Music Printing

Music printing continues to attract great interest and to show rapid progress. A general description of methods of music input was provided in the 1985 *Directory*, and a general description of the problems of printing music by computer appeared in the 1986 *Directory*. A comprehensive listing of past and (then) present systems plus a general description of the internal representation of musical data were given in the 1987 *Directory*.

The Center distributed for this directory selected musical examples for reproduction by currently active music software developers. For novice users and for software developers alike, the opportunity to compare results between systems is widely welcomed. We selected a six-part (unaccompanied) motet by Tallis and an excerpt from Beethoven's "Harp" Quartet, Op. 74. Samples of both works were distributed to all software developers on our list as of February 1988 (our current list of music printing software developers is given at the rear of the *Directory*). The Tallis examples, with non-coincident text overlay and underlay, proved to be problematical more frequently than did the Beethoven quartet, with its rhythmic juxtapositions (2:3, 3:4, 3:8), beamed grace notes and slurs. While both examples test the technical limits of some systems, they represent common needs of the traditional repertory and therefore of ordinary musicians. All contributions of these set pieces that we received are reproduced here.

Each developer was also given the opportunity to provide one page of additional material. Contributions that were received late or which contained material under third-party copyright could not be reproduced. Except for photographic reduction when required, all material is reproduced exactly as received.

This year's contributions come from the following categories: (1) proprietary systems, (2) music printing programs for personal computers (Apple Macintosh, IBM PC compatibles, Atari, and others), (3) academic research systems, and (4) products designed to produce musical examples in the context of running verbal text. A few developers fall into multiple categories. Amadeus Music Software, for example, operates a music printing service and makes systems available for purchase. A number of developers of software for personal computers also offer in-house typesetting services. Oberon Systems offers an archiving service for musical data. Contributors in the first and second categories have concentrated on the set pieces.

With regard to software for personal computers, prospective users should bear in mind that the input process may involve any of the following methods:

* alphanumeric encoding
* alphanumeric encoding with keyboard redefined for music
* alphanumeric encoding with keyboard for text and auxiliary keypad for music
* musical instrument (MIDI) entry of pitch and rhythm
* musical instrument entry of pitch with alphanumeric entry of rhythm
* assembly of score from screen icons
* assembly of score from lightpen identification of musical objects

In general, music entry software for Apple products favors MIDI (synthesizer keyboad) input and/or use of screen menus and icons, while IBM PC-oriented software favors alphanumeric input. To overcome the user-unfriendliness of raw alphanumeric systems of representation, several developers redefine the QWERTY keyboard with templates using familiar musical symbols. Two keyboard redefinition schemes are shown on the following page.

Input methods have important implications for the uses that may be made of the stored data. Users whose requirements extend to musical indexing and analysis will want to consider whether the musical information stored is sufficiently complete and adequately accessible to support these activities. Users whose only requirement is for music printing can base judgments on output only.

All contributors were asked to identify the equipment they used in creating the examples. Some volunteered additional information about input time, printing speed, and other benchmarks of their systems. Readers should bear in mind that some examples are reduced in size to fit our page and that reduction sometimes enhances clarity. Contributors were asked to specify whether reduction had already occurred, since some contributions arrived unretouched and others arrived carefully manicured. A few systems are fully automatic, most are largely automatic, and a few are hybrid systems in which notes are placed and printed automatically but other elements of the score--especially beams, slurs, and performance specifications--are added by graphic artists (for an example of this process, see illustrations 7 and 8). Not uncommonly, the ratio of automatic to manual features varies within one system according to the particular hardware devices used; multiple versions of a program are each intended to accommodate different hardware configurations.

Academic systems are generally intended for multiple uses, of which music printing is only one. Some systems, such as that of LaTrobe University in Australia, are tailored to the needs of particular repertories. Others, such as the one under development at Oslo University, are intended to support diverse activities (sound synthesis, artificial intelligence, musical analysis). Those shown this year have not been shown in previous directories.

We list below, in alphabetical order of product or system names the enterprises represented in the 54 accompanying illustrations. Illustration numbers are shown in square brackets. The illustrations are arranged by host computer type and alphabetically within each category. Businesses producing software for music printing are listed alphabetically in the address list. For specific product information, please contact these companies or the developers whose names appear in parentheses.

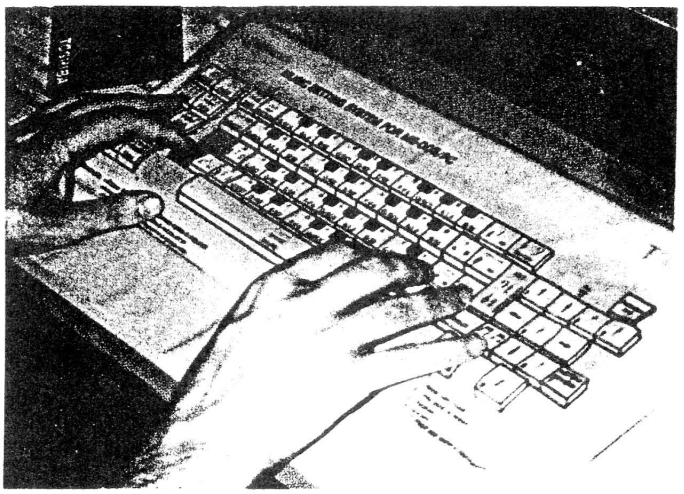
Contributors

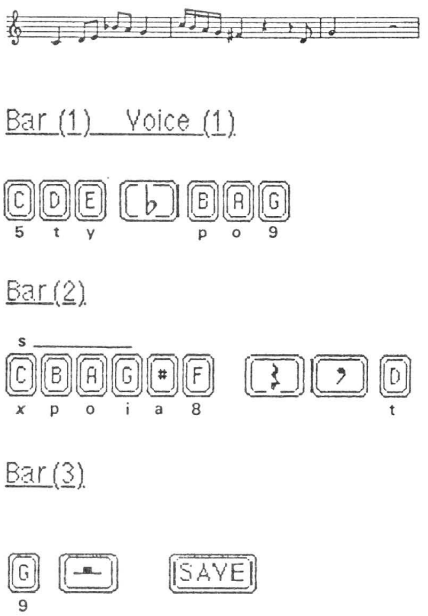
A-R Editions [#1 - #2]. Proprietary system developed by Tom Hall. Inhouse and contract typesetting of music.

Alpha/TIMES [#9]. Commercial (Apple). TIMES stands for Totally Integrated Musicological Environment System. Unusual input system (voice recognition device with light

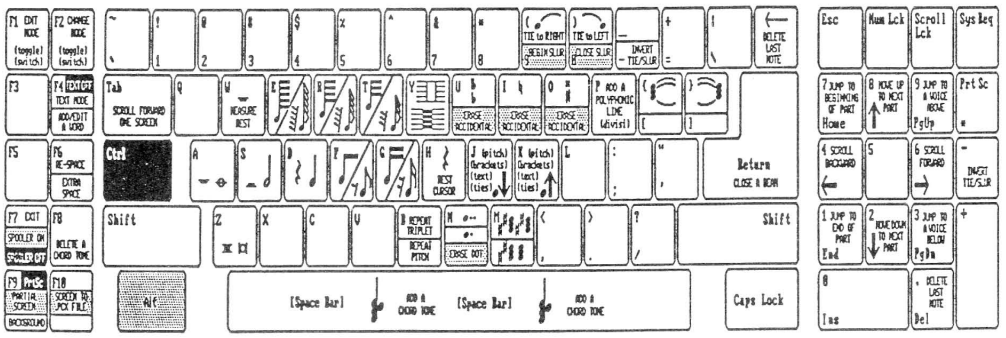
Keyboard Redefinition Schemes

(a) **La mà de guido**: all letter and number keys of the QWERTY keyboard have a pitch equivalent.





(b) **THEME: The Music Editor**--many alphabetic keys are used for rhythmic information.



Keyboard Layout and Keyboard Commands©1986,1987,1988
for THEME, The Music Editor©1986,1987,1988

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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.

Amadeus Music Software [#3 - #5]. Originally a proprietary system developed by Kurt Maas; now commercially available. Uses UNIX-like operating system. Contract typesetting for music publishers.

The Copyist [#18 - #19]. Commercial product (Dr. T's Music Software) for the Atari microcomputer. Cris Sion is the developer.

Dai Nippon Music Processor [#43]. Hardware/software combination dedicated to the production of musical scores. Includes file interchange with research system at Waseda University. Previously proprietary, the system is now available in a commercial version.

Dal Molin Musicomp [#6 - #8, #32]. Proprietary system (Columbia Pictures). Commercial version for IBM PC using auxiliary keypad for pitch entry is in preparation. Armando Dal Molin is the developer.

ERATTO [#47 - #48]. Parisian research center in which the encoding, printing, and analysis of lute music have flourished for many years. Current capabilities are shown in the illustrations. Current software development is by Bernard Stepien; Hélène Charnasse is the resident musicologist.

EZ-Score Plus [#20]. Commercial product for the Atari 1040ST sold by Hybrid Arts. Tom Bajoras is the developer.

la mà de guido [Guido's Hand; #21 - #23]. This previously proprietary system from Spain is now available for the IBM PC XT and AT. Alphanumeric input usesg redefined QWERTY keyboard (see illustration). Contract typesetting for music publishers. The developer is Llorenç Balsach.

MUSED [#51 - #54]. This research system under development at Oslo University supports interactive analysis and music printing. Programs are currently being modified to move to VaxStation II.

Music Editor [#24 - #25]. Commercial product for IBM PC compatibles offered by Oberon Systems. Includes custom fonts. Data archiving service available to users.

Music Processor [#26 - #27]. Academic input and printing system developed by Etienne Darbellay for IBM PC compatibles. Commercial development is under consideration.

Music Publisher [#10 - #11]. Commercial product (Graphic Notes) for the Apple Macintosh. Trevor Richards is the developer. Requires separate "presto pad" for input.

Musicwriter II [#40 - #42]. System for printing musical examples with a modified typewriter (IBM Wheelwriter). Cecil Effinger is the developer.

MusiKrafters [#44 - #46]. Software company providing special-purpose products for musical excerpts and unusual notations for the Apple Macintosh. Robert Fruehwald is the developer.

MusScribe [#12 - #14]. Commercial product for the Apple Macintosh by Keith Hamel, whose company is now called SoftCore Music Systems.

Nightingale [#15 - #16]. Commercial product under development by Don Byrd for the Apple Macintosh. His company is called Advanced Music Notation Systems.

Note Processor [#28 - #29]. Commercial product for IBM PC compatibles developed by Stephen Dydo. Uses alphanumeric input with mouse editing. MIDI input is under development. Contract typesetting available for music publishers.

PARD [#30 - #31]. Music printing system under development in Milan. The system is mainframe based, with plotter output. The developers are Walter Prati and Giorgio Ceroni.

Professional Composer [#17]. Commercial product for the Apple Macintosh offered by Mark of the Unicorn. MIDI output provided by Professional Performer.

SCORE [#33 - #36]. Originally an academic research system developed by Leland Smith at Stanford University. A PC version is now available from Passport Designs. System is currently in use by several commercial music publishers and some research facilities (*e.g.*, optical scanning unit at the University of Surrey). Includes alphanumeric input, forty music fonts and PostScript text font compatibility.

SCRIBE [#49 - #50]. Academic research system developed jointly by La Trobe and Melbourne Universities for fourteenth-century music. Can interleave red and black neumes to reproduce colored notation in its original format. Some programs available on site-license basis for IBM PC compatibles. Software development by John Griffiths; John Stinson is the head musicologist.

THEME, The Music Editor [#37 - #39]. Academically oriented commercial product for IBM PC compatibles. Alphanumeric input using redefined keyboard (see illustration). Provision for MIDI output. Mark Lambert is the developer.

Correspondents

Much additional activity is taking place in the field of computer-assisted music printing. We list below additional sites and products whose directors or developers have been in recent touch with the Center:

ETH (Zurich). Giovanni Müller and Raffaello Giuletti, who work at the Eidgenössische Technische Hochscule in Zurich, are attempting to define a class of naturally parameterizable formatting operations in the continuing development of a high-quality music printing system at their institute.

Finale. A commercial program for the Apple Macintosh currently being beta-tested. A version for the IBM PC is under development. Coda Software, a division of the Wenger Music Learning Corporation, is the distributor.

HB Music Engraver. A recently-released commercial program for the Apple Macintosh. Alphanumeric input using keyboard redefinition. Supports both PostScript "Sonata" font and a custom font called "Interlude." Can convert files from Professional Composer. The distributor is HB Imaging, Inc.

Laboratorio Informatica Musicale. The LIM printing system, under development by Goffreddo Haus, Luigi Finarelli and associates at LIM (University of Milan), utilizes an Apple Macintosh in a research and electronic music setting. The system is designed to accept data in several codes and formats.

Oxford Music Processor. A commercial product for the IBM PC used with Epson dot matrix printers and HPGL plotters currently being beta-tested. Alphanumeric input using keyboard redefinition. The distributor is Oxford University Press.

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.

Staatliches Institut für Musikforschung. 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.

Illustration 1

Proprietary Systems
A-R Music Engraving System (A-R Editions, Inc.)

Input device: DG S-130
Output device: Linotron 202

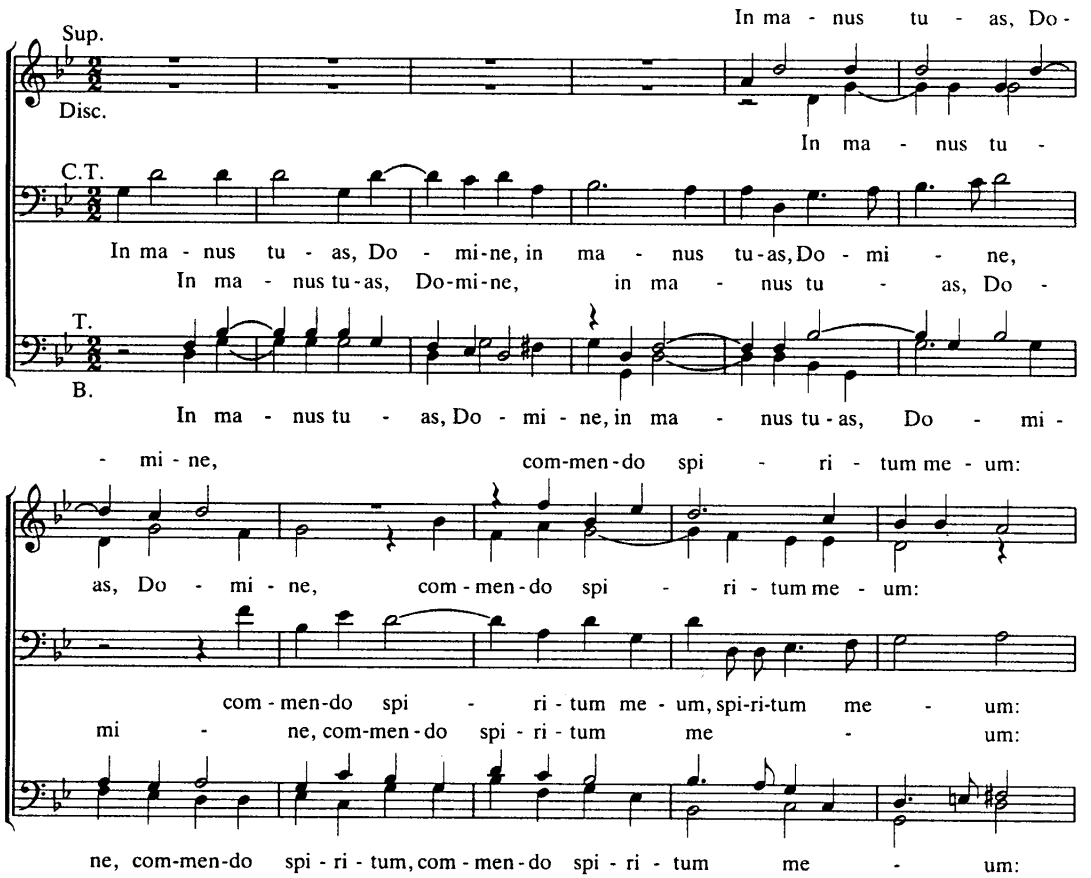


Illustration 2

Proprietary Systems
A-R Music Engraving System (A-R Editions, Inc.)

Input device: DG S-130
Output device: Linotron 202

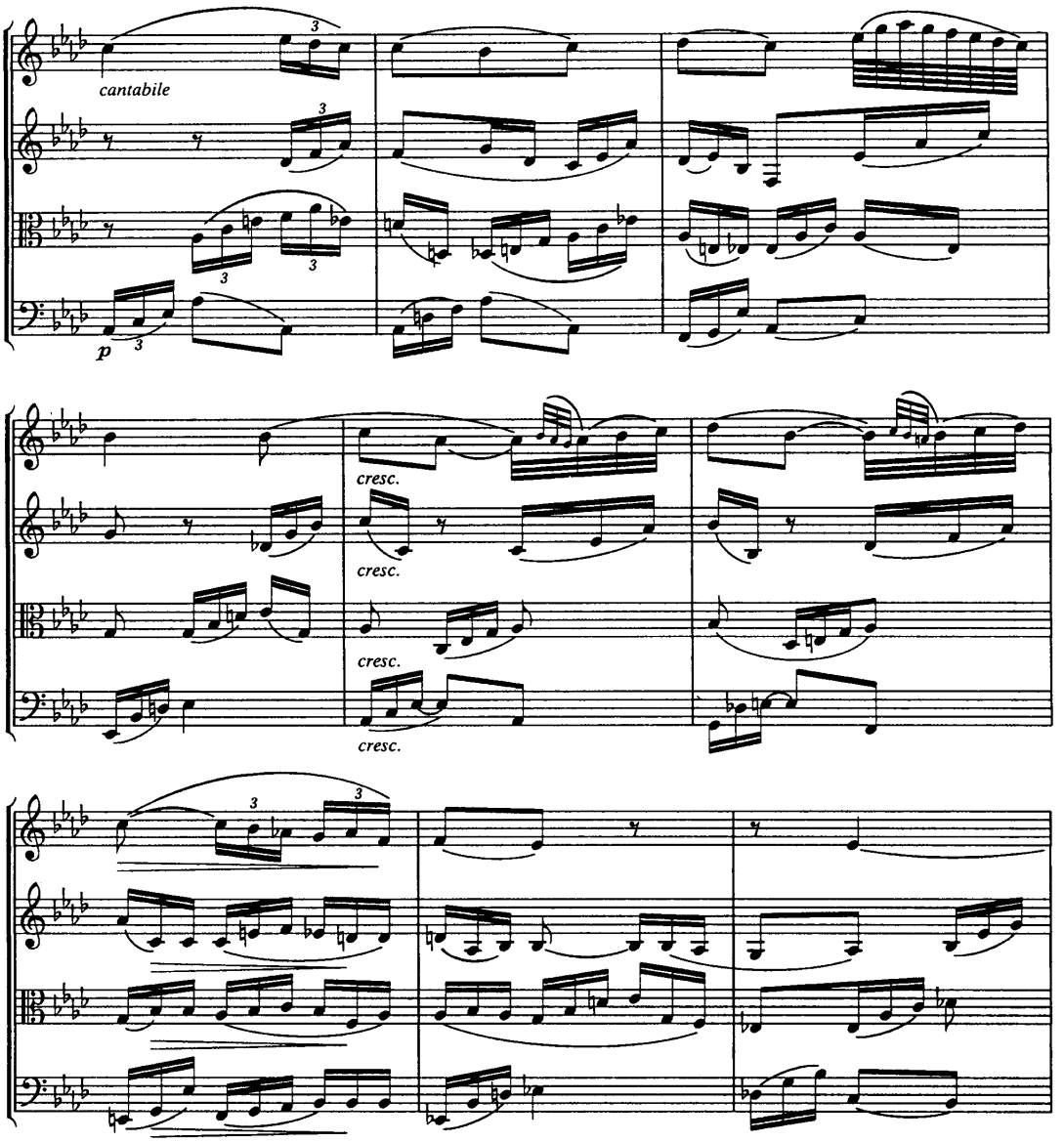


Illustration 3

Proprietary Systems
Amadeus Music Software GMBH (Notenversand Kurt Maas)

Input hardware: PDP-11 (UNIX), Atari workstation, MIDI keyboard
Output device: Amadeus Lasersetter
Alternative output devices: various dot matrix printers, plotters, Monotype Lasercomp

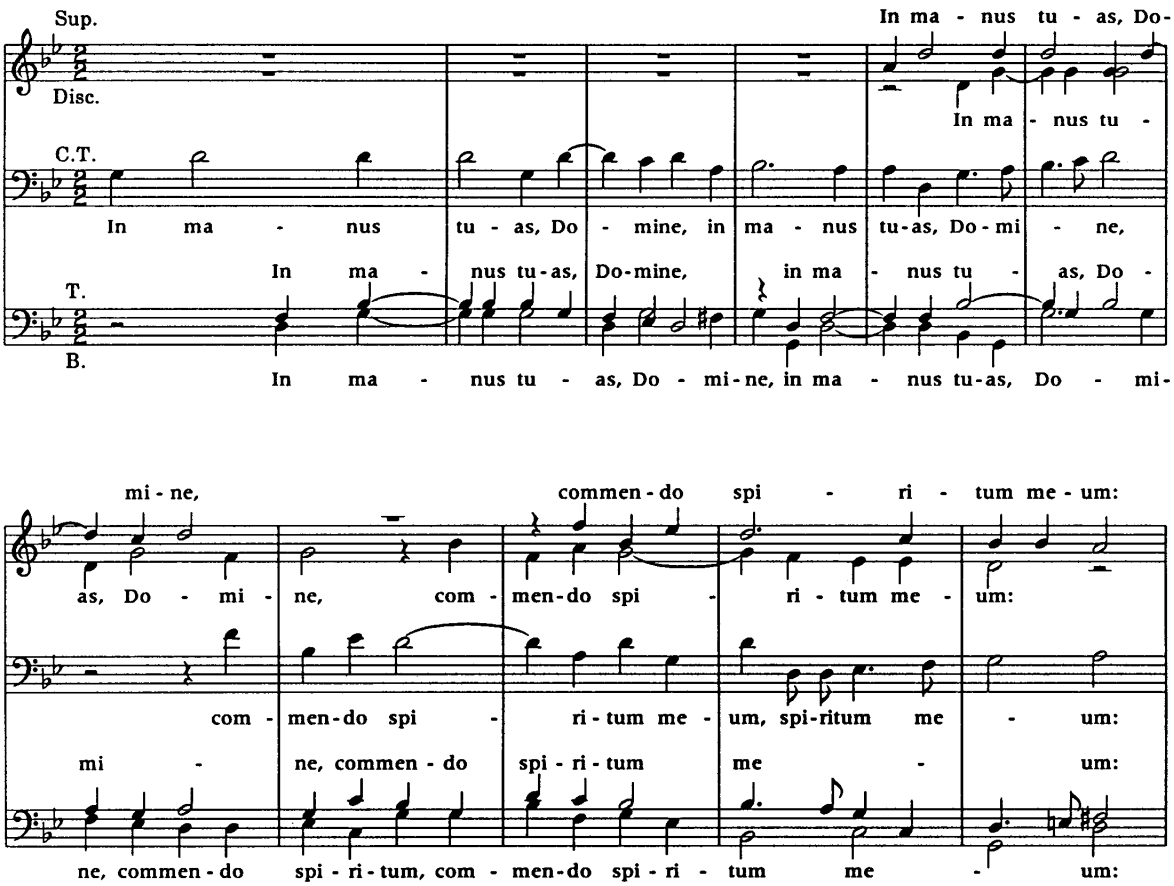


Illustration 4

Proprietary Systems
Amadeus Music Software GMBH (Notenversand Kurt Maas)

Input hardware: PDP-11 (UNIX)
Output device: Amadeus Lasersetter
Alternative output devices: various dot matrix printers, plotters, Monotype Lasercomp

Reduced

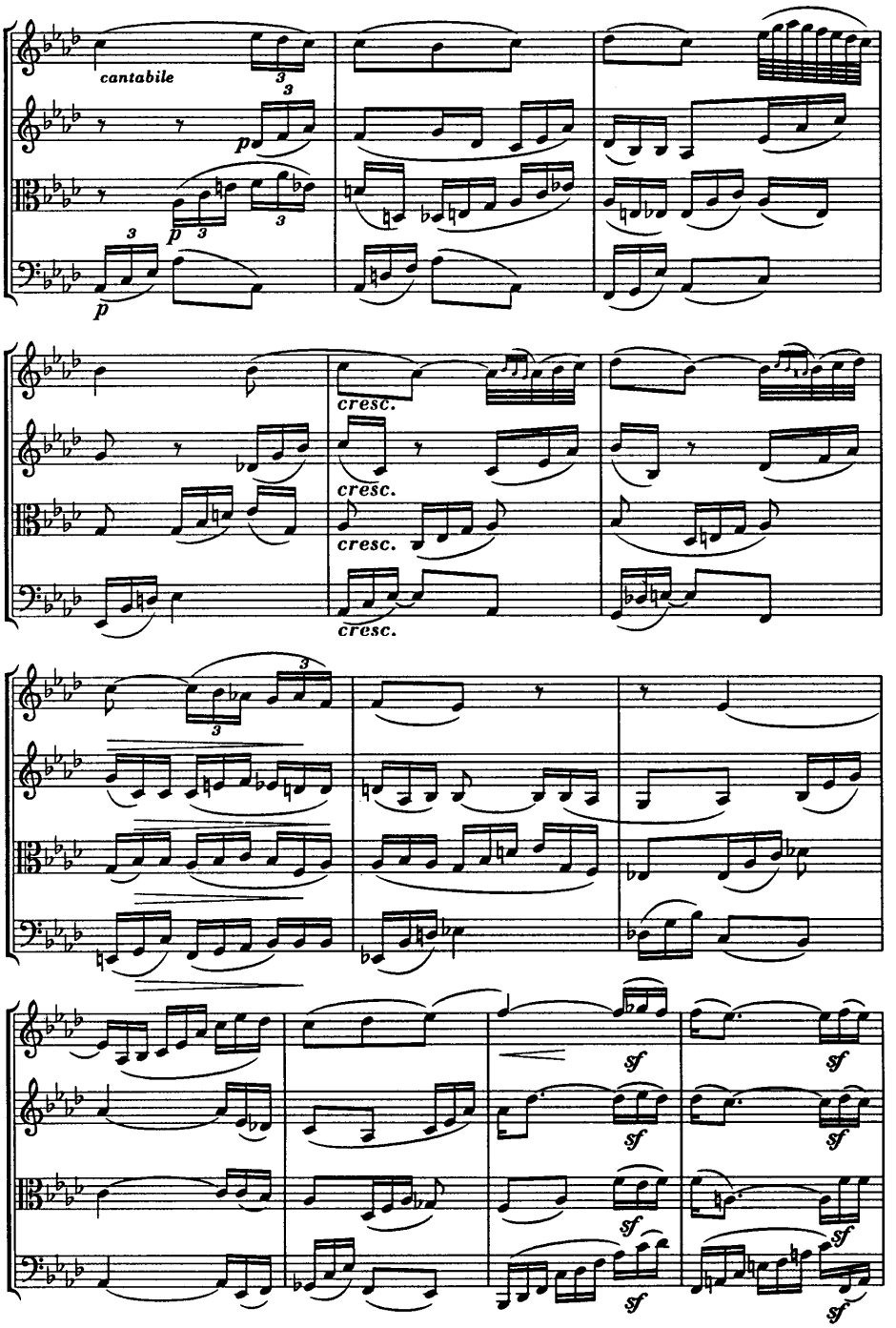


Illustration 5

Proprietary Systems
Amadeus Music Software GMBH (Notenversand Kurt Maas)

Input hardware: PDP-11 (UNIX), Atari workstation, MIDI keyboard
Output device: Amadeus Lasersetter
Alternative output devices: various dot matrix printers, plotters, Monotype Lasercomp

Reduced

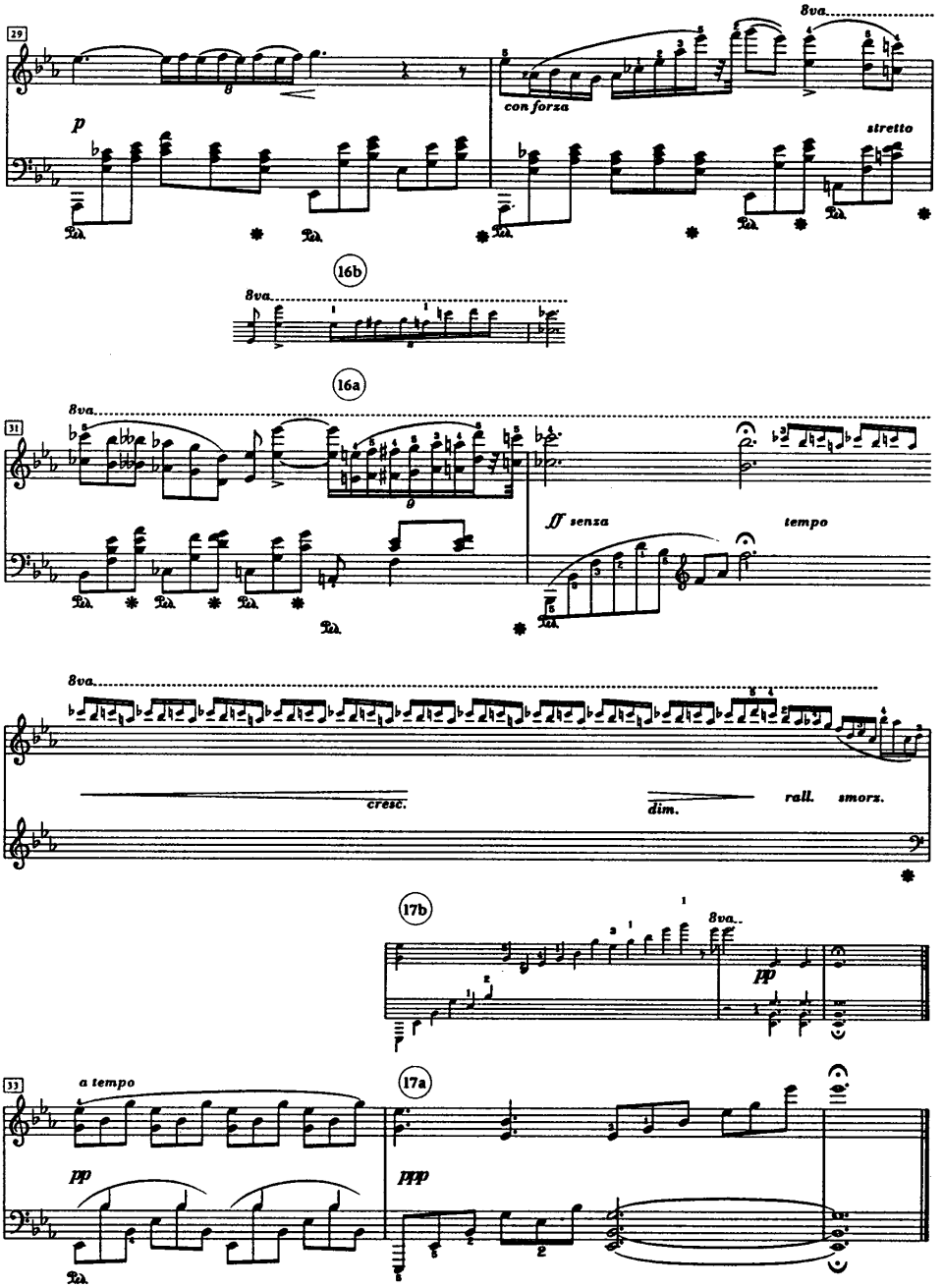


Illustration 6

Proprietary Systems
Dal Molin Musicomp-Rev. 3 (Columbia Pictures Publications)

Input device: Musicomp PCS-500 terminal
Output device: Linotype Omnitech laser typesetter
Music font: Linotype Universal Music (revised)

Input time: 23 min.
Printing time: 3 min.

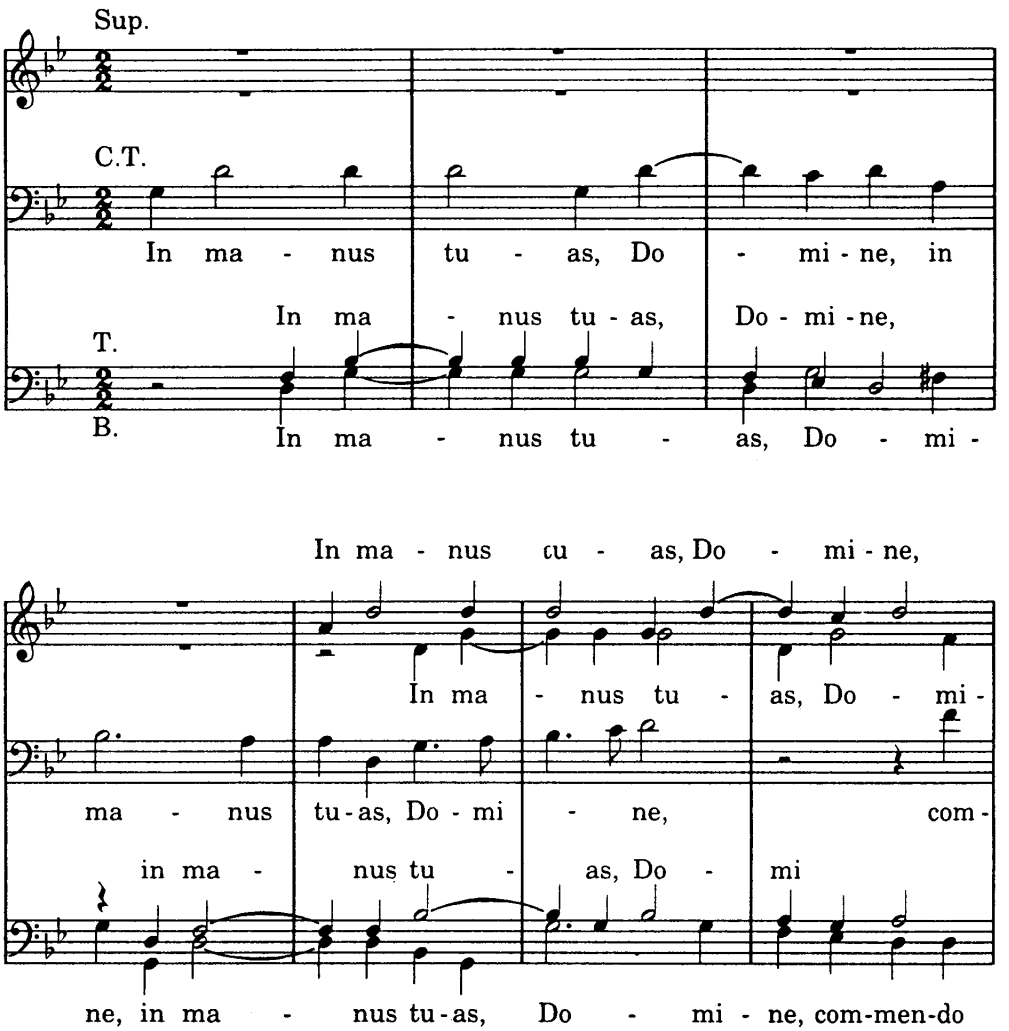


Illustration 7

Proprietary Systems
Dal Molin Musicomp-Rev. 3 (Columbia Pictures Publications)

Input device: Musicomp PCS-500 terminal
Output device: Linotype Omnitech laser typesetter--automatic elements
Music font: Linotype Universal Music (revised)

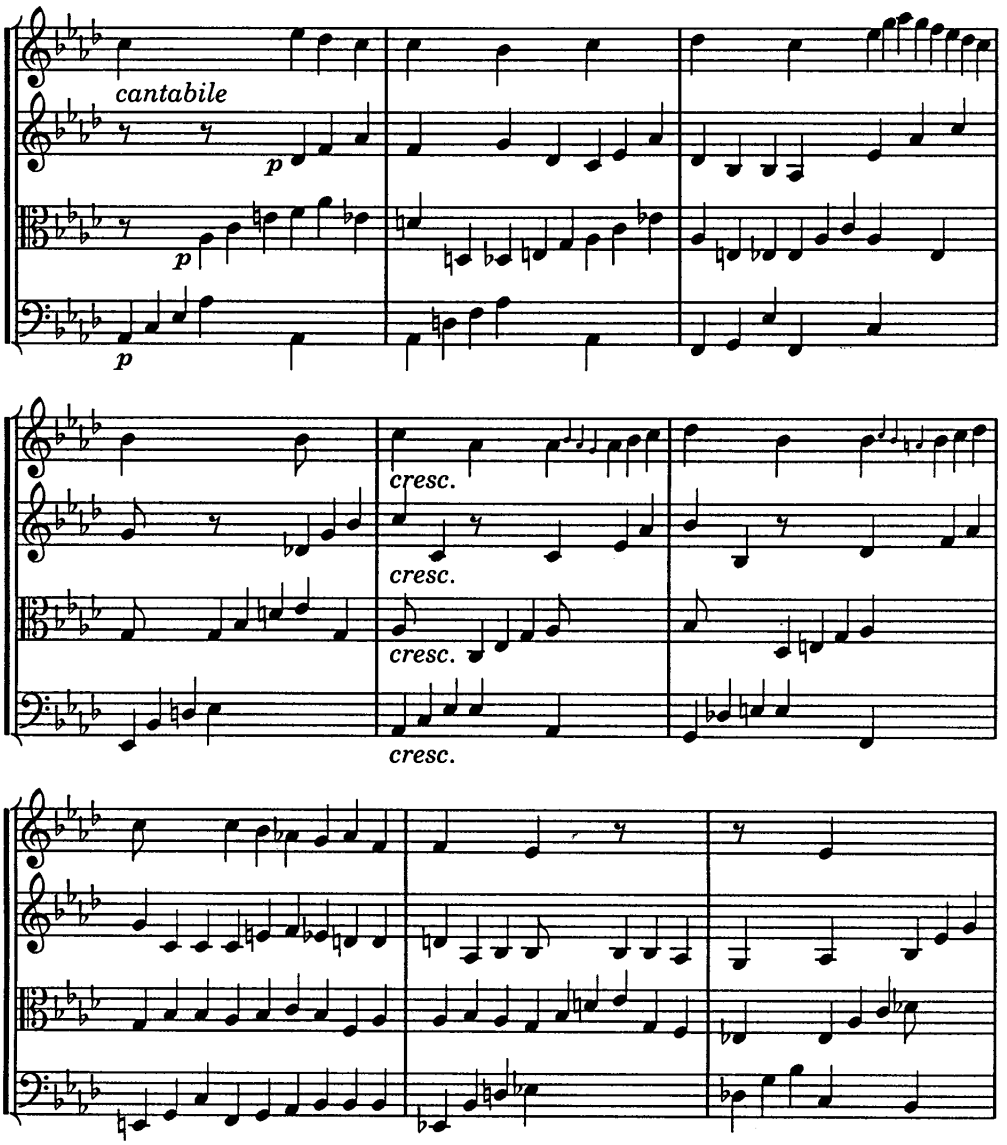


Illustration 8

Proprietary Systems
Dal Molin Musicomp-Rev. 3 (Columbia Pictures Publications)

Input device: Musicomp PCS-500 terminal
Output device: Linotype Omnitech--graphic completion
Input time: 30 min. (input: Steve Einbinder)
Graphic additions: 30 min. (artist: William Moy)
Printing time: 3.5 min.

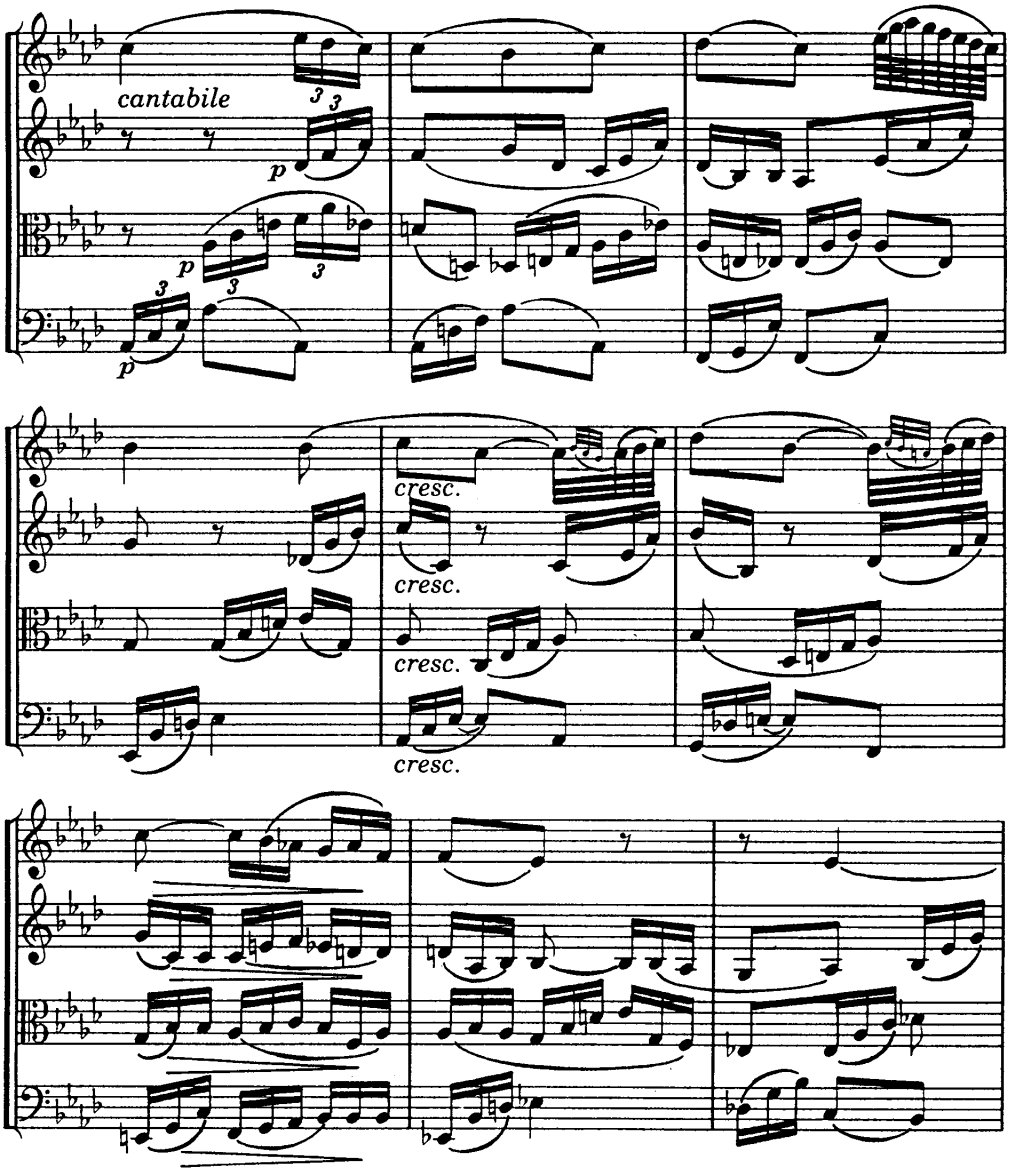


Illustration 9

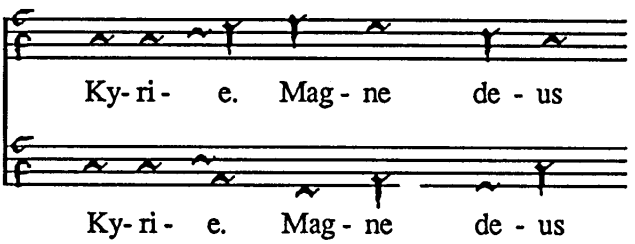
Commercial Software--Apple Macintosh
Alpha/TIMES (Christoph Schnell)

Input device: Ultrasonic digitizer
Host computer: Macintosh SE or II
Output device: Unspecified laser printer
Status: available as part of a comprehensive system

A. Spacing of original manuscript (Engelberg 314) preserved

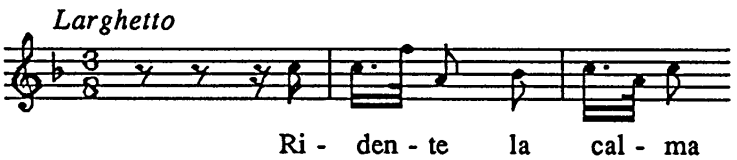
B. Incipit followed by automatically generated (1) DARMS code, (2) sequence of scale degrees, and (3) sequence of melodic intervals ["gr" = grosse (major), "kl" = kleine (minor)]

A. Kyrie. Magne deus potencie liberator



DARMS: 23!F 24P 24P 25P 26V 27V 26P 25V 24P
73!F 74P 74P 75P 72P 70P 72V 71P 74V

B. Ridente la calma Wolfgang Amadeus Mozart



(1) 23!G !K-25 !M3/8 RE RE RS 26S / 26S. 29T 24E 25E / 26S. 24T 26E
(2) c 1 4 ,6 ,7 1 ,6 1
(3) re1 +re4 -kl6 +kl2 +gr2 -kl3 +kl3

Illustration 10

Commercial Software--Apple Macintosh
Music Publisher (Graphic Notes)

Input device: Macintosh SE with Graphic Notes Presto Pad
Output device: Variatyper VT600 (600 d.p.i.); PostScript compatibles
Status: available

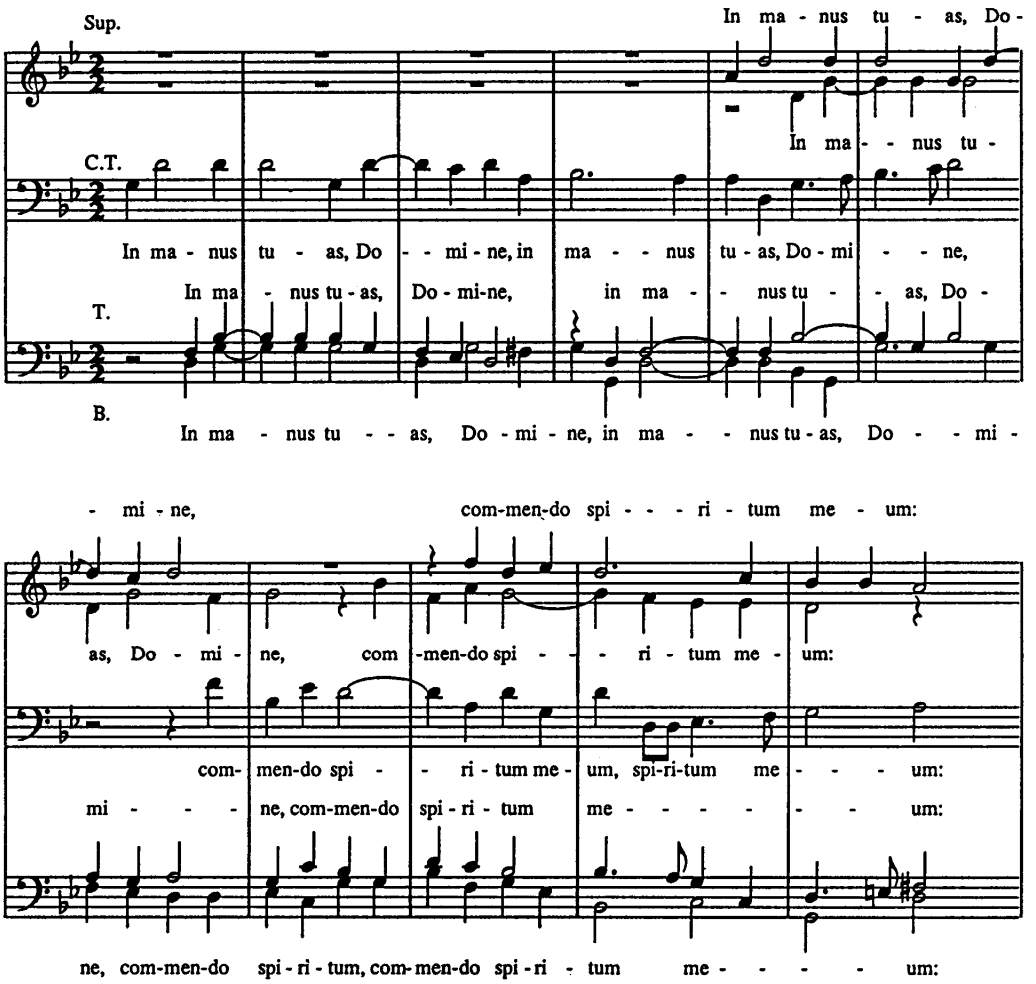


Illustration 11

Commercial Software--Apple Macintosh
Music Publisher (Graphic Notes)

Input device: Macintosh SE with Graphic Notes Presto Pad
Output device: Variatyper VT600 (600 d.p.i.); PostScript compatibles
Status: available

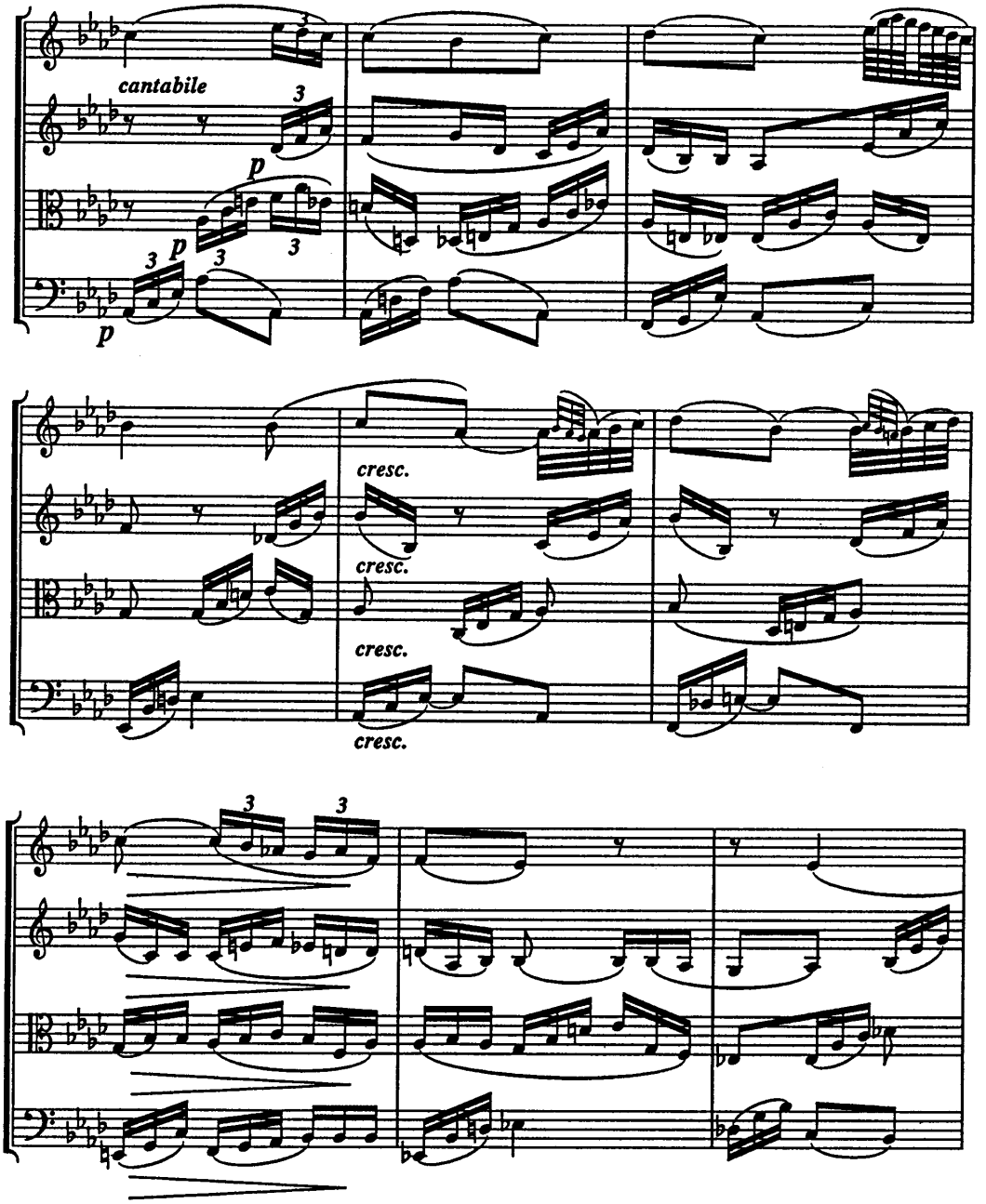


Illustration 12

Commercial Software--Apple Macintosh
MusScribe (Keith Hamel/ SoftCore Music Systems)

Input device: Macintosh
Output device: Linotronic L100 phototypesetter (1270 dots per inch)
Status: available

70% reduction

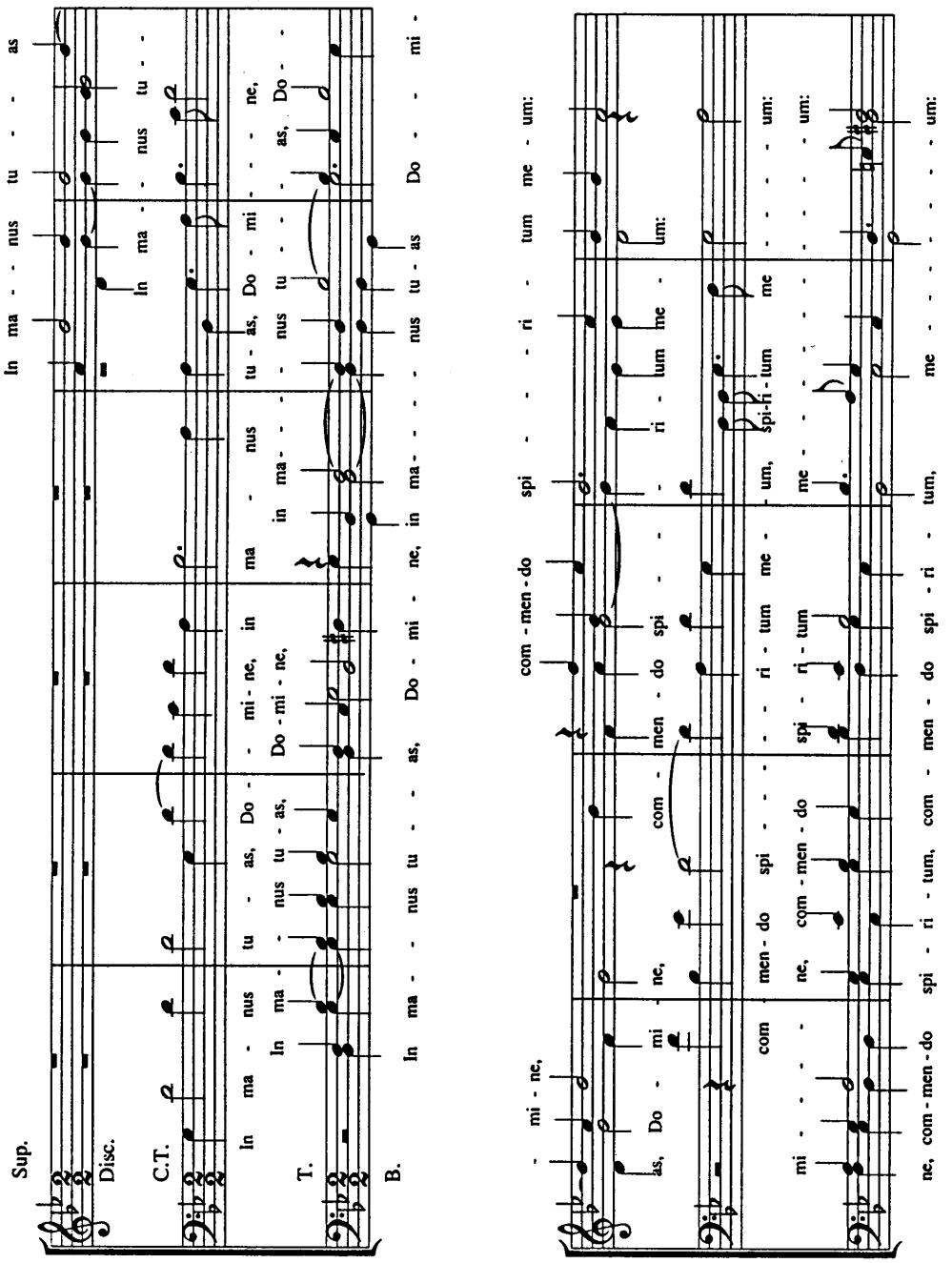


Illustration 13

Commercial Software--Apple Macintosh
MusScribe (Keith Hamel/ SoftCore Music Systems)

Input device: Macintosh
Output device: Linotronic L100 phototypesetter (1270 dots per inch)
Status: available

80% reduction

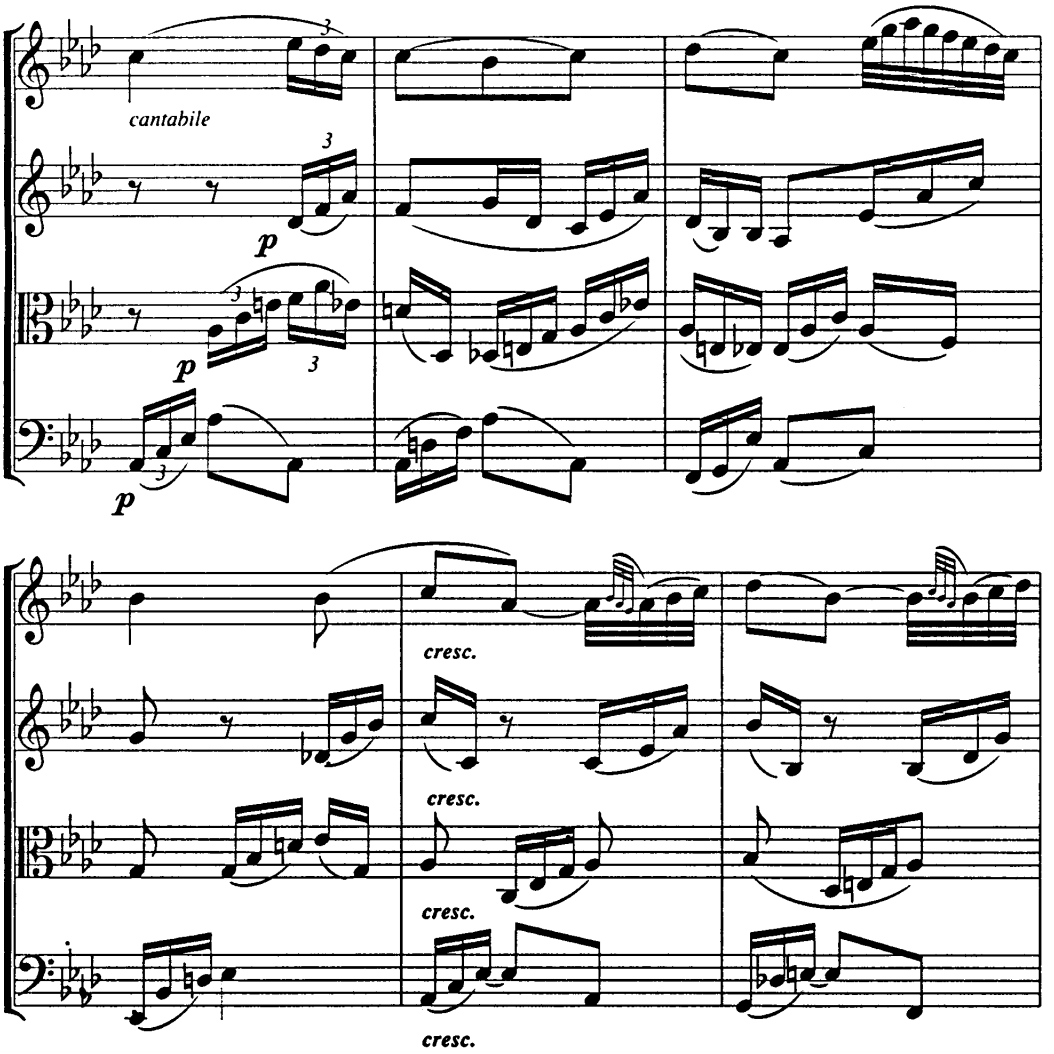


Illustration 14

Commercial Software--Apple Macintosh
MusScribe (Keith Hamel/ SoftCore Music Systems)

Input device: Macintosh
Output device: Apple LaserWriter
Status: available

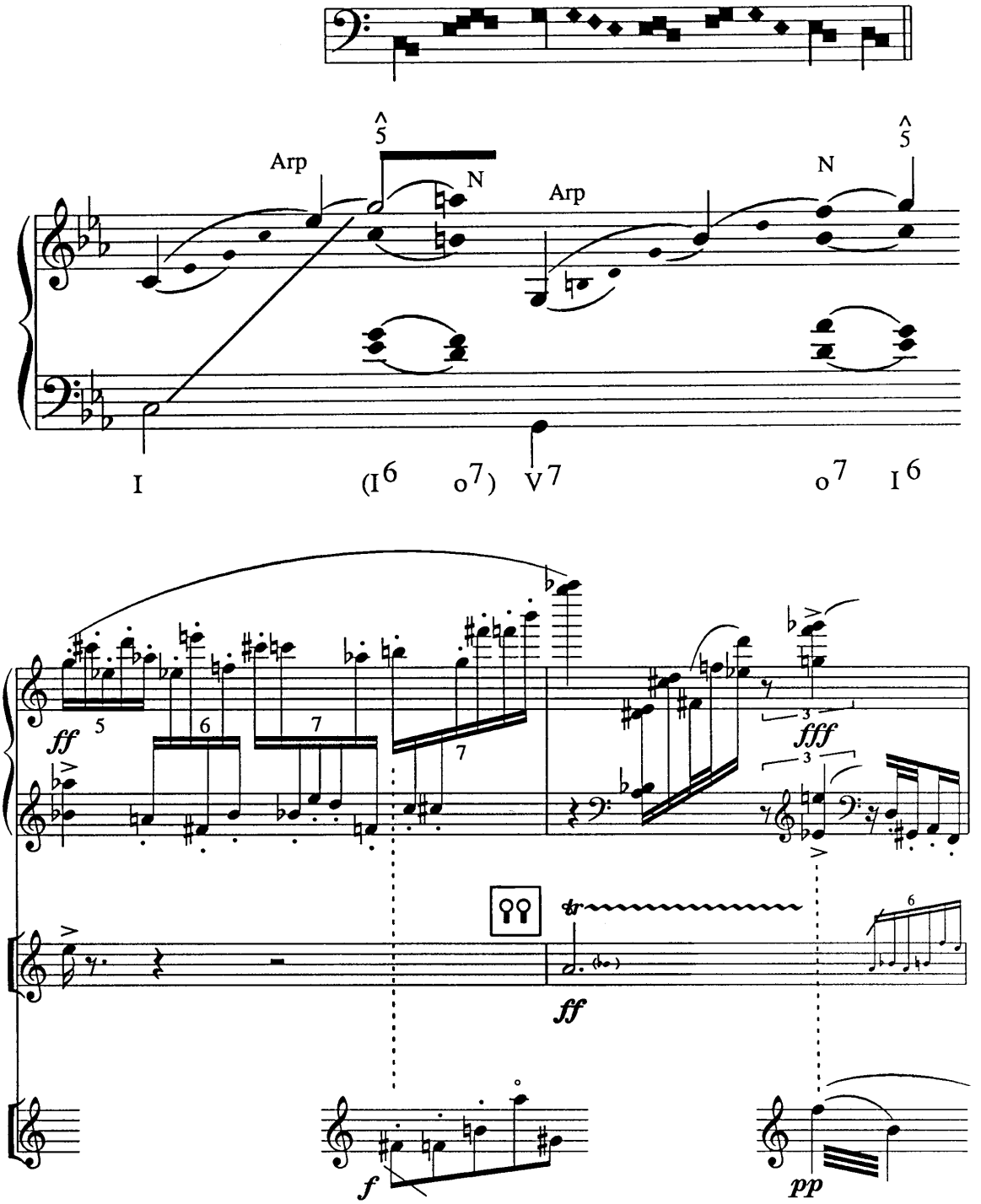


Illustration 15

Commercial Software--Apple Macintosh
Nightingale .70 (Don Byrd/ Advanced Music Notation Systems)

Input device: Macintosh
Output device: Linotronic 300
Status: under development

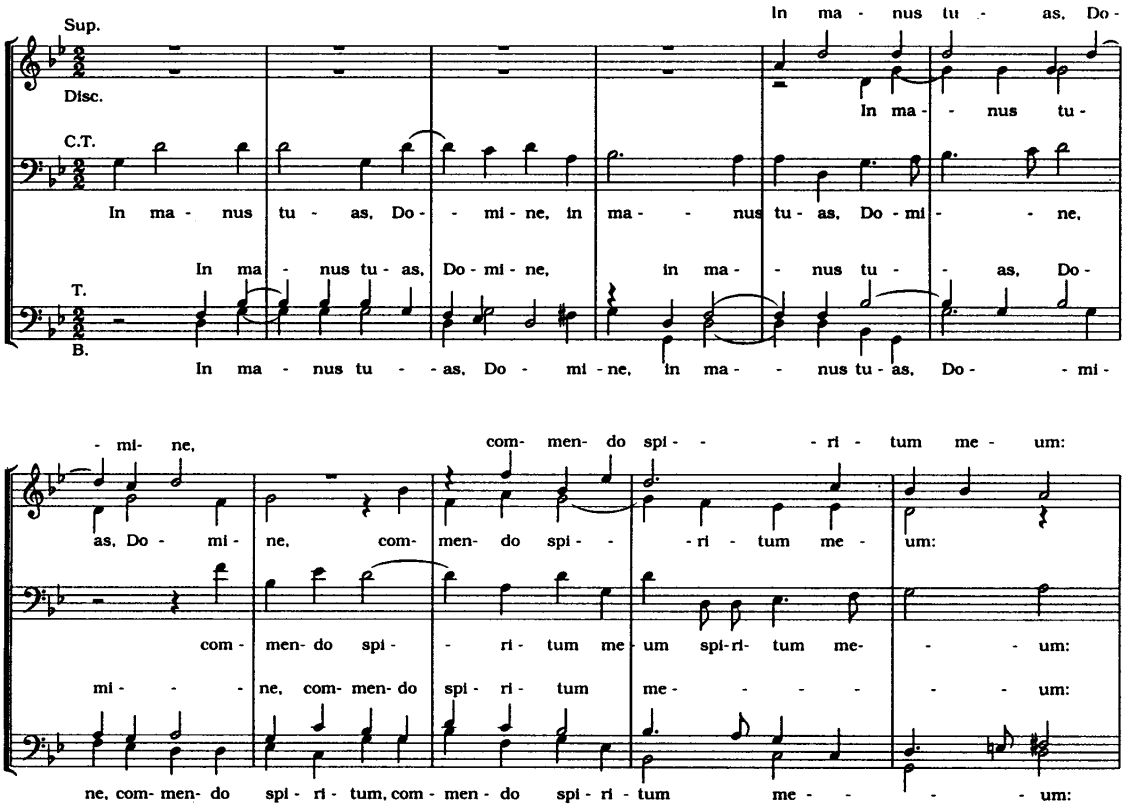


Illustration 16

Commercial Software--Apple Macintosh
Nightingale .70 (Don Byrd/ Advanced Music Notation Systems)

Input device: Macintosh
Output device: Linotronic 300
Status: under development

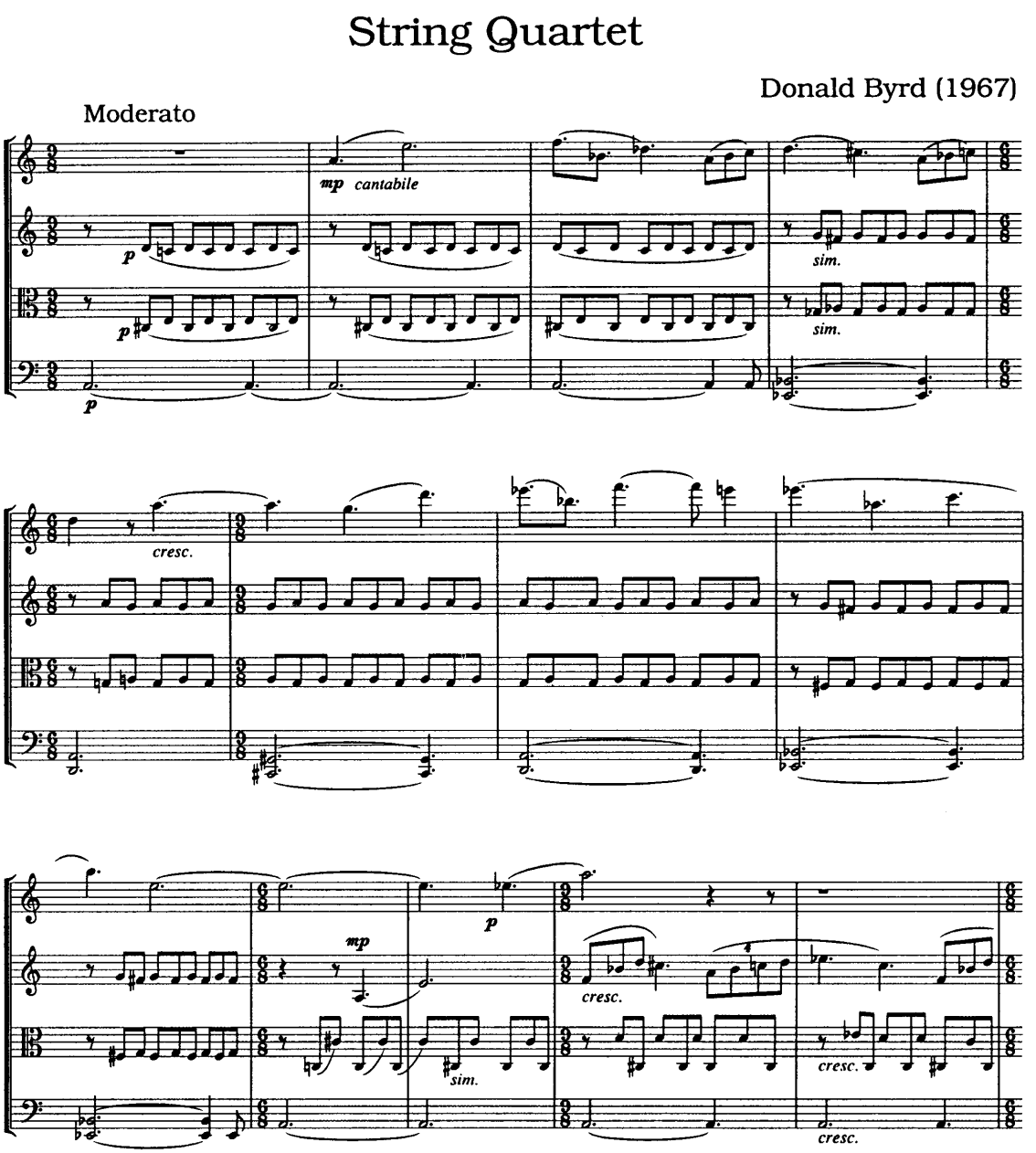


Illustration 17

Commercial Software--Apple Macintosh
Professional Composer (Mark of the Unicorn)

Input device: Macintosh
Output device: unspecified Linotronic typesetter
Status: available

Reduced

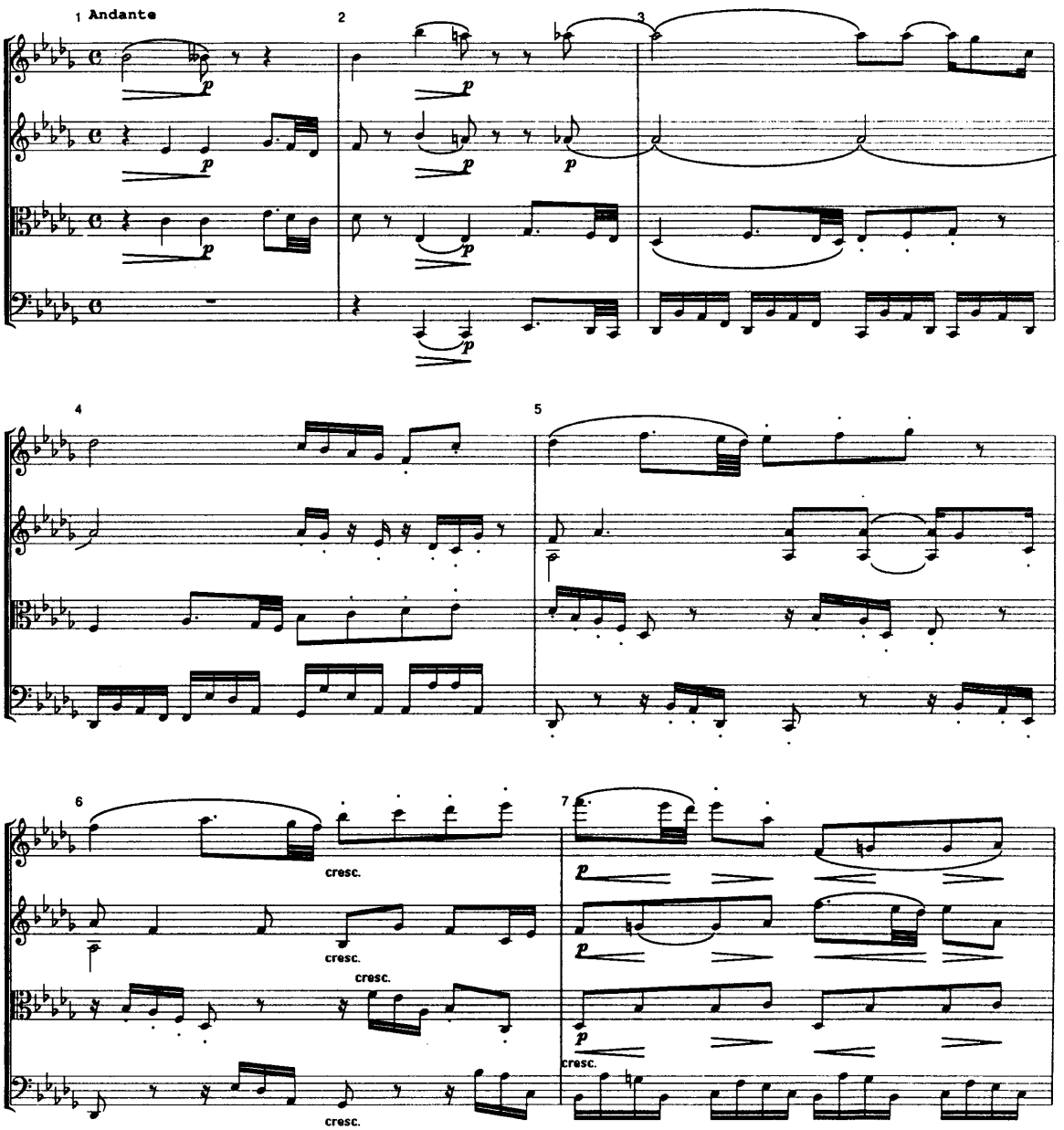


Illustration 18

Commercial Software--Atari
The Copyist (Dr. T's Music Software, Cris Sion)

Input device: Atari 1040ST (IBM PC version also available)
Output device: QMS PS-800 (also supports HP LaserJet, Epson dot matrix compatibles, and HPGL plotters)
File interchange provisions: (see commentary)
Status: available

Reduced

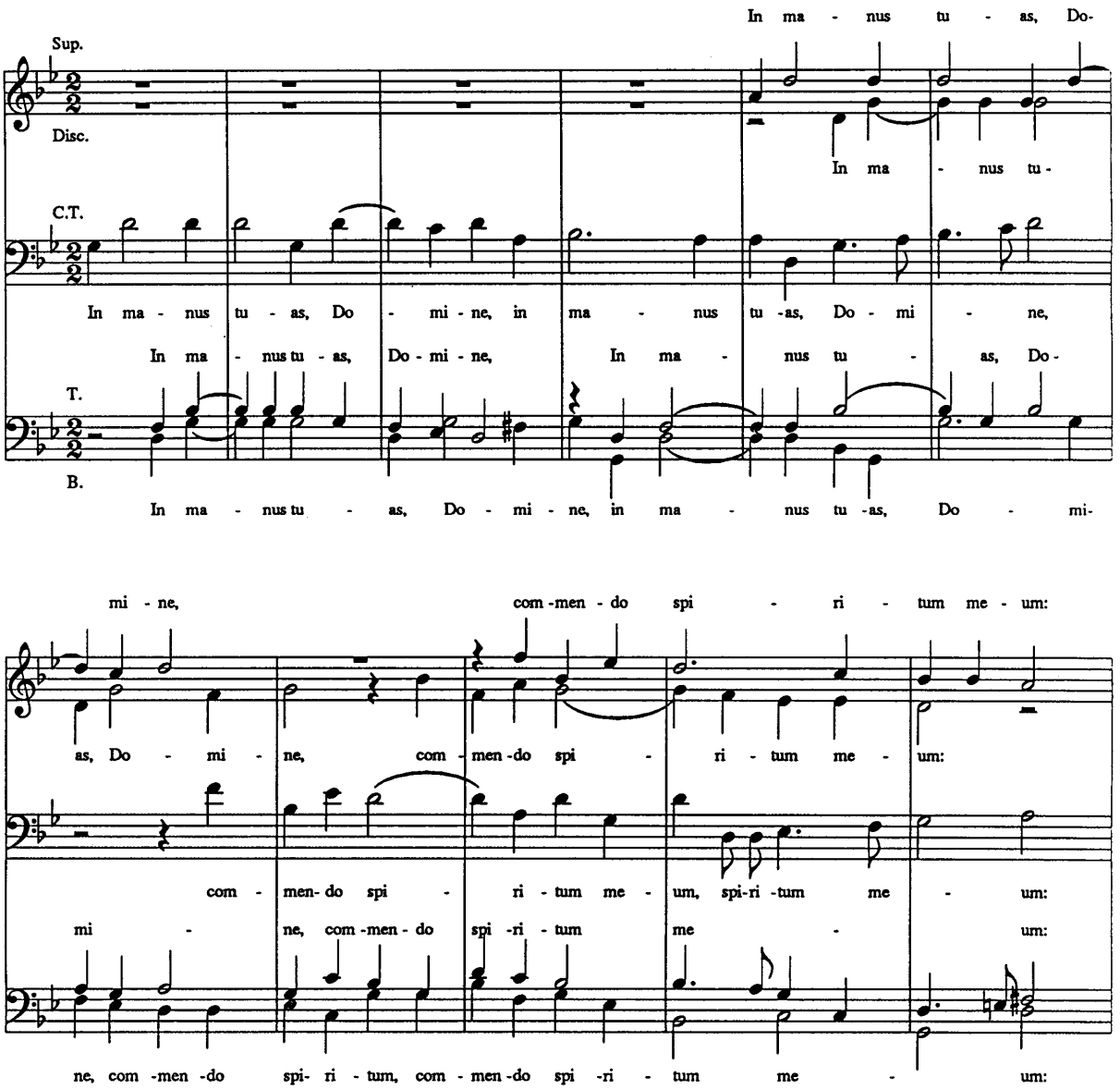


Illustration 19

Commercial Software--Atari
The Copyist (Dr. T's Music Software, Cris Sion)

Input device: Atari 1040ST (IBM PC version also available)
Output device: QMS PS-800 (also supports HP LaserJet, Epson dot matrix compatibles, and HPGL plotters)
File interchange provisions: (see commentary)
Status: available

Reduced

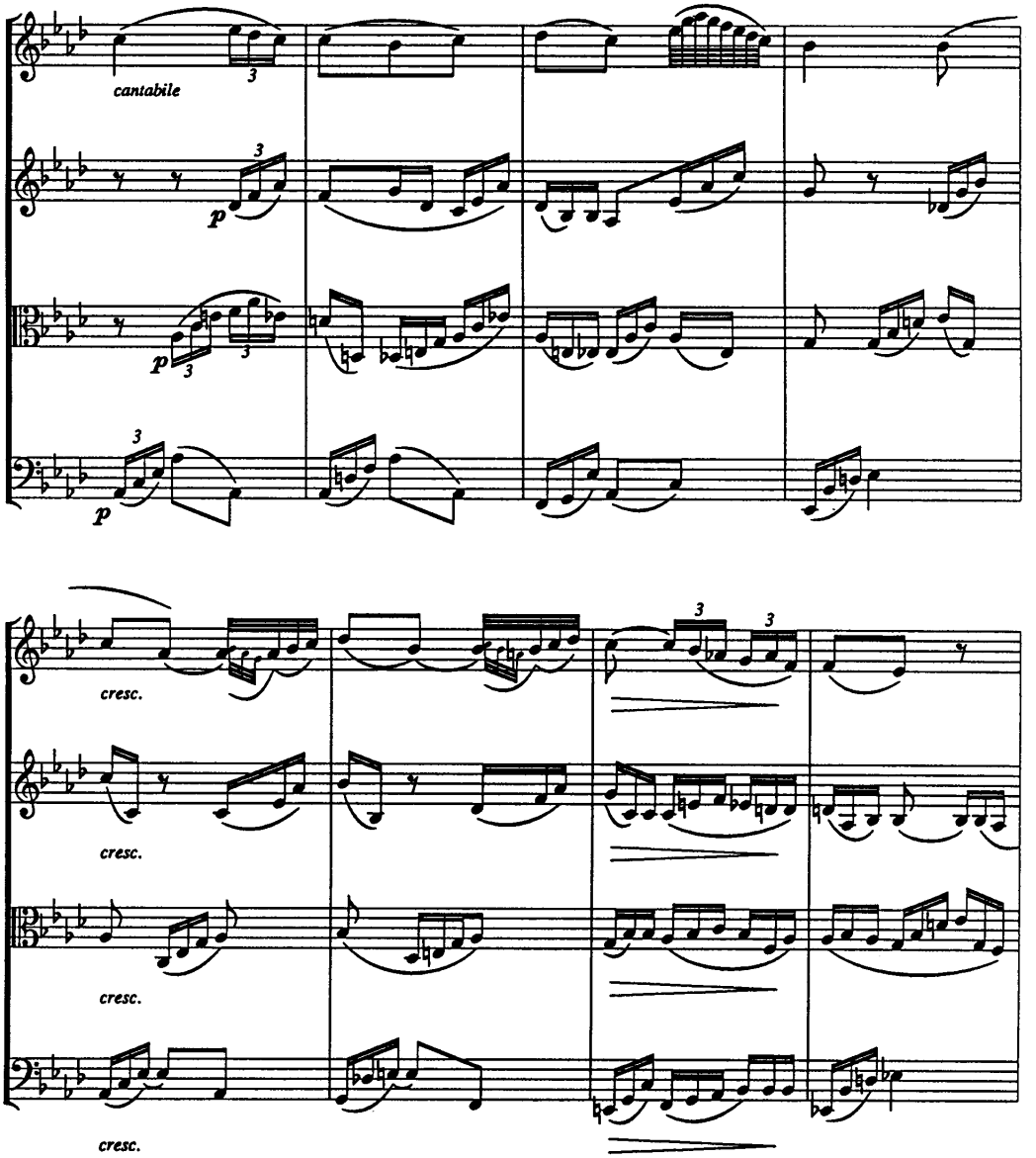


Illustration 20

Commercial Software--Atari
EZ-Score Plus 1.0 (Hybrid Arts, Tom Bajoras)

Input device: Atari 1040ST (alt. 520ST)
Output device: Star SG-10 (or any Epson compatible)
Status: available

Reduced

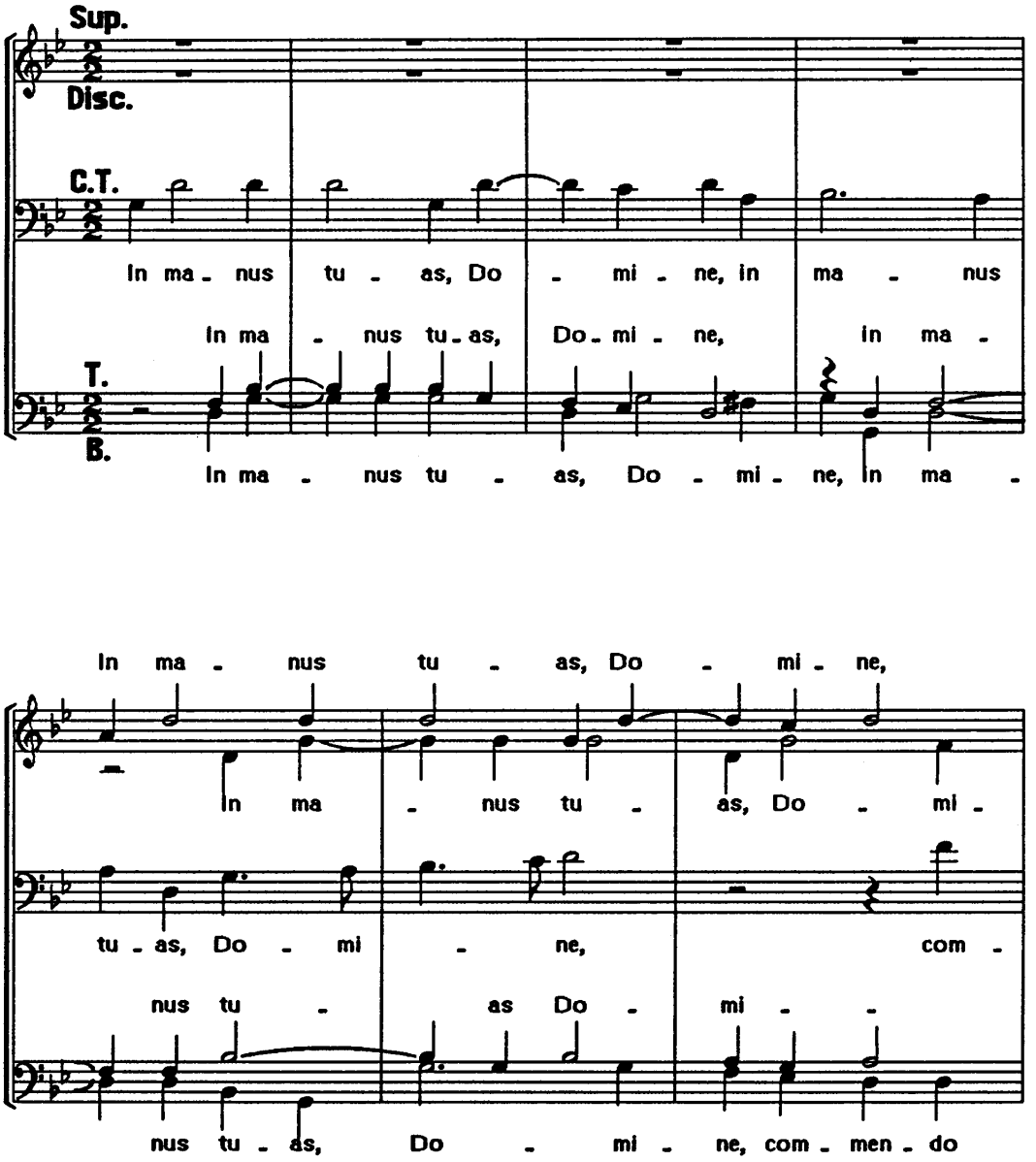


Illustration 21

Commercial Software--IBM PC and compatible microcomputers
la mà de guido (Llorenç Balsach)

Input device: IBM PC XT/AT
Output device: HP 7475 plotter (also other plotters and laser printers)
Status: available

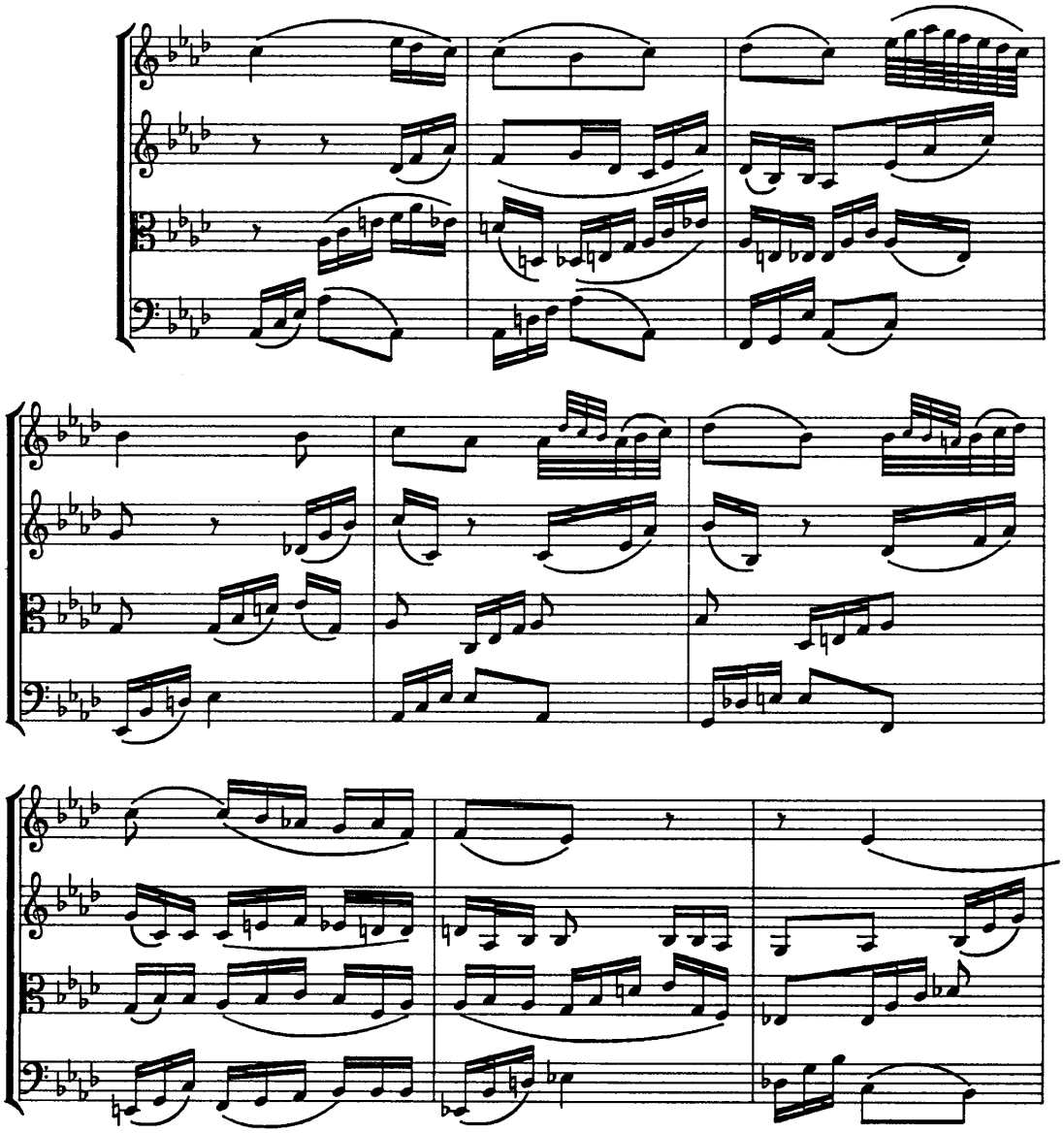


Illustration 22

Commercial Software--IBM PC and compatible microcomputers
la mà de guido (Llorenç Balsach)

Input device: IBM PC XT/AT
Output device: HP 7475 plotter (also other plotters and laser printers)
Status: available

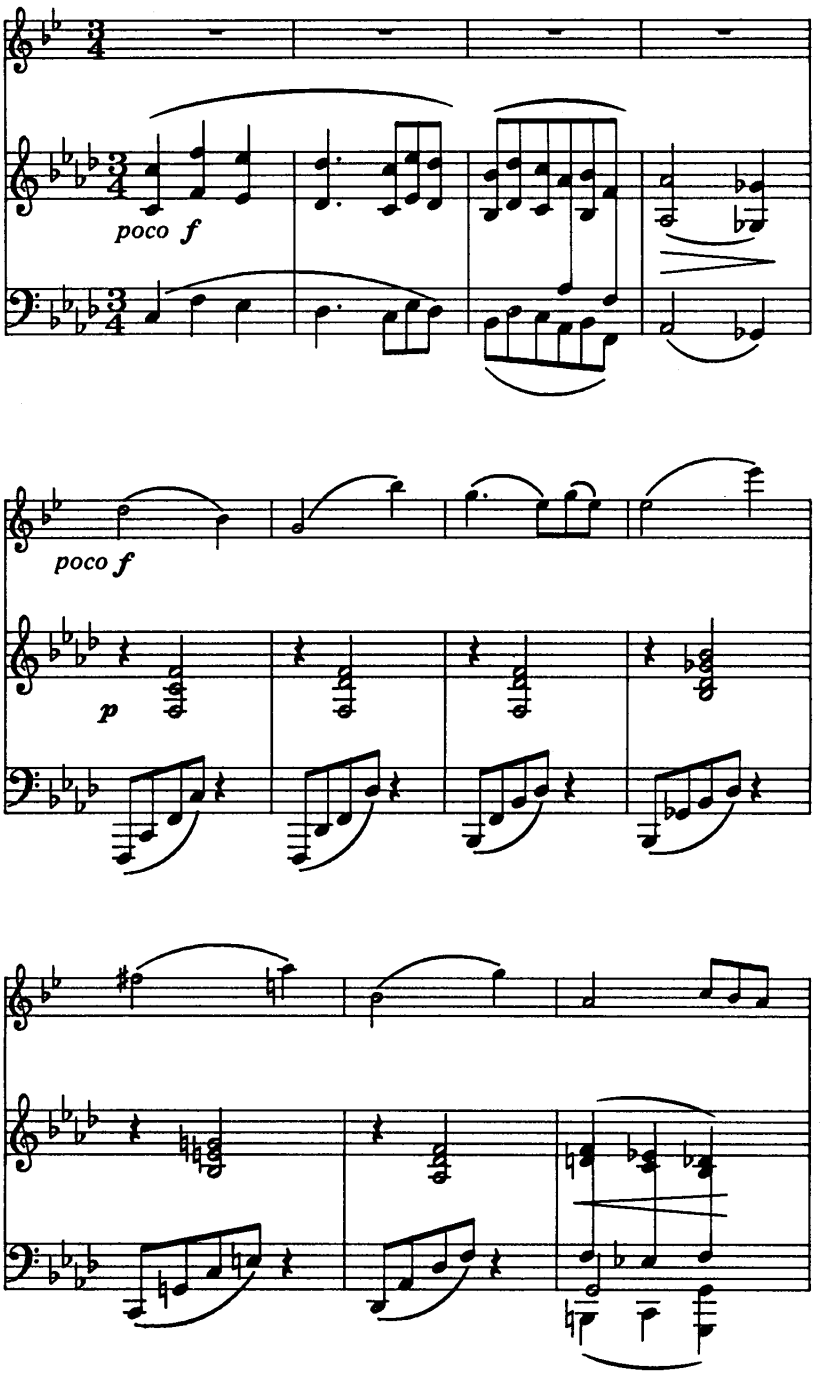


Illustration 23

Commercial Software--IBM PC and compatible microcomputers
la mà de guido (Llorenç Balsach)

Input device: IBM PC XT/AT
Output device: HP 7475 plotter (also other plotters and laser printers)
Status: available

Reduced

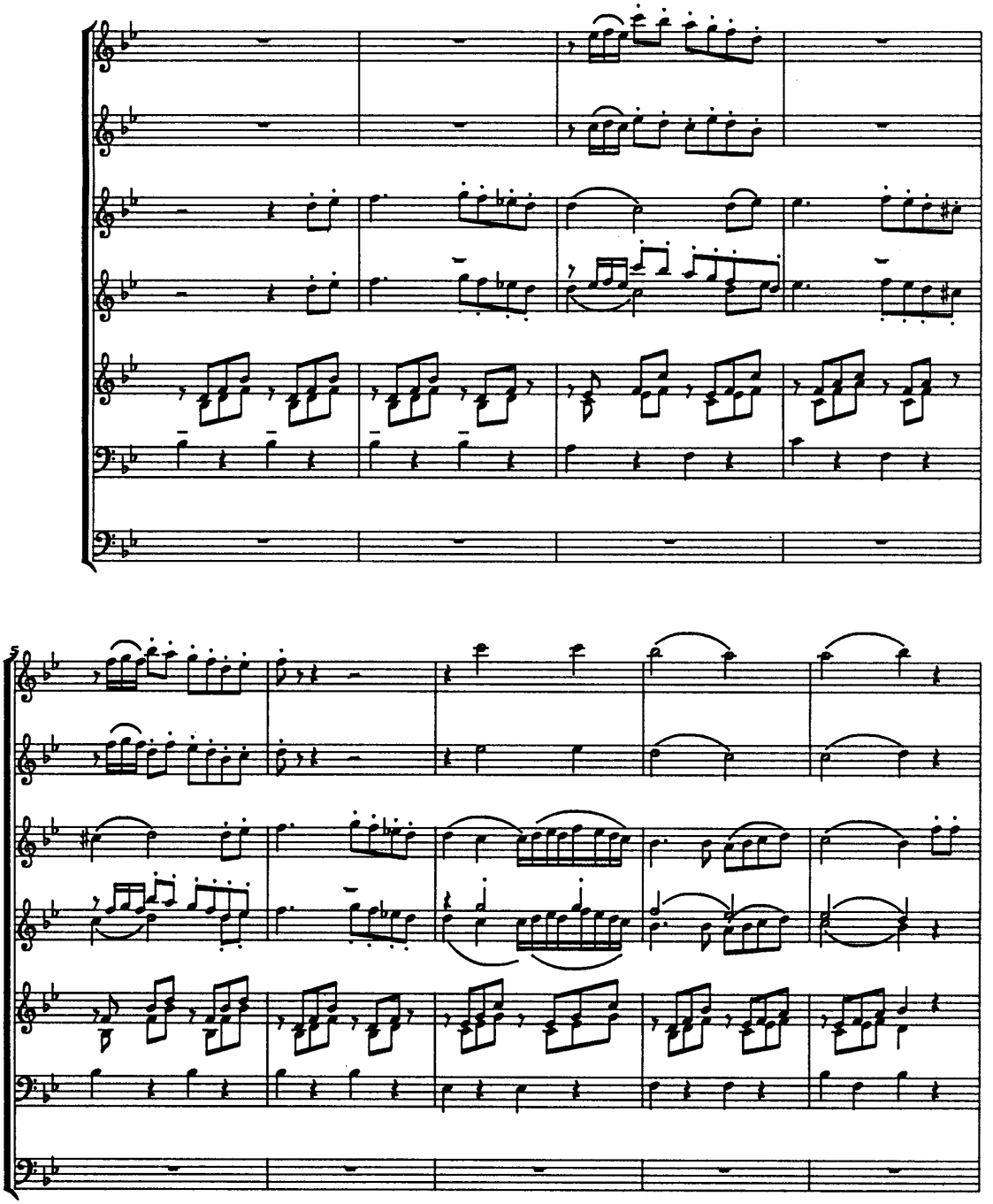


Illustration 24

Commercial Software--IBM PC compatibles
Music Editor (Oberon Systems, Nancy Colton)

Input device: HP Vectra (AT compatible)
Output device: HP LaserJet (11" x 17" capability on HP 2000)
Status: available

Reduced

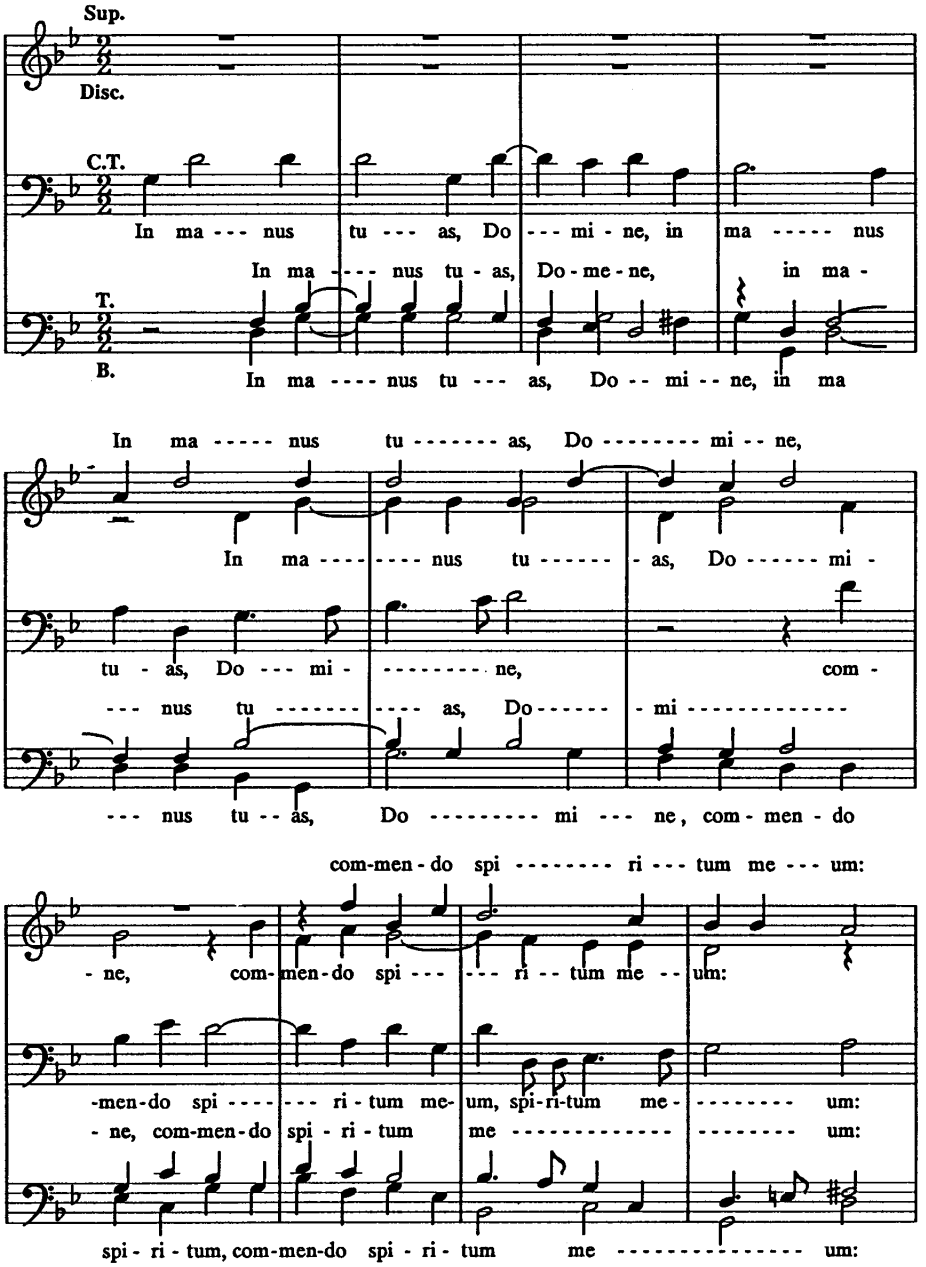


Illustration 25

Commercial Software--IBM PC compatibles
Music Editor (Oberon Systems, Nancy Colton)

Input device: HP Vectra (AT compatible)
Output device: HP LaserJet (11" x 17" capability on HP 2000)
Status: available

Reduced

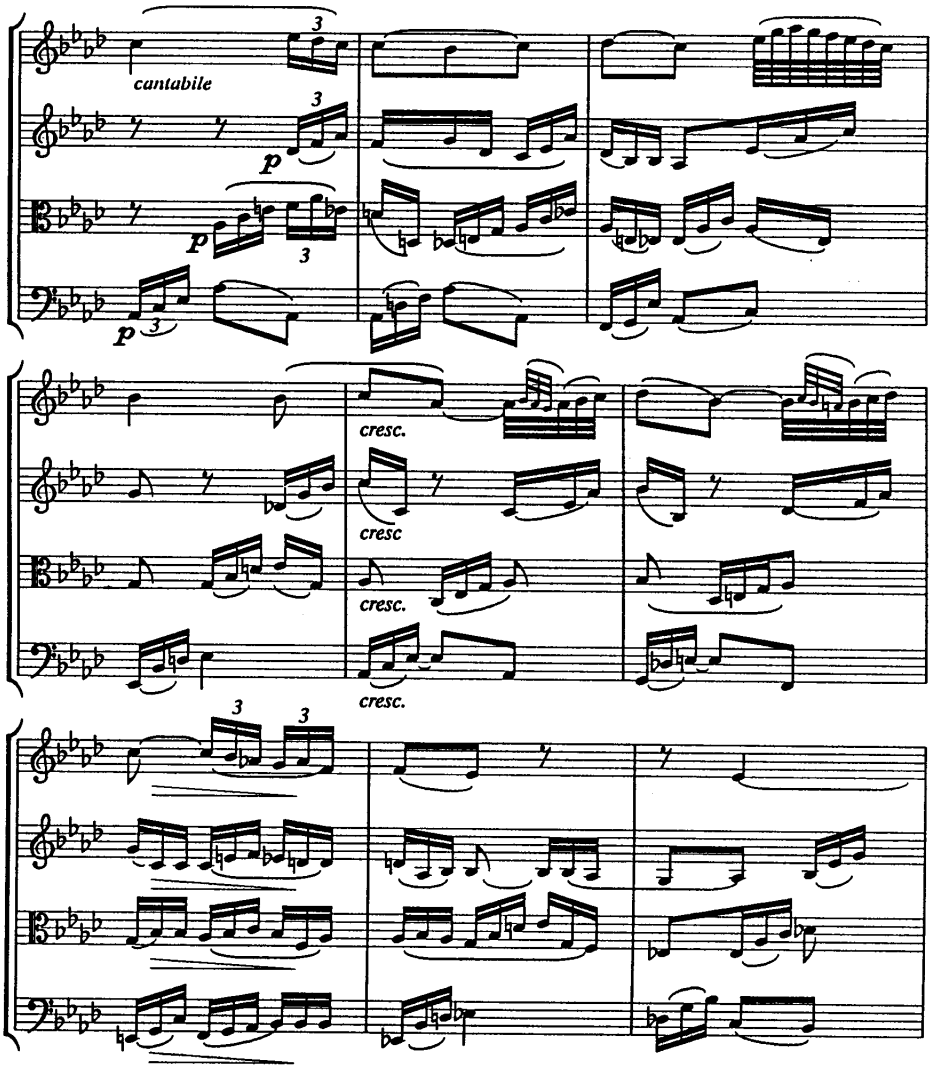


Illustration 26

Commerical Software--IBM PC compatibles
Music Processor (Etienne Darbellay)

Input device: IBM PC AT compatible, Hercules graphics card
Output device: IBM Proprinter X24
Status: under development

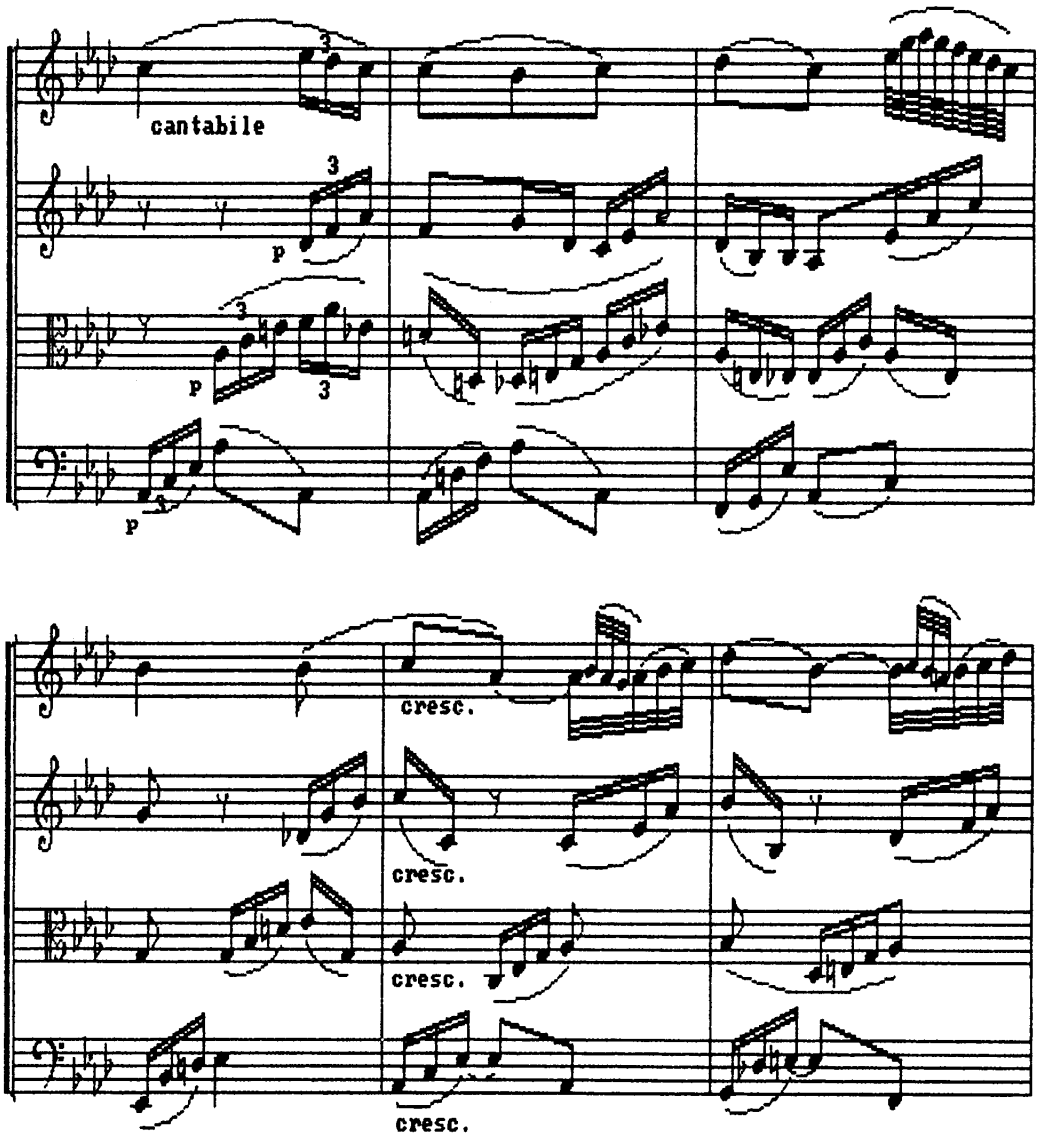


Illustration 27

Commercial Software--IBM PC compatibles
Music Processor (Etienne Darbellay)

Input device: IBM PC AT compatible, Hercules graphics card
Output device: Gemini Star
Status: under development

Reduced

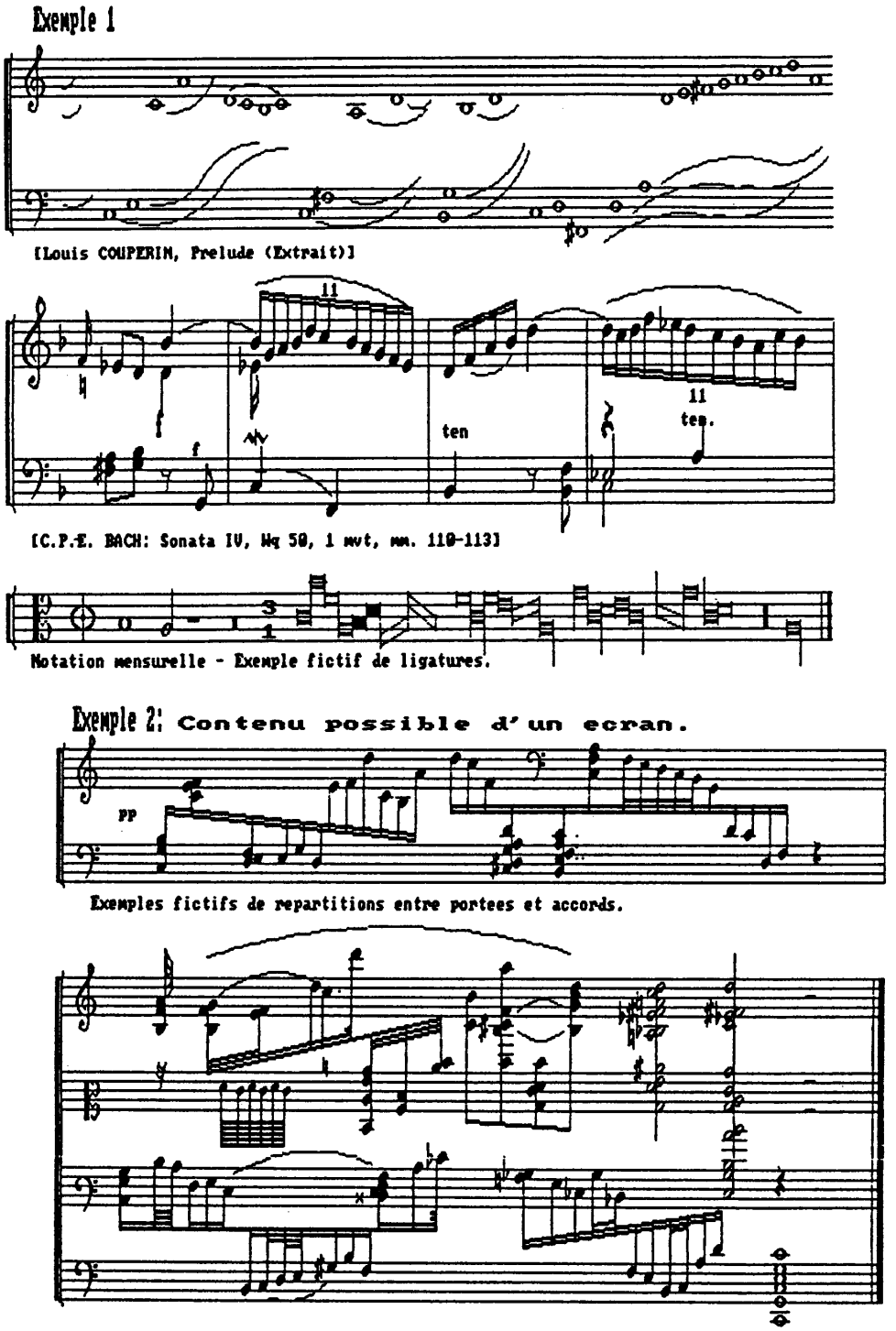


Illustration 28

Commercial Software--IBM PC compatibles
Note Processór (Thought Processors, Stephen Dydo)

Input device: IBM PC compatible, mouse
Output: NEC P7 (Epson dot matrix and HP LaserJet compatibility)
Music font: proprietary **Text font:** HP Softfonts
Status: available 78% Reduction

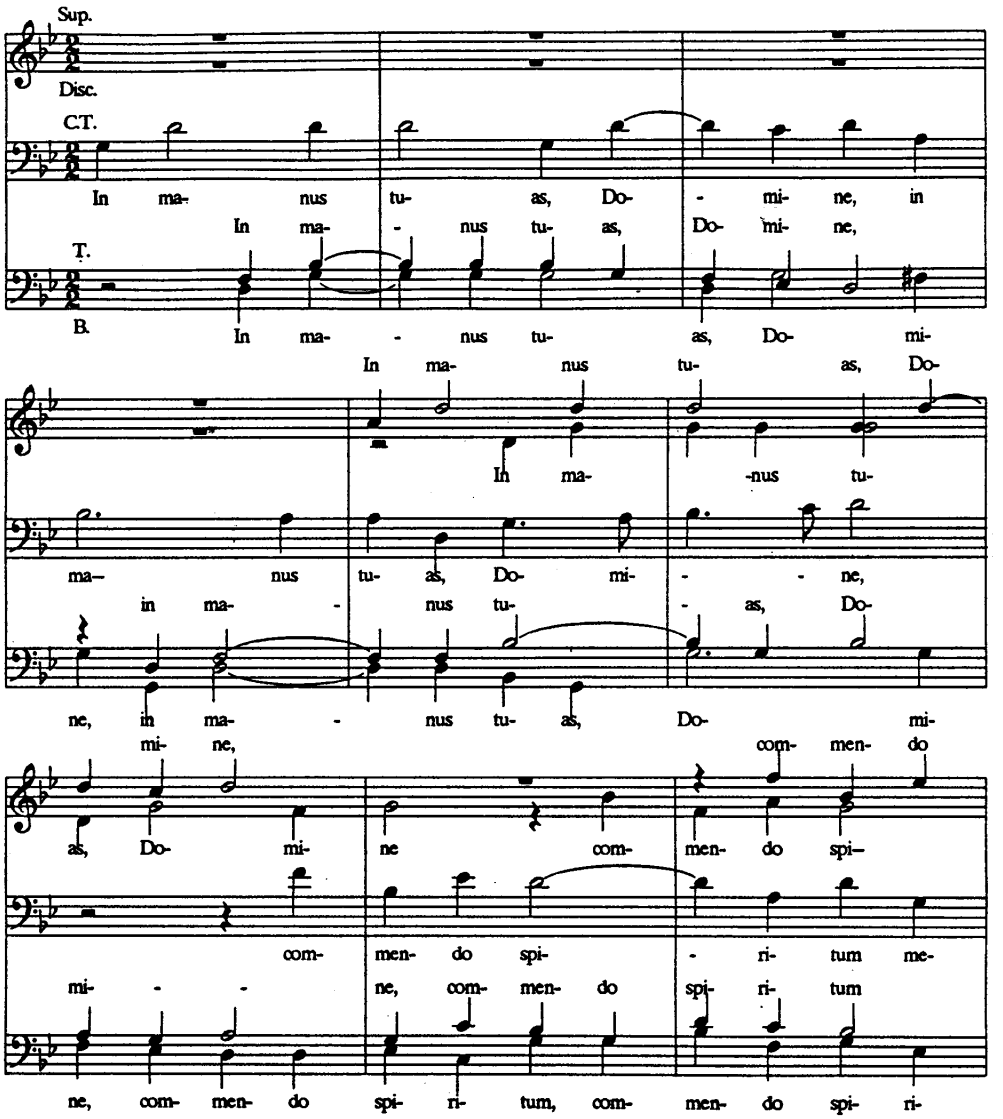


Illustration 29

Commerical Software--IBM PC compatibles
Note Processor (J. Stephen Dydo)

Input device: IBM PC compatible, mouse
Output device: NEC P7 (Epson dotmatrix and HP LaserJet compatibility)
Status: available

Reduced

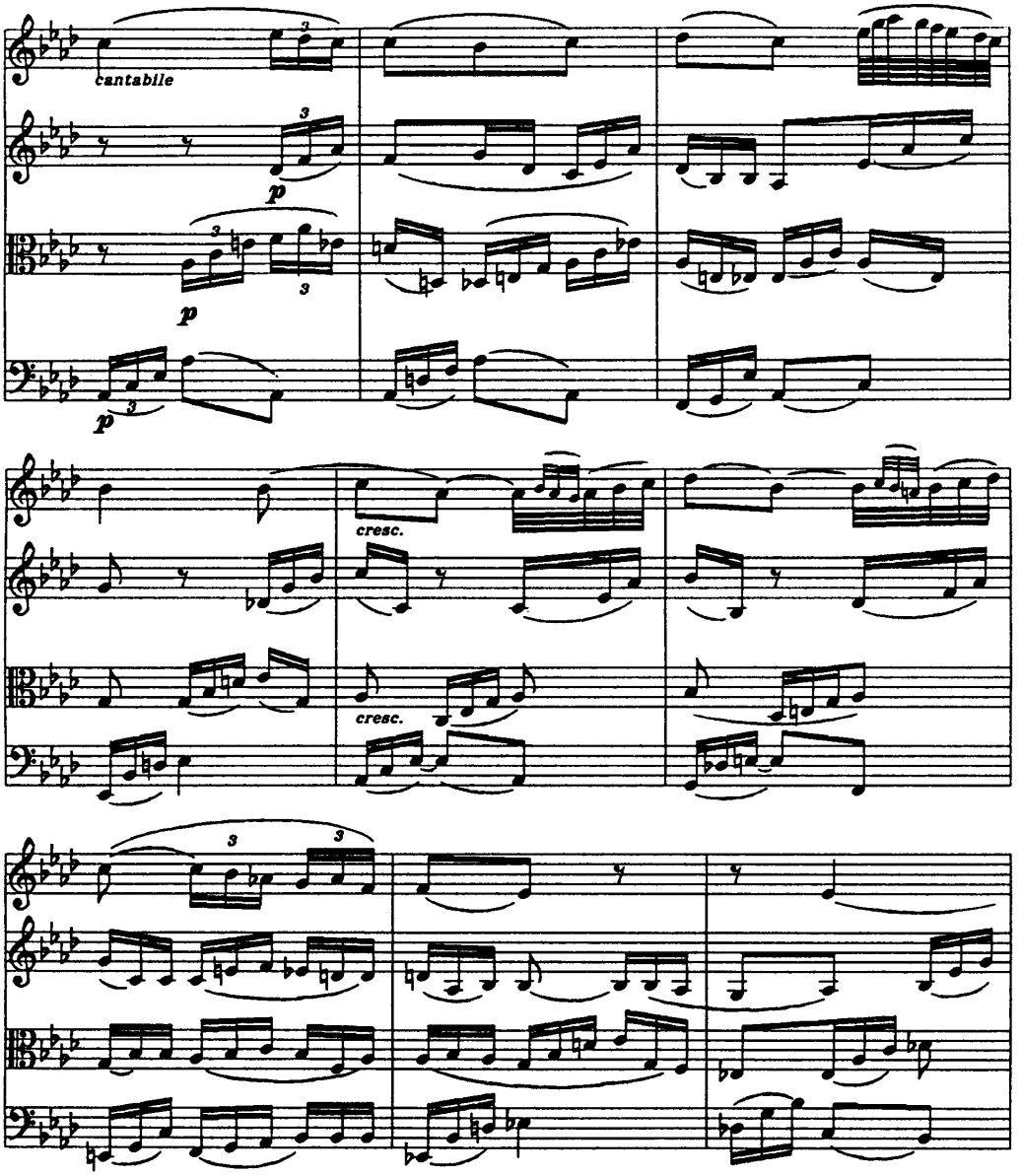


Illustration 30

Commercial Software--IBM PC compatibles
PARD (PARD S.R.L., Walter Prati and Giorgio Ceroni)

Input device: IBM 8580 PS/2
Output device: HP plotter
Status: under development

Reduced

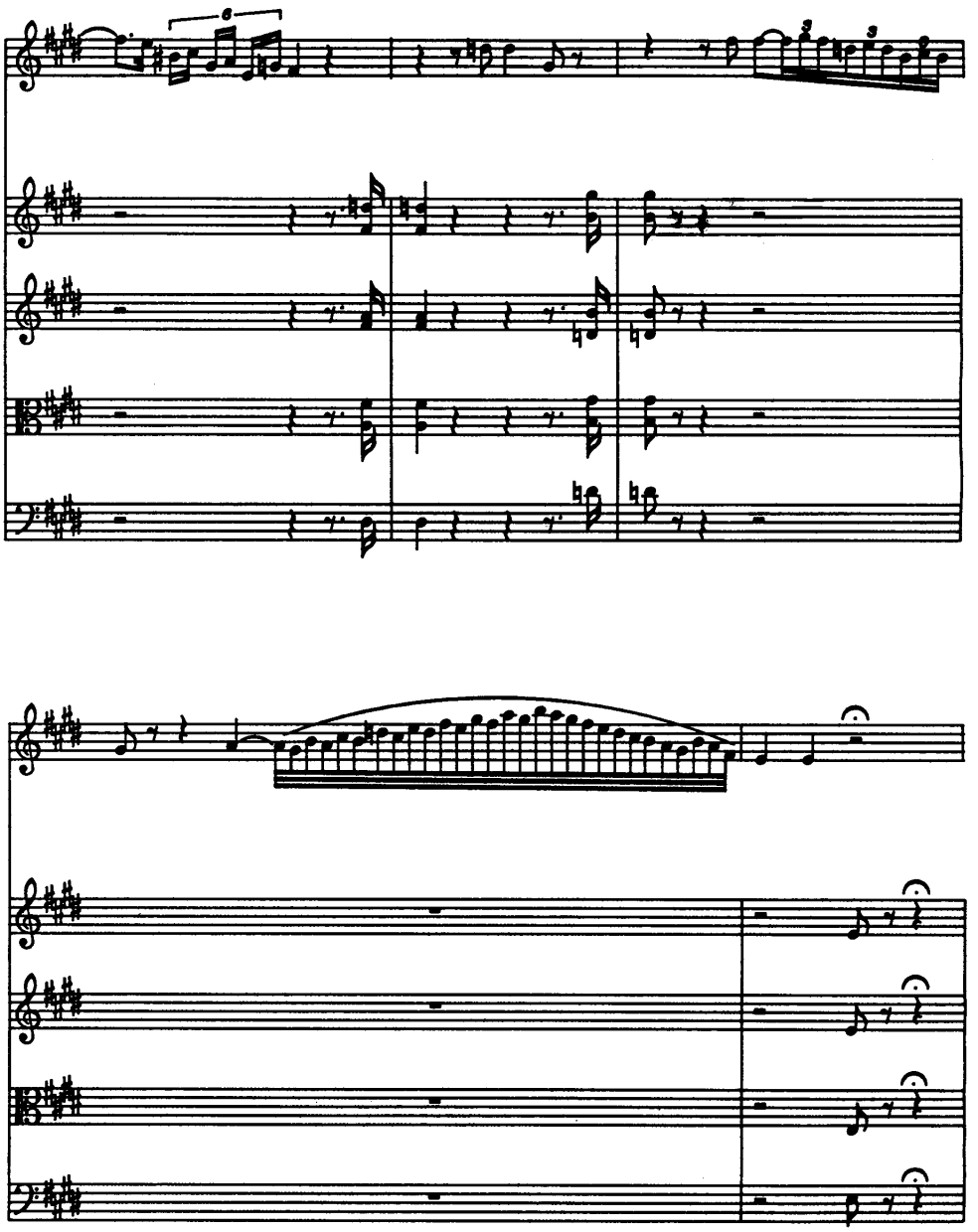


Illustration 31

Commercial Software--IBM PC compatibles
PARD (PARD S.R.L., Walter Prati and Giorgio Ceroni)

Input device: IBM 8580 PS/2
Output device: HP plotter
Status: under development

Reduced

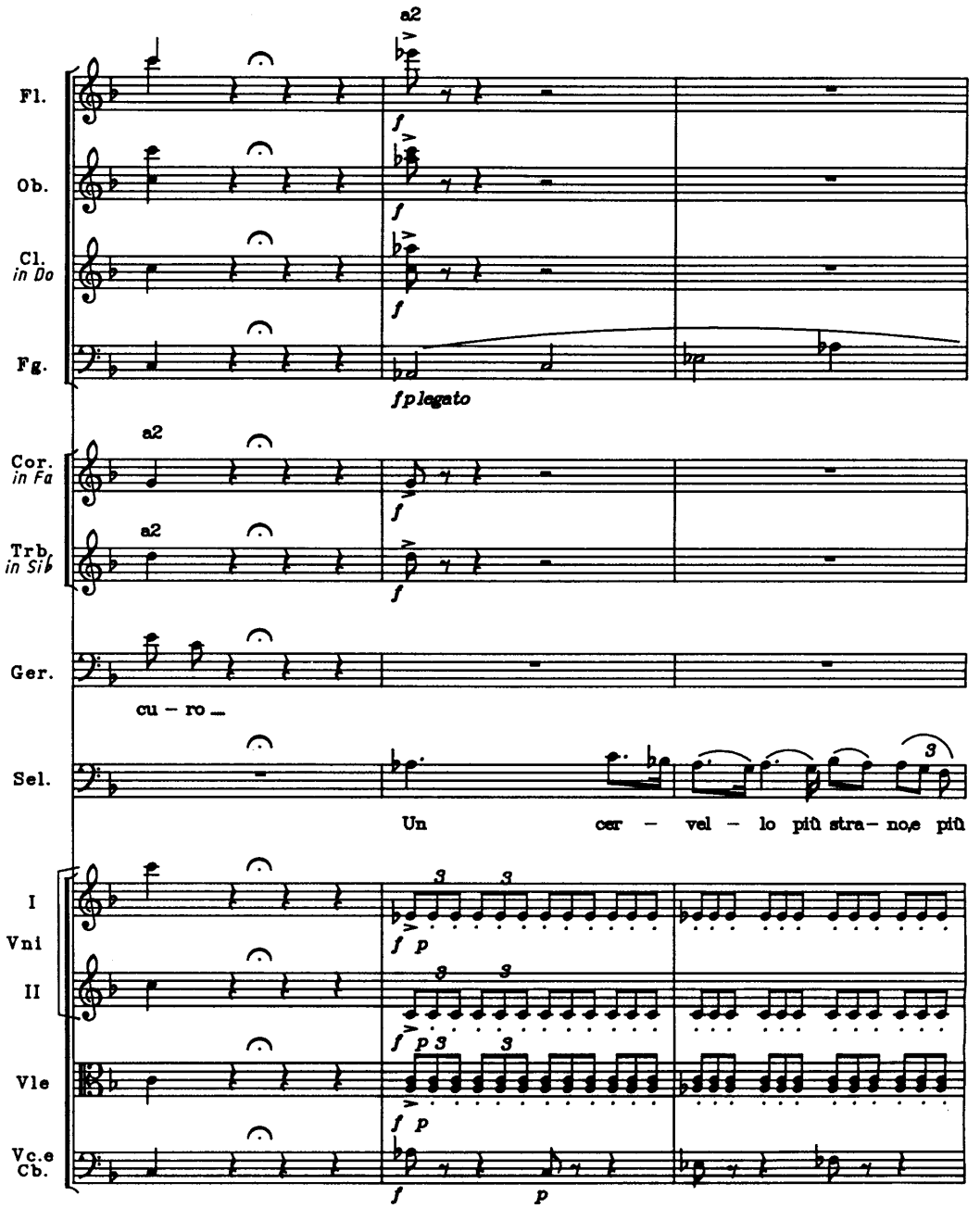


Illustration 32

Commerical Software--IBM PC compatibles
PC-MusiComp Rev. 2 (Armando Dal Molin)

Input device: IBM PC with monographics
Output device: Okidata 192
Status: under development

Input time: 47 min.
Print time: 4'50"

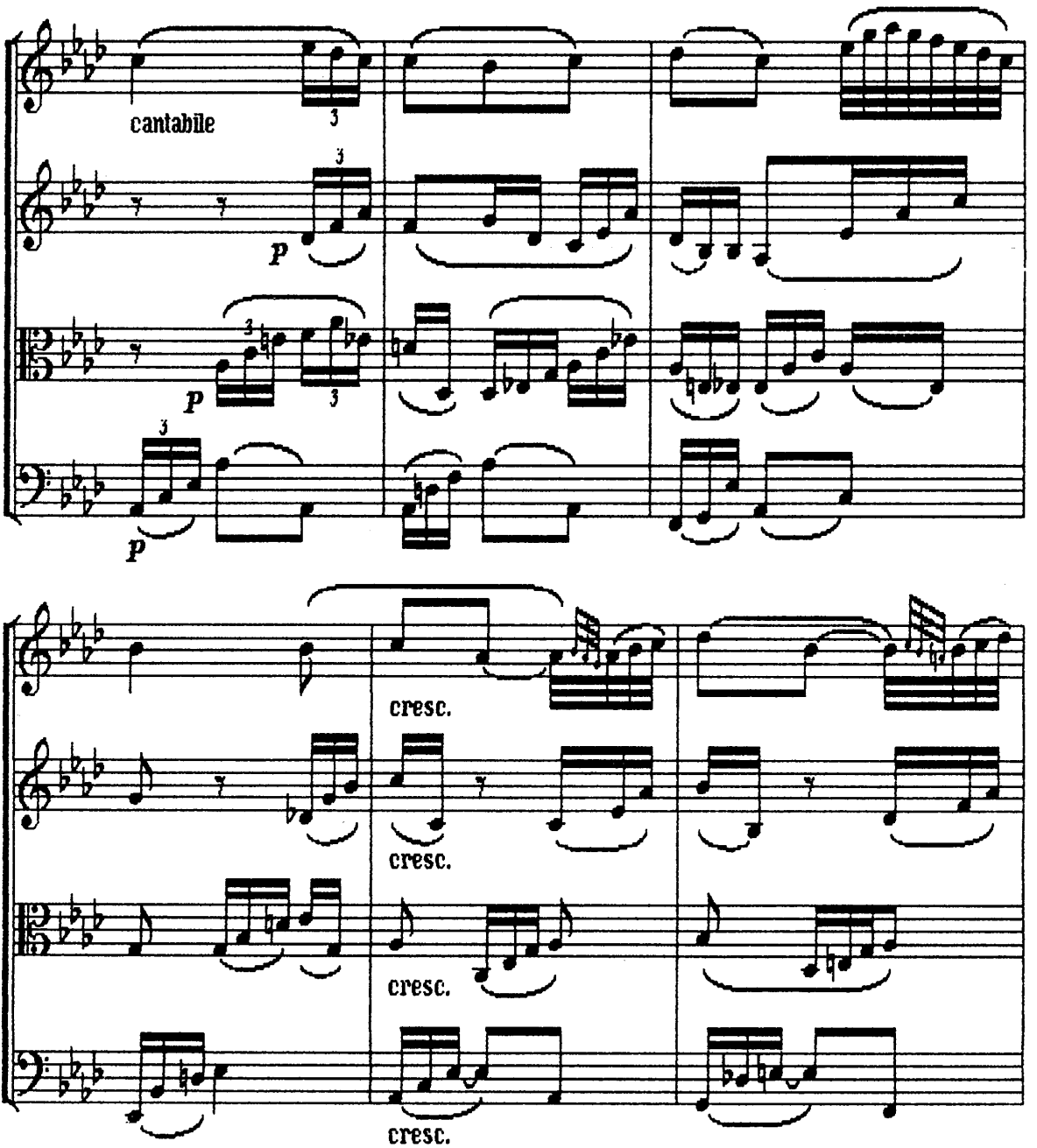


Illustration 33

Commercial Software--IBM PC compatibles
SCORE (Passport Designs, Leland Smith)

Input device: IBM PC compatibles
Output device: Varitype (600 d.p.i.)(support for LaserWriter et al.)
Text fonts: Postscript
Music fonts: SCORE font shown (39 other music fonts available)
Status: available

Reduced

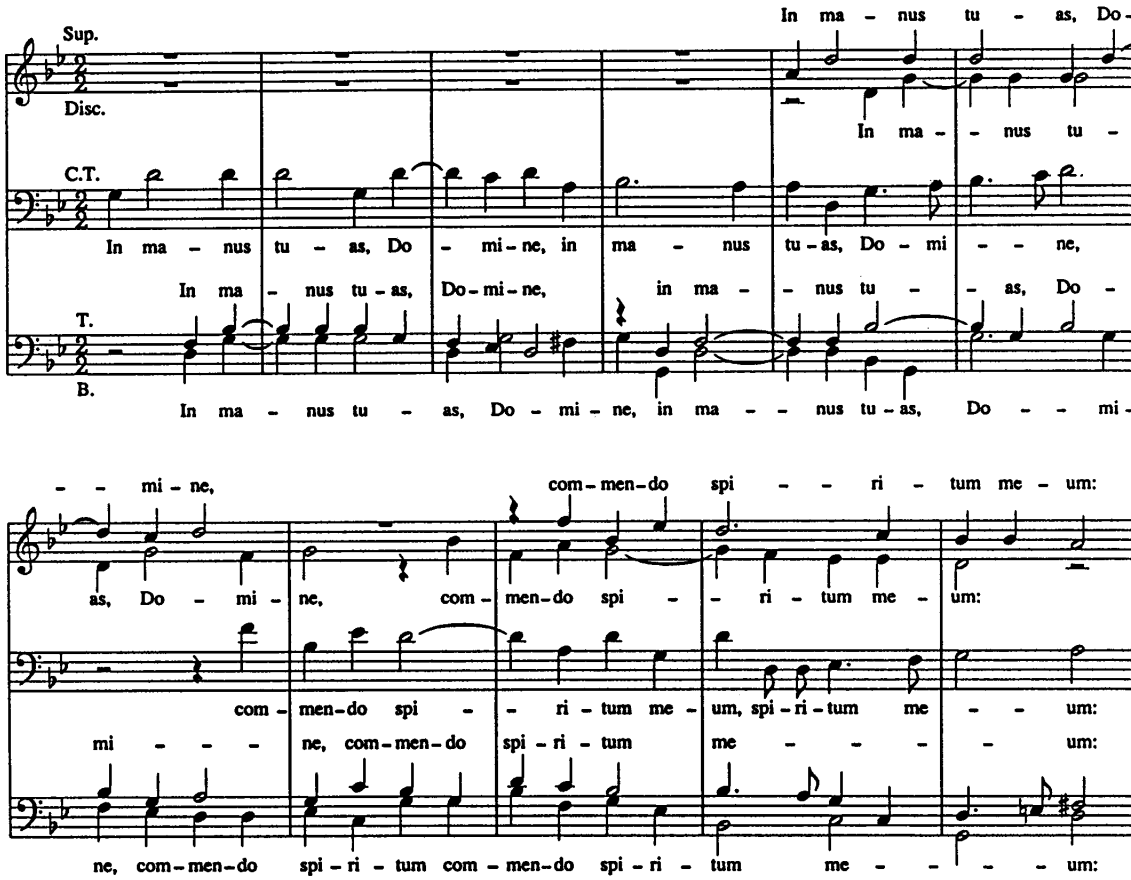


Illustration 34

Commerçial Software--IBM PC compatibles
SCORE (Passport Designs, Leland Smith)

Input device: IBM PC compatibles
Output device: Varitype typesetter (600 d.p.i.)(LaserWriter support)
Status: available

Reduced

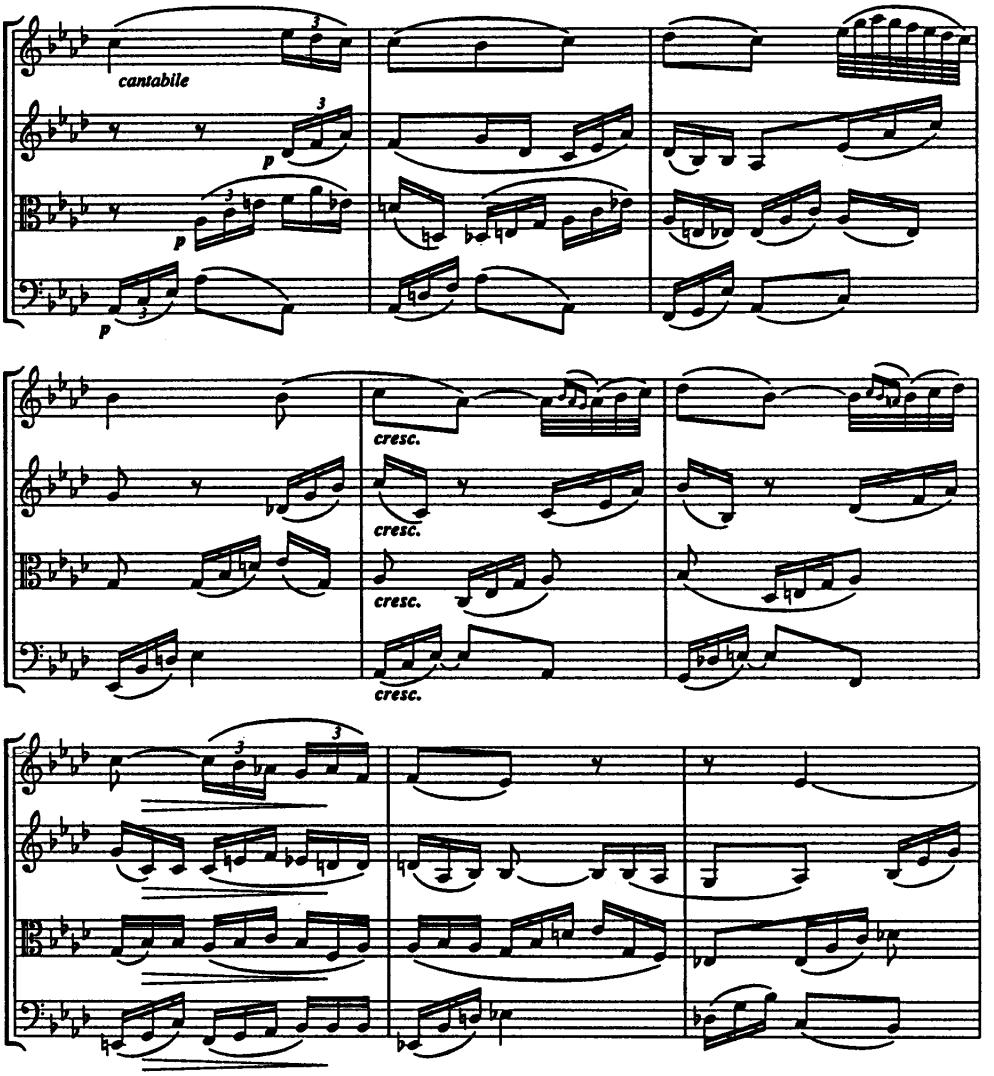


Illustration 35

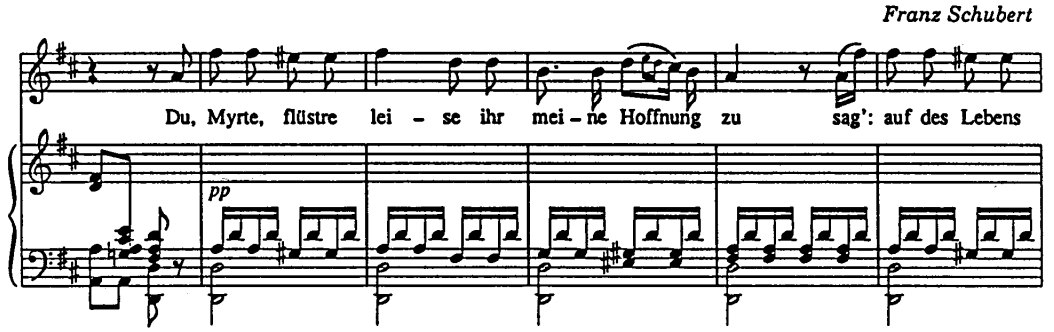
Commercial Software--IBM PC compatibles
SCORE (Passport Designs, Leland Smith)

Input device: IBM PC compatibles
Output device: Varitype typesetter (600 d.p.i.)(LaserWriter support)
Status: available

Reduced

Transposition capability

A. Original



B. Transposition

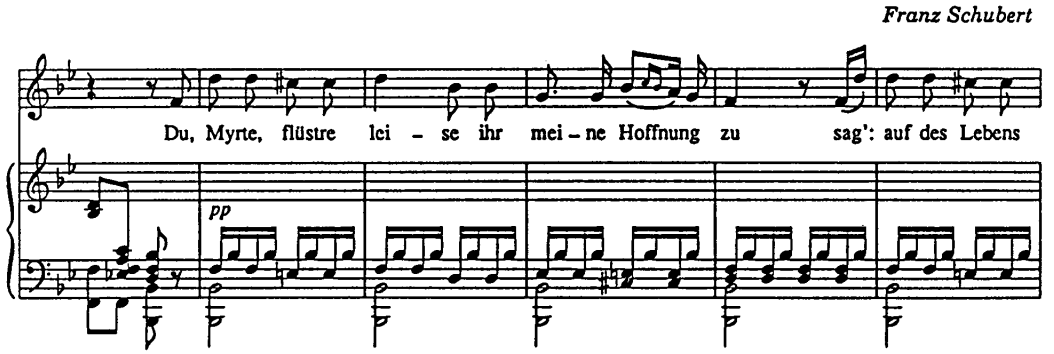


Illustration 36

Commercial Software--IBM PC compatibles
SCORE (Passport Designs, Leland Smith)

Input device: IBM PC compatibles
Output device: Varitype (600 d.p.i.)(support for LaserWriter et al.)
Text fonts: Postscript
Music fonts: SCORE font shown (39 other music fonts available)
Status: available

Reduced

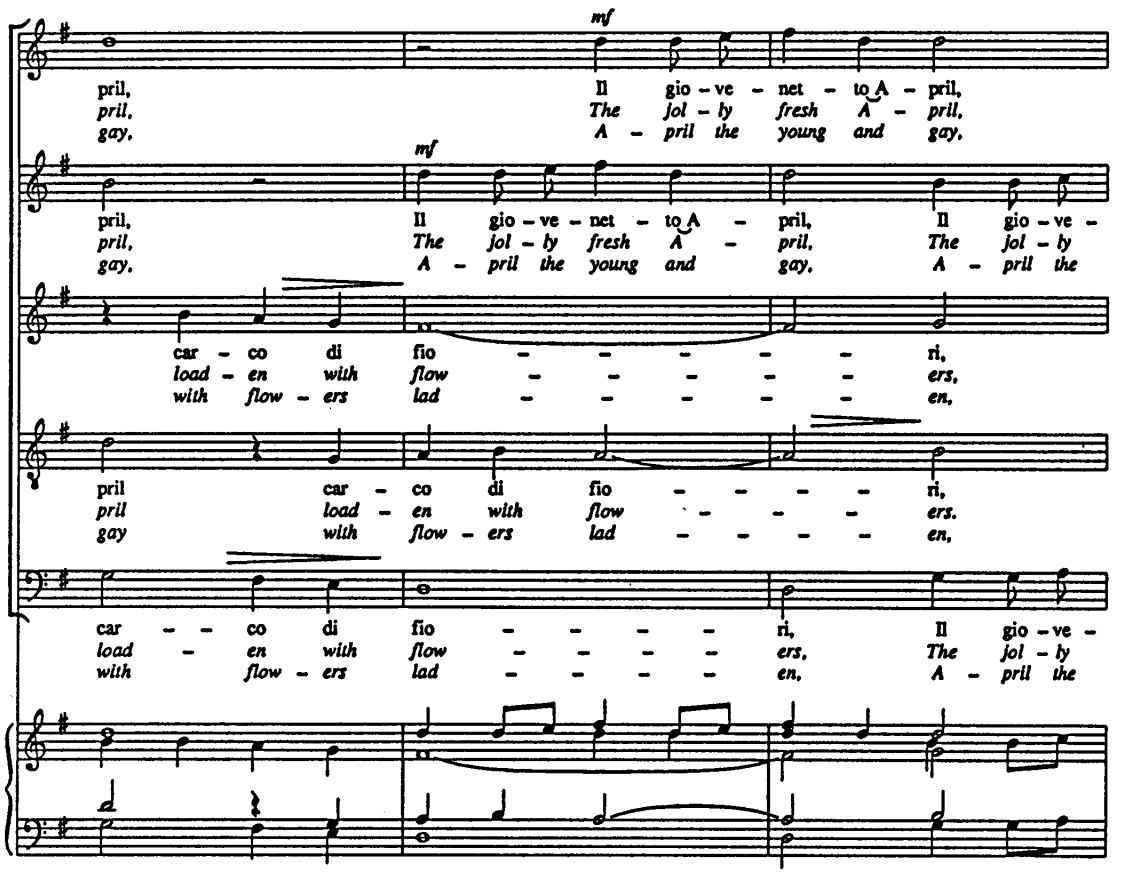


Illustration 37

Commercial Software--IBM PC compatibles
THEME, The Music Editor (THEME Software, Mark Lambert)

Input device: IBM PC compatible
Output device: HP LaserJet Series II
File interchange: MIDI conversion utility
Status: available

Reduced

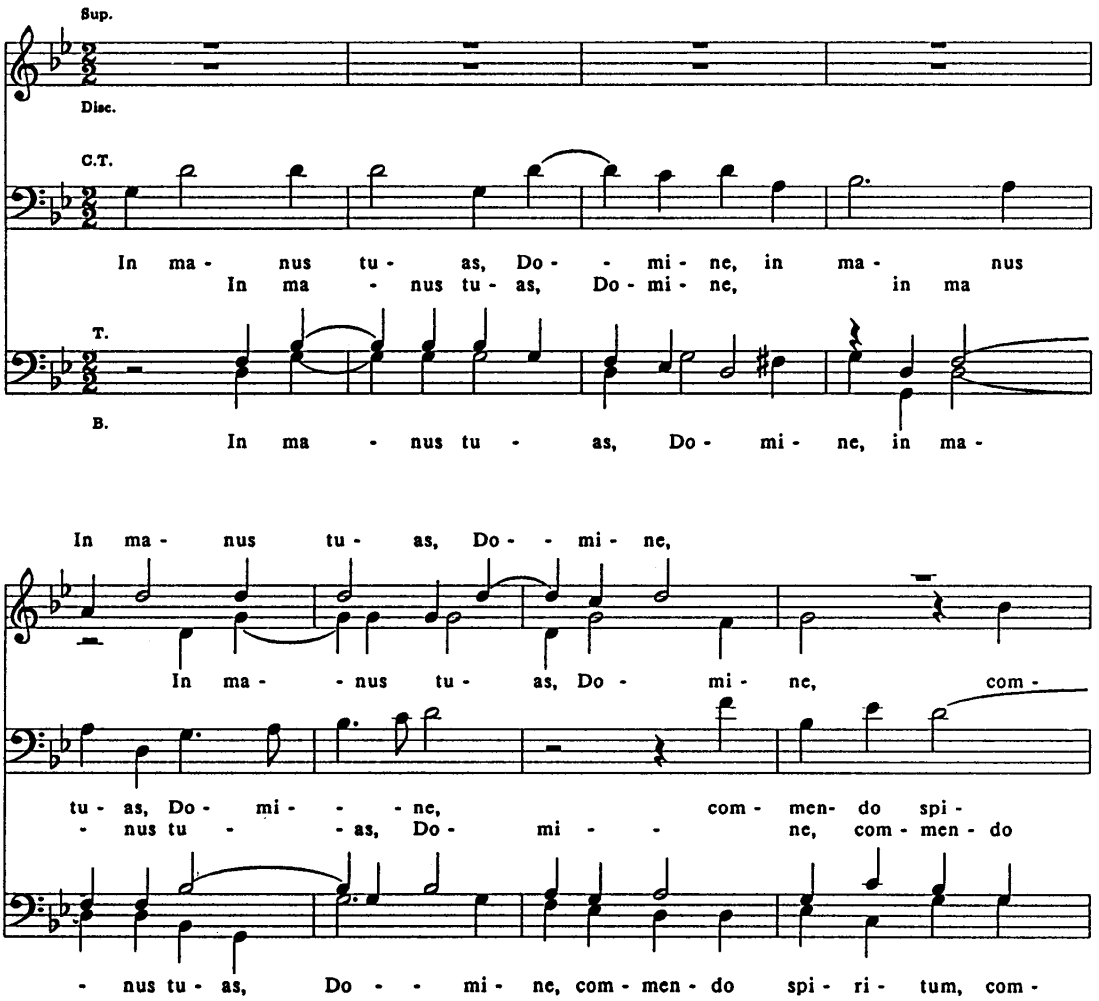


Illustration 38

Commercial Software--IBM PC compatibles
THEME, The Music Editor (THEME Software, Mark Lambert)

Input device: IBM PC compatible
Output device: HP LaserJet Series II
File interchange: MIDI conversion utility
Status: available

Reduced

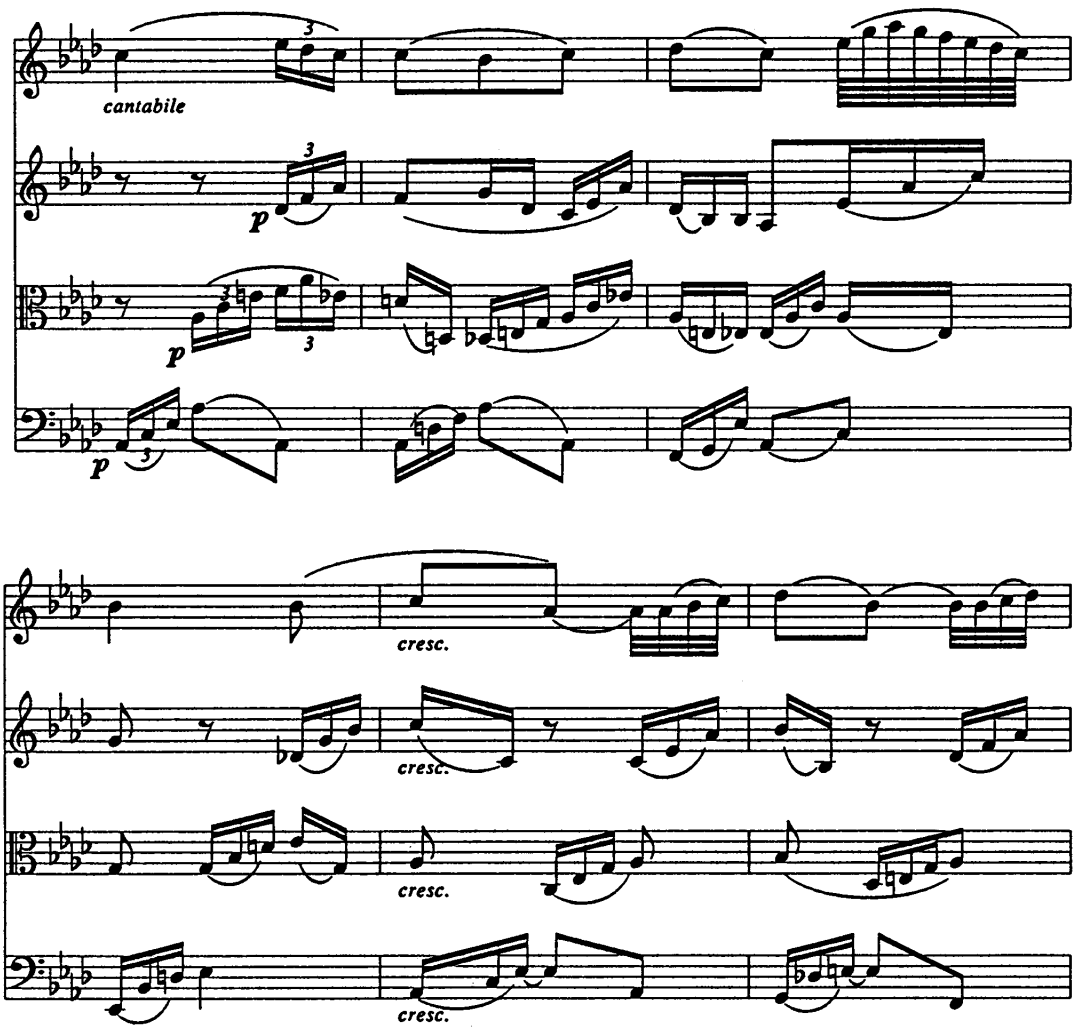


Illustration 39

Commercial Software--IBM PC compatibles
THEME, The Music Editor (THEME Software, Mark Lambert)

Input device: IBM PC compatible
Output device: HP DeskJet
File interchange: MIDI conversion utility
Status: available

Reduced

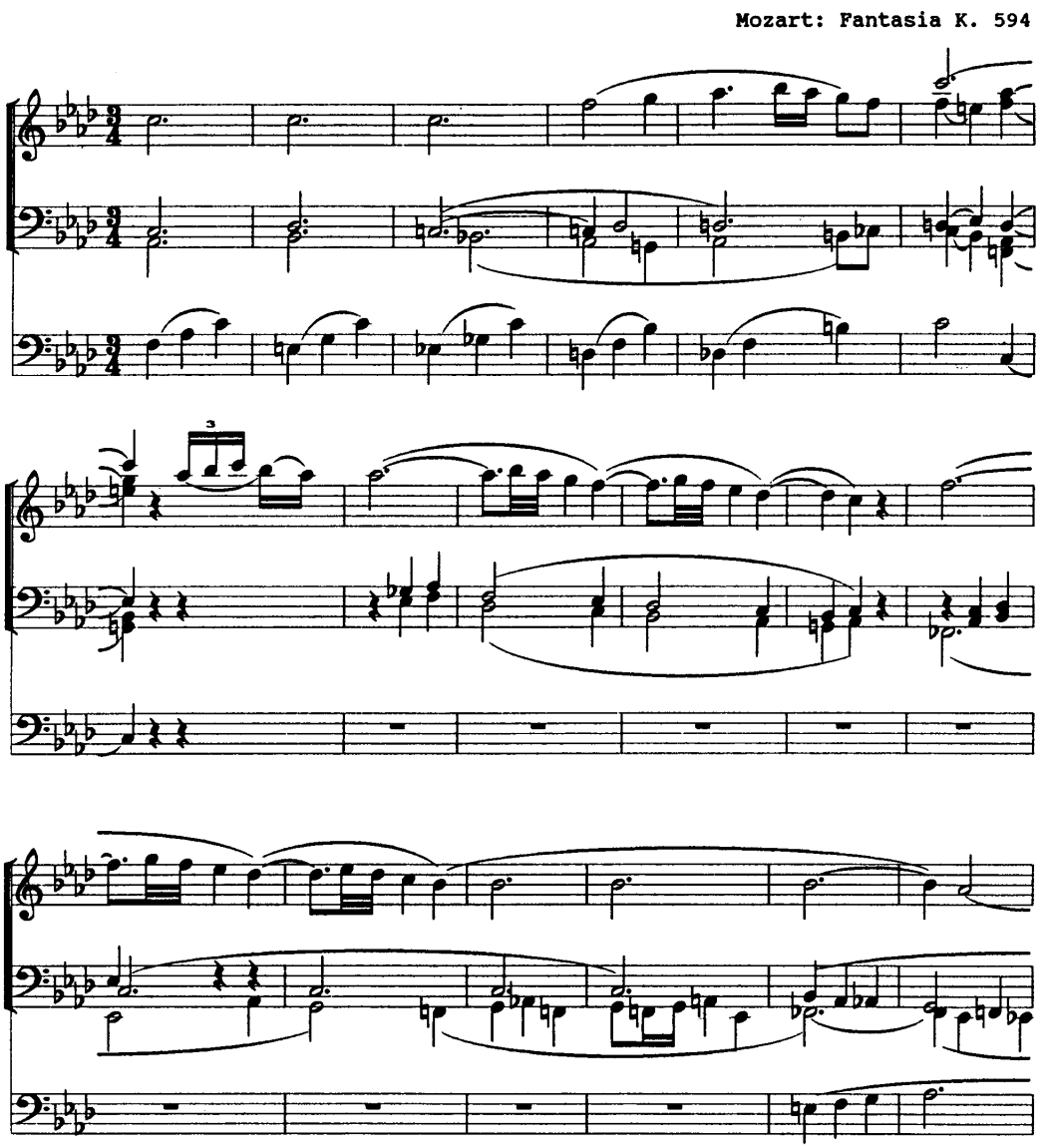


Illustration 40

Commercial Systems
Dai Nippon Music Processor (Dai Nippon Printing Co., Ltd.)

Input device: Dai Nippon Music Processor (16-bit dedicated machine)
Output device: unspecified phototypesetter (dot matrix support also)
File interchange provisions: data can be exchanged with Waseda University's Automatic Score Recognition System and System for Translation of Musical Notation into Braille
Status: available

Reduced

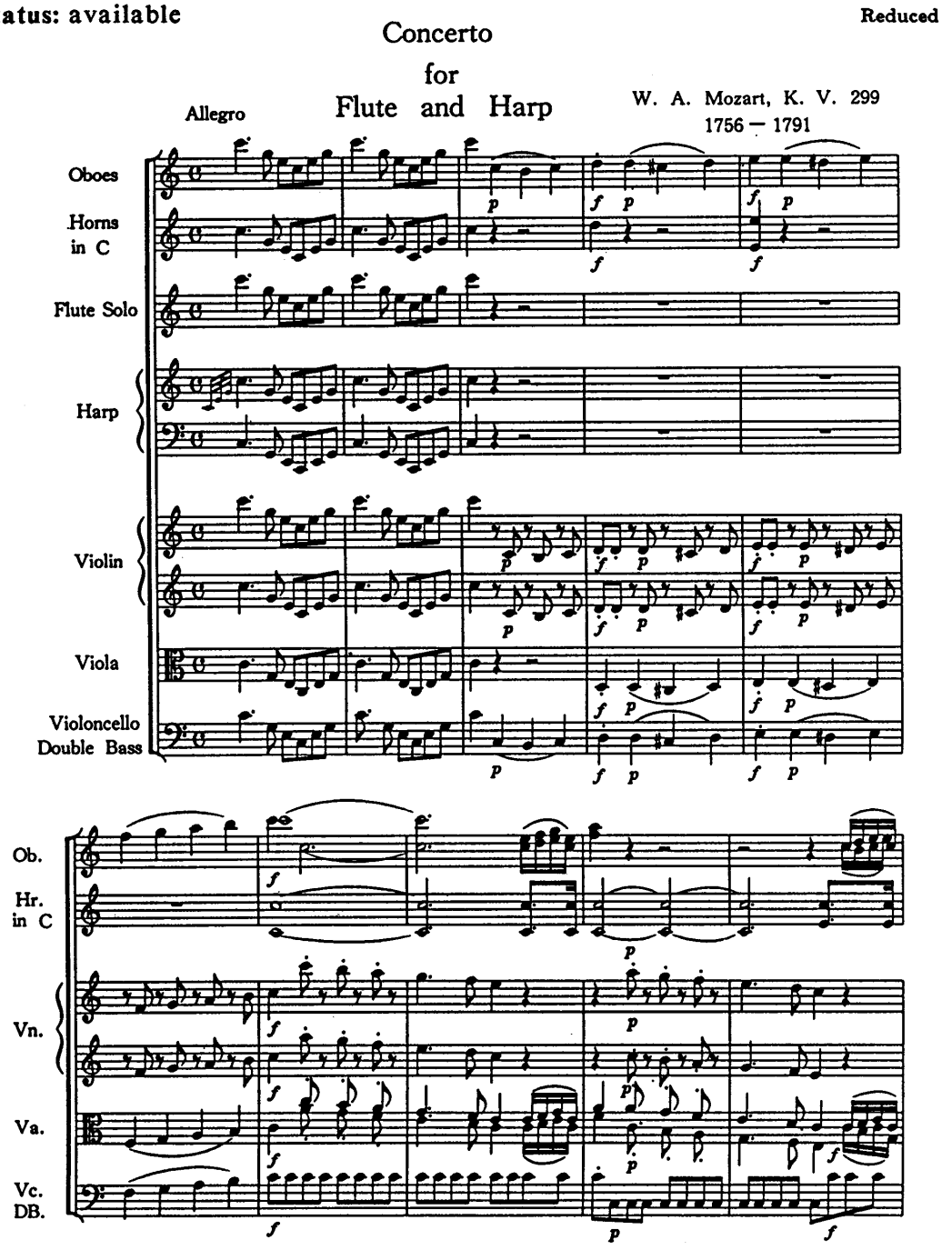


Illustration 41

Commercial Systems
Musicwriter II (Music Print Corp., Cecil Effinger)

Input device: IBM Wheelwriter with proprietary modifications
Output device: same (slurs and ties added by hand)
Status: available

Reduced

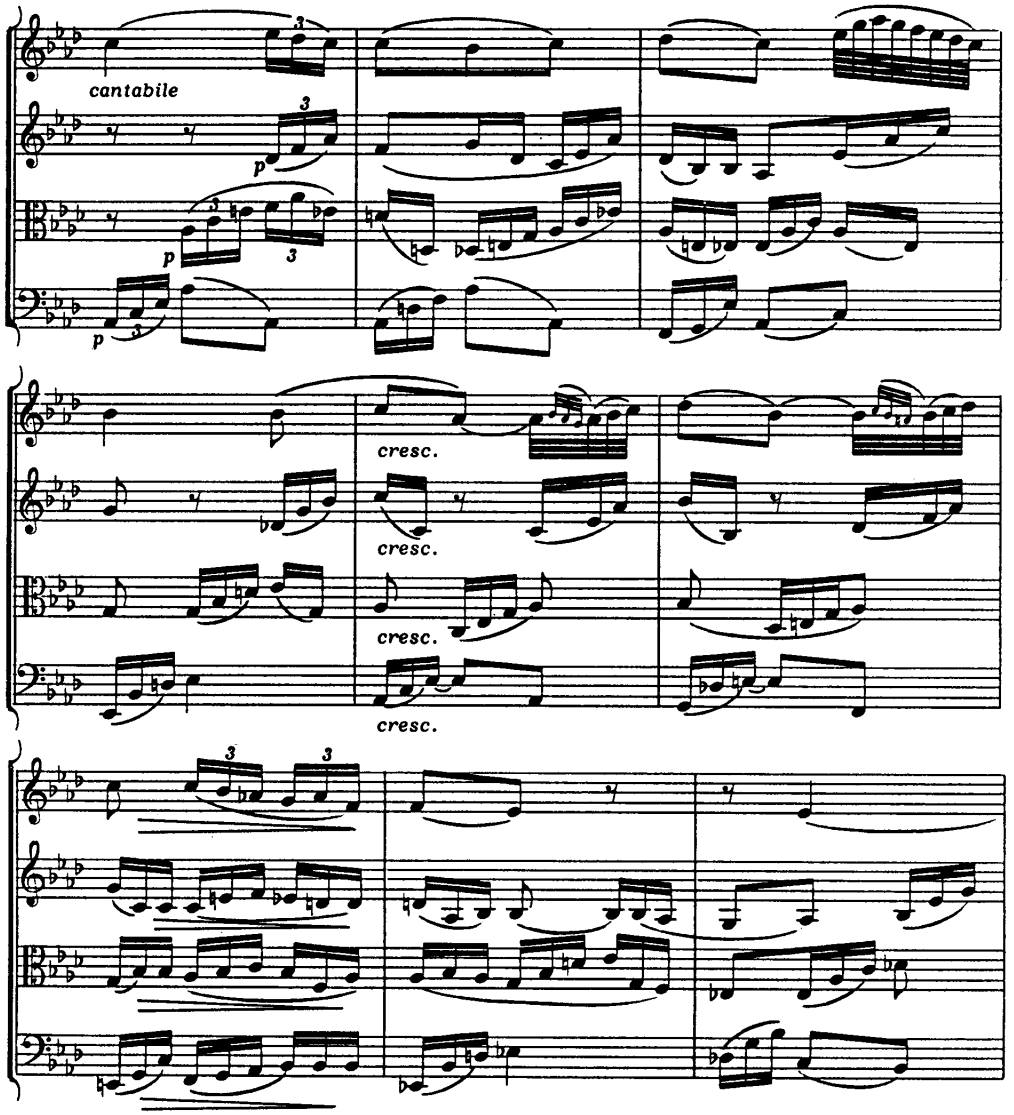


Illustration 42

Commercial Systems
Musicwriter II (Music Print Corp., Cecil Effinger)

Input device: IBM Wheelwriter with proprietary modifications
Output device: same (slurs and ties added by hand)
Status: available

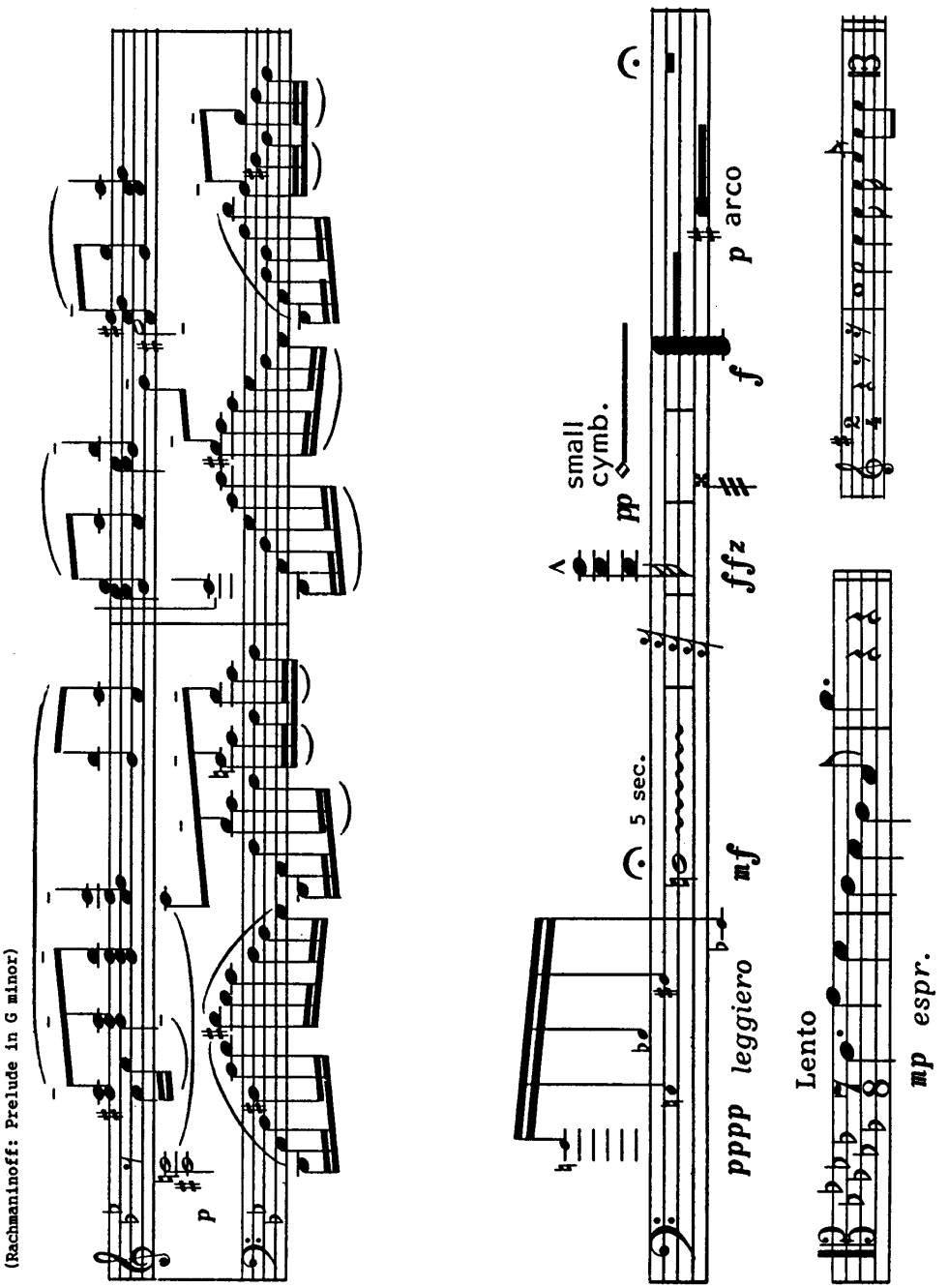


Illustration 43

Commercial Systems
Musicwriter II (Music Print Corp., Cecil Effinger)

Input device: IBM Wheelwriter with proprietary modifications
Output device: same (slurs and ties added by hand)
Status: available

Reduced

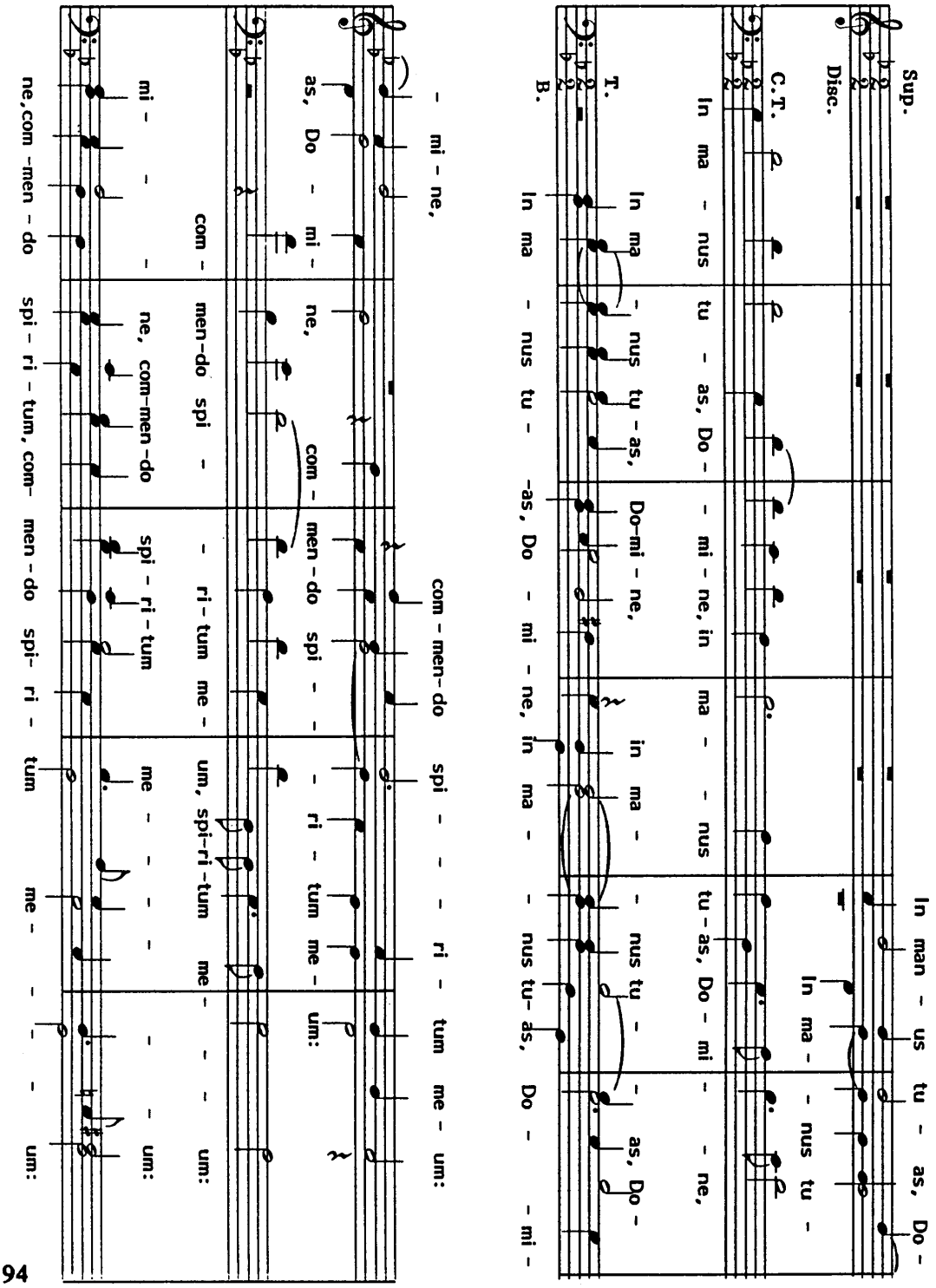


Illustration 44

Special Purpose Software
ExampleKrafter (MusiKrafters, Robert Fruehwald)

Input device: Apple Macintosh (512K)
Output device: Apple LaserWriter (support for Linotronic typesetter)
Purpose: sets musical examples of up to five staves

Reduced

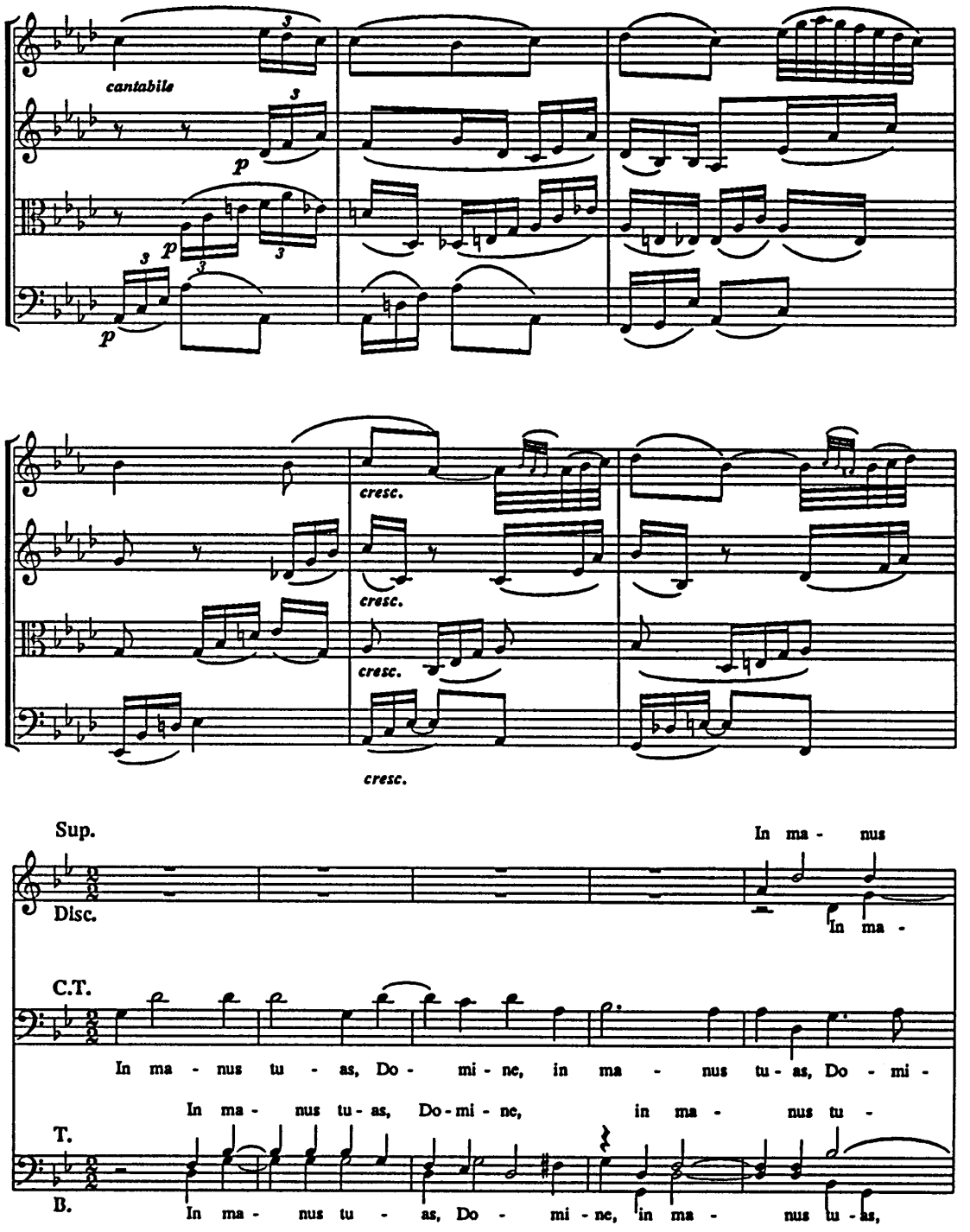


Illustration 45

Special Purpose Software
Shape Notes (MusiKrafters, Robert Fruehwald)

Input device: Apple Macintosh (512K)
Output device: Apple LaserWriter (support for Linotronic typesetter)
Purpose: supports implementation of shape notation (Aiken system)

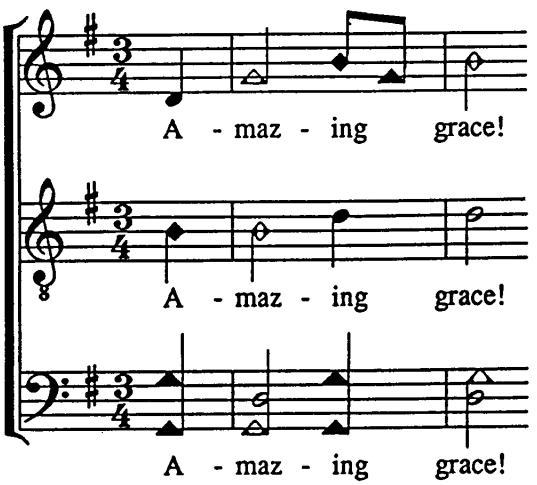


Illustration 46

Special Purpose Software
LuteKrafter (MusiKrafters, Robert Fruehwald)

Input device: Apple Macintosh (512K)
Output device: Apple LaserWriter (support for Linotronic typesetter)
Purpose: typesets French, Italian, English, and Spanish lute tablatures as well as some 4- to 6-course cittern and guitar tablatures

Dowlands adew for Master Oliver Cromwell.

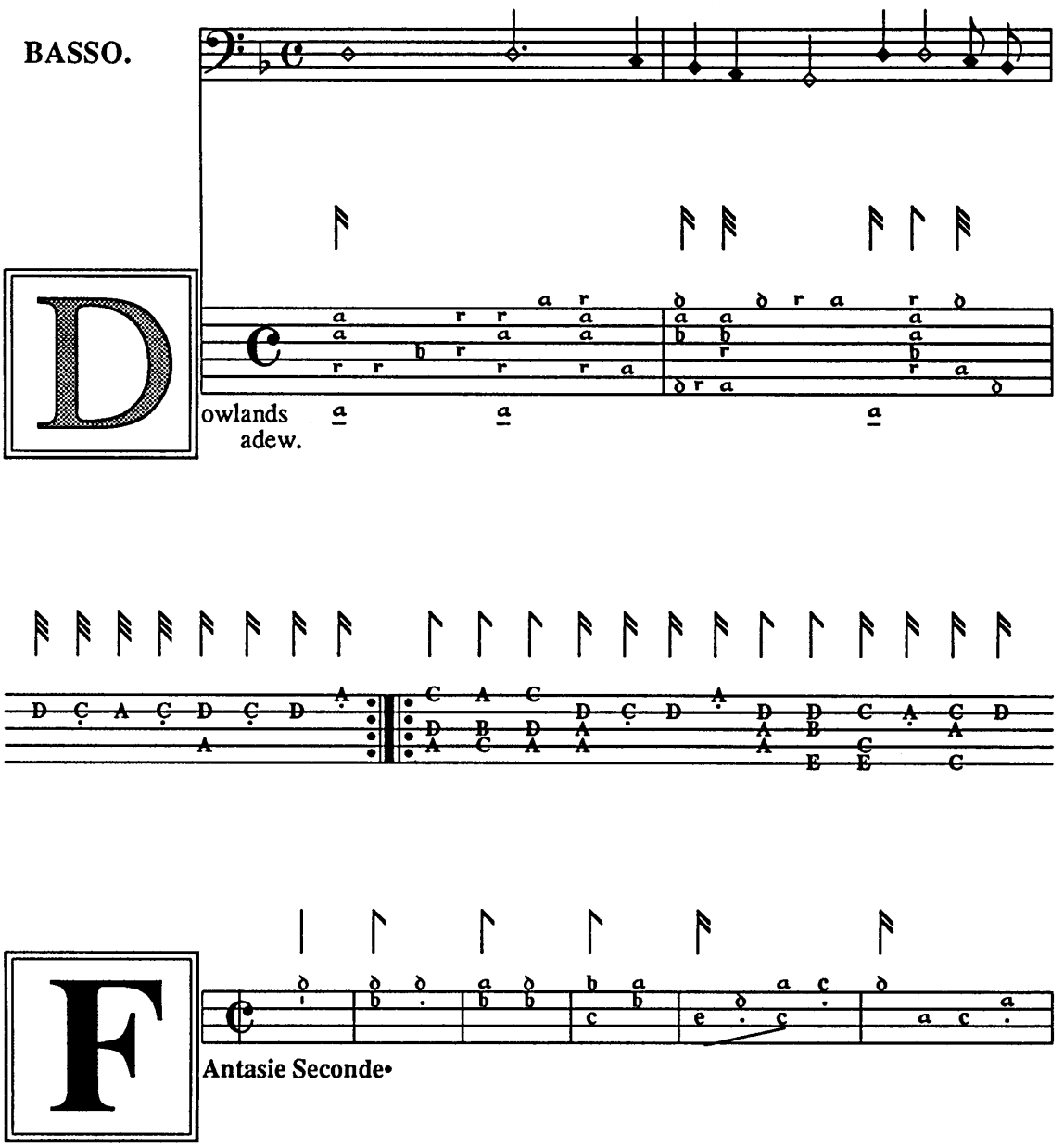


Illustration 47

Academic Systems
ERATTO (Ivry-sur-Seine: Hélène Charnassé; Ottawa: Bernard Stepien)

Input device: IBM PC with SIT code
Output device: Epson dot matrix printer
Focus: German lute tablature, monodic style

Reduced

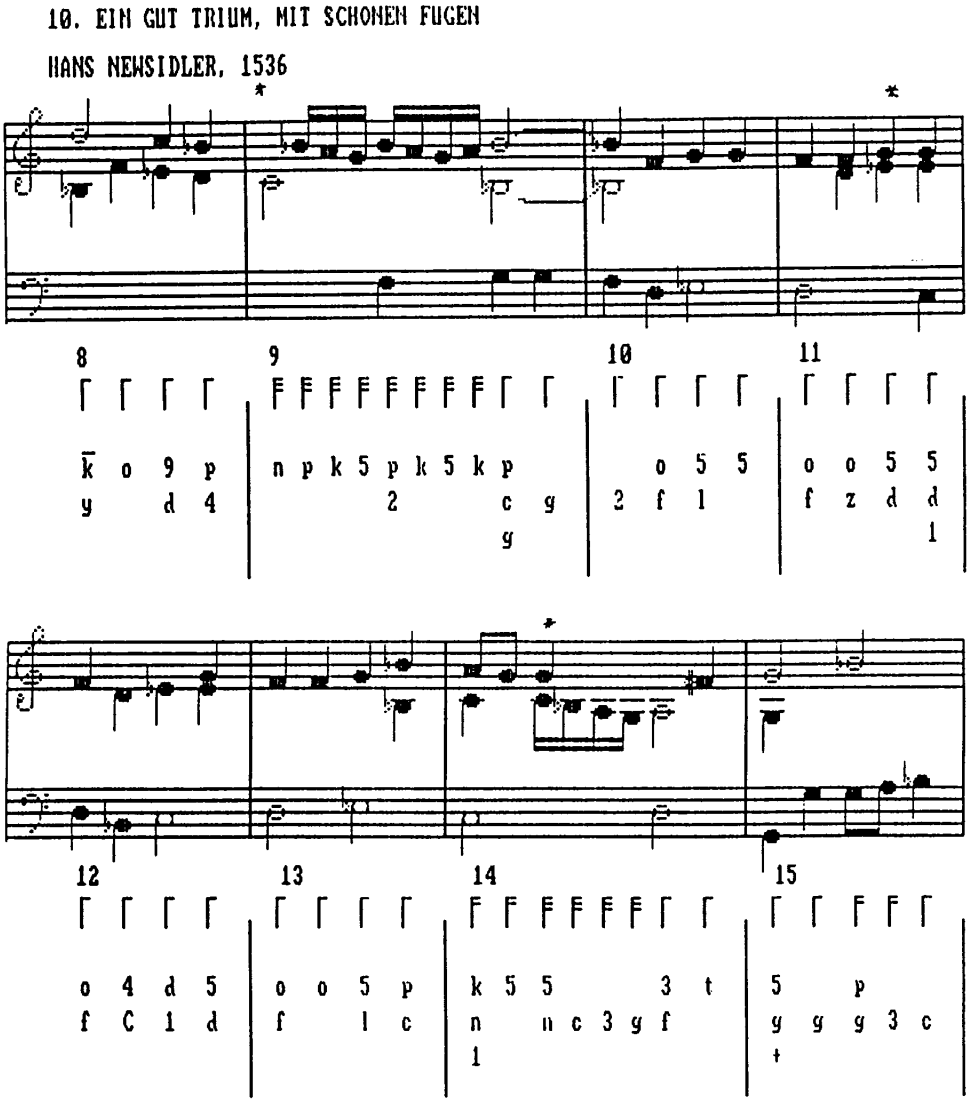


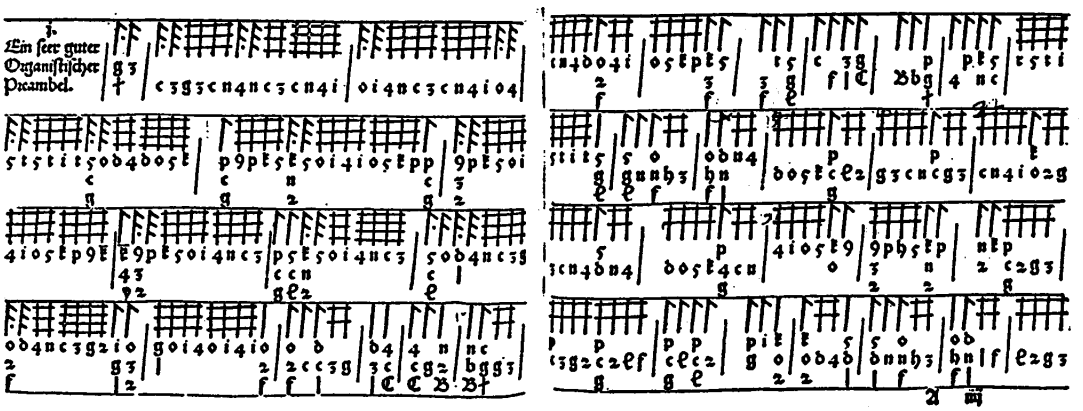
Illustration 48

Academic Systems
ERATTO (Ivry-sur-Seine: Hélène Charnassé; Ottawa: Bernard Stepien)

Input device: IBM PC with SIT code
Output device: Epson dot matrix printer
Focus: German lute tablature, polyphonic style

Reduced

A. Original source



B. Computer printing and analytical reconstruction

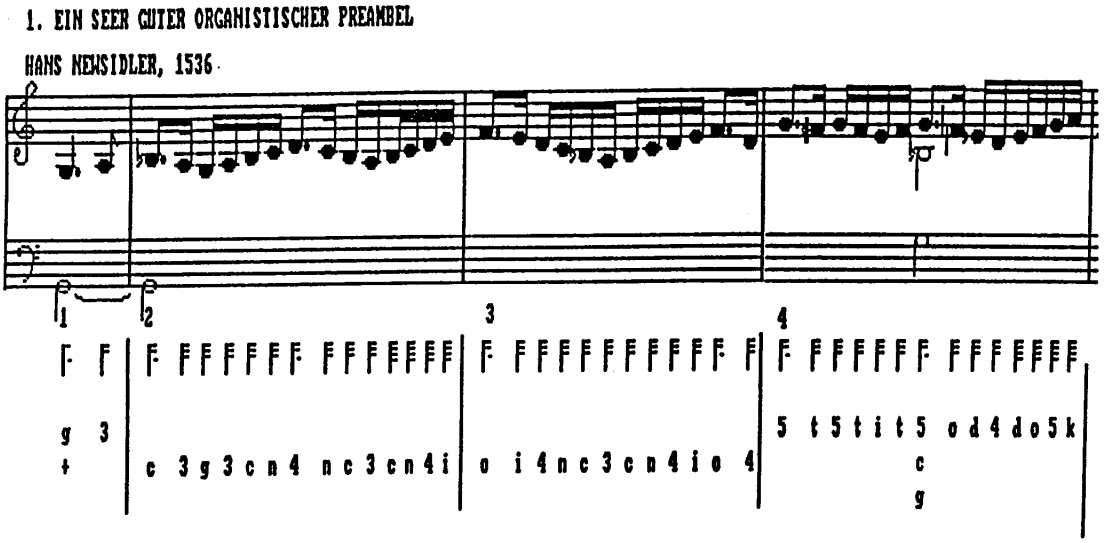
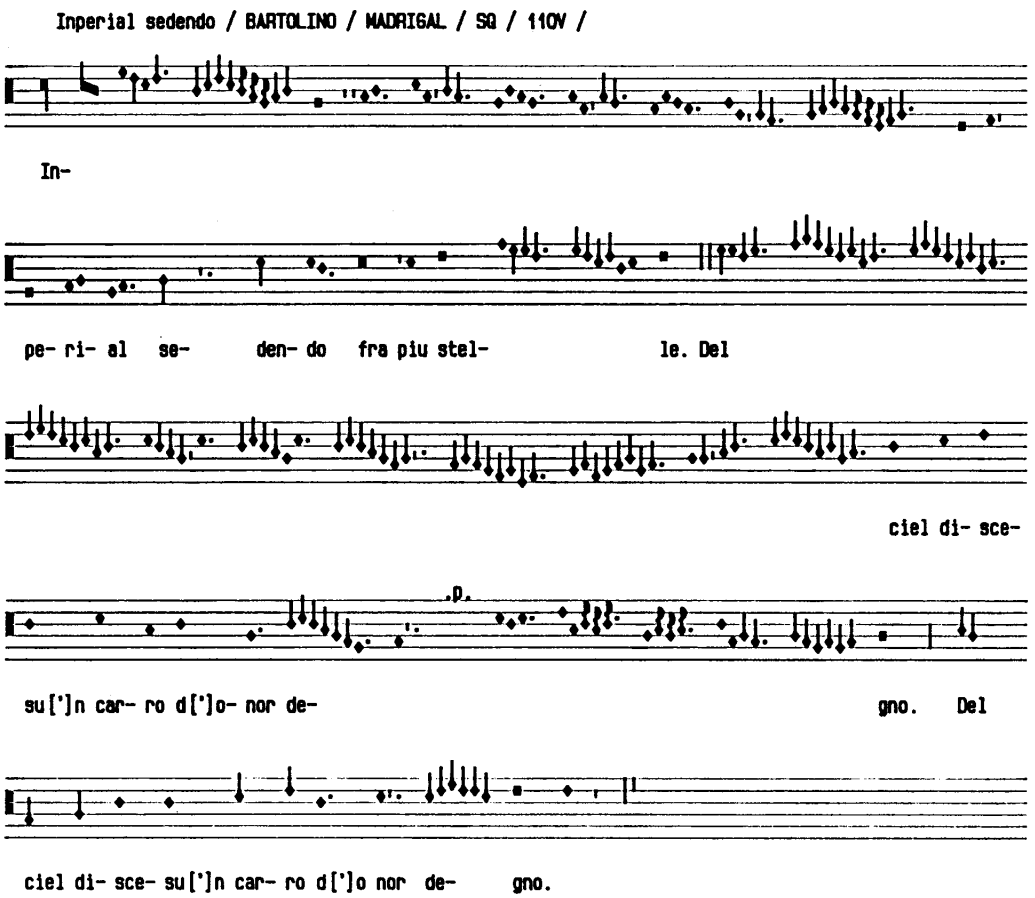


Illustration 49

Academic Systems
La Trobe, Melbourne Universities (SCRIBE, John Griffiths, John Stinson)

Input device: VAX minicomputer, Ericsson PC (IBM PC compatible)
Output device: Houston plotter
Focus: fourteenth-century music
Search parameters: texts, pitch strings, neumes
Status: available June 1988 on single use and site license basis

Black mensural notation



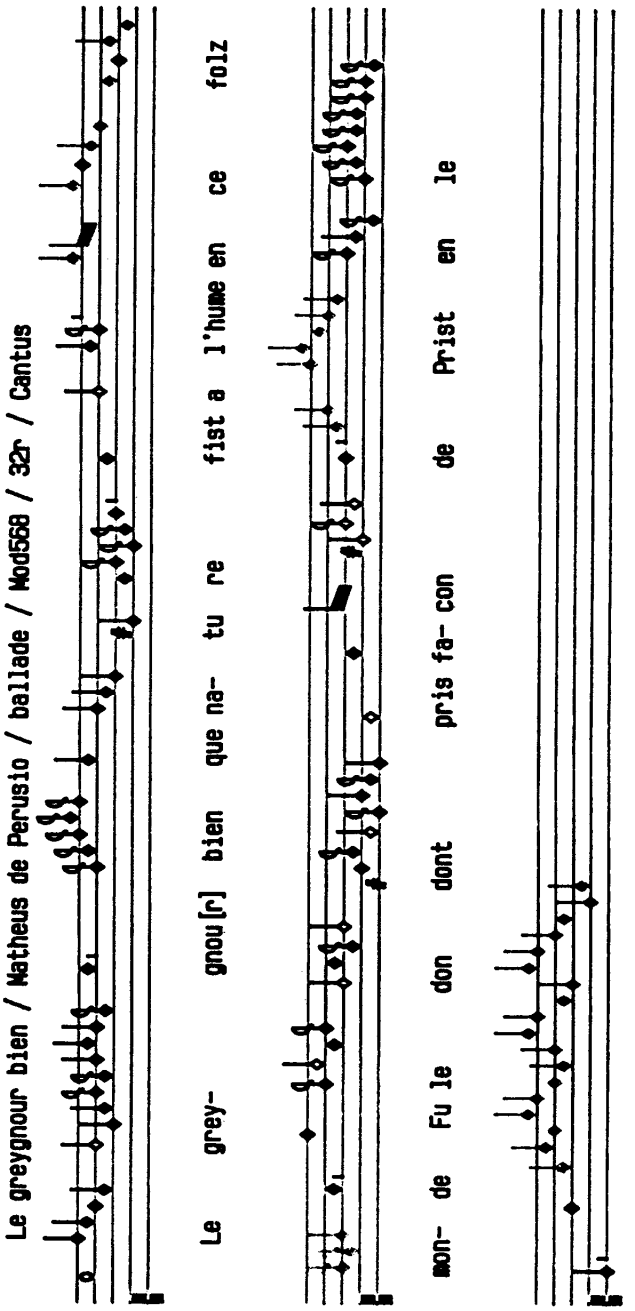
Reduced; reproduced from two-color original (black neumes on red staff)

Illustration 50

Academic Systems
La Trobe, Melbourne Universities (SCRIBE, John Griffiths, John Stinson)

Input device: VAX minicomputer, Ericsson PC (IBM PC compatible)
Output device: Houston plotter
Focus: fourteenth-century music
Search parameters: texts, pitch strings, neumes
Status: available June 1988 on single use and site license basis

Two-color mensural notation



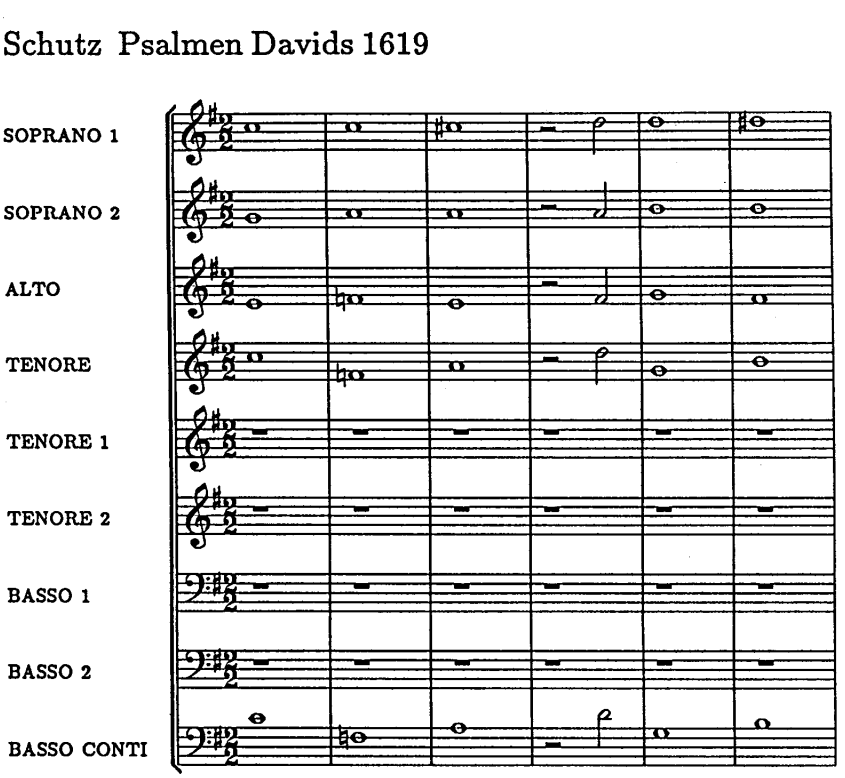
Reproduced from two-color original differentiating black, white, and red neumes on red staff lines (clef signs and text underlay in black)

Illustration 51

Academic Systems
Oslo University (MUSED, Kjell E. Nordli)

Input device: Perqs with MUSIKODE and mouse
Output device: Imagen printer (300 d.p.i.)
Focus: standard repertory, Norwegian folk music; provision for quantitative analysis

Reduced



MUSIKODE for the above example

```
Schutz Psalmen Davids 1619"T2:2; F1'; NG"[22200] 2_ 57$ Alto_
62$ Tenore kor 1_ 57$ Tenore 1 kor 2_ 38$ Tenore 2 kor 2_ 38$
Basso 1 kor 2_ 38$ Basso 2 kor 2_ 38$ Basso continuo_ 57$$ T2:2;
F1'; NG"6C/ "6C/ "6C'/ "P:2 - 6D:2/ "6D/ "6D'/ "6D':4 - 6D':2
- 6D':4/ T2:2;F1';NG"5G/ "5A/ "5A/ "P:2 - 5A:2/ "5H/ "5H/
"5H:4 - 5H:2 - 5H:4/ T2:2;F1';NG"5E/ "5F/ "5E/ "P:2 - 5F':2/
"5G/ "5F'/ "5F':4 - 5F':2 - 5F':4/ T2:2;F1';NG"6C/ "5F/ "5A/
"P:2 - 6D:2/ "5G/ "5H/ "5H:4 - 5H:2 - 5A:4/ T2:2;F1';NG"P/
"+P/ "+P/ "+P/ "+P/ "+P/ "+P/ T2:2;F1';NG"P/ "+P/ "+P/
"+P/ "+P/ "+P/ "+P/ T2:2;F1';NG"P/ "+P/ "+P/ "+P/ "+P/
"+P/ "+P/ T2:2;F1';NG"P/ "+P/ "+P/ "+P/ "+P/ "+P/ "+P/
T2:2;F1';NG"5C/ "4F/ "4A/ "P:2 - 5D:2/ "4G/ "4H/ "4H:4 - 4H:2
- 4A:4/
```

MUSIKODE was developed by Petter Henriksen and Tor Sverre Lande in cooperation with Prof. Ole-Johan Dahl

Illustration 52

Academic Systems
Oslo University (MUSED, Kjell E. Nordli)

Input device: Perqs with MUSIKODE and mouse
Output device: Imagen printer (300 d.p.i.)
Status: in transition to VAXStation II with MIDI input

Reduced

Conclusion of preceding example

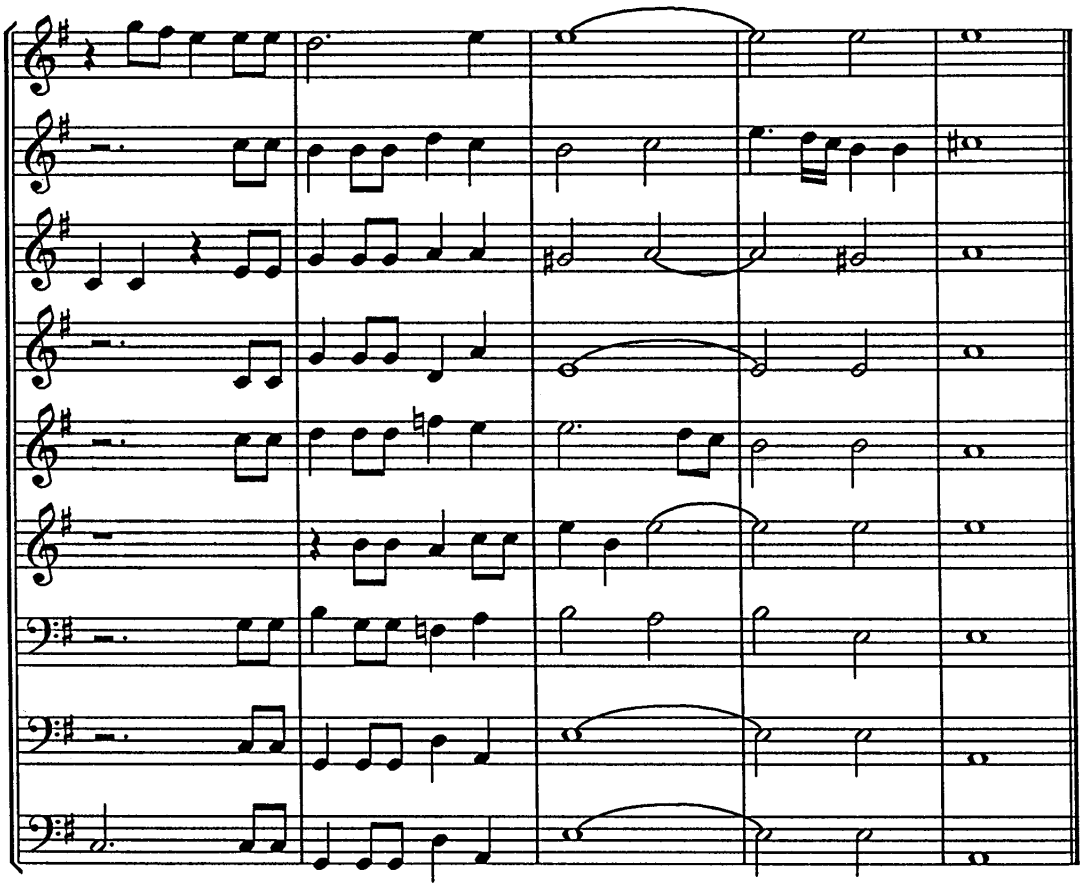


Illustration 53

Academic Systems
Oslo University (MUSED, Kjell E. Nordli)

Input device: Perqs with MUSIKODE and mouse
Output device: Imagen printer (300 d.p.i.)
Focus: standard repertory, Norwegian folk music; provision for quantitative analysis

Reduced

Part extracted from preceding score

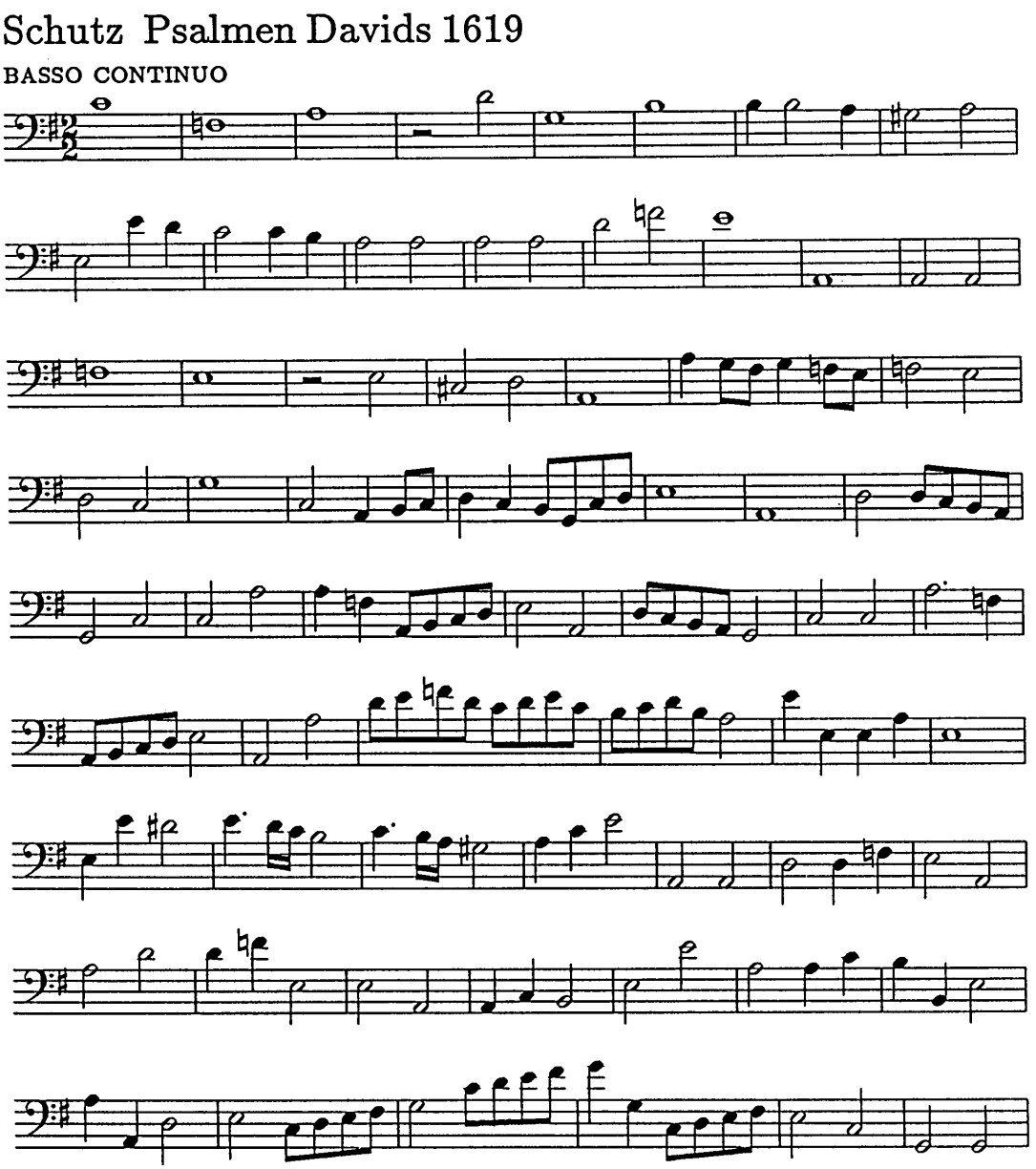


Illustration 54

Academic Systems
Oslo University (MUSED, Kjell E. Nordli)

Input device: Perqs with MUSIKODE and mouse
Output device: Imagen printer (300 d.p.i.)
Status: in transition to VAXStation II with MIDI input

Reduced

Screen display for MUSED system