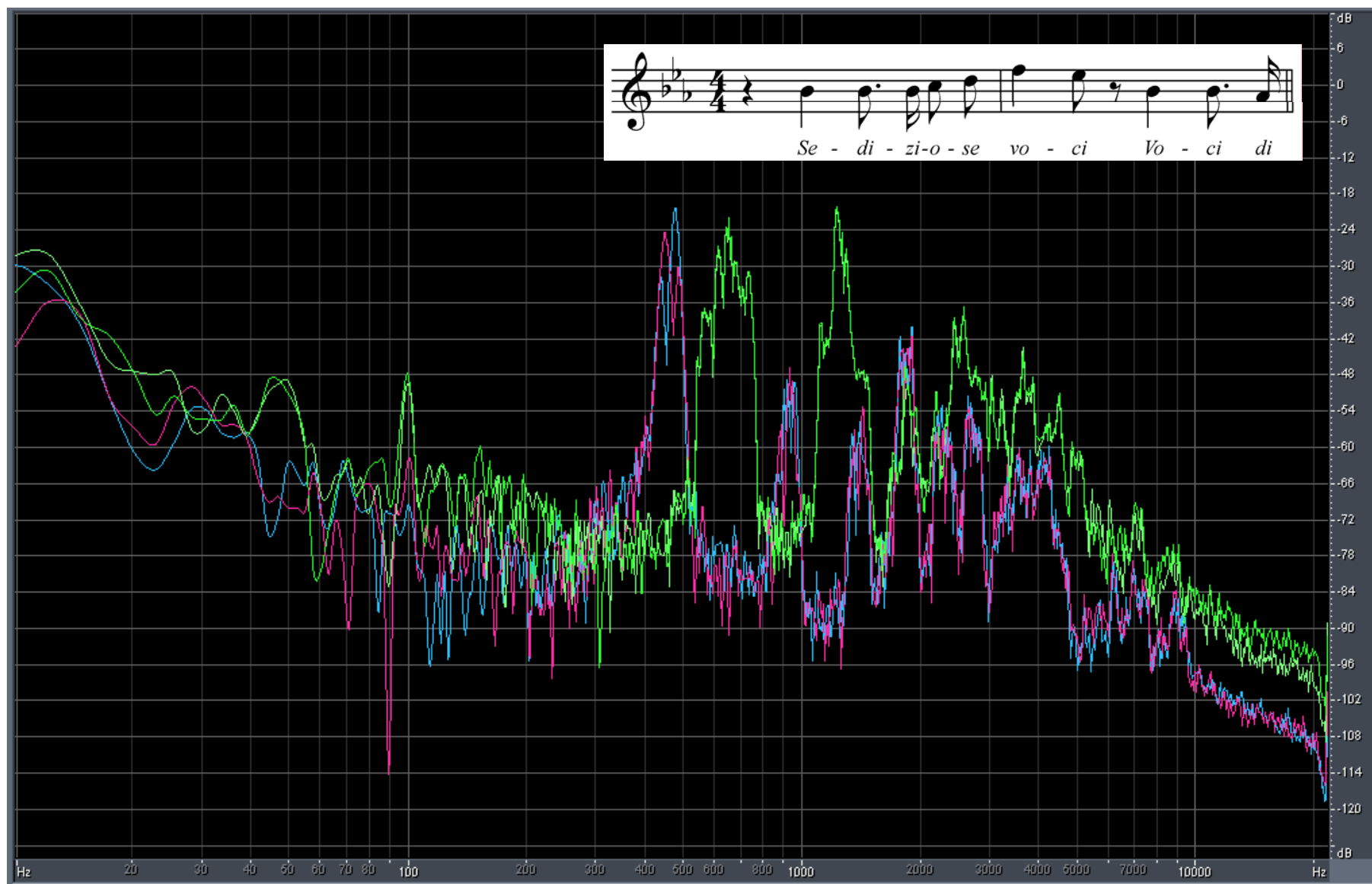


Figure 7.9: Logarithmic frequency spectrum analysis (LP & stereo LP) of phrase "Sediziose voci" from "Sediziose voci," Act I of *Norma* (1954 recording).

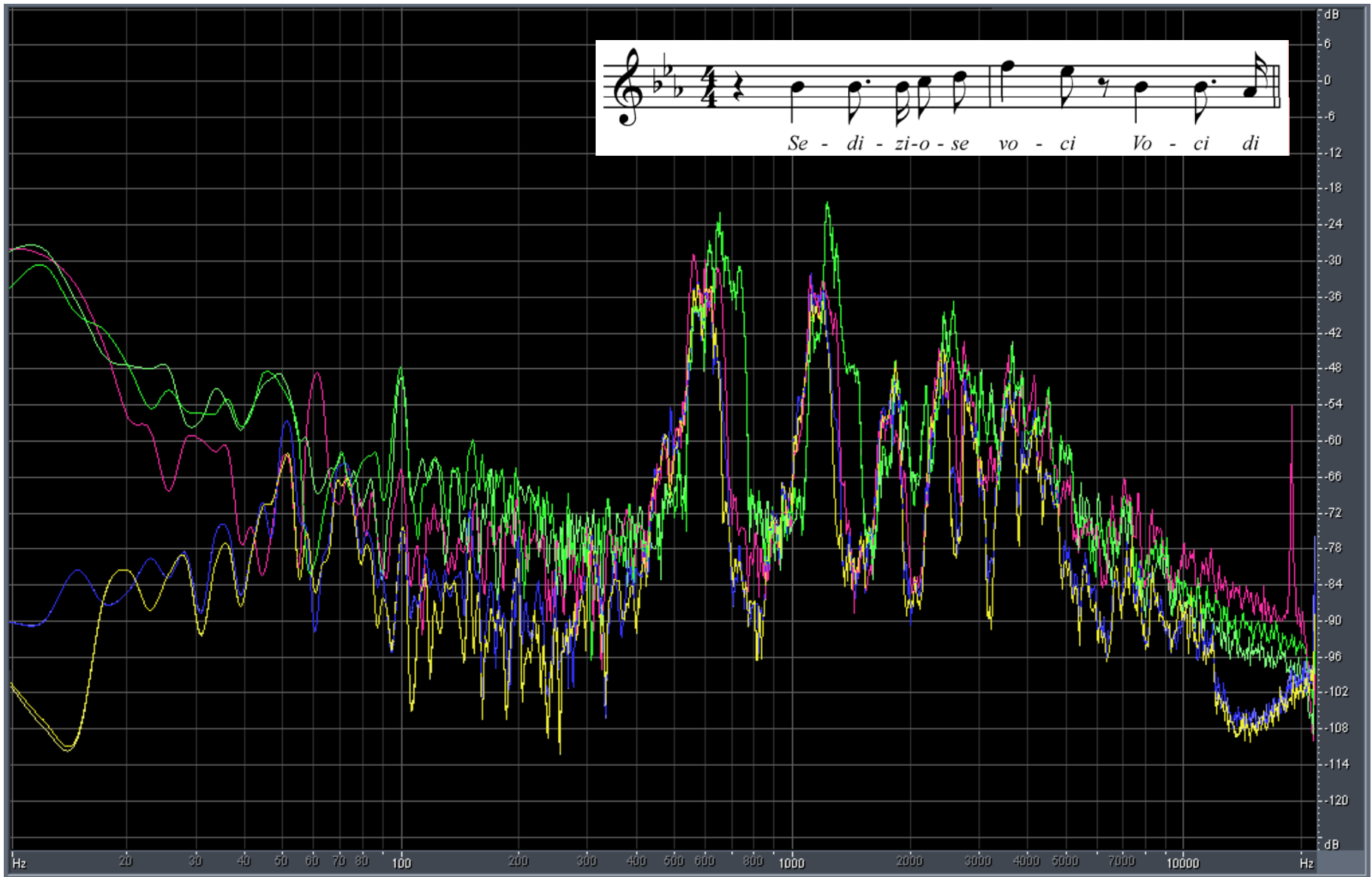


Figure 7.10: Logarithmic frequency spectrum analysis (LP, 1997, GROTC & Naxos) of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).

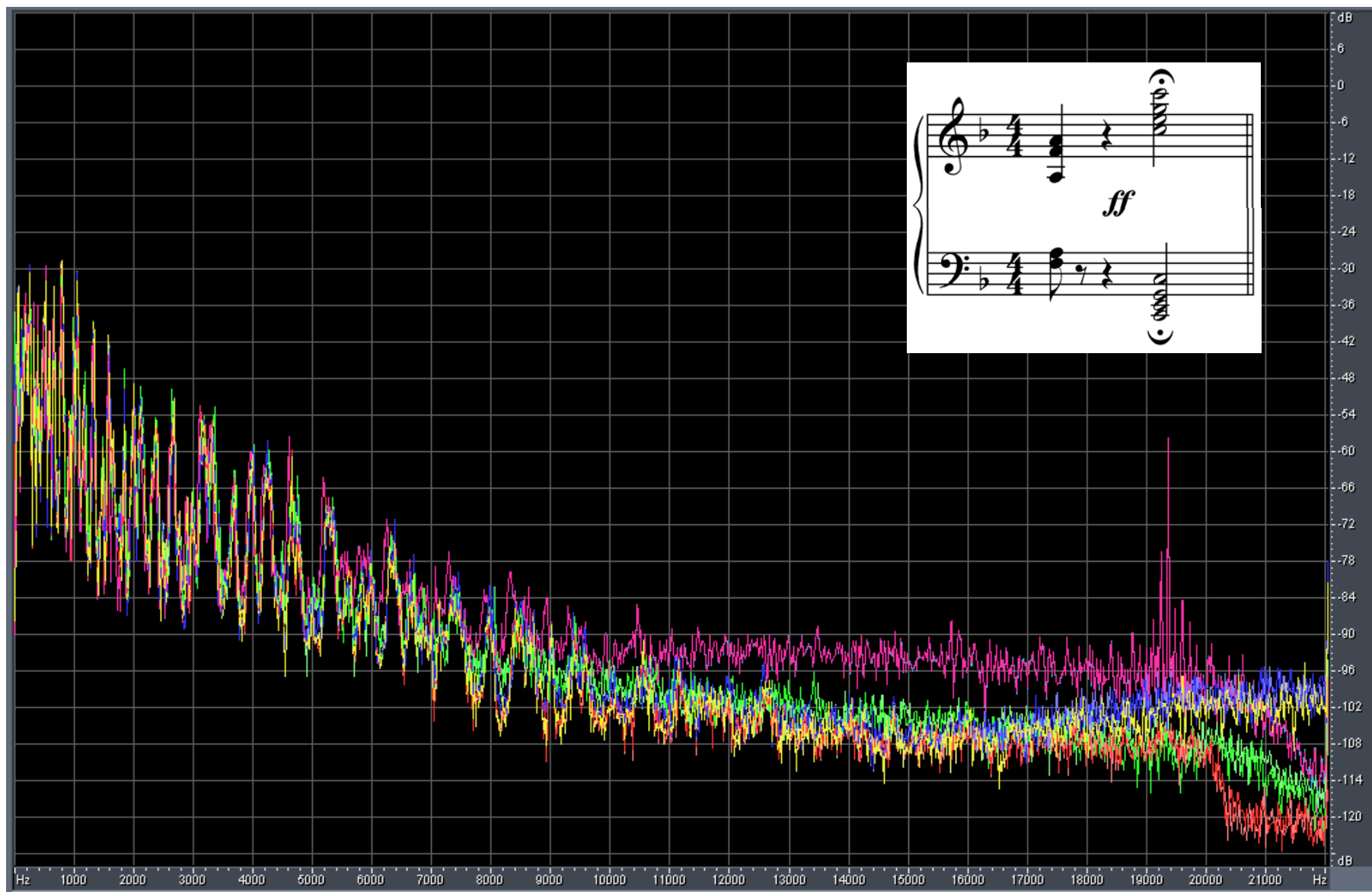


Figure 7.11: Linear frequency spectrum analysis (LP, 1985, 1997, GROTC & Naxos) of opening chord of “A bello a me ritorna,” Act I of *Norma* (1954 recording).

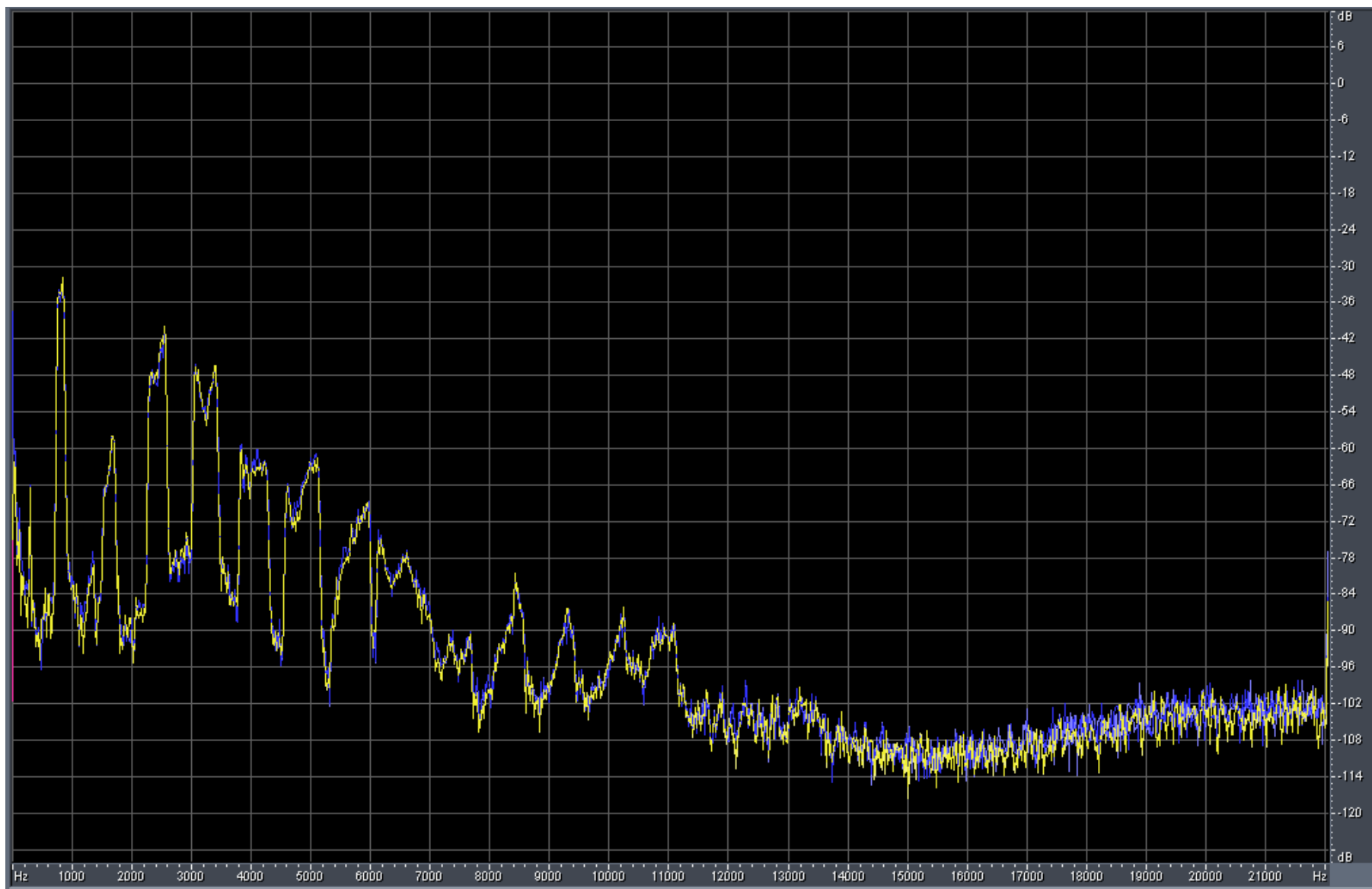


Figure 7.12: Linear frequency spectrum analysis (1997 & GROTC) of Callas singing in
"A bello a me ritorna," Act I of *Norma* (1954 recording).

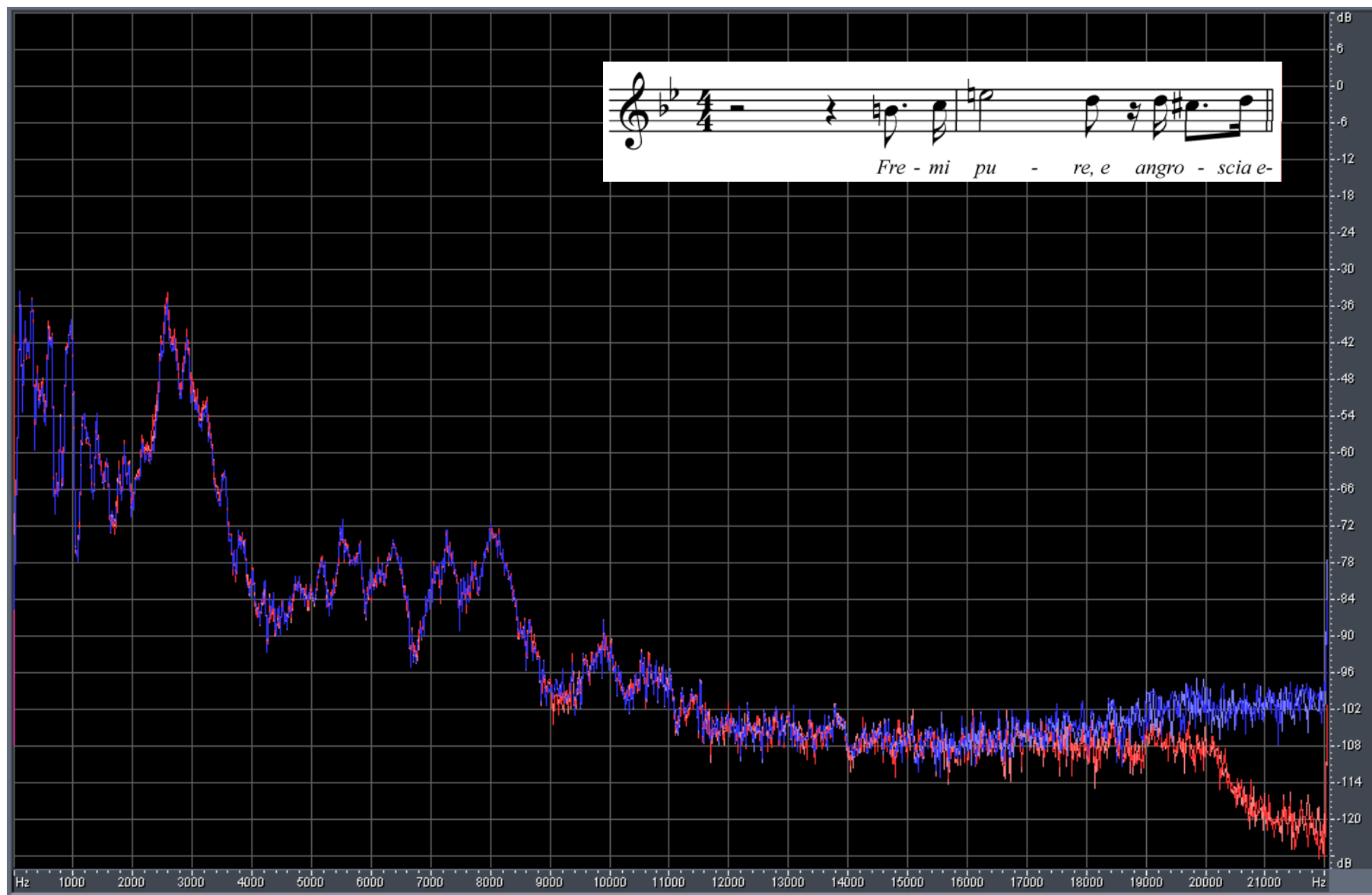


Figure 7.13: Linear frequency spectrum analysis (1985 & 1997) of phrase “Fremi pure” from “Vanni si, mi lascia indegno,” Act I of *Norma* (1954 recording).

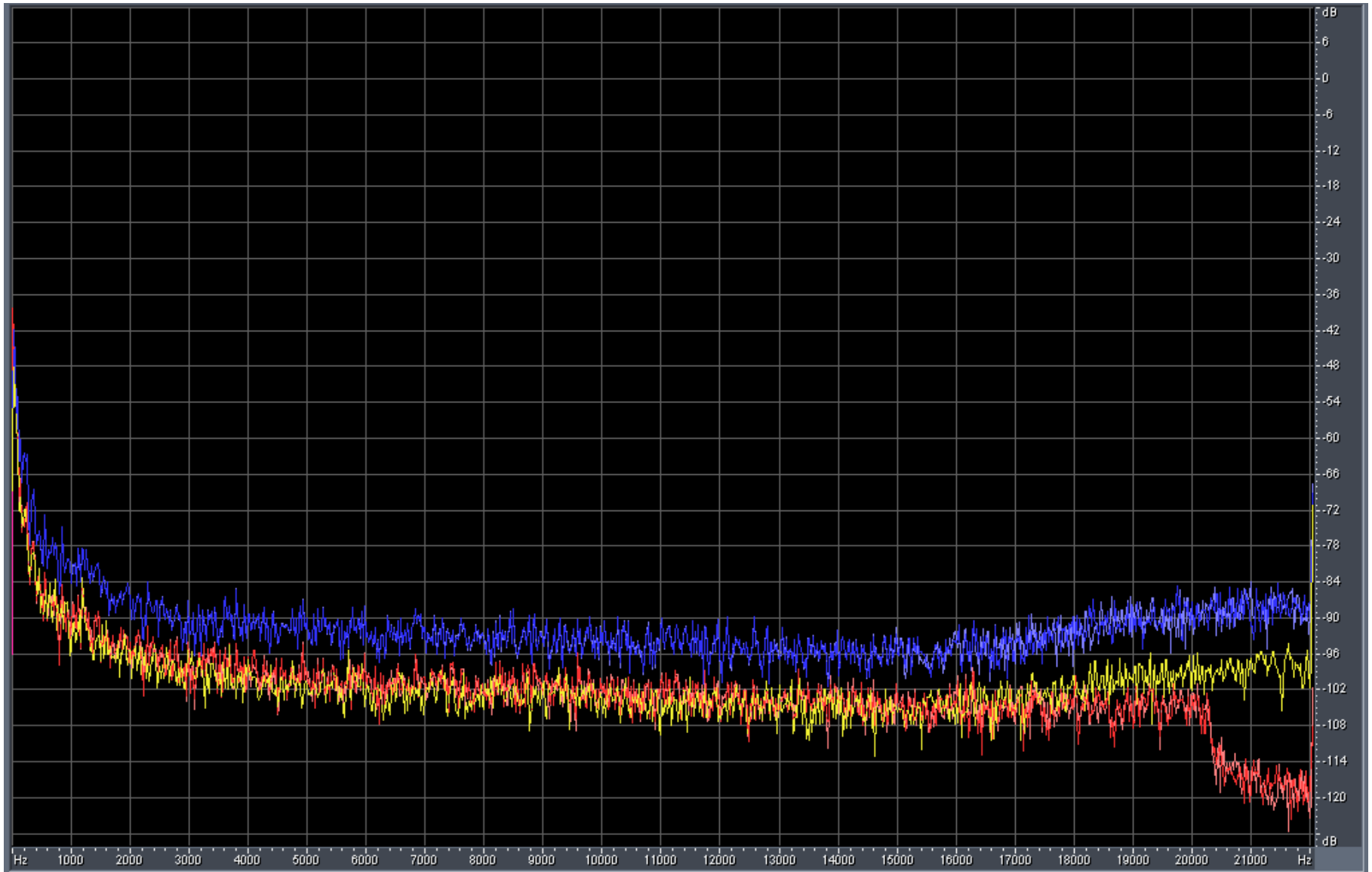


Figure 7.14: Linear frequency spectrum analysis (1985, 1997 & GROTC) of noise sample from “Casta Diva,” Act I of *Norma* (1954 recording).

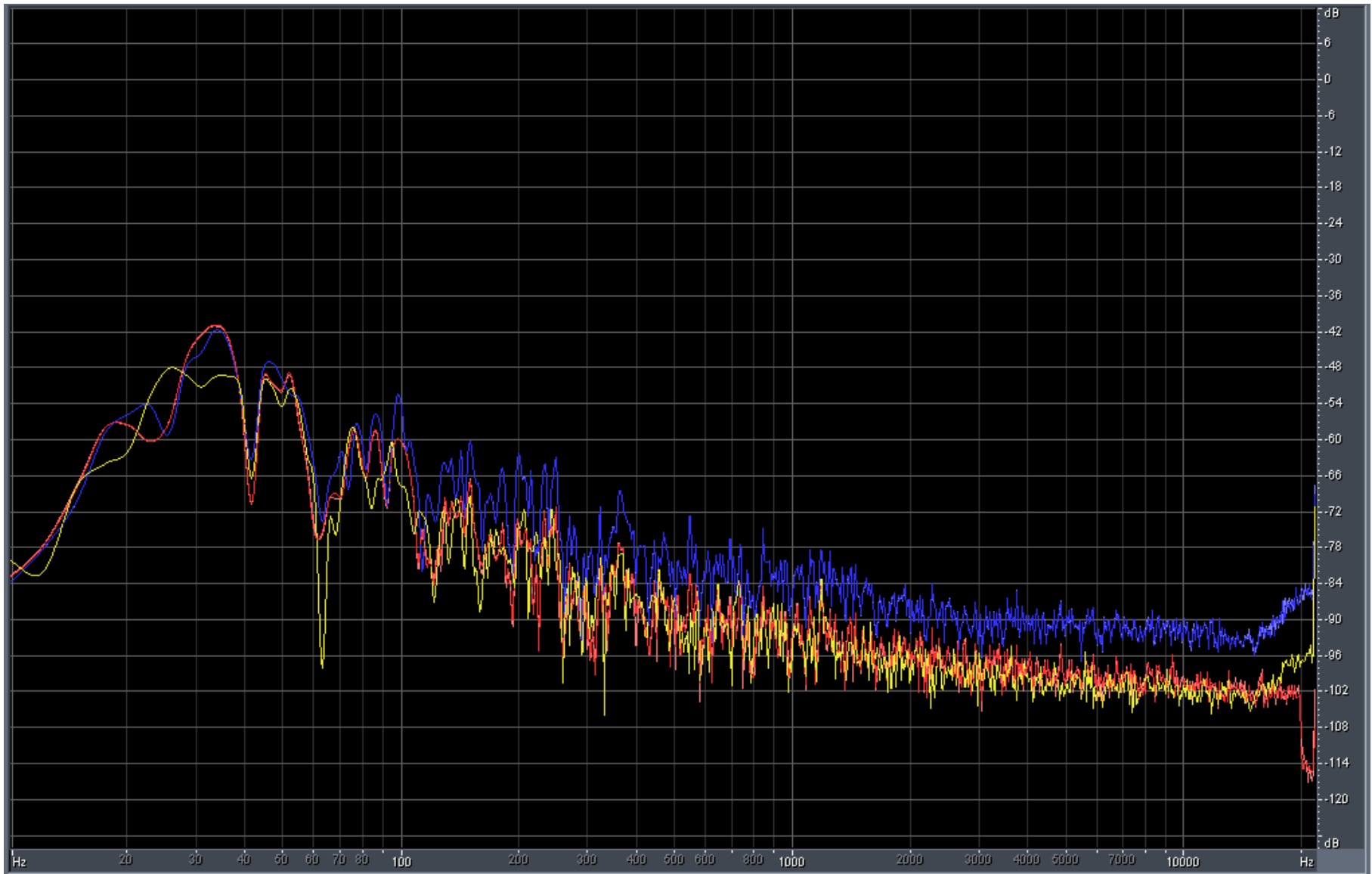


Figure 7.15: Logarithmic frequency spectrum analysis (1985, 1997 & GROTC) of noise sample from “Casta Diva,” Act I of *Norma* (1954 recording).

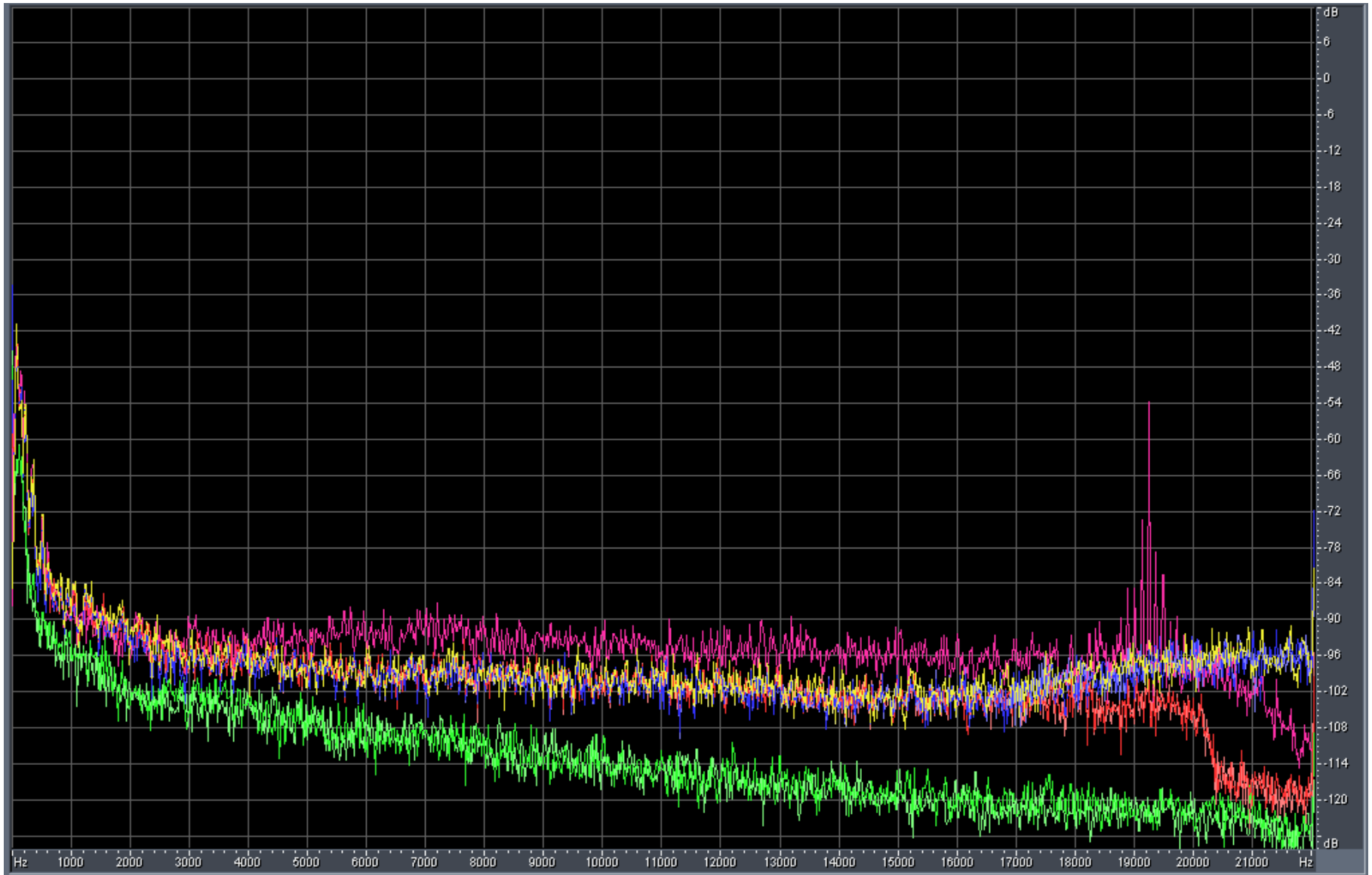


Figure 7.16: Linear frequency spectrum analysis (LP, 1985, 1997, GROTC & Naxos) of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).

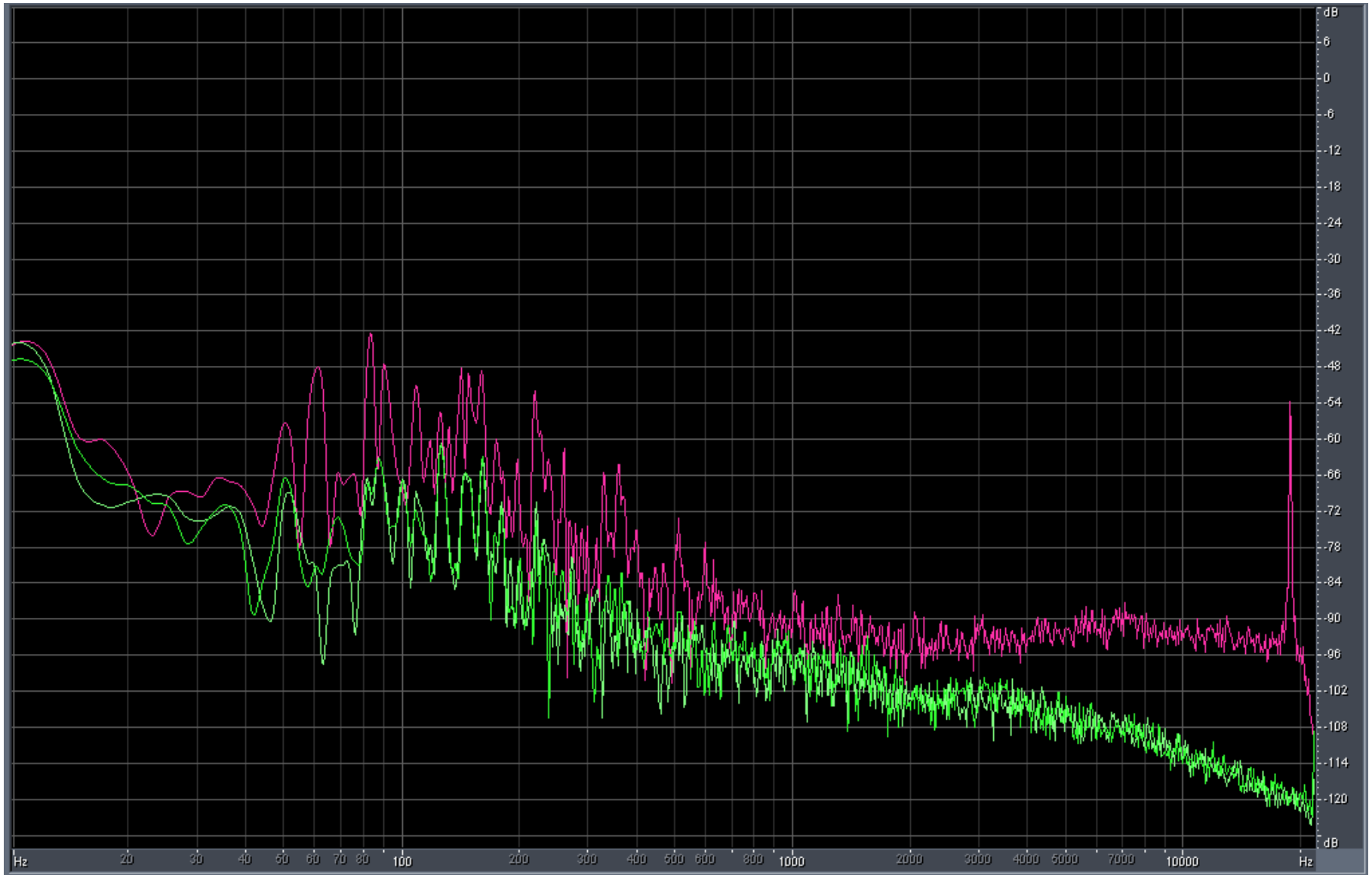


Figure 7.17: Logarithmic frequency spectrum analysis (LP & Naxos) of noise sample from "A bello a me ritorna," Act I of *Norma* (1954 recording).

7.6) MATLAB ANALYSIS:

The following graphs show the results obtained from the Matlab analysis performed on selected audio extracts from *Norma* (1954 recording). For a complete overview and explanation of the algorithm used in analysing the selected examples, please refer to Chapter 1.

7.6.1) CASE 1: “SEDIZIOSE VOCI” FROM “SEDIZIOSE VOCI” (LP & 1997):

The 8-10 Hz rumble evident in the LP version can be seen in the periodicity of Y1 (blue waveform) in Figure 7.18. Please refer to Chapter 5, p. 121, fn 17 for more information regarding the LP rumble.

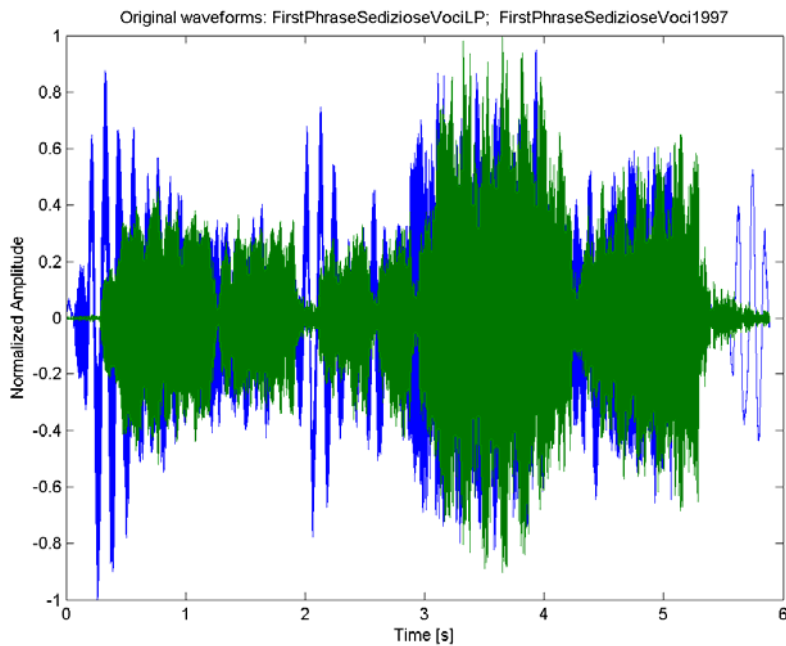


Figure 7.18: Plot of Y1 and Y2 (time-shift visible) of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).

The cross-correlation graph (Figure 7.19) shows that there is very little correlation between Y1 and Y2 (0.17699). A shift of approximately 0.22 s is needed to obtain the best match.

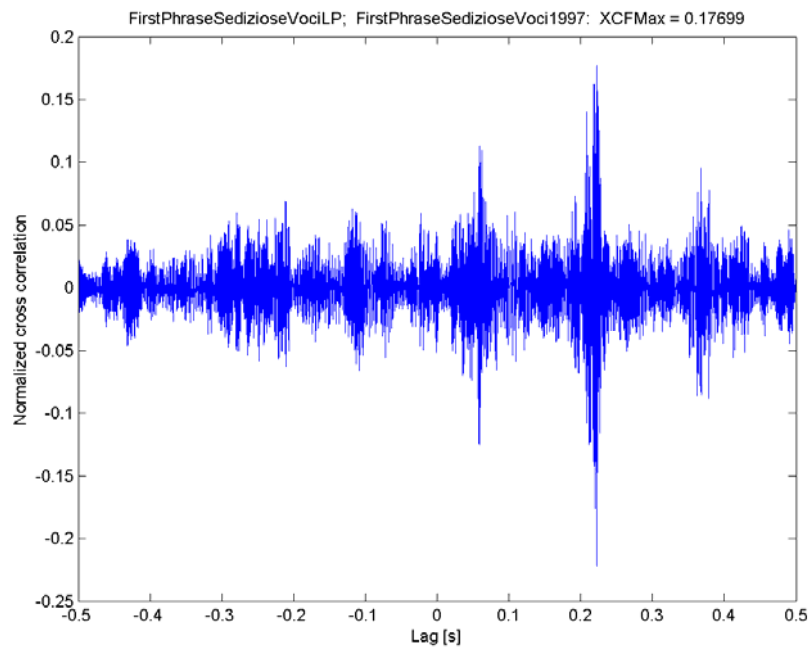


Figure 7.19: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).

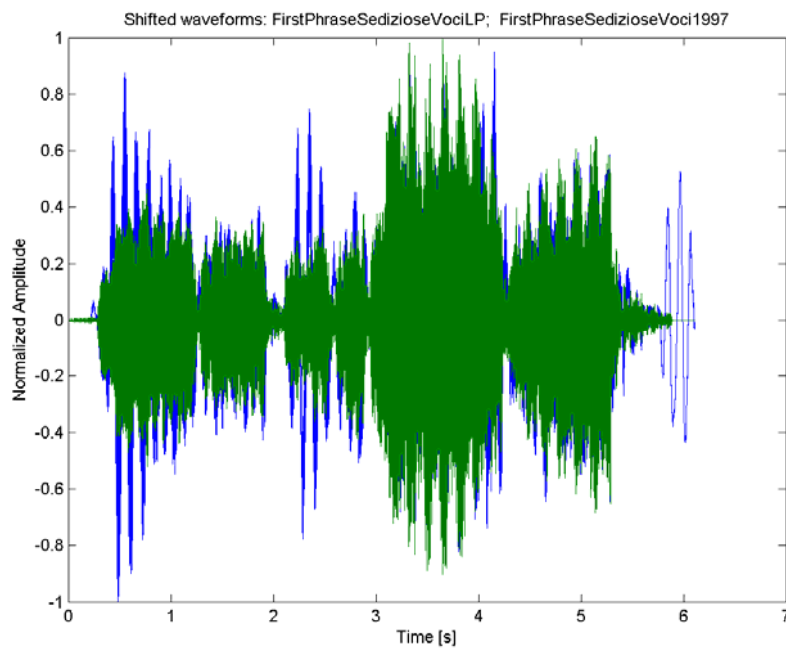


Figure 7.20: Plot of time-shifted waveforms (Y1 and Y2) of phrase “Sediziose voci” from “Sediziose voci,” Act I of *Norma* (1954 recording).

The instantaneous magnitudes of Y1 and Y2, shown in Figure 7.21, do not correspond at all.

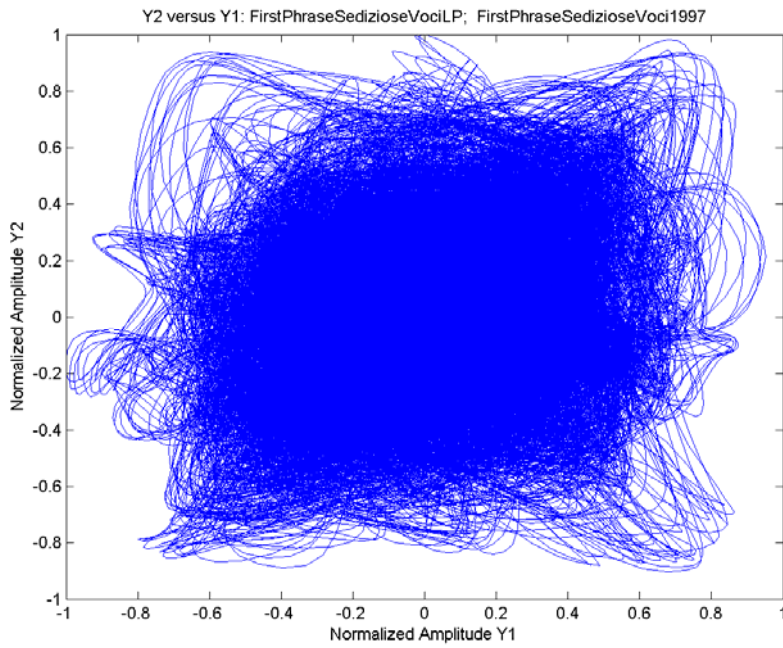


Figure 7.21: Plot of normalised amplitude of Y1 vs. Y2 of phrase "Sediziose voci" from "Sediziose voci," Act I of *Norma* (1954 recording).

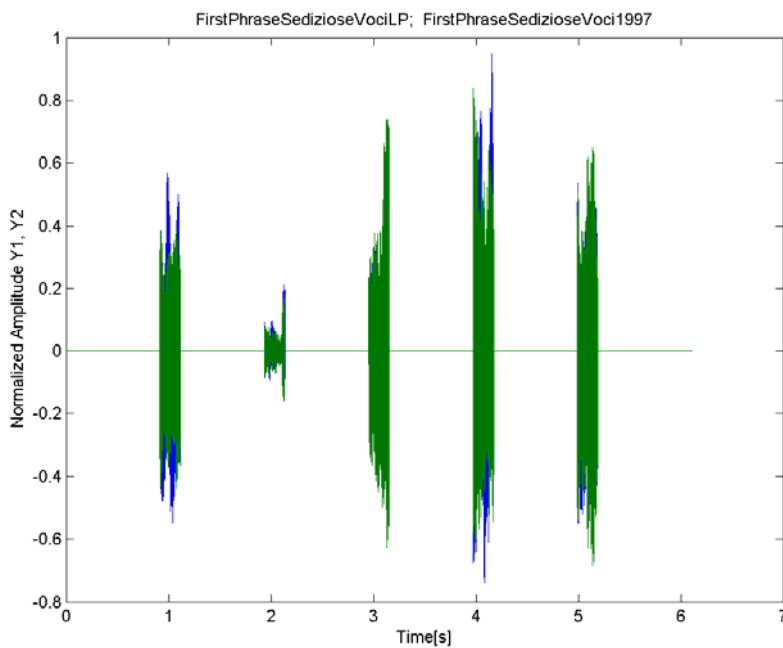


Figure 7.22: Plot of time-shifted windows of phrase "Sediziose voci" from "Sediziose voci," Act I of *Norma* (1954 recording).

Figure 7.23 shows that a maximum shift of approximately -0.0032 s is needed to best match the second window in Figure 7.22, while a time-shift of approximately 0.0002 s is needed to match the fourth window.

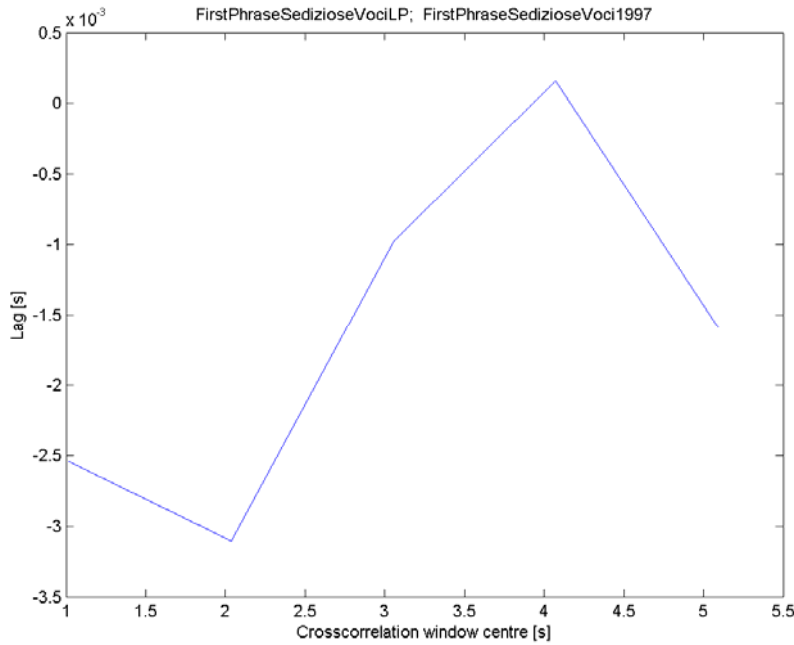


Figure 7.23: Plot of lag or time-shift required for optimum match for each window of phrase "Sediziose voci" from "Sediziose voci," Act I of *Norma* (1954 recording).

The transfer function graph (Figure 7.24) shows clear filtering effects in the low-mid frequency range at approximately 40 Hz, 50 - 60 Hz (to remove any electrical hum present in the signal) and 120 Hz. The 8-10 Hz rumble present in the LP version (as in *Tosca* and *Lucia di Lammermoor*) can be seen as a strong peak in the top graph (compare Figure 7.9 and 7.10). The low frequency range also seems to indicate a shelving filter with low frequency boost. The extreme frequency-dependent difference between the phase of Y1 and Y2 can be seen in the bottom graph.

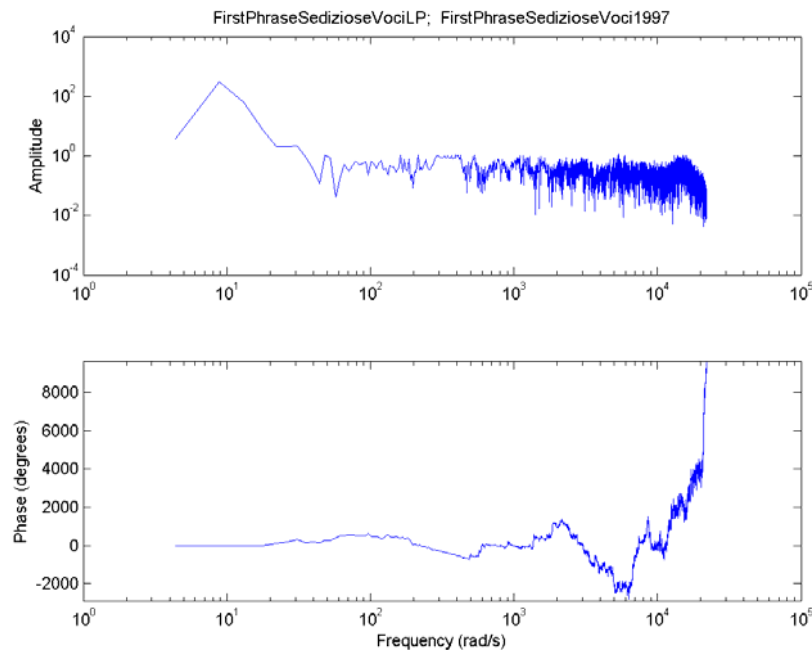


Figure 7.24: Plot of transfer function of phrase "Sediziose voci" from "Sediziose voci," Act I of *Norma* (1954 recording).

7.6.2) CASE 2: NOISE SAMPLE FROM “A BELLO A ME RITORNA” (LP & 1997):

The 10 Hz hum evident in the LP version can clearly be seen in the periodicity of Y1 (blue waveform) in Figure 7.25.

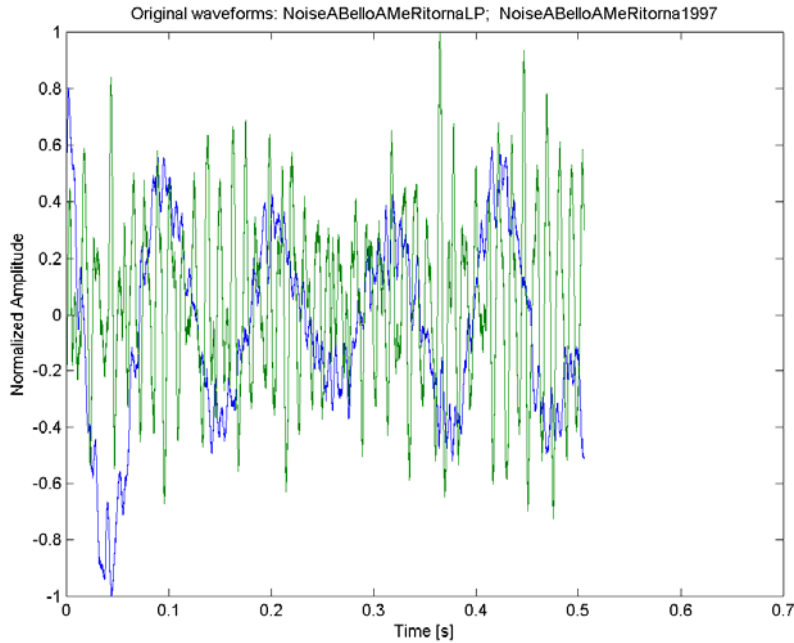


Figure 7.25: Plot of Y1 and Y2 (time-shift visible) of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).

The correlation between Y1 and Y2 is so small (0.072836), that virtually no match is possible (Figure 7.26).

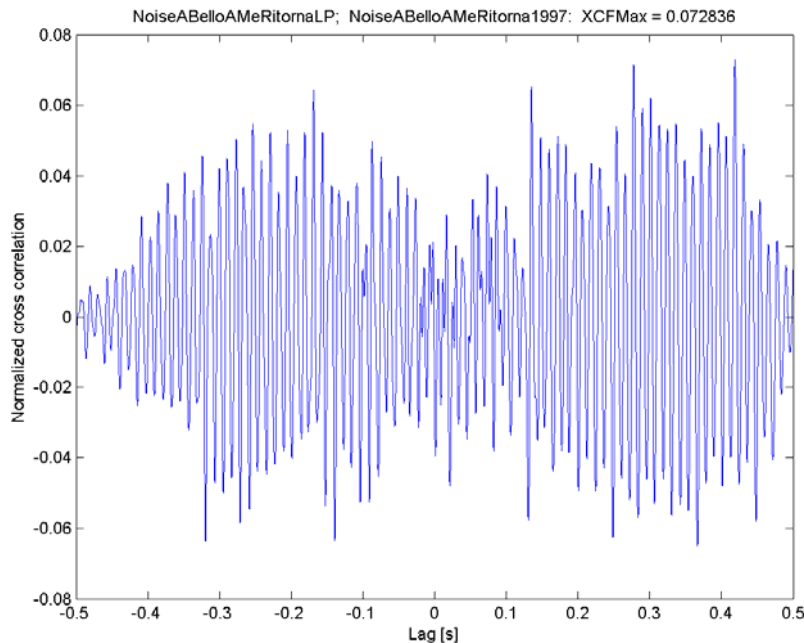


Figure 7.26: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).

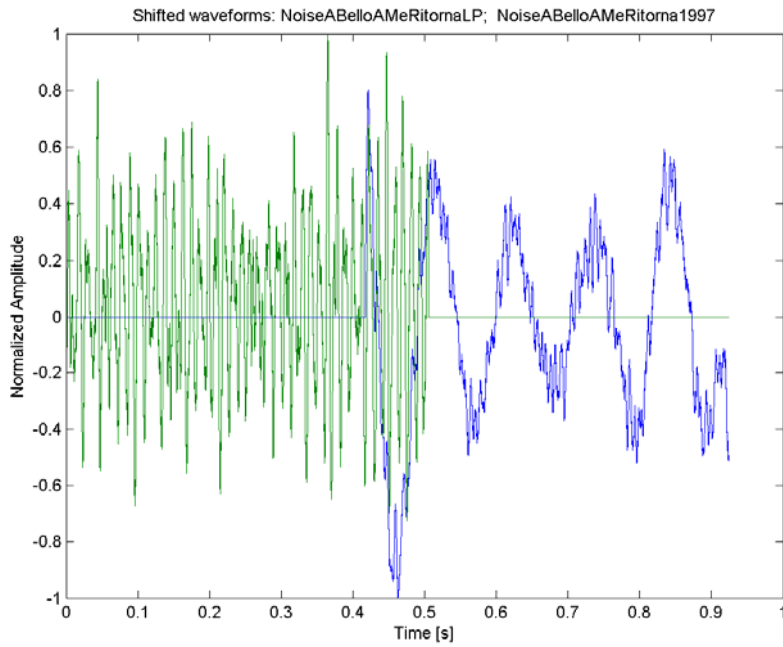


Figure 7.27: Plot of time-shifted waveforms (Y1 and Y2) of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).

Figure 7.28 shows that the instantaneous magnitudes of Y1 and Y2 are totally dissimilar.

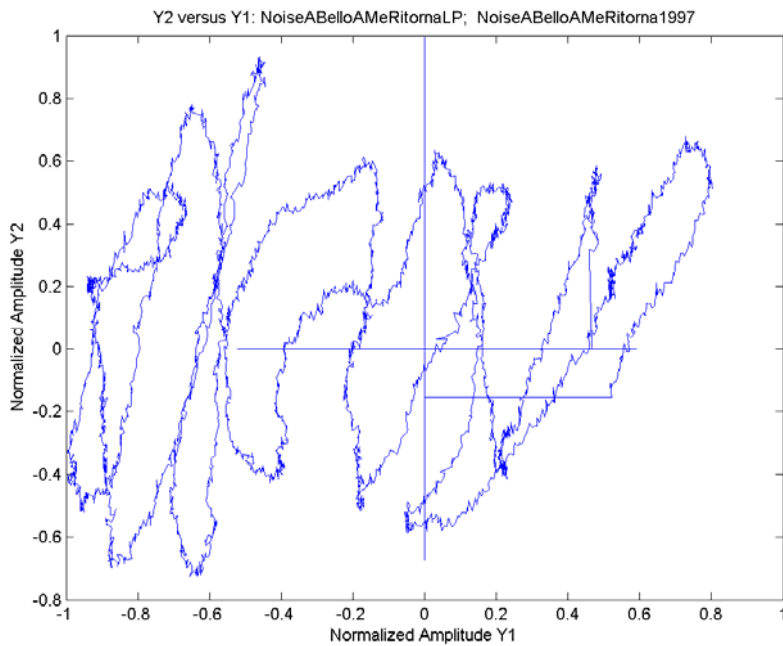


Figure 7.28: Plot of normalised amplitude of Y1 vs. Y2 of noise sample from “A bello a me ritorna,” Act I of *Norma* (1954 recording).

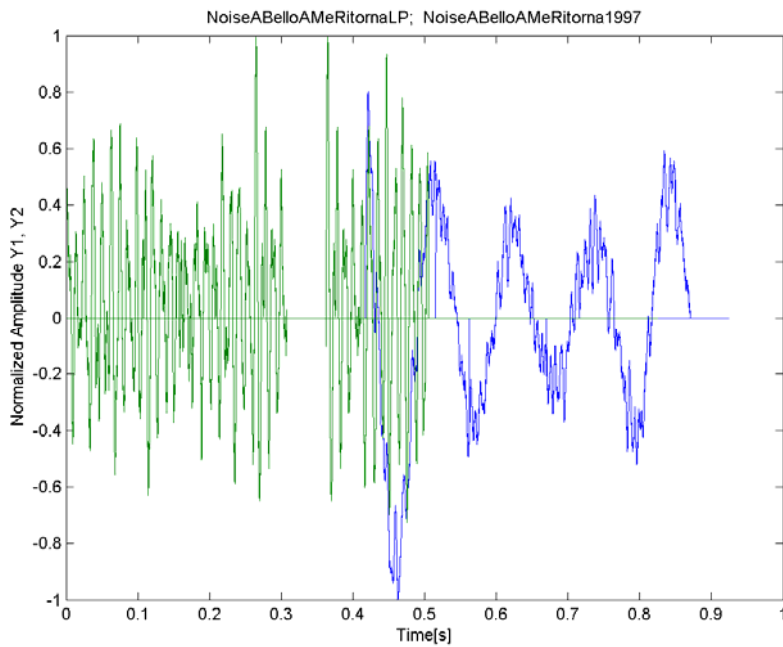


Figure 7.29: Plot of time-shifted windows of noise sample from "A bello a me ritorna," Act I of *Norma* (1954 recording).

The windows in Figure 7.29 cannot be matched properly due to the fact that the two waveforms are so dissimilar. The amount of time-shift can therefore not be calculated accurately.

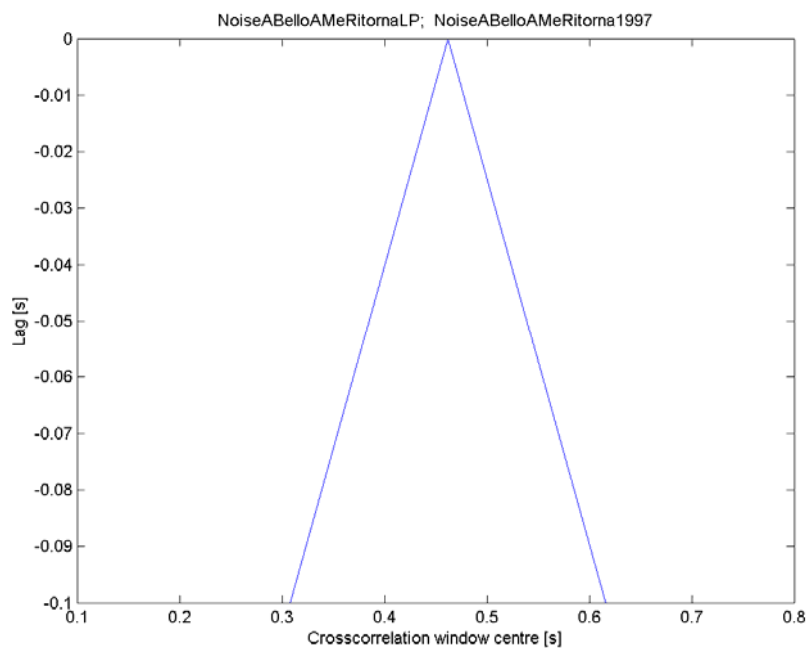


Figure 7.30: Plot of lag or time-shift required for optimum match for each window of noise sample from "A bello a me ritorna," Act I of *Norma* (1954 recording).

As in Figure 7.24 above, the transfer function graph (Figure 7.31) shows clear filtering effects in the low-mid frequency range. The 8-10 Hz rumble present in the LP version can again be seen as a peak at 8-10 Hz in the top graph (compare Figure 7.17).

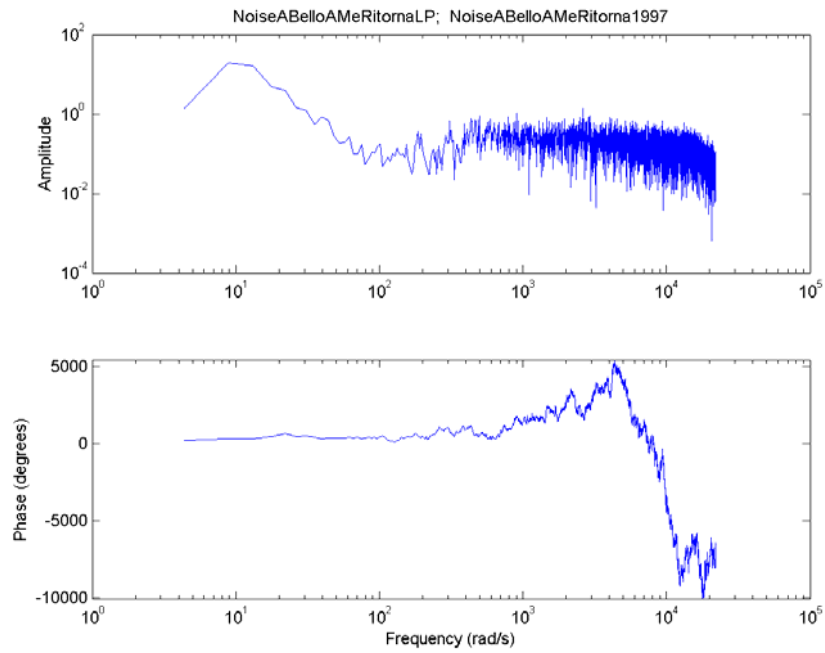


Figure 7.31: Plot of transfer function of noise sample from "A bello a me ritorna," Act I of *Norma* (1954 recording).



CHAPTER 8

MADAMA BUTTERFLY (1955)

“The whole performance is rich in detail. Perhaps more consistently than in any of [Callas’s] other recordings, each phrase here seems to have something special about it, and a whole essay could be written, with its emphasis on what we categorise as ‘interpretation.’”

John Steane (1992: 159)

MADAMA BUTTERFLY

Opera in two acts by Giacomo Puccini (1858 - 1924)

Libretto: Giuseppe Giacosa & Luigi Illica

Butterfly (Cio-Cio-San)	Maria Callas (soprano)
Suzuki	Lucia Danieli (mezzo-soprano)
BF Pinkerton	Nicolai Gedda (tenor)
Kate Pinkerton	Luisa Villa (soprano)
Sharpless	Mario Borriello (baritone)
Goro	Renato Ercolani (tenor)
Yamadori	Mario Carlin (tenor)
Bonzo	Plinio Clabassi (bass)
Commissario	Enrico Campi (bass)

Orchestra and Chorus of La Scala Opera House, Milan

Chorus Master: Norberto Mola

Conductor: Herbert von Karajan

Recorded at La Scala Opera House, Milan on 1 - 6 August 1955.

Producer: Walter Legge

Balance Engineer: Robert Beckett

8.1) INTRODUCTION:

Callas performed the role of Cio-Cio-San onstage only three times, on 11, 14 and 17 November 1955 at the Civic Theatre in Chicago, three months after the present recording was made. Her remarkable identity with the role of the fifteen-year-old Japanese geisha is all the more impressive if one considers that prior to this recording, which was made in August 1955, her only contact with the role was two of

its *arias*, which she recorded as part of her Puccini recital album the previous year. According to Stancioff (1988: 124), Callas was hesitant about *Madama Butterfly*, because, as she told Lawrence Kelly, the founder of Chicago's Lyric Opera and later one of her closest friends, her opinion of the role had not changed since 1945 (when she turned down the offer of making her Metropolitan Opera debut as Butterfly because she did not consider it her best role)¹ and because she believed it to be "destructive vocally." Rasponi (1984: 583), however, claims that when he saw Callas before her performances of *Butterfly* in Chicago in 1955, she told him that "I don't think the geisha is right for me. I'm too tall, and all those small, mincing, miniature gestures don't really suit my style. The music is lovely, but so sentimental, and I prefer roles that I can really get my teeth into."

Cio-Cio-San is probably opera's most tragic and innocent of characters.² "Abandoned, externally frail and internally courageous, immersed in a tragedy of cultural isolation and the pathos of human weakness, Butterfly faced a trial of faith alone, as she also confronted honour in death" (Wolf 1984: 188). These characteristics, combined with the role's dramatic possibilities, ideally suited Callas's interpretive instincts. "Cio-Cio-San is the ideal role for a singing actress because of the growth of character built into the music, running the gamut from life-sustaining naïveté to death-invoking despair. Confrontation with such a cruel truth as desertion inspires the kind of intensification of tragic moments for which Maria Callas is best cast" (Wolf 1984: 189).

In his book, *The Callas Legacy*, John Ardoin (1995: 97-98) notes that "many singers in varying degrees have understood the dramatic potential of *Butterfly*; given a basic sympathy for the role's theatre, a certain success is virtually guaranteed, for much of the character's veracity and appeal was built into the music by Puccini. Yet out of the many who have recorded the part, only two – Toti dal Monte and Renata Scotto – have achieved the compelling heights scaled by Callas... Her remarkable identity with the part on so short an acquaintance becomes understandable if we realise that Callas's Cio-Cio-San was a composite of previous dramatic factors: Amina's innocence and quiet devotion, Gilda's metamorphosis and betrayal, and Violetta's passion and sacrifice. Yet the whole of this *Butterfly* is strikingly different from its parts, for the tragedy of Puccini's geisha was a private one; even her maid Suzuki is kept on its perimeter. Callas sensed and absorbed this essential fact on her initial contact with score, and defined it in inward, concentrated terms, reaffirming her gift of acclimatising herself to a specific theatrical terrain."

¹ Some reports have it that the reason Callas turned down the Metropolitan offer was because she thought herself too fat to be convincing as a fragile, fifteen-year-old Japanese geisha. She weighed 180 pounds at the time (Stassinopoulos 1980: 45).

² Wolf (1984: 188) noted that Puccini was obsessively preoccupied with suffering heroines (Manon, Mimi, Tosca, Cio-Cio-San and Liù), but that he loved his Japanese geisha best, and therefore, she became his most affecting character.

8.2) PERFORMANCE HISTORY:

For her only stage appearances as Butterfly in Chicago in November 1954, Callas was determined to convey the illusion of childishness through dramatic and vocal means. The production was directed by Hizi Koyke, a Japanese soprano who had sung the role of Butterfly, and who brought an authentic Japanese touch to the production. Callas absorbed everything she could from Koyke, telling her “I’m tall and thin, I’m not a Japanese doll. Now let’s make me into one” (cited in Stancioff 1988: 125). The amount of thought and preparation that went into her portrayal of Cio-Cio-San was amazing. “Maria’s five-foot-ten figure had shrunk. It was unbelievable – she was so small onstage, having mastered the delicate mannerisms, the sliding walk of the fifteen-year-old girl who matures into womanhood and faces despair within the span of one act (Zerlina, cited in Stancioff 1988: 125).

During her performances in Chicago, in the final scene where Cio-Cio-San commits *hara-kiri* (Japanese ritual suicide), Callas went upstage to the shrine and, with her back to the audience, prepared to enact Cio-Cio-San’s suicide. “In those days, Maria had her hair down to her waist, which the Japanese director had taught her to arrange with one pin. When she jabbed the dagger in, her head snapped back and her hair flew out like a flag!... She then conveyed incredible pain, managed to get up, stagger to a chest from which a bit of georgette hung out of the drawer. In agony, she grabbed the piece of georgette and it came and came and came as Callas moved towards the centre of the stage. When she finally collapsed, she pushed it into her wound. Unbelievable! I have never seen such acting!” (Zerlina, cited in Stancioff 1988: 125).

Totally immersed in the role of the naïve and innocent Butterfly, Callas performed, in the words of Irving Sablosky, critic of the Chicago Daily News (cited in Jellinek 1960: 140), “as if she were a fully trained member of the Kabuki Theatre. After the crucial first act she handled Butterfly’s transformation into a woman matured in despair and suffering with penetrating insight. Her characterisation grew increasingly powerful as the opera moved inexorably toward its heart-breaking climax.” Lawrence Kelly would later describe her performance of Butterfly, along with her last *Trovatore*, as “the most memorable things I’ve ever heard in my life” (cited in Stancioff 1988: 124).

Callas’s vivid portrayal of Cio-Cio-San in the recording studio three months prior to these three stage performances bespeak an interpretive artist of the highest order. Mandel (1998: 67) believes it to be the most striking of all Callas’s recordings in terms of its moment-to-moment interpretive nuance. “As Butterfly, Callas goes so far in bringing every moment of her characterisation to life, by projecting and colouring the words of virtually every phrase, that the effect becomes almost a purely, intensely theatrical experience rather than a musical one at all – and she accomplishes this three months prior

to her only stage performances of the role. But this was key to her achievement. It was Callas's sense of theatre coupled with her flexibility as a musician, plus the instinctive musicality reflected in her way with colour and phrasing, and in the stylistically appropriate application of such interpretive devices as *rubato*³ and *portamento*, that made her unique in a way that continues to speak through her recordings" (Mandel 1998: 67).

8.3) VOCAL CHARACTERISATION:

The marvel of Callas's recording of *Madama Butterfly* is her superb manipulation of the head voice to depict the fifteen year-old geisha. Callas's extraordinary ability to adapt her own distinctive sound, to change her vocal timbre and to create a different "voice" to best suit the character she is portraying, is best exemplified in this recording, more so than in any other. As John Steane (1992: 157) noted:

"For an actor, it can be advantageous to have a face that is not instantly recognisable. Nose and brow otherwise tend to proclaim the inescapable identity of the player beneath the make-up. Similarly, one would think an opera singer might benefit from the possession of a voice that, of its own kind, is "standard," not too manifestly individual. But what we find is that some of the most adaptable voices are also the most idiosyncratic. Chaliapin's voice was unmistakable; Lotte Lehmann's was always her own. Yet Boris and Varlaam, Prince Igor and Khan Konchak are distinct characters in Chaliapin's records, as are Lehmann's Marschalin, Sieglinde or Frau Fluth in hers. The voices least susceptible to the art of make-up somehow belong to the artists who are best at it.



Figure 8.1: Callas (*Madama Butterfly*)
- Civic Opera (Chicago), 1954.

In our time the prime exponents of this art of vocal make-up have been Maria Callas and Tito Gobbi. The immediately distinctive timbre of both voices was itself a feature of their greatness. Yet Gobbi's Michele and Gianni Schicchi (for instance) presented not merely different faces; they had different voices. Callas's Tosca and Mimì, as we have them on records,

³ Rubato: From the Italian, meaning literally "stolen time." A feature of musical performance in which an elastic, flexible tempo involving slight *accelerandos* and *ritardandos* that alternate according to the requirements of musical expression is used, instead of adhering strictly to musical time.

are utterly separate creations; and on records the voice is all we have. It is reported that Toscanini was asked about the voice of the tenor Aureliano Pertile. He objected that he could not think of any such thing: Radamès, Lohengrin, Canio, Nero, there was a voice for each of them. The remark certainly applies to Callas, and to none of her roles more aptly than to her Butterfly.”

According to Ardoin (1995: 98), “Callas’s voice seems a vessel which can be filled or drained to various levels of intensity at will.” During Act I, her voice is kept light “on, rather than in, the string,” like a violinist using his bow with a minimum of pressure (Ardoin 1995: 98). In the process, she sacrifices effective vocalism for its own sake to create the vocal image of an innocent, young girl - “a creature of great delicacy” as Ardoin (1995: 98) notes, whose exchanges with Pinkerton and Sharpless are characterised by “shyness coupled with a questioning eagerness.” Yet, as Steane (1992: 157) notes, Callas’s “transformation is not so complete that one is denied the thrill of recognition at the first sound of her voice off-stage in the entrance music. The single word ‘Aspetta’ is entirely characteristic, yet, equally, it could not be the Callas of Norma or Tosca, and when she arrives (‘Siam giunte’) it is, miraculously, the fifteen-year-old girl and not the great Callas who stands before us.”

The laps of three years between the first and second acts are reflected by Callas’s vocal characterisation. By the start of Act II, the girlish tone of Act I is replaced by a “dull weary sound without sheen, full of uncertainty” (Ardoin 1995: 99). “We are to see the child develop into a woman: but not all at once. Just as something of the child remains even in the last scene (the excitement and cruel disappointment), so the woman emerges occasionally in the first. As she tells how poverty has touched her family, how the hurricane shakes the strongest oak, the voice fills out to acknowledge life’s harshness. The child is there again in the quick, tight little word ‘Morto’ in answer to Sharpless’s enquiry about her father; it is a child who has a private sorrow associated with a deep pride which she will carry to her death. Callas’s portrayal is so moving partly because it creates, in these early episodes, a girl capable of tragic dignity, and then in the second half of the opera, when experience more than years has brought maturity, she still mingles the adult’s voice with the tones of the girl.” It is only during the final solo (‘Tu, tu, piccolo Iddio’), at the moment of death, “that this Butterfly becomes the complete woman, alone on stage for the only time in the opera and only now abandoning the restraints within which she has suffered, and it is only now that we hear Maria Callas as herself... Her imaginative grasp of the part is marvellously complete” (Steane 1992: 159).

8.4) COMPARISON OF THE DIFFERENT REMASTERINGS:

The different remasterings of *Madama Butterfly* used in the present study are listed below:

RELEASE	DATE OF REMASTERING	CATALOGUE NO.	REMASTERING ENGINEER
EMI Records Ltd.	1987	CDS 7 47959 8	Unknown ⁴
EMI Callas Edition	1997	5 56298 2	Allan Ramsay

Table 8.1: Reissues of the 1955 recording of *Madama Butterfly* used in this study.

In the CD booklet of the 1987 release, EMI states that:

“This famous performance, recorded before the introduction of modern digital techniques, has been made available on compact disc because of its artistic importance and great musical value. The immediacy of sound of the original analogue master is considerably enhanced in this transfer and it is felt that the highlighting of any inadequacies consequent from earlier techniques is far outweighed by the fresh light thrown on an outstanding musical document.”

Of the difference between the various reissues, Seletsky (2000: 246) noted that “the remastered *Butterfly* has a hollow, artificial clarity, with neither the intimacy of the earliest LP’s, nor the sweetness and radiance of the previous CD versions, so Callas’s voice is often quite pale and hard. Breathing and many consonants have a distracting electronic buzz.”⁵

The sound of the 1987 remastering has a warm, rich ambience, yet is intimate and sweet, presenting a slightly more “solid-sounding,” Callas. The sound image is less “in your face” compared with the later 1997 Callas Edition remastering, which, as a result, sounds at first the more exciting and thrilling of the two reissues. The 1997 remastering also provides the soloists, chorus and orchestra with added dynamic presence. In so doing, however, EMI’s rather close-miking of the soloists, no doubt the “immediacy of sound” referred to above, becomes exaggerated, exposing any vocal faults in the soloists. This vocal “highlighting” as it were, can be heard during the opening measures from the well-

⁴ Prior to 1997, no remastering engineers are credited by EMI for the remasterings of the Callas recordings.

⁵ Though not used by Seletsky in quite the same context, the term “buzz” is problematic, since it can refer to different types of audio degradations. It usually describes disturbances produced by, for example, lighting rig controllers and faders, that vary the light intensity in lighting racks by cutting out part of the AC power supply twice every cycle, resulting in sharp electrical transients. If nearby audio equipment is not properly shielded, these transients often appear in the form of closely spaced, regular “ticks” in the signal. Buzz can also refer to the noise produced by electrical faults such as earthing problems. It differs from “Hum,” as it usually contains a large number of high frequency harmonics.

known aria “Un bel dì vedremo” (Example 8.1). Please note as well the more intimate, sweeter sound of the 1987 remastering, compared with the later version.

Example 8.1: “Un bel dì vedremo” from Act II of *Madama Butterfly*

BUTTERFLY

Un bel dì vedremo	One fine day we'll see
levarsi un fil di fumo	a wisp of smoke arising
sull'estremo confin del mare.	over the extreme verge of the sea's horizon,
E poi la nave appare –	and afterwards the ship will appear.
poi la nave bianca	Then the white ship
entra nel porto, romba	will enter the harbour, will thunder
il suo saluto. Vedi?	a salute. You see?
È venuto!	He's arrived!
Io non gli scendo incontro.	I shan't go down to meet him.
Io no.	Not I.

CD 2 Track 21: 1987 remastering (EMI Records Ltd.)

CD 2 Track 22: 1997 remastering (EMI Callas Edition)

Tape hiss, extraneous background noises and breathing, however, also become more noticeable. Compare for example the amount of tape hiss evident in the opening bars of “Che tua madre” (Example 8.2).

Example 8.2: “Che tua madre” from Act II of *Madama Butterfly*

BUTTERFLY

Che tua madre dovrà	That your mother would have
prenderti in braccio	to take you in her arms
ed alla pioggia e al vento	and in all weathers
andar per la città	walk the city streets
a guadagnarti	to earn you
il pane e il vestimento.	food and clothing.
Ed alle impietosite genti	And to the pitying crowd
la man tremante stenderà	stretch out a trembling hand,
gridando, “Udite, udite	crying, “Listen, listen
la triste mia canzon.	to my sad tale.
A un'infelice madre	Charity for an unhappy mother!
la carità, muovetevi a pietà	Have pity!”

CD 2 Track 23: 1987 remastering (EMI Records Ltd.)

CD 2 Track 24: 1997 remastering (EMI Callas Edition)

Whether a result of excessive noise reduction techniques (which filter out certain middle-upper range frequencies in order to remove tape hiss), or personal preference in terms of mastering decisions, there is a notable increase of shrillness and harshness in Callas's voice between the 1987 and 1997 remasterings. Listen for example to the following extract from the dramatic climax to "Un bel di vedremo" (Example 8.3).

Example 8.3: "Tienti la tua paura" from "Un bel di vedremo," Act II of *Madama Butterfly*

BUTTERFLY

Tienti la tua paura,	Keep your fears;
io con sicura fede l'aspetto.	with unalterable faith I shall wait for him.

CD 2 Track 25: 1987 remastering (EMI Records Ltd.)

CD 2 Track 26: 1997 remastering (EMI Callas Edition)

Callas's top range sounds precariously thin, the sound indeed "hollow" as Seletsky pointed out, with the inconsistencies in her upper register, even the dreaded "wobble," sounding more pronounced. This is especially evident during the final moments of the opera, where Callas's top register above the staff sounds much more shrill in the 1997 remastering, as can be heard in Example 8.4, an extract from the final scene, "Tu? tu? piccolo Iddio!"

Example 8.4: "Tu? tu? piccolo Iddio!" from Act II of *Madama Butterfly*

BUTTERFLY

Tu? tu? piccolo iddio!	You? You? Little idol of my heart.
Amore, amore mio, fior di giglio e di rosa.	My love, my love, flower of the lily and the rose.
Non saperlo mai... per te, pei tuoi puri occhi	Never know that, for you, for your innocent eyes,
muore Butterfly...	Butterfly is about to die...
Perché tu possa andar di là del mare	so that you may go away beyond the sea
senza che ti rimorda ai di maturi	without being subject to remorse in later years
il materno abbandono.	for your mother's desertion.
O a me, sceso dal trono dell'alto Paradiso,	Oh, you who have come down to me from high heaven,
guarda ben fiso, fiso, di tua madre la faccia!	look well, well on your mother's face,
Che ten' resti una traccia, guarda ben!	that you may keep a faint memory of it, look well!
Amore, addio, addio!	Little love, farewell!
Piccolo amor!	Farewell, my little love!
Va, gioca, gioca.	Go and play.

CD 2 Track 27: 1987 remastering (EMI Records Ltd.)

CD 2 Track 28: 1997 remastering (EMI Callas Edition)

The fuzzy haze and artificial ambience of the remastered 1997 sound, is perhaps best exemplified by the extract from “Vogliatemi bene, un bene piccolino.” A low-lying hum, more audible in the 1987 remastering, is less prominent in the later version.

Example 8.5: “Vogliatemi bene, un bene piccolino” from Act I of *Madama Butterfly*

BUTTERFLY

Vogliatemi bene, un bene piccolino,	Love me with a little love,
un bene da bambino	a child-like love,
quale a me si conviene.	the kind that suits me.

CD 2 Track 29: 1987 remastering (EMI Records Ltd.)

CD 2 Track 30: 1997 remastering (Callas Edition)



Figure 8.2: Callas (Madama Butterfly) - Civic Opera (Chicago), 1954.

8.5) FREQUENCY SPECTRUM ANALYSIS:

Frequency spectrum analysis was performed on a number of selected extracts, short phrases or noise samples from the two *Madama Butterfly* reissues, each providing a multitude of possible comparisons. The selected extracts comprised the following:

- 1) Opening violin solo from “Vogliatemi bene, un bene piccolino,” Act I
- 2) “Ridi il ciel” from “Vogliatemi bene, un bene piccolino,” Act I
- 3) “Un bel dì vedremo” from “Un bel dì vedremo,” Act II
- 4) “Tienti la tua paura” from “Un bel dì vedremo,” Act II
- 5) “Che tua madre” from “Che tua madre,” Act II
- 6) “Morta” from “Che tua madre,” Act II
- 7) First four notes from “Con onor muore,” Act III
- 8) “Moor Butterfly” from “Con onor muore,” Act III
- 9) “Guarda ben” from “Con onor muore,” Act III

The results of the frequency spectrum analysis were carefully compared and evaluated. From the above extracts, a further selection was made. These selected examples are discussed below.

The frequency spectrum graphs are either logarithmic or linear. The x-axis (left to right) represents frequency (measured in Hz), while the y-axis (bottom to top) corresponds to the amplitude of the corresponding frequency (measured in dB) on the x-axis.

The colours used to represent the releases are as follows:

RELEASE PHASE	COLOUR
EMI Records Ltd. (1987)	Green
EMI Callas Edition (1997)	Pink

Table 8.2: Release phases of the two reissues of *Madama Butterfly* used in this study and the colours used to represent them in the spectrum analysis examples.

Figure 8.4 shows the linear representation of the phrase “Che tua madre” from “Che tua madre,” Act II. Here, in both the 1987 and 1997 remasterings, the tapering away of the upper frequencies above 20000 Hz is clearly visible (compare also Figures 8.5 to 8.7). The graph furthermore indicates the

relatively more prominent frequency content of the 1997 version across the middle to upper frequency range.

Figure 8.5 is a logarithmic representation of the same phrase shown in Figure 8.4. In this example, a sharp filtering effect can be seen at approximately 80 Hz, while from about 45 Hz and below, the 1987 remastering proves comparatively stronger compared with the 1997 reissue. The relatively more prominent frequency content of the 1997 version in the mid to upper frequency range is again visible.

The logarithmic analysis of the phrase “Morta” from “Che tua madre,” Act II is shown in Figure 8.6. Again, as in the previous examples, the slightly stronger mid-upper frequency range, from approximately 4000 - 10000 Hz, of the 1997 remastering is clearly visible. There is another filtering effect in the 1987 remastering at 50 Hz.

Figure 8.7 confirms yet again the relatively strong mid-upper frequency components of the 1997 remastering. In the lower frequency range, however, the 1987 release is consistently more prominent, explaining why the 1997 remastering sounds at times harsh and shrill in comparison, the 1987 version indeed “warmer” and “richer” as described earlier. More evidence of filtering in the 1987 remastering can be seen at 60 Hz.



Figure 8.3: Callas (Madama Butterfly) - Civic Opera (Chicago), 1954.

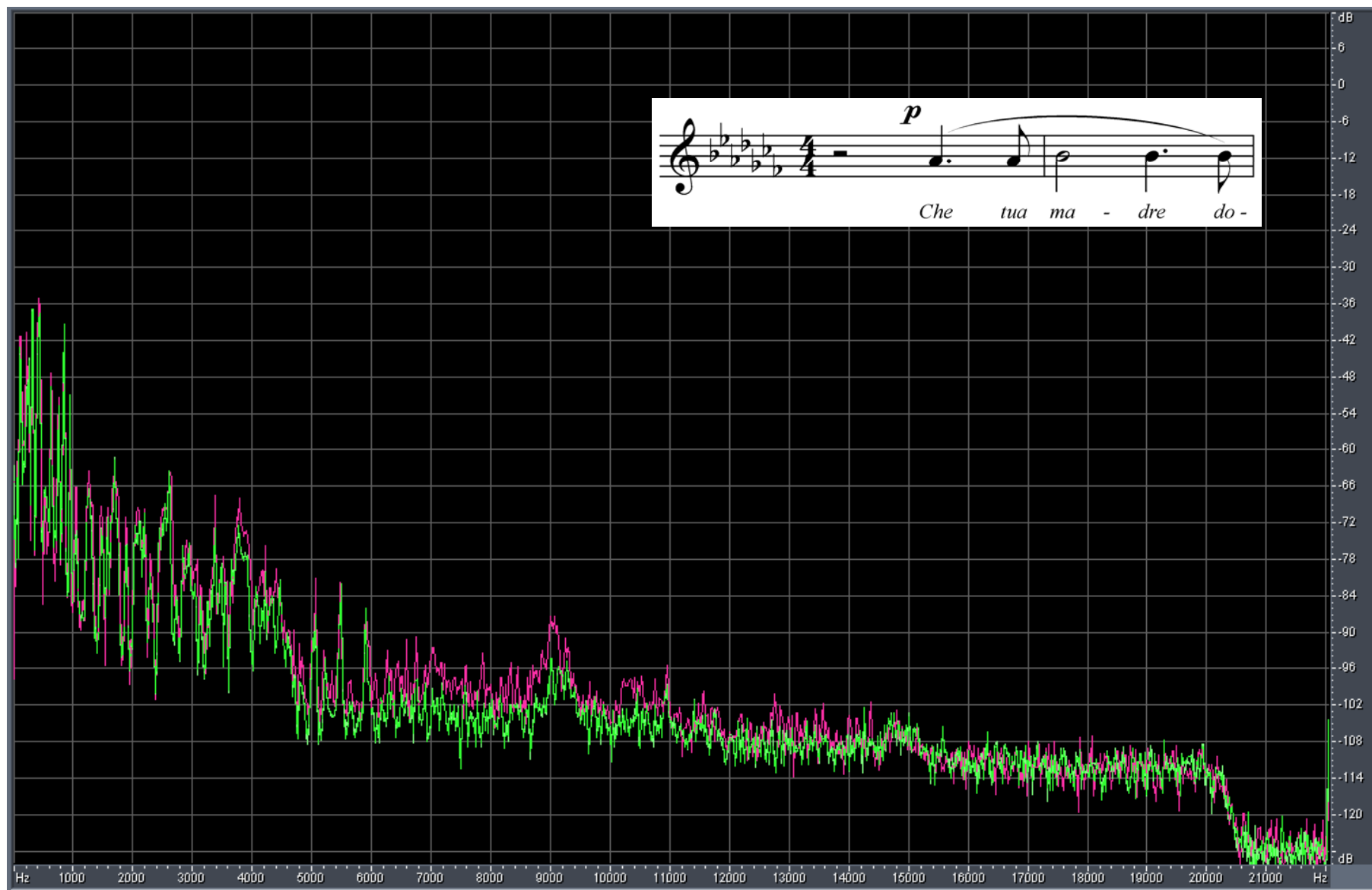


Figure 8.4: Linear frequency spectrum analysis (1987 & 1997) of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).

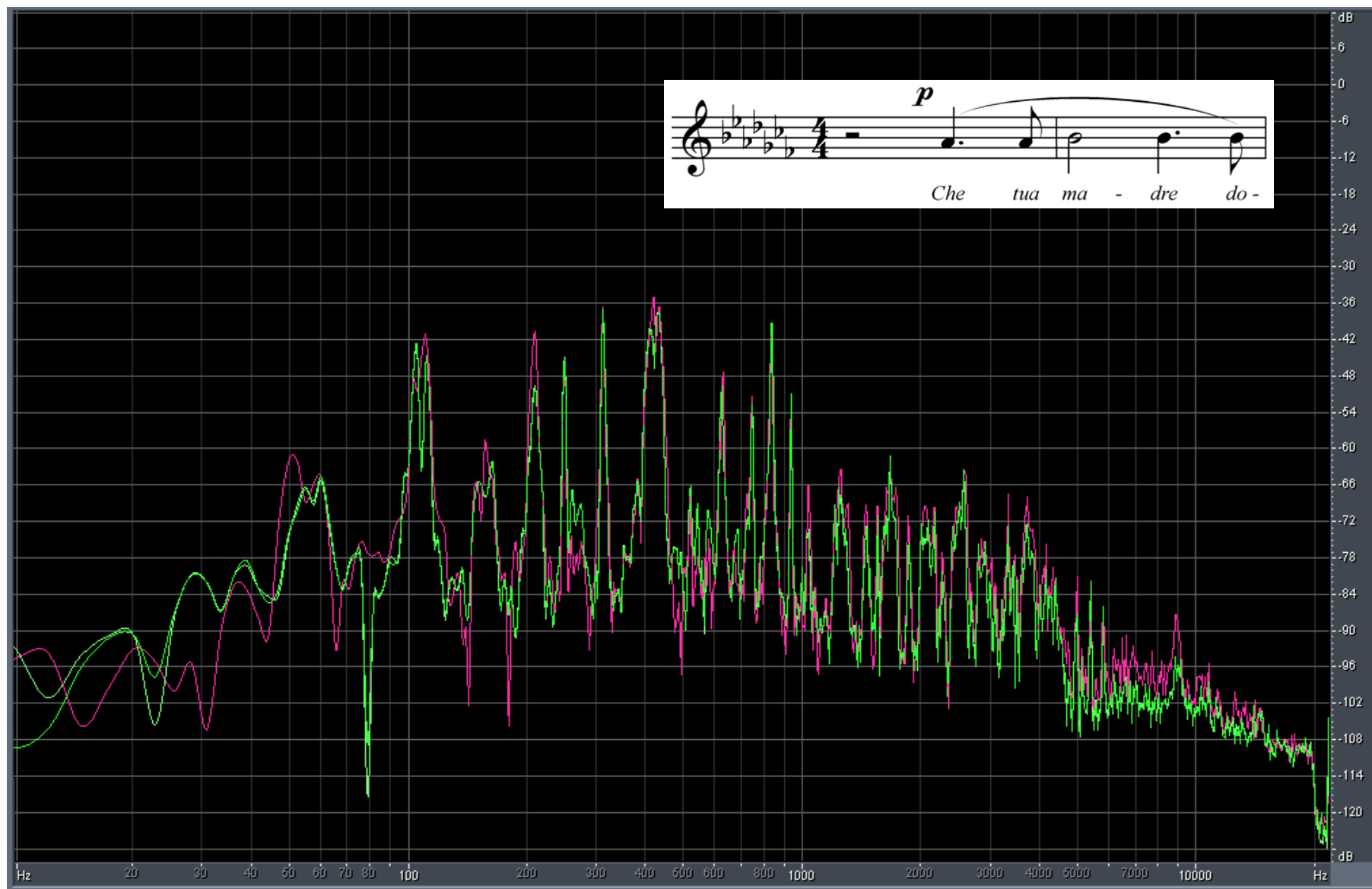


Figure 8.5: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).

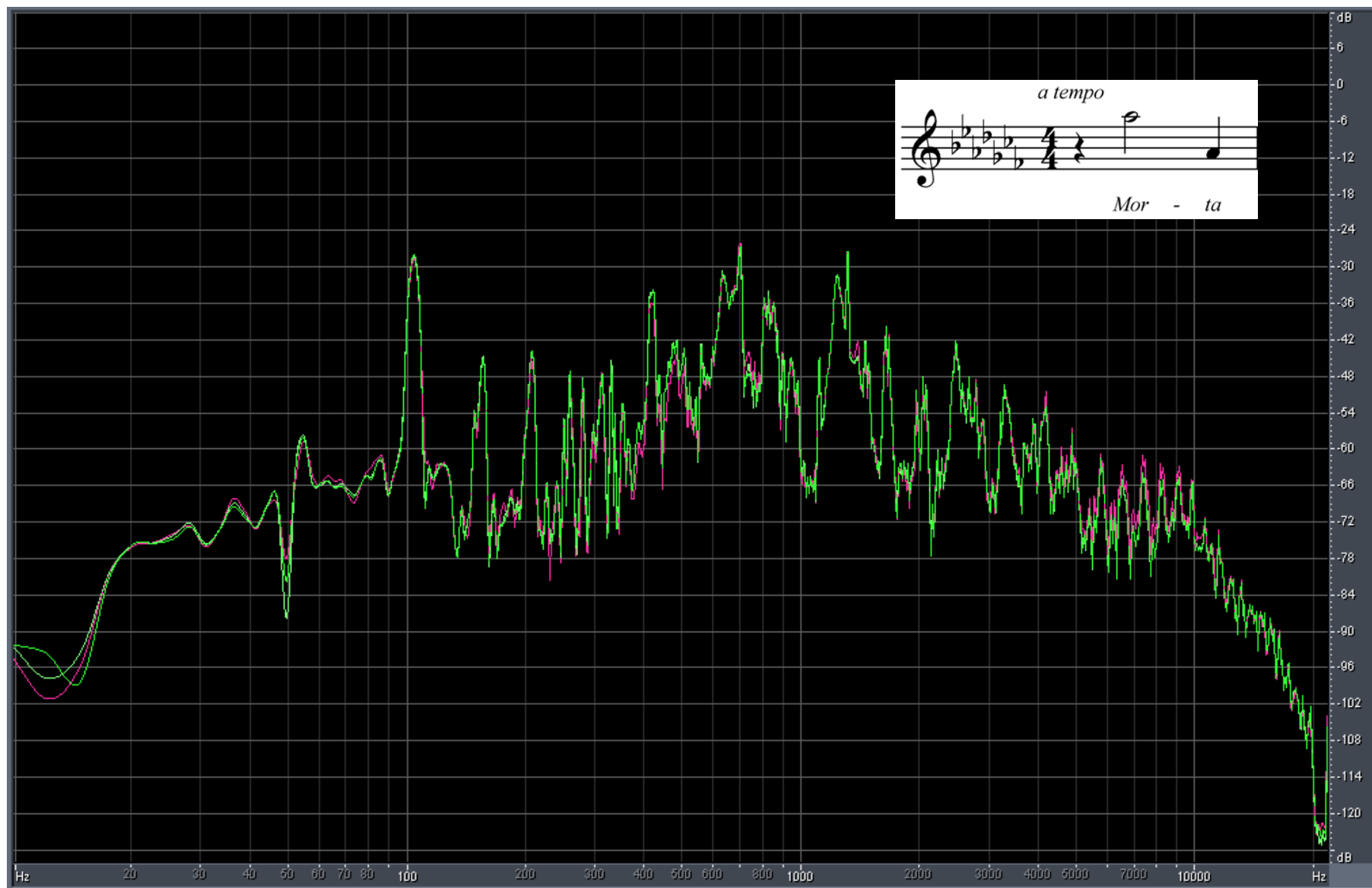


Figure 8.6: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Morta” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).

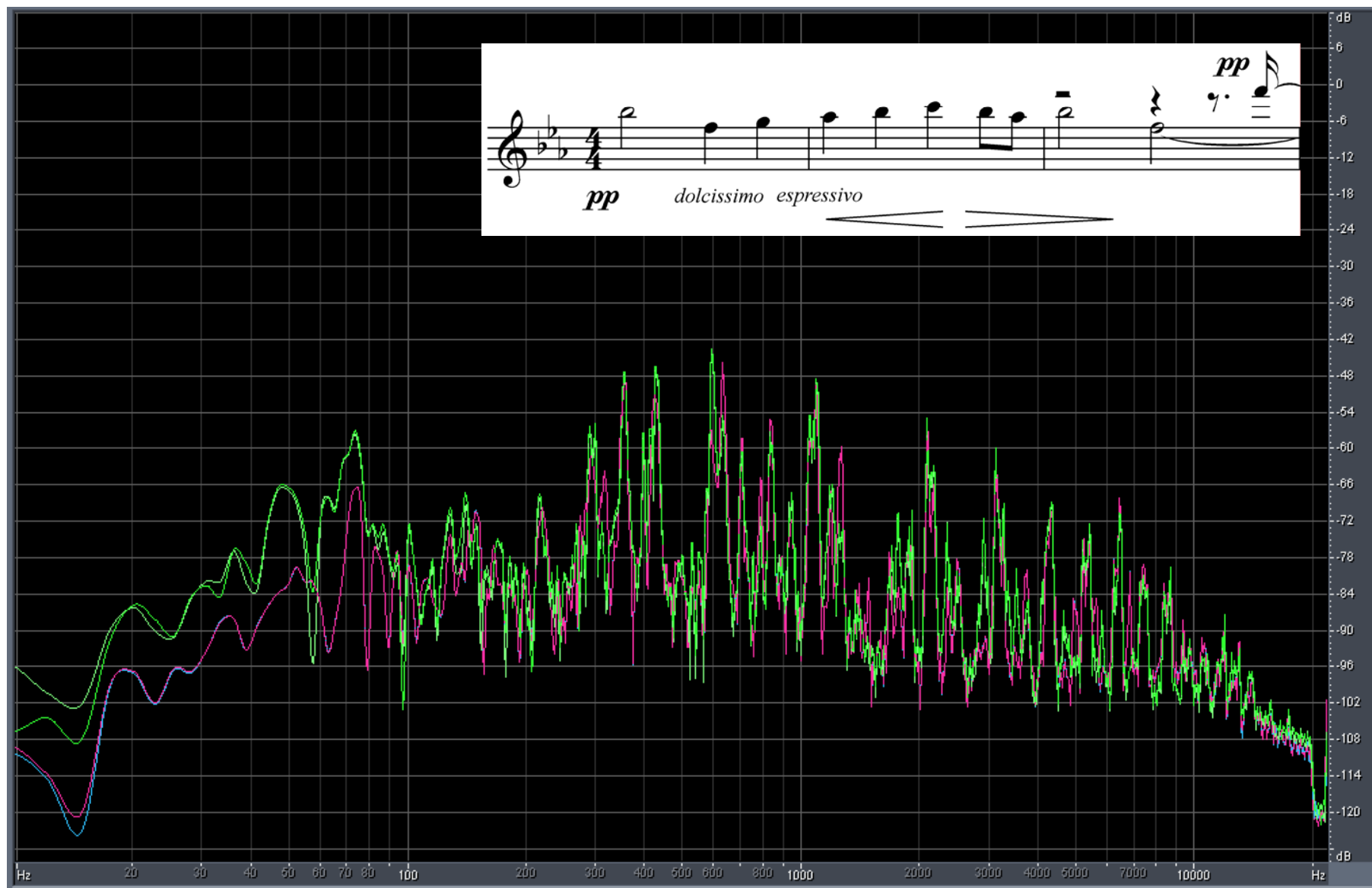


Figure 8.7: Logarithmic frequency spectrum analysis (1987 & 1997) of violin solo from “Vogliateme bene” Act I of *Madama Butterfly* (1955 recording).

8.6) MATLAB ANALYSIS:

The following graphs show the results obtained from the Matlab analysis performed on the selected audio extract from *Madama Butterfly* (1955 recording). For a complete overview and explanation of the algorithm used in analysing the selected example, please refer to Chapter 1.

8.6.1) CASE 1: “CHE TUA MADRE” FROM “CHE TUA MADRE” (1985 & 1997):

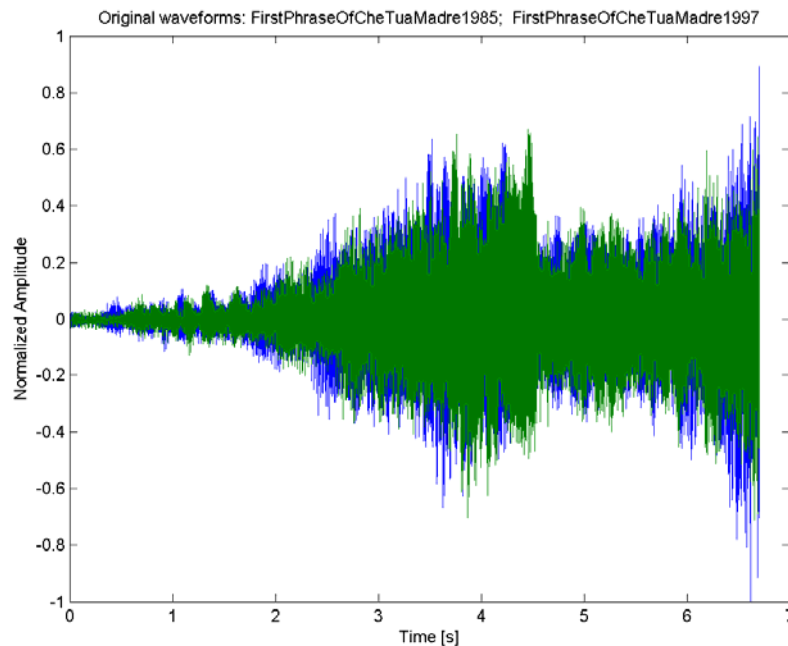


Figure 8.8: Plot of Y1 and Y2 (time-shift visible) of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).

The cross-correlation graph (Figure 8.9) shows good correlation between Y1 and Y2 (0.91015), with a shift of approximately 0.23 s required to obtain the best match.

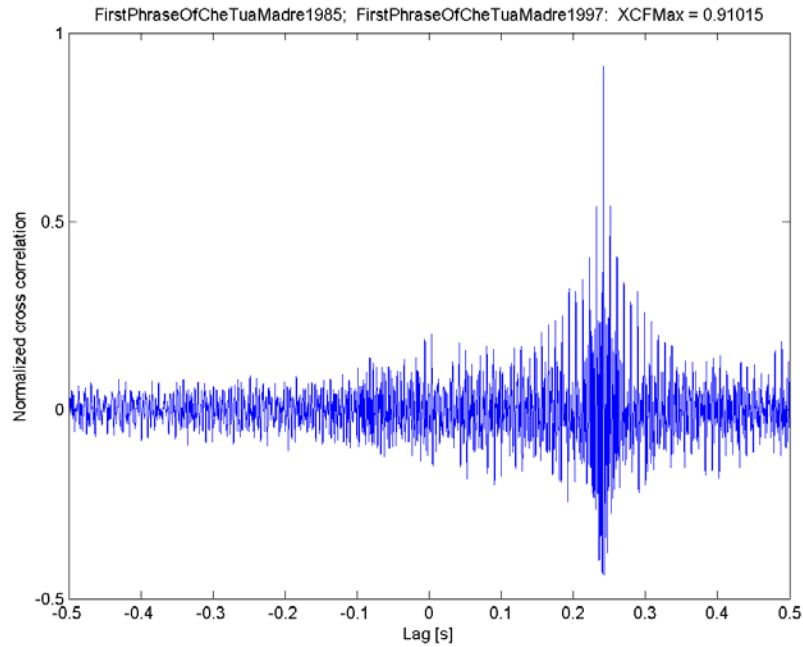


Figure 8.9: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).

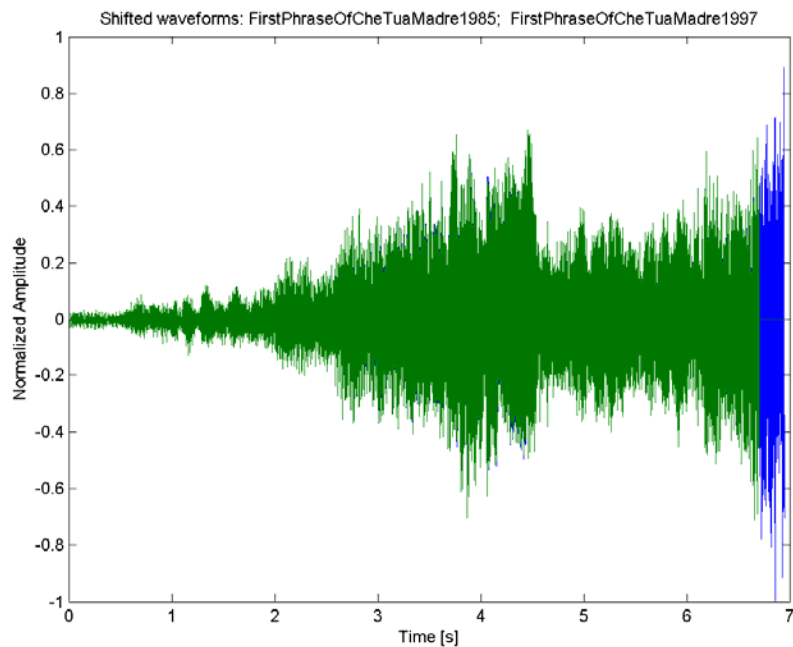


Figure 8.10: Plot of time-shifted waveforms (Y1 and Y2) of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).

Figure 8.11 shows that the instantaneous magnitudes of Y1 and Y2 do not correspond. The tilt of the plot at an angle greater than 45° indicates possible phase differences.

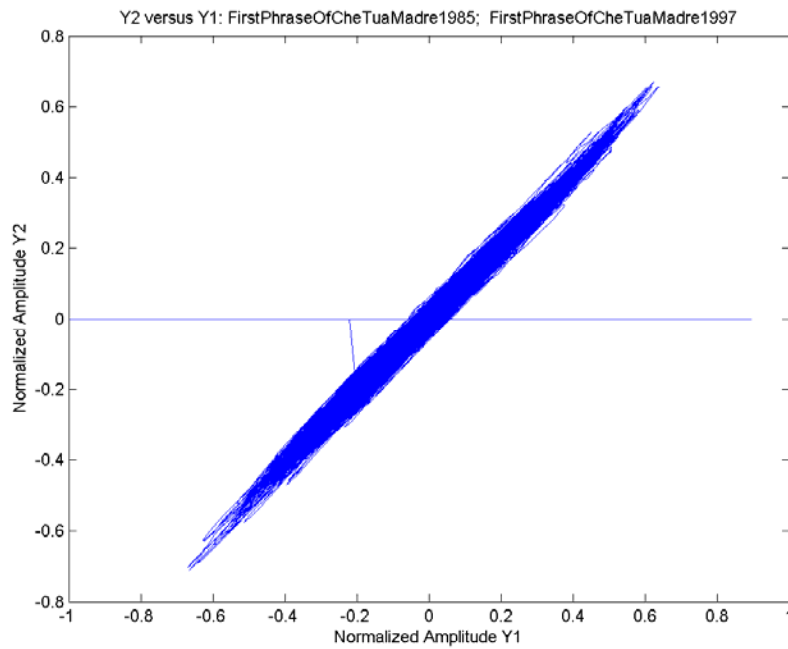


Figure 8.11: Plot of normalised amplitude of Y1 vs. Y2 of phrase "Che tua madre" from "Che tua madre," Act II of *Madama Butterfly* (1955 recording).

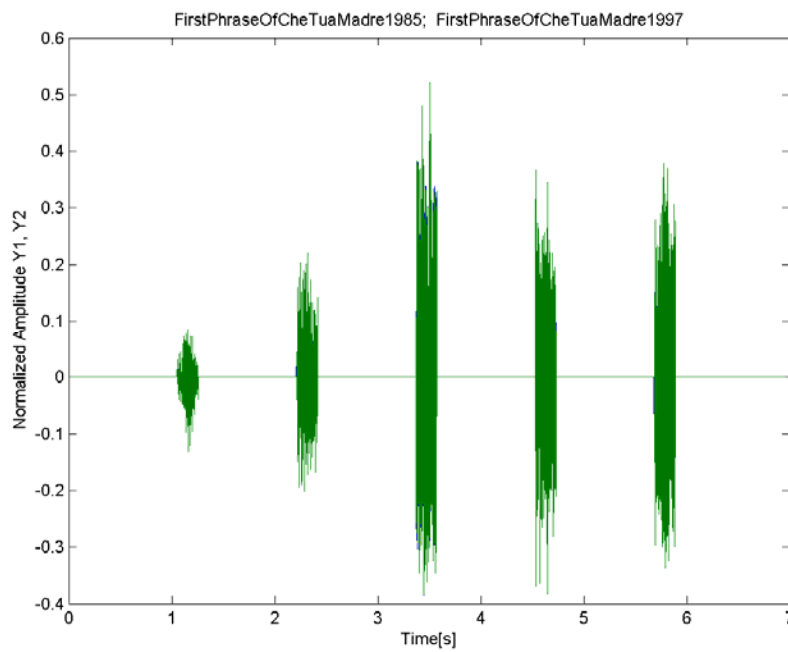


Figure 8.12: Plot of time-shifted windows of phrase "Che tua madre" from "Che tua madre," Act II of *Madama Butterfly* (1955 recording).

As Figure 8.13 indicates that no time-shift is required to match the five selected windows:

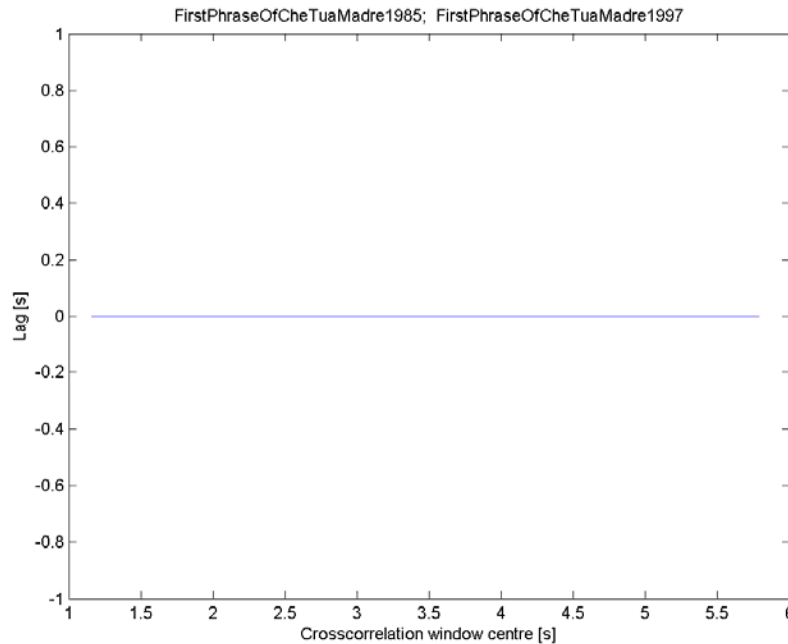


Figure 8.13: Plot of lag or time-shift required for optimum match for each window of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).

Distinct filtering effects are visible in the transfer function graph shown below (Figure 8.14). There is a big dip at approximately 13 Hz, with smaller filtering effects visible at 80 and 90 Hz, as well as in the region of 200 and 300 Hz. There is also a reasonably large frequency-dependent difference in the phase of Y1 and Y2, as can be seen in the bottom graph.

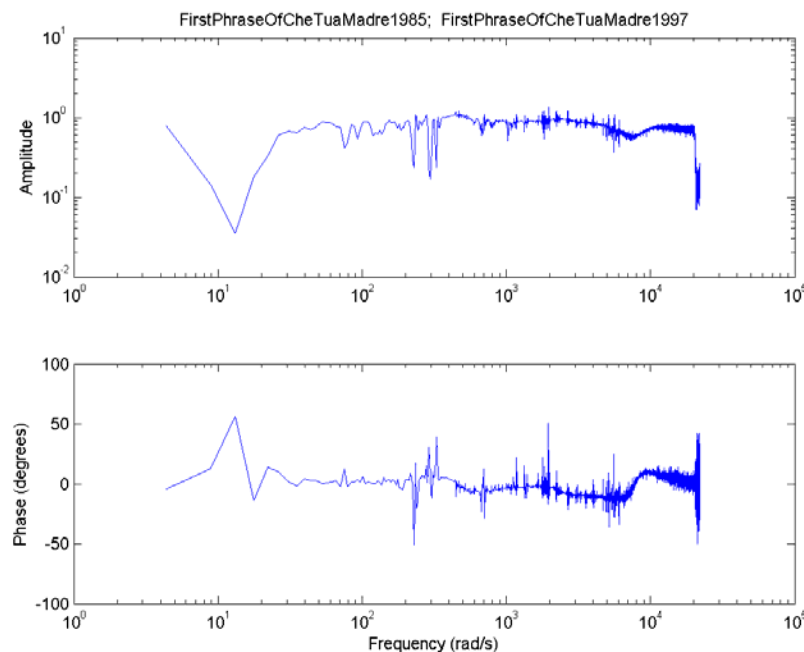


Figure 8.14: Plot of transfer function of phrase “Che tua madre” from “Che tua madre,” Act II of *Madama Butterfly* (1955 recording).

CHAPTER 9
MACBETH (1952)

“An electrifying performance, which like Callas herself, is incomparable. She is Verdi’s ideal Lady Macbeth.”

Stelios Galatopoulos (1966: 166)

MACBETH

Opera in four acts by Giuseppe Verdi (1813 - 1901)
Libretto: Francesco Maria Piave & Andrea Maffei

Macbeth	Enzo Mascherini (baritone)
Lady Macbeth	Maria Callas (soprano)
Banco	Italo Tajo (bass)
Macduff	Gino Penno (tenor)
Malcolm	Luciano Della Pergola (tenor)
Una dama	Angela Vercelli (mezzo-soprano)
Un dattore	Dario Caselli (bass)
Un servo	Attilio Barbesi (bass)
Un assassino	Mario Tommasini (bass)
Un araldo	Ivo Vinco (bass)

Orchestra and Chorus of La Scala Opera House, Milan
Chorus Master: Vittore Veneziani
Conductor: Victor de Sabata

Recorded “live” at La Scala Opera House, Milan on 7 December 1952.
Producer: Unknown
Balance Engineer: Unknown

9.1) INTRODUCTION:

Callas is indelibly associated with the role of Lady Macbeth, despite the fact that she sang a mere five performances of it at La Scala between 7 and 17 December 1952. This recording of the opening night performance is the only complete recording of *Macbeth* in the Callas discography and the earliest of Callas’s many extant broadcasts from La Scala. Though this was only her first public performance of

the role, Callas' interpretation of Verdi's most menacing heroine is, according to John Steane (1993), "an astonishing exhibition of natural mastery," with a "personal and memorable touch brought to everything."

Macbeth is based on Shakespeare's drama of the same name, but whereas the character of Macbeth remains the central figure in the stage play, in the opera it is Lady Macbeth who becomes the protagonist – a ruthless, evil, power-hungry and ambitious character who spurs her husband on to murder the king so that he can ascend the throne. Galatopoulos (1966: 165) referred to Lady Macbeth as "Verdi's finest [role] for a singer who is also a good actress, i.e. a role *par excellence* for Callas," and in spite of the fact that one Italian critic remarked of Callas's opening night performance that the role seemed tailor-made to suit her, she was never to sing the role in its entirety ever again. Plans to record a Callas-Toscanini *Macbeth* never materialised and although Callas was scheduled to make her San Francisco Opera debut in the role in 1957, that also did not come to pass. Pleading such mental and physical exhaustion that a physician recommended a period of rest, Callas tried to reschedule her San Francisco engagement, which was also to include *Lucia di Lammermoor*. Kurt Adler, the director of the San Francisco Opera, was sceptical about Callas's indisposition and refused to accept her withdrawal. When Callas failed to appear on the date specified in her contract, Adler filed a formal complaint with the American Guild of Musical Artists (AGMA). On 26 January, 1958, Callas



Figure 9.1: Callas (Lady Macbeth) - La Scala (Milan), 1952.

appeared before the AGMA panel, and although they felt that her absence from San Francisco "was not fully justified," they accepted her medical documents as valid and did not censure her for breach of contract.

Another highly publicised *contretemps* occurred the following year. Callas, who was scheduled to sing alternating performances of *Macbeth* and *La Traviata* at the Metropolitan Opera in New York in 1959, raised the valid objection that the two operas are dissimilar, requiring vastly different vocal qualities. "My voice is not like an elevator going up and down," she stated (cited in Albright 1995: 186) and demanded longer rest periods than what was initially agreed upon in order to prepare her voice. Rudolf Bing, general manager of the "Met," felt that the rest periods varying between four and eight days already allotted between *Macbeth* and *Traviata* was "a pretty long time for experienced artists to adjust their voices" and

refused Callas's demands. The affair made headlines around the world ("Maria Callas booted by the Met," amongst others) and it was not until 1965 that Callas was to be heard again at the Metropolitan in two highly anticipated performances of *Tosca*.

Although many at the time assumed that Callas was afraid of Lady Macbeth, a notoriously difficult role that she had only sung once before in her life, Callas's husband at the time, Giovanni Battista Meneghini shed new light on the matter in his book, *My Wife, Maria Callas*, when he confessed that the demand for longer rest periods between the various performances was a preconceived and fabricated excuse to create a "pretext for disagreement" with Bing that, if successful, would free Callas to undertake a lucrative US concert tour with fees that were at least double what the Met was offering her. The concert tour was, according to Meneghini (cited in Albright 1995: 185), "a golden opportunity which was not to be passed up. But we had one stumbling block in the form of an agreement with the Metropolitan for twelve performances that winter, to be followed by the company's spring tour. 'We absolutely must free ourselves from that Metropolitan,' I said to Maria. 'If you can manage that, you're good' she said and laughed, imagining what machinations I would have to devise to achieve my goal. I began to manoeuvre to get out of the written agreement with the Met. Bing was a headstrong man. It was necessary to exasperate him to a point where he would lose his temper and cancel the contract himself."

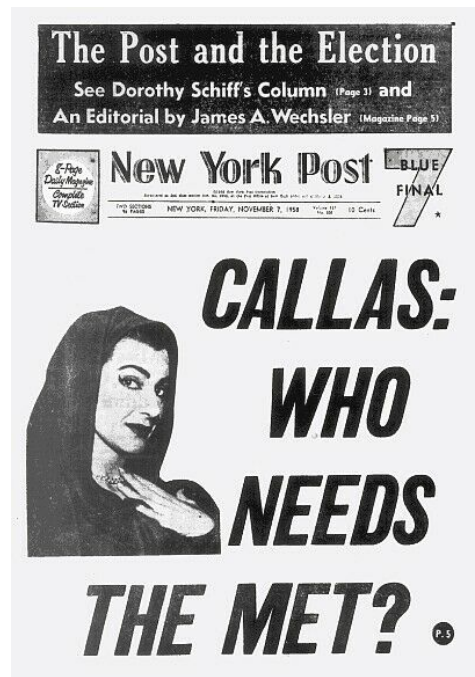


Figure 9.2: "Callas: Who needs the Met?" – Front-page of the *New York Post*, 7 November 1958.

9.2) VOCAL CHALLENGES:

Perhaps using Verdi's own statements about how the role of Lady Macbeth should (or should not) be sung,¹ and willing to sacrifice "conventional" tonal beauty and technique to enhance the drama, Callas

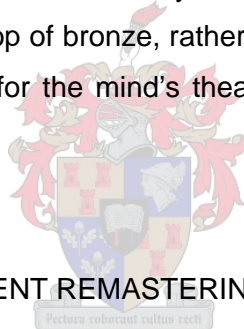
¹ Verdi expressed his own prescription for the interpretation of Lady Macbeth in a letter to his librettist, Salvatore Cammarano, regarding the creator of the role, Eugenia Tadolini:

Tadolini's qualities are too great for this role... Tadolini is a fine figure of a woman, and I would like Lady Macbeth to look ugly and malignant. Tadolini sings to perfection and I would rather that Lady Macbeth didn't sing at all. Tadolini has a marvelous voice, clear, limpid and strong; I would rather that Lady's voice were rough, hollow, stifled. Tadolini's voice has something angelic in it. Lady's should have something devilish... the chief pieces of the opera are two: the duet between Lady and her husband and the sleepwalking scene; and these pieces must not be sung at all: they must be acted and declaimed in a voice that is hollow and veiled: without this the whole effect is lost (Cesari and Luzio, cited in Albright 1995: 183-184).

has given us a performance of Lady Macbeth that has never been surpassed. “The voice should be heavy, thick and strong,” she once noted. “The role and therefore the voice, should have an atmosphere of darkness” (Callas, cited in Levine 2003: 129).

Vocally, the role of Lady Macbeth is incredibly taxing. According to Levine (2003: 169), it “is a notorious voice-wrecker that requires stamina, two-octave leaps, trills, a dark chest register, strong, bright notes, *coloratura* ability and the ability to exclaim almost violently – these last two being almost mutually exclusive in a soprano voice. Most sopranos steer clear of it.” But Callas, “brimming with the vocal prodigality and fearlessness of youth (she was only a few days past her twenty-ninth birthday), gives a predictably white-hot performance. She rams her brazen chest voice up as far as G and even A-flat above middle C. She flings out a very secure and easy high C in the recitative to her entrance aria, “Vieni! t’affretta!,” and caps the *concertato* that ends Act I with a clarion top D-flat” (Albright 1995: 186-187).

Ardoin (1995: 58) is of the opinion that “Callas fills Lady Macbeth’s music with prodigious potency and atmosphere.” Her voice, from a shining top of bronze, rather than steel, down evenly to easy imposing low notes, “creates scenery and action for the mind’s theatre and the inflections and tints here are luminous even for her.”



9.3) COMPARISON OF THE DIFFERENT REMASTERINGS:

The original opening night performance, broadcast by Radio Italiana, has been available on pirate labels for some years. During the broadcast, there was a drop in sound levels in the *a cappella*² ensemble near the end of Act I. In both EMI versions, the 1993 release and the 1997 Callas Edition version, the damaged section is replaced by an extract, two minutes in length, taken from a 1960 Leyla Gencer performance. No mention is made of the substitution. Arkadia Records, who, ironically, also substituted the 1960 Gencer performance, sued EMI in Milan for pirating their mastering of *Macbeth*. According to Seletsky (2000: 255), the lawsuit, “brought to my attention by Robert Tuggle of the Metropolitan Opera Archive, is described in ‘EMI et les pirates,’ a news item in the side-bar ‘À Tempo’ in *Diapason* (Paris:



Figure 9.3: Callas (Lady Macbeth) - La Scala (Milan), 1952.

² A Cappella: Unaccompanied singing. Music performed without accompaniment.

Éditions mondiales presses centres d'entérêt, no. 414 (April 1995), p. 8. 'À Tempo' authors listed are Ivan A. Alexandre, Christophe Capacci, Michel Parouty and André Tubeuf, with no specific attributions for the individual items. The claim presented in the lawsuit may explain why no engineer is credited for the 1993 EMI remastering."

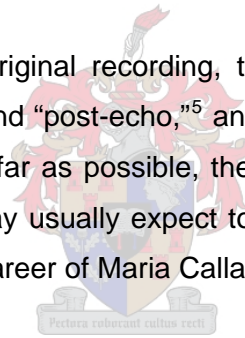
The following table lists the recordings used in comparing the different remasterings:

RELEASE	DATE OF REMASTERING	CATALOGUE NO.	REMASTERING ENGINEER
EMI Classics	1993	CMS 7 64944 2	Unknown ³
EMI Callas Edition	1997	5 66447 2	Allan Ramsay

Table 9.1: Reissues of the 1952 "live" recording of *Macbeth* used in this study.

EMI explains the poor quality of the sound on these recordings in the CD booklet and back of both CD versions as follows:

"Due to the poor quality of the original recording, the performance on these discs is marred by distortion, "pre-echo"⁴ and "post-echo,"⁵ and some "drop-outs." Although these problems have been improved as far as possible, the general quality of the recording is not of the normal standard one may usually expect to hear. It is released because of its importance as a document of the career of Maria Callas."



The "pre"- and "post"-echo of the original source, caused by tape print-through, are according to Seletsky (2000: 252) not to be found in private issues of the performance and indicates a case of bad source selection on the part of EMI.

In his article "Callas at EMI: Remastering and Perception," Seletsky (2000: 251) stated that EMI's 1993 version of the 1952 Scala *Macbeth* "has little weight or bass, but Callas sounds present and articulate, if a bit bright. Ramsay's 1997 remastering increases this brightness to the point of listening discomfort; further, any trace of Callas's rich, powerful 1952 sound is disappointingly absent."

Albright (1995) commented that "the performance is captured here in cramped but quite listenable sound. There are some odd glitches, such as a few bobbles in tape speed and the absence of the first

³ Prior to 1997, no remastering engineers are credited by EMI for the remasterings of the Callas recordings.

⁴ Pre-Echo/Pre-Print: A print-through signal that is on the outer layer of magnetic tape, i.e. it precedes the recorded signal.

⁵ Post-Echo/Post-Print: A print-through signal that follows the recorded signal.

two words of the recitative to Macduff's aria "Ah, la paterna mano." The technical flaws are minor, however, and do not seriously distract from one's enjoyment of this uneven but stirring performance." The recitative that Albright refers to, is "O figli, o figli miei!" The first "O figli" is indeed missing in both releases, though this could have been as a result of a cut in the actual performance.

Example 9.1: "O figli, o figli miei!" from Act IV, Scene One of *Macbeth*

MACDUFF

O figli, o figli miei!	O children, my children!
Da quel tiranno tutti uccisi	By that tyrant you were all
voi foste, e insiem con voi	slain, and together with you
la madre sventurata!...	your unhappy mother!...
Ah! fra gli artigli	Ah! in the claws of
di quel tigre io lasciai la madre e i figli?	that tiger did I leave mother and children?

CD 2 Track 31: 1993 remastering (EMI Classics)

CD 2 Track 32: 1997 remastering (EMI Callas Edition)

EMI's sound source for the 1993 remastering and its 1997 incarnation is incredibly noisy, with crackle, hiss, drop-outs, and as stated above, pre- and post-echo. The pre- and post-echo effect is especially evident in the first half of the opera, as in the extract from Callas's Act I aria, "Vieni! t'affretta!" in Example 9.2 below. The 1997 remastering is, however, slightly less noisy than its predecessor, with noticeable noise elements removed. Compare for instance the recitative "Perché mi sfuggi" from Act II, Scene One (Example 9.3).

Example 9.2: "Vieni! t'affretta!" from Act I, Scene One of *Macbeth*

LADY MACBETH

Vieni! t'affretta! Accendere	Come! Hasten! I will
ti vo' quel freddo core!	kindle that cold heart of yours!
L'audace impresa a compiere	I will give you courage
io ti darò valore.	to complete this bold task.
Di Scozia a te promettono	The throne of Scotland
le profetesse il trono...	the seers promise you...
Che tardi? Accetta il dono,	Why delay? Accept the gift,
ascendivi a regnar.	Mount it and reign.

CD 2 Track 33: 1993 remastering (EMI Classics)

CD 2 Track 34: 1997 remastering (EMI Callas Edition)

Example 9.3: “Perché mi sfuggi” from Act II, Scene One of *Macbeth*

LADY MACBETH

Perché mi sfuggi, e fiso ognor	Why do you avoid me, and why do I
ti veggo in un pensier profondo?	always see you sunk in deep thought?
Il fatto è irreparabile! Veraci	What's done is done! The witches
parlar le maliarde, e re tu sei.	spoke true and you are King.
Il figlio di Duncan, per l'improvvisa	Duncan's son, by his sudden flight
sua fuga in Inghilterra, parricida fu detto,	to England, has been condemned a parricide,
e vuoto il soglio a te lasciò.	and has left the throne vacant for you.

MACBETH

Ma le spirtali donne	But the supernatural women
Banco padre di regi han profetato.	prophesised Banquo as the sire of Kings.

CD 2 Track 35: 1993 remastering (EMI Classics)

CD 2 Track 36: 1997 remastering (EMI Callas Edition)

Though some of the noise has been improved in the 1997 version, there is also increased distortion in some sections, as in Example 9.4, an extract from “Or tutti sorgete, ministri infernale,” the *cabaletta* to Lady Macbeth’s Act I, Scene Two aria.

Example 9.4: “Or tutti sorgete, ministri infernale” from Act I, Scene Two of *Macbeth*



Peccata colubant cultus recti

LADY MACBETH

...qual petto percota	Let the dagger not see
non vegga il pugnale, ecc.	the breast it strikes, etc.

CD 2 Track 37: 1993 remastering (EMI Classics)

CD 2 Track 38: 1997 remastering (EMI Callas Edition)

In contrast with Seletsky’s statement that the 1997 remastering “increases this brightness to the point of listening discomfort,” the author is of the opinion that the 1997 version is not quite as bright as the 1993 version, possibly a result of new noise reduction techniques that have removed some of the upper frequency content. Callas sounds slightly distant in the later version, the remastering darker and less strident. Though the incredible harshness and shrill quality of Callas’s top notes are somewhat mitigated, she is presented with less presence than in the 1993 incarnation. Compare for instance the recitative, “Ambizioso spirito” leading into “Vieni! t’affretta!” from Act I, Scene Two (Example 9.5).

Example 9.5: “Ambizioso spirito...” from Act I, Scene Two of *Macbeth*

LADY MACBETH

Ambizioso spirito tu sei Macbetto...	Ambitious in spirit, you are, Macbeth...
Alla grandezza aneli, ma sarai tu malvagio?	You would be great, but will you be wicked?
Pien di misfatti è il calle della potenza, e mal per lui che il piede dubitoso vi pone e retrocede!	Strewn with misdeeds is the path to power, and woe to him who sets a faltering foot upon it and retreats!

CD 2 Track 39: 1993 remastering (EMI Classics)

CD 2 Track 40: 1997 remastering (EMI Callas Edition)

9.4) FREQUENCY SPECTRUM ANALYSIS:

Frequency spectrum analysis was performed on a number of selected extracts, short phrases or noise samples from the various *Macbeth* reissues, each providing a multitude of possible comparisons. The selected extracts comprised the following:

- 1) “Ambizioso spirito” from “Nel dì della vittoria,” Act I
- 2) Two chords from “Nel dì della vittoria,” Act I
- 3) Noise sample from “Nel dì della vittoria,” Act I
- 4) “Di Scozia a te” from “Vieni! t’affretta!,” Act I
- 5) “Ah!” from “Vieni! t’affretta!,” Act I
- 6) “Ministri infernale” from “Or tutti sorgete,” Act I
- 7) Noise sample from “Or tutti sorgete,” Act I
- 8) “Qual petto percota” from “Or tutti sorgete,” Act I

The results of the frequency spectrum analysis were carefully compared and evaluated. From the above extracts, a further selection was made. These selected examples are discussed below.

The frequency spectrum graphs are either logarithmic or linear. The x-axis (left to right) represents frequency (measured in Hz), while the y-axis (bottom to top) corresponds to the amplitude of the corresponding frequency (measured in dB) on the x-axis.

The colours used to represent the two releases are as follows:

RELEASE PHASE	COLOUR
EMI Classics (1993)	Green
EMI Callas Edition (1997)	Pink

Table 9.2: Release phases of the two reissues of *Macbeth* used in this study and the colours used to represent them in the spectrum analysis examples.

The first example, Figure 9.4, shows the logarithmic frequency spectrum graph of the phrase “Ambizioso spirito” from Lady Macbeth’s Act I recitative, “Nel dì della vittoria.” A strong tonal component can be seen, with the fundamental frequency at approximately 630 Hz and some harmonics above that. The spectrum indicates that the low frequency content of the 1993 remastering is relatively more prominent. There are clear dips in the 1997 version at 40 Hz and again at 80 Hz and 110 - 120 Hz – perhaps an attempt to remove some low frequency hum (see also Figure 9.5). The greater upper frequency range (above 15 000 Hz) of the 1997 Callas Edition release is also visible (compare as well Figure 9.7).

Figure 9.5 shows the logarithmic frequency spectrum of the phrase “Ah!” from “Vieni! t’affretta!,” Act I. The graph indicates possible equalisation of the middle range (above 500 Hz) in the 1997 remastering. It furthermore shows distinct dips in the region of 60 - 70 Hz in both the 1993 and 1997 remasterings, and similar dips at 80 Hz and 110 - 120 Hz in the 1997 release as in Figure 9.4. The 1997 remastering exhibits relatively greater low-mid and upper frequency content.

The phrase “ministri infernale” from “Or tutti sorgete,” Act I is shown in Figure 9.6. This logarithmic representation again confirms the strong filtering applied in the 50 - 70 Hz range of both remasterings, as well as the stronger low frequency content of the 1993 release and the greater upper frequencies of the 1997 release. In contrast to the spectrum graphs in Figures 9.4 and 9.5, however, the 1997 Callas Edition remastering here contains the (slightly) more prominent lower frequencies.

Figure 9.8 shows the logarithmic frequency spectrum analysis of a noise sample from “Nel dì della vittoria.” Yet again there is a strong dip in both versions in the 50 - 70 Hz frequency range. The filtering at 3100 Hz evident in Figure 9.7 is also visible here. Figure 9.8, too, like Figures 9.5 and 9.6, shows that the 1997 remastering contains the slightly stronger low-mid frequency content, perhaps explaining why, subjectively, it sounds less bright than the earlier remastering.

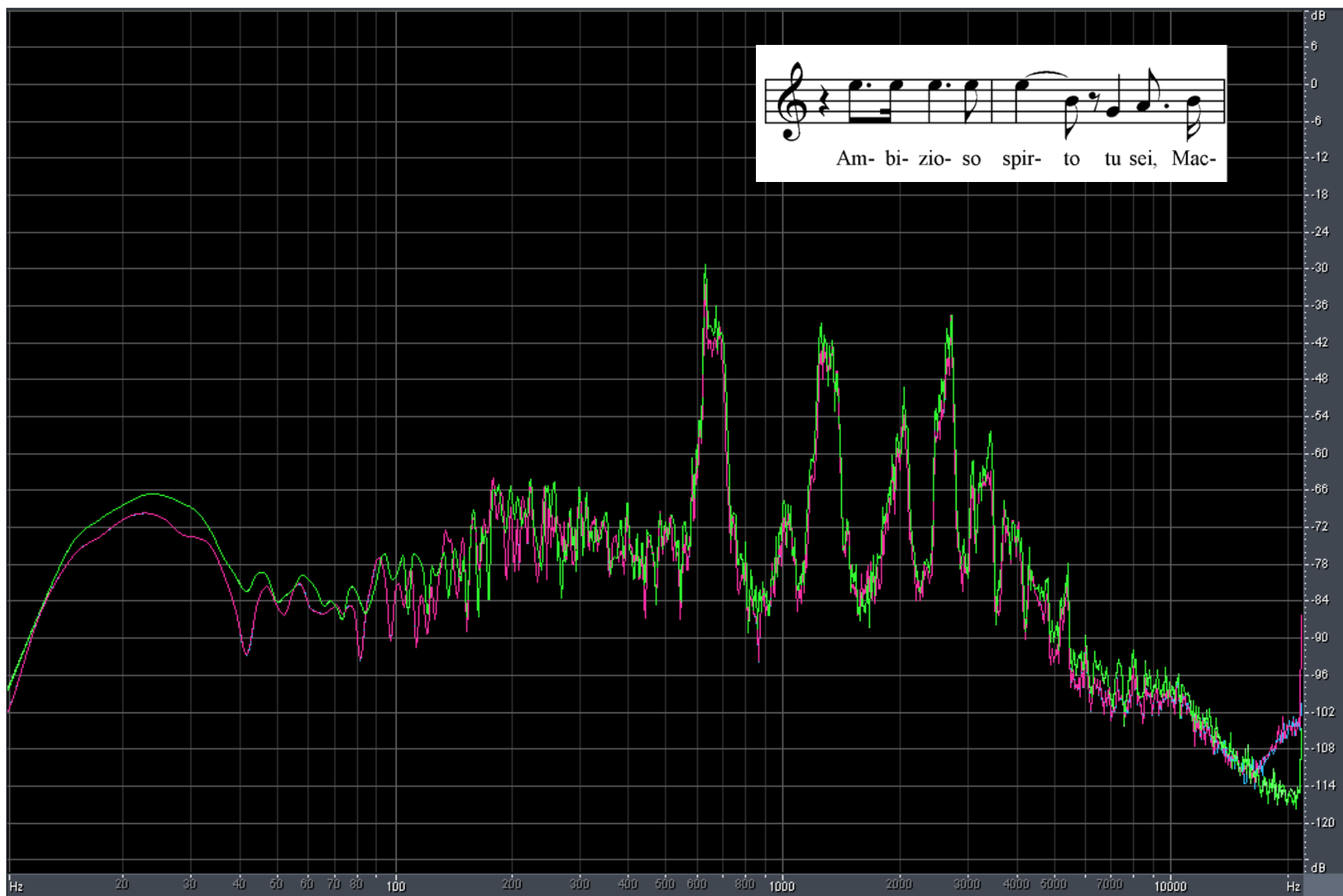


Figure 9.4: Logarithmic frequency spectrum analysis (1993 & 1997) of phrase “Ambizioso spirito” from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).

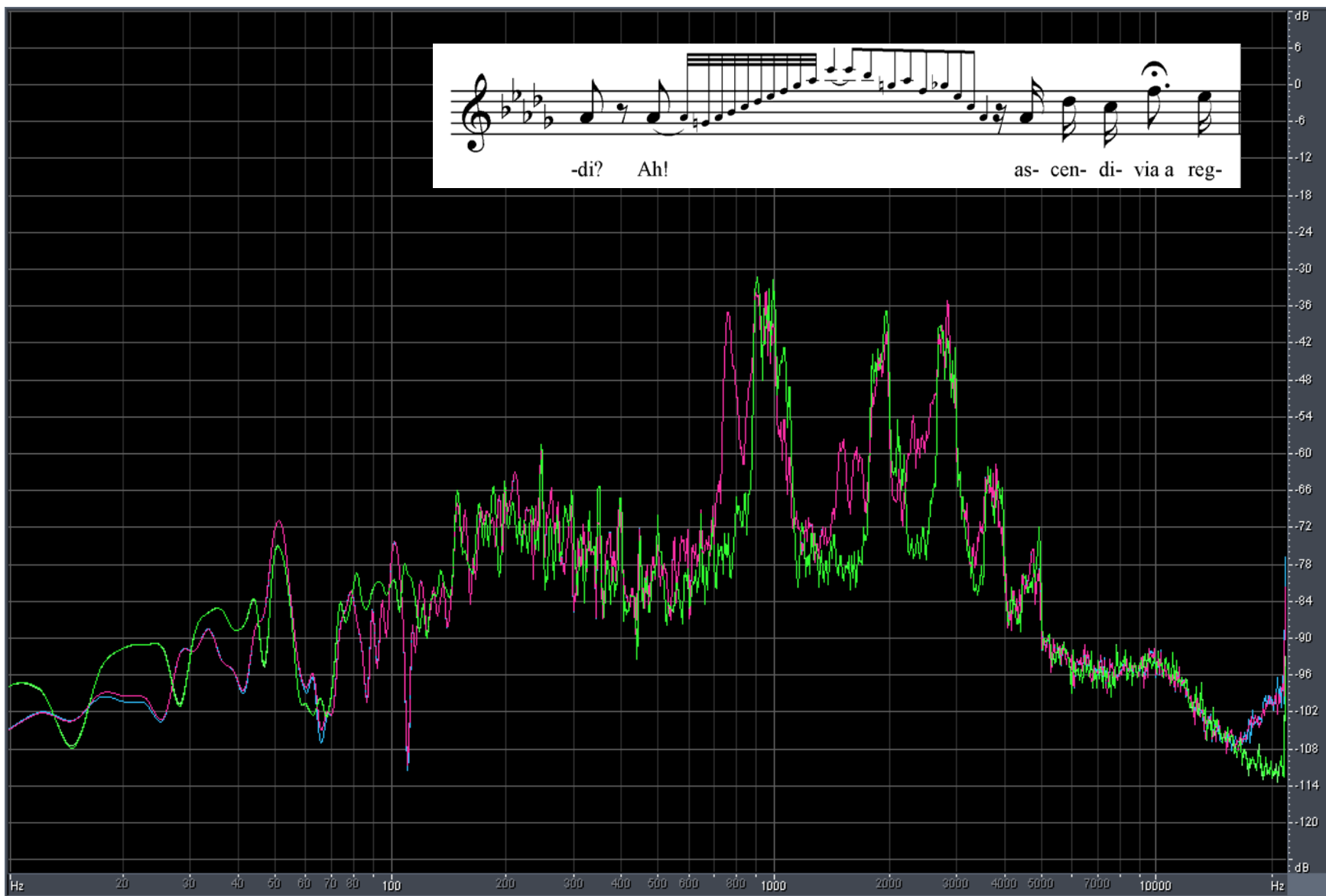


Figure 9.5: Logarithmic frequency spectrum analysis (1993 & 1997) of phrase “Ah!” from “Vieni! t’affretta!” Act I of *Macbeth* (1952 “live” recording).

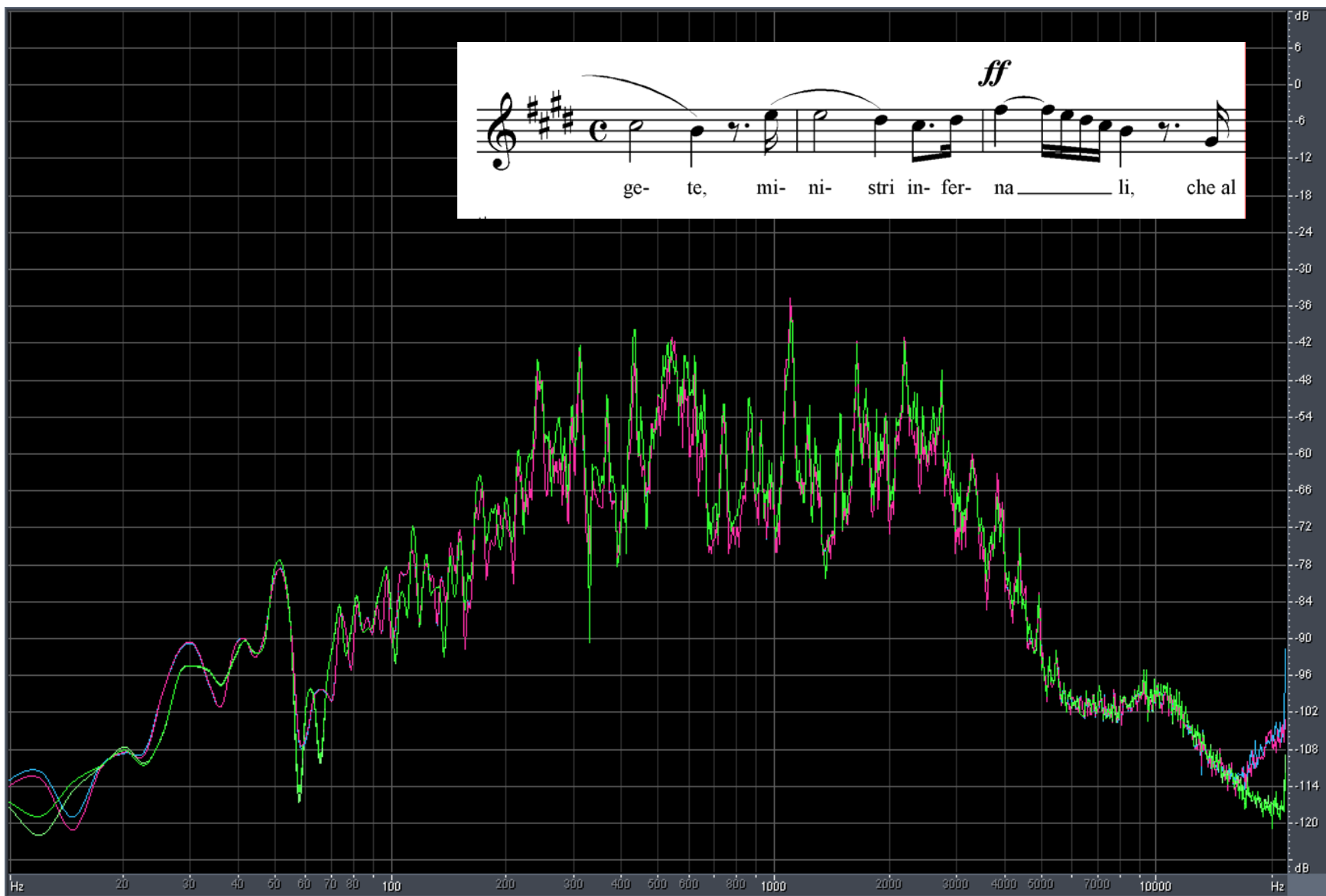


Figure 9.6: Logarithmic frequency spectrum analysis (1993 & 1997) of phrase “ministri infernale” from “Or tutti sorgete,” Act I of *Macbeth* (1952 “live” recording).

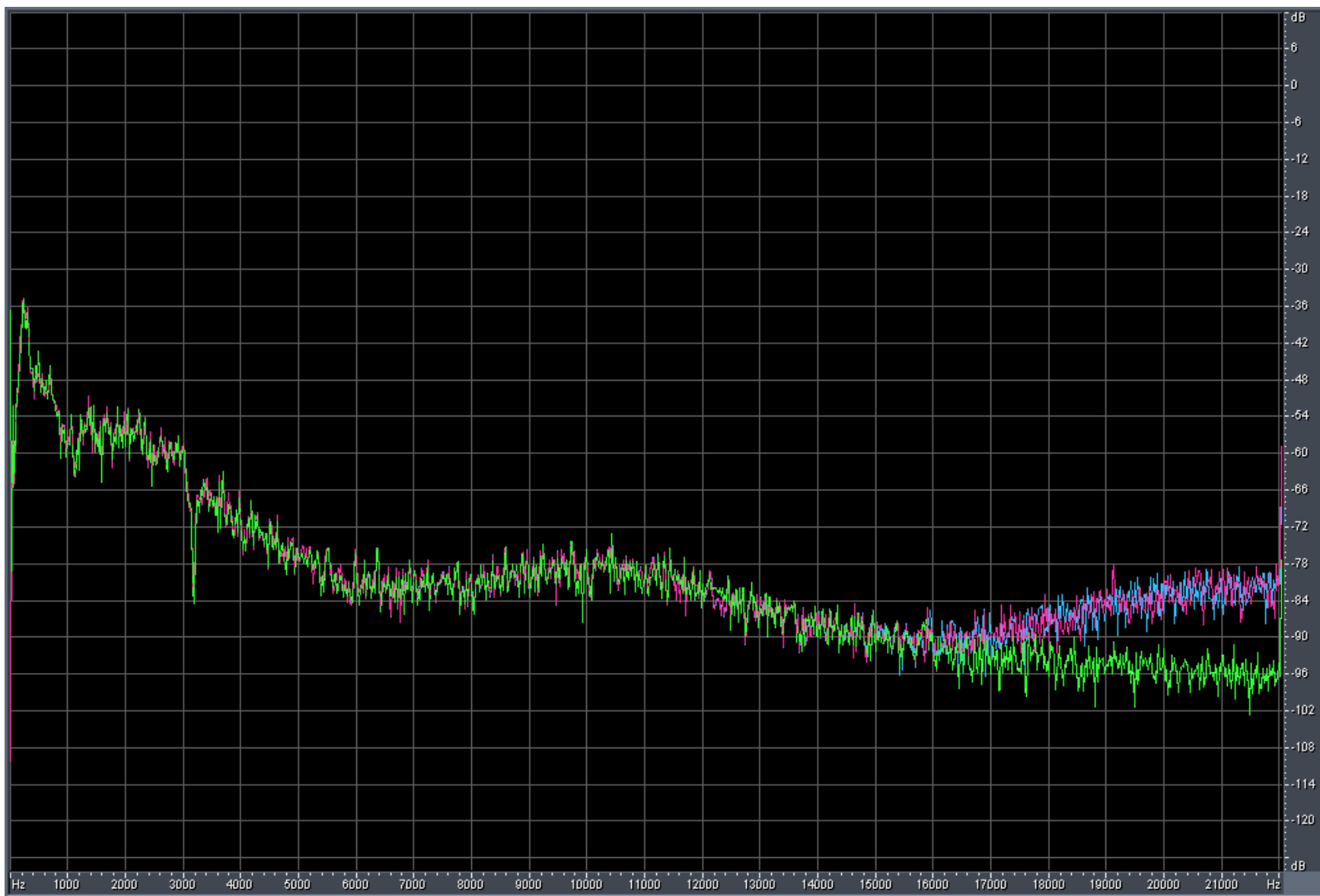


Figure 9.7: Linear frequency spectrum analysis (1993 & 1997) of noise sample from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).

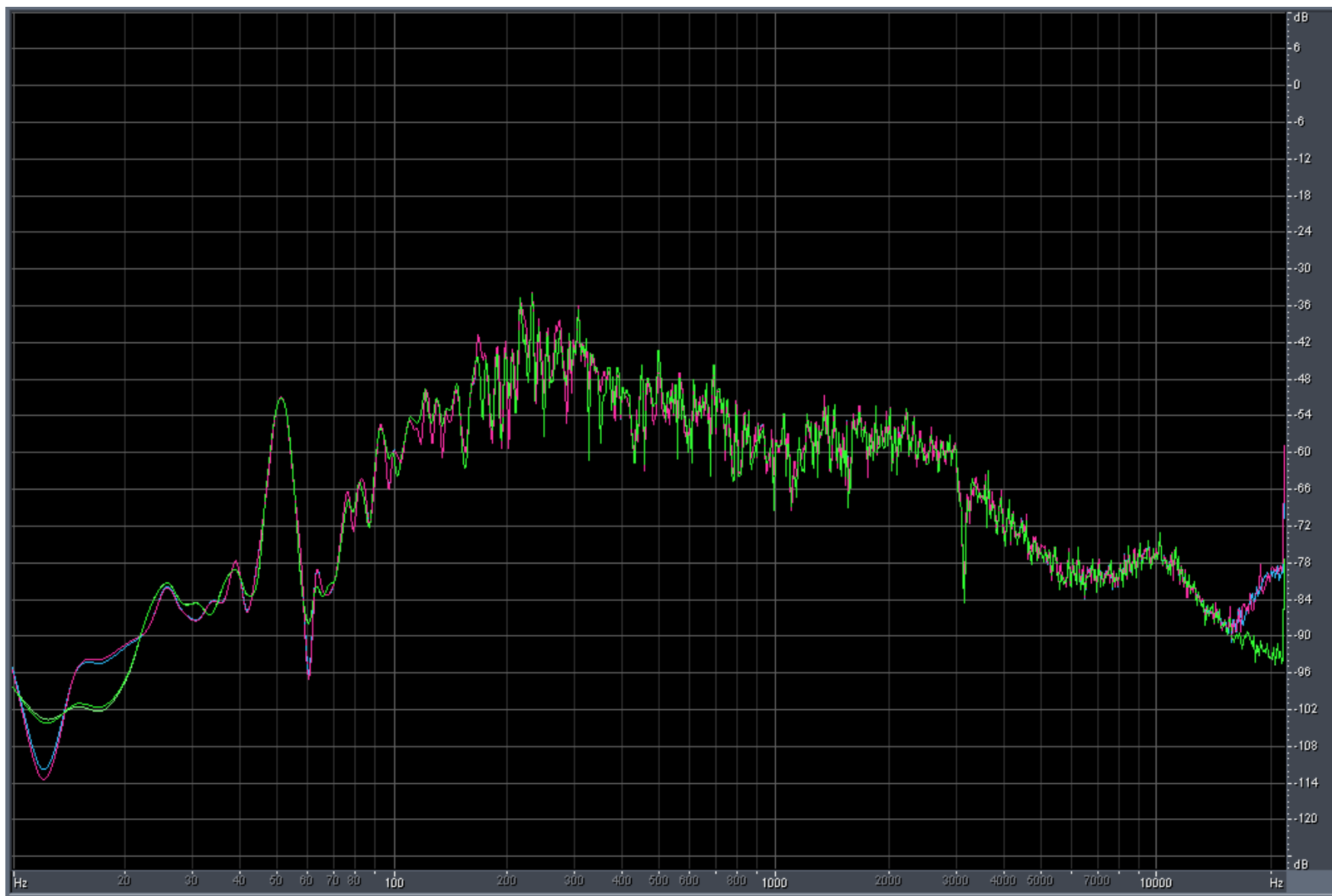


Figure 9.8: Logarithmic frequency spectrum analysis (1993 & 1997) of noise sample from “Nel dì della vittoria,” Act I of *Macbeth* (1952 “live” recording).

9.5) MATLAB ANALYSIS:

The following graphs show the results obtained from the Matlab analysis performed on a selected audio extract from *Macbeth* (1952 “live” recording). For a complete overview and explanation of the algorithm used in analysing the selected example (as well as another Matlab analysis example from *Macbeth*) please refer to Chapter 1.

9.5.1) CASE 1: NOISE SAMPLE FROM “NEL DÌ DELLA VITTORIA” (1993 & 1997):

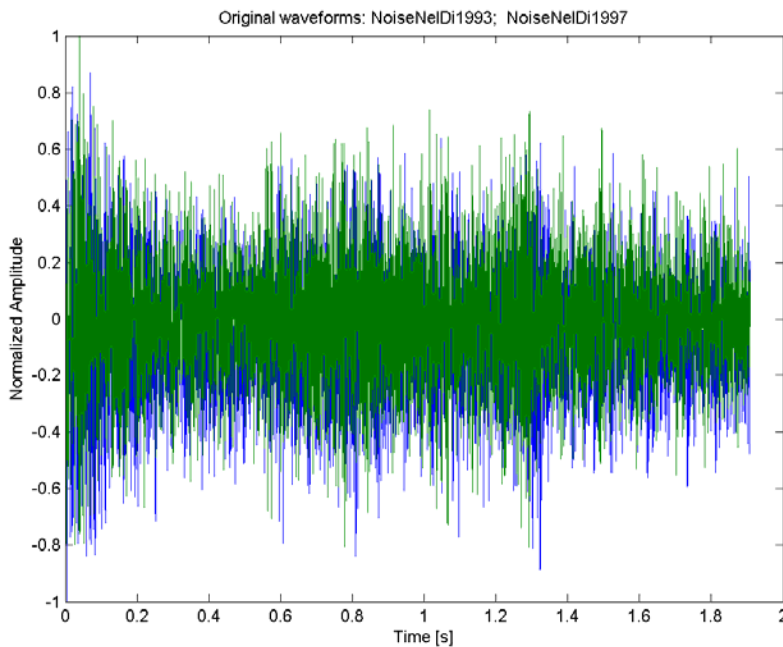


Figure 9.9: Plot of Y1 and Y2 (time-shift visible) of noise sample from “Nel di della vittoria,” Act I of *Macbeth* (1952 “live” recording).

The cross-correlation graph (Figure 9.10) indicates excellent correlation between Y1 and Y2 (0.96444), with a very small shift of approximately -0.03 s needed to match Y1 and Y2 as accurately as possible.

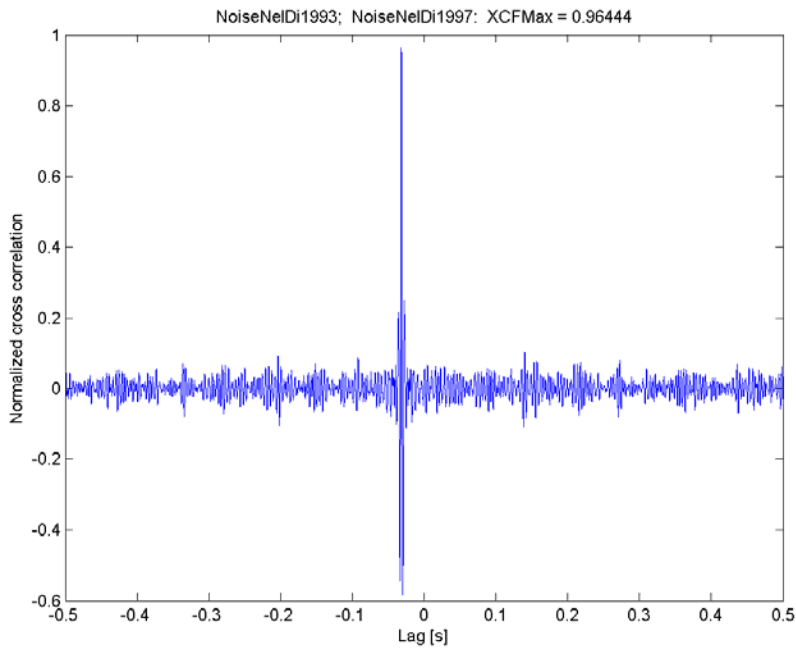
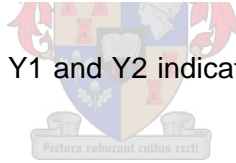


Figure 9.10: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of noise sample from “Nel di della vittoria,” Act I of *Macbeth* (1952 “live” recording).



The plot of the time-shifted waveforms of Y1 and Y2 indicate that the two waveforms do not match at the beginning (Figure 9.11).

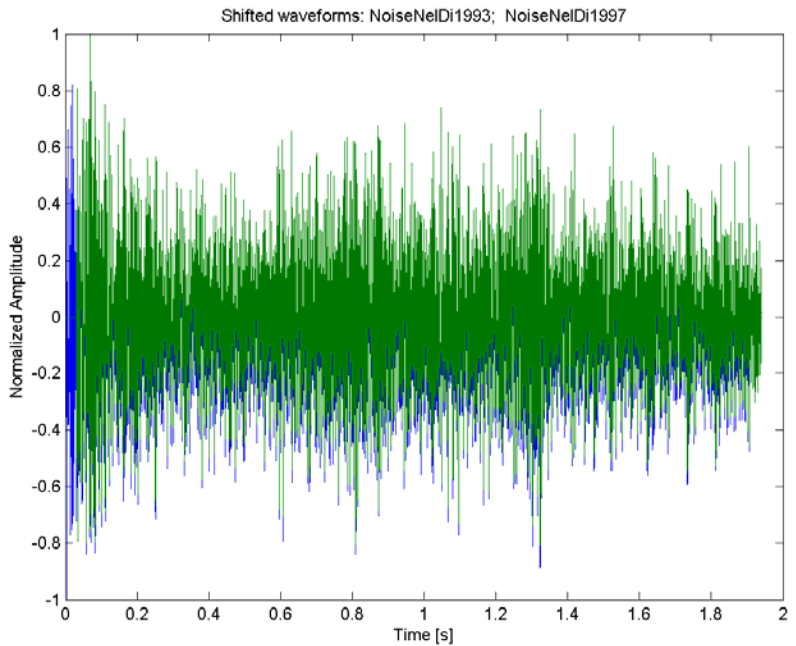


Figure 9.11: Plot of time-shifted waveforms (Y1 and Y2) of noise sample from “Nel di della vittoria,” Act I of *Macbeth* (1952 “live” recording).

As can be seen in Figure 9.12, the instantaneous magnitudes of Y1 and Y2 do not correspond.

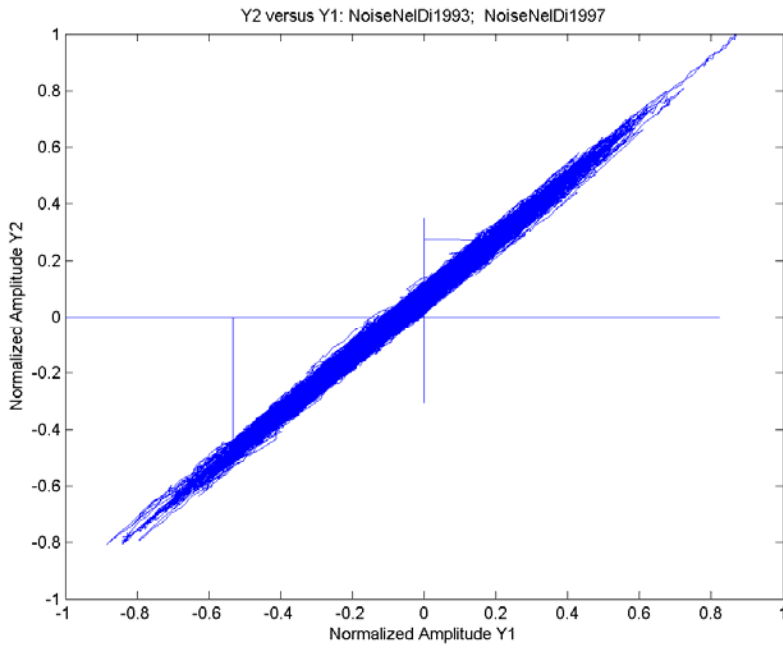


Figure 9.12: Plot of normalised amplitude of Y1 vs. Y2 of noise sample from "Nel di della vittoria," Act I of *Macbeth* (1952 "live" recording).

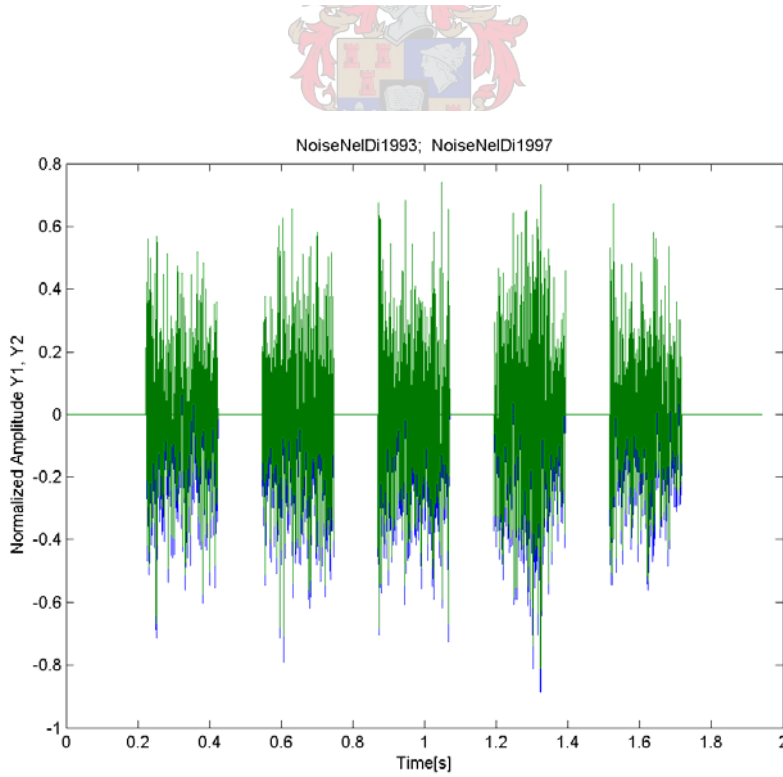


Figure 9.13: Plot of time-shifted windows of noise sample from "Nel di della vittoria," Act I of *Macbeth* (1952 "live" recording).

As Figure 9.14 illustrates, no visible time-shift is required to match the five selected windows:

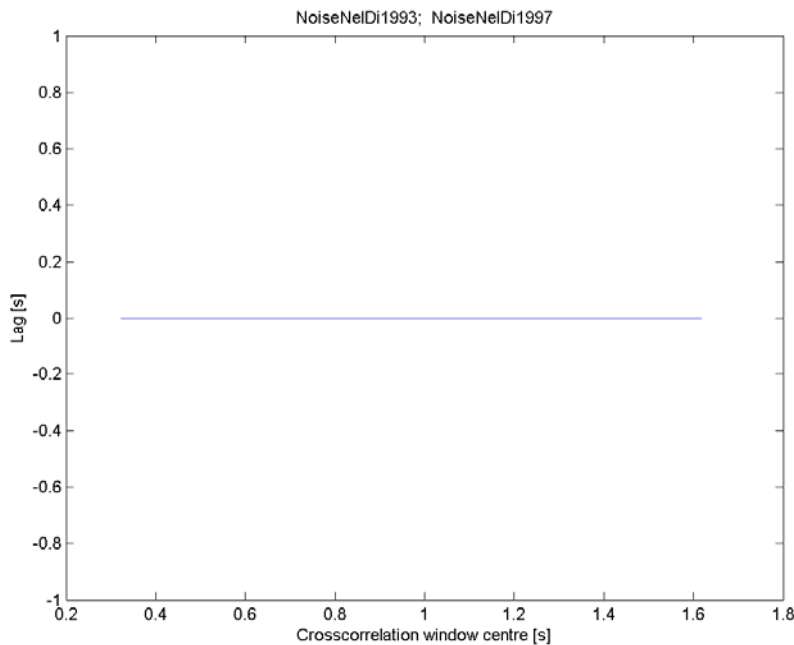


Figure 9.14: Plot of lag or time-shift required for optimum match for each window of noise sample from "Nel di della vittoria," Act I of *Macbeth* (1952 "live" recording).

The transfer function graph (Figure 9.15) shows clear filtering effects at approximately 8 Hz, 40 Hz and 80 Hz (see also Figure 9.4 above) as well as a sharp filtering dip at 3000 Hz (also visible in Figures 9.7 and 9.8). The second graph shows that there is very little frequency-dependent difference in the phase of the two remasterings.

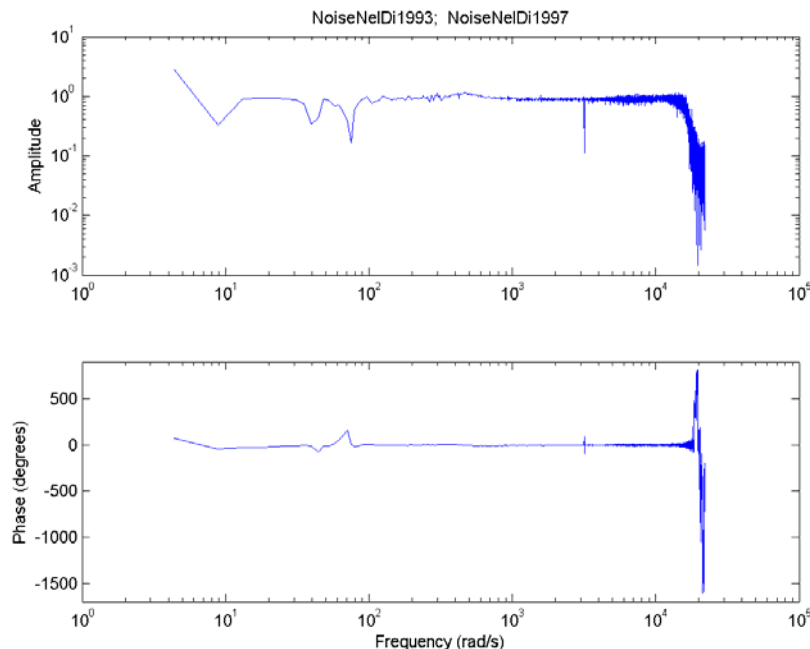


Figure 9.15: Plot of transfer function of noise sample from "Nel di della vittoria," Act I of *Macbeth* (1952 "live" recording).

CHAPTER 10

LA TRAVIATA (1958)

“Most sopranos can make you cry in the last act of *Traviata*, but Callas made you cry in the second act.”

Ande Anderson – Producer (cited in Lewens & Mitchell 1999).

LA TRAVIATA

Opera in three acts by Giuseppe Verdi (1813 - 1901)

Libretto: Francesco Maria Piave after *La Dame aux Camélias* by Alexandre Dumas Jr.

Violetta Valéry	Maria Callas (soprano)
Alfredo Germont	Alfredo Kraus (tenor)
Giorgio Germont	Mario Sereni (baritone)
Flora Bervoix	Laura Zanini (mezzo-soprano)
Annina	Maria Cristina de Castro (soprano)
Gastone	Piero de Palma (tenor)
Barone Douphol	Alvaro Malta (baritone)
Marchese D’Obigny	Vito Susca (bass)
Dottore Grenvil	Alessandro Maddalena (bass)
Un commissionario	Manuel Leitao (tenor)

Orquestra Sinfônica Nacional

Chorus of the Teatro Nacional de São Carlos, Lisbon

Chorus Masters: Mario Pellegrini & Carlo Pasquale

Conductor: Franco Ghione

Recorded “live” in the Teatro Nacional de São Carlos, Lisbon on 27 March 1958.

Production: Emissora Nacional de Radiodifusão

Balance Engineer: Unknown

10.1) INTRODUCTION:

La Traviata played an immensely important part in Callas’s career. She sang 63 performances of the opera, second only to Norma as her most often performed role. During the eight years that it was in her repertory, her interpretation changed and developed, rapidly and prodigiously (vocally, especially, she continued to refine her characterisation), though certain aspects of her conception of the role were already evident from the beginning. Ardoin (1995: 32) noted that Violetta was “tailor-made for Callas’s awareness as an artist and her sensibilities as a woman, and the records

show Callas's identity with the part and her understanding of and response to its myriad emotional inflections were ingrained from the start.”

Nevertheless, Callas continuously scaled down her handling of the role, whether out of vocal necessity, artistic conviction, or a mixture of both. In an interview with Derek Prouse of the *London Sunday Times*, dated March 19, 1961, Callas (cited in Levine 2003: 131) stated that for years she strove to create “a sickly quality in the voice for Violetta; after all, she is a sick woman. It’s all a question of breath, and you need a very clear throat to sustain this tired way of talking, or singing, in this case. And what did they say? ‘Callas is tired. The voice is tired...’ And in the last act they even said, ‘Callas is having trouble with her breath.’ Thank Heaven I eventually attained what I was trying to do and got the proof that I had been appreciated.” In the Juilliard Master Classes of 1971, she made a special point about it: very little, she came to believe, should be sung out loudly, and though it takes time to appreciate this (she said) “you learn to underplay such things, and the drama then increases.”¹ In an interview for *Life* magazine, Callas (cited in Levine 2003: 125-126) explained that she saw Violetta “and therefore the voice, as fragile, weak and delicate. It is a trapeze part filled with sick pianissimo.”



Figure 10.1: Callas (Violetta) and Ettore Bastianini (Giorgio Germont) in Act II of the famous production directed by Lucino Visconti - La Scala (Milan), 1955.

Gage (2001: 240) noted that “Alexis Minotis, who directed Maria in *Traviata* and *Medea* and was himself a renowned interpreter of ancient Greek tragic heroes, considered [Callas] one of the greatest actors he’d ever seen in any field. He often described how, as the dying Violetta in *Traviata*, she achieved an effect he had witnessed only once before in his life, at a performance by a legendary Japanese actor who was revered in his own country. John Ardoin related to me what Minotis had told him: ‘Callas did it in the last act of *Traviata*. Like the Japanese actor, she died with her eyes open and you could see the light go out of her eyes... Minotis said it was the most incredible moment of dramatic truth he had ever seen.’”

¹ Anthony Tommasini (2003b) notes that of all the anecdotes that attest to Callas's uncompromising artistry, the most telling concerns her performances in the Lisbon *Traviata*: “Each time during rehearsals that Callas sang the last phrase of the consumptive Violetta's poignant final aria, “Addio, del passato,” her pitch wavered and her voice nearly cracked on the final note, a soft, sustained high A. Conductor Franco Ghione suggested that she begin the high note in full voice then pull back into *pianissimo* as she prolonged the tone, which is technically easier and standard practice. Callas would have none of this. The dynamic marking on that note, she said, is triple *piano* (softer than *pianissimo*). That's what Verdi wanted and that's what she would do. If she wobbled on the note during performance, so be it. She would not compromise.”

The role of Violetta is incredibly taxing, demanding lots of different vocal skills and technique. It is often said that to play the role, one needs to be three sopranos rolled into one: a light soprano for Act I, in order to cope with the tricky *coloratura* passages in “Sempre libera,” a lyrical soprano in Act II and a *spinto* or dramatic soprano in Act III, in order to do full justice to the emotionally charged final scenes. Ardoin (1995: 34) noted that “Sempre libera” holds understandable terror for sopranos “less well-schooled than Callas, for it calls for the sort of agility and technical command that results only from a careful *bel canto* upbringing. This section has been the downfall of a number of Violettas and has led critics to speak of sopranos as either first-act or second-and-fourth-act Violettas. Usually, a singer comfortable in Act I will lack the body of sound needed to make the fullest of the later acts. The converse is just as certain.”

10.2) PERFORMANCE HISTORY:

Callas performed *La Traviata* for the first time at the Teatro Comunale in Florence on 15 January 1951, following long and detailed study of the work with mentor Tullio Serafin. At that time, she was a very bulky lady and weighed nearly ninety kilograms. As Scott (2005) notes: “Hardly surprisingly, there was nothing tubercular about her conception, and the emphasis then was all on voice.” Zeffirelli, who attended that first performance, later recalled “how the audience went mad... it was sensational, vocally and musically” (cited in Scott 2005).

The role of Violetta was to bring Callas further immediate success in Mexico City, Rio de Janeiro and in São Paulo, where a performance would later inspire Tito Gobbi (1979: 92) to write: “I cannot believe anyone ever sang that first act as Callas sang it... I find it impossible to describe the electrifying brilliance of the *coloratura*, the beauty, the sheer magic of that sound which she poured out then. And with it perfect diction, colour, inflection and feeling. It was something one hears only once in a lifetime. Indeed, one is fortunate to hear it once!” Her performance on 29 December 1951 in Parma, led Elisabeth Schwarzkopf to remark that “We witnessed a major victory for Callas. As everyone knows, there is no victory in Italy like being acclaimed in Parma in a Verdi role! Walter [Legge] and I went backstage and quite spontaneously I said to Maria, ‘There is no point in my singing this role again.’ And I didn’t” (Schwarzkopf 1982:



Figure 10.2: Callas (Violetta) and Ettore Bastianini (Giorgio Germont) - La Scala (Milan), 1955.

Of this photo, Galatopoulos (1966) wrote, “the hands cry too.”

192).² Callas's appearances as Violetta at the Arena in Verona the following year was "the greatest thrill of the season... an unforgettable experience... she appears to make no effort to dramatise the situation physically... [it is] the colour of her voice [that] clearly depicts every emotion and sensation she is experiencing," according to *Opera's* correspondent in 1952. In 1953, it was Callas who was chosen to sing Violetta in the performance commemorating the opera's première one hundred years earlier at the La Fenice Theatre in Venice. The 1954 Chicago production, the highly controversial 1955 production at La Scala designed by Luchino Visconti (which took the expressive potential of the character to new heights), and in 1958, the Metropolitan Opera's production in February, the two performances in Lisbon the following month (the infamous "Lisbon *Traviata*" discussed here, was a broadcast of the first evening's performance), the legendary Covent Garden production in June and the Zeffirelli production in November of that year in Dallas – "all of these were landmarks in Callas's career and have their place in the history of the opera itself" (Steane 1980).

10.3) CALLAS'S *TRAVIATA* ON RECORD:

Despite her success in the role, Callas's recorded association with Violetta was a less happy affair. In 1953 she recorded *La Traviata* for the Italian firm of Cetra. By this time, however, she was already firmly allied with EMI, and the *Traviata* was her last recording for the small Italian company.³ Due to a technicality in her contract with Cetra, which prohibited her from re-recording *La Traviata* within a certain number of years, Callas never made another studio recording of the opera and the Cetra set is therefore the only commercial recording of one of her principal roles.⁴ In all, there exists seven complete recordings of Callas's *Traviata*. Apart from the Cetra



Figure 10.3: Callas (Violetta) and Ettore Bastianini (Giorgio Germont) - La Scala (Milan), 1955.

² Another famous artist, the American mezzo-soprano Teresa Berganza, was so moved when she saw Callas in a 1957 performance of *La Traviata*, that she "shook and trembled with emotion during and after that performance – those eyes, the economy of gesture that made a look suffice where others might have indulged in all manner of histrionics – and it marked me for life as an artist" (cited in Matheopoulos 1991: 250).

³ Previous Cetra recordings had included three 78's (of "Qui la voce" from *I Puritani*, "Casta Diva" from *Norma* and the "Liebestod" from *Tristan und Isolde*) issued in 1949, as well as a 1952 complete recording of Ponchielli's *La Gioconda*.

⁴ When EMI decided to record a new version of *La Traviata* in 1955, with Antonietta Stella (b. 1929), Di Stefano and Gobbi in the cast and with Serafin conducting, Callas was distinctly unhappy. "For years she refused to work with or even talk to Serafin" (Legge, cited in Schwarzkopf 1982: 202).

recording, there are two performances from the Palacio de las Bellas Artes in Mexico that date from 17 July 1951 and 3 June 1952. The opening night (28 May 1955) of the controversial Visconti production was recorded, as well as a performance, also at La Scala, of 19 January 1956. In addition to the present recording that dates from 27 March 1958, there also exists a recording, made three months later at Covent Garden, where Callas was not in very good voice. While fully acknowledging the faults of that particular performance, the critic Peter Heyworth wrote in *The Observer*, according to John Steane (1980), one of the most “vivid and appreciative commentaries that Callas stimulated during the whole of her career.” Apart from the fact that his observations were made a mere three months after the present recorded performance discussed here, it also provides an illuminating testimony of her unique dramatic grasp of the role of Violetta:

“Callas’s understanding of this great part finds its way into the smallest gesture and movement, into the nervous passage of a hand around the face,⁵ the terrible fragility of body that in the last act turns every movement into a labour, and the fearful abruptness with which the gaping image of death is all at once *there* in her staring eyes... And then Callas does after all sing... [and her singing was] full of detail that again and again illuminated the part as though for the first time. Her rebuke to Germont *père* – ‘Donna son io, signore, e in mia casa,’ was turned with unassertive authority that in the voice and gesture bespoke a great singing actress. But perhaps the most marvellous moment of the evening was the long sustained B-flat before Violetta descends to the opening phrase of ‘Dite alla giovine.’ This is the moment of decision on which the whole opera turns. By some miracle Callas makes that note hang unsuspending in mid air; unadorned and unsupported she fills it with all the conflicting emotions that besiege her. As she descends to the aria, which she opened with a sweet, distant *mezza voce* of extraordinary poignancy, the die is cast” (cited in Steane 1980).

10.4) THE “LISBON *TRAVIATA*:"

Callas’s two *La Traviatas* at Lisbon’s Teatro Nacional de São Carlos on 27 and 30 March 1958 were her first and only performances in Portugal. Along with Callas, the production featured Alfredo Kraus (Alfredo Germont), Mario Sereni as (Giorgio Germont) and Franco Ghione, who conducted the Orquestra Sinfônica Nacional, the Portuguese National Symphony Orchestra. The opening night performance was broadcast on the national public radio station, Emissora Nacional de

⁵ Callas (cited in Lawton 1988: 159) once remarked that she learnt from Renato Mordo, an operetta director with whom she worked in Athens, two things that she used for the rest of her life: “Never move your hand unless you follow it with your mind and with your soul,” and “When your colleague sings the role to you, sing his lines, try and forget what he’s supposed to say, and your reactions must be as though you’d never heard what he’s saying and it’s all a first reaction. It must have something new about it.”

Radiodifusão – which is today known as Rádio Difusão Portuguesa or RDP. The original broadcast was recorded on iron oxide tapes, which were later stored in the RDP archives.

As time passed, these tapes were either forgotten or feared lost and the performance attained a sort of mythical status that was further enshrined in the American playwright Terrence McNally's 1989 play, *The Lisbon Traviata*.⁶ Eventually, however, rumour spread amongst Callas devotees of the existence of a recording of the performance. Suddenly, various unauthorised editions of the "Lisbon *Traviata*" started appearing in Europe and the United States. "Though unauthorised," noted Marques (2002), these "editions were welcomed with justified enthusiasm, for they made available to a worldwide audience a performance which had gained a legendary aura. The only regret was their precarious and muffled sound, which obscured the subtlety of Callas's interpretation, as well as Kraus's glorious vocalism. This inferior sound quality can be heard in the well-known and much sold version of EMI's 1980 commercial release."

As RDP had the only original master tape, the question was raised as to which source tapes were used for these unauthorized versions. Seeing as every artist who participates in a musical performance broadcast by the RDP is entitled to a copy of the tape upon request (for personal archival purposes), the obvious deduction was that either Alfredo Kraus or Mario Sereni had entrusted their copies to a record company. Ed Rosen, who produced the first unofficial edition of the "Lisbon *Traviata*," informed Opera-L (an internet discussion list) that he had acquired a copy of the performance from Alfredo Kraus, who feared that the original tapes had been lost. By offering his copy to a recording company, Kraus believed he would at least ensure the preservation of the recording. The original tapes were, however, not only safely intact but had been transferred to chromium tape during the 1970's to protect them from deterioration and, in 1994, were digitally remastered. Only in 1997, however, were these tapes "rediscovered" when an employee at RDP realised that there was a marked difference in the sound quality of the EMI version compared to their own archived recording. In December 2000, RDP released a "courtesy issue" of the recording, the 2000 copies selling out in less than a month! The original RDP recording



Figure 10.4: Callas as the dying Violetta, with Silvio Maionica as Doctor Grenvil - La Scala (Milan), 1955.

⁶ According to McNally, when he named the play *The Lisbon Traviata*, "the tape of that performance had not yet surfaced. The title was thus meant to represent the mythic, the unobtainable" (cited in Ardoin 1995: xiv). McNally was also the playwright of *Master Class*, a fictional play that presents Callas as a self-absorbed diva who berated and belittled her students during her series of master classes at the Juilliard School of Music in New York between October 1971 and March 1972.

has subsequently been licensed to the Pearl label, which has released its own commercial reissue of the recording.

The importance of the “Lisbon *Traviata*” is that, considering the faults of the Covent Garden production three months later, it represents in many respects Callas’s most mature and developed vision of Violetta. As Steane (1980) noted, “the discovery and transcription of this Lisbon tape fills a major gap in the catalogue of Callas’s recorded performances. Callas’s feeling for the role matured over the years, and this performance in Lisbon (strengthened, too, by the presence in the cast of Alfredo Kraus, then in the early years of his long and distinguished career)... came at a time when the role was at the very forefront of her concern... In many ways it must represent the fine flower of her association with it.” “By 1958,” notes Green (1987: 214), “she had perfected her own complex vision of Violetta: ageless, regal, fragile and charismatic even without her unequalled stage presence. This perception is especially vivid in Act II. Dignity, strength, and, yes, a fatal *dependence* are all there.”⁷

10.5) COMPARISON OF THE DIFFERENT REISSUES:

After years of railing against “pirated” “live” Callas releases, EMI issued its own “Lisbon *Traviata*” on LP as early as 1980, transferred from privately owned tape copies of the original broadcast. In the 1997 Callas Edition release, EMI states in the CD booklet that:

“This recording, taken from a rare tape of the radio broadcast of a ‘live’ theatre production in Lisbon, was made before the introduction of modern digital techniques. It is now made available on compact disc because of its value as a memento of one of Maria Callas’s most famous interpretations from a period when she was at the height of her powers. It is felt that the highlighting in this CD transfer of any inadequacies of sound arising from the circumstances of the recording is far outweighed by the light thrown on an important musical document.”

According to Seletsky (2000: 251), the “Lisbon *Traviata*,” a staple in EMI’s catalogue since 1980, had fair sonics in its initial LP release, although some private editions had been better. EMI’s first generation CD version was an improvement, giving the voices more warmth and presence. Gibson’s 1997 remastering is dominated by shrill upper-frequency distortion and accentuated tape hiss – in short, unlistenable.” In 2005, Seletsky (2005: 389) noted in his “A Callas Recording

⁷ “Although,” as Green (1987: 214) notes, “one hesitates to extrapolate art from biography, Sir Rudolf Bing’s memory of Callas’s ‘girlishness, the innocent dependence on others that was so strong a part of her personality when she did not feel she had to be wary’ is of special relevance.”

Update” that EMI transferred the 1958 “Lisbon *Traviata*” “nicely” from LP to CD in 1987, “though ruining it in a dreadful 1997 remastering.”

Of the 1997 Callas Edition reissue, the *Penguin Guide to Compact Discs Yearbook 1997/8* (March et al. 1997: 459) stated that the “Lisbon *Traviata*” is “uniquely valuable in spite of very rough sound. Here, far more than in [Callas’s] earlier, Cetra recording of this opera, one can appreciate the intensity that made this one of her supreme roles...it is an essential set. However, the extraneous noises in this ‘live’ recording... as well as the tape background and the crumbling at climaxes, are made all the clearer on CD; what matters is the vivid sense of presence, with Callas at her most vibrant. A unique historical document.”

The two CD reissues of the “Lisbon *Traviata*” used in the present study are listed in table 10.1:

RELEASE	DATE OF REMASTERING	CATALOGUE NO.	REMASTERING ENGINEER
EMI Records Ltd.	1987	CDS 7 49187 8	Unknown ⁸
EMI Callas Edition	1997	5 56330 2	Simon Gibson

Table 10.1: Reissues of the 1958 “live” recording of *La Traviata* used in this study.

The most striking difference between the two remasterings is the “accentuated” tape hiss of the 1997 Callas Edition version, which is much more prominent than in the earlier, 1987 reissue. Compare for instance the opening measures of the Prelude, the first few bars of Violetta’s Act II scene with Alfredo, “Dammi tu forza, o cielo!” or Violetta’s reading of Giorgio Germont’s letter in Act III, “Teneste la promessa.”

Example 10.1: Prelude to Act I from *La Traviata*

CD 2 Track 41: 1987 remastering (EMI Records Ltd.)

CD 2 Track 42: 1997 remastering (EMI Callas Edition)

Example 10.2: “Dammi tu forza, o cielo!” from Act II, Scene One of *La Traviata*

VIOLETTA

Dammi tu forza, o cielo! Give me strength, oh Heaven!

CD 2 Track 43: 1987 remastering (EMI Records Ltd.)

CD 2 Track 44: 1997 remastering (EMI Callas Edition)

⁸ Prior to 1997, no remastering engineers are credited by EMI for the remasterings of the Callas recordings.

Example 10.3: “Teneste la promessa” from Act III of *La Traviata*

VIOLETTA (she takes a letter from her bosom and reads:)

“Teneste la promessa – la disfida ebbe luogo!	“You kept your promise. The duel has taken place!
Il Barone fu ferito però migliora.	The Baron was wounded, but is recovering.
Alfredo è in stranio suolo;	Alfredo has gone abroad;
Il vostro sacrificio io stesso gli ho svelato.	I myself revealed your sacrifice to him.
Egli a voi tornerà pel suo perdono. Io pur verrò.	He will return to ask your pardon. I too shall come.
Curatevi – mertate un avvenir migliore.	Take care of yourself. You deserve a happier future.
Giorgio Germont.”	Giorgio Germont.”

CD 2 Track 45: 1987 remastering (EMI Records Ltd.)

CD 2 Track 46: 1997 remastering (EMI Callas Edition)

The “Dammi tu forza, o cielo” extract also illustrates how Callas’s voice sounds more “ringy,” with added shrillness and “metal” in the top range when compared with the 1987 reissue. A lot of the time, Callas sounds vocally “raw” and exposed, the voice piercing and cold. Though some critics have claimed that Callas was not in very good voice during the Lisbon performances, the faults I believe lie rather with EMI’s mastering. As Vandenberg (2003), noted: “Alfredo Kraus’s voice sounds louder in *forte* passages, cooler and less colourful than was to be expected. But this may be caused in great part – just as with Callas! – by the ‘remastering’ of the ‘amateur’ radio recording by EMI.” In certain instances, the shrillness in Callas’s voice becomes severe, as in the florid passage, “Gioire!...di voluttà... ne vortici,” that leads into Violetta’s “Sempre libera,” from Act I, the section “Amami Alfredo” from “Che fai?... Nulla” from Act II, Scene One and the phrase “Ah! Tutto, tutto finì” from “Addio, del passata,” Act III.

Example 10.4: “Gioire!...di voluttà... ne vortici,” from Act I of *La Traviata*

VIOLETTA

Gioire, di voluttà ne' vortici perir. Gioir, gioir!	Revel in the whirlpool of earthly pleasures. Revel in joy!
---	--

CD 2 Track 47: 1987 remastering (EMI Records Ltd.)

CD 2 Track 48: 1997 remastering (EMI Callas Edition)

Example 10.5: “Amami Alfredo” from Act II, Scene One of *La Traviata*

VIOLETTA

Sarò la tra quei fior presso a te sempre.	I shall always be here, near you, among the flowers.
Amami, Alfredo, quant'io t'amo.	Love me, Alfredo, love me as much as I love you.
Addio!	Goodbye!

CD 2 Track 49: 1987 remastering (EMI Records Ltd.)

CD 2 Track 50: 1997 remastering (EMI Callas Edition)

Example 10.6: “Ah! Tutto, tutto finì” from Act III of *La Traviata*

VIOLETTA

Ah! Tutto, tutto finì, or tutto, tutto finì. Now all is finished. All is over.

CD 2 Track 51: 1987 remastering (EMI Records Ltd.)

CD 2 Track 52: 1997 remastering (EMI Callas Edition)

EMI has also removed some of the extraneous noise in the 1997 remastering. An audible low frequency hum during “Ah fors’è lui” in the 1987 remastering has been improved in the later version. Clicks have also been removed from the opening of Act II, before Alfredo’s recitative “Lunge da lei...”



Figure 10.5: Callas (Violetta) - Teatro Nacional de São Carlos (Lisbon), 1958.

Example 10.7: “Ah fors’è lui” from Act I of *La Traviata*

VIOLETTA

Ah, fors’è lui che l’anima	Ah, perhaps he is the one
solinga ne’ tumulti	whom my soul,
godea sovente pingere de’ suoi colori occulti!	lonely in the tumult, loved to imagine in secrecy!
Lui che modesto e vigile	Watchful though I never knew it,
all’egre soglie ascese,	he came here while I lay sick,
e nuova febbre accese,	awakening a new fever,
destandomi all’amor.	the fever of love.

CD 2 Track 53: 1987 remastering (EMI Records Ltd.)

CD 2 Track 54: 1997 remastering (EMI Callas Edition)

Example 10.8: “Lunge da lei...” from Act II, Scene One of *La Traviata*

ALFREDO (putting down his shotgun)

Lunge da lei per me non v’ha diletto! I have no joy in life when she is far away!

CD 2 Track 55: 1987 remastering (EMI Records Ltd.)

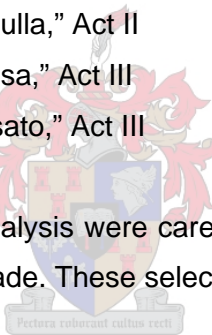
CD 2 Track 56: 1997 remastering (EMI Callas Edition)

10.6) FREQUENCY SPECTRUM ANALYSIS:

Frequency spectrum analysis was performed on a number of selected extracts, short phrases or noise samples from the various *La Traviata* reissues, each providing a multitude of possible comparisons. The selected extracts comprised the following:

- 1) Noise sample from the Prelude to Act I
- 2) A short extract from the Prelude to Act I
- 3) “Destand omi all’amor” from “Ah, fors’è lui,” Act I
- 4) First four bars from “Ah, fors’è lui,” Act I
- 5) Noise sample from “Ah, fors’è lui,” Act I
- 6) “Di volutta” from “Follie! Follie!,” Act I
- 7) “Follie! Follie!” from “Sempre libera,” Act I
- 8) Introduction to “Sempre libera,” Act I
- 9) “Lunga da lei” from “Lunga da lei,” Act II
- 10) “Dammi tu forza, o cielo!” from “Dammi tu forza, o cielo!,” Act II
- 11) “Amami Alfredo” from “Che fai... Nulla,” Act II
- 12) “Attendo” from “Teneste la promessa,” Act III
- 13) “Ah! tutto fini” from “Addio del passato,” Act III

The results of the frequency spectrum analysis were carefully compared and evaluated. From the above extracts, a further selection was made. These selected examples are discussed below.



The frequency spectrum graphs are either logarithmic or linear. The x-axis (left to right) represents frequency (measured in Hz), while the y-axis (bottom to top) corresponds to the amplitude of the corresponding frequency (measured in dB) on the x-axis.

The colours used to represent the various releases are as follows:

RELEASE PHASE	COLOUR
EMI Records Ltd. (1987)	Green
EMI Callas Edition (1997)	Pink

Table 10.2: Release phases of the two reissues of *La Traviata* used in this study and the colours used to represent them in the spectrum analysis examples.

Figure 10.7 shows the logarithmic frequency spectrum of the phrase “Destand omi all’amor” from “Ah, fors’è lui,” Act III. As can be seen here and in the other examples, the 1987 remastering contains the relatively stronger low-mid frequency content. The 1997 release contains the more prominent high frequency content above 17000 Hz (see also Figure 10.8), possibly explaining the slightly harsher, strident quality to Callas’s upper register compared with the 1993 remastering. The graph also shows the effect of filtering (in both versions) in the 40 - 50 Hz and 50 - 70 Hz frequency bands, as well as a steep filtering dip at approximately 6200 - 7200 Hz (compare as well Figure 10.13). Figure 10.7, especially, as well as Figures 10.9 and 10.10, show the relatively more prominent lower frequency content of the 1993 remastering, resulting in the added “warmth” of this release versus the later 1997 Callas Edition version.

The next example, Figure 10.8, shows the linear frequency spectrum of the phrase “Follie! Follie!” from “Sempre libera.” As can be seen, there is some unknown noise element at approximately 9000 Hz in the 1987 version, while in the 1997 remastering, an attempt has been made to remove this artifact (See also Figures 10.10 and 10.13).

The logarithmic frequency plot of the phrase “Lunge da lei...” from “Lunge da lei,” Act II, is shown in Figure 10.10. Of significance here, is a noticeable filtering effect at approximately 20 Hz in both versions (this can also be seen in all the other graphs), as well as a dip in the 1997 remastering at 30 Hz (also visible in Figures 10.12 and 10.13, where both releases show the effect of filtering).

Figures 10.11 and 10.12 represent, respectively, the linear and logarithmic frequency spectrum analysis of the phrase “Ah! tutto fini” from “Addio del passato,” Act III. Notice again the greater high frequency content of the 1997 version from approximately 4000 Hz. In addition, both graphs show the effect of filtering at 60 Hz, no doubt to remove any traces of electrical hum, as well as a strong filtering dip in the region of 6200 - 7200 Hz.



Figure 10.6: Callas (Violetta) - La Scala (Milan), 1955.

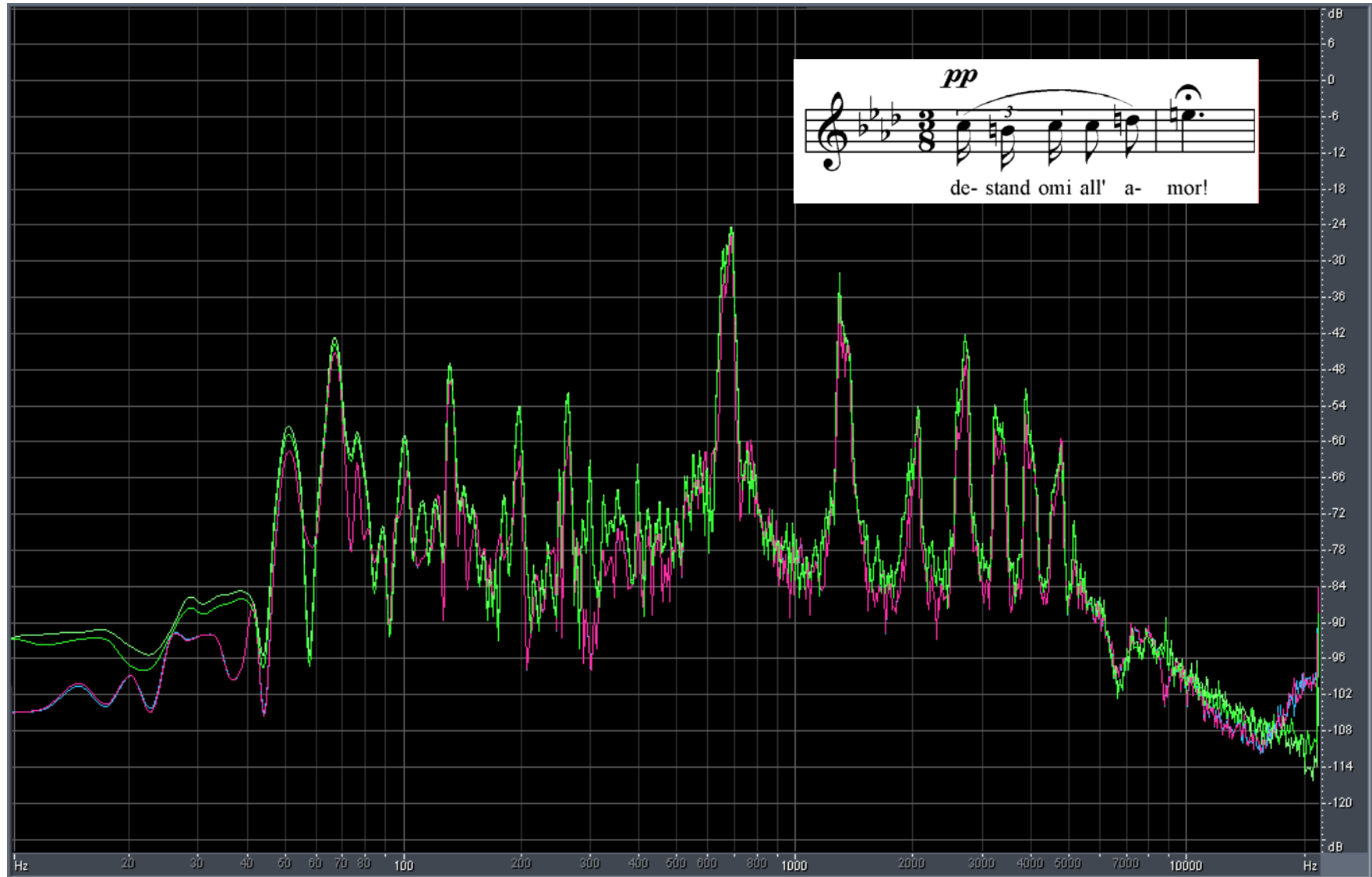


Figure 10.7: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Destand omi all’amor” from “Ah! fors’è lui,” Act I of *La Traviata* (1958 “live” recording).

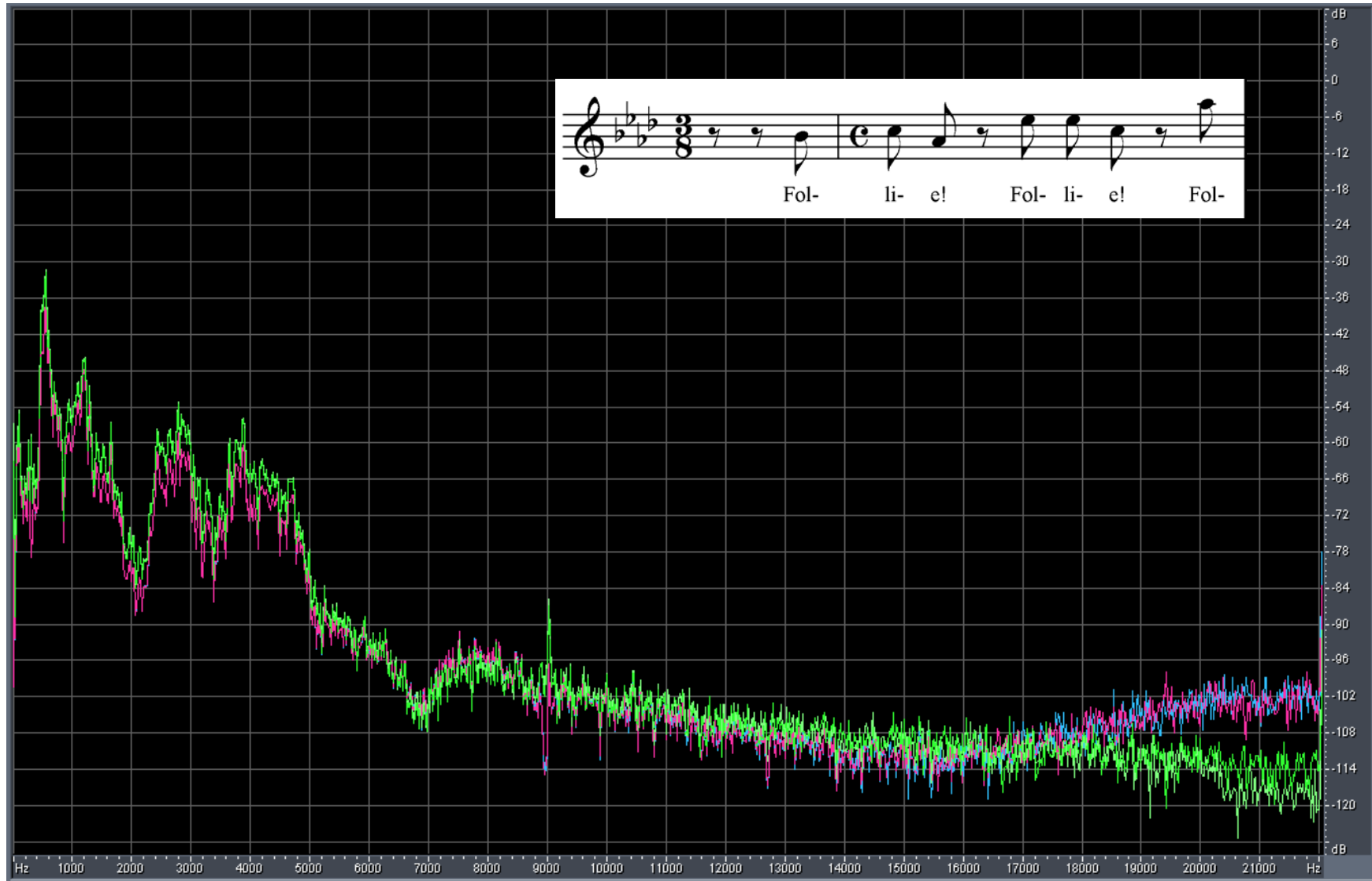


Figure 10.8: Linear frequency spectrum analysis (1987 & 1997) of phrase “Follie! Follie!” from “Sempre libera,” Act I of *La Traviata* (1958 “live” recording).



Figure 10.9: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Follie! Follie!” from “Sempre libera,” Act I of *La Traviata* (1958 “live” recording).

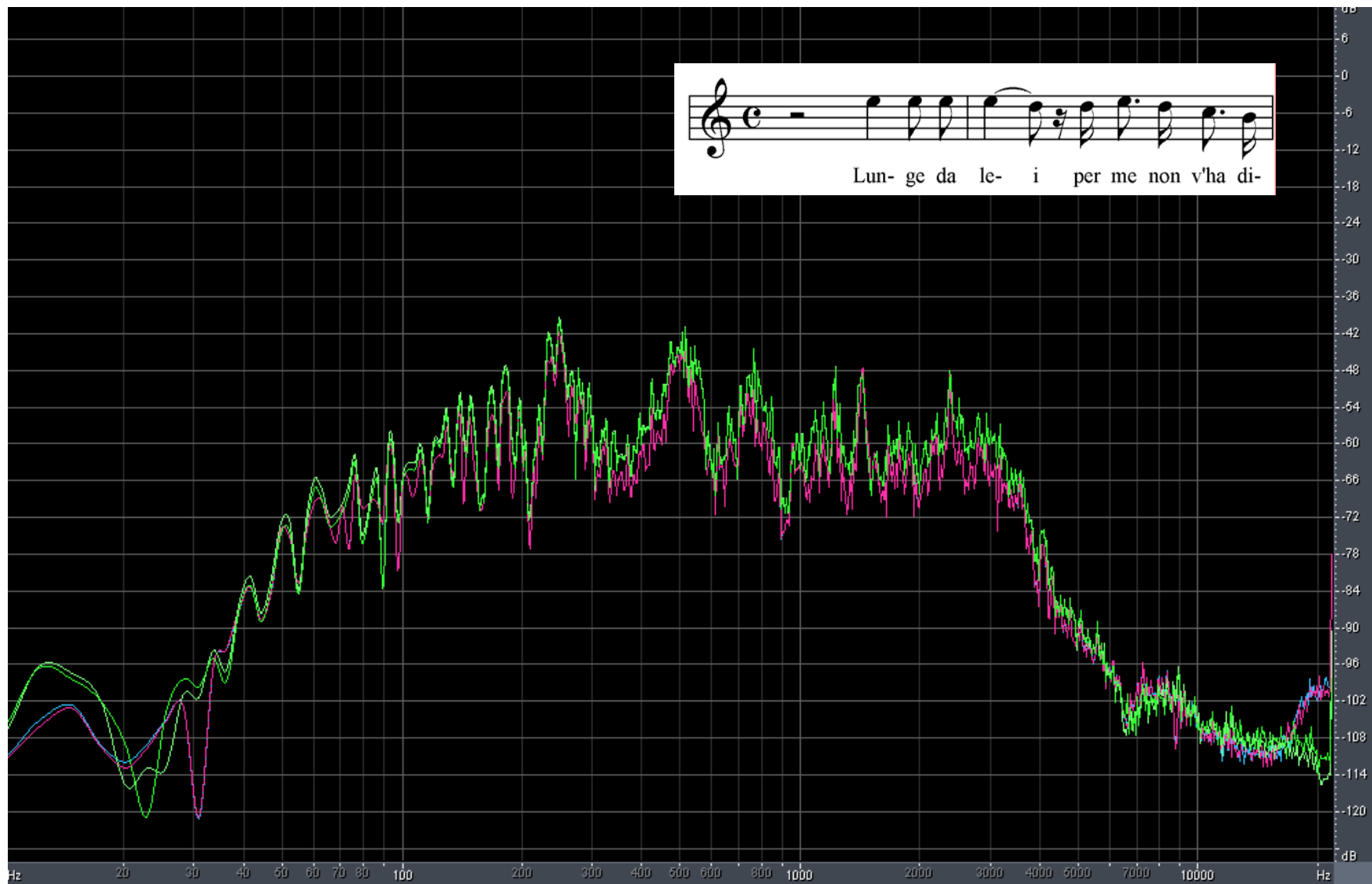


Figure 10.10: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Lunge da lei...” from “Lunge da lei,” Act II of *La Traviata* (1958 “live” recording).

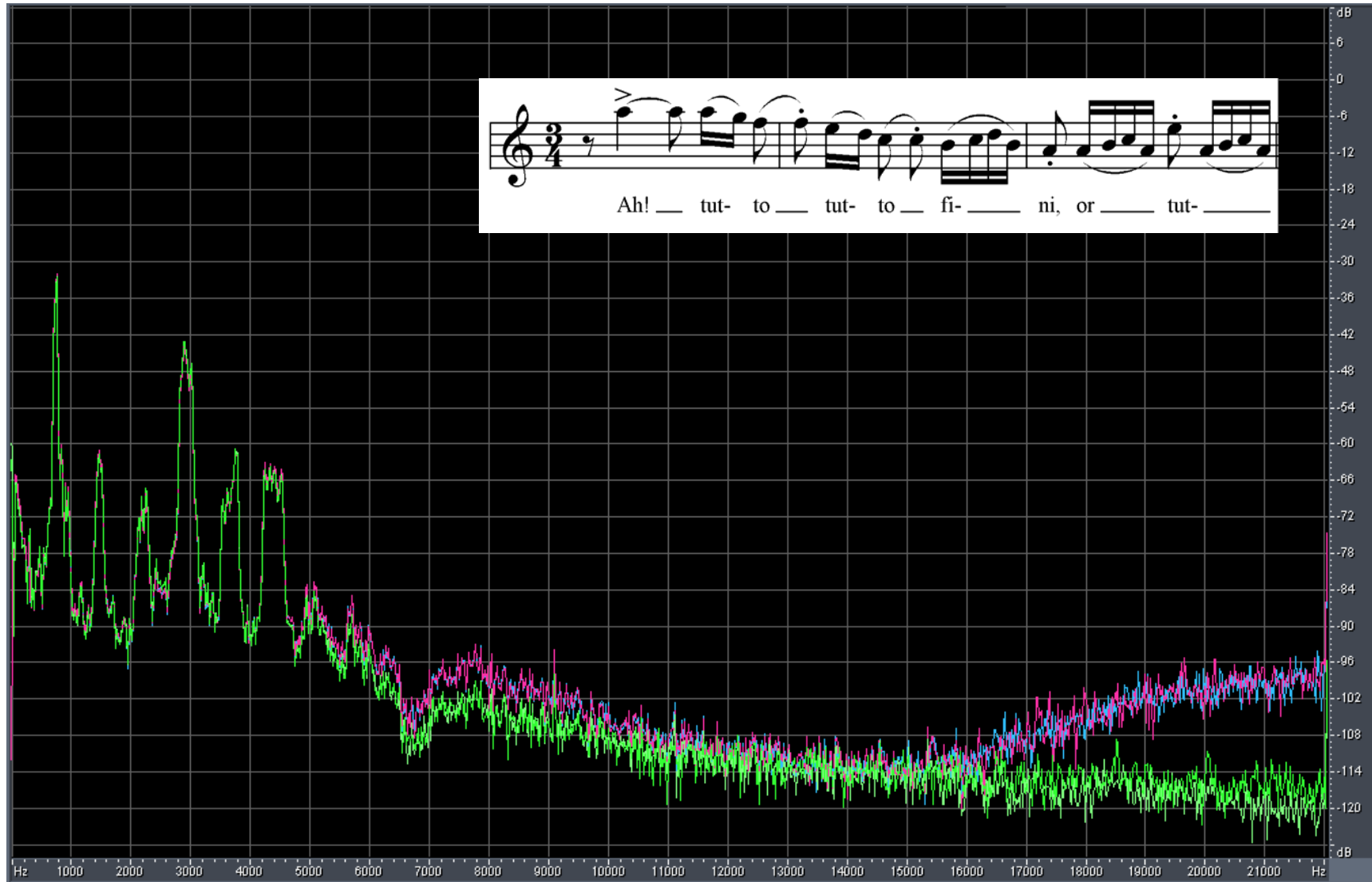


Figure 10.11: Linear frequency spectrum analysis (1987 & 1997) of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).

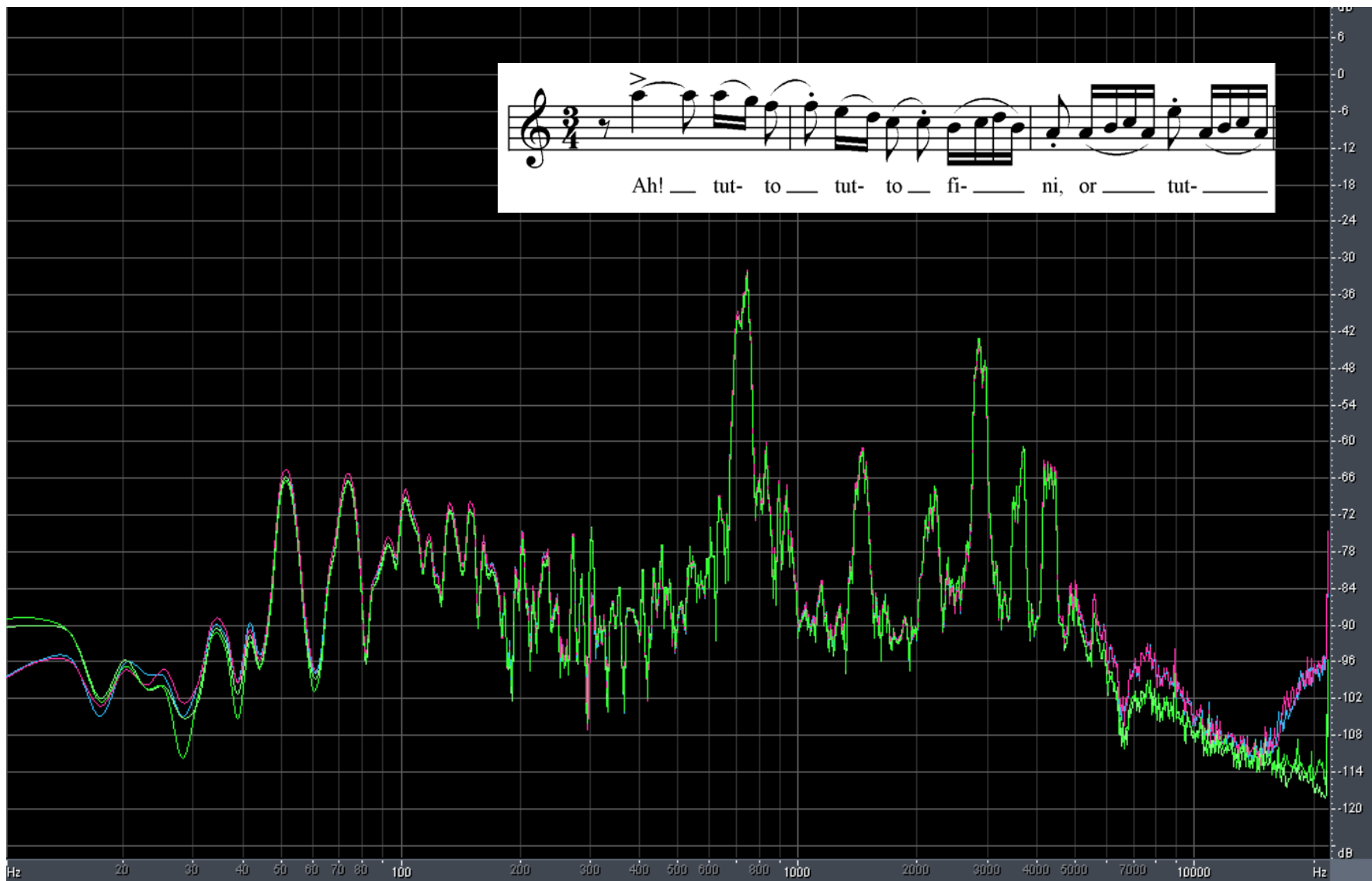


Figure 10.12: Logarithmic frequency spectrum analysis (1987 & 1997) of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).

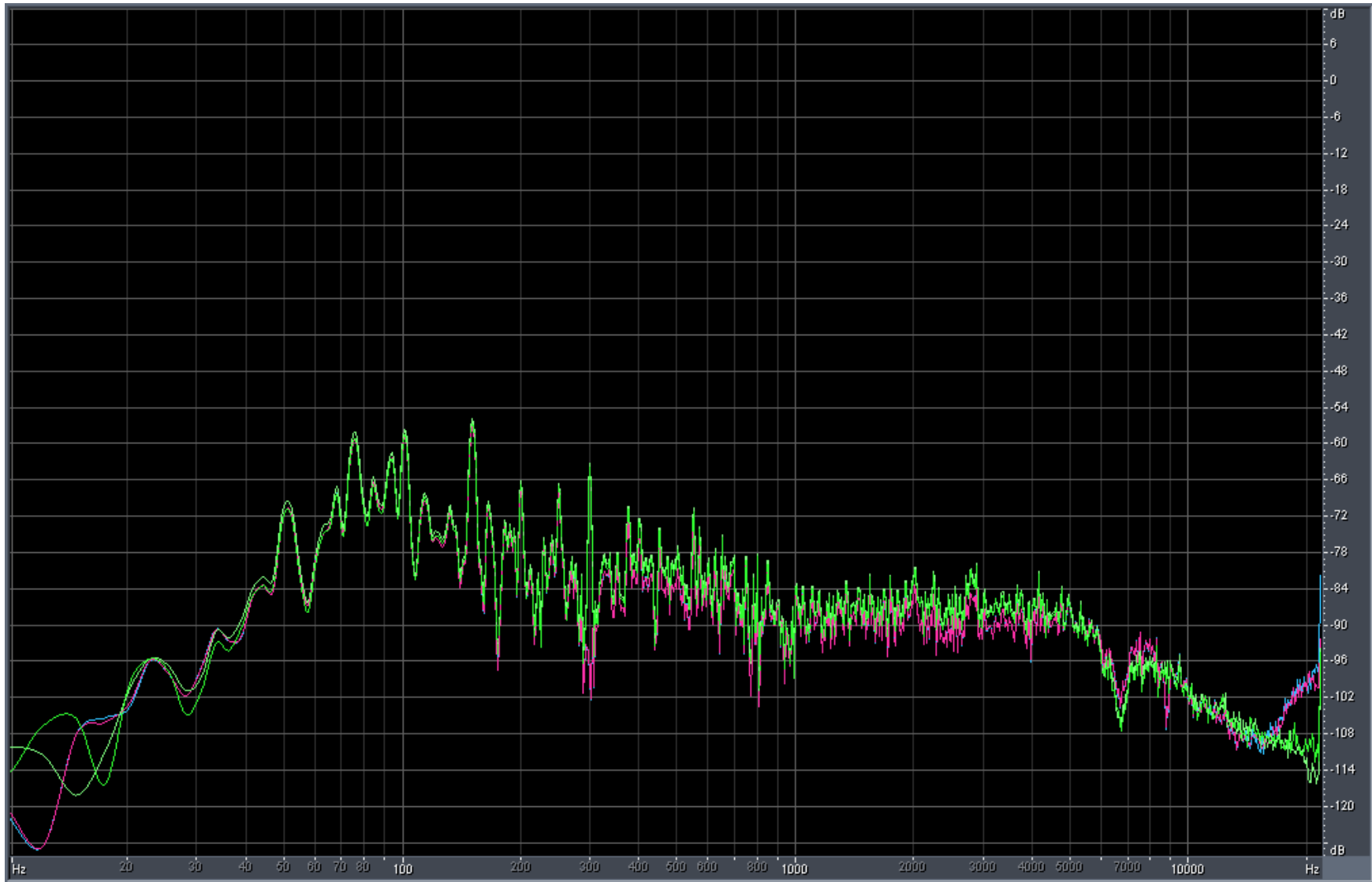


Figure 10.13: Logarithmic frequency spectrum analysis (1987 & 1997) of noise sample from “Ah! fors’è lui,” Act I of *La Traviata* (1958 “live” recording).

10.7) MATLAB ANALYSIS:

The following graphs show the results obtained from the Matlab analysis performed on selected audio extracts from *La Traviata* (1958 “live” recording). For a complete overview and explanation of the algorithm used in analysing the selected examples, please refer to Chapter 1.

10.7.1) CASE 1 - “AH! TUTTO FINI...” FROM “ADDIO DEL PASSATO” (1987 & 1997):

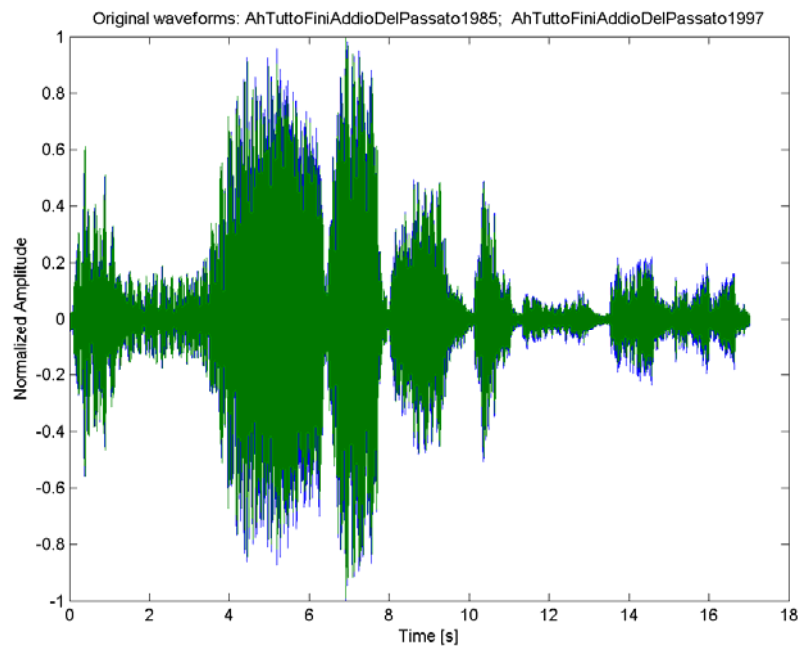


Figure 10.14: Plot of Y1 and Y2 (time-shift visible) of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).

The plot of the cross-correlation between Y1 and Y2 for the complete waveforms show excellent correlation (0.99074) between the two extracts, with a very small shift needed to match Y1 and Y2 (Figure 10.15).

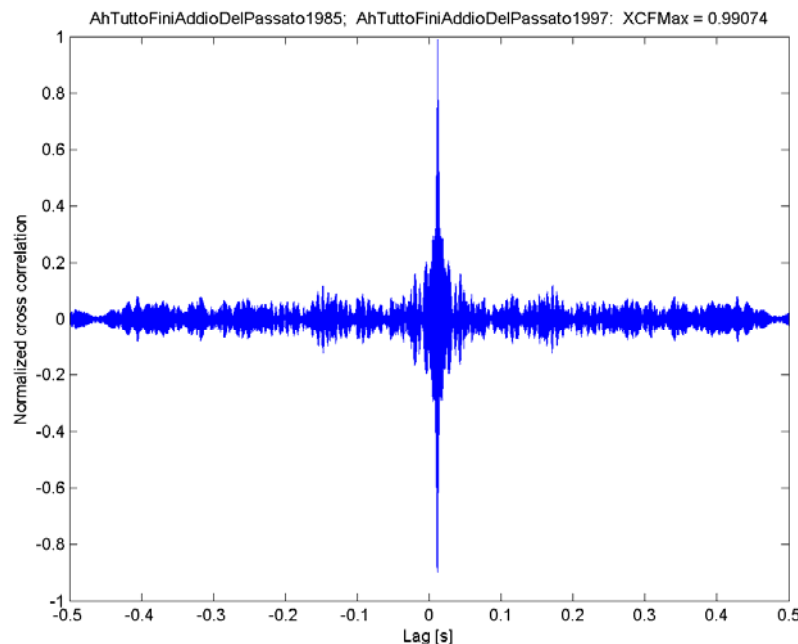


Figure 10.15: Plot of cross-correlation (R_{Y1Y2}) between Y1 and Y2 (for entire waveforms) of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).

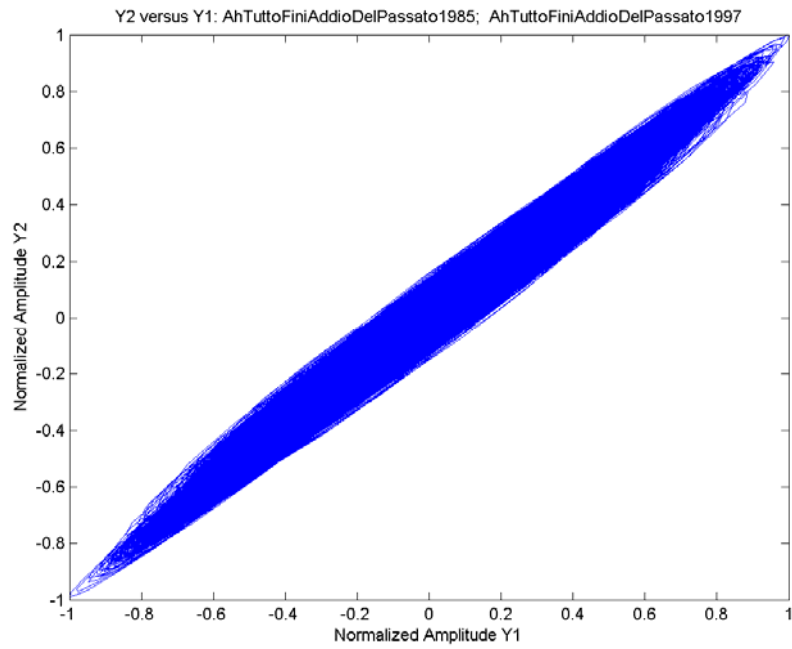


Figure 10.16: Plot of normalised amplitude of Y1 vs. Y2 of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).

The lag or time-shift required to best match each window of the five selected time windows (of set length and position) is shown below in Figure 10.17. An incredibly small shift of approximately 2.3 microseconds (about 1 sample point) is required.

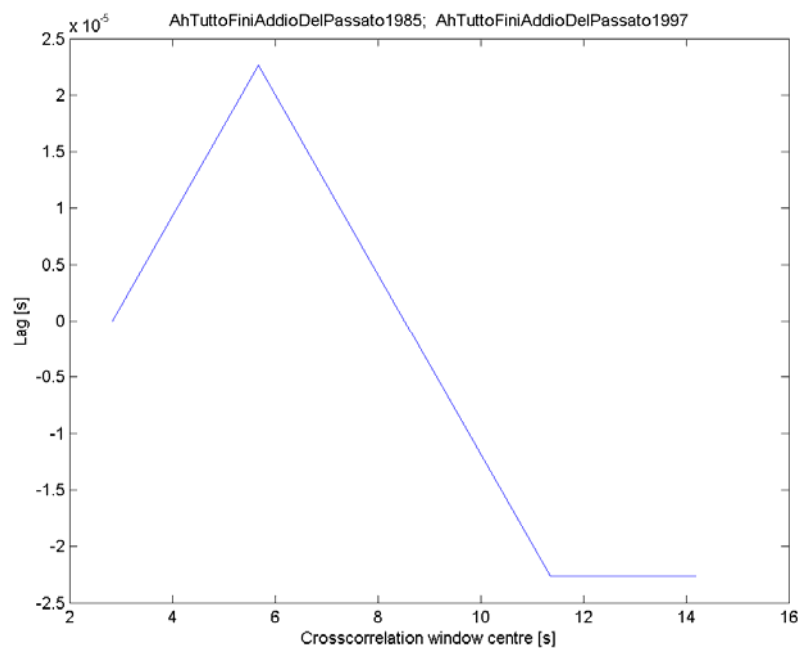


Figure 10.17: Plot of lag or time-shift required for optimum match for each window of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).

The transfer function graph shows a slight shelving filter effect with low frequency boost up to approximately 30 Hz (Figure 10.18). At about 300 Hz a slight peak can be seen on the first graph, no doubt a result of the sharp and inexplicable peak in the 1985 remastering visible on Figures 10.7, 10.9, 10.12 and 10.13 above. The second graph indicates virtually no frequency-dependent difference in the phase of the two remasterings.

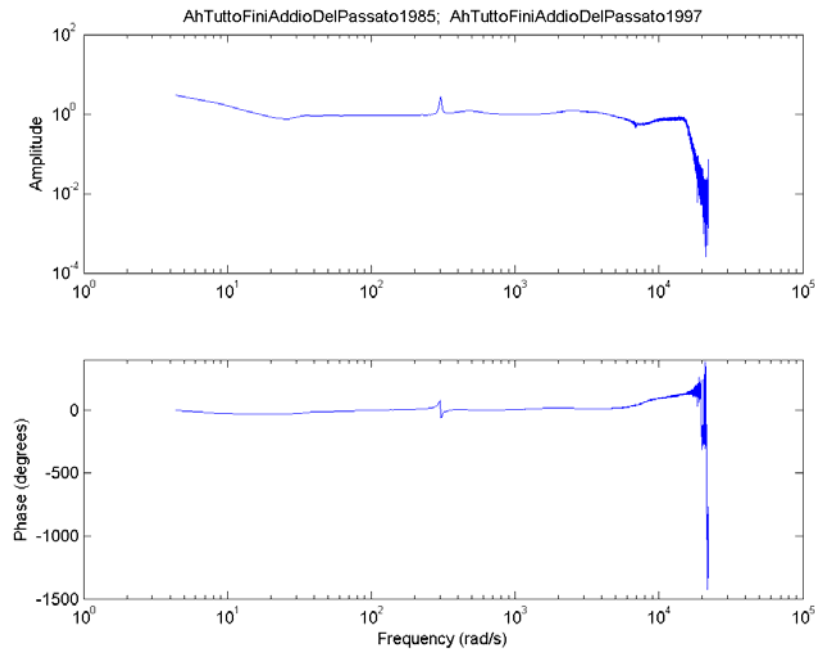


Figure 10.18: Plot of transfer function of phrase “Ah! tutto fini...” from “Addio del passato,” Act III of *La Traviata* (1958 “live” recording).

10.7.2) CASE 2 – NOISE SAMPLE FROM “AH! FORS'È LUI” (1987 & 1997):

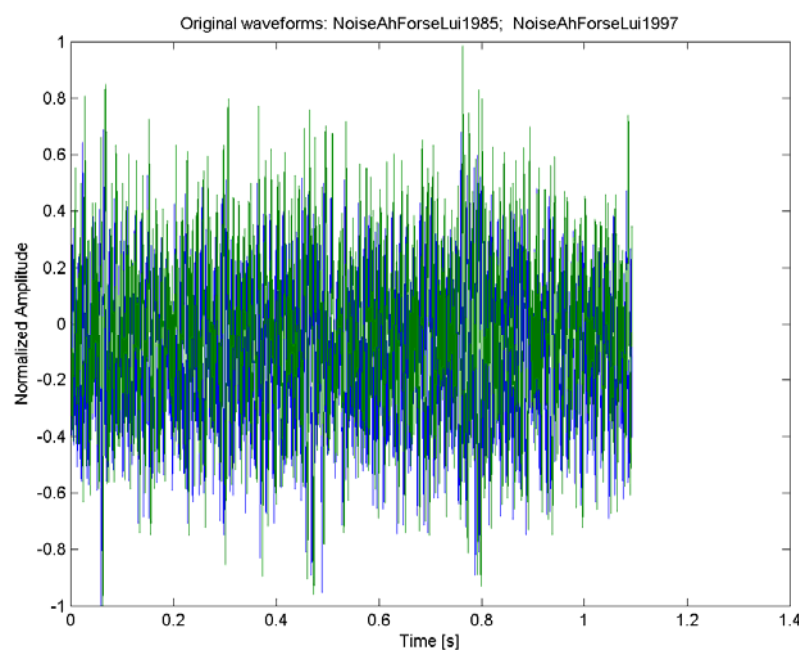


Figure 10.19: Plot of Y1 and Y2 (time-shift visible) of noise sample from “Ah! fors'è lui,” Act I of *La Traviata* (1958 “live” recording).

The cross-correlation plot (Figure 10.20) indicates excellent correlation (0.96215) between Y1 and Y2, with virtually zero time-shift required to match the two waveforms.

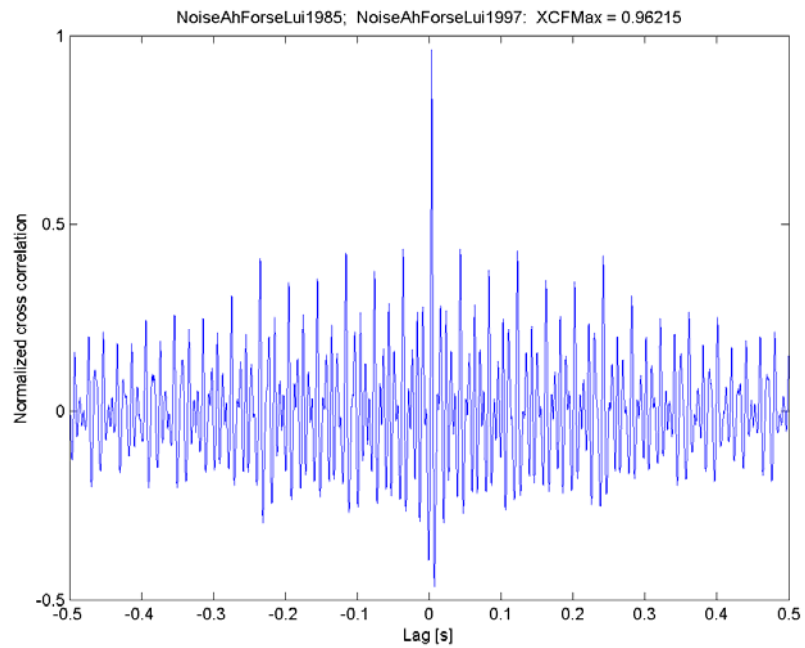


Figure 10.20: Plot of cross-correlation ($R_{Y_1Y_2}$) between Y1 and Y2 (for entire waveforms) of noise sample from "Ah! fors'è lui," Act I of *La Traviata* (1958 "live" recording).

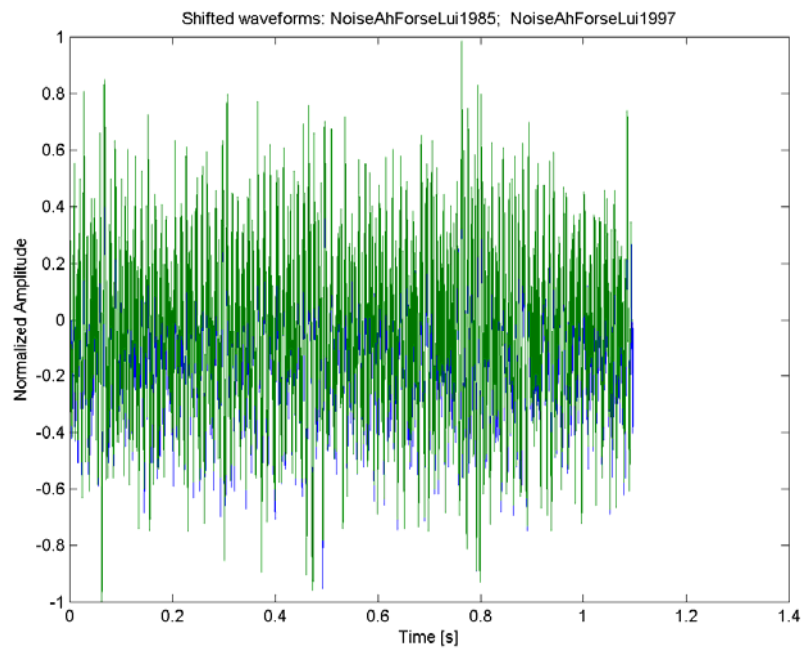
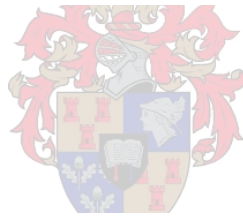


Figure 10.21: Plot of time-shifted waveforms (Y1 and Y2) of noise sample from "Ah! fors'è lui," Act I of *La Traviata* (1958 "live" recording).

As can be seen in Figure 10.22 below, the instantaneous magnitudes of Y1 and Y2 do not correspond.

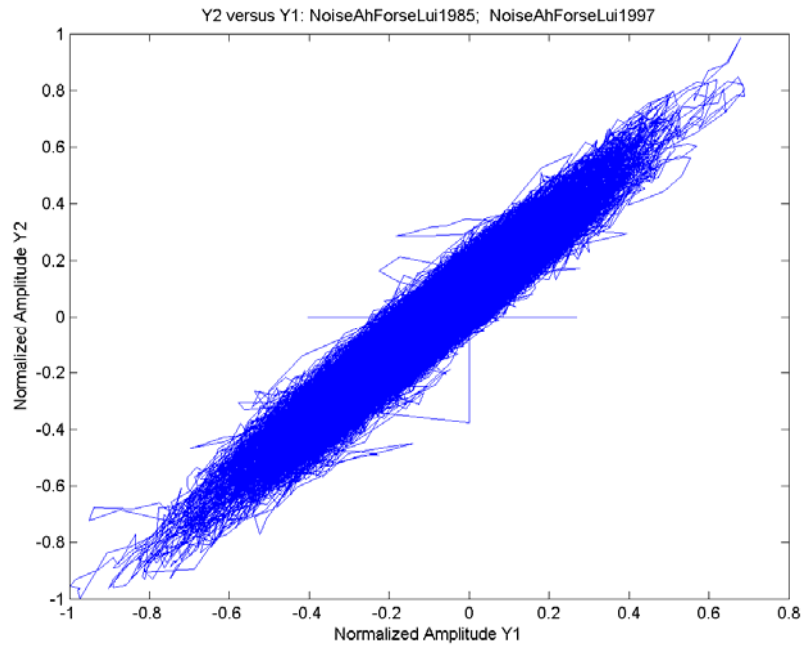


Figure 10.22: Plot of normalised amplitude of Y1 vs. Y2 of noise sample from "Ah! fors'è lui," Act I of *La Traviata* (1958 "live" recording).

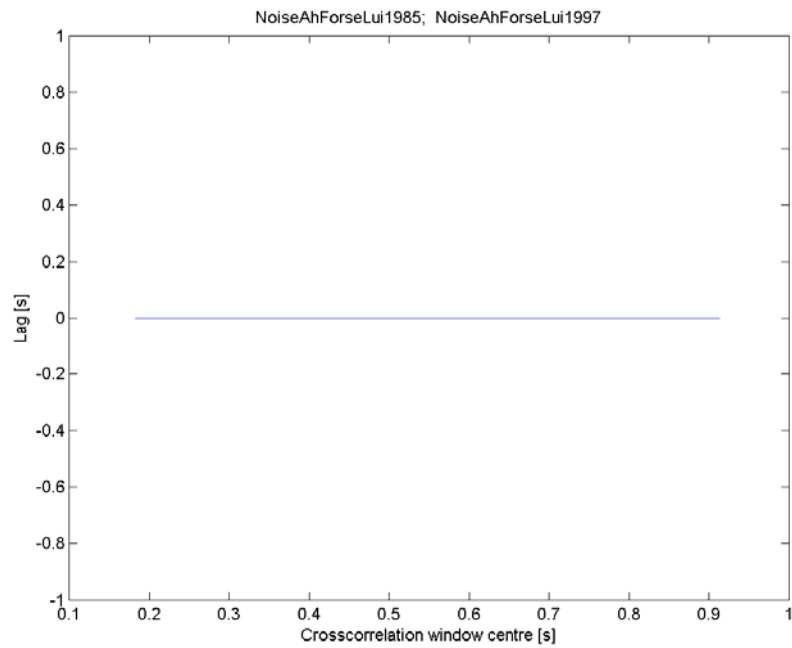


Figure 10.23: Plot of lag or time-shift required for optimum match for each window of noise sample from "Ah! fors'è lui," Act I of *La Traviata* (1958 "live" recording).

As in Case 1, the transfer function graph (Figure 10.24) indicates a shelving filter effect with low frequency boost in the low frequency range and a sharp peak at approximately 300 Hz that can be attributed to the peak in the 1987 remastering mentioned above.

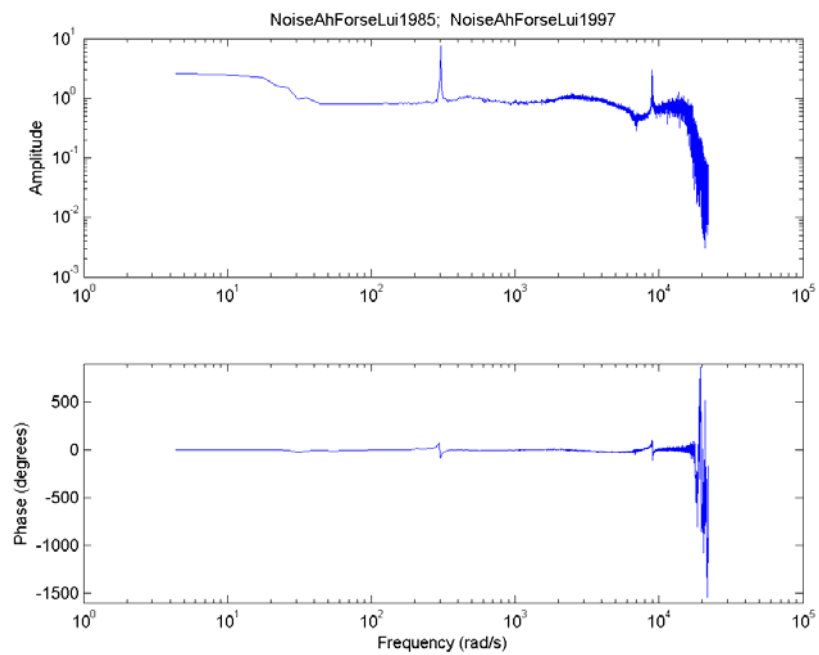


Figure 10.24: Plot of transfer function of noise sample from "Ah! fors'è lui," Act I of *La Traviata* (1958 "live" recording).



CHAPTER 11

CONCLUSION

“I don’t see Callas at all as a tragic figure. Certainly she would have, because she had a certain paranoia’s streak in her. But I don’t think that tragedy was the end result. If anything deification was. I think already it’s not too rash to say that along with, perhaps Caruso and Chaliapin, she will dominate the twentieth century as one of its most remarkable creative artists and that’s hardly a tragedy.”

John Ardoin (cited in Davidson 1998)

This study set out to investigate the influence of audio restoration and remastering techniques on the recorded legacy of Maria Callas, illustrating the sometimes startlingly different ways in which her voice has been made to sound, examining and comparing the way in which different remasterings of the same audio material can vary in quality, as well as how vastly different sonic reinterpretations of a single recording can affect our perception of an artist’s “true” sound. To this end, various reissues of six different complete opera recordings, including four studio recordings: *Tosca* (1953), *Lucia di Lammermoor* (1953), *Norma* (1954), *Madama Butterfly* (1955), as well as two “live” performances of *Macbeth* (1953) and *La Traviata* (1958), have been evaluated and compared, using the “true” sound of Callas’s voice as reference in comparing the different remasterings. Pitch and frequency spectrum analysis was used to confirm or support any subjective claims and observations. Further analysis was performed with the aid of a specialised Matlab algorithm.

11.1) SUMMARY OF FINDINGS:

The evaluation and comparison of various Callas recordings and subsequent reissues has shown that there exist distinct differences in sound and sound quality between the various release phases and reissues, resulting in sometimes vastly different reinterpretations of the same audio material that bear no resemblance to previous CD or LP incarnations and indeed “evince no consolidated conviction about exactly how Callas’s voice *should* sound” (Seletsky 2000: 244). In general, the differences between the various releases (as evaluated in Chapters 5 to 10 of this study) can be summarised as follows:

LP: The original LP releases are characterised by a warm, sweet, “intimate” and “human” sound, with a fullness to the lower frequency spectrum that is unmatched in any of the later CD releases (save the Naxos reissue, which was transferred from LP), though Callas’s top register sounds at times somewhat thin. The original LP’s contain little of the harshness that characterise later CD releases.

1980’s CD’s: The first generation CD’s often proved the most satisfying of those reissues compared in this study, with the (vocally) best sounding Callas, proving that newer remasterings are not necessarily the most musically or sonically satisfying. Their sound is natural, sweet and spacious, somewhat reserved, with less lower frequency content than the original LP’s, though the orchestral image is clearer and more transparent than in the earlier LP sets. The sound image is not at all as close or dry as some of the later CD releases, with very good balance between the soloists and orchestra and little of the stridency, harshness and exaggerated distortion of the later CD’s.

1997 Callas Edition: The Callas Edition releases are characterised by a very close and present sounding Callas, imparting a certain degree of added excitement. Greater ambience and increased reverberation have resulted in a slightly “fuzzy” and unfocussed sound, especially with regards to the orchestra and chorus. Callas’s upper register often sounds thin, with less lower frequency content than the original LP releases. Though most of the noise and hiss audible in the LP sets and earlier CD’s have been removed, the harshness, stridency and “metal” in Callas voice has also increased.

Great Recordings of the Century/EMI Historical: The Great Recordings of the Century/EMI Historical reissues feature a very closely placed vocal image that accentuates any faults, harshness or stridency in Callas’s voice. Noise and tape hiss are also more prominent. While the very dry acoustic image does impart a degree of definition and added clarity to the orchestral and choral sound, it also results in an audible loss of depth and ambience.

Naxos: The Naxos reissues (transferred from LP) are mostly similar to the original LP versions – natural and warm, with audible body and depth to the sound, especially in the lower frequency range (when compared with the EMI CD versions). The sound in these remasterings place the vocal image back, thereby making the voices less exposed and treating them more kindly, though the orchestral and choral sound is muffled. Many of the editing and pitch errors present in the EMI CD versions have been commendably restored or improved in the Naxos releases. The sound is mostly without harshness, but with considerably accentuated noise and hiss.

11.1.1) PITCH DIFFERENCES:

Pitch differences between various reissues of the same recording have been investigated with regards to two studio opera recordings, the 1953 *Tosca* and *Lucia di Lammermoor* recordings. Measurement of track timings and pitch analysis of 40 examples extracted from each of the six reissues of *Tosca* used in the study have confirmed that the GROTC/EMI Historical releases are approximately a minute longer than previous releases. In the case of *Lucia di Lammermoor*, track timings and pitch analysis of 42 examples extracted from the various reissues used in the study, verified the duration of the 1997 EMI Callas Edition remastering and 2004 Great Recordings of the Century/EMI Historical releases as virtually identical, differing by two seconds. Compared with the Naxos and original LP's, however, the later EMI releases are approximately a minute and twenty seconds longer.

Several other instances where there are distinct pitch differences between various reissues are mentioned throughout the text. One such example (provided on the audio CD accompanying this study) is "D'Amore al dolce impero" from Rossini's *Armida*, taken from the "live" 1954 San Remo recital. As released on the "Live in Concert" set, the pitch of this particular aria is nearly a semitone high and most of its orchestral introduction has been excised.



11.1.2) EDITING ERRORS:

Apart from the gross pitch differences that exist between different remasterings of the same material, EMI's remastering engineers have been negligent as regards editing decisions, their haphazard and musically uninformed "corrections" resulting in errors that compromise the value and historical accuracy of EMI's Callas releases, while jeopardising the individual artistry of those involved in the making of these recordings. Various such errors and "corrections" are mentioned throughout the text, and several examples provided on the audio CD accompanying this study. These include the volume reduction at Tosca's "Ah! Piuttosto giù mi avvento!," the "correction" of Tosca's three cries of "Mario!" at her Act I entrance (both from the complete 1953 *Tosca*) and the editing of Callas's glottal sounding release of the final note in "Io son l'umile ancella" from Cilea's *Adriana Lecouvreur* from the "Lyric and Coloratura Arias" recital.

11.1.3) REMASTERING REMASTERINGS:

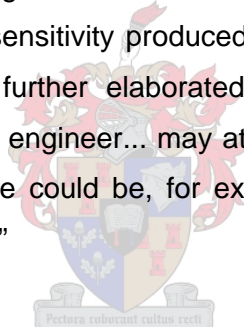
According to Seletsky (2000: 240), the Callas Edition appeared practically overnight in late 1997. The “financial crisis then facing EMI was factored into the haste with which the recordings of its historically most profitable artist were reissued,” providing a possible explanation for the various pitch and editing errors that plague the Callas Edition releases. Seletsky furthermore states that in response to a question regarding the remastering of *Turandot*, an EMI engineer “inadvertently revealed to me that the earlier CD’s - not the original tapes - were used as reference points; at least his phrasing led to that interpretation.” The possibility thus exists that Callas Edition entries were remastered, not from the original analogue tapes, but rather from 1980’s DAT’s, i.e. that they are in fact remastered versions of earlier remasterings, “a questionable shortcut enabling their nearly simultaneous release” (Seletsky 2000: 252). Though it would be impossible to prove conclusively, a number of important observations (apart from the fact that), seem to support this view:

- 1) The tape squeal before “Vissi d’arte” in the 1985 *Tosca* CD remastering and its 1997 successor is absent in the 2002 remastering released in the EMI GROTC and Historical series - the only editions to state explicitly that they were “Digitally Remastered At Abbey Road Studios From The Original Tapes.”
- 2) The five second silence, an original LP side break, between the second and third chords that lead into “Ma di’... l’amato giovane,” following the Norma-Adalgisa duet “Ah sì, fa’ core, abbracciami” in Act I, Scene Two of *Norma*, an editing error that has marred all EMI CD releases of both the 1954 and 1960 recordings, seem to indicate that all subsequent remasterings of these recordings were transferred from the 1980’s DAT’s and not from the original master tapes.
- 3) The slipcases and liners of the complete opera sets released as part of the 1997 Callas Edition simply state “Remastered For Optimum Sound Quality,” whereas the recital discs state “Remastered At Abbey Road Studios From The Original Analogue Tapes.” The EMI Great Recordings of the Century (GROTC) series state on the CD box that the recordings were “Remastered at Abbey Road studios,” while the EMI Historical series releases state on the CD’s that they were “Digitally Remastered At Abbey Road Studios From The Original Tapes.” Since the GROTC and EMI Historical series are based on the same remastering, one can assume that both were remastered from the original tapes.

- 4) Callas CD releases often feature identical pitch and track timings to original LP versions.
- 5) Callas Edition remasterings are closer in sound to previous CD remasterings than to any LP versions.

11.1.4) THE ETHICS OF AUDIO RESTORATION:

In a more general sense, the study has highlighted the various approaches that exist today as regards the role and purpose of the remastering engineer, as well as the ethical implications and nature of audio restoration. This can be summarised in terms of two opposing viewpoints: 1) the archival viewpoint, which states that the audio restoration engineer should present the listener with the most authentic, historically faithful reproduction of the original sound that can possibly be obtained and 2) the belief that the sound of historical recordings may be reinterpreted at a creative level by the remastering or transfer engineer according to the tastes of today's listeners, "who have inevitably been conditioned by the changes in auditive sensitivity produced by the current standards of high fidelity" (Orcalli 2001: 310). This viewpoint is further elaborated upon with regards to CEDAR Audio's statement that "the commercially minded engineer... may attempt to 'generate' a new recording more appropriate to its intended use. This use could be, for example, to please the public palate, or to represent accurately the sound of an era."



11.1.5) OTHER ASPECTS DISCUSSED IN THE STUDY:

In trying to piece together Callas's "true" sound, the study has provided an in-depth examination of Callas's voice, its strengths and weaknesses, vocal development and decline. No previous study of this kind (to the best of the author's knowledge) has discussed Callas's voice in such detail, especially with regards to the reasons put forth to explain her vocal problems and eventual (vocal) undoing.

The overview of Callas's EMI recordings and the discography provided in Addendum A present an insightful and helpful discussion of Callas's recorded studio output, highlighting the differences between the various release phases and reissues, various editing and pitch errors and the differences in sound quality between the various releases. Apart from its significance to the present study, the information contained in these sections may also be helpful to anyone wishing to expand their CD collection, or serve as a guide to future comparative studies of other Callas material.

11.2) AREAS FOR FUTURE RESEARCH:

A study of this kind is not limited to Callas, or indeed to singers or other classical music artists and instrumentalists, though the nature of comparison between various reissues of the same recorded material is better suited to vocalists because of the unique *timbre* and characteristics of each voice, making it easier to detect differences from one remastering to the next. More importantly, it would be difficult to use the “true” sound of a pianist, for example, in comparing different remasterings, due to the fact that the artist would rarely have recorded on the same instrument, and even then, the instrument may have been subject to countless unknown tunings or modifications to the playing mechanism, each time altering its sound.

Similar studies documenting the effect of remastering techniques on an artist’s recorded legacy would be possible in the case of, for example, Luciano Pavarotti or Dietrich Fischer-Dieskau, and in the popular music domain, artists such as Ella Fitzgerald, Edith Piaf, Elvis Presley, etc. Not only are various reissues of these artists readily available, but their recordings are also entering the public domain, resulting in a multitude of remasterings (often of inferior sonic quality) by different recording companies that are sold as budget CD releases, providing a ready source pool from which to select recordings to be used for comparison.

The various forms of technical analysis used in the present study - pitch, frequency and Matlab analysis, were initially included to confirm or validate any subjective claims and observations, in effect providing concrete and scientific proof of the audible differences that exist between the different remasterings. In the end, a large amount of technical analysis was performed for each of the various opera recordings that were evaluated as part of the study. Not only did these technical processes confirm the musical observations, they also brought to light new and fascinating evidence of irregularities within the various reissues (the 10 Hz hum in the *Tosca*, *Lucia* and *Norma* LP versions for example, or the aliasing effect visible in the Naxos reissues, as well as the tapering away of the upper frequencies in all of the 1980’s CD releases).

Though the present study was rooted strongly in musical and artistic considerations, future studies might be focussed more strongly within the signal-processing domain, i.e. placing greater stress on the technical analysis and evaluation of recordings. One of the benefits of the current study is that it has proven that clear differences exist between the various reissues of Callas recordings, and in so doing has laid the (musical) groundwork (while still making an important technical contribution) for future, more technically-orientated, analytical or comparative studies.

The technical possibilities of analysis algorithms, such as the Matlab algorithm used in the present study, are virtually limitless. A logical step in expanding the present algorithm for future analysis would be, for example, to first separate the selected sound extracts into different frequency bands, examining each frequency band individually. This would result in much more detailed analysis possibilities. Though the present study inadvertently had to analyse several reissues of a number of complete opera recordings in order to provide as complete a picture as possible of the effect of remastering on the recorded legacy of Callas, it would be advantageous for future, technically-orientated studies, to simply focus on the detailed analysis of a single recording and its reissues.

The cognitive and subjective perception of a sound recording, as opposed to the results obtained from careful technical and frequency analysis of the same sound source, is another aspect that might form part of future research on the topic. It was, however, purposefully excluded from the present study as it touches on a number of aspects (auditive physiology, sound processing in the brain, acoustics, etc.) that would have shifted the focus of the current research project towards the domain of cognitive musicology.

11.3) IN CLOSING:

The study has shown that EMI have been revising Callas's unique sound since the beginning of their association by continuously "reinterpreting" her recordings to satisfy the perceived preferences of the record-buying public and by trying to improve the sound of the various reissues (especially the early mono studio and "live" recordings) to meet current sonic expectations of high-fidelity.

Almost thirty years after her death, Callas remains EMI's biggest selling classical artist. The fact that EMI's remastering processes have altered the actual character and *timbre* of her voice, thereby affecting our perception of her "true" sound, is both disrespectful and ignorant, and lends support to claims by some commentators that EMI is treating Callas as nothing more than a commodity. The various editing and pitch problems of EMI's most recent Callas releases, which compromise the value and historical accuracy of her recordings, as well as the multitude of various compilation discs regularly issued by EMI (appearing under such titles as "The Passion of Callas," "Romantic Callas" or "Maria Callas: Popular Music from TV, Film and Opera"), seem to further reinforce this belief.

Sound recordings are historical documents, providing future generations an aural record of musical works, performance practices, concerts and the artistry of individual musicians. As the present study has shown, it is erroneous to believe that a recording, once made, is permanent and unchangeable or

that an artist, captured on disc, is necessarily truthfully represented. Now that out-of-copyright recordings are appearing in various incarnations and in various remastered versions, we must take special caution to protect the artistic integrity that the artists, musicians and producers in these recordings strove to uphold, and to learn to listen with a keen and critical ear.

Despite sonic “reinterpretations,” as well as gross editing errors and pitch differences in reissues of her recordings, Callas’s legacy and posthumous reputation has, if anything, continued to grow and inspire. As Seletsky (2000: 252) so rightly pointed out, “it is a tribute to Maria Callas that her unmistakable voice and incomparable musicianship always emerge, attracting new listeners regardless of flawed engineering.” May she long continue to do so.





Figure 11.1: *La Divina*

“Probably millions of words have been written about *La Callas*, and quite a few about the vulnerable, lonely, elusive creature who was Maria. There is little I can add. She shone for all too brief a while in the world of opera, like a vivid flame attracting the attention of the whole world, and she had a strange magic which was all her own.

I always thought she was immortal – and *she is*.”

Tito Gobbi (1979: 100)

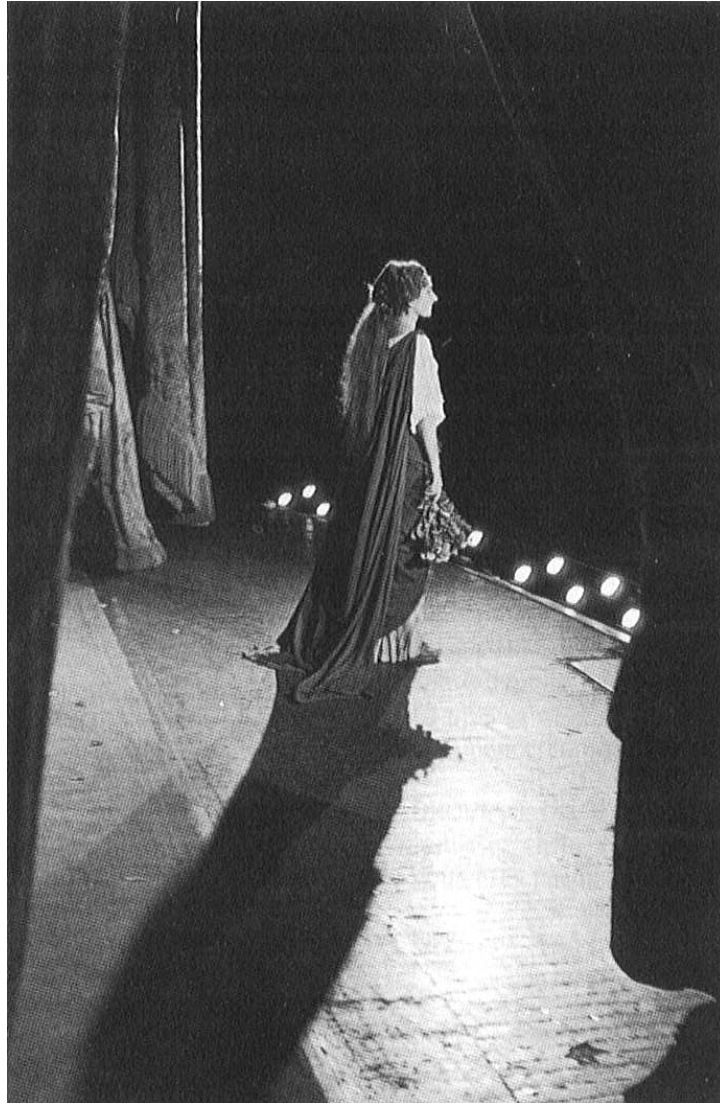


Figure 11.2: Greeting the applause - Metropolitan Opera (New York), 1956

“So, you can die: Sweet is your death and your mission accomplished. What all people perceive to be genius is our need for love; anything else is in vain, nothing will be forever. And since human love will sometime be forgotten, it is destined in the generous heart a fortunate fate, dying like you for blessed, divine love...”

From a poem by Alfred de Musset (1836), dedicated to Maria Malibran (cited in Pilichos 1997)

REFERENCE LIST

1) BOOK PUBLICATIONS:

- Albanese, S. & MacQueen, C. 1999. *The Digital Audio Dictionary*. Indianapolis: Prompt Publications, Howard W. Sams & Co.
- Ardoin, J. 1995. *The Callas Legacy – The Complete Guide to Her Recordings on Compact Disc*. Fourth Edition. London: Duckworth
- Ardoin, J. 1987. *Callas at Juilliard – The Master Classes*. New York: Alfred A. Knopf, Inc.
- Christiansen, R. 1986. *Prima Donna – A History*. Harmondsworth: Penguin Books Ltd.
- Davis, G. & Jones, R. 1989. *The Sound Reinforcement Handbook – Second Edition*. Milwaukee: Hal Leonard Corporation.
- Edwards, A. 2001. *Maria Callas – An Intimate Biography*. New York: St. Martin's Press
- Gage, N. 2001. *Greek Fire – The Story of Maria Callas and Aristotle Onassis*. London: Pan Books
- Galatopoulos, S. 1966. *Callas: La Divina*. London: JM Dent & Sons, Ltd.
- Gara, E. 1958. *Great Concert Artists – Maria Callas*. Geneva: René Kister
- Gathey, C.N. 1979. *Queens of Song*. London: Barrie & Jenkins Ltd.
- Gobbi, T. 1979. *My Life*. London: Macdonald and Jane's Publishers Ltd.
- Jellinek, G. 1960. *Callas – Portrait of a Prima Donna*. London: Anthony Gibbs & Phillips Ltd.
- Kefauver, A.P. 2001. *The Audio Recording Handbook*. Middleton, Wisconsin: A-R Editions, Inc.
- Kennedy, M. (Ed.) 1996. *The Concise Oxford Dictionary of Music*. Fourth Edition. Oxford: Oxford University Press
- Levine, R. 2003. *Maria Callas – A Musical Biography*. New York: Black Dog & Leventhal Publishers
- March, I. (Ed.), Greenfield, E. & Layton, R. 1988. *The New Penguin Guide to Compact Discs and Cassettes*. London: Penguin Books Ltd.
- March, I. (Ed.), Greenfield, E. & Layton, R. 1989. *The New Penguin Guide to Compact Discs and Cassettes*. London: Penguin Books Ltd.
- March, I. (Ed.), Greenfield, E. & Layton, R. 1997. *The New Penguin Guide to Compact Discs and Cassettes Yearbook 1997/8*. London: Penguin Books Ltd.
- Matheopoulos, H. 1991. *Diva – Great Sopranos And Mezzos Discuss Their Art*. London: Victor Gollancz Ltd.

- Miller, R. 1986. *The Structure of Singing*. New York: Schirmer Books.
- Parker, R. (Ed.) 1994. *The Oxford Illustrated History of Opera*. Oxford: Oxford University Press
- Pahlen, K. 1973. *Great Singers*. London: WH Allen
- Randel, D.M. (Ed.) 1986. *The New Harvard Dictionary of Music*. Cambridge, Massachusetts: Harvard University Press
- Rasponi, L. 1984. *The Last Prima Donnas*. London: Victor Gallancz Ltd.
- Reid, C.L. 1985. *A Dictionary of Vocal Terminology*. Huntsville, Texas: Recital Publications
- Schwarzkopf, E. 1982. *On and Off the Record – A Memoir of Walter Legge*. Boston: Northeastern University Press
- Stancioff, N. 1988. *Maria Callas Remembered*. London: Sidgwick & Jackson Ltd.
- Stassinopoulos, A. 1980. *Maria – Beyond The Callas Legend*. London: Weidenfeld and Nicolson
- Steane, J. 1992. *Voices: Singers & Critics*. London: Gerald Duckworth & Co. Ltd.

2) JOURNAL ARTICLES:

- Albright, W. 1995. Macbeth - Giuseppe Verdi. *The Opera Quarterly*, 11(1): 183 - 188
- Bamberger, B. 1997. EMI Classics Mines Vaults To Mark 100. *Billboard Magazine*, 109(36): 5, 118
- Breunig, C. 2004. Breaking The Sound Barrier. *The Strad*, 115(1376): 1332 - 1336
- Canazza, S., Coraddu, G., De Poli, G., & Mian, G.A. 2001. Objective And Subjective Comparison Of Audio Restoration Methods. *Journal of New Music Research*, 30(1): 93 - 102
- Farach-Colton, A. 2002. Review of *Tosca* (EMI 5 67756-2). *Gramophone*, 80(955): 79
- Fairman, R. 1983. Callas – The Juilliard Master Classes. *Opera*, September 1983: 953 - 958
- Fogel, H. 1984. Review of “Maria Callas in Paris: Great Arias from French Opera.” *The Opera Quarterly*, 2(1): 167 - 169
- Fogel, H. 2002. Puccini: *Tosca*. *Fanfare – The magazine for serious record collectors*, 26(1): 187 - 188
- Gasaway, L. 2001. Copyright And Sound Recordings: Overview And Update. *Association for Recorded Sound Collections (ARSC) Journal*, 32(2): 217 - 231.
- Giles, P. 1999. Leap of Faith: Embracing *Tosca*. *Opera News*, 63(9): 48 - 51
- Godsill, S.J., Wolfe, P.J. & Fong, W.N.W. 2001. Statistical Model-Based Approaches To Audio Restoration And Analysis. *Journal of New Music Research*, 30(4): 323 - 338
- Green, L. 1998. Callas and *Lucia*. *The Opera Quarterly*, 14(3): 65 - 71

- Green, L. 1987. La Traviata. *The Opera Quarterly*, 5(2-3): 210 - 218
- Gronow, P. 1999. Copyright and Re-Issues: The European Situation. *Association for Recorded Sound Collections (ARSC) Journal*, 30(2): 166
- Huck, W. 1984. Tosca – Four Callas Toscas, *The Opera Quarterly*, 2(3): 175 - 178
- Jeal, E. 2005. Great Expectations. *The Gramophone*, 83(995): 25 - 29
- Jellinek, G. 1999. Callas – Again? *The Opera Quarterly*, 15(2): 186 - 195
- Lawton, D. 1988. Review of “Callas: In Her Own Words.” *The Opera Quarterly*, 6(2): 156 - 160
- Mandel, M. 1998. Maria Callas on EMI: A Legacy Enhanced. *Fanfare – The magazine for serious record collectors*, 22(1): 62, 64, 66 - 67
- Mandel, M. 2004. More Live Callas from EMI. *Fanfare – The magazine for serious record collectors*, 27(5): 30, 32 - 35
- McKee, E. 2002. Puccini: Tosca. *Association for Recorded Sound Collections (ARSC) Journal*, 33(2): 275 - 277
- Milazzo, L. 2003. Maria Callas in Opera. *American Record Guide*, 66(2): 219 - 221
- Orcalli, A. 2001. On the Methodologies of Audio Restoration. *Journal of New Music Research*, 30(4): 307 - 322
- Rishoi, N. 2001. Norma (1831). *The Opera Quarterly*, 17(3): 533 - 554
- Schüller, D. 1991. The Ethics of Preservation, Restoration and Re-Issues of Historical Sound Recordings. *Journal of the Audio Engineering Society*, 39(12): 1014 - 1016
- Seletsky, R.E. 2000. Callas at EMI: Remastering and Perception. *The Opera Quarterly*, 16(2): 240 - 256
- Seletsky, R.E. 2005. A Callas Recording Update. *The Opera Quarterly*, 21(2): 387 - 406
- Smith, K. 1999. Voices from the past make their presence felt. *Billboard Magazine*, 111(36): 52, 55
- Smith, S. 2002. The Classical Score. *Billboard Magazine*, 114(9): 20
- Stover, S. 1999. Copyright Issues: State and Federal Copyright Law. *Association for Recorded Sound Collections (ARSC) Journal*, 30(1): 33 - 44
- Wolf, M.H. 1984. Madama Butterfly - The Three Voices of Butterfly. *The Opera Quarterly*, 2(3): 187 - 191

3) ELECTRONIC SOURCES:

- Audio Recording FAQ (Frequently Asked Questions). 2005. Retrieved: 09/11/2005. WWW: <http://www.faqs.org/faqs/AudioFAQ/part2>
- Brylawski, S. 2002. Preservation of Digitally Recorded Sound. *Building a national strategy for preservation: Issues in digital media archiving*. Council on Library and Information Resources, Washington, DC. Retrieved: 31/01/2005. WWW: <http://www.clir.org/pubs/reports/pub106/sound.html>
- CEDAR Audio Ltd. 2005. *Introduction to Audio Restoration*. Retrieved: 22/01/2005. WWW: <http://www.cedaraudio.com>
- EMI 2005. *Maria Callas on EMI Classics*. Retrieved: 11/10/2005. WWW: <http://www.callasonemiclassics.com>
- Enhanced Audio.com. 2005. *Glossary of Terms*. Retrieved: 30/09/2005. WWW: <http://www.enhancedaudio.com>
- Enjoythemusic.com. 2005. *Audio Terminology*. Retrieved: 30/09/2005. WWW: <http://www.enjoythemusic.com/audioterminology.com>
- Farr, R.J. 2004. Review of *Tosca* (Naxos 8.110256-57). Retrieved: 14/03/2005. WWW: http://www.musicweb-international.com/classrev/2004/Feb04/Puccini_Tosca_Callas.htm
- Farr, R.J. 2005. Review of *Lucia di Lammermoor* (Naxos 8.110131-32). Retrieved: 28/04/2005. WWW: http://www.musicweb-international.com/classrev/2005/Feb05/Lucia_Callas
- Glossary of Electronic Music Terms. 2005. Retrieved: 10/10/2005. WWW: http://www.digitalthymnal.org/glossary_a-l.html
- Godsill, S.J. & Rayner, P.J.W. 1998. *Digital Audio Restoration - A Statistical Model-Based Approach*. Originally published by Springer-Verlag, London. Retrieved: 22/01/2005. WWW: <http://www.sigproc.eng.cam.ac.uk/~sjg/>
- Hamilton, F. 2005. *Maria Callas - Performance Annals and Discography*. Retrieved: 09/01/2005. WWW: <http://frankhamilton.org/mc>
- Howell, C. 2004a. Review of *Tosca* (EMI 85644). Retrieved: 14/03/2005. WWW: http://www.musicweb-international.com/classrev/2004/Mar04/Puccini_Tosca_Callas_EMI_CH.htm
- Howell, C. 2004b. Review of *Tosca* (Naxos 8.110256-57). Retrieved: 14/03/2005. WWW: http://www.musicweb-international.com/classrev/2004/Feb04/Puccini_Tosca_Callas.htm
- Loft, A. 2004. *Terms Used To Describe How A Loudspeaker Sounds*. Retrieved: 09/11/2005. WWW: <http://forum.ecoustics.com/bbs/messages/34579/114726.html>
- Interstellar Research. 2004. *FFT Windowing*. Retrieved: 07/11/2005. WWW: <http://www.daqarta.com>
- Loukakos, K.P. 1997. *Maria Callas – Looking for the truth behind the legend*. Paper presented at the 1st International Congress in memory of Maria Callas, September 1997, Athens, Greece. Retrieved: 29/09/2005. WWW: <http://www.ids.gr/mariacallas97/english/loukakos.htm>

Marques, N.M. 2002. *Champagne and Coca-Cola: The True Story of the Lisbon Traviata*. Retrieved: 31/08/2005. WWW: http://www.classicalvoice.org/articles/NU_lisbon22032002.htm#lisbon_traviata

Martland, P. 2005. EMI (Electric & Musical Industries). *Grove Music Online*. Macy, L. (Ed.) Retrieved: 28/04/2005. WWW: <http://www.grovemusic.com>

Petkovic, M. 2000. *Callas' Trieste 'Norma' on Melodram CDM 26031: Reality and illusion*. Retrieved: 09/01/2005. WWW: http://www.divinarecords.com/tr_norma.htm

Petkovic, M. 2002. *Callas' Buenos Aires 'Turandot' – Authenticity and forgery*. Retrieved: 09/01/2005. WWW: http://www.divinarecords.com/ba_turan.htm

Pilichos, G.K. 1997. *The Eternal Maria Callas!* Paper presented at the 1st International Congress in memory of Maria Callas, September 1997, Athens, Greece. Retrieved: 29/09/2005. WWW: <http://www.ids.gr/mariacallas97/english/pilichos.htm>

Rosenberg, M.L. 2003. Re-visioning Callas. *USItalia*, November 2003. Retrieved: 03/10/2005. WWW: <http://www.revisioningcallas.com/revision.html>

SDA Digital Hymnal. 2001. *Glossary of Electronic Music Terms*. Retrieved: 10/10/2005. WWW: <http://www.digitalthymnal.org>

Smith, E.S. 1999. Maria Callas Website. Retrieved: 13/01/2005. WWW: <http://www.geocities.com/Vienna/Strasse/1523/callas.htm>

Tommasini, A. 1997. Maria Callas: A Voice And A Legend That Still Fascinates. *New York Times*, 15 September 1997. Retrieved: 09/09/2005. WWW: <http://www.serendipity.li>

Tommasini, A. 2003a. European copyrights expiring on recordings from 1950's. *New York Times*, 2 January 2003. Retrieved: 30/03/2005. WWW: <http://www.nytimes.com>

Tommasini, A. 2003b. From beyond the grave, Callas gives her (warts and) all. *New York Times*, 10 January 2003. Retrieved: 03/08/2005. WWW: <http://www.theage.com.au>

Vandenbergh, M. 2003. *Maria Callas in [the] Teatro Nacional de São Carlos in Lisbon, Portugal – 27 and 30 March 1958*. Retrieved: 28/09/2005. WWW: <http://www.mariacallasonemicclassics.com>

Wikipedia – The Free Encyclopaedia. 2005. WWW: <http://en.wikipedia.org>

4) COMPACT DISC SLEEVE NOTES:

Obert-Thorn, M. 2005. Producer's Note: *Lucia di Lammermoor*. Naxos 8.110131-32

Obert-Thorn, M. 2005. Producer's Note: *Norma*. Naxos 8.110325-27

Osborne, R. 2002. *Victor de Sabata conducts Tosca*. EMI 5 62890 2

Osborne, R. 2003. *Serafin conducts Norma*. EMI 5 62638 2

Osborne, R. 2004. *Serafin conducts Lucia di Lammermoor*. EMI 5 62764 2

Patmore, D. 2004. *Tosca*. Naxos 8.110256-57

Roubinet, M. 2000. *Maria Callas – Myth and Reality*. EMI 5 57050 2/CDELJ (WFL) 148

Scott, M. 2005a. *Norma*. Naxos 8.110325-27

Scott, M. 2005b. *Lucia di Lammermoor*. Naxos 8.110131-32

Steane, J. 1980. *Callas and La Traviata*. EMI 5 56330 2

Steane, J. 1993. *Callas and Macbeth*. EMI 5 66447 2

Steane, J. 1986. *Callas and Tosca*. EMI 5 56304 2

Steane, J. 1989. *Callas and Lucia (1953)*. EMI 5 66438 2

Tarrant, R. 2003. *Maria Callas*. Dejavu Retro Gold Collection. R2CD 42-51

5) VOCAL SCORES:

Bellini, V. *Norma*. Edited by A. Sullivan and J. Pittman. New York: Boosey & Hawkes, Inc.

Donizetti, G. *Lucia di Lammermoor*. Milan: G. Ricordi & Co. Ltd.

Puccini, G. *Madama Butterfly*. Arranged for voice and piano by C. Carignani. London: G. Ricordi & Co. Ltd.

Puccini, G. *Tosca*. Arranged for voice and piano by C. Carignani. London: G. Ricordi & Co. Ltd.

Verdi, G. *La Traviata*. Milan: G. Ricordi & Co. Ltd.

Verdi, G. *Macbeth*. Edited by M. Parenti. Milan: G. Ricordi & Co. Ltd.

6) AUDIO-VISUAL RESOURCES:

Davidson, M. 1998. *Maria Callas: A Big Destiny*. Produced and directed by M. Davidson. BBC/Arts and Entertainment Network Co-Production. Produced as part of *Reputations*. Series editor: J. Hadlow.

Lewens, A. & Mitchell, A. 1999. *Maria Callas – Life and Art*. Produced and directed by A. Lewens & A. Mitchell. Jo Lustig Ltd. Released on EMI Classics DVD (EMI 4 92248 9).

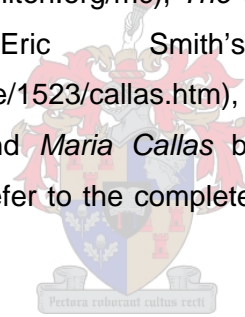
ADDENDUM A

DISCOGRAPHY OF RECORDINGS BY MARIA CALLAS RELEASED ON EMI

“Maria Callas suffered a fate as flamboyant as it was tragic, like her favourite characters, those women who came into their own fully as they submitted to the playing out of their destiny: Norma, Violetta, Tosca, Medea. Happily the discs are there to pay homage to the artist to whom we owe an eternal debt, and to bear witness to an art which will live forever.”

Michael Roubinet (2000)

The following discography has been compiled from Frank Hamilton’s *Maria Callas – Performance Annals and Discography* (<http://frankhamilton.org/mc>), *The Callas Legacy* by John Ardoin, information obtained from Scott Eric Smith’s Maria Callas website (<http://www.geocities.com/Vienna/Strasse/1523/callas.htm>), the EMI Classics Callas website (<http://www.callasonemiclassics.com>) and *Maria Callas* by Robert Levine. For more information regarding the various sources, please refer to the complete reference list provided at the end of this study.



A complete discography of all Callas’s studio and “live” recordings, both authorised and “pirate,” is beyond the scope of this study. The current selection has therefore been limited to provide a complete overview of the entire EMI Callas Edition, as released between 1997 and present. Catalogue numbers are also provided in the case of complete opera recordings that have subsequently been reissued as part of EMI’s Great Recordings of the Century and Historical series, or were released prior to 1997, as these releases are also relevant to the current study. In each case, dates in brackets after catalogue numbers indicate year of release.

The multitude of various compilation discs of Callas recordings that have been issued by EMI have also not been included in this discography, as these recordings were sourced either from the complete opera sets or the recital recordings already listed.

For a complete discography of all known recorded Callas material, as well as a complete performance history, please refer to Frank Hamilton’s *Maria Callas – Performance Annals and Discography* (<http://frankhamilton.org/mc>).

COMPLETE OPERA RECORDINGS

BELLINI, VINCENZO (1801 - 1835)

NORMA

“Live” Performance - Covent Garden, London

Tuesday, 18 November 1952

Maria Callas (Norma), Mirto Picchi (Pollione), Ebe Stignani (Adalgisa), Giacomo Vaghi (Oroveso), Joan Sutherland (Clotilde), Paul Asciak (Flavio)

Orchestra and Chorus of the Royal Opera House, Covent Garden, London

Conductor: Vittorio Gui

EMI 7243 5 62668 2 7 (2003)

Studio Recording - Cinema Metropol, Milan

Friday, 23 April – 3 May 1954

Maria Callas (Norma), Mario Filippeschi (Pollione), Ebe Stignani (Adalgisa), Nicola Rossi-Lemeni (Oroveso), Rina Cavallari (Clotilde), Paolo Caroli (Flavio)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Tullio Serafin

EMI CDS 7 47304 8 (1985 & 1993), EMI CDM7 64419 2 (1992), EMI CDS 5 56271 2 (1997), EMI 7243 5 62638 2 6 [Great Recordings of the Century, Nipper logo] (2003), EMI 7243 5 62642 2 9 [Great Recordings of the Century, Angel logo] (2003)

Studio Recording - Teatro alla Scala, Milan

Monday, 5 – 12 September 1960

Maria Callas (Norma), Franco Corelli (Pollione), Christa Ludwig (Adalgisa), Nicola Zaccaria (Oroveso), Edda Vincenzi (Clotilde), Piero de Palma (Flavio)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Tullio Serafin

EMI CMS 7 63000 2 (1989), EMI CDM7 63091 2 (1989), EMI CMS 5 66428 2 (1997), EMI CDM5 66662 2 (1998)



IL PIRATA

“Live” Performance - Carnegie Hall, New York

Tuesday, 27 January 1959

Pier Miranda Ferraro (Gualtiero), Costantino Ego (Ernesto), Glade Peterson (Itulbo), Chester Watson (Goffredo), Regina Sarfaty (Adele)

American Opera Society

Conductor: Nicola Rescigno

EMI CMS 7 64938 2 (1993), EMI CMS 5 66432 2 (1997)

“You are born an artist or you are not. And you stay an artist, dear, even if your voice is less of a fireworks [*sic*]. The artist is always there.”

Maria Callas (cited in Tarrant 2003)

I PURITANI

Studio Recording - Basilica di Santa Euphemia, Milan

Tuesday, 24 March – 3 April 1953

Maria Callas (Elvira), Giuseppe Di Stefano (Arturo), Rolando Panerai (Riccardo), Nicola Rossi Lemeni (Giorgio), Carlo Forti (Gualtiero), Angelo Mercuriali (Bruno), Aurora Cattelani (Enrichetta di Francia)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Tullio Serafin

EMI CDS 7 47308 8 (1986 & 1992), EMI CDS 5 56275 2 (1997), EMI CDM5 66665 2 (1998), EMI 7243 5 85647 2 3 [Historical Recordings] (2003), NAXOS 8.110259-60 [Transferred from LP] (2004)

LA SONNAMBULA

“Live” Performance - Teatro alla Scala, Milan

Saturday, 5 March 1955

Cesare Valletti (Elvino), Giuseppe Modesti (Rodolfo), Gabriella Carturan (Teresa), Eugenia Ratti (Lisa), Pierluigi Latinucci (Alessio), Giuseppe Nessi (Un notaro)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Leonard Bernstein

EMI 7243 5 67906 2 9 (2002)

Studio Recording - Basilica di Santa Euphemia, Milan

3 – 9 March 1957

Nicola Monti (Elvino), Nicola Zaccaria (Rodolfo), Fiorenza Cossotto (Teresa), Eugenia Ratti (Lisa), Giuseppe Morresi (Alessio), Franco Ricciardi (Un notaro)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Antonino Votto

EMI CDS 7 47378 8 (1986 & 1993), EMI CDS 5 56278 2 (1997)

“Live” Performance - Grosseshaus, Cologne

Thursday, 4 July 1957

Nicola Monti (Elvino), Nicola Zaccaria (Rodolfo), Fiorenza Cossotto (Teresa), Mariella Angioletti (Lisa), Dino Mantovani (Alessio), Franco Ricciardi (Un notaro)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Antonino Votto

EMI 7243 5 62672 2 0 (2003)

BIZET, GEORGES (1838 - 1875)

CARMEN

Studio Recording - Salle Wagram, Paris

5 – 20 July 1964

Maria Callas (Carmen), Nicolai Gedda (Don José), Andréa Guiot (Micaëla), Robert Massard (Escamillo), Nadine Sautereau (Frasquita), Jane Berbié (Mercédès), Jean-Paul Vauquelin (Le Dancaïre), Jacques Pruvost, Maurice Maievski (Le Remendado), Claude Calès (Moralès), Jacques Mars (Zuniga)

Choeurs René Duclos

Choeurs d'enfants Jean Pesneaud

Orchestre du Théâtre National de l'Opéra de Paris

Conductor: Georges Prêtre

EMI CDS 7 47313 8 (1985), EMI CDM7 63075 2 (1989), EMI CDS 7 54368 (1991), EMI CDS 5 56281 2 (1997), EMI CDM 5 66663 2 (1998)

CHERUBINI, LUIGI (1760 - 1842)

MEDEA

“Live” Performance - Teatro alla Scala, Milan

Thursday, 10 December 1953

Maria Callas (Medea), Gino Penno (Giasone), Maria Luisa Nache (Glauce), Giuseppe Modesti (Creonte), Fedora Barbieri (Neris), Angela Vercelli (Prima ancella), Maria Amadini (Seconda ancella), Enrico Campi (Capo delle guardie del re)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Leonard Bernstein

EMI 7243 5 67909 2 6 (2002)

Studio Recording - Teatro alla Scala, Milan

12 – 19 September 1957

Maria Callas (Medea), Mirto Picchi (Giasone), Renata Scottò (Glauce), Giuseppe Modesti (Creonte), Miriam Pirazzini (Neris), Lydia Marimpietri (Prima ancella), Elvira Galassi (Seconda ancella), Alfredo Giacomotti (Capo delle guardie del re)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Tullio Serafin

EMI CMS 7 63625 2 (1990), EMI 5 66435 2 (1997) [DISCONTINUED]

DONIZETTI, GAETANO (1797 - 1848)

ANNA BOLENA

“Live” Performance – Teatro alla Scala, Milan

Sunday, 14 April 1957

Maria Callas (Anna Bolena), Gianni Raimondi (Lord Riccardo Percy), Nicola Rossi-Lemeni (Enrico VIII), Giulietta Simionato (Giovanna Seymour), Plinio Clabassi (Lord Rochefort), Luigi Rumbo (Sir Hervey), Gabriella Carturan (Smeton)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Gianandrea Gavazzeni

EMI CMS7 64941 2 (1993), EMI CMS 5 66471 2 (1997)

LUCIA DI LAMMERMOOR

Studio Recording - Teatro Comunale, Florence

29 January – 5 February 1953

Maria Callas (Lucia), Giuseppe Di Stefano (Edgardo), Tito Gobbi (Enrico), Raffaele Arié (Raimondo), Valiano Natali (Arturo), Anna Maria Canali (Alisa), Gino Sarri (Normanno)

Orchestra and Chorus of the Maggio Musicale Fiorentino

Conductor: Tullio Serafin

EMI CMS 7 69980 2 (1989 & 1993), EMI CDM7 64420 2 (1992), EMI CMS 5 66438 2 (1997), EMI 7243 5 62747 2 3 (2004), EMI 7243 5 86197 2 0 (2004)

“Live” Performance - Städtische Oper, Berlin

Thursday, 29 September 1955

Maria Callas (Lucia), Giuseppe Di Stefano (Edgardo), Rolando Panerai (Enrico), Nicola Zaccaria (Raimondo), Giuseppe Zampieri (Arturo), Luisa Villa (Alisa), Mario Carlin (Normanno)

Chorus of the Teatro alla Scala, Milan

RIAS [Rundfunk im Amerikanischen Sektor] Symphony Orchestra, Berlin

Conductor: Herbert von Karajan

EMI CMD7 63631 2 (1990), EMI CMS 5 66441 2 (1997)

Studio Recording – Kingsway Hall, London

16 – 29 March 1959

Maria Callas (Lucia), Ferruccio Tagliavini (Edgardo), Piero Cappuccilli (Enrico), Bernard Ladysz (Raimondo), Leonard del Ferro (Arturo), Margreta Elkins (Alisa), Renzo Casellato (Normanno)

Philharmonia Orchestra and Chorus

Conductor: Tullio Serafin

EMI CDS 7 47440 8 (1986), EMI CDM7 63934 2 (1986), EMI CDS 5 56284 2 (1997), EMI CDM5 66664 2 (1998)

POLIUTO

“Live” Performance – Teatro alla Scala, Milan

Wednesday, 7 December 1960

Franco Corelli (Poliuto), Ettore Bastianini (Severo), Nicola Zaccaria (Callistene), Rinaldo Pelizzoni (Felice), Piero de Palma (Nearco), Virgilio Carbonari (Primo cristiano), Giuseppe Morresi (Secondo cristiano)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Antonino Votto

EMI CMS 5 65448 2 (1997)

GIORDANO, UMBERTO (1867 - 1948)

ANDREA CHÉNIER

“Live” Performance – Teatro alla Scala, Milan

Saturday, 8 January 1955

Maria Callas (Maddalena di Coigny), Mario del Monaco (Andrea Chénier), Aldo Protti (Carlo Gérard), Maria Amadini (La contessa di Coigny), Silvana Zanolli (La mulatta Bersi), Enzo Sordello (Pietro Fléville), Mario Carlin (L'abate), Carlo Forti (Il maestro di casa), Michele Cazzato (Il sanculotto Mathieu), Mariano Caruso (Un «Incredibile»), Enrico Campi (Roucher), Lucia Danieli (Madelon), Vittorio Tatzzi (Fouquier-Tinville), Giuseppe Morresi (Dumas, presidente), Eraldo Coda (Schmidt)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Antonino Votto

EMI 7243 5 67913 2 9 (2002)

GLUCK, CHRISTOPH WILLIBALD VON (1714 - 1787)

IFIGENIA IN TAURIDE

“Live” Performance – Teatro alla Scala, Milan

Saturday, 1 June 1957

Maria Callas (Ifigenia), Francesco Albanese (Pilade), Anselmo Colzani (Toante), Fiorenza Cossotto (Artemide), Dino Dondi (Oreste), Franco Piva (Uno scita), Stefania Malagù (Prima sacerdotessa), Pinuccia Perotti (Seconda sacerdotessa), Edith Martelli (Una schiava greca), Costantino Ego (Un servo del tempio)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Nino Sanzogno

EMI CMS 5 65451 2 (1997)

LEONCAVALLO, RUGGIERO (1857 - 1919)

I PAGLIACCI

Studio Recording – Teatro alla Scala, Milan

12 – 17 June 1954

Maria Callas (Nedda), Giuseppe Di Stefano (Canio), Tito Gobbi (Tonio), Nicola Monti (Peppe), Rolando Panerai (Silvio)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Tullio Serafin

EMI CDS 7 47981 8 (1987 & 1993), EMI CDS 5 56287 2 (1997)

MASCAGNI, PIETRO (1863 - 1945)

CAVALLERIA RUSTICANA

Studio Recording - Basilica di Santa Eufemia, Milan

16 – 25 June & 3 – 4 August 1953

Maria Callas (Santuzza), Giuseppe Di Stefano (Turiddu), Rolando Panerai (Alfio), Anna Maria Canali (Lola), Ebe Ticozzi (Lucia), Maria Callas (Una donna)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Tullio Serafin

EMI CDS 7 47981 8 (1987 & 1993), EMI CDS 5 56287 2 (1997)

PONCHIELLI, AMILCARE (1834 - 1886)

LA GIOCONDA

Studio Recording – Teatro alla Scala, Milan

4 – 11 September 1959

Maria Callas (La Gioconda), Fiorenza Cossotto (Laura Adorno), Irene Companeez (La cieca), Pier Miranda Ferraro (Enzo Grimaldo), Piero Cappuccilli (Barnaba), Ivo Vinco (Alvise Badoero), Leonardo Monreale (Zuàne), Renato Ercolani (Isèpo), Carlo Forti (Un cantore, Un pilota), Bonaldo Giaiotti (Un barnabotto), Renato Ercolani (Prima voce lontana), Aldo Biffi (Seconda voce lontana)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Antonino Votto

EMI CDS 7 49518 2 (1987), EMI CDS 5 56291 2 (1997)

PUCCINI, GIACOMO (1858 - 1924)

LA BOHÈME

Studio Recording – Teatro alla Scala, Milan

20 – 25 August & 3 – 12 September 1956

Maria Callas (Mimi), Giuseppe Di Stefano (Rodolfo), Rolando Panerai (Marcello), Anna Moffo (Musetta), Nicola Zaccaria (Colline), Manuel Spatafora (Schaunard), Carlo Badioli (Benoît/Alcindoro), Franco Ricciardi (Parpignol), Eraldo Coda (Un doganiere), Carlo Forti (Sergente dei doganieri)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Antonino Votto

EMI CDS 7 47475 8 (1987 & 1993), EMI CDS 5 56295 2 (1997), EMI CDM 5 66670 2 (1998)

MADAMA BUTTERFLY

Studio Recording – Teatro alla Scala, Milan

1 – 6 August 1955

Maria Callas (Cio-Cio-San), Nicolai Gedda (BF Pinkerton), Lucia Danieli (Suzuki), Mario Borriello (Sharpless), Renato Ercolani (Goro), Mario Carlin (Il principe Yamadori), Plinio Clabassi (Lo zio Bonzo), Enrico Campi (Il commissario imperiale), Luisa Villa (Kate Pinkerton), Mario Carlin (L'ufficiale del registro)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Herbert von Karajan

EMI CDS 7 47959 8 (1987 & 1993), EMI CDM 7 64421 2 (1992), EMI CDS 5 56298 2 (1997)

MANON LESCAUT

Studio Recording – Teatro alla Scala, Milan

18 – 27 July 1957

Maria Callas (Manon Lescaut), Giuseppe Di Stefano (Renato des Grieux), Giulio Fioravanti (Lescaut), Franco Calabrese (Geronte di Ravoir), Dino Formichini (Edmondo), Carlo Forti (L'oste), Vito Tatone (Il maestro di ballo), Fiorenza Cossotto (Un musico), Giuseppe Morresi (Un sergente), Franco Ricciardi (Un lampionaio), Franco Ventriglia (Un comandante di marina)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Tullio Serafin

EMI CDS 7 47393 8 (1985 & 1992), EMI CDS 5 56301 2 (1997)

TOSCA

Studio Recording – Teatro alla Scala, Milan

10 – 21 August 1953

Maria Callas (Floria Tosca), Giuseppe Di Stefano (Mario Cavaradossi), Tito Gobbi (Il barone Scarpia), Franco Calabrese (Cesare Angelotti), Melchiorre Luise (Il sagrestano), Angelo Mercuriali (Spoletta), Dario Caselli (Sciarrone, Un carceriere), Alvaro Cordova (Un pastore)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Victor De Sabata

EMI CDS 7 47175 8 (1984 & 1992), EMI CDCB 7 47174-2 (USA), EMI CDM7 64422 2 (1992), EMI CDS 5 56304 2 (1997), EMI 7243 5 67756 2 6 [Great Recordings of the Century, Nipper logo] (2002), EMI 7243 5 67759 2 3 [Great Recordings of the Century, Angel logo], EMI 7243 5 85644 2 6 [Historical Series] (2003), NAXOS 8.110256-57 [Transferred from LP] (2004), EMI 7243 5 62890 2 4 [Great Recordings of the Century, Nipper logo] (2004)

“Live” Performance – Royal Opera House, Covent Garden, London

Friday, 24 January 1964

Maria Callas (Floria Tosca), Renato Cioni (Mario Cavaradossi), Tito Gobbi (Il barone Scarpia), Victor Godfrey (Cesare Angelotti), Eric Garrett (Il sagrestano), Robert Bowman (Spoletta), Dennis Wicks (Sciarrone), Edgard Boniface (Un carceriere), David Sellar (Un pastore)

Orchestra and Chorus of the Royal Opera House, Covent Garden, London

Conductor: Carlo Felice Cillario

EMI 7243 5 62675 2 7 (2003)

Studio Recording – Salle Wagram, Paris

3 – 31 December 1964

Maria Callas (Floria Tosca), Carlo Bergonzi (Mario Cavaradossi), Tito Gobbi (Il barone Scarpia), Leonardo Monreale (Angelotti, Un carceriere), Giorgio Tadeo (Il sagrestano), Renato Ercolani (Spoletta), Ugo Trama (Sciarrone), David Sellar (Un pastore)

Choeurs du Théâtre National de l’Opéra

Orchestre de la Société des Concerts du Conservatoire

Conductor: Georges Prêtre

EMI CMS 7 69974 2 (1989), EMI CDM7 63087 2 (1989), EMI CMS 5 66444 2 (1997), EMI CDM5 66666 2 (1998)

TURANDOT

Studio Recording – Teatro alla Scala, Milan

9 – 17 July 1953

Maria Callas (Turandot), Elisabeth Schwarzkopf (Liù), Eugenio Fernandi (Calaf), Nicola Zaccaria (Timur), Mario Borriello (Ping), Renato Ercolani (Pang), Piero de Palma (Pong), Giuseppe Nessi (L’imperatore Altoum), Giulio Mauri [Nicola Zaccaria] (Un mandarino), Piero de Palma (Il principino di Persia), Elisabetta Fusco (Prima voce), Pinuccia Perotti (Seconda voce)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Tullio Serafin

EMI CDS 7 47971 8 (1987 & 1992), EMI CDS 5 56307 2 (1997)

ROSSINI, GIOACHINO (1792 - 1868)

IL BARBIERE DI SIVIGLIA

Studio Recording – Kingsway Methodist Hall, London

7 – 14 February 1957

Maria Callas (Rosina), Tito Gobbi (Figaro), Luigi Alva (Il conte d’Almaviva), Nicola Zaccaria (Basilio), Fritz Ollendorff (Bartolo), Gabriella Carturan (Berta), Mario Carlin (Fiorello / Un ufficiale)

Philharmonia Orchestra and Chorus

Conductor: Alceo Galliera

EMI CDS 7 47634 8 (1986 & 1993), EMI CDM7 63076 2 (1989), EMI CDS 5 56310 2 (1997), EMI CDM5 66671 2 (1998)

“No-one has ever accused me of not being disciplined. I don’t like being told what to do, because I know my job very well.”

Maria Callas (cited in Davidson 1998)

IL TURCO IN ITALIA

Studio Recording – Teatro alla Scala, Milan

31 August – 8 September 1954

Maria Callas (Fiorilla), Nicola Rossi Lemeni (Selim), Nicolai Gedda (Don Narciso), Jolanda Gardino (Zaida), Piero de Palma (Albazar), Franco Calabrese (Don Geronio), Mariano Stabile (Prosdocimo)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Gianandrea Gavazzeni

EMI CDS 7 49344 2 (1987 & 1993), EMI CDS 5 56313 2 (1997)

VERDI, GIUSEPPE (1813 - 1901)

AÏDA

“Live” Performance - Palacio de las Bellas Artes, Mexico City

Tuesday, 3 July 1951

Maria Callas (Aïda), Mario del Monaco (Radamès), Oralia Domínguez (Amneris), Giuseppe Taddei (Amonasro), Ignacio Ruffino (Il re d'Egitto), Roberto Silva (Ramfis), Carlos Sagarminaga (Un messaggero), Rosita Rodríguez (Una sacerdotessa)

Orchestra and Chorus of the Palacio de las Bellas Artes

Conductor: Oliviero de Fabritiis

EMI 7243 5 62678 2 4 (2003)

Studio Recording – Teatro alla Scala, Milan

10 – 24 August 1955

Maria Callas (Aïda), Richard Tucker (Radamès), Fedora Barbieri (Amneris), Tito Gobbi (Amonasro), Nicola Zaccaria (Il re d'Egitto), Giuseppe Modesti (Ramfis), Franco Ricciardi (Un messaggero), Elvira Galassi (Una sacerdotessa)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Tullio Serafin

EMI CDS 7 49030 8 (1987 & 1992), EMI CDS 5 56316 2 (1997), EMI CDM5 66668 2 (1998)

UN BALLO IN MASCHERA

Studio Recording – Teatro alla Scala, Milan

4 – 12 September 1956

Maria Callas (Amelia), Giuseppe Di Stefano (Riccardo), Tito Gobbi (Renato), Fedora Barbieri (Ulrica), Eugenia Ratti (Oscar), Ezio Giordano (Silvano), Silvio Maionica (Samuel), Nicola Zaccaria (Tom), Renato Ercolani (Un giudice / Un servo d'Amelia)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Antonino Votto

EMI CDS 7 47498 8 (1987), EMI CDS 5 56320 2 (1997)

“Live” Performance – Teatro alla Scala, Milan

Saturday, 7 December 1957

Maria Callas (Amelia), Giuseppe Di Stefano (Riccardo), Ettore Bastianini (Renato), Giulietta Simionato (Ulrica), Eugenia Ratti (Oscar), Giuseppe Morresi (Silvano), Antonio Cassinelli (Samuel), Marco Stefanoni (Tom), Angelo Mercuriali (Un giudice), Antonio Ricci (Un servo d'Amelia)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Gianandrea Gavazzeni

EMI 7243 5 67918 2 4 (2002)

LA FORZA DEL DESTINO

Studio Recording – Teatro alla Scala, Milan

17 – 27 August 1954

Maria Callas (Leonora), Richard Tucker (Don Alvaro), Carlo Tagliabue (Don Carlo), Nicola Rossi Lemeni (Padre Guardiano), Renato Capecchi (Fra Melitone), Elena Nicolai (Preziosilla), Plinio Clabassi (Il marchese di Calatrava), Rina Cavallari (Curra/Una mendicante), Dario Caselli (Un alcade / Un chirurgo), Gino del Signore (Mastro Trabuco), Dario Caselli, Giulio Scarinci, Ottorino Bagali (Soldati, Giuocatori)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Tullio Serafin

EMI CDS 7 47581 8 (1987 & 1993), EMI CDS 5 56323 2 (1997)

MACBETH

“Live” Performance – Teatro alla Scala, Milan

Sunday, 7 December 1952

Maria Callas (Lady Macbeth), Enzo Mascherini (Macbeth), Italo Tajo (Banco), Gino Penno (Macduff), Luciano della Pergola (Malcolm), Angela Vercelli (Una dama di Lady Macbeth), Dario Caselli (Un medico), Attilio Barbese (Domestico di Macbeth), Mario Tommasini (Un sicario), Ivo Vinco (Un araldo)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Victor De Sabata

EMI CMS 7 64944 2 (1993), EMI CMS 5 66447 2 (1997)

RIGOLETTO

Studio Recording – Teatro alla Scala, Milan

3 – 16 September 1955

Maria Callas (Gilda), Giuseppe Di Stefano (Il duca di Mantova), Tito Gobbi (Rigoletto), Nicola Zaccaria (Sparafucile), Adriana Lazzarini (Maddalena), Plinio Clabassi (Il conte di Monterone), Renato Ercolani (Matteo Borsa), Elvira Galassi (La contessa di Ceprano), Giuse Gerbino (Giovanna), William Dickie (Il cavaliere Marullo), Carlo Forti (Il conte di Ceprano), Vittorio Tatzzi (Usciere di corte), Luisa Mandelli (Paggio della duchessa)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Tullio Serafin

EMI CDS 7 47469 8 (1986 & 1993), EMI CDS 5 56327 2 (1997), EMI CDM 5 66667 2 (1998)

LA TRAVIATA

“Live” Performance – Teatro alla Scala, Milan

Saturday, 28 May 1955

Maria Callas (Violetta Valéry), Giuseppe Di Stefano (Alfredo Germont), Ettore Bastianini (Giorgio Germont), Silvana Zanolli (Flora Bervoix), Arturo la Porta (Il barone Douphol), Silvio Maionica (Il dottor Grenvil), Luisa Mandelli (Annina), Giuseppe Zampieri (Gastone di Letorières), Antonio Zerbini (Il marchese d'Obigny), Franco Ricciardi (Giuseppe), Carlo Forti (Un commissionario)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Carlo Maria Giulini

EMI CMS 7 63628 2 (1990), EMI CDM 7 64423 2 (1992), EMI CMS 5 66450 2 (1997)

“I do not like being called ‘La Divina.’... I am Maria Callas. And I am only a woman.”

Maria Callas (cited in Stancioff 1988: vii)

“Live” Performance – Teatro Nacional de São Carlos, Lisbon

Thursday, 27 March 1958

Maria Callas (Violetta Valéry), Alfredo Kraus (Alfredo Germont), Mario Sereni (Giorgio Germont), Laura Zannini (Flora Bervoix), Álvaro Malta (Il barone Douphol), Alessandro Maddalena (Il dottor Grenvil), Maria Cristina de Castro (Annina), Piero de Palma (Gastone di Letorières), Vito Susca (Il marchese d’Obigny), Manuel Leitão (Un messaggero)

Chorus of the Teatro Nacional de São Carlos

Portugese National Symphony Orchestra

Conductor: Franco Ghione

EMI CDS 7 49187 8 (1987), EMI CDS 5 56330 2 (1997)

IL TROVATORE

Studio Recording – Teatro alla Scala, Milan

3 – 9 August 1956

Maria Callas (Leonora), Fedora Barbieri (Azucena), Giuseppe Di Stefano (Manrico), Rolando Panerai (Il conte di Luna), Nicola Zaccaria (Ferrando), Luisa Villa (Ines), Renato Ercolani (Ruiz, Un messaggero), Giulio Mauri [Nicola Zaccaria] (Un vecchio zingaro)

Orchestra and Chorus of the Teatro alla Scala, Milan

Conductor: Herbert von Karajan

EMI CDS 7 49347 2 (1987 & 1993), EMI CDS 5 56333 2 (1997), EMI CDM5 66669 2 (1998), EMI 7243 5 62898 2 6 [Great Recordings of the Century, Nipper logo] (2004)

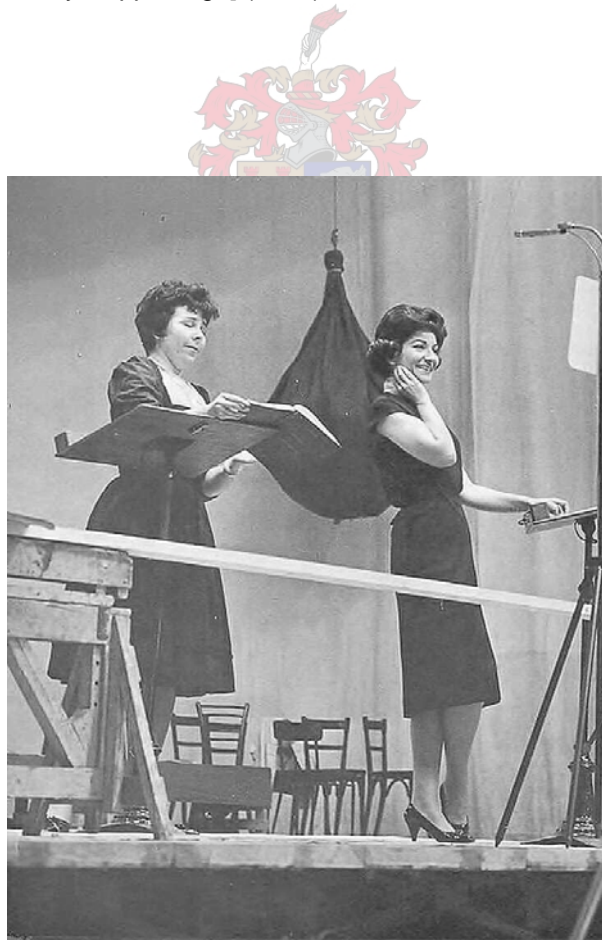


Figure A1: Recording *Norma* with Christa Ludwig (Adalgisa), 1960.

STUDIO RECITALS

Callas at La Scala

EMI 7243 5 66457 2 1

Cherubini	<i>Medea</i>	Dei tuoi figli la madre (Act I)	11/06/1955*
Spontini	<i>La vestale</i>	Tu che invoco (Act II)	10 - 12/06/1955
Spontini	<i>La vestale</i>	O nume tutelar (Act II)	10 - 12/06/1955
Spontini	<i>La vestale</i>	Caro oggetto (Act III)	10 - 12/06/1955
Bellini	<i>La sonnambula</i>	Compagne, teneri amici. . . Come per me sereno (Act I)	9, 12/06/1955
Bellini	<i>La sonnambula</i>	Oh! se una volta sola. . . Ah! non credea mirarti. . . Ah! non giunge uman pensiero (Act II)	9, 12/06/1955

Orchestra of the Teatro alla Scala, Milan
Conductor: Tullio Serafin
Producer: Walter Jellinek
Balance Engineer: Robert Beckett
Remastered by Simon Gibson, Abbey Road Studios, London

*Date of recording.

Lyric & Coloratura Arias

EMI 7243 5 66458 2 0

Cilèa	<i>Adriana Lecouvreur</i>	Ecco: respiro appena. Io son l'umile ancella (Act I)	20/09/1954
Cilèa	<i>Adriana Lecouvreur</i>	Poveri fiori (Act IV)	20/09/1954
Giordano	<i>Andrea Chénier</i>	La mamma morta (Act III)	18, 20/09/1954
Catalani	<i>La Wally</i>	Ebben? ne andrò lontana (Act I)	20/09/1954
Boïto	<i>Mefistofele</i>	L'altra notte in fondo al mare (Act III)	17/09/1954
Rossini	<i>Il barbiere di Siviglia</i>	Una voce poco fà (Act I)	21/09/1954
Meyerbeer	<i>Dinorah</i>	Ombra leggiara (Act II)	21/09/1954
Delibes	<i>Lakmé</i>	Dov'è l'indiana bruna? (Act II)	21/09/1954
Verdi	<i>I vespri siciliani</i>	Mercè, dilette amiche (Act V)	21/09/1954

Philharmonia Orchestra
Conductor: Tullio Serafin
Producer: Walter Legge
Balance Engineer: Robert Beckett
Remastered by Paul Baily, Abbey Road Studios, London

Mad Scenes

EMI 7243 5 66459 2 9

Donizetti	<i>Anna Bolena</i>	Piangete voi? . . . Al dolce guidami castel natio. . . Qual mesto suon!. . . Cielo, ai miei lunghi spasimi. . . Suon festivo? . . . Coppia iniqua (Act II)	24 - 25/09/1958
Thomas	<i>Hamlet</i>	À vos jeux. . . Partagez-vous mes fleurs. . . Et maintenant, écoutez ma chanson (Act IV)	25/09/1958
Bellini	<i>Il pirata</i>	Oh! s'io potessi. . . Col sorriso d'innocenza. . . Qual suon ferale. . . O sole, ti vela (Act II)	25/09/1958

Philharmonia Orchestra and Chorus
Conductor: Nicola Rescigno
Producer: Walter Legge
Balance Engineer: Neville Boyling
Remastered by Simon Gibson, Abbey Road Studios, London

Verdi Arias I**EMI 7243 5 66460 2 5**

Verdi	<i>Macbeth</i>	Nel dì della vittoria. . . Vieni! t'affretta! . . Duncano sarà qui?. . . Or tutti sorgete (Act I)	19/09/1958
Verdi	<i>Macbeth</i>	La luce langue (Act II)	19/09/1958
Verdi	<i>Macbeth</i>	Una macchia è qui tuttora! (Act IV)	19, 21, 24/09/1958
Verdi	<i>Nabucco</i>	Ben io t'invenni. . . Anch'io dischiuso un giorno. . . Salgo già del trono aurato (Act II)	20, 24/09/1958
Verdi	<i>Ernani</i>	Surta è la notte. . . Ernani ! Ernani, involami !. . . Tutto sprezzo che d'Ernani (Act I)	21/09/1958
Verdi	<i>Don Carlo</i>	Tu che le vanità (Act IV)	20, 21, 24/09/1958

Philharmonia Orchestra
 Conductor: Nicola Rescigno
 Producer: Walter Legge
 Balance Engineer: Neville Boyling
 Remastered by Andrew Walter, Abbey Road Studios, London

Verdi Arias II**EMI 7243 5 66461 2 4**

Verdi	<i>Otello</i>	Mi pareva. M'ingiunse di coricarmi. . . Mia madre aveva una povera ancella. . . (Act IV)	16 - 17/12/1963
Verdi	<i>Otello</i>	Piangea cantando (Act IV)	16 - 17/12/1963
Verdi	<i>Otello</i>	Ave Maria, piena di grazia (Act IV)	16 - 17/12/1963
Verdi	<i>Aroldo</i>	Ciel, ch'io respiri! . . . Salvami, salvami, tu gran Dio! (Act I)	20/02/1964
Verdi	<i>Aroldo</i>	O cielo! Dove son io? . . . Ah! degli scanni. . . Ah, fuggite il mio terrore (Act II)	30/12/1963, 6/01 & 10, 22, 24/04/1964
Verdi	<i>Don Carlo</i>	Non pianger, mia compagna (Act II)	27/12/1963 & 20/02/1964
Verdi	<i>Don Carlo</i>	O don fatale (Act III)	17, 30/12/1963 & 21/02/64

Orchestre de la Société des Concerts du Conservatoire
 Conductor: Nicola Rescigno
 Producer: Michel Glotz
 Balance Engineer: Paul Vavasseur
 Remastered by Simon Gibson, Abbey Road Studios, London

Verdi Arias III**EMI 7243 5 66462 2 3**

Verdi	<i>I lombardi</i>	O madre, dal cielo soccorri. . . Se vano è il pregare (Act II)	10, 24/04/1964 & 20/01/1965
Verdi	<i>Attila</i>	Liberamente or piangi. . . Oh! nel fuggente nuvolo (Act I)	7, 24/04/1964
Verdi	<i>Il corsaro</i>	Egli non riede ancor. . . Non so le tetre immagini (Act I)	20, 24/02 & 5/03/1969
Verdi	<i>Il corsaro</i>	Né sulla terra. . . Volà talor dal carcere. . . Verrò. . . Ah, conforto è sol la speme (Act II)	20, 24/02 & 5/03/1969
Verdi	<i>Il trovatore</i>	Tacea la notte placida. . . Di tale amor (Act I)	15/04/1964 & 20/01/1965
Verdi	<i>I vespri siciliani</i>	Arrigo! ah, parli a un core (Act IV)	21/02, 21/04/1964 & 8, 22/01/1965
Verdi	<i>Un ballo in maschera</i>	Ecco l'orrido campo. . . Ma dall'arido stelo divulsa (Act II)	8, 13, 24/04/1964 & 25/01/1965
Verdi	<i>Un ballo in maschera</i>	Morrò, ma prima in grazia (Act III)	22, 24/04/1964
Verdi	<i>Aida</i>	Ritorna vincitor! (Act I)	22/04/1964

Orchestre de la Société des Concerts du Conservatoire
Orchestre du Théâtre National de l'Opéra de Paris
Conductor: Nicola Rescigno
Producer: Michel Glotz
Balance Engineer: Paul Vavasseur
Remastered by Paul Baily, Abbey Road Studios, London

Puccini Arias

EMI 7243 5 66463 2 2

Puccini	<i>Manon Lescaut</i>	In quelle trine morbide (Act II)	15/09/1954
Puccini	<i>Manon Lescaut</i>	Sola, perduta, abbandonata (Act IV)	17/09/1954
Puccini	<i>Madama Butterfly</i>	Un bel dì vedremo (Act II)	16/09/1954
Puccini	<i>Madama Butterfly</i>	Con onor muore. . . Tu? tu? Piccolo iddio! (Act II)	17/09/1954
Puccini	<i>La bohème</i>	Sì. Mi chiamano Mimì (Act I)	15/09/1954
Puccini	<i>La bohème</i>	D'onde lieta uscì (Act III)	15, 21/09/1954
Puccini	<i>Suor Angelica</i>	Senza mamma	16, 20/09/1954
Puccini	<i>Gianni Schicchi</i>	O mio babbino caro	15/09/1954
Puccini	<i>Turandot</i>	Signore, ascolta! (Act I)	15/09/1954
Puccini	<i>Turandot</i>	In questa reggia (Act II)	18/09/1954
Puccini	<i>Turandot</i>	Tu, che di gel sei cinta (Act III)	15/09/1954

Philharmonia Orchestra
Conductor: Tullio Serafin
Producer: Walter Legge
Balance Engineer: Robert Beckett
Remastered by Paul Baily, Abbey Road Studios, London

Rossini & Donizetti Arias

EMI 7243 5 66464 2 1

Rossini	<i>La cenerentola</i>	Nacqui all'affanno. . . Non più mesta (Act II)	23, 30/12/1963 & 6/01/1964
Rossini	<i>Guglielmo Tell</i>	S'allontanano alfine. . . Selva opaca (Act II)	4/12/1963
Rossini	<i>Semiramide</i>	Bel raggio lusinghier. . . Dolce pensiero (Act I)	9/12/1963, 6/01 & 21/02/1964
Donizetti	<i>La figlia del reggimento</i>	Convien partir (Act I)	24/04/1964
Donizetti	<i>Lucrezia Borgia</i>	Tranquillo ei posa. . . Com'è bello (Act I)	13/04/1964
Donizetti	<i>L'elisir d'amore</i>	Prendi, per me sei libero (Act II)	24/04/1964

Orchestre de la Société des Concerts du Conservatoire
Conductor: Nicola Rescigno
Producer: Michel Glotz
Balance Engineer: Paul Vavasseur
Remastered by Simon Gibson, Abbey Road Studios, London

Mozart, Beethoven & Weber Arias**EMI 7243 5 66465 2 0**

Beethoven		Ah! perfido, op. 65	6, 30/12/1963 & 8/01/1964
Weber	<i>Oberon</i>	Ocean! thou mighty monster (Act II)	13/12/1963 & 8/01/1964
Mozart	<i>Le nozze di Figaro</i>	Porgi, amor (Act II)	23/12/1963 & 8/01/1964
Mozart	<i>Don Giovanni</i>	Or sai chi l'onore (Act I)	12/12/1963 & 8/01/1964
Mozart	<i>Don Giovanni</i>	Crudele?. . . Non mi dir (Act II)	12/12/1963
Mozart	<i>Don Giovanni</i>	In quali eccessi, o Numi!. . . Mi tradi (Act II)	18/12/1963

Orchestre de la Société des Concerts du Conservatoire
 Conductor: Nicola Rescigno
 Producer: Michel Glotz
 Balance Engineer: Paul Vavasseur
 Remastered by Simon Gibson, Abbey Road Studios, London

Callas à Paris I**EMI 7243 5 66466 2 9**

Gluck	<i>Orphée et Eurydice</i>	J'ai perdu mon Eurydice (Act IV)	28/03/1961 & 5/04/1961
Gluck	<i>Alceste</i>	Divinités du Styx (Act I)	29/03/1961 & 5/04/1961
Bizet	<i>Carmen</i>	L'amour est un oiseau rebelle (Habanera) (Act I)	29/03/1961 & 5/04/1961
Bizet	<i>Carmen</i>	Près des remparts de Séville (Séguedille) (Act I)	29/03/1961 & 5/04/1961
Saint-Saëns	<i>Samson et Dalila</i>	Printemps qui commence (Act I)	28/03/1961 & 5/04/1961
Saint-Saëns	<i>Samson et Dalila</i>	Samson, recherchant ma présence. . . Amour! viens aider ma faiblesse! (Act II)	29/03/1961 & 5/04/1961
Saint-Saëns	<i>Samson et Dalila</i>	Mon coeur s'ouvre à ta voix (Act II)	31/03/1961 & 5/04/1961
Gounod	<i>Roméo et Juliette</i>	Ah! Je veux vivre dans ce rêve (Act I)	4/04/1961
Thomas	<i>Mignon</i>	Ah, pour ce soir. . . Je suis Titania (Act II)	4 - 5/04/1961
Massenet	<i>Le cid</i>	De cet affreux combat. . . Pleurez! pleurez, mes yeux! (Act III)	30 - 31/03/1961 & 5/04/1961
Charpentier	<i>Louise</i>	Depuis le jour (Act III)	5/04/1961

Orchestre National de la Radiodiffusion Française
 Conductor: Georges Prêtre
 Producer: Walter Legge
 Balance Engineer: Francis Dillnutt
 Remastered by Simon Gibson, Abbey Road Studios, London

Callas à Paris II**EMI 7243 5 66467 2 8**

Gluck	<i>Iphigénie en Tauride</i>	O malheureuse Iphigénie! (Act II)	8/05/1963
Berlioz	<i>La damnation de Faust</i>	D'amour l'ardente flamme (4e Partie)	4/05/1963
Bizet	<i>Les pêcheurs de perles</i>	Me voilà seule. . . Comme autrefois (Act II)	8/05/1963
Massenet	<i>Manon</i>	Je ne suis que faiblesse. . . Adieu, notre petite table (Act II)	7/05/1963
Massenet	<i>Manon</i>	Suis-je gentille ainsi?. . . Je marche sur tous les chemins (Act III)	3/05/1963
Massenet	<i>Werther</i>	Werther! Oui m'aurait dit. . . Des cris joyeux (Air des lettres) (Act III)	4/05/1963
Gounod	<i>Faust</i>	Je voudrais bien savoir. . . Il était un Roi de Thulé. . . Ô Dieu! que de bijoux!. . . Ah! je ris (Act III)	8/05/1963

Orchestre de la Société des Concerts du Conservatoire
 Conductor: Georges Prêtre
 Producer: Walter Legge
 Balance Engineer: Francis Dillnutt
 Remastered by Simon Gibson, Abbey Road Studios, London

The EMI Rarities

EMI 7243 5 66468 2 7

Mozart	<i>Don Giovanni</i>	Non mi dir (Act II) (take 1)	27/01/1953
Mozart	<i>Don Giovanni</i>	Non mi dir (Act II) (take 2)	27/01/1953
Verdi	<i>Macbeth</i>	Una macchia è qui tuttora! (Act IV) (mono version, with ending from alternate take)	19, 21, 24/09/1958
Rossini	<i>Semiramide</i>	Bel raggio lusinghier. . . Dolce pensiero (Act I)	14, 15/11/1961
Verdi	<i>I vespri siciliani</i>	Arrigo! ah, parli a un core (Act IV)	15/07/1960
Donizetti	<i>Lucrezia Borgia</i>	Tranquillo ei posa. . . Com'è bello (Act I)	15/11/1961
Rossini	<i>Guglielmo Tell</i>	S'allontanano alfine. . . Selva opaca (Act II)	13, 14/11/1961
Rossini	<i>Semiramide</i>	Bel raggio lusinghier. . . Dolce pensiero (Act I)	13, 15/07/1960
Bellini	<i>Il pirata</i>	Sorgete; è in me dover. . . Lo sognai ferito, esangue. . . Sventurata, anch'io deliro (Act I)	16/11/1961
Verdi	<i>Don Carlo</i>	O don fatale (Act III)	9, 13/04/1962
Rossini	<i>La cenerentola</i>	Nacqui all'affanno. . . Non più mesta (Act II)	13/11/1961 & 13/04/1962
Weber	<i>Oberon</i>	Ocean! thou mighty monster (Act II)	9,13/04/1962
Verdi	<i>Aida</i>	Pur ti riveggo, mia dolce Aida. . . Fuggiam gli ardori inospiti (Act III)	17/06/1964
Verdi	<i>I lombardi</i>	Te, Vergin santa, invoco!. . . Salve Maria, di grazia il petto (Act I)	7/04/1964
Verdi	<i>Il trovatore</i>	Vanne, lasciami. . . D'amor sull'ali rosee (Act IV)	22/04/1964
Verdi	<i>I vespri siciliani</i>	Arrigo! ah, parli a un core (Act IV)	2, 3/1969
Verdi	<i>Attila</i>	Liberamente or piangi. . . Oh! nel fuggente nuvolo (Act I)	2, 3/1969
Verdi	<i>I lombardi</i>	Te, Vergin santa, invoco!. . . Salve Maria, di grazia il petto (Act I)	2, 3/1969

Remastered by Allan Ramsay, Abbey Road Studios, London



Figure A2: In the recording studio.

“LIVE” CONCERT PERFORMANCES

Live in Concert (Release date: 1997)

EMI 7243 5 72030 2 9

Puccini	<i>Madama Butterfly</i>	Un bel di vedremo (Atto II)	7/04/1935
Proch		Deh! torna mio bene, op. 164 (Aria e variazioni)	12/03/1951
Verdi	<i>Macbeth</i>	Vieni ! t'affretta! . . . Duncano sarà qui? . . . Or tutti sorgete (Atto I)	18/02/1952
Donizetti	<i>Lucia di Lammermoor</i>	Il dolce suono. . . Ardon gl'incensi (Atto III)	18/02/1952
Verdi	<i>Nabucco</i>	Ben io t'invenni. . . Anch'io dischiuso un giorno (Atto II)	18/02/1952
Delibes	<i>Lakmé</i>	Dov'è l'indiana bruna? (Atto II)	18/02/1952
Mozart	<i>Il ratto dal serraglio</i>	Tutte le torture (Atto II)*	27/12/1954
Meyerbeer	<i>Dinorah</i>	Ahimè! che notte oscura. . . Ombra leggiera (Atto II)	27/12/1954
Charpentier	<i>Louise</i>	Depuis le jour (Acte III)	27/12/1954
Rossini	<i>Armida</i>	D'amore al dolce impero (Atto II)	27/12/1954
Thomas	<i>Hamlet</i>	Ai vostri giochi. . . Vi voglio offrir dei fiori. . . Dorme in sen (Atto IV)	27/09/1956
Wagner	<i>Tristan und Isolde</i>	Dolce e calmo, sorridente (Liebestod) (Atto III)	5/08/1957
Spontini	<i>La vestale</i>	Tu che invoco (Atto II)	11/07/1959
Verdi	<i>Ernani</i>	Surta è la notte. . . Ernani! Ernani, involami!. . . Tutto sprezzo che d'Ernani (Atto I)	11/07/1959
Verdi	<i>Don Carlo</i>	Tu che le vanità (Atto IV)	11/07/1959
Bellini	<i>Il pirata</i>	Oh! s'io potessi. . . Col sorriso d'innocenza. . . Qual suon ferale. . . O sole, ti vela (Atto II)	11/07/1959

Remastered by Andrew Walter, Abbey Road Studios, London

*This is the aria "Martern aller Arten" from *Die Entführung aus dem Serail* in Italian translation.

Live in London 1958 & 1959 (Release date: 2002)

EMI 7243 5 67912 2 0

Puccini	<i>Tosca</i>	Vissi d'arte (Act II)	17/06/1958
Rossini	<i>Il barbiere di Siviglia</i>	Una voce poco fà (Act I)	17/06/1958
BBC Symphony Orchestra Conductor: John Pritchard Chelsea Empire Theatre, London			
Bellini	<i>Norma</i>	Casta diva (Act I)	23/09/1958
Puccini	<i>Madama Butterfly</i>	Un bel di vedremo (Act II)	23/09/1958
BBC Symphony Orchestra Conductor: John Pritchard Chelsea Empire Theatre, London			
Puccini	<i>La bohème</i>	Mi chiamano Mimì (Act I)	3/10/1959
Boïto	<i>Mefistofele</i>	L'altra notte in fondo al mare (Act III)	3/10/1959
Royal Philharmonic Orchestra Conductor: Sir Malcolm Sargent Wood Green Empire Theatre, London			
Verdi	<i>Macbeth</i>	Una macchia è qui tuttora! (Act IV)	23/09/1959
Bellini	<i>Il pirata</i>	Oh! s'io potessi [fragments] (Act II)	23/09/1959
London Symphony Orchestra Conductor: Nicola Rescigno Royal Festival Hall, London			

Live in Paris 1958 (Release date: 2002) **EMI 7243 5 67916 2 6**

Bellini	<i>Norma</i>	Sediziose voci. . . Casta diva. . . Ah! bello a me ritorna (Act I)	19/12/1958
Verdi	<i>Il trovatore</i>	Vanne. . . lasciami. . . D'amor sull'ali rosee. . . Miserere. . . Quel suon, quelle preci (Act IV)	19/12/1958
Rossini	<i>Il barbiere di Siviglia</i>	Una voce poco fà (Act I)	19/12/1958
Puccini	<i>Tosca</i>	Act II	19/12/1958

Orchestre et Choeurs du Théâtre National de l'Opéra de Paris
Conductor: Georges Sebastian
Palais Garnier (Théâtre National de l'Opéra), Paris

Live in Milan 1956 & Athens 1957 (Release date: 2002) **EMI 7243 5 67917 2 5**

Spontini	<i>La vestale</i>	Tu che invoco (Act II)	27/09/1956
Bellini	<i>I puritani</i>	La dama d'Arturo. . . Oh, vieni al tempio (Act I)	27/09/1956
Rossini	<i>Semiramide</i>	Bel raggio lusinghier (Act I)	27/09/1956
Thomas	<i>Amleto</i>	Ai vostri giochi. . . Vi voglio offrir dei fiori. . . Dorme in sen (Act IV)	27/09/1956

Orchestra and Chorus of the RAI, Milan
Conductor: Alfredo Simonetto

Verdi	<i>Il trovatore</i>	D'amor sull'ali rosee (Act IV)	5/08/1957
Verdi	<i>La forza del destino</i>	Pace, pace, mio Dio! (Act IV)	5/08/1957
Wagner	<i>Tristan und Isolde</i>	Dolce e calmo (Liebestod) (Act III)	5/08/1957
Donizetti	<i>Lucia di Lammermoor</i>	Regnava nel silenzio. . . Quando rapito in estasi (Act I)	5/08/1957
Thomas	<i>Amleto</i>	Ai vostri giochi. . . Vi voglio offrir dei fiori. . . Dorme in sen (Act IV)	5/08/1957
Thomas	<i>Amleto</i>	Ed ora a voi canterò una canzon (Act IV)	5/08/1957

Athens Festival Orchestra
Conductor: Antonino Votto

Maria Callas in Rehearsal: Dallas 1957 (Release date: 2002) **EMI 7243 5 67921 2 8**

Verdi	<i>La traviata</i>	È strano. . . Ah! fors'è lui. . . Follie!. . . Sempre libera (Act I)	20/11/1957
Bellini	<i>I puritani</i>	O rendetemi la speme. . . Qui la voce sua soave. . . Vien, diletto (Act II)	20/11/1957
Donizetti	<i>Anna Bolena</i>	Piangete voi?. . . Al dolce guidami castel natio. . . Coppia iniqua, l'estrema vendetta (Act II)	20/11/1957
Verdi	<i>Macbeth</i>	Nel dì della vittoria. . . Vieni! t'affretta! (Act I)	20/11/1957
Mozart	<i>Il ratto dal serraglio</i>	Tutte le torture (Act II)	20/11/1957

Dallas Symphony Orchestra
Conductor: Nicola Rescigno
State Fair Music Hall, Dallas

Live in Rome 1952 & San Remo 1954 (Release date: 2002)**EMI 7243 5 67922 2 7**

Verdi	<i>Macbeth</i>	Vieni! t'affretta! . . . Or tutti sorgete (Act I)	18/02/1952
Verdi	<i>Nabucco</i>	Ben io t'invenni. . . Anch'io dischiuso un giorno (Act II)	18/02/1952
Donizetti	<i>Lucia di Lammermoor</i>	Il dolce suono. . . Ardon gl'incensi (Act III)	18/02/1952
Delibes	<i>Lakmé</i>	Dov'è l'indiana bruna? (Act II)	18/02/1952

Orchestra of the RAI, Rome
 Conductor: Oliviero de Fabritiis
 Studio of the RAI, Rome

Mozart	<i>Il ratto dal serraglio</i>	Tutte le torture (Act II)	27/12/1954
Meyerbeer	<i>Dinorah</i>	Ahimè! che notte oscura. . . Ombra leggièra (Act II)	27/12/1954
Charpentier	<i>Louise</i>	Depuis le jour (Act III)	27/12/1954
Rossini	<i>Armida</i>	D'amore al dolce impero (Act II)	27/12/1954

Orchestra of the RAI, Milan
 Conductor: Alfredo Simonetto
 Teatro del Casino, San Remo

Live in Hamburg 1959 (Release date: 2003)**EMI 7243 5 62681 2 8**

Spontini	<i>La vestale</i>	Tu che invoco (Act II)	15/05/1959
Verdi	<i>Macbeth</i>	Nel dì della vittoria. . . Vieni! t'affretta! (Act I)	15/05/1959
Rossini	<i>Il barbiere di Siviglia</i>	Una voce poco fà (Act I)	15/05/1959
Verdi	<i>Don Carlo</i>	Tu che le vanità (Act IV)	15/05/1959
Bellini	<i>Il pirata</i>	Oh! s'io potessi. . . Col sorriso d'innocenza. . . Qual suon ferale. . . O sole, ti vela (Act II)	15/05/1959

Sinfonieorchester des Norddeutschen Rundfunks
 Conductor: Nicola Rescigno
 Musikhalle, Hamburg

Live in Stuttgart 1959 (Release date: 2003)**EMI 7243 5 62682 2 7**

Spontini	<i>La vestale</i>	Tu che invoco (Act II)	19/05/1959
Verdi	<i>Macbeth</i>	Nel dì della vittoria. . . Vieni! t'affretta! (Act I)	19/05/1959
Rossini	<i>Il barbiere di Siviglia</i>	Una voce poco fà (Act I)	19/05/1959
Verdi	<i>Don Carlo</i>	Tu che le vanità (Act IV)	19/05/1959
Bellini	<i>Il pirata</i>	Oh! s'io potessi. . . Col sorriso d'innocenza. . . Qual suon ferale. . . O sole, ti vela (Act II)	19/05/1959

Symphonieorchester des Süddeutschen Rundfunks
 Conductor: Nicola Rescigno
 Liederhalle, Stuttgart

Live in Amsterdam 1959 (Release date: 2003)**EMI 7243 5 62683 2 6**

Spontini	<i>La vestale</i>	Tu che invoco (Act II)	11/07/1959
Verdi	<i>Ernani</i>	Surta è la notte. . . Ernani! Ernani, involami! . . . Tutto sprezzo che d'Ernani (Act I)	11/07/1959
Verdi	<i>Don Carlo</i>	Tu che le vanità (Act IV)	11/07/1959
Bellini	<i>Il pirata</i>	Oh! s'io potessi. . . Col sorriso d'innocenza. . . Qual suon ferale. . . O sole, ti vela (Act II)	11/07/1959

Concertgebouw Orchestra
 Conductor: Nicola Rescigno
 Concertgebouw, Amsterdam

Live in London 1961 & 1962 (Release date: 2003)**EMI 7243 5 62684 2 5**

Weber	<i>Oberon</i>	Ocean! thou mighty monster (Act II)	27/02/1962
Massenet	<i>Le cid</i>	De cet affreux combat. . . Pleurez! pleurez, mes yeux! (Act III)	27/02/1962
Rossini	<i>La cenerentola</i>	Nacqui all'affanno. . . Non più mesta (Act II)	27/02/1962
Verdi	<i>Macbeth</i>	La luce langue [incomplete] (Act II)	27/02/1962
Donizetti	<i>Anna Bolena</i>	Piangete voi? . . . Al dolce guidami castel natio. . . [<i>Coppia iniqua</i> not included here]	27/02/1962

Philharmonia Orchestra
 Conductor: Georges Prêtre
 Royal Festival Hall, London

Verdi	<i>Don Carlo</i>	Tu che le vanità (Act IV)	4/11/1962
Bizet	<i>Carmen</i>	Prélude (Act I)	4/11/1962
Bizet	<i>Carmen</i>	L'amour est un oiseau rebelle (Habanera) (Act I)	4/11/1962
Bizet	<i>Carmen</i>	Entr'Act (Act III)	4/11/1962
Bizet	<i>Carmen</i>	Près des remparts de Séville (Séguedille) (Act I)	4/11/1962

Orchestra of the Royal Opera House
 Conductor: Georges Prêtre
 Covent Garden, London

Massenet	<i>Le cid</i>	De cet affreux combat. . . Pleurez! pleurez, mes yeux! (Act III)	30/05/1961
Verdi	<i>Don Carlo</i>	Tu che le vanità (Act IV)	30/05/1961
Boïto	<i>Mefistofele</i>	[L'altra notte in fondo al mare]. . . In funereo sopore (Act III)	30/05/1961

Sir Malcolm Sargent (piano)
 St. James' Palace, London

"An opera begins long before the curtain goes up and ends long after it has come down. It starts in my imagination, it becomes my life, and it stays part of my life long after I've left the opera house."

Maria Callas (cited in Tarrant 2003)

Rossini	<i>Semiramide</i>	Bel raggio lusinghier. . . Dolce pensiero (Act I)	5/06/1963
Rossini	<i>La cenerentola</i>	Nacqui all'affanno. . . Non più mesta (Act II)	5/06/1963
Massenet	<i>Manon</i>	Je ne suis que faiblesse. . . Adieu, notre petite table (Act II)	5/06/1963
Massenet	<i>Werther</i>	Werther! Oui m'aurait dit. . . Des cris joyeux (Air des lettres) (Act III)	5/06/1963
Verdi	<i>Nabucco</i>	Ben io t'invenni. . . Anch'io dischiuso un giorno (Act II)	5/06/1963
Puccini	<i>La bohème</i>	Quando m'en vo (Act II)	5/06/1963
Puccini	<i>Madama Butterfly</i>	Tu? tu? Piccolo iddio! (Act II)	5/06/1963
Puccini	<i>Gianni Schicchi</i>	O mio babbino caro	5/06/1963

Orchestre Philharmonique de la Radio-Télévision Française

Conductor: Georges Prêtre

Théâtre des Champs-Élysées, Paris

Beethoven Ah! perfido, op. 65 3/03/1976

Jeffrey Tate (piano)



Figure A3: Callas (Medea) – Covent Garden (London), 1959.

ADDENDUM B

GLOSSARY OF MUSICAL AND VOCAL TERMINOLOGY

The following glossary was compiled from various sources, including the *Oxford Concise Dictionary of Music* (Ed.: Michael Kennedy), *DIVA* by Helena Matheopoulos, *Callas at Juilliard* by John Ardoin, *Maria Callas* by Robert Levine, *The Last Prima Donnas* by Lanfranco Rasponi, *Prima Donna* by Rupert Christiansen and the *New Harvard Dictionary of Music* (Ed.: Don Michael Randel). Those terms relating to specific vocal characteristics, techniques or physiology, were obtained from Cornelius L. Reid's *A Dictionary of Vocal Terminology*. For more information on these sources, please consult the Reference List provided at the end of this study.

Abbellimento (-i): Embellishment(s).

A Cappella: Unaccompanied singing. Music performed without accompaniment.

Accelerando: Getting faster.

Appoggiatura: Leaning note. A term derived from the Italian verb “appoggiare” (to lean or support). A grace note inserted before a note, to support or emphasise a melodic or harmonic progression. It is as important as the note on which it “leans,” from which it normally takes half the time-value (two-thirds the time-value if the supporting note is dotted).

Aria: An elaborate composition for solo voice with instrumental accompaniment.

Bel Canto: Literally “beautiful singing.” The Italian vocal technique of the early-18th to middle 19th century, with its emphasis on purity of tone and brilliant vocal display, rather than overtly dramatic expression or romantic emotion. Associated especially with the operas of Bellini, Donizetti and Rossini. Vocal agility, beauty of sound and *legato* phrasing, with faultless technique, are the principle foundations. See also Legato.

Bottled-Up: A phrase used to describe tones that are the product of pharyngeal constriction, and which therefore appear to be “caught,” “swallowed” or “bottled up” in the throat; “throaty.”

Buzz: A tonal “buzz” is attributable to any or a combination of the following three sources: 1) a good, but approximate tuning of the laryngeal pharynx, 2) a slightly nasal quality imposed on the former condition and 3) pressure variations that result from puffs of air that escape during every undulating movement of the focal folds. A “buzzy” tone quality is generally considered undesirable and according to Reid (1995: 56), “is not an ascription applicable to the tones produced by great singers, which are clear ringing and well defined.”

Cabaletta: From the Italian “cavata,” meaning “extraction.” The final section of an elaborate *aria* or duet, where the music settles to a quick, uniform rhythm.

Cadenza: A passage or section of varying length in the style of a brilliant improvisation, usually inserted near the end of a composition or *aria*, giving the performer a chance to exhibit his technical mastery.

Cantabile: Singable, singingly. Indicates expressive, *legato* singing, with the melody smoothly performed and well brought out. See also Legato.

Cantatrice: Female singer.

Chest Voice: A term commonly used to refer to the lowest register of human voice, or to those tone qualities that respond to high levels of intensity in the lower pitch ranges. The term “chest voice” is actually a misnomer, as the sympathetic vibrations produced by the chest voice are not produced or resonated in the chest cavity, as commonly believed, but rather in the laryngeal pharynx. Any other vibrations experienced in the thoracic region are the result of bone conduction or other transmitting agents. See also Head Voice.

Coloratura: A term derived from the German “Koloratur.” The elaborate and agile ornamentation or embellishment of a melody, either extemporised or written, with runs, *cadenzas*, trills, roulades and the like. The term later came to apply to singers specialising in roles requiring great vocal agility and with an extraordinary developed higher register, hence *coloratura soprano* or *soprano leggiera*. See also Cadenza.

Coloratura Soprano: The *coloratura* soprano is the highest of all female voice types, with an approximate range from C₄ to G₆. It is characterised by extreme agility in executing rapid scale passages. See also *Coloratura*.

Contralto: The lowest female voice, with a normal range of (approximately) G₃ to G₅.

Crescendo: Increasing in volume. Opposite of *decrescendo* (also known as *diminuendo*). See also Decrescendo.

Decrescendo (Diminuendo): Decreasing (diminishing) in volume. Opposite of *crescendo*. See also Crescendo.

Diaphragm: The large muscle that forms the partition between the chest cavity and the abdominal cavity, separating the respiratory and digestive systems.

Dramatic Soprano: A powerful, dark and heavy soprano voice capable of sounding over a large orchestra, with marked declamatory and histrionic ability suitable for forceful, dramatic operatic roles.

Falsetto: A term derived from the Italian “falso,” meaning “false.” Though proper *falsetto* is applicable to all voice types, both male and female, it is generally used to refer to the special application of voice production used by male singers to extend the upper limits of their range. The *falsetto* voice is limited in range to an octave at most and has a distinctly lighter, breathier or “hooty” quality than the normal range or chest voice. See also Chest Voice.

Fil Di Voce: With a thread of voice.

Fioritura: From the Italian for “flowering.” The florid vocal embellishment of the melody of an operatic *aria*, either written out or improvised.



Forte: From the Italian for “strong,” i.e. loud (abbr. *f*). *Fortissimo* (*ff* or *fff*) means very loud.

Glissando: An Italian term that refers to the execution of rapid scales by a sliding movement.

Head Voice: Tone qualities produced through the coordinate activity of both register mechanisms, the chest register and the *falsetto*, but with the *falsetto* strongly dominant. It so-called because the singer experiences a sensation of the voice vibrating in the head cavities. See also Chest Register and Falsetto.

Legato: From the Italian verb “legare,” meaning to bind or tie. The performance of music so that there is no perceptible pause between notes, i.e. the smooth passage from one note to another as opposed to *staccato*. In vocal music, *legato* passages are sung in one breath. See also Staccato.

Libretto (-i): From the Italian, meaning “little book(s).” The text of a vocal work, for ex. opera, oratorio, etc. The author is known as the “librettist.”

Lyric Soprano: A light, focused soprano voice, easily produced and with a pleasant *cantabile* style, capable of sustaining long, flowing lines. The lyric soprano is not required or expected to carry over a large orchestra, nor expected to sing in a very high range. See also Cantabile.

Messa Di Voce: From the Italian “to put forth, bud” or to “place.” The *bel canto* technique of singing a gradual *crescendo* then *decrescendo* on a sustained note. See also Bel Canto, Crescendo and Decrescendo.

Metallic: An adjective describing a sound whose “hard” and “bright” tonal characteristics are the result of a rigid pharyngeal adjustment and a predominance of high partials (many of which are inharmonic, i.e. noise) within its harmonic spectrum.

Mezza Voce: Literally “half voice.” Denotes singing softly, with a restrained volume of tone, as if “under the breath,” referring not only to the amount of volume, but to a different quality from that when singing full voice.

Mezzo-Soprano: Literally “half-soprano.” The designation for a female voice midway between soprano and contralto, with a range from (approximately) F₃ to B₅. It is a voice type whose tonal characteristics are weightier than those of the dramatic soprano, yet lighter than those of the contralto. Several operatic roles written for sopranos are traditionally sung by and better suited to mezzo-sopranos, ex. Dorabella in *Così fan tutte*, Carmen, Oktavian in *Der Rosenkavalier*, the Composer in *Ariadne auf Naxos*. See also Contralto, Dramatic Soprano and Soprano.

Passagio: From the Italian for “passageway.” The point or “break” at which the voice makes a transition from the chest voice to the head voice. In sopranos and tenors, the *passagio* usually lies between the notes E₄, F₄ and G₄. See also Chest Voice and Head Voice.

Piano: From the Italian meaning “soft.” (abbr. as *p*). *Pianissimo* means very soft (abbr. *pp* or *ppp*).

Portamento: From the Italian verb “portare,” meaning to carry. A practice by which singers gradually slide from one note to another through all the intermediate pitches without a break.

Prima Donna: From the Italian for “first lady.” Originally, in 18th century operas, the singer of the principal female role of an opera. It is distinguished from *primo uomo*, the leading male singer, as well as *seconda donna*, the second female singer. During the 19th century, however, the term came to mean a conceited, jealous, capricious operatic star, “an outrageous *grand dame*, ‘exacting, torrential and exasperating,’ and often lazy, greedy, stupid, conceited and ‘impossible’ as well” (Mayhew, cited in Christiansen 1986: 9).

Recitative: From the Italian *recitativo*. Declamatory passages designed to imitate and emphasise the natural inflections of speech. It is used especially in opera and oratorio to carry the action or plot from one *aria*, ensemble or chorus to another. In the *recitative*, the purely musical principles of vocal melody, phrase and rhythm are largely disregarded, being replaced by speech-like reiteration of the same note, slight inflections, irregular rhythms, purely syllabic treatment of the text, etc.

Register: A series of consecutive voice tones of equal or similar *timbre*, which can be distinguished from an adjoining series of tones. Various opinions exist as to the classification of vocal registers, with some scholars dividing the voice into as many as five different registers (Miller 1986), while others, such as Reid (1985), speak of only two primary registers, the “chest voice” and “head voice,” all other registers being a mixture of these two. The present study will concur with Reid’s view.

Ritardando: Slowing down gradually.

Rubato: From the Italian, meaning literally “stolen time.” A feature of musical performance in which an elastic, flexible tempo involving slight *accelerandos* and *ritardandos* that alternate according to the requirements of musical expression is used, instead of adhering strictly to musical time. See also *Accelerando* and *Ritardando*.

Shrill: An “edgy,” piercing vocal tone quality, caused by a high laryngeal position (i.e. throat constriction) and a consequent spreading of the oropharynx (the pharyngeal cavity directly behind the mouth, directly above the laryngeal pharynx and directly below the nasopharynx).

Soprano: From the Italian *sopra*, meaning “above.” The highest register of the female voice, with a range of (approximately) C₄ upwards for two octaves.

Sotto Voce: Literally translated as “under the voice.” Softly, whispered, in an undertone, i.e. barely audible (as in an aside) or with subdued sound.

Spinto (*Lirico spinto*): Derived from the Italian verb “spingere,” meaning to “push” or to “urge on.” It identifies a lyric voice leaning towards the dramatic, i.e. usually a tenor or soprano voice that has been “pushed” into more forceful singing, but without the tonal intensity of its dramatic counterpart. Cio-Cio-San in Puccini’s *Madama Butterfly* is an example of a *spinto* soprano role.

Staccato: From the Italian, “detached.” A method of performance indicated by a dot placed over a note, calling for a reduction of its written duration so that it is shortened or “detached” from its successor by half or more of its value. See also *Legato*.

Steel: An adjective describing vocalised sounds whose hard, “edgy” tonal characteristics result from excessive force and from tongue and throat constriction. “Steely” singing can invariably be traced to an energised chest register driven too high in the tonal range, causing the throat to stiffen. See also Chest Voice.

Tenor: From the Italian *tenore*, translated as “holding.” The highest natural male voice with an approximate range from C₃ upwards for two octaves. The term developed from the early polyphony (c. 1200 to 1500) as the vocal part that carries the *cantus firmus* and is therefore the basis for the addition of other vocal parts. Originally it was called the *vox principalis*, but later became known as the tenor part, in connection with the development of melismatic organum, in which the notes of the *cantus* were drawn out and sustained or “held.”

Tessitura: Literally “texture.” A term used to describe the average pitch or general “lie” of an *aria* or vocal part. A vocal part can be taxing despite the absence of extraordinarily high or low notes, due to the prevailing range or *tessitura*.

Veiled: An adjective describing vocalised sounds whose breathy tonal characteristics are produced by improper register and resonance adjustments.

Verismo: Literally “realism.” An Italian operatic school of the late 19th century that followed the literary realism of Zola, Flaubert and Ibsen. Instead of the idealistic *librettos* of earlier operas, realistic and contemporary subjects from everyday life were chosen, often embellished with sordid, violent elements. *Coloratura* arias and other features of earlier Italian opera were abandoned in favour of a more melodramatic recitative that was more naturalistic. Mascagni’s *Cavalleria Rusticana* (1890), Leoncavallo’s *Pagliacci* (1892), Giordano’s *Fedora* (1898) and Charpentier’s *Louise* (1900) are the prime examples of veristic opera. See also *Coloratura* and *Libretto*.

Wobble: An erratic and uncontrolled tonal movement in which neither the periodicity nor the amplitude of the sound waves produced are related to the particular pitch-intensity being sung. There are distinct physiological and qualitative differences between the wobble and other characteristic tonal movements such as the *vibrato* and *tremolo*. The perfectly even pulsations of the *vibrato* are desirable when called for, while the *tremolo* and wobble result from poor muscular co-ordination and indicate the presence of muscular interference and compensatory tensions. The wobble results from an overly dominant chest register forced too high in the tonal range, a fault that disrupts the stability of the laryngeal suspension. See also Chest Voice.

ADDENDUM C

GLOSSARY OF TECHNICAL AND AUDIO RESTORATION TERMINOLOGY

The following glossary was compiled from a variety of sources, including similar collections of audio terminology found at <http://www.enhancedaudio.com>, <http://www.digitalthymnal.org> and <http://www.enjoythemusic.com/audioterminology.htm>, in addition to Wikipedia encyclopaedia (2005), Albanese and MacQueen's *Digital Audio Dictionary*, *The Audio Recording Handbook* by AP Kefauver, *Digital Audio Restoration - A Statistical Model-Based Approach* by Godsill and Rayner, as well as the glossary provided with Cool Edit Professional 2.0. Definitions of subjective terms relating to sound quality were obtained from descriptions by Alan Loft (2004) and the Audio FAQ (2005). Further information regarding these sources can be found in the Reference List provided at the end of this study.

AIFF: Audio Interchange File Format. The standard Apple Macintosh audio file format. It can be either mono or stereo, 8-bit or 16-bit, with sampling rates of up to 48 kHz.

Aliasing: Noise that occurs from sampling a high-frequency sound at a sample rate that is less than what is required to accurately represent that frequency. A certain sampling rate can only represent a frequency equal to half its rate (the Nyquist frequency). See also Nyquist Frequency.

Amplitude: An audio signal's loudness is represented by its amplitude, i.e. the height of the signal's waveform. The greater the amplitude of a sound wave, the louder the sound. Acoustic amplitudes (or sound pressure levels) are measured in decibels (dB). See also Loudness, Decibel and Sound Pressure Level.

Analogue: From the term "analogous," meaning "similar to." Analogue processes record or monitor events in a continuous manner, converting them into similarly continuous mechanical or electronic representations of the original phenomena. In analogue audio and video recording, a signal is represented and stored as a continuously varying electrical or mechanical representation of the input signal, for example on magnetic tape or a phonograph record. Such systems furthermore amplify and process these signals using continuous voltages and/or currents (whose value could be expressed as

an irrational number at any point in time) that are not quantised. An analogue audio recording is therefore represented by a continuous curve, whereas a digital recording is based on discrete samples, which approximate the corresponding analogue amplitudes.

Proponents of analogue recordings argue that it is superior to digital as digital recordings are at best only an approximation of a waveform, influenced by the sampling rate and bit resolution of the digital medium. CD audio for example is encoded as 44.1 kHz, 16-bit audio, meaning that the original wave is “sliced” 44,100 times a second and an average amplitude applied to each sample. The higher the sampling rate and resolution, the higher the quality of the audio, because a wave form closer to that of the original sound can be stored.

Many claim that analogue sound is “truer” because it is not reconstructed and that digital sound simply does not sound as natural as analogue. Others claim that digital is more natural because it is not subject to the same imperfections and non-linear distortion of an analogue medium. Others suggest that though analogue sound is technically of lower quality than digital, it sounds *subjectively* better. See also Bit, Digital and Quantisation.

Artifacts: An extraneous noise or distortion introduced into a sound recording as a result of defects or limitations in the hardware and/or processing algorithms used in the sequence of recording a signal to its final reproduction. See also Distortion and Noise.

Audio Degradation: Degradation of an audio source should be considered as any undesirable modification to the audio signal that occurs as a result of (or subsequent to) the recording process. For example, in a recording made direct-to-disc from a microphone, degradation could include noise in the microphone and amplifier as well as noise in the disc cutting process. Further noise may be introduced by imperfections in the pressing material, transcription to other media or wear and tear of the medium itself. See also Noise.

Audiophile: A term that is generally used to refer to someone “who loves sound” and is concerned with achieving high-quality results in the recording and playback of music. Audiophile values can perhaps best be described by the belief that “the sound of music, unamplified and occurring in a real space, is a philosophic absolute against which may be judged the performance of devices designed to reproduce music” (Wikipedia 2005).

Auto-Correlation: The process of correlating (comparing) a signal with itself. It can be used, for example, to extract a signal from noise. See also Correlation and Enhanced Auto-Correlation.

Azimuth Errors: When analogue magnetic tapes are recorded or reproduced, the respective tape head should ideally be perpendicular to the direction of the tape movement. If, during the playback or recording process, the respective head is sloped away from the desired angle, it is said to be off-normal or off-Azimuth, and as a result, two types of signal degradation can occur. The first results in the loss of high-end frequency response. The second effect produces a phase shifting of one channel with respect to the other, thereby “smearing” the sound image. See also Phase.

Bit: Abbreviation for Binary digit. The smallest possible unit of information used in computers or other digital systems. Bits are numerically represented as either a 1 or a 0 (representing for ex. on/off, yes/no, etc.). Digital audio is encoded in large numbers or “words,” that are used to represent the voltage level (amplitude) of an analogue signal. Words are made up of a certain number of bits, usually 8, 12, or 16 bits long. The amount of bits that make up a word is called the bit resolution and determines the number of voltage levels possible in representing the signal’s amplitude. Each added bit represents a theoretical improvement of about 6dB in the signal-to-noise ratio of a signal. See also Digital.

Boomy: Excessive bass around 125 Hz. Also poorly damped low frequencies or low-frequency resonances.

Boxy: A subjective description of a sound having resonances as if the music were enclosed in a box.

Bright: An adjective describing a greater proportion of high-frequency components in a sound source or a reverberant space. The harmonics are strong relative to the fundamentals. See also Harmonics.

Buzz: The term “buzz” is problematic, since it can refer to different types of audio degradations. It usually describes disturbances produced by, for example, lighting rig controllers and faders, that vary the light intensity in lighting racks by cutting out part of the AC power supply twice every cycle, resulting in sharp electrical transients. If nearby audio equipment is not properly shielded, these transients often appear in the form of closely spaced, regular “ticks” in the signal. Buzz can also refer to the noise produced by electrical faults such as earthing problems. It differs from “Hum,” as it usually contains a large number of higher frequency harmonics. See also Audio Degradation, Hum, Noise and Transients.

Compression: The process of reducing the amplitude range of an audio signal by reducing the peaks and boosting the low levels according to a specific ratio of the signal’s input level to output level, thereby decreasing its dynamic range. See also Amplitude.

Correlation: In digital signal processing, correlation is the process of comparing one signal with another in order to determine how similar these signals are. The correlation function is a weighted moving average, and is given by the equation:

$$R(n) = \sum x(k) * y(n + k)$$

The correlation algorithm works as follows:

1. One signal is shifted with respect to the other.
2. Each element of one signal is multiplied by the corresponding element of the other.
3. The multiplied values are integrated.

If one signal is of length m and the other signal is of length n , then $(m * n)$ multiplications are necessary to calculate the whole correlation function.

Correlation is at a maximum when two signals are similar in shape and “unshifted” with respect to each other. See also Cross-Correlation and Auto-Correlation.

Clear: See Transparent.

Clicks: A generic, localised type of degradation of finite duration that occurs at random positions in the waveform and is common to many audio media. Clicks are perceived in a number of ways by the listener, ranging from tiny ‘tick’ noises which can occur in any recording medium, including modern digital sources, through to the characteristic ‘scratch’ and ‘click’ noise associated with most analogue disc recording methods.

Clicks are typically the result of specks of dirt and dust adhering to the grooves of a gramophone disc or granularity in the material used for pressing such a disc. Further click-type degradation may be caused through damage to the disc in the form of small scratches on the surface. Similar artifacts are encountered in other analogue media, including optical film sound tracks and early wax cylinder recordings, although magnetic tape recordings are generally free of clicks. Ticks can occur in digital recordings as a result of poorly concealed digital errors and timing problems. Peak-related distortion, a result either of overload distortion during recording or wear and tear during playback, can give rise to a similarly perceived click effect. See also Audio Degradation and Noise.

Clipping: When the amplitude of a signal exceeds the maximum level for the available current conditions (i.e. 256 in 8-bit audio), a process known as clipping occurs. Clipping causes the signal to distort and appears in the display as a “chopping-off” of the top of the waveform. See also Distortion.

Crackle: Randomly distributed, high density, small amplitude, short duration, additive impulsive disturbances, similar to the noise produced by a “chip-fryer” or the sound made by Rice Krispies after adding milk. Crackle is usually the result of a fungus that eats the vegetable matter contained in old 78 RPM records, leaving millions of pock-marks on the surface of the disc that create impulsive disturbances in the signal, thereby producing a characteristic crackly surface noise. It can, however, also be caused by slight imperfections in the record playing surface due to the use of coarse grain fillers in the record composition or by gas bubbles that occur in the surface as the record “cured” after the stamping process. See also Noise.

Crisp: A subjective term relating to extended high-frequency response.

Cross-Correlation: Cross-correlation (or cross-covariance) is the process of correlating (comparing) a known or reference signal with an unknown one. It is a function of the relative time between the two signals and is sometimes referred to as the “sliding dot product.” Cross-correlation has applications in digital signal processing, pattern recognition and cryptanalysis. See also Correlation.

Dark: The opposite of “bright,” indicating weak high frequencies. See also Bright.

Decibel (dB): The standard measurement unit used to logarithmically express the relative difference or relative loudness (sound pressure level, SPL) of sounds. One decibel is equal to one-tenth (1/10) of a Bel, a measurement unit created in 1928 by researchers at Bell Laboratories and named after Alexander Graham Bell (1847 - 1922). Generally, 0 dB is the maximum possible amplitude value of a waveform, without clipping. See also Amplitude, Loudness and Sound Pressure Level.

Depth: The apparent relative distances of various instruments or voices as perceived by the listener.

Digital: Computer technology where information is captured, represented and manipulated as a series of numbers (usually binary). Thus, digital music equipment use microprocessors to store, retrieve and manipulate sound information in the form of numbers, enabling editing and manipulation of the sound data in ways that are impossible with electromechanical (analogue) sound systems. See also Analogue.

Distortion: In general terms, any inaccurate representation of the input sound signal, including clipping of the waveform at its maximum amplitude, overload, unwanted harmonic frequency content, etc.

Drop-Out: A momentary loss or reduction of signal level, often due to imperfections on the surface of an analogue tape, tracking errors during tape playback, etc.

Dry: An adjective describing a sound or recording that lacks reverberant information.

Enhanced Auto-Correlation: Auto-correlation is a common method used for determining the frequencies of periodic signal components or for extracting a signal from noise. It works by comparing the signal with time-delayed versions of itself: for a periodic signal, the correlation will be high whenever the delay is a multiple of the period. The enhanced auto-correlation algorithm eliminates random factors from the auto-correlation data, leaving only the most useful information. The algorithm is as follows:

1. Compute the auto-correlation of the input signal.
2. Use the Fast Fourier Transform (FFT) to compute the power spectrum of the auto-correlation results.
3. Take the cube root of each element in the power spectrum, then apply the inverse Fourier transform. The result after this step is called the cube root auto-correlation. Clip this data at zero (replace negative entries with zeros).
4. Time-dilate the resulting signal by a factor of two, using linear interpolation. Subtract the dilated version from the original, again clipping the result at zero. The final result is the enhanced auto-correlation.

Steps 2 and 3 (converting the auto-correlation into the cube root auto-correlation) rescales the data to make it better suited to pitch extraction. Step 4 eliminates “echoes” of the auto-correlation peaks, leaving only the first peak from each frequency component. This results in a single high peak corresponding to the strongest frequency of the input. See also Correlation and Fast Fourier Transform.

Equalisation (EQ): Equalisation is the process of increasing or decreasing the amplitude of audio signals at a specific frequency band relative to the signals at other audio frequencies. See also Amplitude.

Fast Fourier Transform (FFT): The FFT process is a standard method for analysing sounds, based on Jean Baptiste Joseph Fourier's (1768 - 1830) theory, which states that any waveform can be represented by an infinite sum of sine and cosine functions, plus a finite number of terms which describe the waveform's harmonics. FFT uses these mathematical relationships to resolve complex waveforms into a series of fundamental frequencies, allowing signals in the time domain to be represented in the frequency domain.

Filter: A device for attenuating selected frequencies from the sound spectrum of a signal and perhaps (in the case of a resonant filter) increasing the level of other frequencies. Filtering is the process of using a filter on a signal.

Forward: A subjective term that refers to vocals, male and female, which are considered very prominent, almost as if the singer was standing close to the listener. Can also be used as a negative term – if singers sound too close it may indicate that the midrange is boosted or exaggerated.

Frequency: The rate of vibration or cycles per second of a sound, measured in Hertz (Hz). Frequency determines the pitch of a sound. A cycle consists of movement from a starting point, through both negative and positive amplitude, and back to its starting point. See also Hertz.

Frequency Spectrum: The distribution of frequencies within the audio bandwidth.

Hanning window: Named after the Austrian meteorologist Julius von Hann (1839 - 1921), the Hanning window/function is a general purpose window for the analysis of continuous signals, boasting the best overall filter characteristic of the most common window types.

Also known as the raised cosine window, the Hanning window of length N is defined by:

$$h(k) = \frac{1}{2}(1 - \cos(2\pi k/N))$$

See also Window.

Hard: A subjective term, describing too much upper midrange frequencies, usually around 3 kHz.

Harmonics: Harmonics are the whole number multiples of a fundamental frequency (if the fundamental frequency of a sound, for example, is 440 Hz, then the first two harmonics are 880 Hz and 1320 Hz). The distribution of these harmonics provides the characteristic *timbre* (tone colour) or unique sound of different instruments or voices.

Harsh: The description of a sound as “harsh” implies too much upper midrange frequencies or peaks in the frequency response between 2 and 6 kHz.

Hertz (Hz): A unit for the measurement of frequency, named after Heinrich Rudolph Hertz (1857 - 1894), a German physicist. 1 Hertz = 1 cycle per second. The frequency range of human hearing is approximately from 20 Hz to 20 kHz (20,000 Hz). See also Frequency.

Hiss: A form of random, additive background noise, generally perceived as ‘hiss’ by the listener and common to all analogue measurement, storage and recording systems. It appears at the top end of the audio spectrum, usually above 5kHz and is generally composed of electrical circuit noise, irregularities in the storage medium and ambient noise (such as for ex. air conditioning units) from the recording environment. The combined effect of these sources is generally treated during a single noise removal process, although a “pure” restoration should strictly not treat the ambient noise, which might be considered part of the original “performance.” See also Noise.

Hum: A category of noise usually found in recordings as a result of improper shielding or grounding of audio components. As hum is harmonically related to the AC power supply that powered the recording gear, it usually appears as a 50 Hz (US) or 60 Hz (European) “hum” or low-order harmonic in the 100 - 120 Hz range. See also Noise.

Impedance: Acoustical impedance is the total opposition provided by acoustical resistance and reactance to the flow of an AC signal. The unit is the acoustical ohm (Ω).

kHz: Kilohertz (thousands of Hertz). See also Hertz.

Loudness: The subjective impression of the intensity of a sound. See also Amplitude.

Mono (Monophonic): An audio signal or a wave file that contains only one unique channel of sound information. See also Stereo.

Muffled: A subjective term describing audio that sounds as though it is “covered with a blanket.” Muffled sounds are usually characterised by weak high or upper-midrange frequencies.

Muted: A subjective term indicating a rolled-off, depressed or dull midrange and treble.

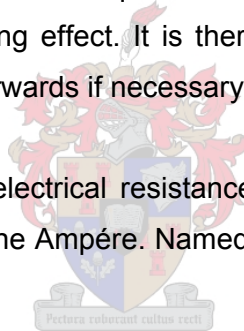
Normalisation: The process of boosting the highest peak of a waveform to a certain percentage or dB level, without clipping (distortion), thereby raising or lowering all other peaks accordingly. This maximizes resolution and minimizes certain types of noise. See also Clipping, Distortion and Noise.

Noise: Unwanted disturbances superimposed upon a signal that tend to obscure its information content. See also Signal-To-Noise Ratio.

Noise Reduction: Signal processing designed to attenuate noise components within an audio system. See also Noise.

Nyquist Frequency: The Nyquist frequency (also called the “Nyquist rate”) is equal to half the current sampling rate and is named after Harry Nyquist (1889 - 1976). For example, the Nyquist frequency for 44100 Hz audio is 22050 Hz. This frequency designates the highest reproducible frequency for that sampling rate. In order to reproduce a signal with an 11 kHz frequency range, one would need to select a sampling rate of at least 22 kHz. Frequencies that exceed the Nyquist limit during the recording process will produce an aliasing effect. It is therefore better to record at higher sampling rates and to convert the signal down afterwards if necessary. See also Aliasing.

Ohm (Ω): A unit of measurement for electrical resistance or impedance, where the electromotive force of one volt maintains a current of one Ampère. Named after Georg Simon Ohm (1789 - 1854), a German physicist. See also Impedance.



Overload: The distortion that occurs when an applied signal exceeds the level at which the system will produce its maximum output level. See also Distortion.

Phase: The relationship in time between two versions of the same periodic waveform (such as a sound wave). When two waveforms are out-of-phase with one another, amplitude peaks may not coincide and “phase cancellation” will occur, altering the quality of the sound. See also Amplitude and Phase Cancellation.

Phase Cancellation: Interference caused by the interaction of two slightly offset versions of the same waveform, causing amplitude dips (reductions) at certain frequencies. See also Amplitude and Phase.

Piercing: An adjective describing a sound that is strident, hard on the ears, screechy, having sharp, narrow peaks in the frequency response around 3 to 10 kHz.

Pre-Echo/Pre-Print: A print-through signal that is on the outer layer of magnetic tape, i.e. it precedes the recorded signal. See also Tape Print-Through.

Presence: A sense that the instrument or voice is present in the listening environment. Synonyms are edge, punch, detail, closeness and clarity. For most instruments, a sense of “presence” can be attributed to good or emphasised frequency response around 5 kHz.

Post-Echo/Post-Print: A print-through signal that follows the recorded signal. See also Tape Print-Through.

PCM (Pulse Code Modulation): Standard method of digitally encoding uncompressed audio data, used in file types such as the Windows-based .wav and Apple .aiff formats. See also WAV and AIFF.

Quantisation: The capture of any continuously varying value, using a certain number of discrete steps to represent that value’s total range. Captured values are converted to a series of binary data, which can be stored or manipulated in the digital domain. See also Digital.

Remastering: The process of creating a new “master” (the entity duplicated to make a product, i.e. sound recording, video cassette, DVD, etc.).

Reverberation (“Reverb”): The persistence of a sound in an acoustic space, in the form of multiple reflected sound waves, after the original source has ceased. Also, the process whereby the acoustical reflections of a room or concert hall are reproduced artificially, with devices such as tapped delay lines working in conjunction with mixing and phase shifting devices or algorithms to add depth and warmth to recorded sounds. See also Depth, Phase and Warm.

Rich: A sound that contains strong fundamentals relative to harmonics, with good low-frequency response, not necessarily extended, but with adequate response around 100 to 300 Hz. The opposite of “thin.” See also Harmonics.

RPM (Revolutions Per Minute): The amount of revolutions per minute of a phonograph recording, a measurement of the speed at which the recording should be played. Some common record speeds are 33.33 RPM or 45 RPM for LP's, 78.26 RPM for most so called lateral 78's (like Victor), 78.8 RPM for Edison Lateral's, 80 RPM for Edison Diamond Discs and 160 RPM for Edison Cylinder recordings.

Roll-Off: The attenuation of signal components beyond a specified frequency, at a gradually increasing rate.

Rumble: A low frequency noise, typically below 50 Hz, which is often found on records and/or associated with the use of a turntable. It can be caused by seismic effects during the mastering process or during playback. More likely, however, it is a result of noise produced by the turntable as the record is spun on the platter. Typically, this noise is from the motor, and the resulting vibrations are captured by the stylus as “rumble.”

Sensitivity: The amount of output for a given input. In RF receivers, the amount of input signal a device requires in order to produce a reference quality of output.

Signal-To-Noise Ratio: A measure of signal strength relative to background noise. Often written as S/N or SNR, signal-to-noise ratio is usually measured in decibels (dB) and is given by the formula below, where the incoming signal strength is measured in microvolts (V_s) and the noise level, also in microvolts, is V_n :

$$S/N = 20\log_{10}(V_s/V_n)$$

Ideally, the signal strength should be greater than the level of noise. The S/N would therefore be positive. If $V_s = V_n$, then the S/N would be 0. Where the S/N is negative, reliable signal transmission is generally not possible. See also Noise.

Sound Pressure Level (SPL): The acoustical energy (air displacement) of a sound source, measured in decibels above a reference pressure level of 0.0002 microbars (the minimum threshold of human hearing). See also Decibel.

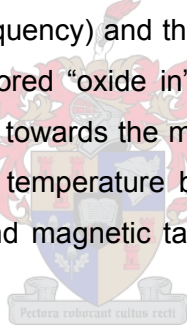
Spacious: A subjective term relating to the positive characteristic that describes the sense of space present around the instruments and vocalists. Synonymous with “open” and “airy.”

Stereo (Stereophonic): An audio signal or a wave file that contains two channels of sound information enabling the discrete positioning of left and right sounds. See also Mono.

Strident: A description that refers to too much treble or high-frequency output, making the sound shrill and harsh.

Sweet: An adjective describing a sound that is not strident or piercing, with flat high-frequency response and low distortion. The high-end frequency spectrum is extended to 15 or 20 kHz and is not over-emphasised. See also Distortion, Piercing and Strident.

Tape Print-Through: Print-through is the undesired, low-level transfer of magnetic fields from one layer of analogue tape to another. When a signal is recorded on analogue tape, the magnetisation of the tape causes external magnetic fields to appear symmetrically on either side of the tape coating. This can result in a weak imprint of magnetic information to be transferred from one layer of a tape to the other, in effect transferring a weak copy of the signal backwards or forwards along the tape. This is sometimes heard as, so-called, pre- or post-echo. Pre-echo or pre-print, is the print-through signal that is on the outer tape layer, i.e. it precedes the recorded signal. Post-echo or post print, is when the print-through signal follows the recorded signal. Tape print-through can affect any type of analogue tape, though some brands of magnetic tape have a greater potential for print-through. This is measured by what is called the signal-to-print ratio and remains constant for a given reel of tape, regardless of the recorded signal strength. The signal-to-print ratio is a function of the recorded wavelength (tape speed divided by the frequency) and the thickness of the tape. In order to minimize print-through, magnetic tape should be stored “oxide in” and “tail-end out,” i.e. the tape should be wound so that its oxide coating side points towards the music that was recorded earlier, tapes should be rewound before playback, stored at a temperature between 70 - 80° F, strong magnetic fields should be avoided near analogue tape and magnetic tape with good signal-to-print ratio should be used.



Thin: Little or no bass output. Could also describe fundamentals that are weak compared with the number of harmonics. See also Harmonics.

Tight: An expression describing the sound picked up by a microphone placed very close to the recorded source. Also good low-frequency transient response and detail. See also Transient.

Total Harmonic Distortion (THD): An audio measurement specification used to determine the accuracy with which a device can reproduce an input signal at its output. THD describes the cumulative level of the harmonic overtones that the device being tested adds to an input sine wave. See also Distortion.

Tonmeister: From the German, literally translated as “tone master.” The term was originally used by Deutsche Grammophon to describe the function performed by a professional recording engineer.

Transfer Function: In its simplest form, the transfer function is a mathematical representation of the total change incurred from one system to another, i.e. the relation between the input and output of a linear time-invariant system. For continuous-time signals, the transfer function is often written as:

$$H(s) = Y(s)/X(s)$$

Transient: Any of the non-sustaining, non-periodic frequency components of a sound, usually of brief duration and higher amplitude than the sustaining components occurring near the onset of the sound (attack transients).

Transparent: An adjective describing music that is “easy to hear into,” detailed, clear, not muddy, with wide, flat frequency response, sharp time response, very low distortion and noise. See also Distortion and Noise.

Warm: A subjective term describing good bass, adequate low frequencies or adequate fundamentals relative to harmonics. A sound that is not “thin.” Also indicates spaciousness, with adequate reverberation at low levels. See also Harmonics, Reverberation and Spaciousness.

WAV: An uncompressed, PCM (Pulse Code Modulation) audio file format used by Windows. Typically encountered as “filename.wav.” See also Pulse Code Modulation.

Weighty: A subjective description of a sound having good low-frequency response below 50 Hz.

Window: Functions defined over a finite range that are used in the process of Fast Fourier Transform (FFT) to analyse digital signals. They achieve their maximum value at the middle point of their finite range, and decay symmetrically away from it, both to the start and end of the range. Windows are used to weigh more strongly the data values at the centre of the sample, to the detriment of the values at its extremes. A window is applied to a finite set of data by calculating a set of window values of the same length as the data, and then multiplying each data value by the corresponding window value. See also Fast Fourier Transform (FFT).

The following overview of various window types was obtained from Interstellar Research (2004):

Hanning window:

Good resolution of spectral peaks and good rejection of sidelobe leakage or "skirts" at low levels for input signals that don't have an integer number of cycles in the N -points data set. A good choice for most uses.

Hamming window:

Finer resolution of spectral peaks than Hanning, but poorer rejection of sidelobe skirts at low levels.

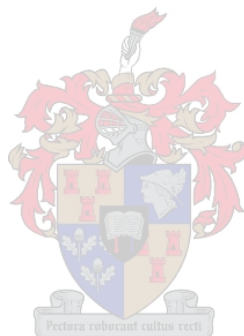
Blackman window:

Peak resolution is not as fine as Hanning, but the response shape flares out less at lower levels and rejection of sidelobes is better.

Blackman-Harris:

The peak resolution of the Blackman-Harris window is similar to the regular Blackman, but the response shape flares out even less at lower levels.

Wow: An undesirable alteration of an audio signal caused by slow, periodic variations in the recording and/or playback speed of an audio tape or turntable, perceived by the listener as cyclic variations in the pitch of the recorded sound.



ADDENDUM D

MATLAB SOURCE CODE

```
clear all;
close all;
% Define filepath and filenames
FileExt = '.wav';

FilePath = 'c:\MATLAB6p5\work\Fuchs\AudioExtracts\LaTraviata\Case2\';
%FileName1 = 'AhTuttoFiniAddioDelPassato1985';
%FileName2 = 'AhTuttoFiniAddioDelPassato1997';
%FileName1 = 'NoiseAhForseLui1985';
%FileName2 = 'NoiseAhForseLui1997';

FilePath = 'c:\MATLAB6p5\work\Fuchs\AudioExtracts\Lucia\Case4\';
FileName1 = 'DolorP67VerrannoATeSullaureLP';
FileName2 = 'DolorP67VerrannoATeSullaure1985';
FileName2 = 'DolorP67VerrannoATeSullaure1997';
FileName2 = 'DolorP67VerrannoATeSullaureGROTC';
FileName2 = 'DolorP67VerrannoATeSullaureNaxos';

FilePath = 'c:\MATLAB6p5\work\Fuchs\AudioExtracts\Macbeth\Case2\';
%FileName1 = 'AmbiziosoSpirto1993';
%FileName2 = 'AmbiziosoSpirto1997';
FileName1 = 'NoiseNelDi1993';
FileName2 = 'NoiseNelDi1997';

FilePath = 'c:\MATLAB6p5\work\Fuchs\AudioExtracts\MadamaButterfly\Case2\';
FileName1 = 'FirstPhraseOfCheTuaMadre1985';
FileName2 = 'FirstPhraseOfCheTuaMadre1997';
FileName1 = 'ViolinSoloVogliatemiBene1985';
FileName2 = 'ViolinSoloVogliatemiBene1997';

FilePath = 'c:\MATLAB6p5\work\Fuchs\AudioExtracts\Norma\Case11\';
FileName1 = 'FirstPhraseSedizioseVociLP';
FileName2 = 'FirstPhraseSedizioseVoci1997';

FilePath = 'c:\MATLAB6p5\work\Fuchs\AudioExtracts\Norma\Case22\';
FileName1 = 'NoiseABelloAMeRitornaLP';
FileName2 = 'NoiseABelloAMeRitorna1997';

FilePath = 'c:\MATLAB6p5\work\Fuchs\AudioExtracts\Tosca\Case1\';
FileName1 = 'LoDiciMaleOraStammiASentirLP';
FileName2 = 'LoDiciMaleOraStammiASentir1997';

FilePath = 'c:\MATLAB6p5\work\Fuchs\AudioExtracts\Tosca\Case2\';
FileName1 = 'FirstPhraseOfVissiDarteLP';
FileName2 = 'FirstPhraseOfVissiDarte1997';

%FilePath = 'c:\MATLAB6p5\work\Fuchs\AudioExtracts\Norma\Case6\';
%FileName1 = 'NoiseABelloAMeRitornaLP';
%FileName2 = 'NoiseABelloAMeRitorna1985';

%FileName1 = 'Ah forse lui (1987) Normalized';
%FileName2 = 'Ah forse lui (1997) Normalized';
%FileName1 = 'LoDiciMale 1985 Normalized';
```



```

%FileName2 = 'LoDiciMale LP Normalized';
%FileName1 = 'LoDiciMale 1985 Normalized';
%FileName2 = 'LoDiciMale GROTC Normalized';
%FileName1 = 'LoDiciMale 1985 Normalized';
%FileName2 = 'LoDiciMale Naxos Normalized';

File1 = [FilePath FileName1 FileExt];
File2 = [FilePath FileName2 FileExt];
CaseName = [FileName1 ' ' FileName2];

% Read waveform 1
[Y1,Fs1,Resolution1] = wavread(File1);
% Extract the first channel from the waveforms
Y1 = Y1(:,1);
% Read waveform 2
[Y2,Fs2,Resolution2] = wavread(File2);
% Extract the first channel from the waveforms
Y2 = Y2(:,1);

% Determine waveform 1 length
NSamples1 = size(Y1);
NSamples1 = NSamples1(1);
% Determine waveform 2 length
NSamples2 = size(Y2);
NSamples2 = NSamples2(1);
% Set waveform length to minimum length
NSamples = min(NSamples1,NSamples2);
% Set the sample frequency and sample period
Fs = Fs1;
Ts = 1/Fs;
% Create a time vector
Time = linspace(0,(NSamples-1)/Fs,NSamples);
% Truncate longer vector
Y1 = Y1(1:NSamples);
Y2 = Y2(1:NSamples);

% Plot the waveforms
Figure1 = figure;
plot(Time,Y1,Time,Y2);
xlabel('Time [s]');
ylabel('Normalized Amplitude');
title(['Original waveforms: ' CaseName]);

% Define the crosscorrelation parameters
TLag = 0.5;
% Calculate the cross correlation between Y1 and Y2
NLag = fix(TLag*Fs);
NCentre = 100000;
NWidth = 10000;
%NLags = NWidth;
[XCF, Lags, Bounds] = crosscorr(Y1,Y2,NLag);
TLags = Lags/Fs;
%[XCF, Lags, Bounds] = crosscorr(Y1(NCentre-NWidth:NCentre+NWidth),Y2(NCentre-
NWidth:NCentre+NWidth),NLag);
[XCFMax,XCFMaxIndex] = max(XCF)
XCFCentreIndex = size(Lags)
XCFCentreIndex = XCFCentreIndex(1)
XCFCentreIndex = (XCFCentreIndex-1)/2+1
XCFMaxLag = XCFMaxIndex-XCFCentreIndex;

```



```

% Plot the cross correlation fuction
Figure2 =figure;
plot(TLags,XCF);
xlabel('Lag [s]');
ylabel('Normalized cross correlation');
title(['CaseName ': XCFMax = ' num2str(XCFMax)']);

% Shift the waveforms
ZeroPad = zeros(abs(XCFMaxLag),1);
switch XCFMaxLag >= 0
case 1
    Y1 = [ZeroPad; Y1];
    Y2 = [Y2; ZeroPad];
case 0
    Y1 = [Y1; ZeroPad];
    Y2 = [ZeroPad; Y2];
end
NSamples = size(Y1);
NSamples = NSamples(1);
% Create a time vector
Time = linspace(0,(NSamples-1)/Fs,NSamples);
%% Plot the waveforms
Figure3 = figure;
plot(Time,Y1,Time,Y2);
xlabel('Time [s]');
ylabel('Normalized Amplitude');
title(['Shifted waveforms: ' CaseName]);

% Do the scatter plot
Figure4 = figure;
plot(Y1,Y2);
xlabel('Normalized Amplitude Y1');
ylabel('Normalized Amplitude Y2');
title(['Y2 versus Y1: ' CaseName]);

% Calculate the cross correlation response between Y1 and Y2
% Define the crosscorrelation window parameters in seconds
TWidth = 0.1;
NCrossCorrWindows = 7;
% Calculate the crosscorrelation window parameters in samples
NWidth = fix(TWidth*Fs);
NWidth = fix(TWidth*Fs);
TCentre = linspace(0,NSamples/Fs,NCrossCorrWindows);
NCentre = fix(TCentre*Fs);
NLags = NWidth;
%CrossCorrSamples = 7;
CrossCorrMax = [];
CrossCorrWindowLag = [];
Figure5 = figure;
for Index = 2:NCrossCorrWindows-1
    Y1Section = [zeros(NCentre(Index)-NWidth-1,1); Y1(NCentre(Index)-NWidth:NCentre(Index)+NWidth);
zeros(NSamples-(NCentre(Index)+NWidth),1)];
    Y2Section = [zeros(NCentre(Index)-NWidth-1,1); Y2(NCentre(Index)-NWidth:NCentre(Index)+NWidth);
zeros(NSamples-(NCentre(Index)+NWidth),1)];
    [XCF, Lags, Bounds] = crosscorr(Y1Section,Y2Section,NLags);
    [XCFMax,XCFMaxIndex] = max(XCF);
    XCFCentreIndex = size(Lags);
    XCFCentreIndex = XCFCentreIndex(1);
    XCFCentreIndex = (XCFCentreIndex-1)/2+1;

```



```

XCFMaxLag = XCFMaxIndex-XCFCentreIndex;
CrossCorrMax = [CrossCorrMax XCFMax];
CrossCorrWindowLag = [CrossCorrWindowLag XCFMaxLag];
switch XCFMaxLag >= 0
case 1
    plot(Time(1:NSamples), Y1Section(1:NSamples), Time(1+abs(XCFMaxLag):NSamples),
Y2Section(1:NSamples-abs(XCFMaxLag)));
    %Y1 = [ZeroPad; Y1];
    %Y2 = [Y2; ZeroPad];
case 0
    plot(Time(1:NSamples), Y1Section(1:NSamples), Time(1:NSamples-abs(XCFMaxLag)),
Y2Section(1+abs(XCFMaxLag):NSamples));
    %Y1 = [Y1; ZeroPad];
    %Y2 = [ZeroPad; Y2];
end

% plot(Time, Y1Section, Time, Y2Section);

hold on;
end;
xlabel('Time[s]');
ylabel('Normalized Amplitude Y1, Y2');
title([CaseName]);

CrossCorrWindowLagT = CrossCorrWindowLag/Fs;
% Plot the cross correlation bestfit lags
Figure6 =figure;
plot(TCentre(2:NCrossCorrWindows-1),CrossCorrWindowLagT,'MarkerSize',10);
xlabel('Crosscorrelation window centre [s]');
ylabel('Lag [s]');
title([CaseName]);

% Calculate transfer function frequency response
SisoData = iddata(Y1(1:NSamples),Y2(1:NSamples),Ts);
NFreq = 5000;
me = etfe(SisoData,[5000],NFreq);
WVec = me.Frequency;
FreqVec = WVec/(2*pi);
me.Frequency = FreqVec;
%FreqVec = 44100*WNormalized/2;
%b=frd(me.ResponseData,FreqVec,Fs);
%plot(FreqVec,abs(me.Responsedata(1,1,:)));
Figure7 = figure;
%semilogx(b(1,:),abs(b(2,:)));
%f = pi*44100/2
%bode(me,'b*')
%Figure5 =figure;
bode(me);
FigHandle=get(gcf,'Children');
FigHandle=FigHandle(2);
TitleHandle=get(FigHandle,'title');
set(TitleHandle,'string',[CaseName]);

%xlabel('Frequency [Hz]');
%ylabel('Amplitude [dB]');
%title(['Transfer function frequency response: ' CaseName]);

% Save all figures

```



```
FigFileName = [FilePath FileName1 '_' FileName2 ' figure1'];  
saveas(Figure1, FigFileName, 'tif');  
FigFileName = [FilePath FileName1 '_' FileName2 ' figure2'];  
saveas(Figure2, FigFileName, 'tif');  
FigFileName = [FilePath FileName1 '_' FileName2 ' figure3'];  
saveas(Figure3, FigFileName, 'tif');  
FigFileName = [FilePath FileName1 '_' FileName2 ' figure4'];  
saveas(Figure4, FigFileName, 'tif');  
FigFileName = [FilePath FileName1 '_' FileName2 ' figure5'];  
saveas(Figure5, FigFileName, 'tif');  
FigFileName = [FilePath FileName1 '_' FileName2 ' figure6'];  
saveas(Figure6, FigFileName, 'tif');  
FigFileName = [FilePath FileName1 '_' FileName2 ' figure7'];  
saveas(Figure7, FigFileName, 'tif');
```

