Music Printing

Update for 1989

In its first directory, the Center showed eight examples of computer-generated music printing from several highly diverse systems, simply to show that it was possible to print music by computer. Since that time a large number of programs have appeared.

The 1986 directory carried a review article on programs to print music, pointing out the broad range of motivations that led to the development of such programs. At that time several of the most highly evolved programs were in research environments. Plotter output was prevalent. A few proprietary systems were producing high quality copy with laser phototypesetters. In the intervening three years microcomputer programs have become widely available. In the majority of cases they produce output for both dot matrix and desktop laser printers.

At this writing laser printers and phototypesetters seem increasingly to dominate the market, while plotter programs are in eclipse. Some programs that have come onto the market in recent months issue from the computer-aided design sphere of activity.

By 1987 we had recognized the need for a uniform basis on which to compare the output of different systems. To this end we distributed six months prior to publication a set of three musical examples--a four-voice Bach chorale with two verses of text underlay and a figured bass, a keyboard prelude by Bach, with rhythmically independent inner voices, and a passage from Mozart's clarinet quintet. Different sets of examples, probing diverse aspects of musical notation, were distributed in the winter of 1988 and the winter of 1989. The set pieces for 1988 were a six-voice Tallis motet on three staves and an excerpt from a Beethoven string quartet with unusual subdivisions of the beat in combination with slurs and ornaments.

The examples distributed in 1989 were a Binchois chanson, a Haydn quartet, a keyboard piece by C. P. E. Bach, and the beginning of one of Brahms' *Liebeslieder.* The Brahms example is the most difficult because of multiple problems of simultaneity. The Binchois also poses a range of problems including transposition cues at the start, brackets in the music, editorial accidentals, multiple meters and so forth. The Haydn example involves traditional problems of space allocation, clef changes within the stave, and varying subdivisions of the beat. The rococo ornamentation of C. P. E. Bach's "La Buchholtz" combined with the ever-changing distribution of notes between staves and complex rhythmic figures (one of which was erroneous in the example distributed) creates a treacherous combination of details to accommodate. Nonetheless, a very gratifying number of computer engravings was received.

The example sets are distributed to all software developers (about 75 of them) whose names are recorded in our office. Most have been eager to submit at least some of the examples in some years. A few have regularly set all the examples every year. A few have consistently avoided setting any of the distributed examples, substituting free choices in their place. Two years ago we set a limit of one free choice per firm.

Some special capabilities that have been shown in previous years (*) or which have been verified by other means include the following:

Gregorian chant [square notation] (ALPHA*, A-R, MusScribe*, SCORE*, THEME*)

Guitar tablature (Finale, MusicPrinter Plus, Note Processor, SCORE*)

Ligature indications (A-R*)

Lute tablature (ERATTO*, MusiKrafters*, SCORE*)

Mensural notation (Darbellay*, FASTCODE*, MusPrint*, SCORE,* SCRIBE*, Subtilior Press*)

Neumes (ALPHA*, SCRIBE)

Percussion figures (SCORE*)

Piano reduction of polyphonic music (Darbellay Music Processor*)

Polymetric music (Note Processor*, SCORE*)

Shape notes (MusiKrafters*, Oberon Music Editor)

Style brisé [unmeasured] (Darbellay Music Processor*)

Underlay of multiple verses of text (Dal Molin*)

The Center does not publish information about prices, hardware requirements, or range of capabilities. Prices vary widely place to place; hardware requirements and software capabilities also change from month to month. *The Musician's Music Software Catalogue*, published by Digital Arts and Technologies (P.O. Box 11, Milford, CT 06480) and sold for $5 in the US and $10 overseas, provides an extensive listing of MIDI products including music printing programs and font sets. It provides many detailed specifications. Its order prices are for the US market highly competitive.

Listings and reviews of music software are coming to be included in a wide range of scholarly journals. Robert Skinner is coordinating software information and reviews for *Notes: The Journal of the American Music Library Association*. Reviews of music printing software for the IBM PC by Garrett Bowles for *Notes* and by Nicholas Cook for *Current Musicology* are in press.

Special exhibits of music printing software are increasingly common. In the US the Music Publishers' Association has held a one-day workshop in New York in June for each of the past three years. The programs demonstrated in 1989 were Finale, the Note Processor, NoteWriter, SCORE, and the Synclavier Music Engraving System.

In the UK, a one-day exhibit of music printing software was held at the University of Surrey on May 19, 1989. The programs demonstrated included The Copyist, Finale, Graphic Notes Music Publisher, HB Music Engraver, NoteWriter, and SCORE. A concurrent seminar entitled "Music Origination by Computer: Quality and Standardization" addressed the diverse aims of users and user issues [see p. 12].

Current and Recent Contributors

This lising concentrates on systems that have been represented by illustrations (#) over the past three years. Some now dormant systems are cited in the 1987 *Directory*, pp. 27-34. Music printing programs advertised in popular music magazines are not listed here unless they have a demonstrated capability for handling classical music.

The work of some contributors represented this year has also been shown in previous years; illustrations in previous directories are indicated only for those programs for which there is no current illustration. Past illustration numbers are given in square brackets. Company locations are given after product names. Complete company addresses are given in the Business Address list.

A-R Editions, Inc.. Madison, WI. In addition to publishing many scholarly editions of music and producing academic journals, A-R supplies musical examples for other publishers. Its music printing system, originally developed by Tom Hall, has been ported over to a Sun workstation. Music input is done alphanumerically with a modified version of DARMS. A Linotron L-300 with PostScript is used for output. A version of this software intended for commercial distribution is under development. See Illustrations #10, #20, and #33.

Adagio is a musical code developed by Roger Dannenberg of Carnegie Mellon University as part of the CMU Toolkit. Pitch and octave representation are the same as in CCARH code (shown in the 1987 *Directory*) and duration representation is roughly the same as in DARMS (Q = quarter, E = eighth, etc.). The Toolkit is available with documentation for IBM PC XT and AT machines at a very modest cost from the Computer Science Department at CMU (Pittsburgh, PA 15213).

Alpha/TIMES. St. Gall, Switzerland. An integrated system for the Apple Macintosh line. TIMES stands for Totally Integrated Musicological Environment System. An unusual input method (voice recognition device with light pen) permits accurate reproduction of non-common notation. The system incorporates graphics editors, a font editor, and a communication system. It supports certain analytical tasks. Christoph Schnell is the developer. Illustrated [#9] in 1988 and previous years. No submission provided in 1989.

Amadeus Music Software GmbH. Munich, FRG. This product, originally developed by Kurt Maas, is commercially available by license for the PDP-11/73 and the Atari Mega ST4. Both alphanumeric and MIDI input are supported, the latter facilitating acoustical playback. Most data are stored as ASCII files. Output (for dot matrix and laser printers, plotters, and phototypesetters) is scalable to a resolution of 1000 dots per inch. The examples shown here were produced by the Amadeus ECRM lasersetter, a device that combines raster image processing with laser image recording. See Illustrations #7, #17, and #28.

Beethoven [from Samson Technologies]. Hicksville, NY. This program has been announced as one for the Atari and the Macintosh. It accepts MIDI input, permits the creation of custom fonts, and creates output for the Atari laser printer and the Hewlett Packard Desk Jet. Its attraction for musicologists is that its graphics library includes medieval neumes. However, the product has not yet been released and no sample was obtainable.

CCARH. Menlo Park, CA. The Center's music representation system supports the development of electronic transcriptions and editions of a large quantity of musical repertory, chiefly from the eighteenth century. Input is from an electronic keyboard; alphanumeric code is used to provide non-acoustical information. A corollary music printing system, developed by Walter Hewlett, was used to produce a performing score and parts for Handel's oratorio *Susanna* in September 1989 and for two Telemann serenatas scheduled for performance early in 1990. CCARH's input code was shown in 1987: #6.

The Copyist [from Dr. T's Music Software]. Chestnut Hill, MA. Three versions of this commercial program for Atari, Amiga, and IBM PC compatibles are offered by Dr. T's. "DTP" is the most comprehensive version. Alphanumeric and MIDI input and output are supported. Files can be converted to TIFF and EPS formats. Output supports PostScript and Ultrascript printers as well as the Hewlett Packard LaserJet Plus and plotters. The Copyist interfaces with a number of popular sequencer programs. The developer is Crispin Sion. See Illustrations #8 and #30.

Dai Nippon Music Processor. Tokyo, Japan. This dedicated system for the production of musical scores was announced two years ago. An illustration [#43] was provided in 1988. File interchange with the research system in use at Waseda University (Tokyo) is supported. The system was originally proprietary; a commercial version has now been released.

Dal Molin Musicomp. Miami, FL, and Oyster Bay, NY. Armando Dal Molin has spent a lifetime in the effort to make music printing more efficient. More than 500,000 pages of music have been printed using equipment of his design. Examples were shown in 1988 [#6-8, #32] and the internal code was indicated in 1987: #4. Dal Molin's Musicomp terminal is used by Belwin Mills Co.; a DOS version utilizing an auxiliary keypad for pitch entry is part of a larger package tailored to individual needs of existing users. The developer remains in contact with the Center and is eager to exchange ideas about computer music notation with other programmers but was unable to provide a contribution for this year.

Darbellay Music Processor. Geneva, Switzerland. This academically oriented input and printing system for IBM PC compatibles has been under development for several years by Etienne Darbellay. It was illustrated [#26-#27] in 1988 and previous years. Although outputting only to dot matrix printers and not commercially available at present, it has the ability to represent and reproduce plain chant, mensural notation (black and white, ligatures), and the unmeasured *style brisé* as well as many subtle and intricate problems of music printing. The keyboard is fully user definable. An interface with the ADLIB sound driver exists. Commercial development is intended. See Illustration #23. Automatic reduction of five voices to a two-stave score is shown in 1987's Illustration #22.

DARMS is an encoding system that originated in the 1960's. In various dialects it has been used in several printing programs including those of A-R Editions, the Note Processor, and systems developed at the State University of New York at Binghamton by Harry Lincoln (1986: #15) and at the University of Nottingham, England, by John Morehen (1986: #14).

Deluxe Music Construction Set [from Electronic Arts]. San Mateo, CA. This software program for the Macintosh line of computers produces PostScript files. Developed by Geoff Brown, it was shown in 1987 (Illustrations #39 and #40).

ERATO Music Manuscriptor, a product of the ERATO Software Corporation (Salt Lake City, UT), operates as part of an integrated workstation for composition and orchestration. Setup requires an IBM PC compatible microcomputer, a digitizer tablet, and special graphics boards supporting a resolution of 800 x 1000 pixels. Pitches are entered as MIDI data; rhythmic assignment is automatic. The program

has been used to set David Newman's score for the silent film *Sunrise*. Pattern storage (1000 slots) is provided for composition. Text underlay is available. Lines and pages can be justified automatically. A Breitkopf und Härtel font is available. This product is compatible with two desktop publishing programs, Ventura Publisher and PageMaker. Two laser printers, the Canon LBP8-11 and the Hewlett Packard LaserJet II, are supported. See Illustration #44.

ERATTO. Parisian research center in which the encoding, printing, and analysis of lute music have flourished for many years. Transcription and conversion capabilities for German lute tablature to staff notation were shown in 1988 as Illustrations #47 and #48. Bernard Stepien has developed software for the projects of Hélène Charnasse. Michel Wallet is now developing a music printing program called **Euterpe** to interface with ERATTO's musical data.

ETH. Zurich, Switzerland. Giovanni Müller and Raffaello Giulietti, who work at the Eidgenössische Technische Hochschule in Zurich, have been attempting to define a class of naturally parameterizable formatting operations in the continuing development of a high-quality music printing system at their institute. Examples focussing on particular complex aspects of music representation have been shown at conferences. No contribution was received this year. See 1987: #44.

EZ-Score Plus. This commercial product for the Atari 1040ST, shown in 1988 [#20], was previously sold by Hybrid Arts in Los Angeles, CA. Its distribution is now managed by a different firm, which we were unable to locate. Tom Bajoras developed the original product.

FASTCODE. An encoding language of the 1970's developed at Princeton University for white mensural notation. An example of plotter output was shown in 1985.

Finale from Coda Music Software, a subsidiary of Wenger Learning Systems in Bloomington, MN, supports music printing and MIDI playback. It provides immediate screen transcription of two-handed music. Four-part works played in two-stave arrangements may be "exploded" into four parts. Conversely, multi-voice music can be "imploded" to a piano reduction. A version for the Apple Macintosh is currently available and others for the IBM PC and NeXT are under development.

Data may also be entered alphanumerically. *Finale* is being used to produce the complete works of Giuseppe Verdi. There are numerous means of editorial control. PostScript printers are supported. Coda offers several music fonts--Petrucci for conventional notation, Rameau for subscripted chord names and basso continuo figures, Seville for guitar tablature, and Newport for jazz and percussion notation. Phil Ferrand developed the original program. Tim Herzog contributed this year's Illustrations #25 and #34.

Graphic Notes Music Publisher [#10-#11]. Adelaide, Australia. This program, developed by Trevor Richards for the Apple Macintosh, requires the use of a separate "presto pad" for input. It provides output for PostScript printers and typesetters. Examples were shown [#10-#11] in 1988. No contribution was received in 1989.

Gregory's Scribe. A printing program for the Apple II designed to produce Gregorian chant. In use at the University of Michigan in the mid-1980's, it was rendered obsolete by hardware discontinuations.

HB Music Engraver. Orem, UT. This printing program, distributed by HB Imaging, Inc., runs on the Apple Macintosh. Input is alphanumeric and utilizes redefinition of the QWERTY keyboard. HB output is for PostScript printers; a custom font called "Interlude" is available from the company. This program can convert files originated by another program, Mark of the Unicorn's Professional Composer. No contribution was received in 1989. Advertising copy and copyright-restricted materials only were submitted in 1988.

Hybrid Technology of Cambridge, England, developed an ASCII music notation system called AMPLE for the BBC microcomputer, a 6502 Acorn machine available in the UK. AMPLE is a complete programming language similar to *forth*.

IML-MIR. Linked languages for musical description and retrieval developed at Princeton University in the late 1960's.

Interactive Music System (IMS). Urbana, IL. This extensive system has been under development at the University of Illinois since the early 1970's. It is based on the PLATO system, although extensions for the Macintosh and other microcomputers have been made in recent years. Music can be input from an alphanumeric code or from a synthesizer. The IMS was recently used to create a score and parts for Vivaldi's opera *Orlando furioso*. Its printing capability was last shown in 1987: #46; its input and intermediate codes were shown in 1987: #5.

Laboratorio Informatica Musicale. The LIM printing system, under development by Goffreddo Haus, Luigi Finarelli and associates at the University of Milan, utilizes an Apple Macintosh. The system is designed to accept data in several codes and formats and its printing has been shown at conferences. No contribution was received in 1989.

la mà de guido [Guido's Hand]. Barcelona, Spain. Music printing software for the IBM PC XT and AT. An alphanumeric input system uses a redefined QWERTY keyboard (shown in 1988 on p. 48). Playback and analysis are supported. Graphic output is by plotter. The developer is Llorenç Balsach. These benchmarks were provided: for Haydn the input time was 7 minutes, the output 13 minutes; for C. P. E. Bach, input and output took 15 minutes each. See Illustrations #11 and #21.

Masterscore [from Steinberg Jones]. Northridge, CA. This transcription program accepts MIDI input and outputs to various dot matrix printers by the firms Atari, Epson, NEC, and Star. It runs on an Atari ST. See Illustration #41.

MTeX is a set of fonts for music typesetting with the TeX document description language. They were developed by Angelika Schofer and Andrea Steinbach at the Rheinische Friedrich-Wilhelms-Universität in Bonn. The set is available for DM 25 at Wegler Strasse 6, D-5300 Bonn, FRG.

MUSED. Oslo, Norway. This research system under development at Oslo University. supports interactive analysis and music printing. Programs currently run on a VaxStation II. Examples of its representation and in-house printing system were shown in 1988 as Illustrations #51-54. Commercial programs for music printing are also now in use.

MUSICADD [from T & S Enterprises]. Bellevue, WA. MUSICADD is a score assembly program that works with Generic CADD Level 3. It provides a menu of more than 170 musical symbols. It was added to our list too recently to request a printing sample.

MusicPrinter Plus [from Temporal Acuity Products, Inc.] Bellevue, WA. A manufacturer of interactive systems for rhythmic drill and other music teaching products, TAP's music printing program has evolved from one originally designed by Jack Jarrett for the Apple II to one for MS DOS machines. Version 3.0 permits MIDI entry of data; previous versions relied on graphic assembly of a score on the

screen. The playback choices are quite sophisticated and extend to much subtlety of articulation. Playback can be in realtime or steptime, which can be forwards or backwards. Dot matrix printers are supported. See Illustrations #18, #29, and #39.

Musicwriter II. Boulder, CO. This method for printing musical examples, developed by Cecil Effinger, requires an IBM Wheelwriter (Illustrations #4 and #42). The setup can also be used as an output device for an IBM PC compatible running the Oberon Music Editor (Illustration #13). Music is represented alphanumerically. Slurs are added by hand.

MusiKrafters. Lexington, KY. This software company offers special-purpose products for musical excerpts and unusual notations for the Apple Macintosh. Data are entered alphanumerically; it may be edited on the screen. PostScript files are produced. Robert Fruehwald is the developer. Its shape-note and tablature capabilities were shown in 1988 (Illustrations #45-46). See Illustrations #5 (music printing) and #45 (musical information management).

MusScribe. See NoteWriter.

MUSTRAN. This alphanumeric code was developed at Indiana University by Jerome Wenker in the 1960's. Music printing capabilities were extended by Don Byrd; music encoded in MUSTRAN has been used for analytical programs by Dorothy Gross, Gary Wittlich, and others.

Nightingale. Menlo Park, CA. Don Byrd's program for music notation for the Apple Macintosh is soon to be released by Opcode Systems. Provisional examples of output are shown in this year's Illustrations #1, #12, and #43.

The Note Processor. Brooklyn, NY. Stephen Dydo's program for for IBM PC compatibles accepts both alphanumeric and MIDI input; data can be edited either through code revisions or by using a mouse. The input code is a slightly modified version of DARMS; an example was shown in 1987: #1. Numerous dot matrix printers as well as the Hewlett Packard DeskJet and LaserJet printers are supported. The Note Processor is being used in East and West Germany for data entry in conjunction with the International Telemann Database Project and in several Italian bibliographical projects [see Integrated Text and Music Applications.] See Illustrations #3, #14, and #24.

NoteWriter [from Passport Designs]. Half Moon Bay, CA. This commercial product for the Apple Macintosh is the heir of *MusScribe* (1988: #12-14) and has been developed by Keith Hamel of Richmond, BC. This year's Illustration #38 (*MusScribe*) was contributed by a MusScribe user, Philip Downs, who has organized a large chamber music transcription project that uses the program. NoteWriter is used to typeset the musical examples in *Perspectives of New Music* and in the popular music publications of the GPI Corp. in Cupertino, CA. Hamel describes his approach to music printing, "Software Based on Notational Syntax," in the Winter 1989 issue of *Perspectives*.

Oberon Music Editor. Boulder, CO. This program for IBM PC compatibles is available as a stand-alone product or on a license basis. Entry is alphanumeric and supports printing only. A custom font, Callisto, and a multi-size font set called Publisher Series are available. A shape-note version of the Editor is also available. Output devices supported include the Hewlett Packard DeskJet and LaserJet series as well as various 9- and 24-pin dot matrix printers. A driver for MusicPrint Corp.'s latest electronic music typewriter has recently been written [see Musicwriter II, above]. Oberon makes a data-archiving service available to users. Illustrations #2, #13, and #22 were contributed by Nancy Colton.

Ohio State University. Extensive research project concerned with the development of a MusiCopy Language Processor terminated in late 1987. The project was headed by John Gourlay. Actual printing was oriented towards the Xerox 2700, a character-oriented laser printer. Dean Rousch's "Music Formatting Guidelines" (OSU-CISRC-3/88-TR10) is a systematic listing of the main graphic elements of common musical notation (CMN). The algorithm described in "Optional Line Breaking in Music" (OSU-CISRC-8/87-TR33) by Wael Hegazy and John Gourlay represents an effort to extend the line-breaking model developed by Donald Knuth for TeX.

Oxford Music Processor. Oxford, England. This provisional product for the IBM PC originally conceived by Richard Vendome was intended to interface with Epson dot matrix printers and HPGL plotters. It utilized alphanumeric input with keyboard redefinition. Development was suspended by Oxford University Press in 1988. See 1987: #43.

PARD. Milan, Italy. This music printing system, under development in 1988, was mainframe based, with plotter output. The developers were Walter Prati and Giorgio Ceroni. Examples of its work were shown in Illustrations #30 and #31 in 1988.

Personal Composer. Mercer Island, WA. This program by Jim Miller for the IBM PC line accepts MIDI input and outputs Postscript files. See 1987: #29. No contribution was received in 1988 or 1989.

Phil's Music Scribe (PMS). Cambridge, England. This program by Philip Hazel for the Acorn Archimedes workstation uses alphanumeric input and produces PostScript files for output. Acorn products are currently available in the UK and Europe. PMS, which is available by license only, has extensive capabilities for accommodating the needs of parts and scores derived from a common file. Staves can be overlaid, permitting four-part choral music to be shown on two staves, for example. Slur control is extensive also. Basso continuo figuration is supported. All characters found in PMS's music font are also available for use in text strings. See Illustrations #6, #15, and #26.

Plaine and Easie. This melodic input code was developed by Barry Brook and Murray Gould in the late 1960's. It has been widely used for thematic indexing projects, the most extensive of which is the manuscript cataloguing effort of the International Inventory of Musical Sources (RISM) coorindinated in Frankfurt, FRG. Diverse printing programs for RISM data have been written. One by Böker-Heil was shown as 1986: #16. An example of RISM's meta-code to facilitate printing is shown in the 1988 *Directory* on pp. 23-4.

Professional Composer [from Mark of the Unicorn]. Cambridge, MA. This commercial product for the Apple Macintosh has been poorly represented in previous years because of its failure to provide any material other than advertising copy. Its one contribution in 1988 was shown as Illustration #17; it provided no contribution in 1989.

SCORE [from Passport Designs]. Half Moon Bay, CA. Deriving from an academic research system at Stanford University, Leland Smith's SCORE program for IBM PC compatibles is now in use by major music publishers such as Schott and several performing organizations. SCORE generated the parts for a Munich performance of Wagner's Unfinished Symphony in E (WWV 35), which will be forthcoming in the

Gesamtausgabe. SCORE is also being used to produce the collected works of J.-B. Lully. Optically scanned musical data from the University of Surrey have been converted to SCORE data for printing. The input is alphanumeric and requires separate passes for pitch, rhythm, and articulation. Forty music fonts are available. There is a PostScript text font compatibility. See Illustrations #9, #31, and #35. The SCORE input code was shown in 1987: #2.

ScoreWriter [from Sonus Corp.]. Canoga Park, CA. This is a MIDI input transcription program for the Atari. No information on output devices was provided. See Illustration #40.

SCRIBE. Bundoora and Melbourne, Australia. The academic research system developed jointly by La Trobe and Melbourne Universities for fourteenth-century music is oriented mainly toward database management of musical repertories. It handles entry, display, retrieval, and analysis. Its capability for producing facsimiles of sources with any Hewlett Packard compatible plotter extends to colored notation (reduced to grey-scale reproduction in Illustrations #49 and #50 of the 1988 *Directory*). Neume type and text underlay are preserved. Single attributes (*e.g.*, pitch) may be searched. The program is available by license to both individuals and institutional sites and runs in IBM PC compatibles. The original software development was by John Griffiths; John Stinson is the head musicologist. The current software developer is Brian Parish.

Staatliches Institut für Musikforschung. West Berlin, FRG. Music printing programs written in FORTRAN in the early 1970's by Norbert Böker-Heil for IBM 360 input and output from a Digiset T 41 typesetter are currently under revision. The new programs will be written in C, will operate initially under MS DOS and later under the UNIX operating system, and will be PostScript compatible. The existing system has been used to produce scores for music publishers. Questions regarding its use may be directed to the firm of Satz-Rechen-Zentrum in Berlin. Some special uses of the system were shown in the 1988 *Directory*, pp. 122-5.

Subtilior Press. London, Ontario. David Palmer's Subtilior Press is a program for late-Medieval and Renaissance mensural notation that runs on a Macintosh Plus with Hypercard. Transcriptions are assembled on the screen from graphic elements. The price is extremely modest. See Illustration #46.

Synclavier Music Engraving System. White River Junction, VT. The Music Engraving System offered by New England Digital Corp. is designed exclusively for use with its Synclavier digital audio system. Information can be entered alphanumerically, via MIDI input, or by on-screen assembly. Scalable PostScript files are produced. Gregg Sewell, who created this year's NED contributions, recorded precise information on the time involved in his work. For Haydn, input required 12 minutes, editing 21 minutes, and output 38 seconds. For Bach the times were 26 minutes, 63 minutes, and 43 seconds. For Brahms they were 6 minutes, 47 minutes, and 50 seconds. See Illustrations #19, #32, and #36.

TELETAU. Pisa and Florence, Italy. TELETAU is an integrated system for musical data management initially developed at CNUCE in Pisa; it is now maintained jointly with the Florence Conservatory. It has a library of 800 encoded works and numerous analysis programs. Details of its encoding system were shown in 1987: #7.

THEME, The Music Editor. Charlottesville, VA. This commercial product, developed by Mark Lambert for the IBM PC, has been used extensively in certain academic settings. Its alphanumeric input system uses a redefined keyboard (shown in 1988 on p. 48). It has a provision for MIDI input and for conversion of alphanumeric files to MIDI output. Optimization of page layout is automatic. Binary-encoded data sets are available to users. THEME is being used to produce a collected edition of the works of Thomas Crequillon. See Illustrations #16, #27, and #37.

Toppan Scan-Note System. Tokyo, Japan. The Toppan system originated in Aarhus, Denmark, where it was developed by Mogens Kjaer. It is at present a proprietary system that accepts electronic keyboard input and prints music with a laser phototypesetter. Toppan Printing Co. Ltd. contracts with major music publishers and has produced some recent volumes of the *Neue Mozart Ausgabe*. Illustrations were shown in 1987: #8-12.

List of Musical Examples

Compiled by Edmund Correia, Jr.

These illustrations are presented alphabetically by composer, and alphabetically by contributor within each group. Free contributions appear in the last section.

Binchois: De plus en plus se renouvelle

#1 Don Byrd, Nightingale
#2 Nancy Colton, Oberon Systems Music Editor
#3 Stephen Dydo, Thoughtprocessors' Note Processor
#4 Cecil Effinger, Musicwriter II
#5 Robert Fruehwald, MusiKrafters' Examplekrafter
#6 Philip Hazel, Phil's Music Scribe
#7 Kurt Maas, Amadeus Music Software
#8 Crispin Sion, The Copyist
#9 Leland Smith, SCORE from Passport Designs
#10 Rolf Wulfsberg, A-R Editions, Inc.

Haydn: Quartet No.81, Movement 1

#11 Llorenç Balsach, La mà de guido
#12 Don Byrd, Nightingale
#13 Nancy Colton & Cecil Effinger, Oberon Music Editor
#14 Stephen Dydo, The Note Processor
#15 Philip Hazel, Phil's Music Scribe
#16 Mark Lambert, THEME, The Music Editor
#17 Kurt Maas, Amadeus Music Software
#18 Roger McRea, Music Printer Plus from Temporal Acuity Pr.
#19 Alan Talbot, Synclavier Music Engraving System
#20 Rolf Wulfsberg, A-R Editions, Inc.

C.P.E. Bach: La Buchholtz

#21 Llorenç Balsach, La mà de guido
#22 Nancy Colton, Oberon Systems Music Editor
#23 Etienne Darbellay, Music Processor
#24 Stephen Dydo, Thoughtprocessors' Note Processor
#25 Phil Farrand, Finale
#26 Philip Hazel, Phil's Music Scribe

#27 Mark Lambert, THEME, The Music Editor
#28 Kurt Maas, Amadeus Music Software
#29 Roger McRea, Temporal Acuity Products, Music Printer Plus
#30 Crispin Sion, The Copyist
#31 Leland Smith, SCORE from Passport Designs
#32 Alan Talbot, Synclavier Music Engraving Systems
#33 Rolf Wulfsberg, A-R Editions

Brahms: Liebeslied No. 7
#34 Tim Herzog, Finale
#35 Leland Smith, SCORE from Passport Designs
#36 Alan Talbot, Synclavier Music Engraving Systems

Free Contributions:
#37 Mark Lambert, THEME, The Music Editor--Gregorian chant
#38 Philip Downs, MusPrint--Boccherini: Quartet G.159
#39 Roger McRea, MusicPrinter Plus--Chopin: Prelude #20
#40 Sonus Corporation, ScoreWriter--Unidentified
#41 Steinberg Jones, Masterscore--Rimsky-Korsakov
#42 Cecil Effinger, Musicwriter II--Brahms Op. 118
#43 Don Byrd, Nightingale--music by David Gottlieb
#44 John Hawkins, Music Manuscriptor--music by David Newman
#45 Robert Fruehwald, Music Manager--screen displays
#46 David Palmer, Subtilior Press--Obrecht *et al.*

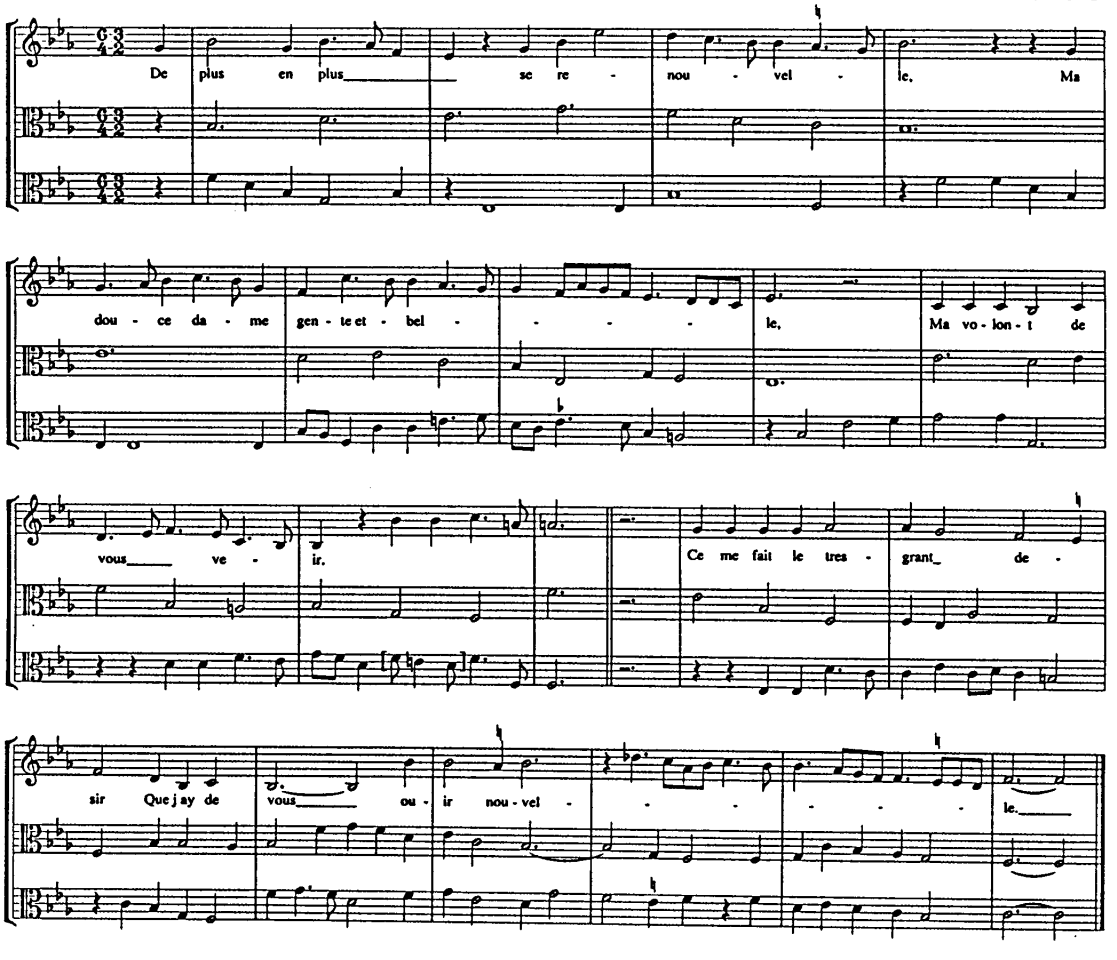
Illustration 1

Contributor: Don Byrd
Product: Nightingale
(to be released by Opcode Systems)
Running on: Apple Macintoshes

Output from: Linotronic L-300
Size as shown: 100% of original

De plus en plus se renouvelle

Binchois



Contributor: Nancy Colton
Product: Oberon Systems Music Editor
Running on: IBM PC compatibles

Output from: Hewlett Packard DeskJet
Size as shown: 78% of original

Binchois

De plus en plus se renouvelle

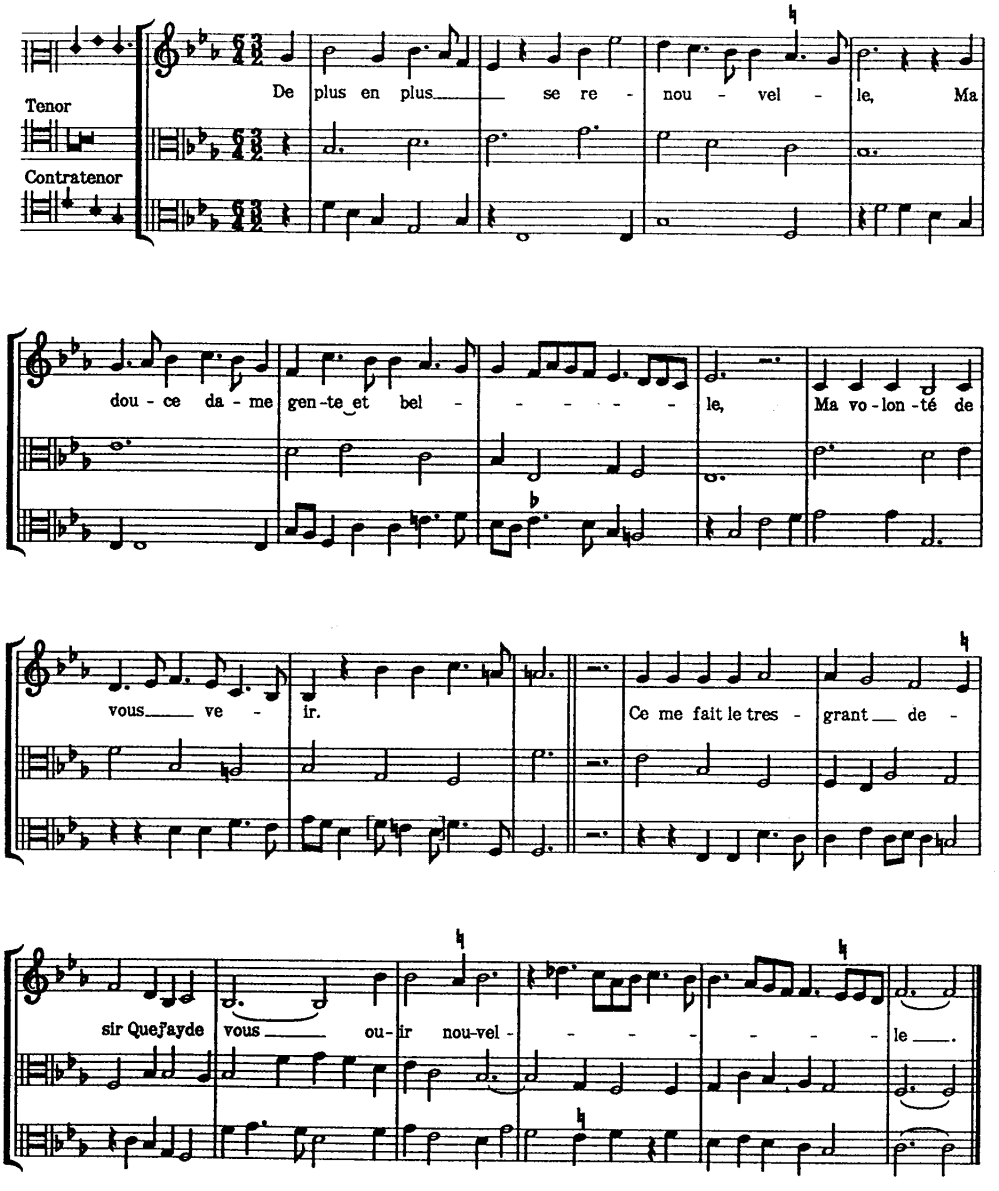


Illustration 3

Contributor: Stephen Dydo
Product: Thoughtprocessors' Note Processor
Running on: IBM PC compatibles

Output device: Hewlett Packard DeskJet
Size as shown: 64% of original

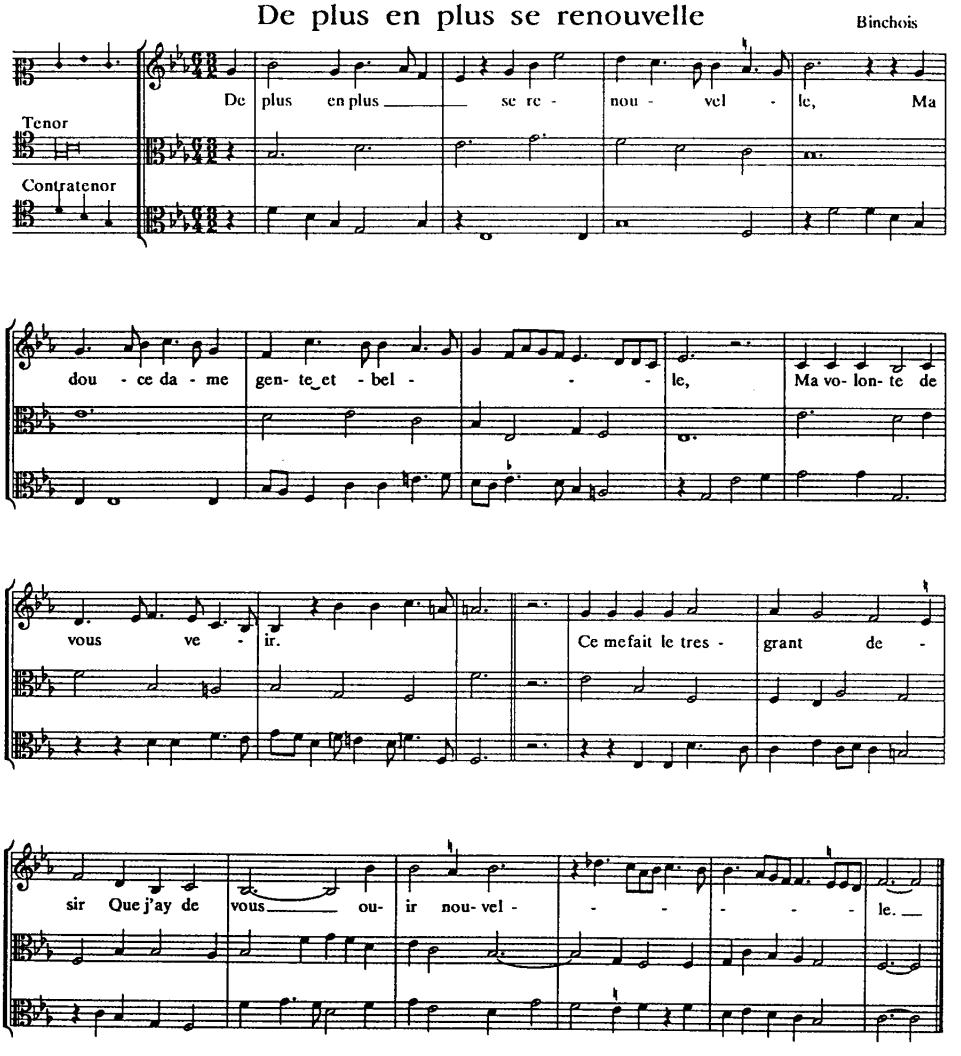


Illustration 4

Contributor: Cecil Effinger
Product: Musicwriter II

Output device: IBM Wheelwriter
Size as shown: 54% of original

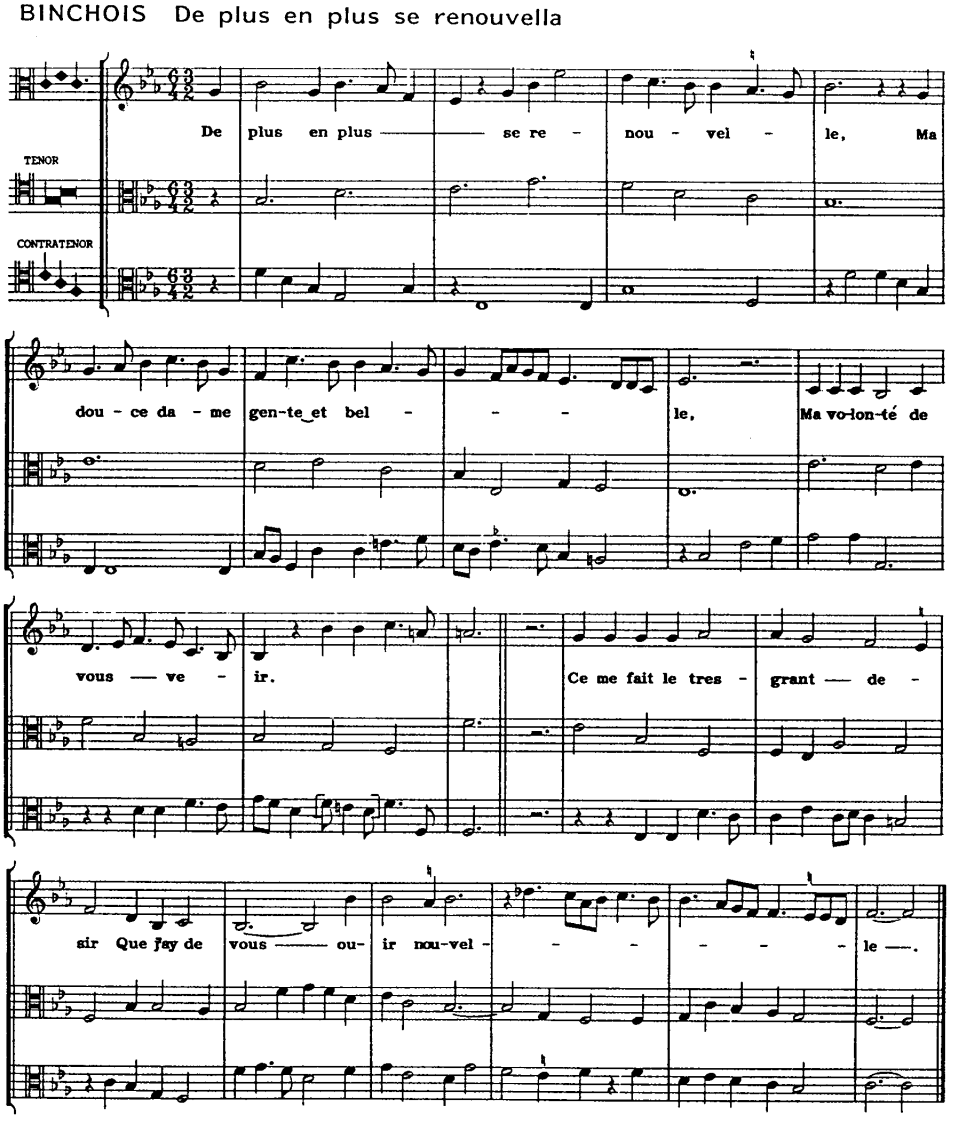


Illustration 5

Contributor: Robert Fruehwald
Product: Musikrafters' Examplekrafter
Running on: Apple Macintoshes

Output device: Apple Laserwriter
Size as shown: 100% of original

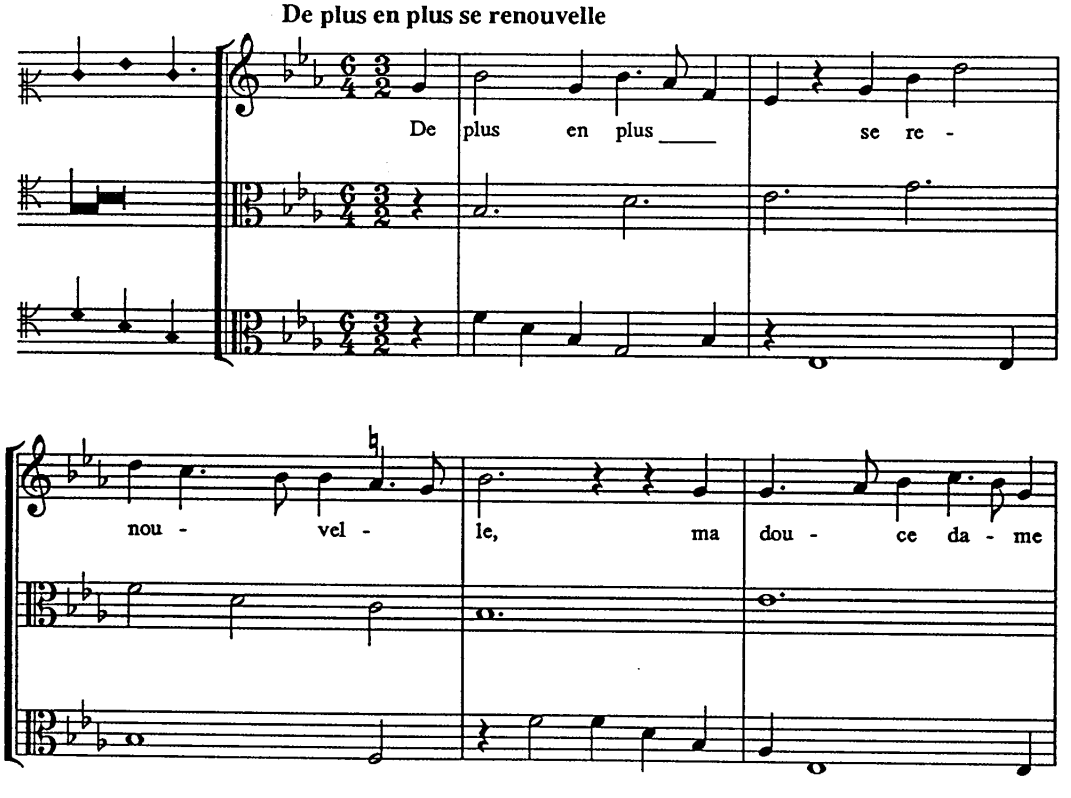


Illustration 6

Contributor: Philip Hazel
Product: Phil's Music Scribe
Running on: Acorn Archimedes workstation

Output device: Apple Laserwriter
Size as shown: 78% of original

Binchois

De plus en plus se renouvelle

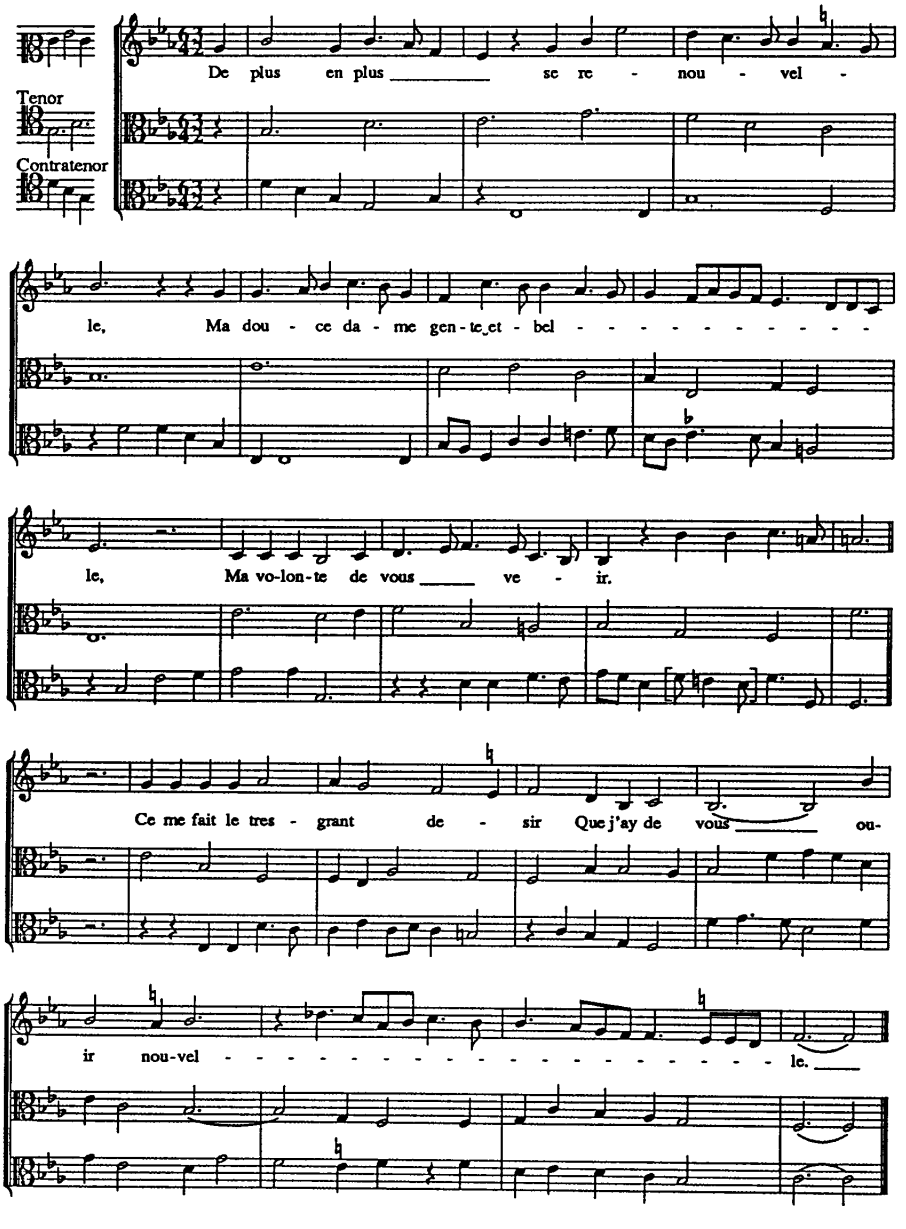


Illustration 7

Contributor: Kurt Maas
Product: Amadeus Music Software
Running on: a PDP-11/73; Atari Mega ST4

Output device: Amadeus ECRM Lasersetter (1000 d.p.i.)
Size as shown: 83% of original

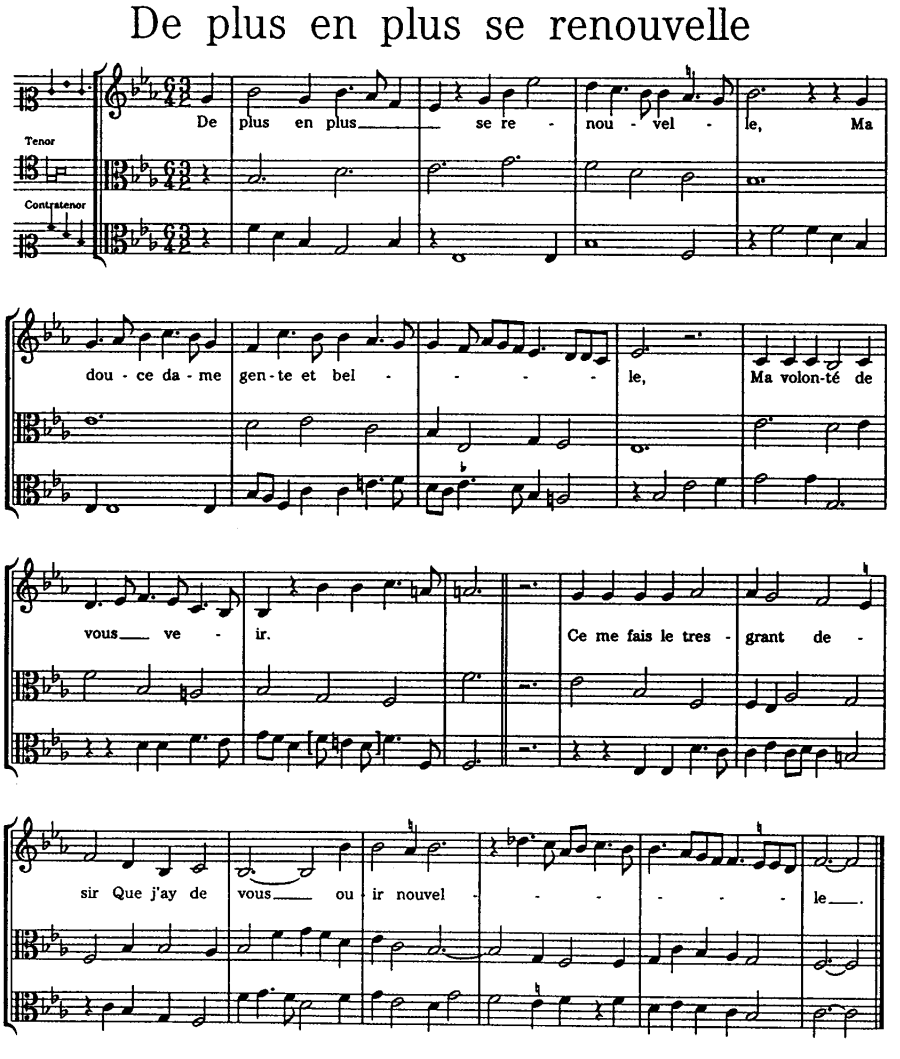


Illustration 8

Contributor: Crispin Sion
Product: The Copyist (DTP version)
from Dr. T's Music Software
Running on: Atari and Amiga microcomputers

Output device: Atari Laser Printer
Size as shown: 80% of original

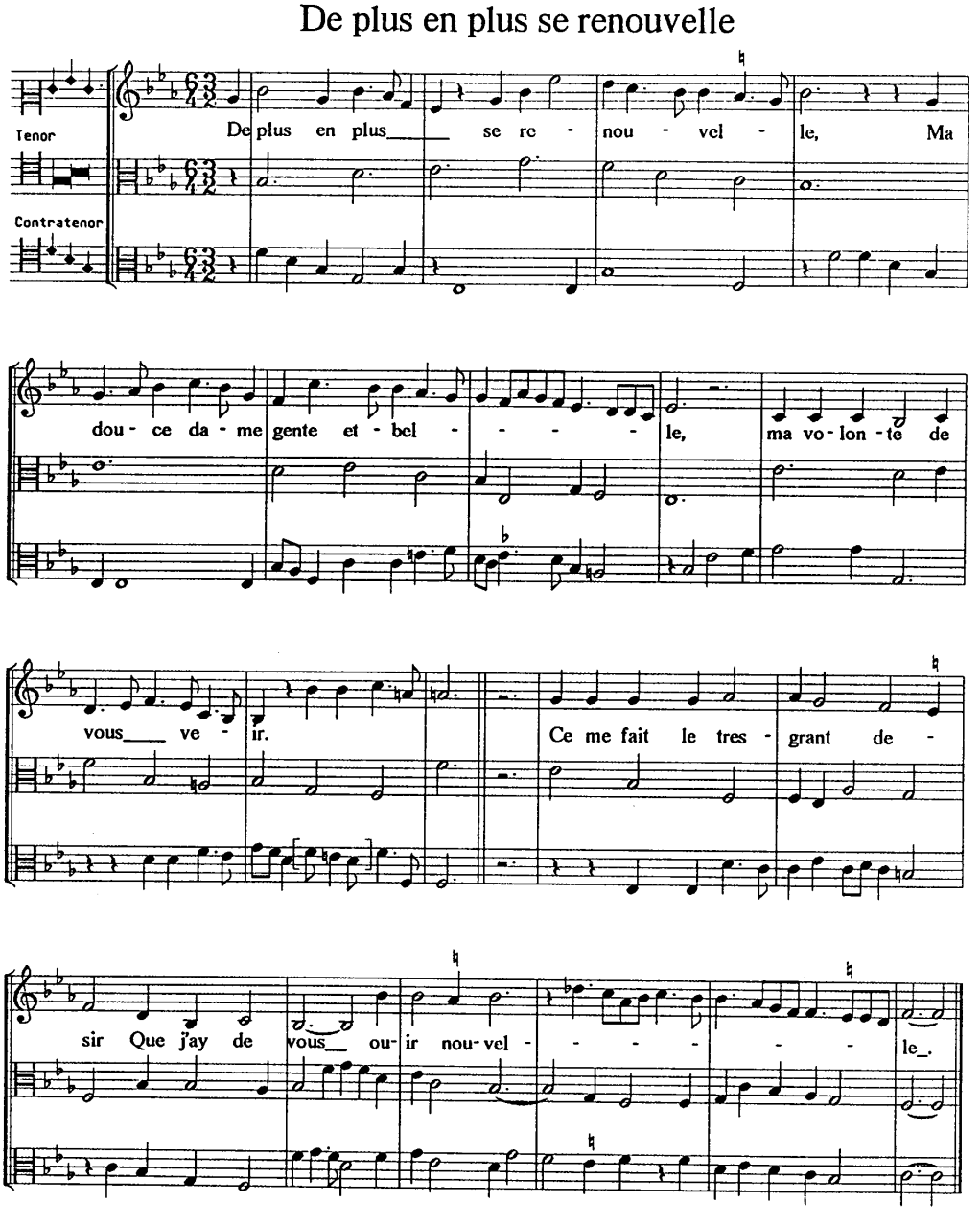
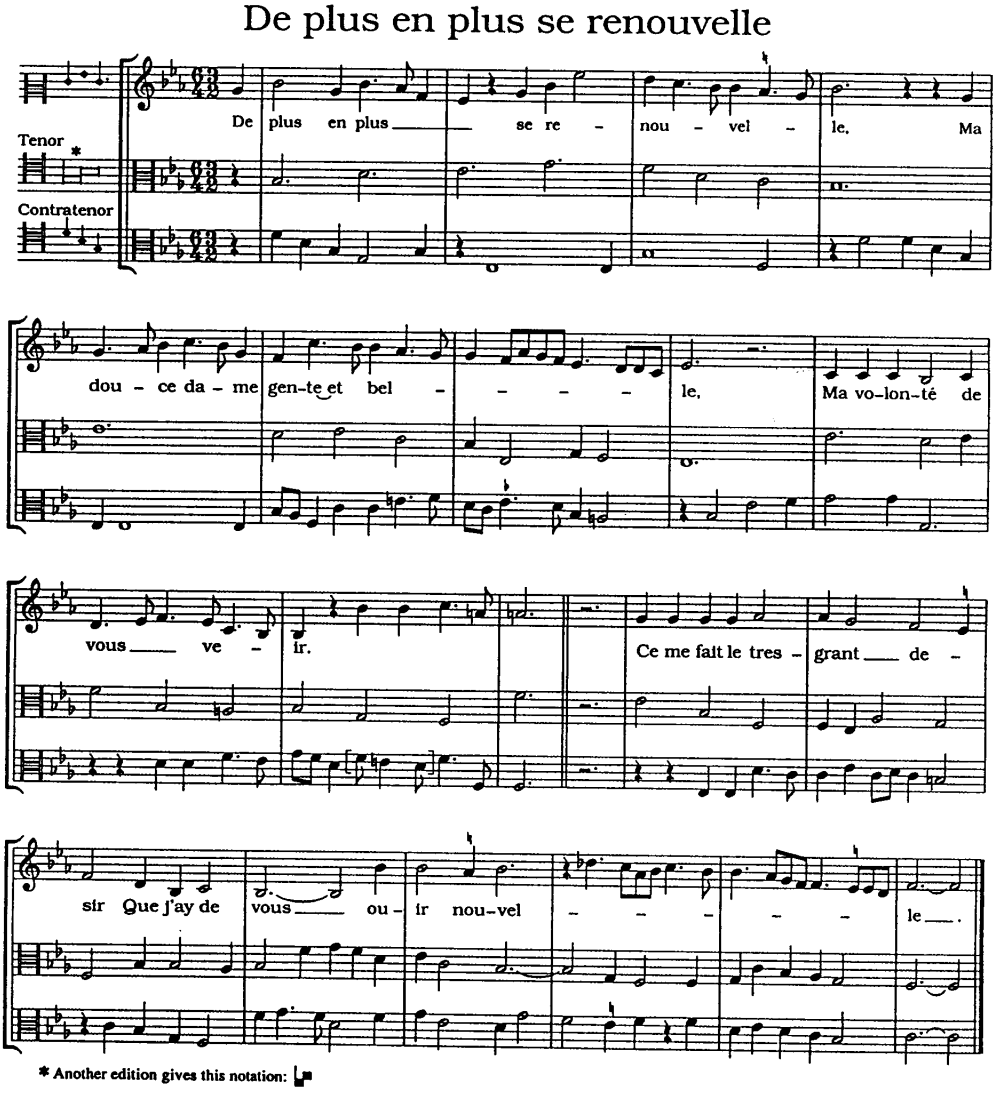


Illustration 9

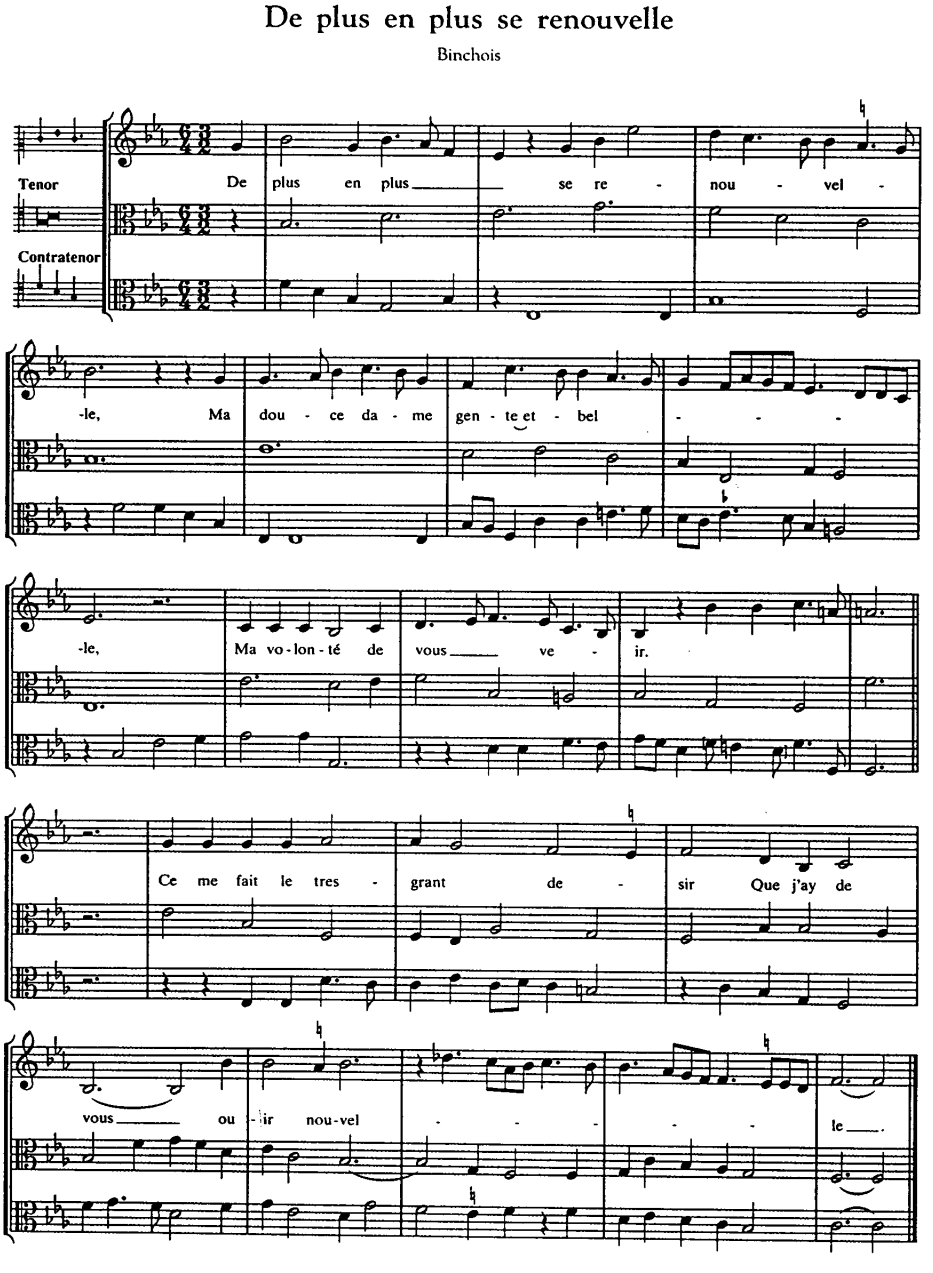
Contributor: Leland Smith
Product: SCORE from Passport Designs
Running on: IBM PC compatibles

Output device: Varityper (1250 d.p.i.)
Size as shown: 70% of original



Contributor: Rolf Wulfsberg
System: A-R Editions, Inc.
Running on: a Sun workstation

Output device: Linotron L-300 (1250 d.p.i.)
Size as shown: 83% of original



De plus en plus se renouvelle

Binchois

Illustration 11

Contributor: Llorenç Balsach
Product: La mà de guido
Running on: IBM PC compatibles

Output device: Hewlett Packard 7475 Plotter
Size as shown: 78% of original

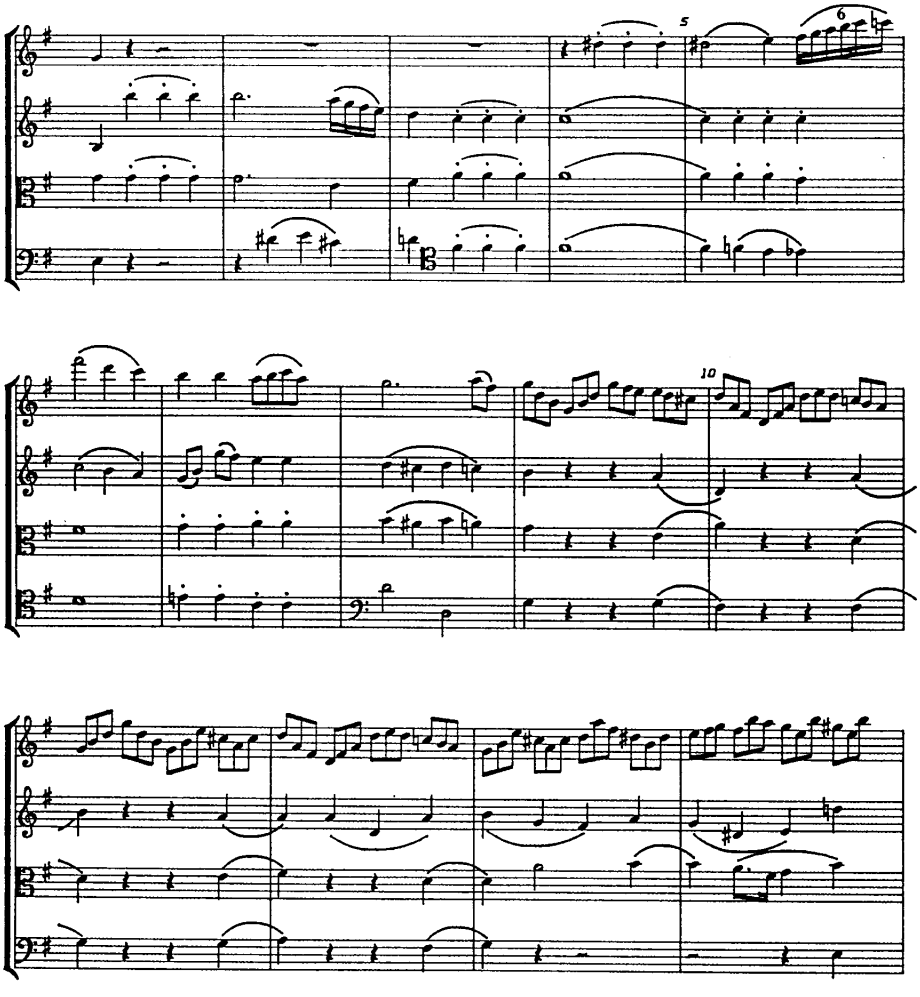


Illustration 12

Contributor: Don Byrd
Product: Nightingale
Running on: Apple Macintoshes

Output device: Linotronic L-300 typesetter
Size as shown: 82% of original

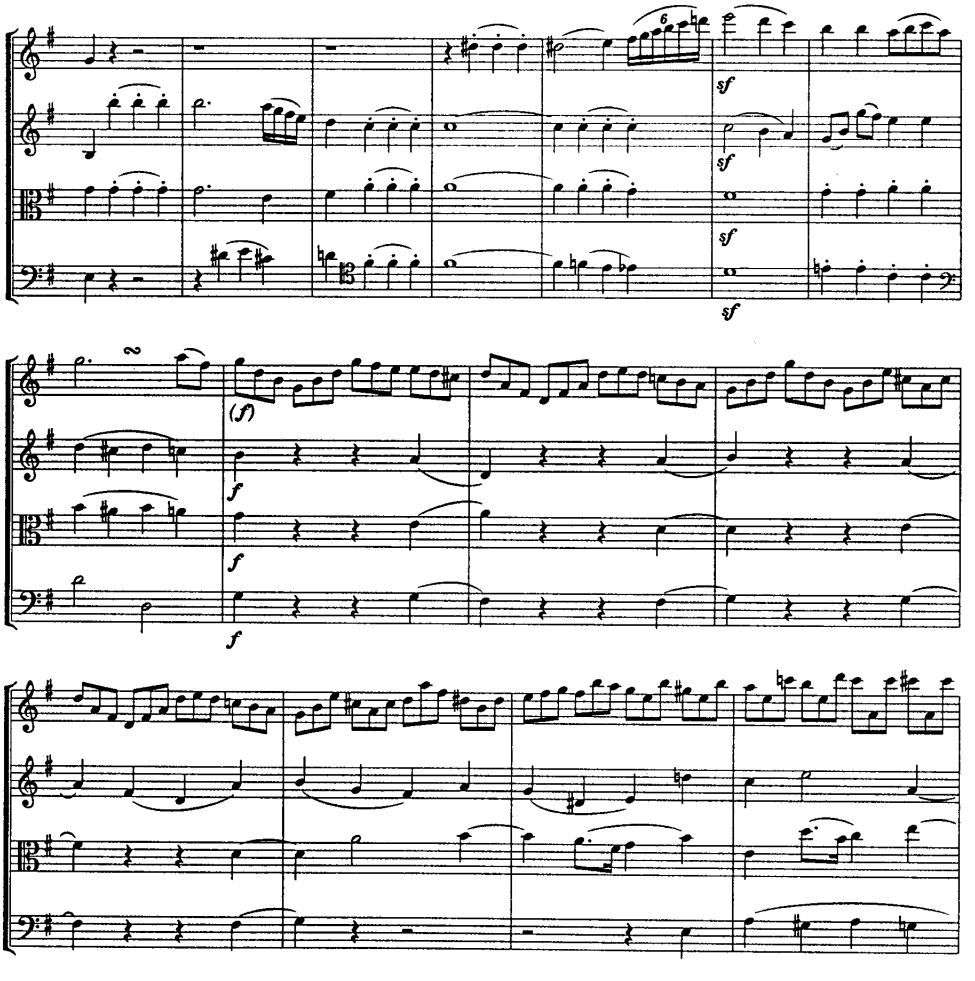


Illustration 13

Contributors: Nancy Colton, Cecil Effinger
Product: Oberon Music Editor with special driver
Running on: IBM PC compatibles

Output device: Musicwriter II
(Music Print Corp.; slurs added by hand)
Size as shown: 64% of original

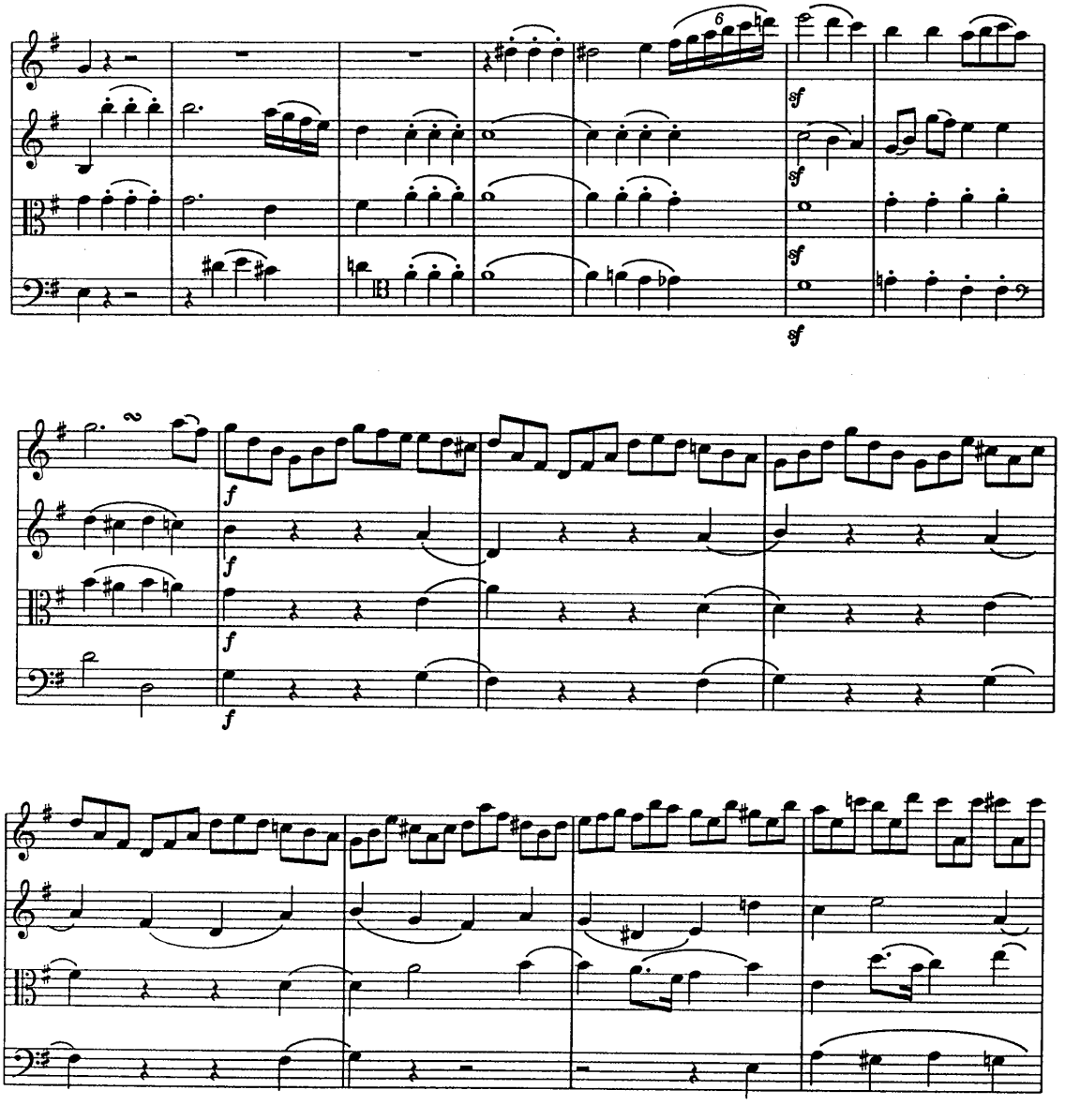


Illustration 14

Contributor: Stephen Dydo
Product: The Note Processor
Running on: IBM PC compatibles

Output device: Hewlett Packard DeskJet
Size as shown: 78% of original

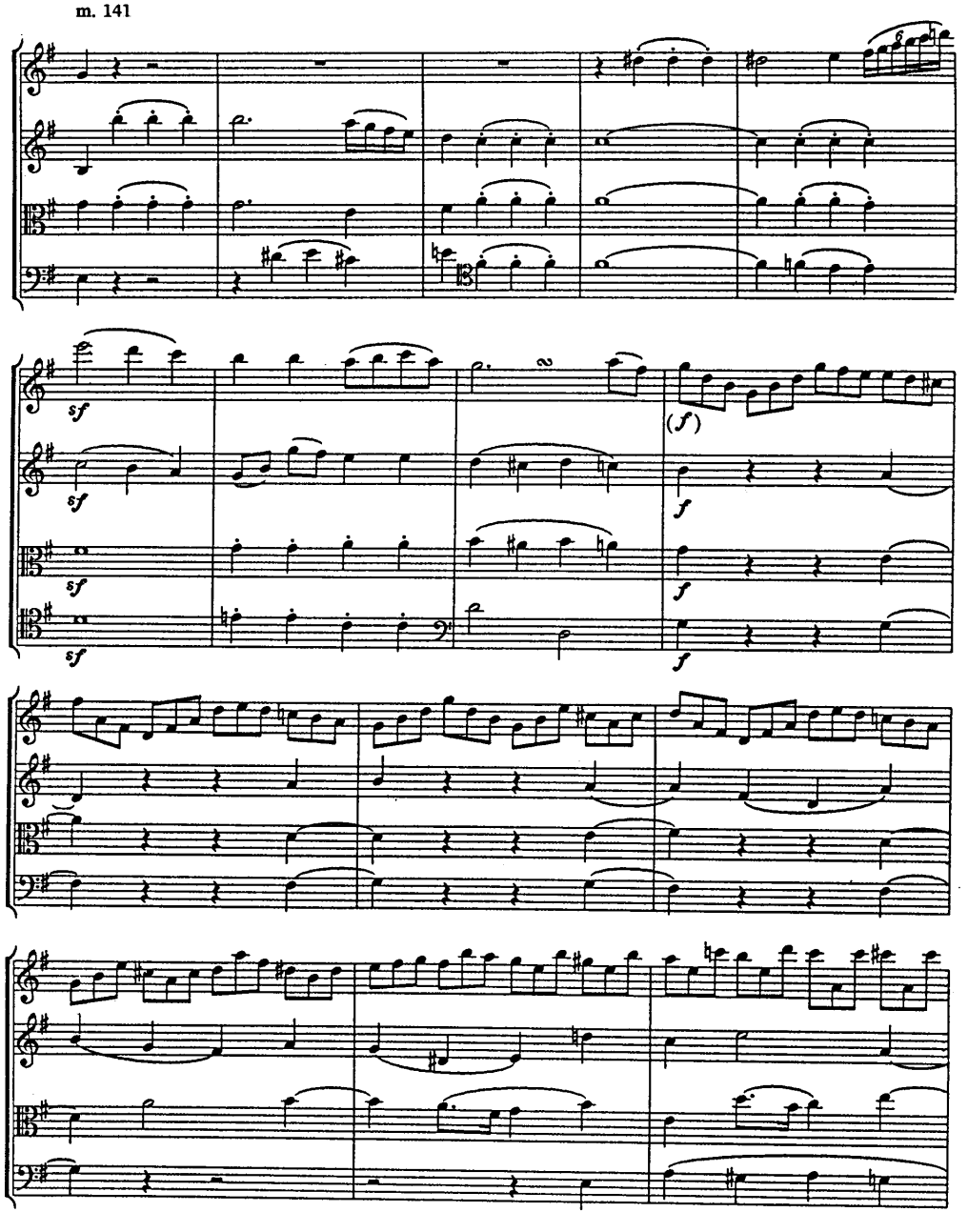


Illustration 15

Contributor: Philip Hazel
Product: Phil's Music Scribe (PMS)
Running on: Acorn Archimedes workstation

Output device: Apple Laserwriter
Size as shown: 78% of original

Haydn

Quartet No. 81, Movement 1 (Allegro Moderato)

Bars 141ff.

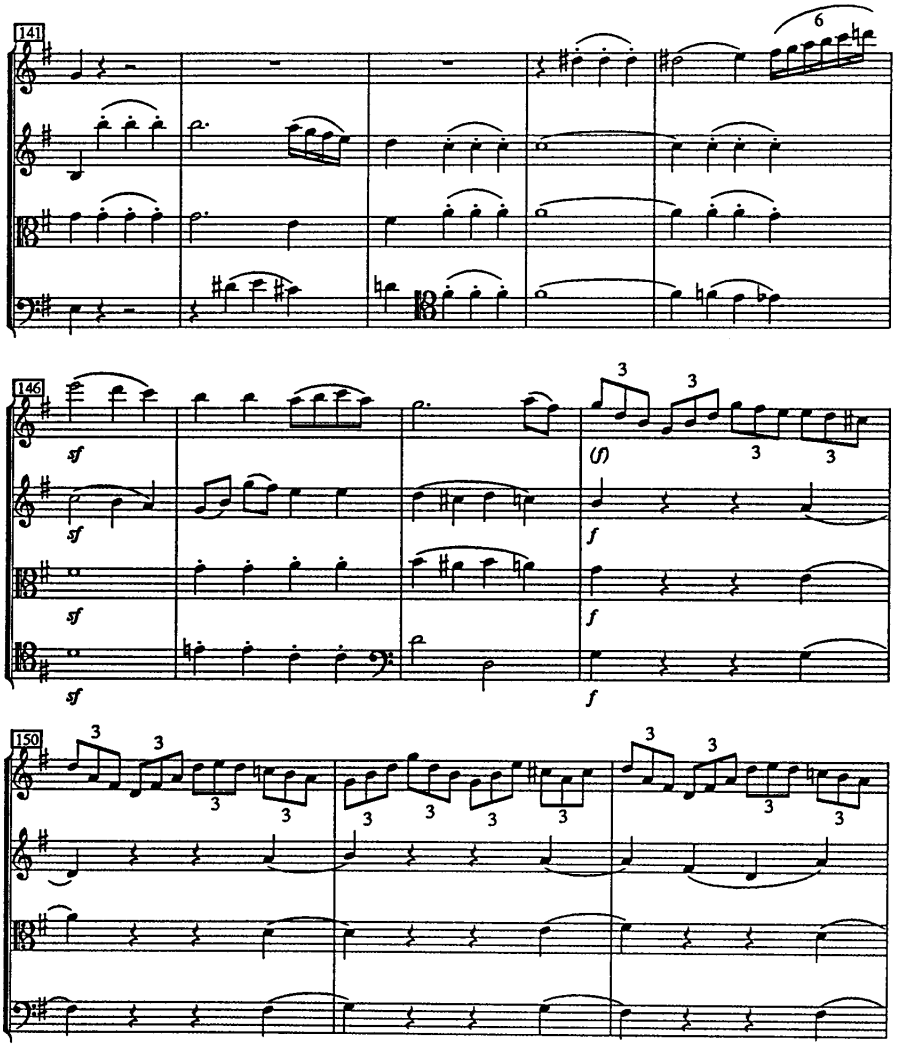


Illustration 16

Contributor: Mark Lambert
Product: THEME, The Music Editor
Running on: IBM PC compatibles

Output from: not identified
Size as shown: 45% of original

Haydn

Quartet No. 81, Movement 1 (Allegro Moderato)

Bars 141ff.

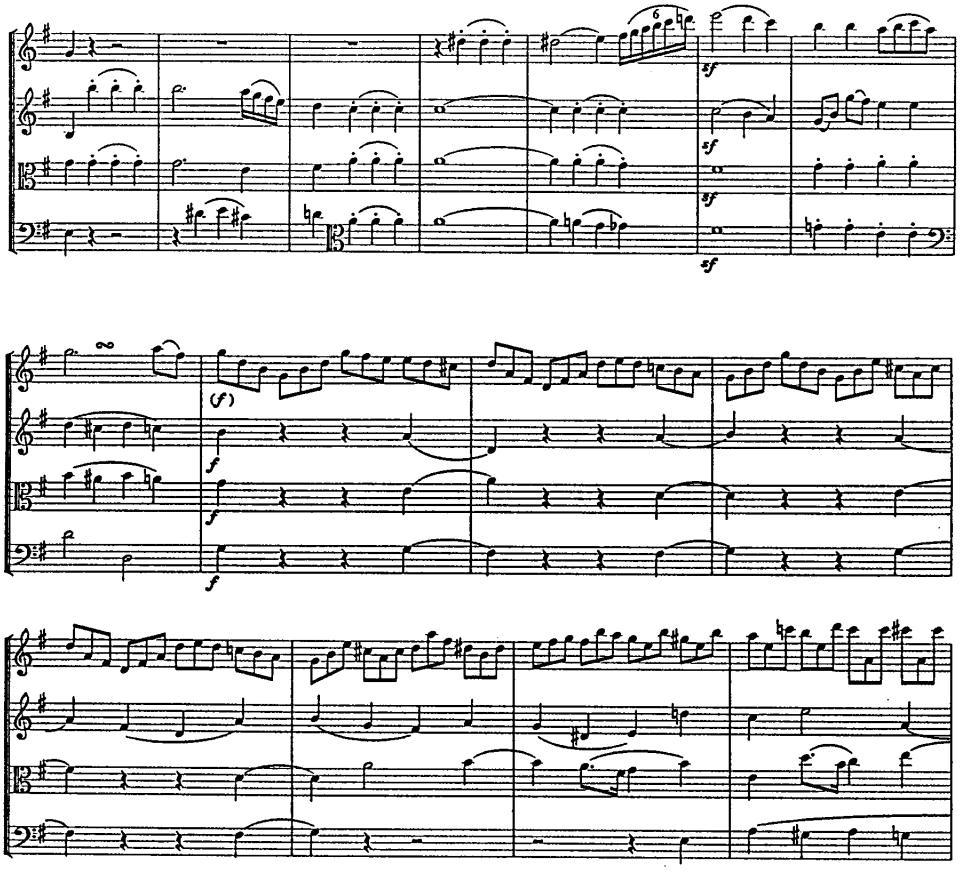


Illustration 17

Contributor: Kurt Maas **Output device:** Amadeus ECRM Laserwriter (1000 d.p.i.)
Product: Amadeus Music Software **Size as shown:** 90% of original
Running on: a PDP-11/73; Atari Mega ST4

Haydn

Quartet No. 81, Movement 1 (Allegro Moderato)

Bars 141ff.

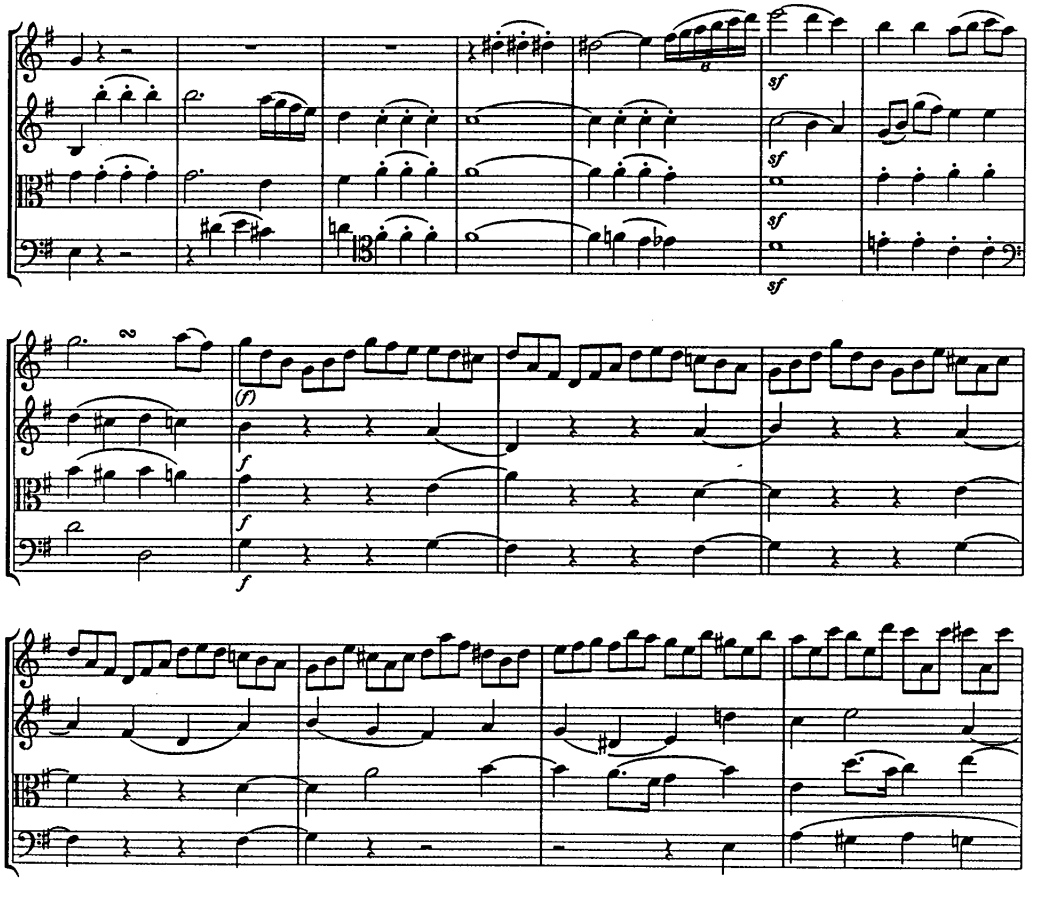


Illustration 18

Contributor: Roger McRea
Product: Music Printer Plus
from Temporal Acuity Products
Running on: IBM PC compatibles

Output device: Canon BJ-130 in 24-pin mode
Size as shown: 72% of original

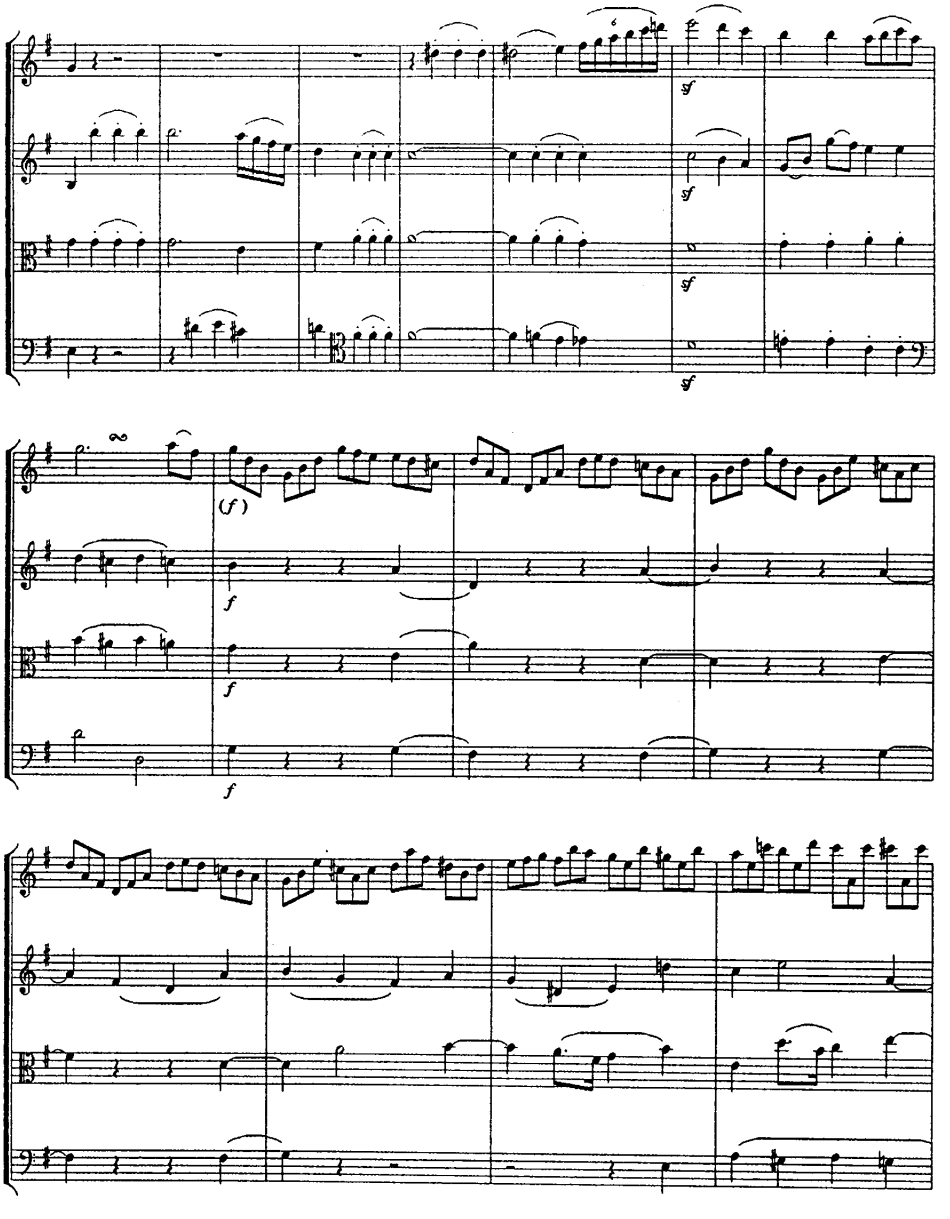


Illustration 19

Contributor: Alan Talbot
Product: Synclavier Music Engraving System
Running on: a Synclavier Digital Audio System

Output device: Linotronic L-300 typesetter
Size as shown: 78% of original

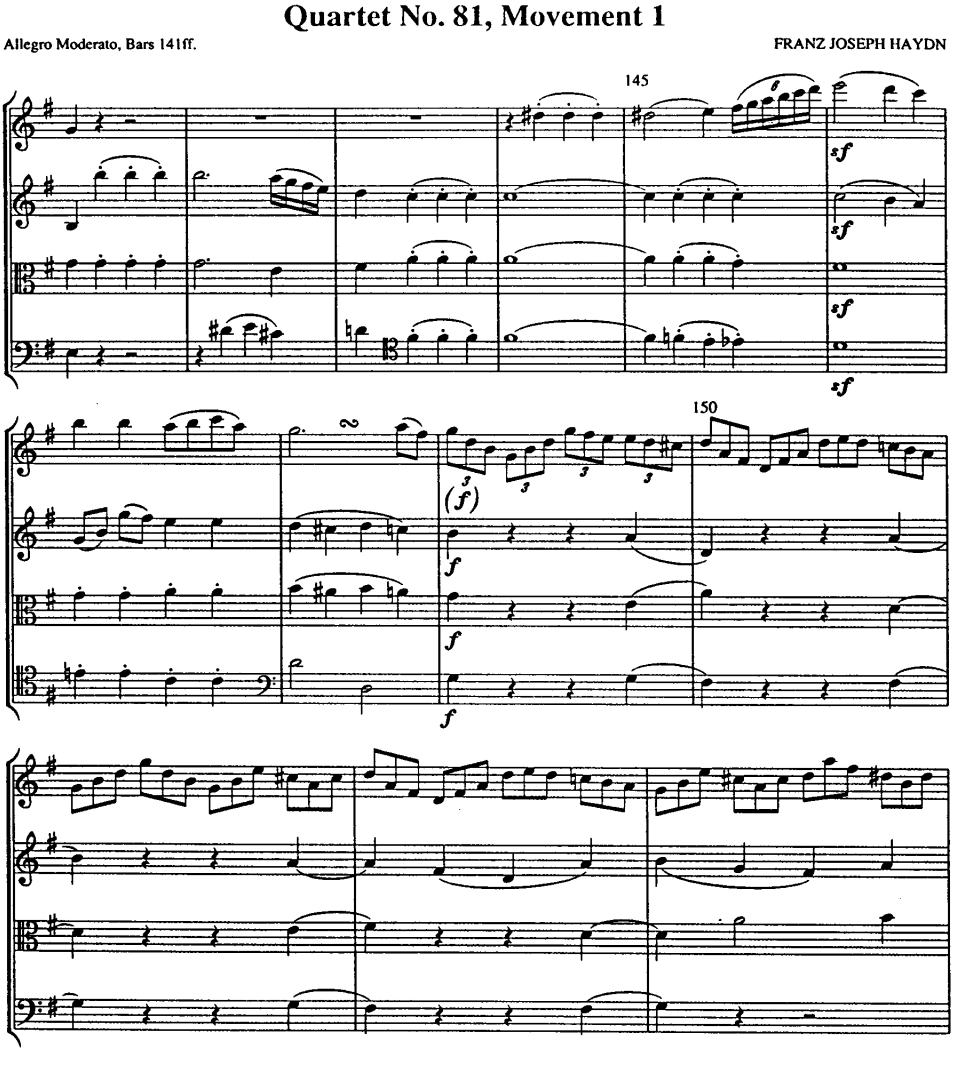


Illustration 20

Contributor: Rolf Wulfsberg
System: A-R Editions, Inc.
Running on: a Sun workstation

Output device: Linotronic L-300 typesetter
Size as shown: 86% of original

Haydn

Quartet No. 81, Movement 1 (Allegro Moderato)

Bars 141ff.

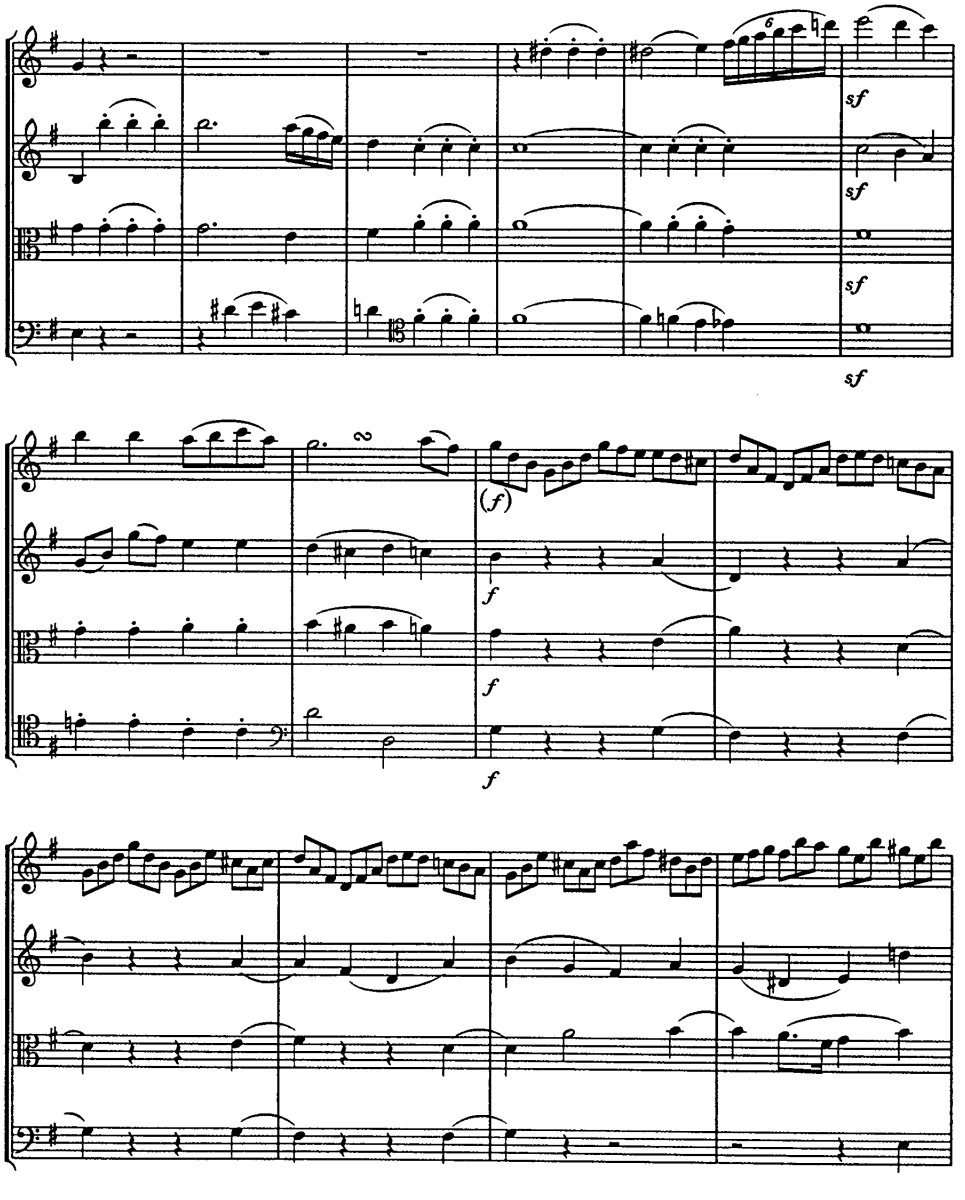


Illustration 21

Contributor: Llorenç Balsach
Product: La mà de guido
Running on: IBM PC XT and AT compatibles

Output from: Hewlett Packard 7475 plotter
Size as shown: 80% of original

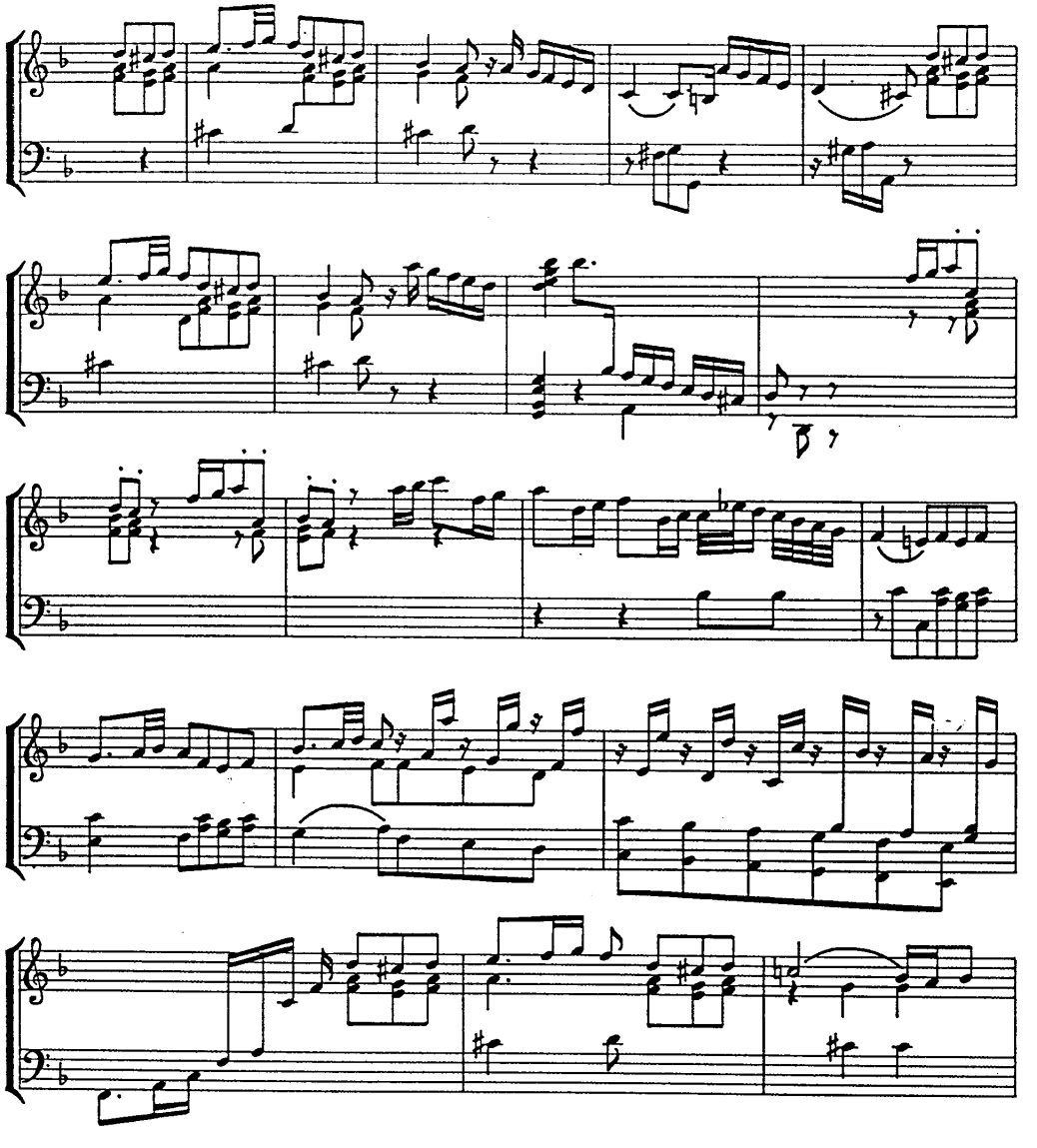


Illustration 22

Contributor: Nancy Colton
Product: Oberon Systems Music Editor
Running on: IBM PC compatibles

Output from: a Hewlett Packard LaserJet II
Size as shown: 78% of original

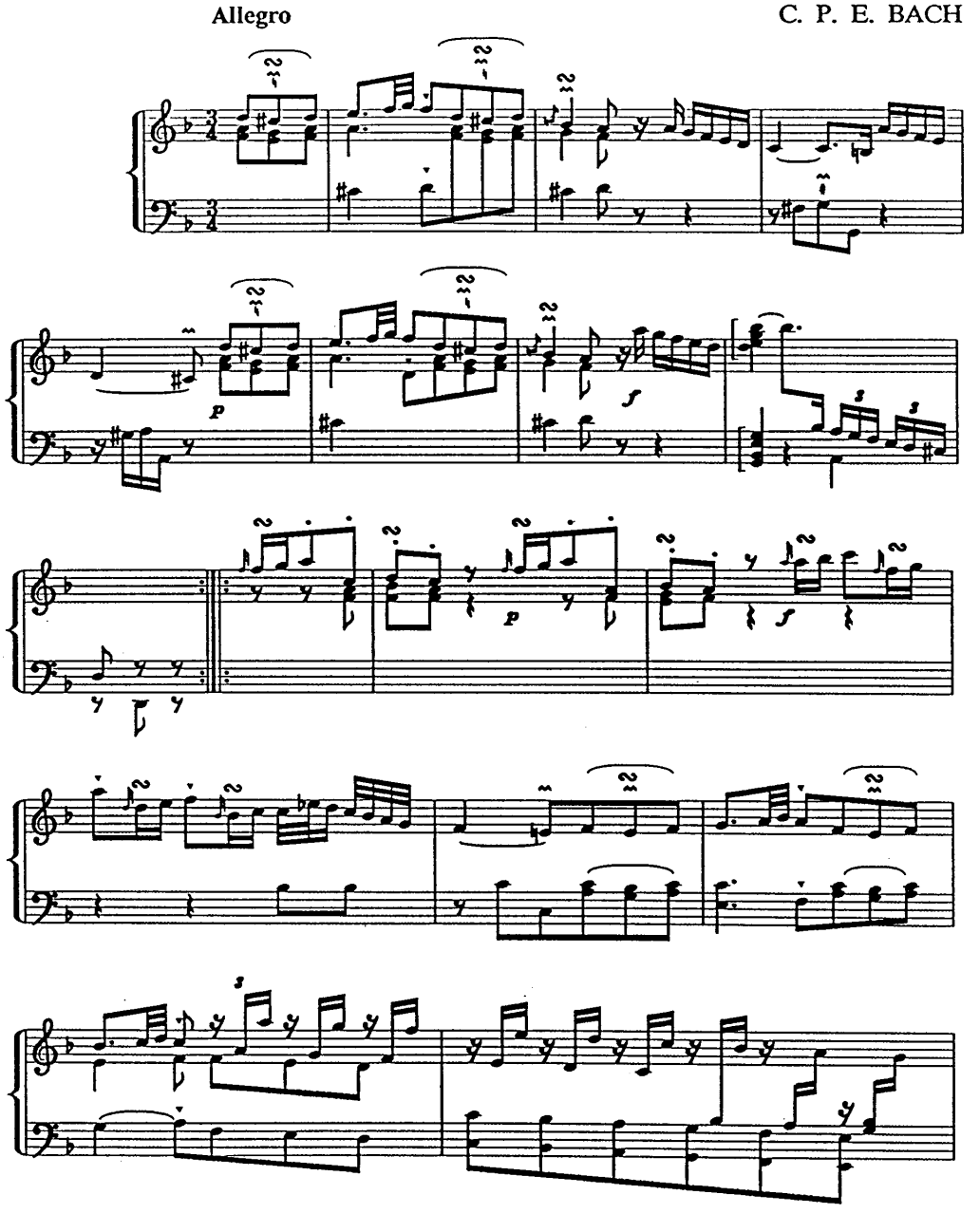


Illustration 23

Contributor: Etienne Darbellay
Product: Music Processor (under development)
Running on: IBM PC compatibles

Output from: IBM Proprinter X24
Size as shown: 80% of original

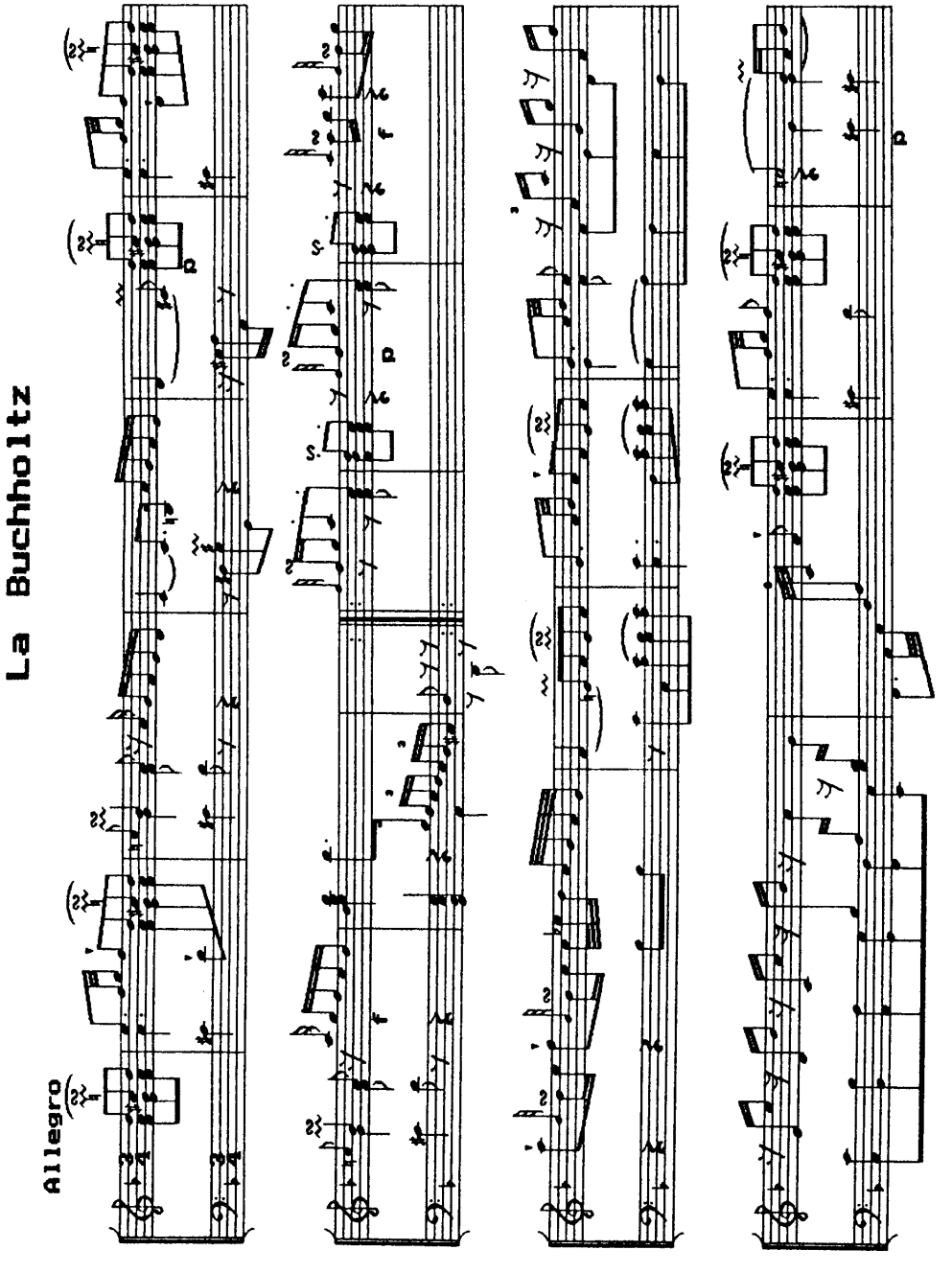


Illustration 24

Contributor: Stephen Dydo
Product: Thoughtprocessors' Note Processor
Running on: IBM PC compatibles

Output from: Hewlett Packard DeskJet
Size as shown: 74% of original

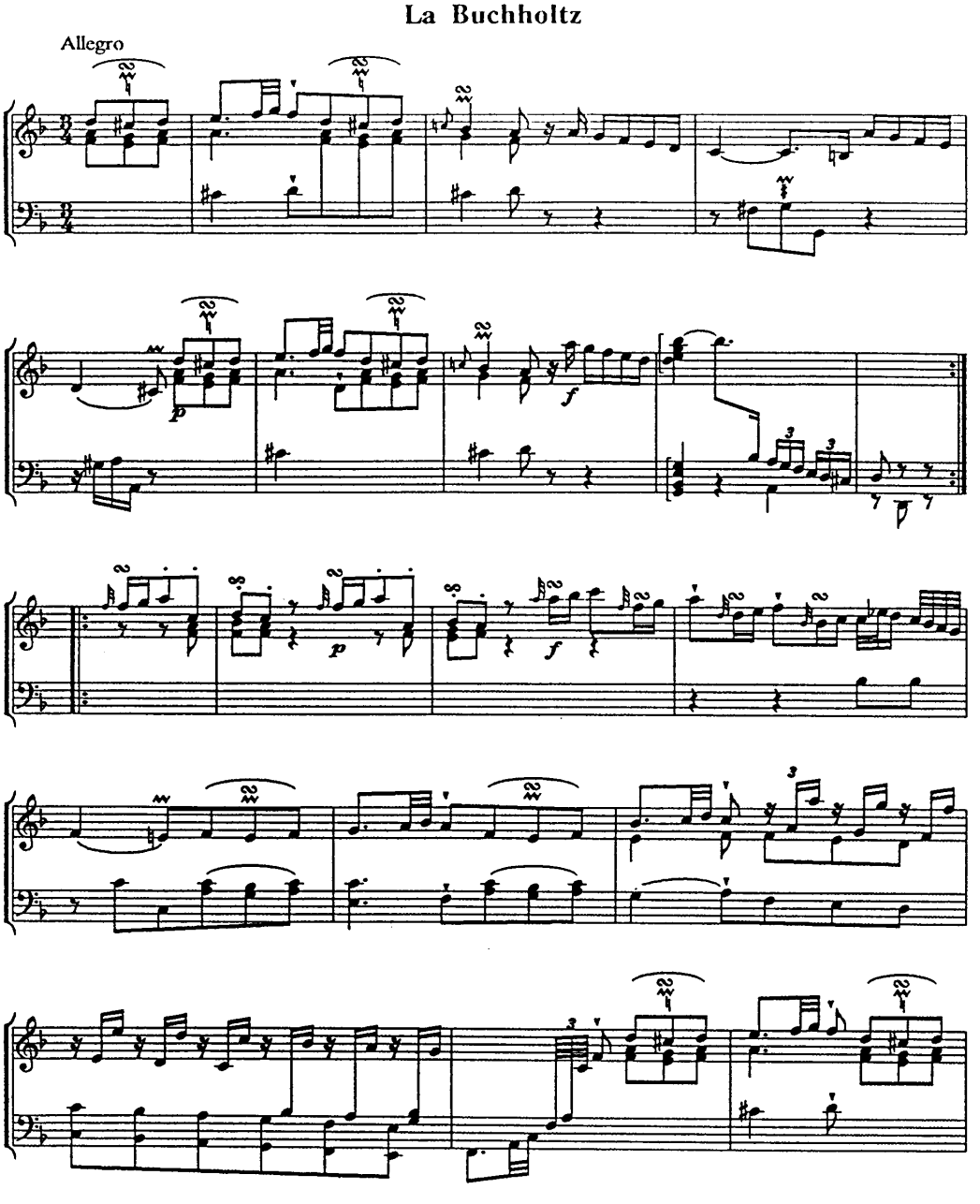


Illustration 25

Developer: Phil Ferrand
Product: Finale
Running on: Apple Macintosh

Output from: Apple LaserWriter IINT
Size as shown: 70% of original
Music font: Petrucci (from CODA)

La Buchholtz

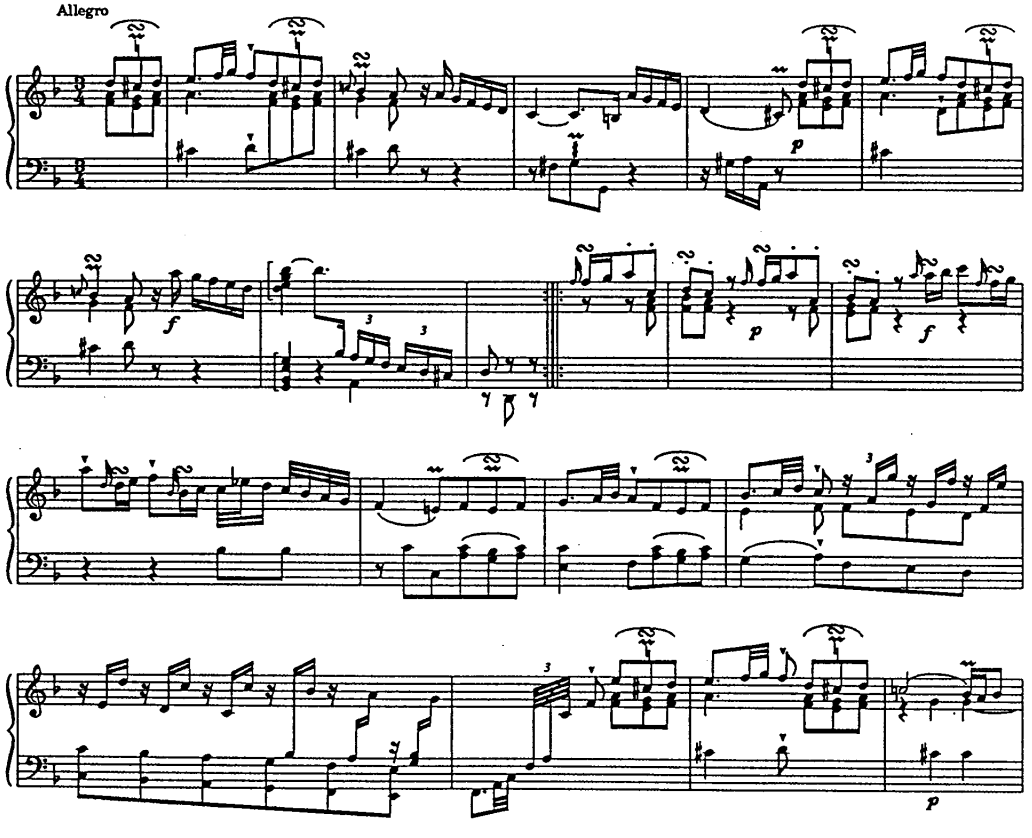


Illustration 26

Contributor: Philip Hazel
Product: Phil's Music Scribe
Running on: Acorn Archimedes workstation

Output from: Apple LaserWriter
Size as shown: 78% of original

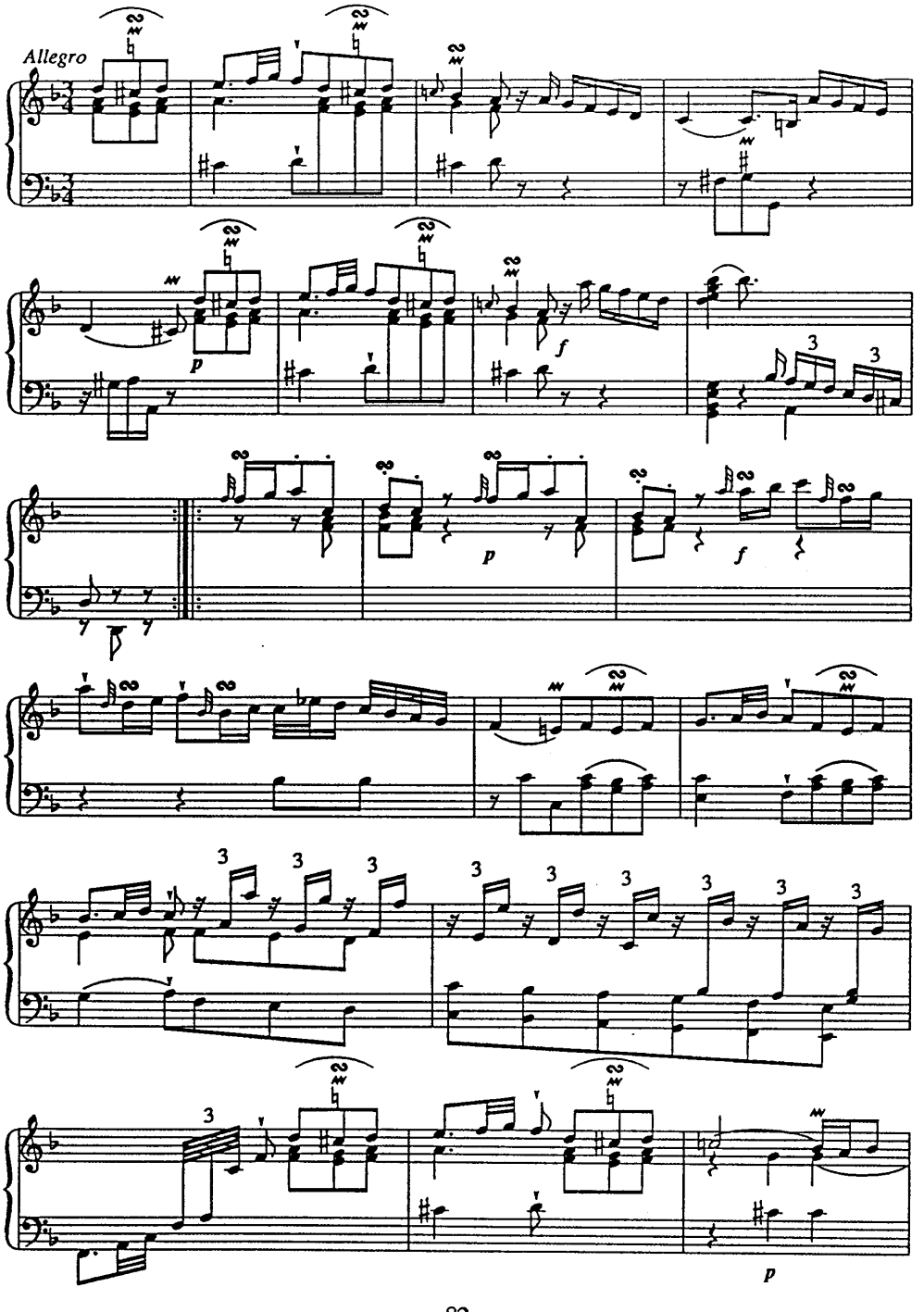


Illustration 27

Contributor: Mark Lambert
Product: THEME, The Music Editor
Running on: IBM PC compatibles

Output from: Hewlett Packard LaserJet II
Size as shown: 42% of original

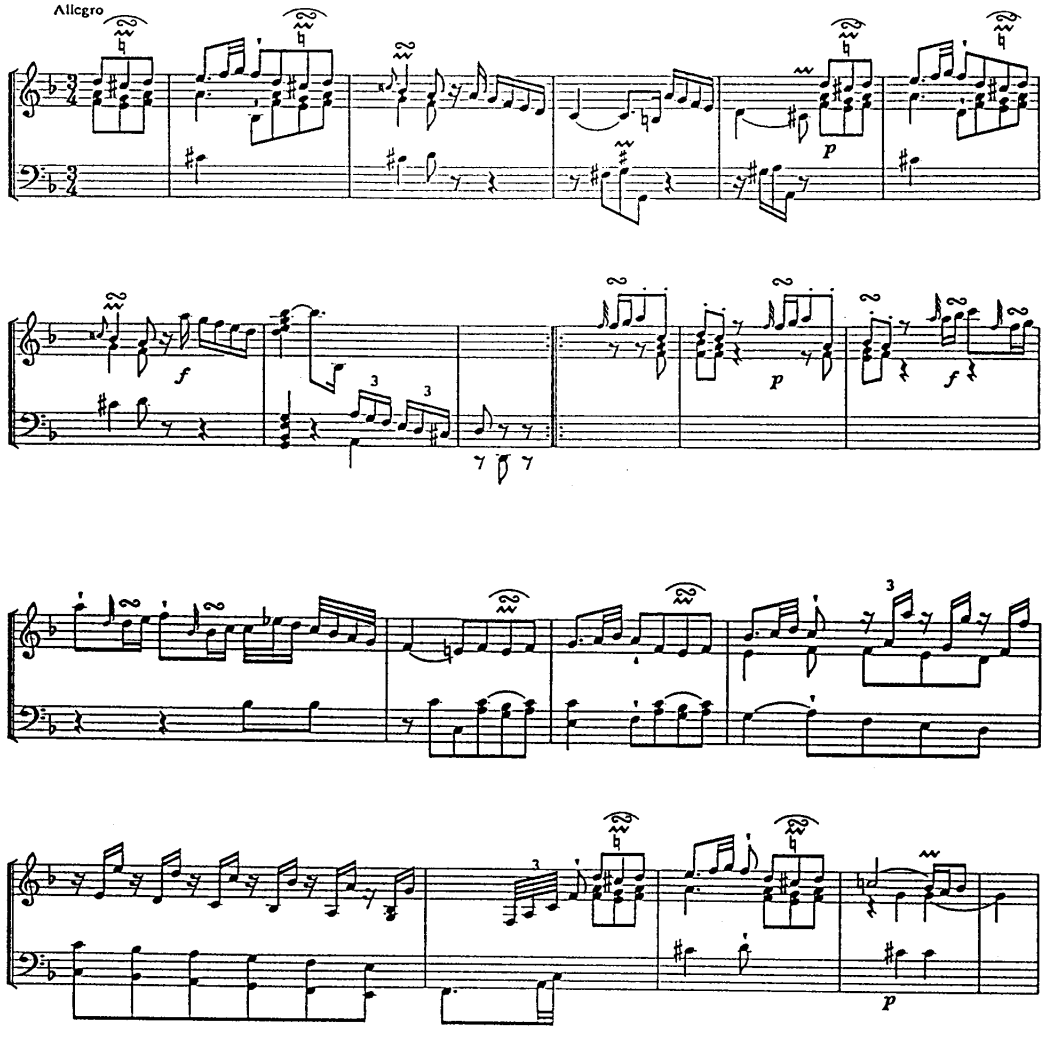


Illustration 28

Developer: Kurt Maas
Product: Amadeus Music Software
Running on: a PDP-11/73; Atari Mega ST4

Output from: Amadeus ECRM Lasersetter (1000 d.p.i.)
Size as shown: 90% of original

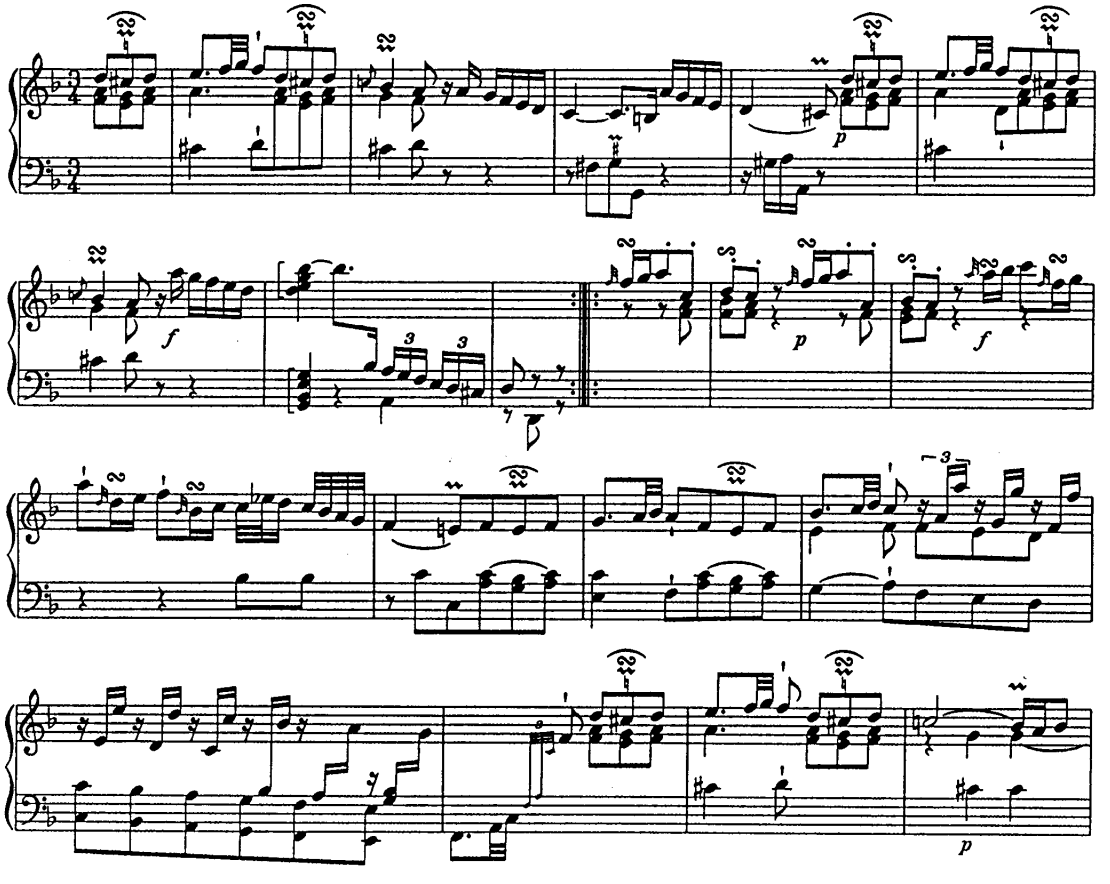


Illustration 29

Contributor: Roger McRea
Product: Temporal Acuity Products Music Printer Plus
Running on: IBM PC compatibles

Output from: Canon BJ-130 (24-pin mode)
Size as shown: 100% of original

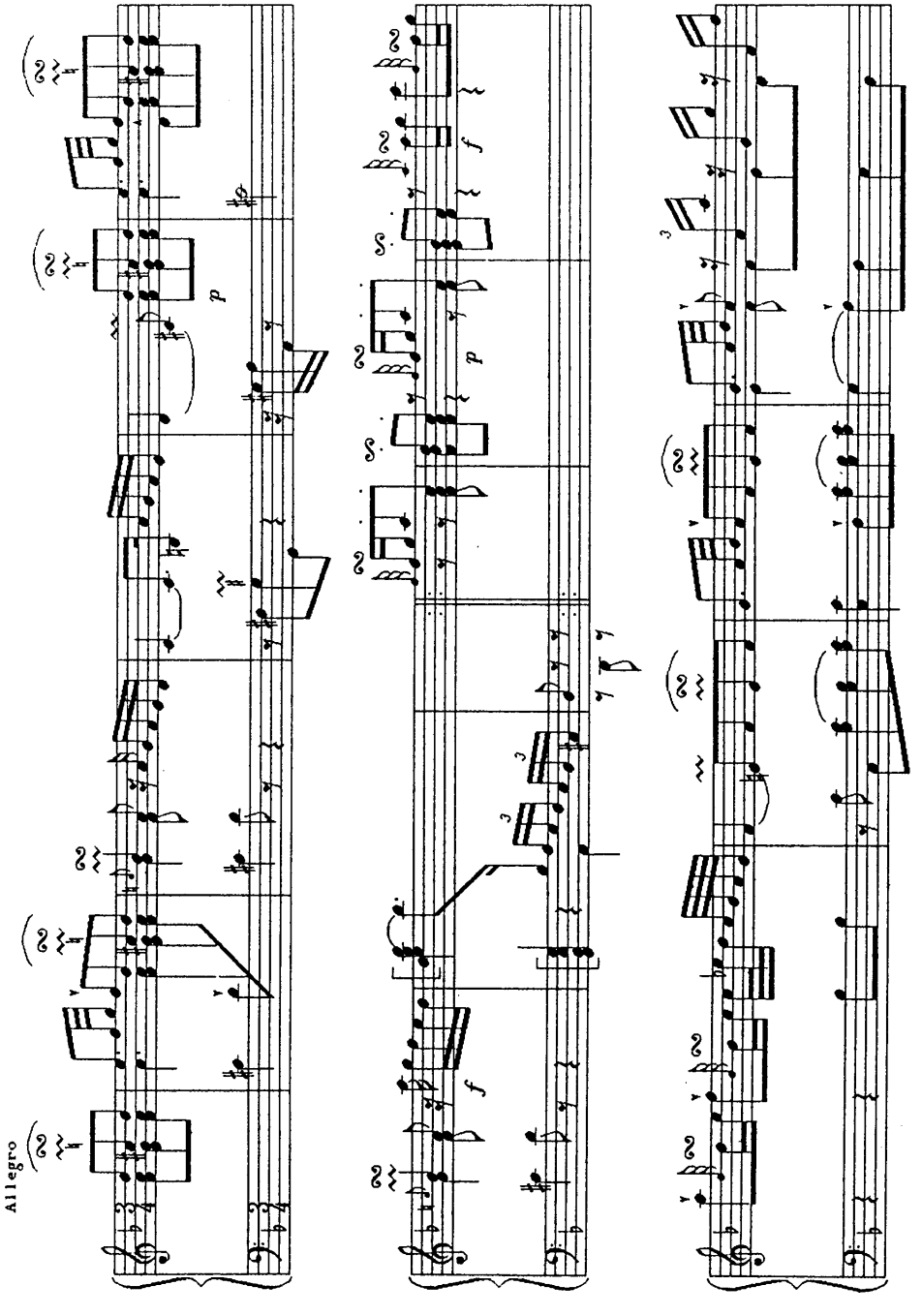


Illustration 30

Contributor: Crispin Sion
Product: The Copyist (DTP version)
from Dr. T's Music Software
Running on: Atari and Amiga microcomputers

Output from: Atari Laser Printer
Size as shown: 80% of original

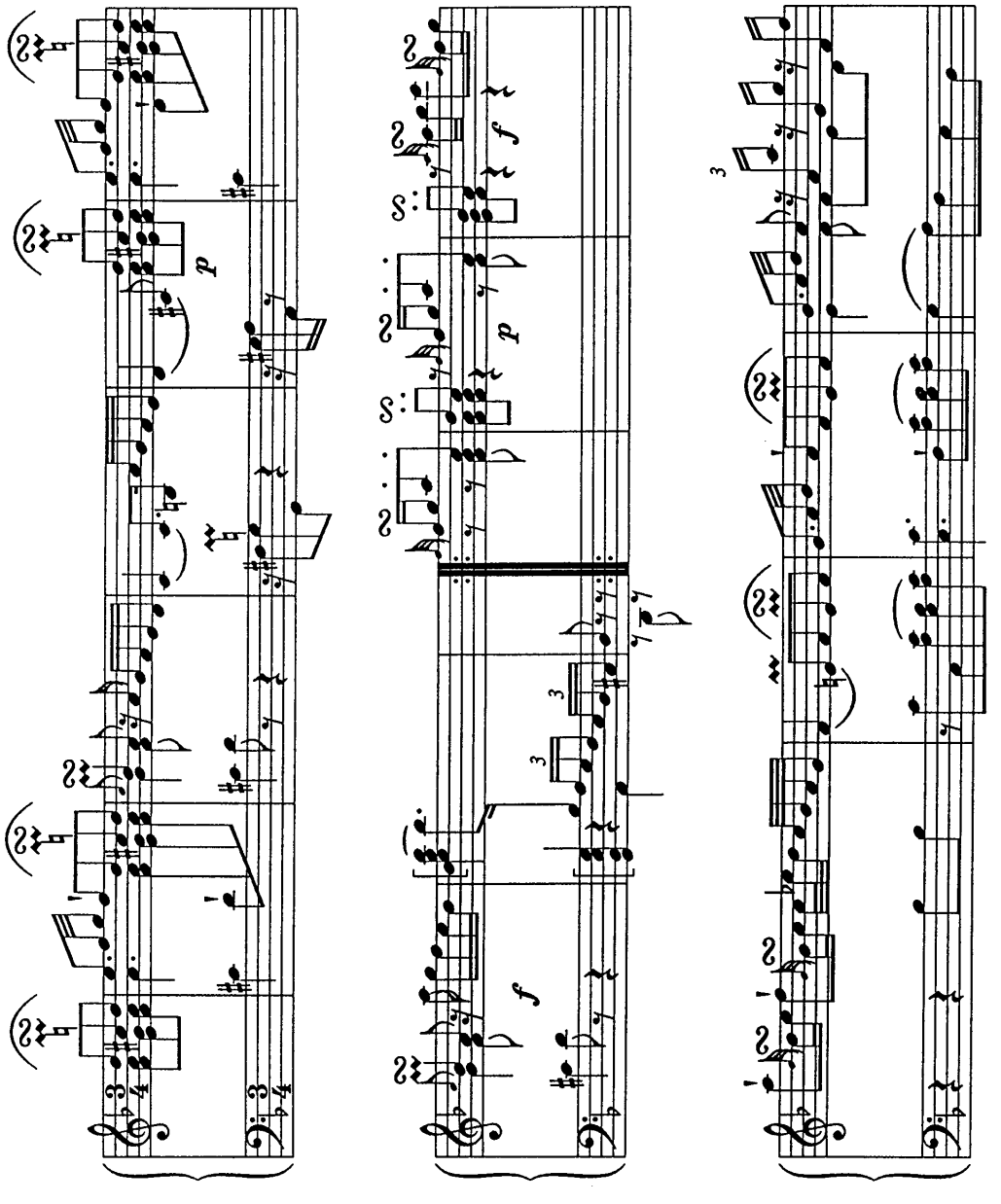


Illustration 31

Contributor: Leland Smith
Product: SCORE from Passport Designs
Running on : IBM PC compatibles

Output from: Varityper (1250 d.p.i.)
Size as shown: 65% or original

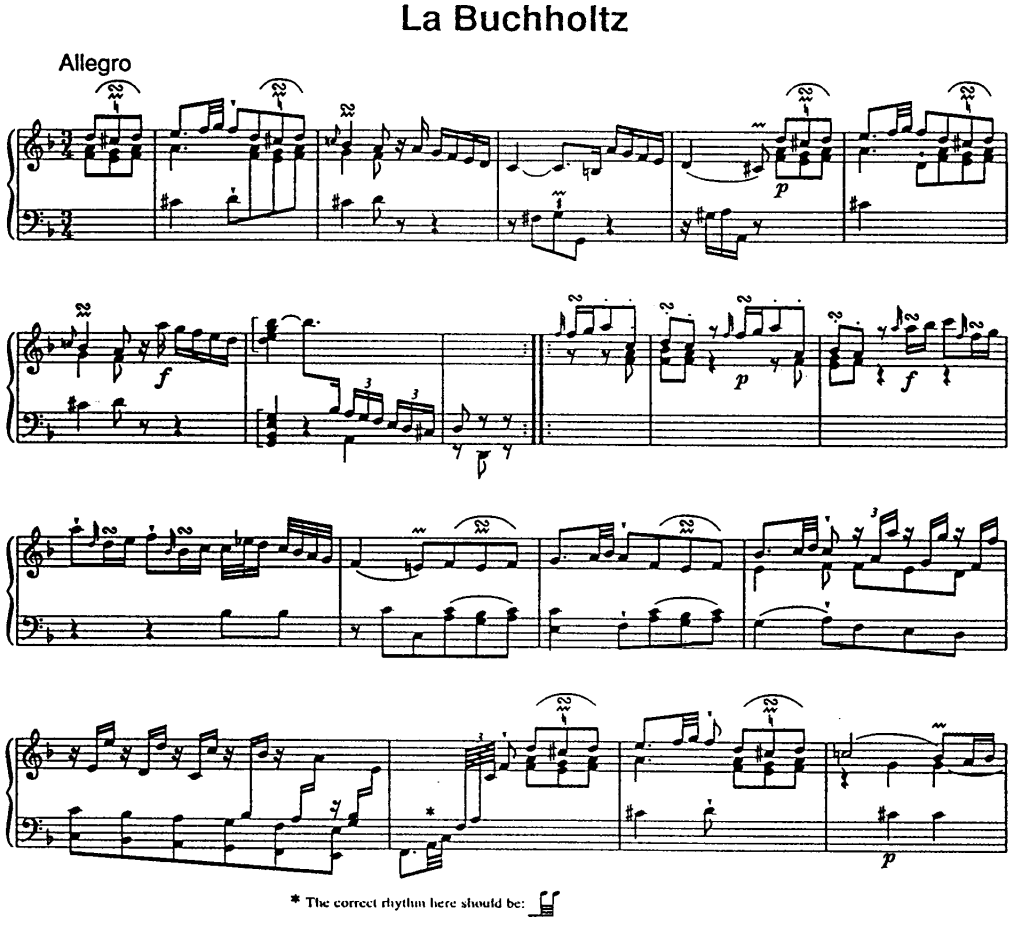


Illustration 32

Contributor: Alan Talbot
Producut: Synclavier Music Engraving System
Running on: a Synclavier Digital Audio System

Output from: Linotronic 100 Imagesetter (1270 d.p.i.)
Size as shown: 78% of original
Engraver: Gregg Sewell

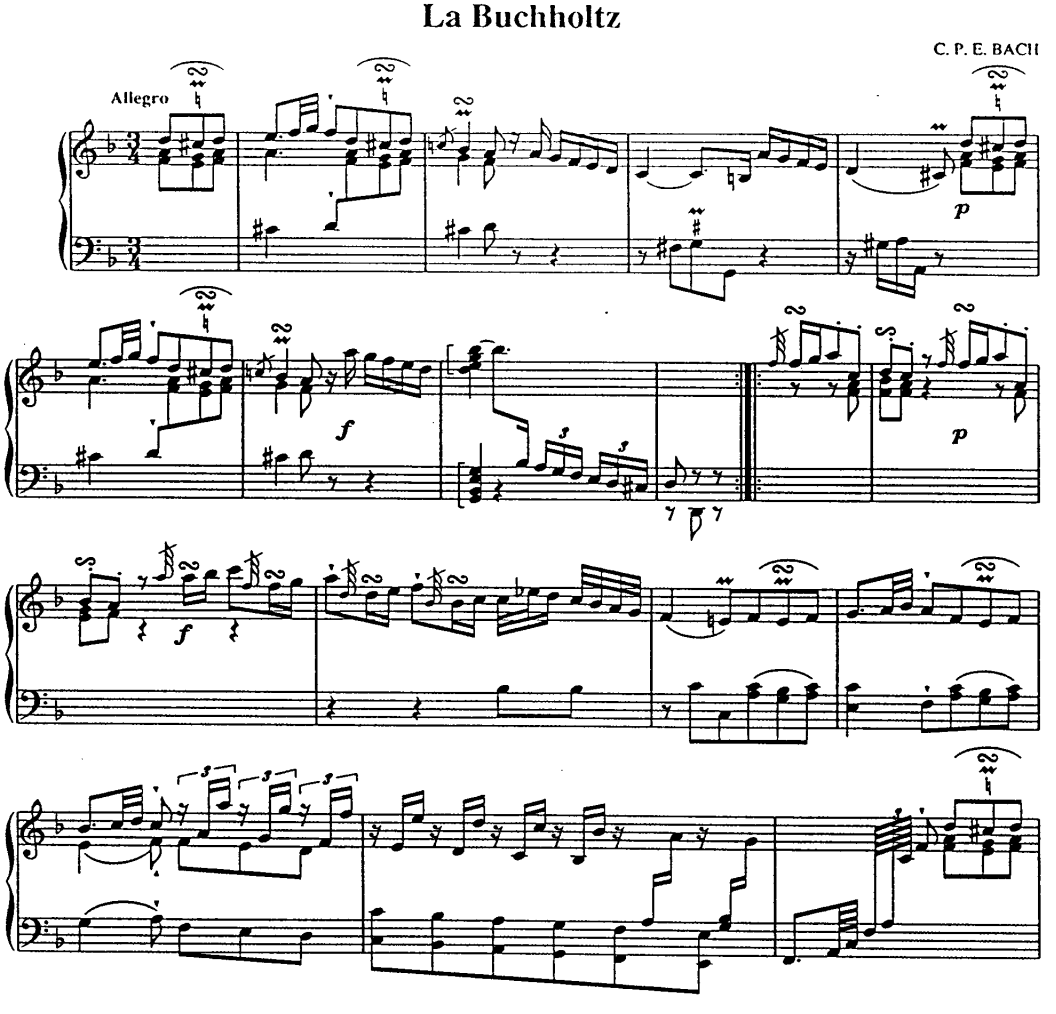


Illustration 33

Contributor; Rolf Wulfsberg
System: A-R Editions, Inc.
Running on: a Sun workstation

Output from: Linotronic L-300 typesetter
Size as shown: 83% of original

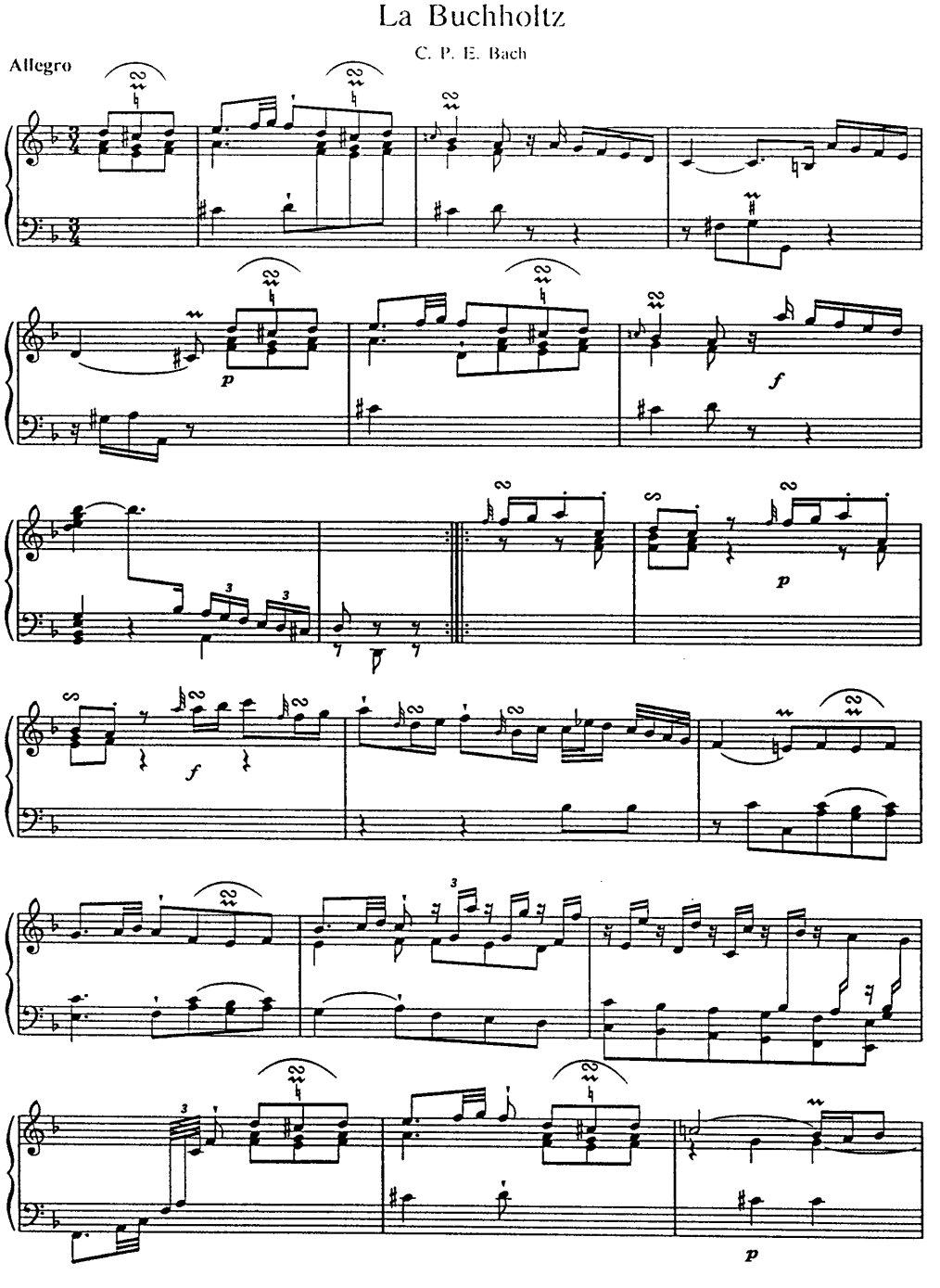


Illustration 34

Developer: Phil Ferrand
Product: Finale
Running on: Apple Macintosh

Output from: Apple LaserWriter IINT
Size as shown: 100% of original
Music font: Petrucci (from CODA)

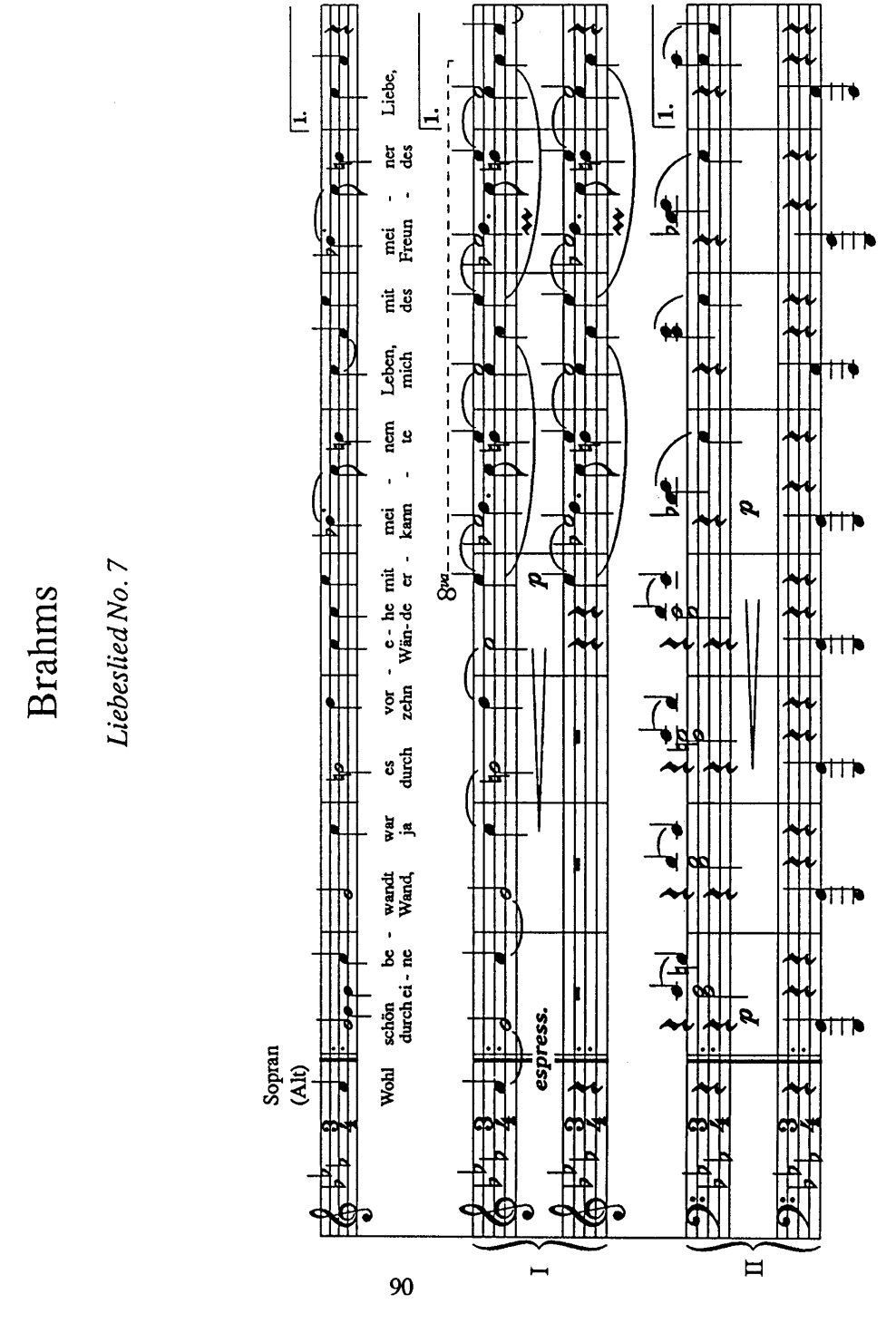


Illustration 35a

Contributor: Leland Smith
Product: SCORE from Passport Designs
Running on: IBM PC compatibles

Output from: Varityper (1250 d.p.i.)
Size as shown: 100% of original

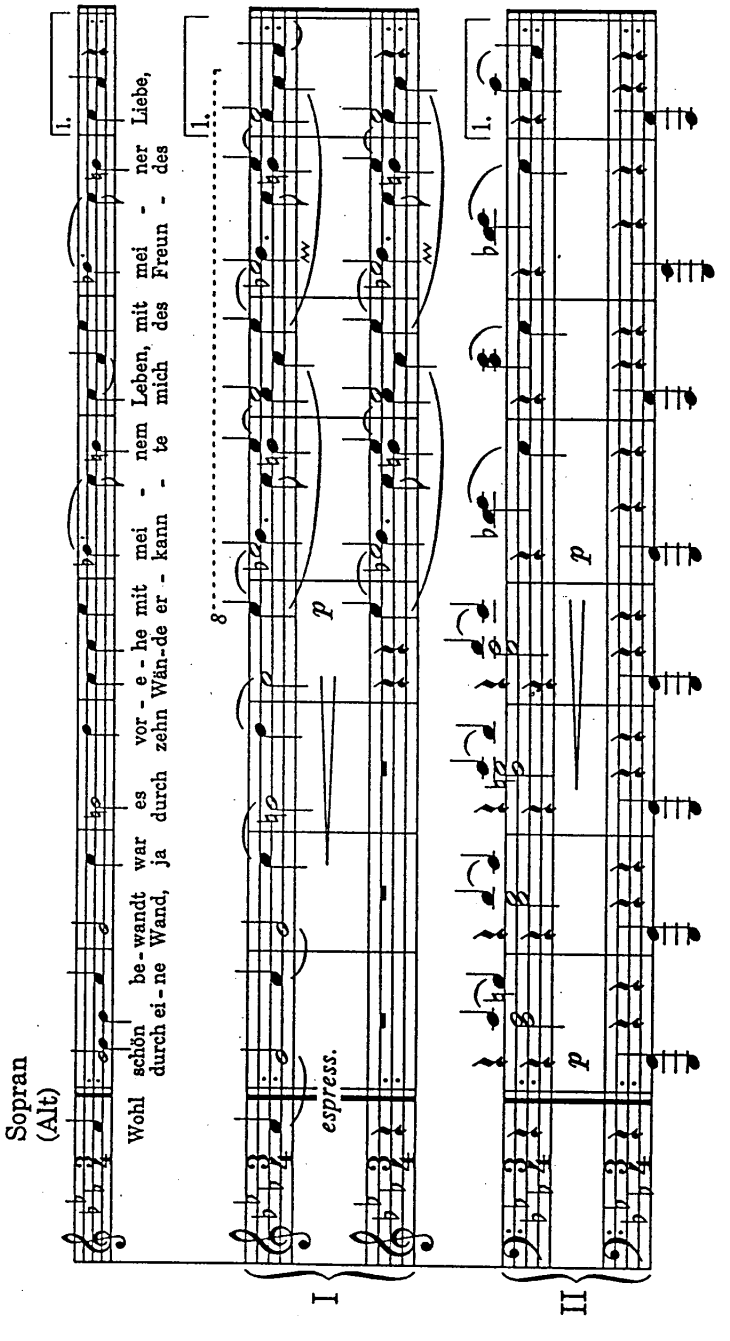


Illustration 35b

Contributor: Leland Smith
Product: SCORE from Passport Designs
Running on: IBM PC compatibles

Output from: Varityper (1250 d.p.i.)
Size as shown: 65% of original

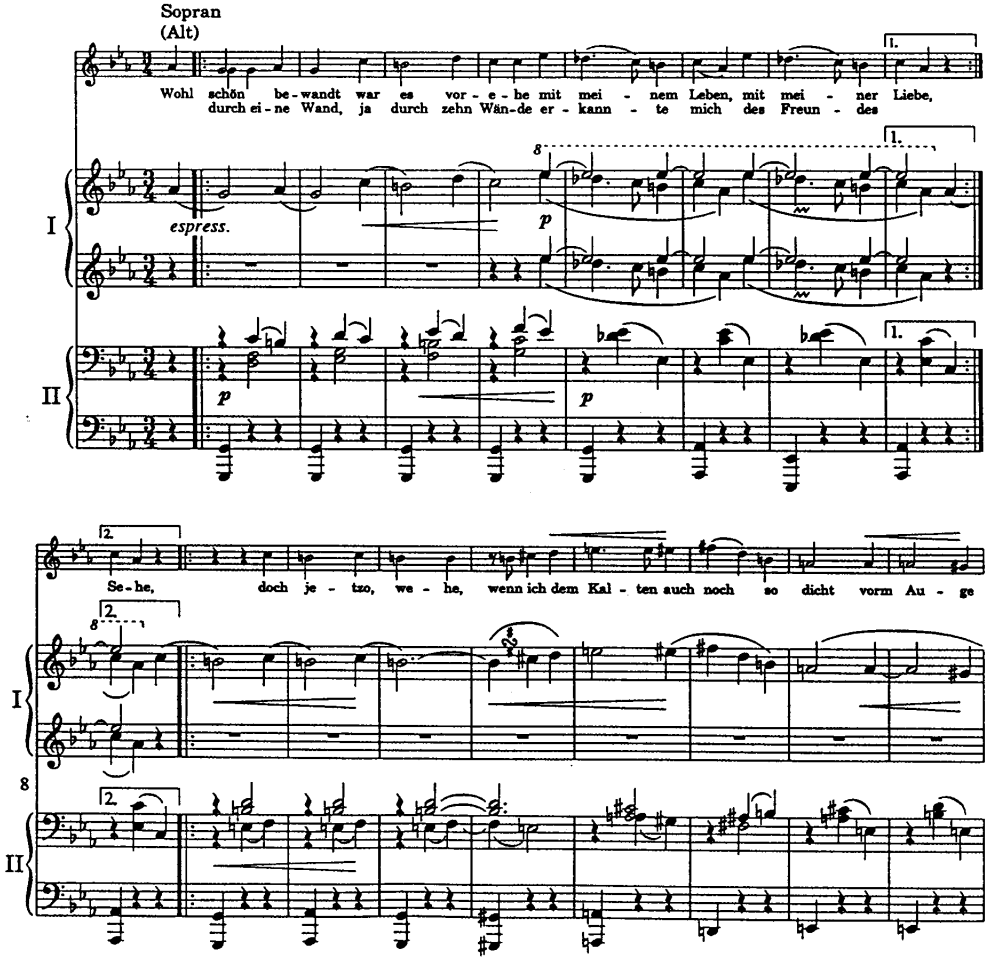


Illustration 36

Contributor: Alan Talbot
Product: Synclavier Music Engraving System
Running on: a Synclavier Digital Audio System

Output from: Linotronic 100 Imagesetter (1270 d.p.i.)
Size as shown: 78% of original
Engraver: Gregg Sewell

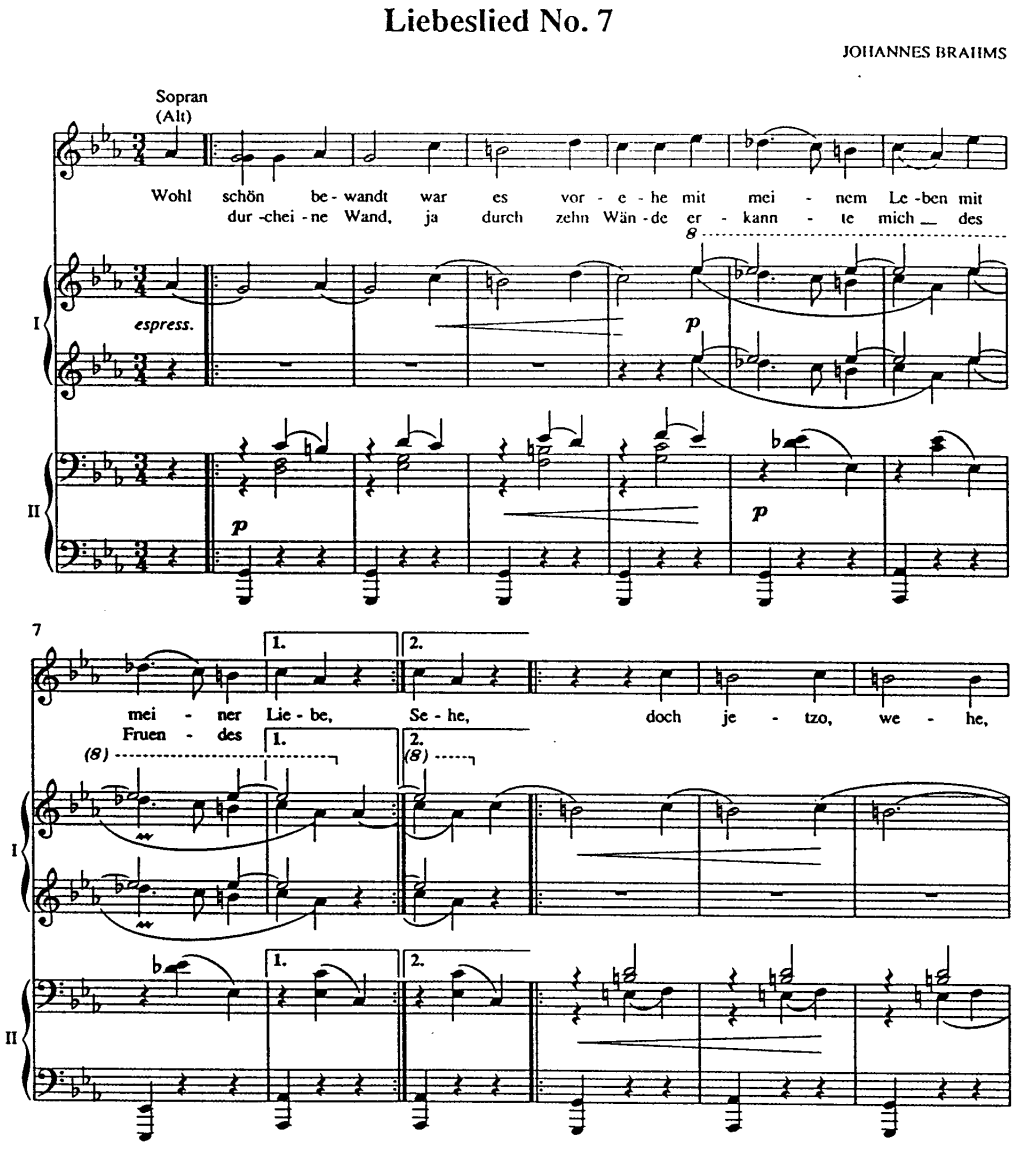


Illustration 37

Contributor: Mark Lambert
Product: THEME, The Music Editor
Running on: IBM PC compatibles

Subject: Gregorian chant
Output from: Hewlett Packard LaserJet II

Ave Maris Stella

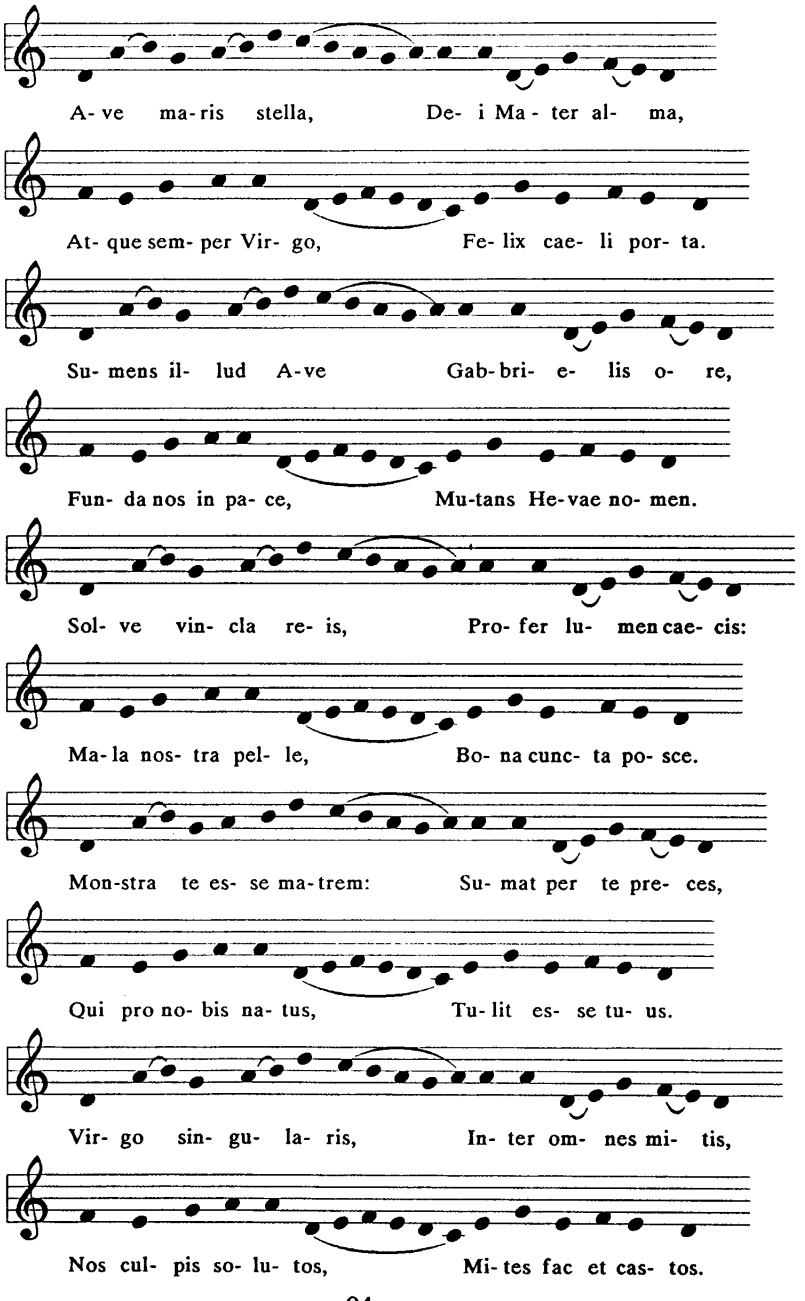


Illustration 38

Contributor: Philip Downs
Program: MusPrint (by Keith Hamel)
Running on: Apple Macintosh

Subject: Boccherini Quartet G. 159, part of larger chamber music project
Output from: Apple ImageWriter
Size as shown: 58% of original

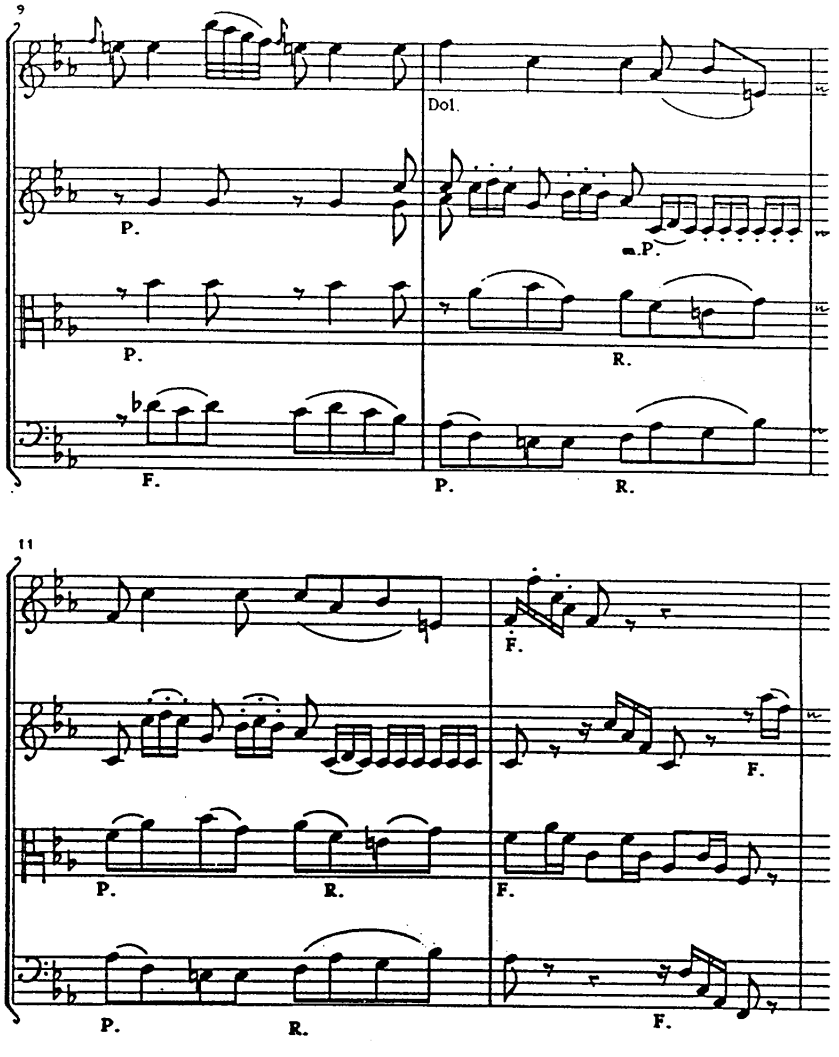


Illustration 39

Contributor: Roger McRea
Program: MusicPrinter Plus
(Temporal Acuity Products)
Running on: IBM PC compatibles

Subject: Chopin Prelude #20
Output from; Canon BJ-130 (24-pin mode)
Size as shown: 95% of original

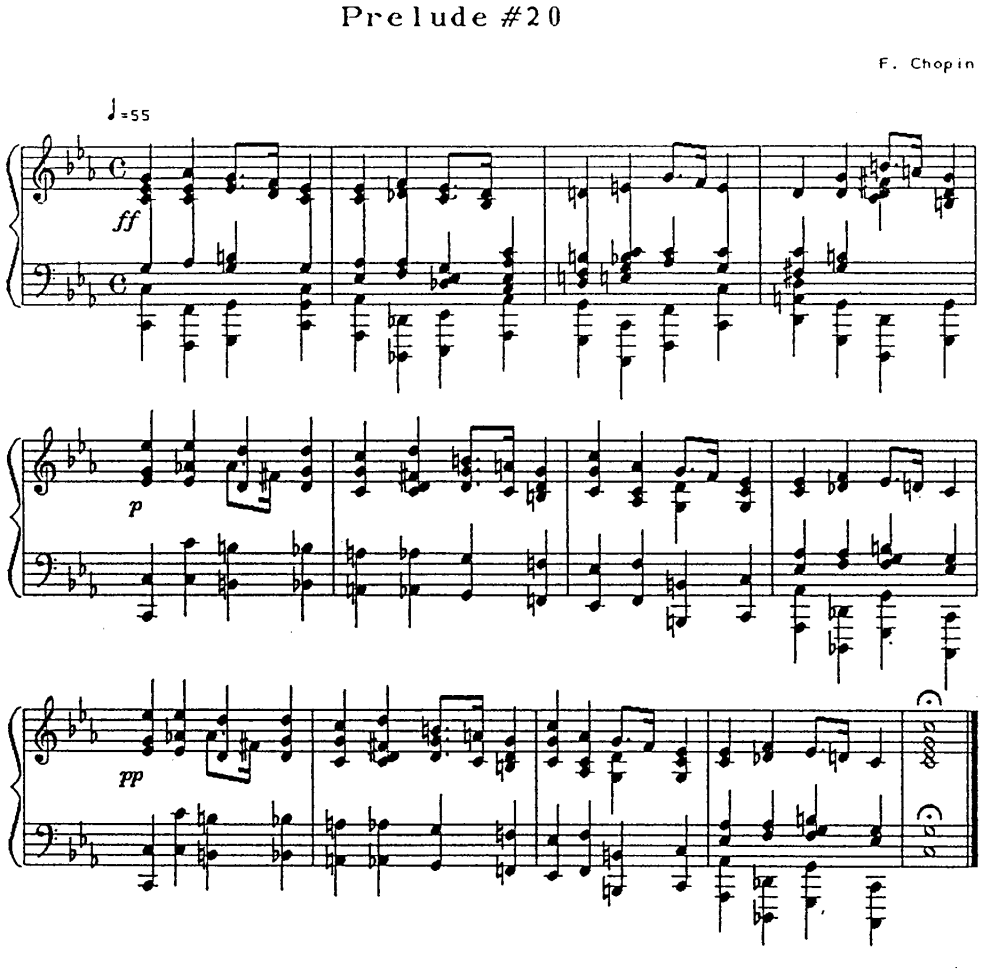


Illustration 40

Contributor: Sonus Corporation
Product: ScoreWriter
Running on: Atari microcomputers

Output device: Unspecified
Size as shown: 64% of original

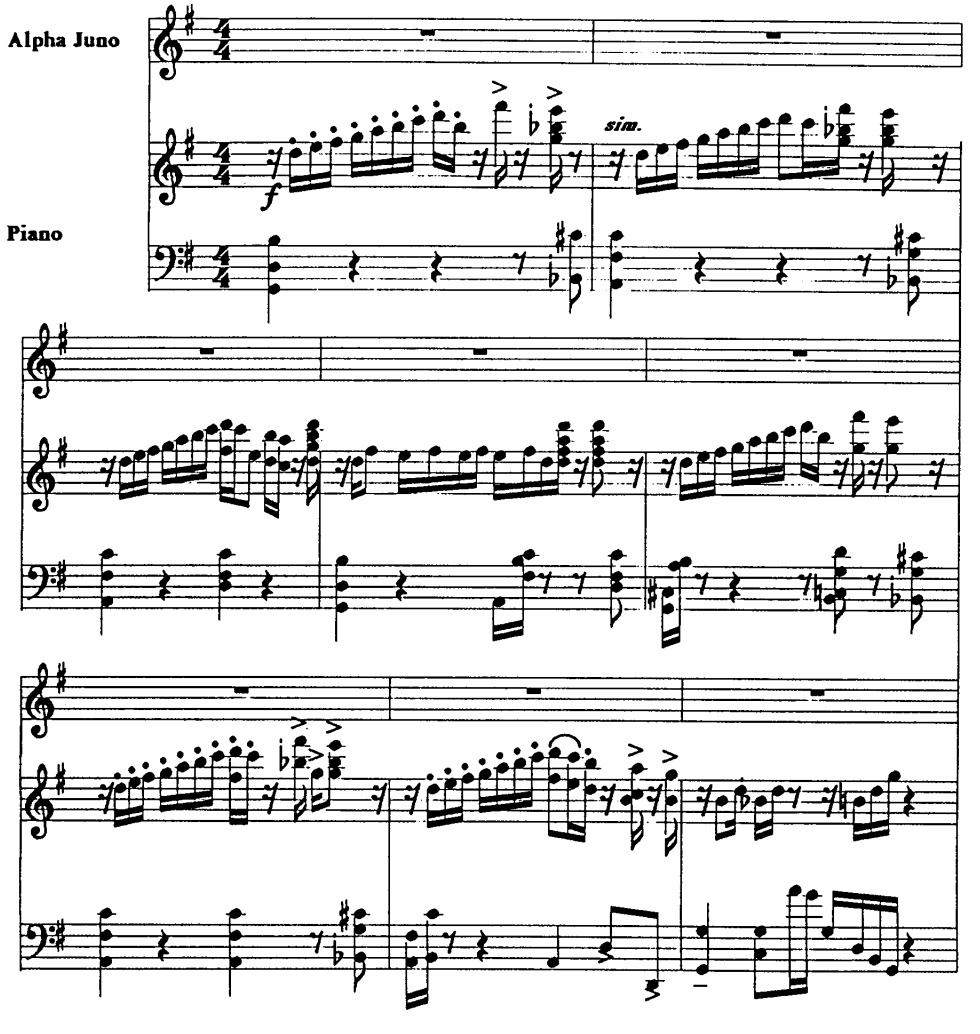


Illustration 41

Contributor: Steinberg Jones
Product: Masterscore
Running on: Atari microcomputers

Output device: Epson LQ-950
Size as shown: 70% of original

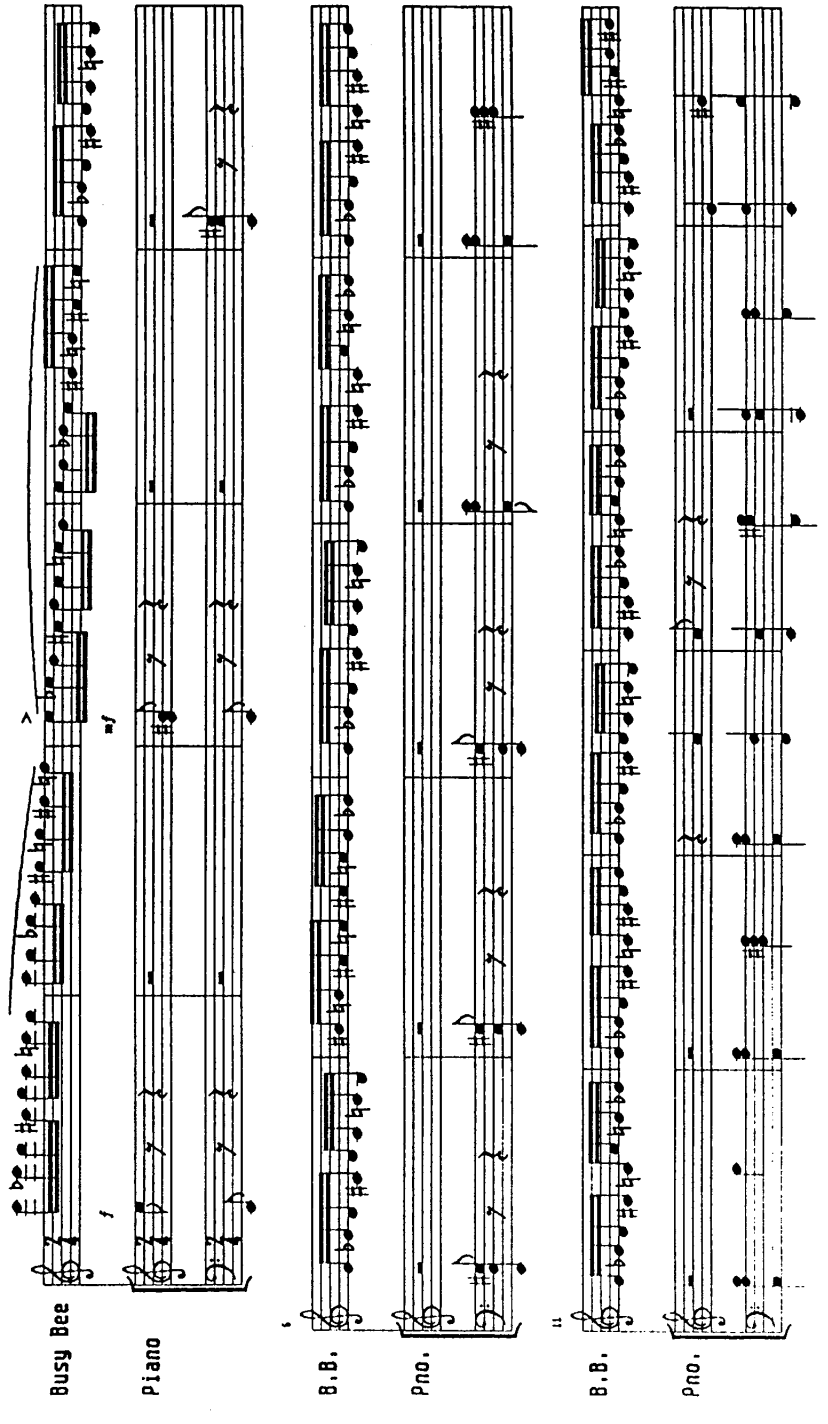
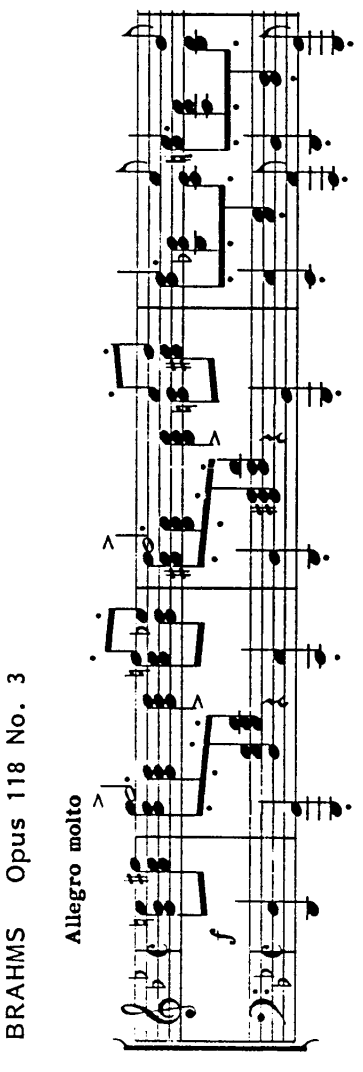


Illustration 42

Contributor: Cecil Effinger
Product: Musicwriter II
Input and output: IBM Wheelwriter

Sizes as shown:
Upper--85% of original
Lower--100% of original



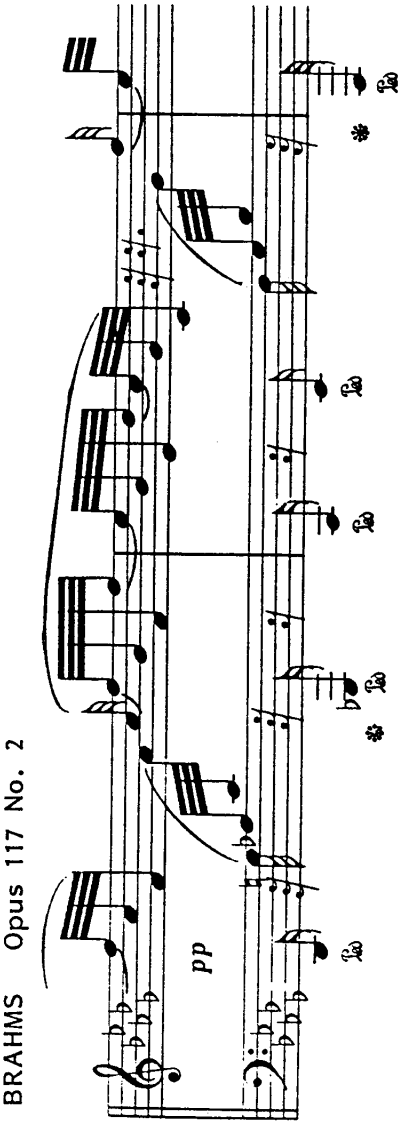
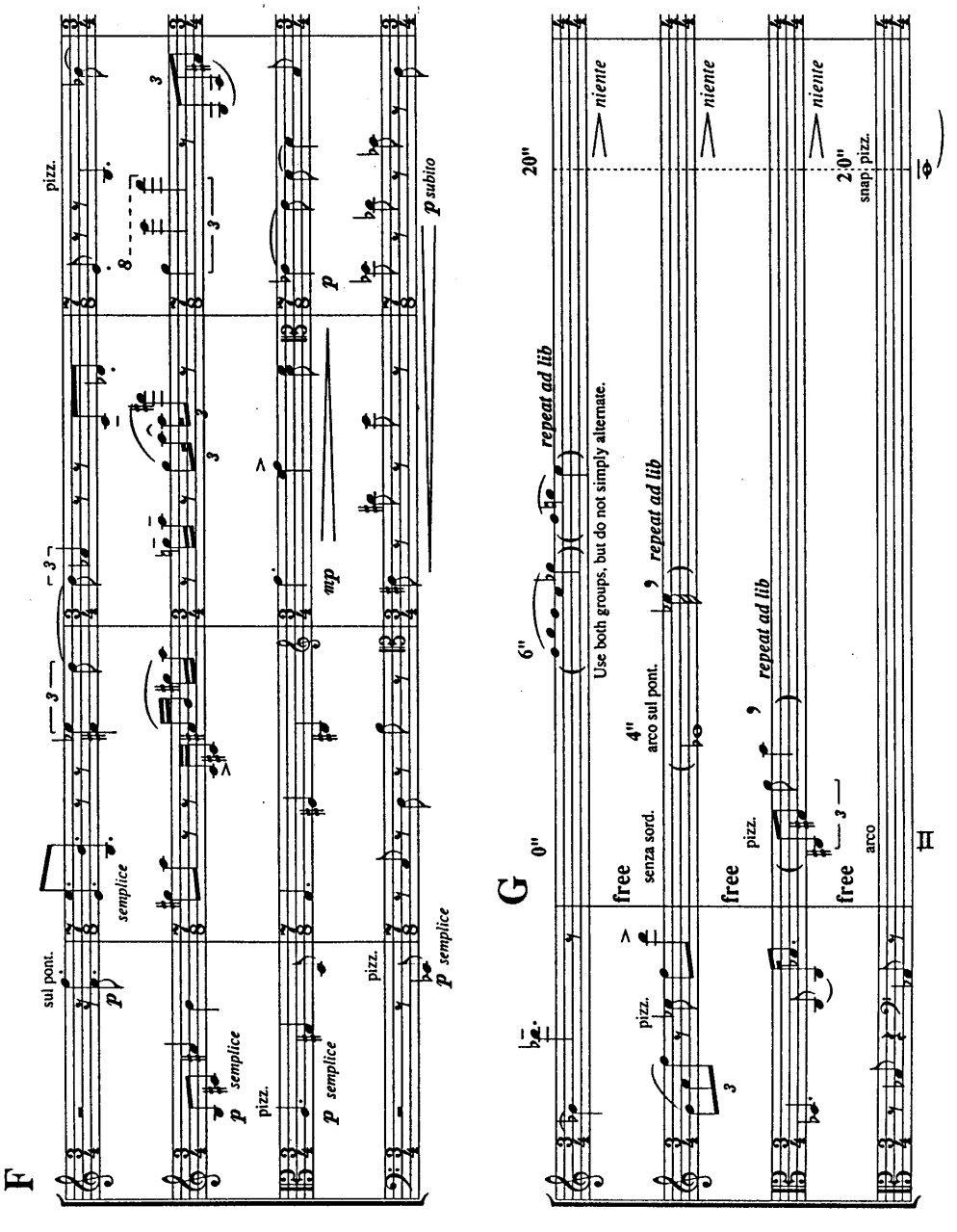


Illustration 43

Contributor: Don Byrd
Product: Nightingale
Running on: Apple Macintoshes

Output device: Linotronic L-300 typesetter
Size as shown: 70%



Contributor: John Hawkins
Program: Music Manuscriptor
from Erato Software Corporation
Running on: Erato workstation

Output from: Hewlett Packard LaserJet II
Size as shown: 64% of original

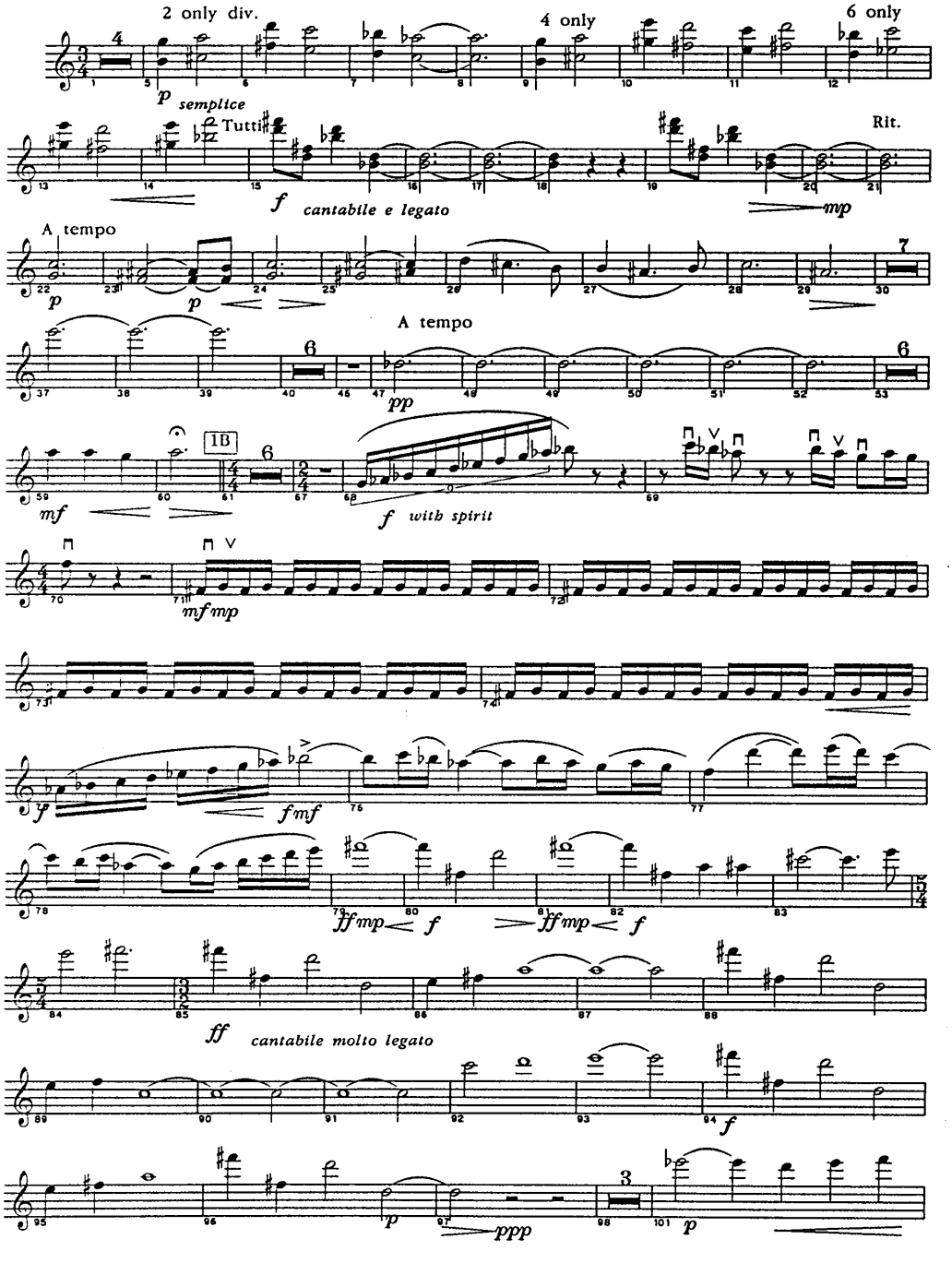


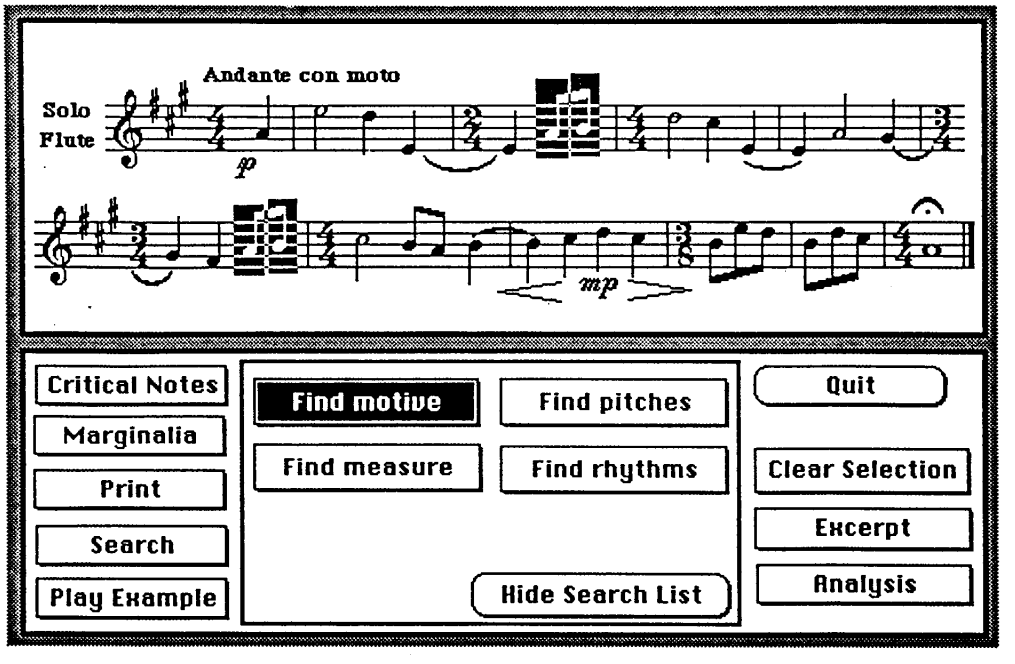
Illustration 45

Contributor: Robert Fruehwald
Product: Music Manager
Running on: Apple Macintoshes

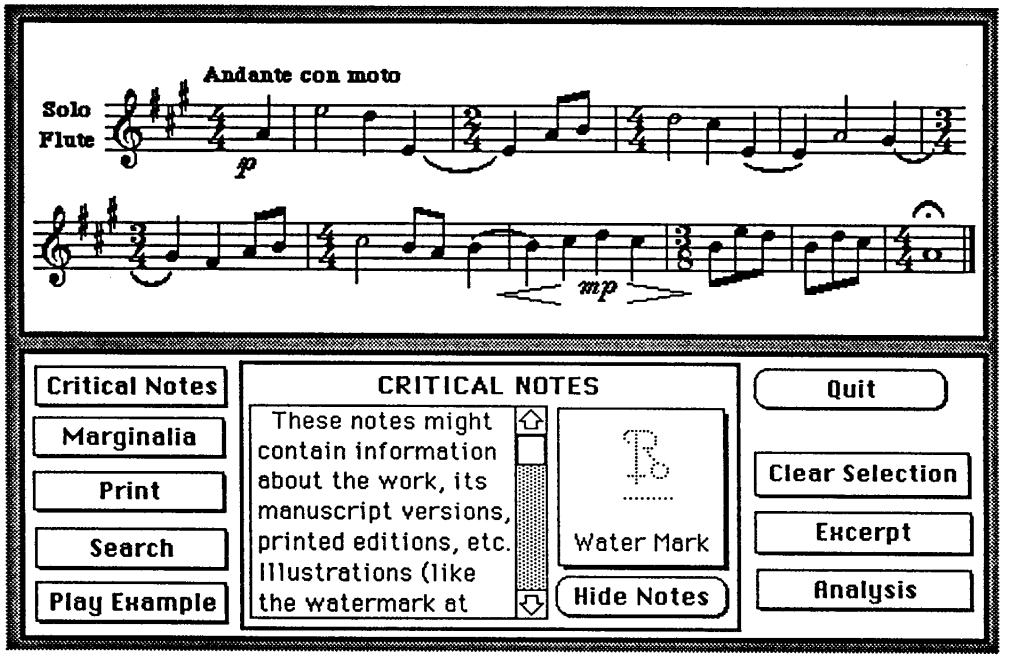
Output device: Apple ImageWriter

Music Manager is a hypertext program that is designed to support the management of files containing diverse kinds of information about musical works and/or sources. Incipits may be assembled using a companion program, *Melody-Maker.* Notes about sources and analytical information can be stored in linked files (the program does not currently perform analytical tasks). Screen information is shown below.

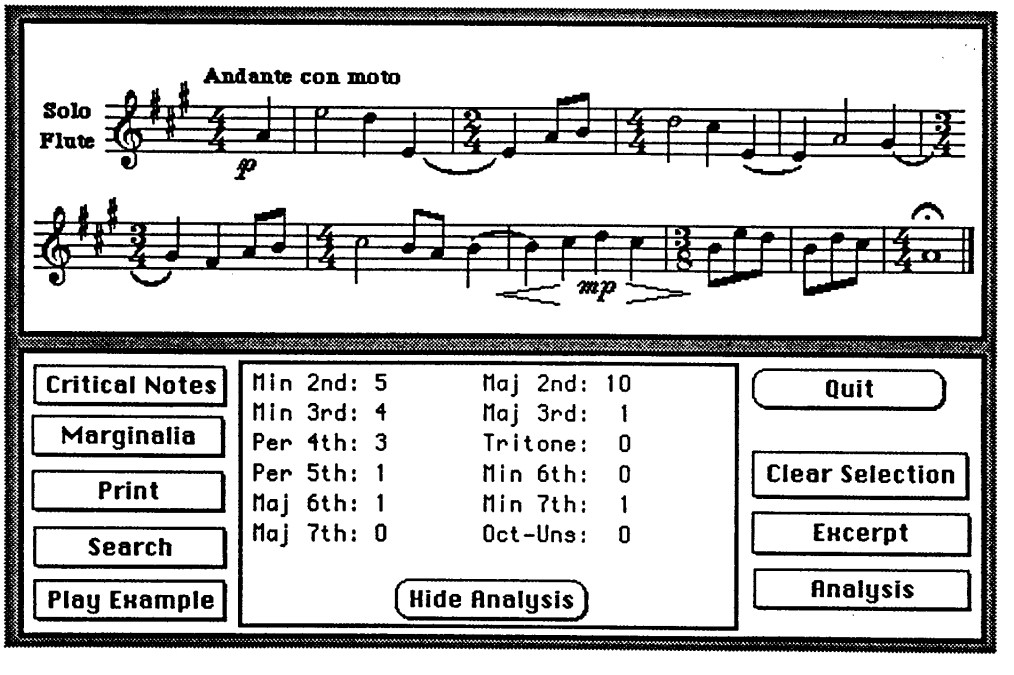
Display of a search:



Display of critical notes:



Display of analytical information:

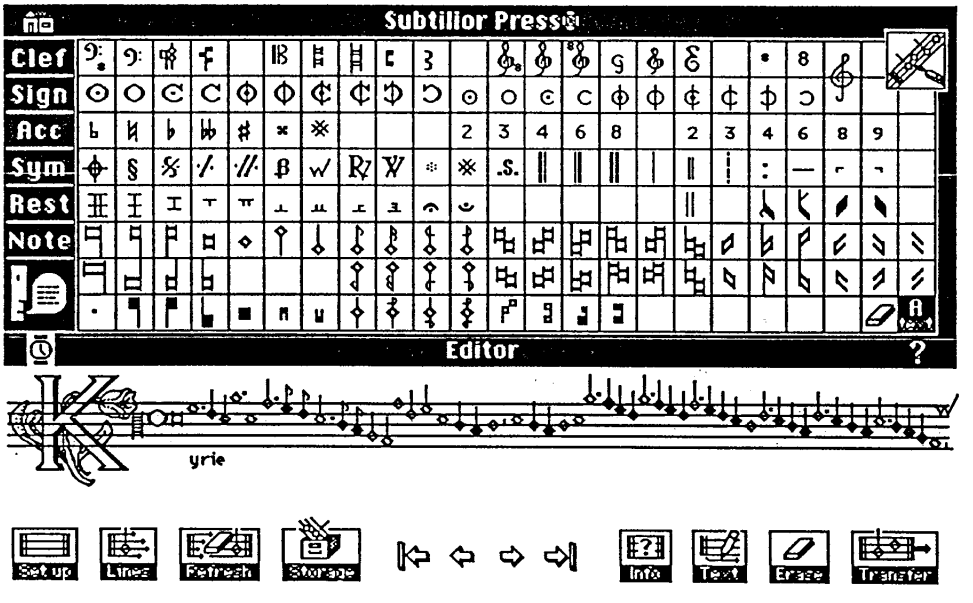


Contributor: David Palmer
Program: Subtilior Press
Running on: Apple Macintosh

Output device: Apple LaserWriter

Subtilior Press provides a menu of symbols from which users can assemble facsimiles of any of several systems of notation in use in the Renaissance. Users may design their own symbols, may alter the number of lines in the staff, and may control the placement of staves.

Menu of symbols:



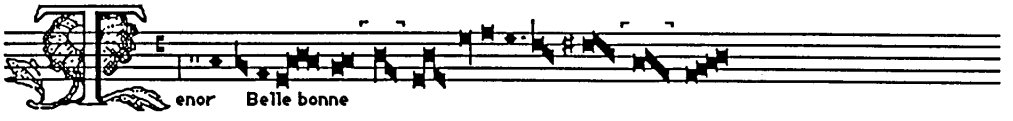
Above is the on-screen editor for Subtilior Press© (reduced to 85%). It allows the user to point and click on the symbol desired and position it precisely on the staff. The placement and appearance of all symbols are completely under the control of the user; new symbols can be added or old ones changed in minutes. The user also has complete control of the number of lines per staff, the number of staves, and the placement of staves, limited only by screen size. There is also a directory for the storage and retrieval of multiple documents.

Facsimile transcriptions:

MS Chantilly
1047,
page 11

Belle bonne

M. Baude Cordier



Venice,
1503

L'ome arme

Pe. de. la rue

Venice,
1508

Si dedero

Jacobus obrect