

# Technology Institute for Music Educators

## **Basic Skills in Music Technology (TI:ME 1A)**

Notation, Music Production, and Electronic Musical Instruments

## **Workbook**



By Marc Jacoby, Don Muro, and Daniel Zanutto

Course Editor: Don Muro

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<http://www.ti-me.org>

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# TI:ME 1A

## Notation, Electronic Musical Instruments. and Music Production

### Course Syllabus

#### Description

The objective of **Basic Skills in Music Technology** is to impart practical skills and knowledge to in-service teachers to allow them to integrate technology effectively into teaching and learning. The course is divided into three sections - notation software, music production software, and the use of electronic musical instruments. The format of each section alternates presentations with class activities, many of which serve to assess student progress. Satisfactory participation in class activities and the successful completion of several final projects are required for certification.

#### Prerequisite Computer Skills

The prerequisites for this course are basic computer skills and basic piano keyboard skills. These include:

- Using a computer keyboard
- Using a mouse for pointing, clicking, and dragging
- Opening and saving files
- Printing
- Music reading in treble and bass clefs
- Playing simple melodies on a piano or other keyboard instrument

#### Additional Information

**Basic Skills in Music Technology** may be offered as a two-credit or three-credit graduate course. Topics in ALL CAPS within the outline need not be included in the course when it is offered for two graduate credits only. The instructor of the course should be approved by TI:ME and experienced in teaching technology to in-service music teachers. It is highly recommended that the class size be limited to allow for one participant per computer and no more than 16 participants per instructor. Additional participants may be accommodated if computer workstations and assistants are available. Each participant will need approximately 20 hours working alone on a workstation in order to complete the final projects and class activities.

# TI:ME 1A

## Notation, Electronic Musical Instruments. and Music Production

### Hardware Requirements

A computer lab/classroom consisting of computers connected to MIDI keyboards is the standard recommended configuration. The teacher station should have a stereo sound system as well as a projector to allow the instructor's screen to be viewed by the entire class. A sound system connecting all MIDI instruments in the room should be used to allow for class activities in keyboard performance.

### Software Requirements

Notation and music production software designed for professional musicians and educators should be used. Demonstration versions of low-end software packages designed for young students or amateurs should be used only in presentations to demonstrate software choices that are available.

The activities in the three sections of this course use specific musical examples that are included in the course materials. Instructors may choose other appropriate music for these activities.

*(Note: Some material in this course has been adapted from previous TI:ME 1A workbooks by Steven Estrella, Don Muro, Bill Purse, C. Floyd Richmond, and Tom Rudolph).*

# Technology Institute for Music Educators

## **Basic Skills in Music Technology (TI:ME 1A)**

Notation, Music Production, and Electronic Musical Instruments

### **Section 1: Notation Software**



By Daniel Zanutto

Course Editor: Don Muro

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<http://www.ti-me.org>

# Notation Software

## Syllabus

### Description

The objective of the Notation Module is to teach functional skills and knowledge to in-service teachers to allow them to integrate notation technology effectively into teaching and learning. This module covers basic skills in music notation software using high-end software i.e. Finale or Sibelius. This module presents class activities with specific notation outcomes. Satisfactory participation in class activities and successful completion of the final notation project fulfill the 1A notation requirements for TI:ME certification.

### Prerequisite Computer Skills

The prerequisites for this course are basic computer skills and basic piano keyboard skills. These include:

- Using a computer keyboard
- Using a mouse for pointing, clicking, and dragging
- Opening and saving files
- Printing
- Music reading in treble and bass clefs
- Playing simple melodies on a piano or other keyboard instrument

### Additional Information

Basic Skills in Music Technology may be offered as a two-credit or three-credit graduate course. Unit Topics listed in ALL CAPS within the module outline need not be included in the course when it is offered for two graduate credits only. The instructor of the course should be approved by TI:ME and experienced in teaching technology to in-service music teachers. It is highly recommended that the class size be limited to allow for one participant per computer and no more than 16 participants per instructor. Additional participants may be accommodated if computer workstations and assistants are available. Each participant will need approximately 20 hours working alone on a workstation in order to complete the final projects and class activities.

### Final Notation Project

Participants will complete a final notation project of at least 24 measures in length, 4 or more staves, with at least one transposing instrument. The final project should be turned in as a full score in concert pitch as well as individual parts in their appropriate transpositions. ***Participants are encouraged to select their own project that meets the criteria as well as being applicable to their personal teaching assignment.*** In the absence of an expressed preference, participants may arrange any Bach Fugue for woodwind quartet. This project will be submitted to the instructor as a printed document at the completion of the course.



# Notation Software

## *Syllabus*

### Hardware Requirements

A computer lab/classroom consisting of multimedia computers connected to MIDI keyboards is the standard recommended configuration. The teacher's station should have a projection device and sound system to allow the instructor's screen to be viewed by the entire class.

When possible, a sound system connecting all MIDI devices in the room should be used to allow for class activities in keyboard performance.

### Software Requirements

High-end Notation Software (i.e. Finale or Sibelius) designed for professional musicians and educators should be used. Demonstration versions of low-end software packages designed for young students or amateurs should be used only in presentations to demonstrate software choices that are available.

Please Note: The activities in this syllabus often specify the use of specific scores that are provided in the course materials. ***Instructors may choose other pieces for these activities.***

# Notation Software

## *Unit 1 – Score Setup and Navigation*

### Objectives

Upon completion of this unit, you will be able to:

- Understand basic navigation and operation features of music notation software.
- Create, save, and work with templates when beginning a music notation project.

### Activities

- Create new documents using the setup wizard.
- Create new documents using templates.

### Materials

The instructor will provide a music notation software document for participants to use for hands-on navigation. The provided document must contain multiple pages.

The instructor will also provide a wide array of templates to be opened and examined by the participants. ***High-end music notation software products such as Sibelius and Finale come with many suitable sample documents and templates.***

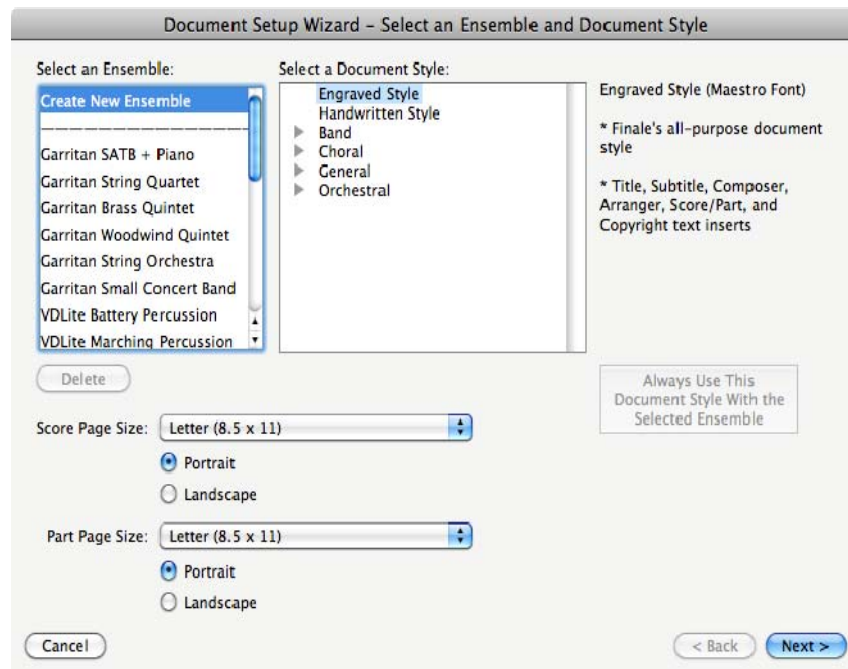
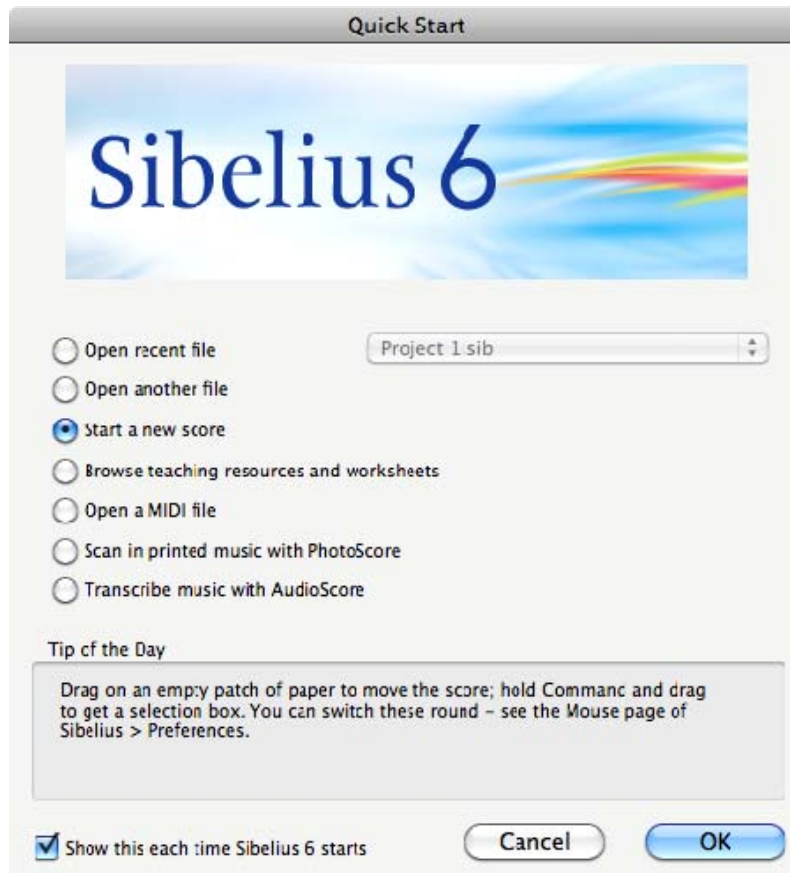
### Procedures

The instructor will demonstrate how to:

1. Launch the software.
2. Open and create documents.
3. Use Document Setup Wizards help to speed up the process of preparing a score for notation input.
4. Create an anacrusis or pick-up measure in a score.
5. Add, remove, and/or edit instruments in the score.
6. Add and remove measures from the score.
7. Edit staff names and abbreviations.
8. Add staff braces and brackets.
9. Move measures across systems.
10. Switch between score view choices, percentages available for scaling view (50%, 75%, 200%, 100%, etc.), and their impact on the music data entry speed.
11. Quickly navigate within a document.
12. Use templates and pre-formatting to save time when initiating a project.
13. Create a new original template and how to save this document for use as a personal template in the future.
14. Save your documents and quit the application(s).

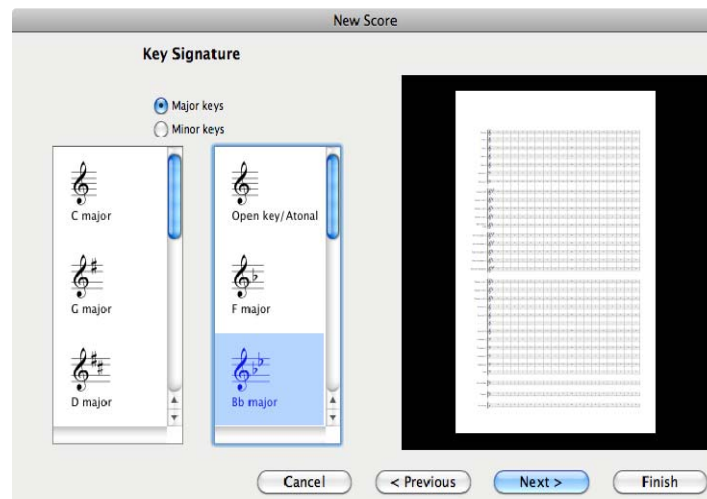
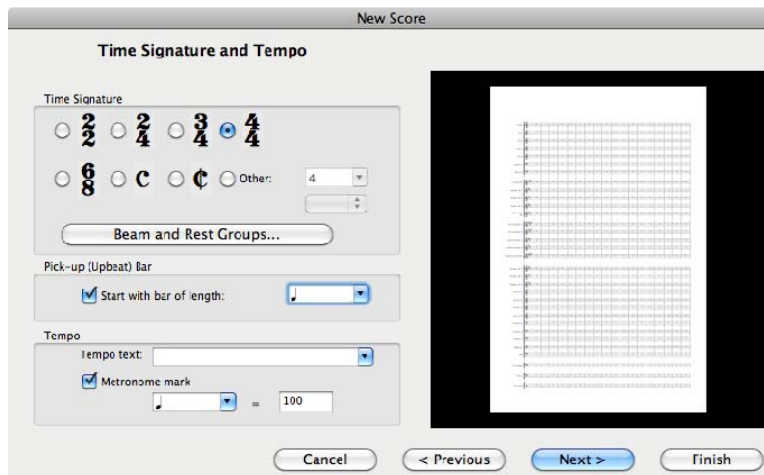
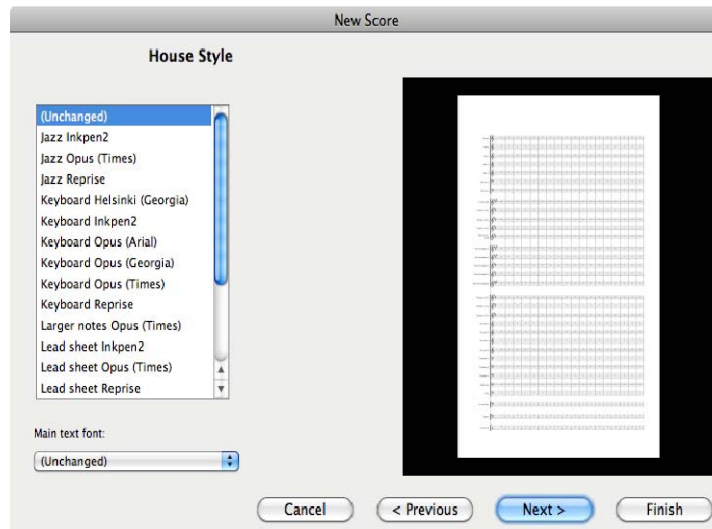
# Notation Software

## Unit 1 – Score Setup and Navigation



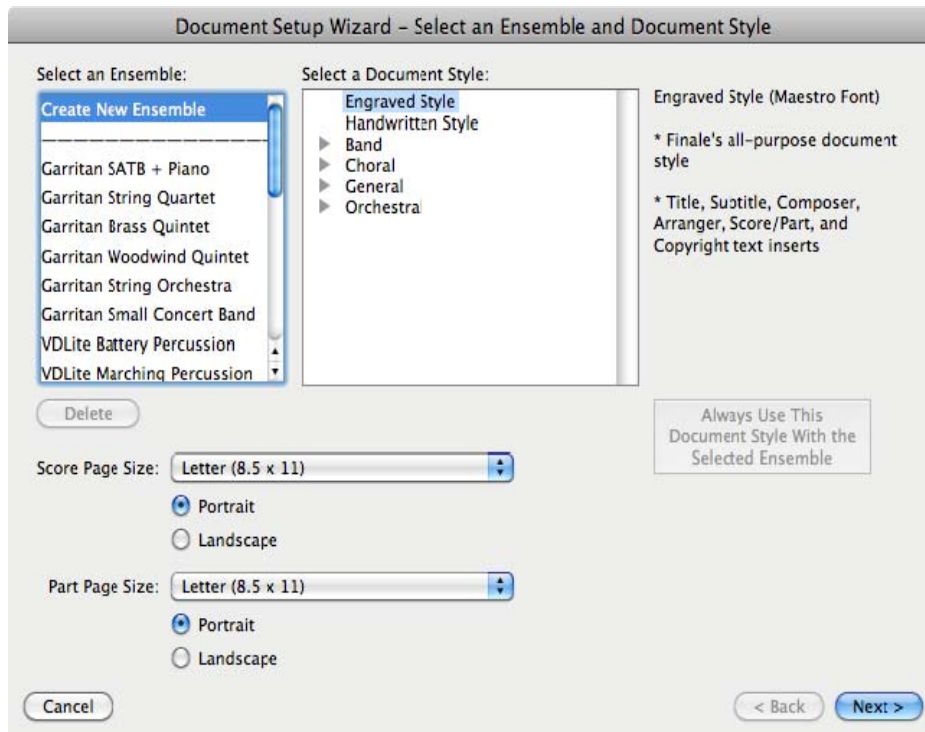
# Notation Software

## *Unit 1 – Score Setup and Navigation*



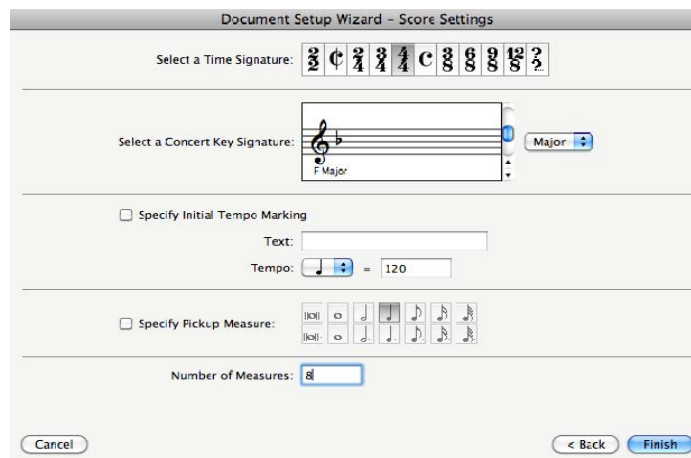
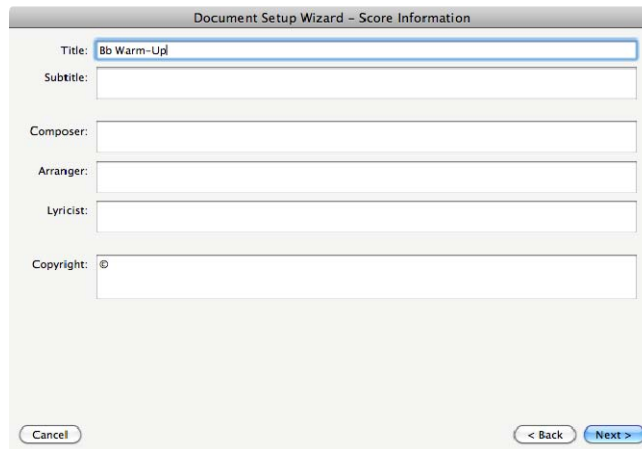
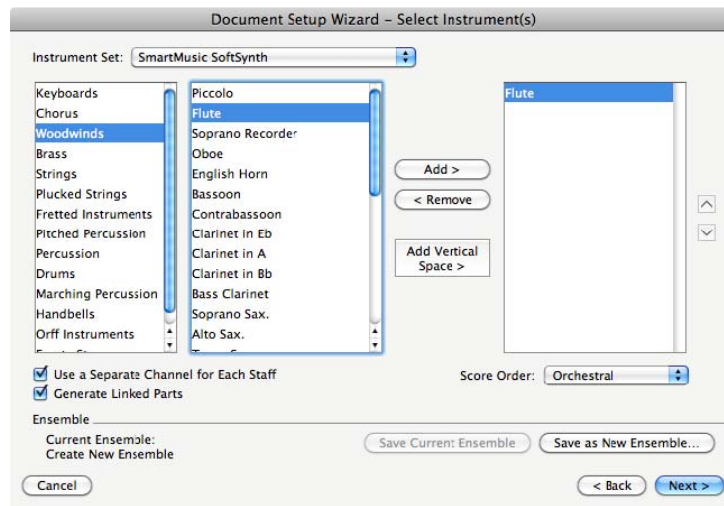
# Notation Software

## Unit 1 – Score Setup and Navigation



# Notation Software

## *Unit 1 – Score Setup and Navigation*



# Notation Software

## *Unit 1 – Score Setup and Navigation*

### Amazing Grace

Score

Traditional

The image displays a musical score for the hymn "Amazing Grace". The score is presented in two systems. The first system shows the initial setup with five staves: Soprano, Alto, Tenor, Bass, and Piano. The second system shows the same parts with a measure number '5' at the beginning of each staff. The key signature is one sharp (F#) and the time signature is 3/4. Each staff contains a whole rest in the first measure, followed by four measures of empty staves. The Soprano and Alto parts are on a single staff, the Tenor and Bass parts are on a single staff, and the Piano part is on a grand staff (treble and bass clef).

Soprano  
Alto

Tenor  
Bass

Piano

5

S  
A

T  
B

5

Pno.

# Notation Software

## *Unit 2 – Note Entry Techniques*

### Objectives

Upon completion of this unit, you will be able to:

- Demonstrate the major methods of note entry in music notation software.
- Demonstrate use of multiple layers (voices) on a staff.

### Materials

The instructor will provide printed music notation documents for participants to use for note entry. The provided documents must contain a variety of durations including tuplets and dotted notes and accidentals. One of the printed documents should contain two independent voices on a staff. Sample documents are included at the beginning of the notation module of this workbook.

### Procedures

The instructor will discuss input techniques used by music notation software:

1. The Non-MIDI approach (helpful when traveling with just your laptop)
  - Point and click with the mouse
  - Typing on an alphanumeric keyboard
2. Step-Time MIDI
  - One note or chord at a time without regard to actual entry tempo
  - Pitch on MIDI keyboard and duration on alphanumeric keyboard
3. Real-Time MIDI
  - WYPIWYP (What You Play Is What You Print) from Christopher Yavelow
  - Use notation software to capture musical performances
  - Not necessarily a keyboard (guitar, wind, and other special controllers)
  - Some MIDI information will be ignored (pitch bend)
  - Using click track from notation software
  - Using a user defined tap tempo (beat reference)
  - User sets a quantization level for smallest duration the software will notate.
4. Transcription from a Standard MIDI File (SMF)
5. Techniques for erasing input errors and inserting notes and rests.
6. The instructor will discuss how music notation software works with multiple voices in the same staff and pertinent information such as stem direction.
7. The instructor will demonstrate how to select display colors for notes and score elements, and how this can help the participant working with music notation software.
8. SCANNING MUSIC
9. MUSIC XML AND BACKWARD COMPATIBILITY



# Notation Software

## *Unit 2 – Note Entry Techniques*

### Activities

Participants will transcribe printed documents as supplied by the instructor.

Amazing Grace

Score Traditional

The image displays a musical score for the hymn 'Amazing Grace'. It is organized into three systems. The first system includes staves for Soprano, Alto, Tenor, and Bass voices, along with a Piano accompaniment. The second system continues the vocal parts, with the Piano part remaining empty. The third system shows the vocal parts concluding, while the Piano part remains empty. The score is written in G major (one sharp) and 3/4 time. The vocal parts are in SATB format, and the piano part is in treble and bass clef. The score is labeled 'Score' and 'Traditional'.

# Notation Software

## *Unit 3 - Creating Expressions and Other Music Symbols*

### Objectives

Upon completion of this unit, you will be able to:

- Add and edit expressive markings in the score.
- Add bar line variations, including repeats and coda markings.

### Materials

The instructor will provide a printed music notation document for participants to use. The provided document must contain a variety of dynamics, articulations, lyrics, chord symbols, metronome markings, and other symbols.

### Procedures

The instructor will demonstrate techniques for adding and editing the following:

1. Dynamics
2. Articulations
3. Shapes such as slurs and hairpins
4. Lyrics – multiple verses and word extensions.
5. Chord symbols – manual or MIDI input, guitar fret board diagrams
6. Repeats
7. Codas
8. Text blocks
9. Metronome (tempo) markings
10. Ornaments
11. Bar line variations (single, double, broken, final, and system)
12. ADDING (EDITING) GUITAR FRETBOARD DIAGRAMS
13. FINGERINGS

### Activities

Participants will transcribe a printed document supplied by the instructor.

# Notation Software

## Unit 3 - Creating Expressions and Other Music Symbols

**Amazing Grace**

Score Traditional

**Andante** (♩ = c. 92)

**System 1:**

Soprano: *mf* A - maz - ing - grace! how  
 Alto: *mf* 'Twas grace that taught my  
 Tenor: *mf*  
 Bass: *mf*  
 Piano: *mf* G D7 C G G Gmaj7

**System 2:**

S: sweet the sound, that saved a wretch like me I once was  
 A: heart to fear, and grace my fears re - lieved How prec - ious  
 T: (Like me!)  
 B: (Like me!)  
 Pno.: Cmaj7 G D G

**System 3:**

S: lost, but now am found, was blind but now I see. ("Twas)  
 A: did that grace ap - pear the low I first be - lieved  
 T: 1. 2.  
 B: 1. 2.  
 Pno.: 14 G/B C G G/E G/D D7 C C/A 1. G 2. G

3) Thro' many dangers, toils and snares,  
 I have already come.  
 'Tis grace hath brought me safe thus far,  
 and grace will lead me home.

4) When we've been there ten thousand years,  
 bright shining as the sun.  
 We've no less days to sing God's praise,  
 than when we first begun.

# Notation Software

## *Unit 4 - Editing*

### Objective

Upon completion of this unit, you will be able to apply basic editing skills, including selective and global editing.

### Materials

The instructor will provide a music notation document as an electronic file for participants to use. The provided document must contain a variety of errors that require correction.

### Procedures

The instructor will demonstrate the following score editing techniques:

1. Basic editing for inserting and deleting notes and other symbols.
2. Adding and deleting measures
3. Adding measure numbers and rehearsal marks
4. Local editing – affecting only a single music symbol, placement and adjustment
5. Global editing – affecting the entire score, preferences, global settings
6. Selecting a region of measures for editing
7. Selecting multiple non-contiguous notes or symbols for editing
8. Copy/Paste with filtering
9. Changing key signatures
10. Changing time signatures
11. Changing clefs
12. Changing note heads

### Activities

Participants will edit an electronic document supplied by the instructor.

# Notation Software

## *Unit 5 - Playback*

### Objectives

Upon completion of this unit, you will be able to:

- Play back scores using hardware and software synthesizers.
- Control playback mix (volume), pan, and tempo.
- Set nuanced human performance qualities (i.e. jazz eighths, etc.)
- Control playback tempo (rit. and/or accel.)

### Materials

The instructor will provide several music notation documents as electronic files for participants to use. The provided documents must represent a variety of musical idioms. High-end music notation software products such as Sibelius and Finale come with many suitable sample documents.

### Procedures

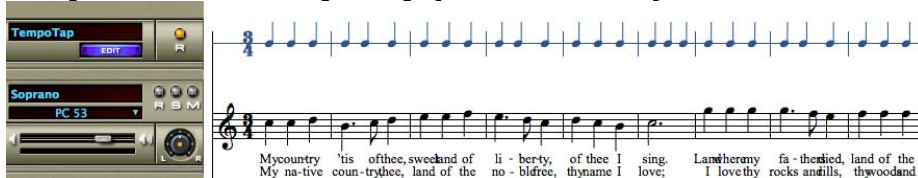
The instructor will demonstrate the following:

1. Setting up playback for hardware synthesizers and other MIDI devices.
2. Setting up playback for software synthesizers.
3. Assigning instrument sounds to staves.
4. Using mixing controls for volume, reverb, chorus, and stereo pan.
5. Swinging versus straight eighth notes and sixteenth notes
6. Human playback settings
7. Tap features to control accel./rit. Playback

#### Sample Sibelius Live Tempo



#### Sample of Finale Tempo Tap (in Studio View)



### Activities

Participants will create multiple playback settings for electronic documents supplied by the instructor.

# Notation Software

## *Unit 6 – Page Layout*

### Objectives

Upon completion of this unit, you will be able to:

- Manipulate page layout and orientation
- Change the spacing and organization of staves
- Create various text features
- Include graphics in score

### Materials

The instructor will provide several music notation documents as electronic files for participants to use. The instructor will supply printed versions of the same documents showing the final layouts.

### Procedures

The instructor will demonstrate the following:

1. Page sizes, portrait and landscape modes.
2. Fitting Measures and Systems
3. Forcing Measures into a System
4. Manually Breaking a System
5. Hiding Empty Staves
6. Changing Staff and System Spacing
7. Titles, Copyright Statements, and Other Page Text
8. Add graphics in score
9. CREATING PDF FILES

### Activities

Participants will create page layouts of electronic documents supplied by the instructor to match the printed documents supplied.

# Notation Software

## *Unit 7 - Score Output*

### Objectives

Upon completion of this unit, you will be able to:

- Perform a part extraction.
- Output scores to MIDI files and digital audio files.
- Export graphic file formats to word documents.

### Materials

The instructor will provide several music notation documents as electronic files for the participants to use.

### Procedures

The instructor will demonstrate the following:

1. Part extraction with one staff per part
2. Part extraction with two or more staves per part (piano, organ, marimba, etc.)
3. Saving a score as a Standard MIDI File (SMF)
4. Exporting notation to standard graphic file formats such as TIFF and EPS.
5. Saving a score as a digital audio file (MP3, WAV, AIFF).
6. CREATING AUDIO CDS FROM NOTATION SOFTWARE FILES.

### Activities

Participants will use electronic documents supplied by the instructor to extract parts, save SMFs, export graphics, and create digital audio files.

# Notation Software

## *Unit 8 - Automatic Arranging Features*

### Objective

Upon completion of this unit, you will be able to use the automatic arranging features found in high-end music notation software.

### Materials

The instructor will provide a music notation document as an electronic file for participants to use. The file will consist of a four-staff, four-part harmonization of a chorale or other simple melody.

### Procedures

The instructor will demonstrate:

1. How to create a full ensemble score from a simple 4-part arrangement.
2. How to create a keyboard reduction from a simple 4-part arrangement.
3. Techniques for obtaining the most creative results from the automatic arranging features of the software.

### Activities

Participants will use electronic documents supplied by the instructor to create multiple arrangements using the automatic arranging feature.



# Notation Software

## *Unit 9 - Creating a Lead Sheet*

### Objectives

Upon completion of this unit, you will be able to:

- Create a lead sheet (you may use the model provided).
- Explore playback options offered by the software.

### Materials

The instructor will provide a short printed lead sheet for participants to use. The document need not be any more than 16 measures in length.

### Procedures

The instructor will:

1. Discuss the model lead sheet and make note of any special notation challenges.
2. Guide participants as they create a new document and edit it.
3. Discuss playback options for the lead sheet.

### Activities

Participants will create a lead sheet to match the printed document supplied by the instructor.

# Notation Software

## *Unit 10 - Creating a Piano Vocal Score*

### Objectives

Upon completion of this unit, you will be able to:

- Create a piano-vocal score (you may use the model provided).
- Explore playback options offered by the software.

### Materials

The instructor will provide a short piano-vocal piece for participants to use. The document need not be any more than 16 measures in length. The document should contain a single melody, lyrics, left and right hand piano staves, and accompanying chord symbols.

### Procedures

The instructor will:

1. Discuss the model score and make note of any special notation challenges.
2. Guide participants as they create a new document and edit it.

### Activities

Participants will create a piano-vocal score to match the printed document supplied by the instructor.

# Notation Software

## *Unit 11 - Create Large Ensemble Score and Parts*

### Objectives

Upon completion of this unit, you will be able to:

- Create a large ensemble score using a model provided.
- Begin preparations to complete your final project.

### Materials

The instructor will provide a short large ensemble piece for participants to use. There must be at least 8 staves in the score with at least one transposing instrument. The document need not be any more than 16 measures in length.

### Procedures

The instructor will:

1. Discuss the model score and make note of special notation challenges.
2. Guide participants as they create a new document and edit it.
3. Ask participants to print the completed score in concert pitch and the parts in their appropriate transpositions.

### Activities

Participants will create a brief large ensemble score to match the printed document supplied by the instructor

# Notation Software

## *Unit 12 - Creating Tests and Worksheets*

### Objectives

Upon completion of this unit, you will be able to:

- Explore built-in features for tests and worksheets as included in software.
- Demonstrate special notation techniques required for tests and worksheets.
- Create an example document suitable for classroom situation.

### Materials

The instructor will provide several tests and worksheet examples including:

- Handouts that include music notation exported in a graphic file format and then inserted into a word processing document.
- Worksheets, created with music notation software, that use imported graphics such as instrument drawings.
- Worksheets, created with music notation software, that use advanced layout techniques such as hidden measures, special note heads, and stemless notes.
- The instructor will provide test and worksheet templates. These are usually available from the publishers of high-end notation software.

### Procedures

The instructor will distribute printed examples of tests and worksheets and demonstrate:

1. Saving Notation Graphics for Use in Word Processing Files
2. Importing Graphics into Notation Software Layouts
3. Advanced Layout Procedures for Worksheets
4. Drop-out scores with missing measures
5. Split systems
6. Hidden notes and rests
7. Hidden staff lines
8. Non-standard staff styles
9. Slash notation
10. Using music fonts in a word processor document
11. Using worksheet templates

### Activities

Participants will create worksheets from templates supplied by the software or instructor

# Notation Software

## *Unit 13 - Classroom Applications*

### Objective

Upon completion of this unit, you will learn ways to integrate music notation software into their teaching.

### Materials

The instructor will provide several lesson plans that incorporate music notation software.

***Lesson plans are available in the “Lesson Plans” page of the members-only section of [time.org](http://time.org).***

### Procedures

The instructor will demonstrate the use of notation to:

1. Teach compositional devices
  - Inversion
  - Ostinatos
  - Augmentation
  - Diminution
2. Teach students to compose and arrange music
3. Capture musical performances for student self-evaluation
4. Demonstrate the rules of music notation.
5. Demonstrate the relationship between sound and symbol.
6. Create handouts and exercises.
7. Create composition forms with copy/paste.
8. Create blank manuscript paper.
9. Demonstrate the ranges of instruments.

### Activities

- Participants will spend time experimenting with each of the demonstrated techniques.
- Participants will participate in a class discussion of ways they can use notation software in their teaching.

# Notation Software

## *Unit 14 – Copyright and Music Notation Software*

### **Objective**

Participants will learn the central issues in U.S. copyright law and how it applies to music notation software.

### **Materials**

<http://www.pdinfo.com/proof.htm>

The PDInfo site provides information on public domain music and guidance on how to avoid copyright infringement.

### **Procedures**

The instructor will guide students to the PDInfo.com site and allow time for reading the page at the URL listed above.

### **Activity**

Participants will discuss the issues in copyright today as they apply to works of music transcribed with music notation software.

# Notation Software

## *Unit 15 – Evaluating Music Notation Software*

### Objective

Participants will learn criteria for evaluating music notation software.

### Materials

Web site addresses for demo versions of at least two music notation software programs in addition to the one used in class.

### Procedures

The instructor will:

1. Distribute Web site addresses where participants can download and install demo versions of music notation software.
2. Lead a class discussion using the following focusing questions:
  - How much does the software cost?
  - What is the education price?
  - What is the learning curve for the software?
  - Are there third party books, CDROMS, or videos that can shorten the learning curve?
  - Does the software have a Page oriented display?
  - Can you edit and input music data in the page view?
  - How many staves can you use?
  - Can you create staves of more or less than five lines?
  - Are staff sizes variable?
  - What is the smallest rhythmic value you can use (32nd, 64th, 128th)?
  - How many clefs are available (G, F, alto & tenor)?
  - Can you create alternate note heads (harmonics, grace notes, slash, and X)?
  - Can you create custom key signatures?
  - Can you have different key signatures in different parts simultaneously?
  - Can you create custom time signatures?
  - Can you have different time signatures in different parts simultaneously?
  - Can you have diagonal beaming?
  - Is the beaming handled automatically?
  - How many independent voices can be displayed on each staff?
  - How many music-input options does the software possess? (MIDI, Mouse, computer keyboard, other (tablet))
  - Can you play back your score with MIDI? Are articulations, dynamics and expressions reflected in MIDI playback?
  - Does transposition include chord symbols?

# Notation Software

## *Unit 15 – Evaluating Music Notation Software*

- Can you export the notation in standard graphic file formats (Postscript, EPS, TIFF)?
- Can you create user-defined program defaults (fonts, spacing, dot offsets)?

### **Class Activity:**



# Notation Software

## *Discussion – Notation as the Ultimate Tool for the Music Educator*

Participants will participate in a class discussion about music notation software products they have used. Participants will share their experiences and discuss appropriate notation software choices for different educational settings.

### Short Answer Activity Sheet

1. Which MENC national standard(s) can be addressed using notation software?
2. Explain specific ways notation software can be used to address these standards?

Standard #	Explanation

### MENC Standards:

1. Singing, alone and with others, a varied repertoire of music.
2. Performing on instruments, alone and with others, a varied repertoire of music.
3. Improvising melodies, harmonies, and accompaniments.
4. Composing and Arranging Music within specified guidelines.
5. Reading and notating music.
6. Listening to, analyzing and describing music.
7. Evaluating music and music performances.
8. Understanding relationships between music, the other arts, and disciplines outside the arts.
9. Understanding Music in Relation to History and Culture.

- Now review the Teaching Strategies listed in the TI:ME technology strategies document. See Appendix A of the *Technology Strategies for Music Education*.
- Which ones from the notation area are most applicable to your teaching position?
- How could these strategies be best implemented in your classroom? TI:ME Technology

Strategy #	Teaching Application
1. Classroom Implementation	
2. Classroom Implementation	
3. Classroom Implementation	
4. Classroom Implementation	

# Notation Software

## *Discussion: Notation as the Ultimate Tool for the Music Educator*

**By Tom Rudolph**

Technology brings a wide variety of applications to the music classroom. One of the most powerful technology tools is notation software. Notation software is designed with the primary goal of printing out scores and parts. I have found that notation software is an invaluable teaching and compositional tool. Some of the most popular notation programs include Finale, Sibelius, Overture, and others. Before selecting the program, be sure to have an idea of how you are going to use it in your teaching.

### **Re-Writing Parts**

The most obvious reasons for using a notation program is to save time and produce more readable pieces of music. I am a middle school band director. No matter which arrangement I purchase, minor revisions are needed to suit the abilities of my students, so I often re-write some of the parts. Before notation software, I would re-write parts by hand. Even in the best circumstances my left-handed scrawl is barely legible. Hence, questions such as, "Is the first note an e, f, or g?" or, "Isn't my part missing ten measures?" were commonplace. Now, with the help of notation software, I hand out music that looks professionally type-set. Students are able to read my revisions as well as they read printed music. Another advantage of using notation software is the way it helps find mistakes. Simply play back the composition and "proof listen" to the piece. It is often easier to find mistakes while listening than solely by inspecting the printed score.

### **Teaching Applications**

Notation software can be applied in music education in two basic areas: for the teacher's use to print out scores and parts and for students to use to compose and arrange music. Instrumental and choral directors and classroom music specialists can find many applications for notation software. Some specific applications include:

Simplify parts for students. For example, you might need a custom clarinet part for students not yet over the break; or perhaps the range of a particular piece goes above that which is comfortable for your soprano section. Notation software could be used to reduce the difficulty level of the part. The parts printed by notation software are easier to read than hand-written ones and with notation software notes can be entered quickly using the computer's mouse or with a MIDI keyboard.

Re-orchestrate an existing arrangement. In my middle school band I now have 18 alto saxes and 2 trombones. Yet the arrangements I purchase are usually written for 3 trombones and 2 alto saxes. I enter the second and third trombone parts and print them out for the alto saxes. Parts for all ensembles can be re-orchestrated in this manner. Use the transpose function to print out parts for various instruments. Every good notation program has built-in transposition capabilities. Parts can be entered in concert pitch and then automatically transposed and printed out for Bb instruments, Eb instruments, etc.

Create warm-ups and practice exercises. I'm sure you have developed some of your own favorite warm-up exercises. Notation software can help you to print out your exercises. A notation program works like a word processor. Notes can easily be copied and pasted into

# Notation Software

## *Discussion: Notation as the Ultimate Tool for the Music Educator*

other parts of the music. With practice, notation software will allow you to create professional-looking parts much faster than you could write by hand.

Create readiness exercises for performing groups. Before I pass out a new arrangement to my performing groups I sit down and create a page or two of exercises that will help the

students prepare for playing the piece. I include scales, rhythm patterns, and important melodies. Once the C part is completed, I simply copy and paste the music to create the other parts. I often use templates that come with the notation program. A template is a blank score that has already been formatted to transpose parts to the appropriate keys.

Create ensemble music such as duets, trios, and quartets. As long as the music is original or in the public domain, you can create your own chamber music for any instrument combination. Imagine having duets that any instrument combination can play. I use notation software to create 2, 3 and 4 part pieces for my students to perform in chamber groups.

Reduce a piano part so students can accompany a chorus or other ensemble. Many times, the piano accompaniment part is too difficult for student accompanists. Notation software can help the teacher simplify the part so students can play it.

Compose difficult parts, such as descants, to challenge the more advanced students in the ensemble. How many times have you heard the better students in your ensembles complain that the music is boring or too easy? With notation software, directors can create challenging parts for the more talented students in the group.

Write your own compositions, arrangements, or even a method book. If you have been avoiding writing original compositions or arrangements because of the cost of having parts copied, notation software remedies this problem. Also, once the composition is entered into the computer, it can be listened to, edited, and revised as often as you like.

### **Student Use**

Notation software is a fascinating tool in the hands of students. A notation program will not teach students to compose any more than a word processor will teach them how to write. However, just as a word processor can assist a student with editing, copying and pasting, spell checking, and so forth, a notation program can assist in the music composition process. Notation software gives students a fast and legible way to enter and print music and then hear what they have written. Once the appropriate hardware and software are made available, students can begin to experience a wide variety of composition activities. Some ideas are listed below to help you get started.

Teach student librarians to use notation software. Many of the applications listed above, such as re-orchestrating parts from an arrangement, could be delegated to students. They can enter parts and then have the computer make the proper transposition.

# Notation Software

## *Discussion: Notation as the Ultimate Tool for the Music Educator*

Allow students to use a notation program to create original music. Students can learn to use a notation program and begin to print out their own compositions. Every year I ask my middle school band members to compose a duet. I provide them with a melody and they write the harmony part. Notation software gives them the opportunity to hear their composition as it is being composed. Also, they can produce a professional looking printout.

Teach students to transcribe melodies, perhaps the parts they are playing in the ensemble. Through the process of entering the notation, they will "discover" many aspects of music such as note values, number of beats per measure, direction of stems, etc.

# Notation Software

## *Discussion – Unique Features*

### Objective

Participants will learn about features exclusive to Finale and Sibelius.

### Materials

The instructor may provide lesson plans that incorporate these exclusive features.

### Procedures

The instructor will demonstrate (using course software) and/or discuss (in the absence of software) the following:

- **SmartMusic** [Finale Exclusive]

The only way to write custom SmartMusic assessment files is with Finale software.

1. Music Accompaniment and Assessment for 1,000's of solos
2. Popular Method Books and Solo Assessable Accompaniments
3. Create custom Assessable files in Finale
4. Integrated Grade book with 24/7 access
5. Worksheets, flashcards, over 800 customizable files
6. Alpha (and solfege) notes as of 2011
7. <http://www.smartmusic.com/Default.aspx>

 **SmartMusic for Students**  
We make practicing easier and learning fun.



- **Scorch** [Sibelius Exclusive] – The easiest way to post and sell your music on the internet.

1. Post and Play interactive music on your website
2. Sell your music on [www.sibeliusmusic.com](http://www.sibeliusmusic.com)
3. Classroom Control from teacher's station
4. Worksheet Creator with over 1,700 files
5. <http://www.sibelius.com/products/scorch/index.html>



# Notation Software

## *Discussion – Notation Options*

### Objective

Participants learn about other versions of commercial and free notation programs.

### Procedures

The instructor may discuss other notation products (not already taught in course) from the following:

- **Noteflight** [Free] - <http://www.noteflight.com>



- **MuseScore** [Free open source] - <http://musescore.org/>



- Others from **Finale** - [http://makemusic.com/notation\\_software.aspx](http://makemusic.com/notation_software.aspx)



- Others from **Sibelius** - <http://www.sibelius.com/products/index.html>



# Notation Software

## Sample Lead Sheet

### AMAZING GRACE

A - MA - Z - ING GRACE, HOW SWEET THE SOUND, THAT

SAVED A WRETCH LIKE ME I ONCE WAS

LOST, BUT NOW AM FOUND, WAS BLIND BUT NOW I

SEE THROUGH MAN - Y DAN - GERS TOILS AND

SNARES, I HAVE AL - READ - Y COME. 'TIS

GRACE HATH BROUGHT ME SAFE THUS FAR, AND GRACE WILL

LEAD ME HOME.

# Notation Software

## Sample Piano Vocal Score

### Santa Lucia

Words and Music by  
Teodoro Catrau  
(tr. Thomas Oliphant)

Piano

*mp* *p*

Now 'neath the sil-ver moon, o - cean is glow-ing. O'er the calm bil-low,

7 1. *Bb* 2. *Bb* *mf* *Eb*  
soft winds are blow-ing; all things de-light us. Hark, how the sail-or's cry joy-ous-ly

14 *Bb* *F7* *Bb* *Eb*  
ech-oes nigh; San-ta Lu-ci-a. San-ta Lu-ci-a. Home of fair po-e-sy,

21 *Bb* *F7* *rit.* *Bb* *p*  
realms of pure har-mon-y. San-ta Lu-ci-a, San-ta Lu-ci-a!

Pno.



# Notation Software

## *Sample Large Ensemble Score - excerpt*

### Centennial Celebration Fanfare

**Celebratory** (♩. = 144) **John Alan Carnahan**

The score is written for a large ensemble. The tempo is marked "Celebratory" with a quarter note equal to 144 beats per minute. The key signature has two flats (B♭ and E♭). The score is written in 8/8 time. The woodwinds and strings play a fanfare melody, while the brass instruments provide harmonic support. The piano part features a rhythmic pattern. The percussion includes chimes, timpani, bass drum, and cymbals.

# Notation Software

## Sample Large Ensemble Score - excerpt

2

The score is written for a large ensemble. The first system includes staves for Picc., Fl. 1/2, Ob. 1, Ob. 2 / E. Hn., Bsn. 1/2, B♭ Cl. 1, B♭ Cl. 2/3, B. Cl., A. Sx., T. Sx., and B. Sx. The second system includes B♭ Tpt. 1, B♭ Tpt. 2/3, Hn. 1/2, Hn. 3/4, Tbn. 1/2, B. Tbn., Euph., Tuba, and Ch. The third system includes Pno., Chm., Timp., B. Dr., and Sn. Cym. / Cr. Cym. The score features various musical notations including notes, rests, and dynamic markings such as *f*, *ff*, and *mf*. There are also markings for *loco* and *mf* at the bottom.

# Notation Software

## *Sample Large Ensemble Score – Concert Pitch*

### Durch Adams Fall

Jos. Klug. G. B. 1535

J. S. Bach

$\text{♩} = 100$

Piccolo Trumpet in B $\flat$

Trumpet in B $\flat$

Tenor Trombone

Tuba

SOPRANO

ALTO

TENOR

BASS

ORGAN

Ped.

*f*

Durch A -damsFall ist ganz ver - derbt Mensch - lich Nat - tur und We - sen.

Durch A -damsFall ist ganz ver - derbt Mensch - lich Nat - tur und We - sen.

Durch A -damsFall ist ganz ver - derbt Mensch - lich Nat - tur und We - sen.

Durch A -damsFall ist ganz ver - derbt Mensch - lich Nat - tur und We - sen.

*f*

# Notation Software

## Sample Percussion Score – excerpt

**Circadian Rhythms**  
*abstract constructs in a 24x24 grid*

Carolyn Bremer  
*single stroke, let ring*

The score is written for the following instruments:

- Glockenspiel
- Xylophone
- Vibraphone
- Marimba 1
- Marimba 2
- Marimba 3
- Bass Marimba
- Timpani
- Percussion 1 (labeled "low & med wdbkls")
- Percussion 2 (labeled "snare")

Dynamic markings include *f* (forte) and *sf* (sforzando). Performance instructions include "single stroke, let ring" and "low & med wdbkls".

# Notation Software

## Sample SATB Arrangement on 4 Staves

### CANTICLES OF IRONY

#### I. Escape

words and music by  
Carolyn Bremer

piano

$\bullet = 80$  *sweetly, legato*



7 Soprano

*p*

There is no es - cape. There is no es - cape.

Alto

*p*

There is no es - cape. There is no es - cape.

8 Tenor

*p*

There is no es - cape. There is no es - cape.

Bass

*p*

There is no es - cape. There is no es - cape.

7



Performance time: approx 17 minutes

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# Notation Software

## *Sample Jazz Band Arrangement - excerpt*

**BREAKING NEWS BLUES**

FULL SCORE

JON PHELPS

5

Alto Sax. 1

Alto Sax. 2

Tenor Sax. 1

Tenor Sax. 2

Baritone Sax.

Trumpet in Bb 1

Trumpet in Bb 2

Trumpet in Bb 3

Trumpet in Bb 4

Trombone 1

Trombone 2

Trombone 3

Trombone 4

Guitar

Piano

Bass

Drum Set

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COURTESY OF JEFF JARVIS

# Notation Software

## *Sample Jazz Band Arrangement - excerpt*

**BREAKING NEWS BLUES - 2**

⑨

The musical score is arranged for a jazz band. The instruments and their parts are as follows:

- Alto Sax 1 & 2:** Play a melody of eighth and quarter notes.
- Tenor Sax 1 & 2:** Play a melody of eighth and quarter notes.
- Baritone Sax:** Play a melody of eighth and quarter notes.
- Baritone Trumpet 1-4:** Play a rhythmic pattern of eighth notes.
- Trombone 1-4:** Play a rhythmic pattern of eighth notes.
- Guitar:** Play chords and arpeggios.
- Piano:** Play chords and arpeggios.

The score is in 4/4 time, key of F major, and starts at measure 9. The guitar and piano parts are marked with chords: F7, F7(b9), Bb7, and Bb7(b9).





# Technology Institute for Music Educators

## **Basic Skills in Music Technology (TI:ME 1A)**

Notation, Music Production, and Electronic Musical Instruments

## **Section 2: Electronic Musical Instruments**



By Don Muro

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<http://www.ti-me.org>

# Electronic Musical Instruments

## *Syllabus*

### Description

The purpose of this section of **Basic Skills in Music Technology** is to instruct participants in basic skills using electronic musical instruments. The instructor will explain and demonstrate the features and functions of electronic instruments as well as the integration of electronic instruments into the music curriculum at all levels. The format of this section alternates between presentations and class activities which serve to assess student progress. Some of the skills described here will be accomplished in conjunction with the notation and music production software sections of the class. Satisfactory participation in class activities, assessment activities, written worksheets, and the completion of a lesson plan fulfill the 1A electronic musical requirements for TI:ME certification.

### Prerequisite Skills

The prerequisites for this course are basic computer skills and basic piano keyboard skills. These include:

- Using a computer keyboard
- Using a mouse for pointing, clicking, and dragging
- Opening and saving files
- Music reading in treble and bass clefs
- Playing rhythms, melodies and/or chords on a piano or other keyboard instrument

### Additional Information

Basic Skills in Music Technology may be offered as a two-credit or three-credit graduate course. Unit Topics listed in ALL CAPS within the module outline need not be included in the course when it is offered for two graduate credits only. The instructor of the course should be approved by TI:ME and experienced in teaching technology to in-service music teachers. It is highly recommended that the class size be limited to allow for one participant per computer and no more than 16 participants per instructor. Additional participants may be accommodated if computer workstations and assistants are available. Each participant will need approximately 20 hours working alone on a workstation in order to complete the final projects and class activities.

Please Note: The activities in this syllabus often specify the use of specific music scores that are provided in the course materials. ***Instructors may choose other appropriate music for these activities.***

# Electronic Musical Instruments

## *Unit 1 - Electronic Musical Instruments Basic Operation*

### Objective

Upon completion of this unit, you will be able to operate the electronic instruments used in the class.

### Activities

- Listen to all timbres on the instrument and identify those that would be useful in your teaching environment (classroom, band, orchestra, chorus, jazz ensemble, show choir, musicals, etc.)

### Procedures

The instructor will explain and demonstrate how to:

1. Power up the instrument
2. Use the audio system and headphones
3. Operate the master volume control and other basic controls
4. Select sounds
5. Activate combination mode and select various sound combinations (if applicable)
6. Read the drum chart and locate specific drum sounds on the keyboard
7. Transpose the keyboard to various intervals
8. Tune the keyboard to other sound sources
9. Set up the instrument for use with computer software
10. Reset the instrument to factory defaults

### Notes

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# Electronic Musical Instruments

## *Unit 1 - Electronic Musical Instruments Basic Operation*

### Key Map of General MIDI Drums

	27	Hi Q	
28		Slap	
		Scratch Push	
29		Scratch Pull	
	30	Sticks	
31		Square Click	
	32	Metronome Click	
33		Metronome Bell	
	34	Loose Kick Drum	
35		Tight Kick Drum	
36 C3		Rimshot	
	37	Loose Snare	
38		Hand Clap	
	39	Tight Snare	
40		Lo Floor Tom	
41		Closed High Hat	
	42	Hi Floor Tom	
43		Pedal High Hat	
	44	Lo Tom	
45		Open High Hat	
	46	Lo Mid Tom	
47		Hi-mid Tom	
48 C4		Lo Crash Cymbal	
	49	Hi Tom	
50		Lo Ride Cymbal	
	51	Chinese Cymbal	
52		Ride Bell	
53		Tambourine	
	54	Splash Cymbal	
55		Cowbell	
	56	Hi Crash Cymbal	
57		Vibrasplash	
	58	Hi Ride Cymbal	
59		Hi Bongo	
60 C5		Lo Bongo	
	61	Mute Hi Conga	
62		Open High Hat	
	63	Lo Conga	
64		Hi Timbale	
65		Lo Timbale	
	66	Hi Timbale	
67		Lo Agogo	
	68	Cabasa	
69		Maracas	
	70	Short Whistle	
71		Long Whistle	
72 C6		Short Guiro	
	73	Long Guiro	
74		Claves	
	75	Hi Wood Block	
76		Lo Wood Block	
77		Mute Cucia	
	78	Open Cucia	
79		Mute Triangle	
	80	Open triangle	
81		Shaker	
	82	Jingle Bell	
83		Bell Tree	
84 C7		Castanets	
	85	Muted Surdo	
86		Open Surdo	
	87		

# Electronic Musical Instruments

## *Unit 2 - An Overview of Electronic Keyboards*

### Objectives

Upon completion of this unit, you will be able to:

- Describe the different types of electronic keyboards available
- Describe the sound production and control features available on electronic keyboards
- Describe how to select the appropriate keyboard and feature set for specific teaching environments

### Activities

Participants will discuss electronic keyboard types and features appropriate for various educational settings. Afterwards, participants will prioritize a list of keyboard types and features for their specific work environments.

### Procedures

The instructor will explain and demonstrate the following:

#### 1. Electronic Keyboard Features

The features on electronic keyboards can be divided into two groups: *sound production* features and *control* features. Sound production features affect the sonic capabilities of the instrument.

- Sonic palate
- Polyphony
- Keyboard performance modes (split, layer, velocity switch)
- Effects processor(s)
- Audio output capabilities (external speakers, internal speakers, headphones)

*Control* features include various ways that an instrument can be controlled in live performance and in use with computers.

- Keyboard span (the number of keys)
- Key size (full size vs. mini keyboards)
- Key weight (non-weighted, semi-weighted, full weighted)
- Velocity sensitivity
- Aftertouch

# Electronic Musical Instruments

## *Unit 2 - An Overview of Electronic Keyboards*

- Pitch bender
- Modulation controller
- Sliders/knobs
- Foot switches/foot pedals
- MIDI capability (described on p. x)
- Internal sequencer (if applicable)

### 2. Types of Electronic Keyboards

Electronic keyboards can be classified into the following categories:

- *Low-Cost Electronic Keyboards* (self-contained, introductory instruments with limited professional capabilities aimed primarily at the home market.)
- *Keyboard Controllers* (keyboards with no internal sound generating capability)
- *Digital Pianos* (a keyboard instrument designed primarily to emulate the sound and, in most cases, the feel of an acoustic piano. Manufacturers usually provide only non-editable keyboard-oriented sounds.)
- *Synthesizers* (unlike the previous categories, synthesizers are unique because they allow users to modify internal sounds and to create entirely new sounds. Synthesizers are available in two categories: *hardware synthesizers* and *software synthesizers*.)
- *Workstations* (a keyboard synthesizer with the capability to record, edit and play back multi-part arrangements. Some workstations can record digital audio as well as MIDI data.)

## Notes

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# Electronic Musical Instruments

## *Unit 2 - An Overview of Electronic Keyboards*

### Activity Sheet

Using the numbers 1-5, prioritize the following list of electronic keyboard types in order of relevance for your teaching environment.

- \_\_\_\_\_ low-cost electronic keyboards
- \_\_\_\_\_ keyboard controllers
- \_\_\_\_\_ digital pianos
- \_\_\_\_\_ synthesizers
- \_\_\_\_\_ workstations

Using the numbers 1-11, prioritize the following list of electronic keyboard control features in order of relevance for your teaching environment.

- \_\_\_\_\_ keyboard span
- \_\_\_\_\_ key size
- \_\_\_\_\_ key weight
- \_\_\_\_\_ velocity sensitivity
- \_\_\_\_\_ aftertouch
- \_\_\_\_\_ pitch bender
- \_\_\_\_\_ modulation controller
- \_\_\_\_\_ sliders/knobs
- \_\_\_\_\_ foot switches/foot pedals
- \_\_\_\_\_ MIDI capability
- \_\_\_\_\_ internal sequencer

### Notes

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# Electronic Musical Instruments

## *Unit 3 – Understanding MIDI*

### Objectives

Upon completion of this unit, you will be able to:

- Explain the basics of the Musical Instrument Digital Interface (MIDI) specification
- Explain how MIDI connections are made between instruments and computers.

### Activities

Participants will discuss MIDI, read the *MIDI Basics* article and complete the MIDI Theory worksheet at the end of the unit.

### Procedures

The instructor will explain and demonstrate the following:

1. The definition and development of MIDI
2. The information transmitted and received through MIDI
3. MIDI connections - IN, OUT and THRU ports and/or USB ports
4. MIDI channels
5. General MIDI (GM):
6. GM extensions (GM2, GS, and XG)
7. Standard MIDI Files (SMFs)
8. System Exclusive (SysEx)
9. MIDI sound modules and alternate controllers including wind controllers, guitar controllers, violin/cello controllers, and percussion (drum and mallet) controllers.
10. MIDI interfaces – single, multi-port, USB connections

### Notes

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# Electronic Musical Instruments

## Unit 3 – Understanding MIDI

### General MIDI Sound Bank

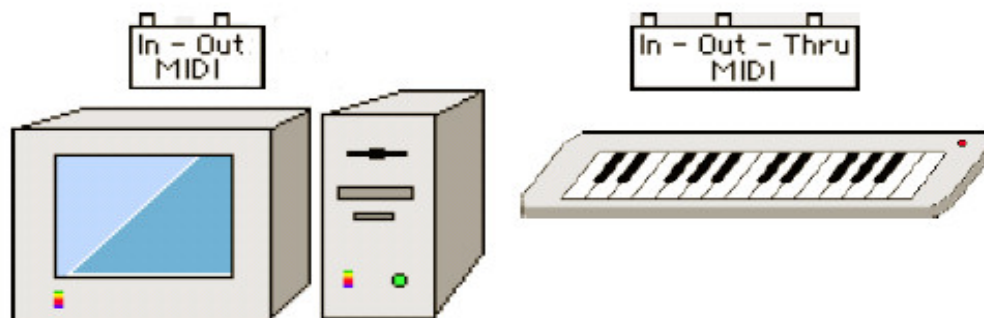
<b><u>Piano</u></b> 1 Acoustic Grand 2 Bright Acoustic 3 Electric Grand 4 Honky Tonk 5 Electric Piano 1 6 Electric Piano 2 7 Harpsichord 8 Clavinet	<b><u>Bass</u></b> 33 Acoustic Bass 34 Fingered Bass 35 Picked Bass 36 Fretless Bass 37 Slap Bass 1 38 Slap Bass 2 39 Synth Bass 1 40 Synth Bass 2	<b><u>Reed</u></b> 65 Soprano Sax 66 Alto Sax 67 Tenor Sax 68 Baritone Sax 69 Oboe 70 English Horn 71 Bassoon 72 Clarinet	<b><u>Synth FX</u></b> 97 Ice Rain 98 Sound Track 99 Crystal 100 Atmosphere 101 Brightness 102 Goblins 103 Echoes 104 Sci-Fi
<b><u>Chromatic Percussion</u></b> 9 Celesta 10 Glockenspiel 11 Music Box 12 Vibraphone 13 Marimba 14 Xylophone 15 Tubular Bells 16 Dulcimer	<b><u>Strings</u></b> 41 Violin 42 Viola 43 Cello 44 Contrabass 45 Tremolo 46 Pizzicato 47 Orchestral 48 Timpani	<b><u>Pipe</u></b> 73 Piccolo 74 Flute 75 Recorder 76 Pan Flute 77 Bottle 78 Shakuhachi 79 Whistle 80 Ocarina	<b><u>Ethnic</u></b> 105 Sitar 106 Banjo 107 Shamisen 108 Koto 109 Kalimba 110 Bagpipe 111 Fiddle 112 Shanai
<b><u>Organ</u></b> 17 Drawbar 18 Percussive 19 Rock Organ 20 Church Organ 21 Reed Organ 22 Accordion 23 Harmonica 24 Tango Accordion	<b><u>Ensemble</u></b> 49 Strings 50 Slow Strings 51 Syn Strings 1 52 Syn Strings 2 53 Choir Aahs 54 Choir Oohs 55 Synth Voice 56 Orchestra Hit	<b><u>Synth Lead</u></b> 81 Square 82 Sawtooth 83 Calliope 84 Chiff 85 Charang 86 Voice 87 Fifths 88 Bass/Lead	<b><u>Percussion</u></b> 113 Tinkle Bell 114 Agogo 115 Steel Drums 116 Woodblock 117 Taiko Drum 118 Melodic Tom 119 Synth Drum 120 Rev Cymbal
<b><u>Guitar</u></b> 25 Nylon String 26 Steel String 27 Jazz Electric 28 Clean Electric 29 Muted Electric 30 Overdrive 31 Distortion 32 Harmonics	<b><u>Brass</u></b> 57 Trumpet 58 Trombone 59 Tuba 60 Muted Trumpet 61 French Horn 62 Brass Section 63 SynthBrass 1 64 SynthBrass 2	<b><u>Synth Pad</u></b> 89 New Age 90 Warm 91 Polysynth 92 Choir 93 Bowed 94 Metallic 95 Halo 96 Sweep	<b><u>Sound FX</u></b> 121 Fret Noise 122 Breath Noise 123 Seashore 124 Bird Tweet 125 Telephone 126 Helicopter 127 Applause 128 Gunshot

# Electronic Musical Instruments

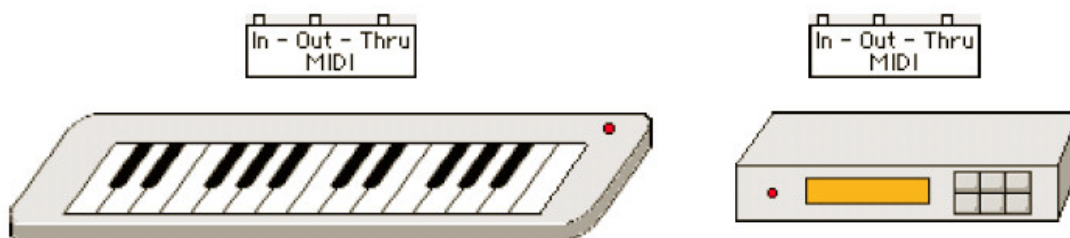
## Unit 3 – Understanding MIDI

### Activity Sheet

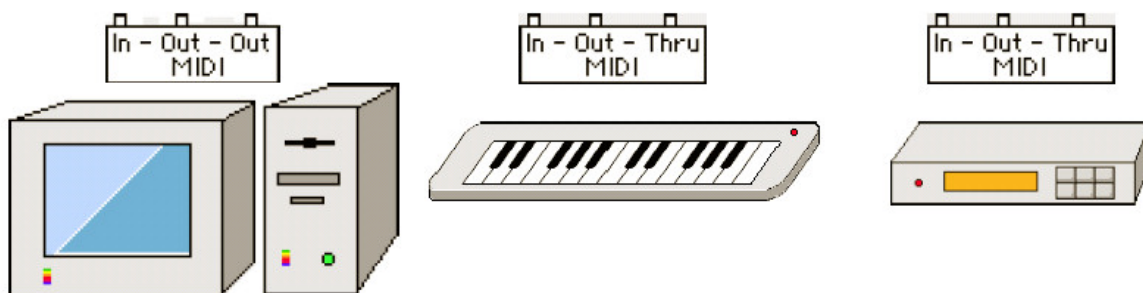
1. Draw lines showing the proper MIDI connections between a keyboard and a computer using a standard MIDI interface.



2. Set up the system using only one cable so that playing the keyboard will produce sound on the sound module.



3. Connect the computer and keyboard as in #1 above. Use the second MIDI OUT port on the computer's multi-port interface to connect to the sound module.



- Which device or devices respond when the computer sends MIDI data?  
Which device or devices respond when the keyboard sends MIDI data?

# Electronic Musical Instruments

## *Unit 3 – Understanding MIDI*

1. MIDI stands for \_\_\_\_\_
2. MIDI is useful because it allows communications between  
\_\_\_\_\_
3. The extension of the MIDI standard which establishes a common bank of sounds to be used on each instrument is called \_\_\_\_\_
4. The MIDI standard defines a set number of channels through which information may be transmitted. What is that number? \_\_\_\_\_
5. True/False - MIDI data may contain information created by performance gestures such as pressing and releasing notes on a keyboard. \_\_\_\_\_
6. True/False - MIDI data may contain information describing changes in volume and timbre \_\_\_\_\_
7. True/False - Standard MIDI Files may contain audio recordings. \_\_\_\_\_
8. True/False - MIDI data played by instruments from different manufacturers will sound the same. \_\_\_\_\_
9. True/False - SysEx data enable electronic instruments from different manufacturers to exchange information. \_\_\_\_\_

# Electronic Musical Instruments

## *Unit 3 – Understanding MIDI*

### MIDI Basics

MIDI (Musical Instrument Digital Interface) is a digital, non-proprietary hardware and software protocol for data communications among electronic musical instruments and computers. MIDI was developed in 1983 by a consortium of hardware and software manufacturers. The three ports commonly found on MIDI instruments are IN, OUT, and THRU. The MIDI specification describes 16 MIDI channels through which MIDI data can be sent and received. MIDI data describe every aspect of a musical performance. For example, the note "middle C" is assigned the number 60. MIDI messages are divided into Channel Messages and System messages. Channel messages are addressed to any MIDI device that receives a given channel. System messages address an entire MIDI system which may include several MIDI devices. A special type of system message called "System Exclusive" is addressed to a specific MIDI device by referring to that device's Manufacturer's identification number.

Some of the more commonly used messages are explained below.

- *Note On* and *Note Off* messages are sent to a MIDI device to turn individual notes on or off. These messages do not have a range of values other than on and off.
- *Velocity* messages are sent to a MIDI device to indicate the speed with which a key is depressed or released. Most commonly, this message is used to control the volume of individual notes in a manner similar to that of an acoustic piano; if you hit it harder, the key goes down faster, and the sound for that note is louder. Velocity messages have values ranging from 0 to 127.
- *Aftertouch* (also called pressure sensitivity or second touch) is a measure of the pressure exerted on the key after it is depressed. There are two types of aftertouch: *Channel Pressure* and *Key Pressure*. Channel Pressure is an average pressure reading for everything on a given MIDI channel. Key pressure (also called polyphonic pressure) is measured and sent by the individual key, which allows one to add vibrato to a single note while holding a chord that does not have vibrato. Aftertouch can be assigned to change many aspects of sound. Common assignments include vibrato (modulation) and volume. Range of values is 0 to 127.

# Electronic Musical Instruments

## *Unit 3 – Understanding MIDI*

- *Pitch Bend* is a message sent from a pitch bender. Movement of the pitch bender causes changes in the pitch of all notes being played on a given channel. Pitch

bend values include a null position for normal pitch (0) and positive and negative ranges from -8192 to +8191.

- *Program Change* messages are sent to an instrument on a given MIDI channel to change timbre. For example, a program change value 1 would be sent to one of the channels on the Roland Sound Canvas to indicate a change to Grand Piano.
- *Control Change* messages are sent to an instrument on a given MIDI channel to change the quality of the sound.
  - Controller 7 is volume. Its value range is 0 to 127.
  - Controller 10 is stereo *pan*. Its value range is 0 (left speaker) to 127 (right speaker),
  - Controller 91 is *reverberation* on devices that use the GS extension to the General MIDI standard. Its value range is 0 to 127.
  - Controller 93 is *chorus effect* on devices that use the GS extension to the General MIDI standard. Its value range is 0 to 127.

# Electronic Musical Instruments

## *Unit 4 – Electronic Instruments and Audio Equipment Setups*

### Objective

Upon completion of this unit, you will be able to set up and connect the components used in music technology labs.

### Activities

Given a diagram of audio equipment including electronic instruments, sound modules, computers and amplifiers, participants will draw lines indicating the proper connections.

### Procedures

The instructor will explain and demonstrate the following:




1. electronic instruments(AC/audio/MIDI connections)
2. foot switch and foot pedal connections
3. computer connections (including MIDI interfaces)
4. sound modules
5. mixing boards
6. amplification systems

#### AUDIO CABLE CONNECTIONS




- *1/4 inch* phone (as in telephone switchboard) plugs and jacks are commonly used on MIDI electronic keyboards and professional mixing equipment. Usually a pair of 1/4 inch jacks marked "left" and "right" are found on the back of a keyboard. Each jack is designed to accept a monophonic phone plug. Cables with monophonic phone plugs are used to connect the left and right audio out jacks of a keyboard to the corresponding left and right audio in jacks of a stereo amplifier or mixer. An additional phone jack marked "headphone" is also commonly found on keyboards and other MIDI devices. This jack is designed to accept a stereo phone plug commonly found on high-quality stereo headphones. (See below.)

# Electronic Musical Instruments



## Unit 4 – Electronic Instruments and Audio Equipment Setups

Stereo 1/4 Inch Phone Plug	1/4 Inch Jack	Mono 1/4 Inch Phone Plug
		

- *1/8 inch or “mini”* phone plugs and jacks are commonly used on consumer-level audio equipment, computer sound cards, and some MIDI devices. Adapters can be purchased to allow 1/8 inch phone jacks to accept input from 1/4 inch phone plugs and vice versa. (See below.)

Stereo 1/8 Inch Phone Plug	1/8 Inch Jack	Mono 1/8 Inch Phone Plug
		

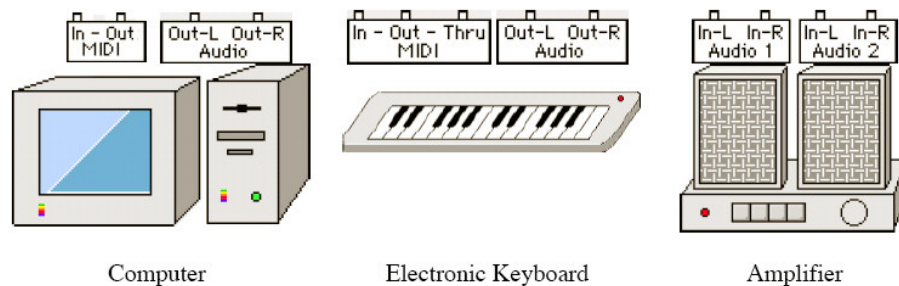
- *RCA phono* (as in phonograph) plugs and jacks are commonly used on modular home stereo equipment. Usually a pair of RCA jacks marked "left" and "right" are found on the back of a stereo system. Each jack is designed to accept a monophonic phono plug. Cables with monophonic phono plugs are used to connect the left and right audio out jacks of electronic equipment to the corresponding left and right audio in jacks of a stereo amplifier or mixer. In turn, the left and right audio out jacks of the stereo amplifier can then be connected to the left and right speakers which actually produce the sound. A variety of adapters can be purchased to allow equipment with RCA phono jacks and plugs to be connected to equipment with 1/8 inch or 1/4 phone plugs and jacks.

RCA Phono Jack	Mono RCA Phono Plug
	

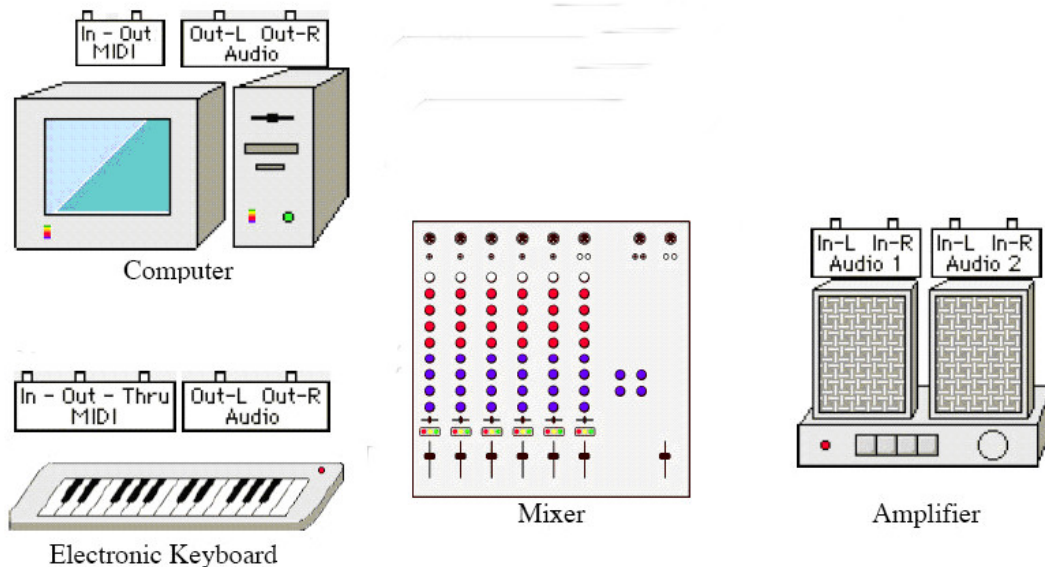
# Electronic Musical Instruments

## Unit 4 – Electronic Instruments and Audio Equipment Setups Activity Sheet

1. Use solid lines to connect the audio output of the keyboard to Audio 1 of the amplifier as well as to connect the audio output of the computer to Audio 2 of the amplifier. Use dotted lines to draw MIDI cables to connect the computer and keyboard.



2. In the above diagram the sounds of the computer and the keyboard cannot be heard simultaneously because they are connected to different audio inputs on the amplifier. In the diagram below, route the audio outputs of the computer and keyboard to the first four inputs (top left) on the mixer. Route the two mixer outputs (top/right) to the Audio 1 inputs on the amplifier. This setup allows you to hear the computer and the keyboard simultaneously.





# Electronic Musical Instruments

## *Unit 5 – Electronic Instrument Performance Techniques*

### Objectives

Upon completion of this unit, you will be able to:

- Execute basic performance techniques unique to electronic instruments
- DEMONSTRATE BASIC IMPROVISATIONAL SKILLS USING PITCH BENDING, VIBRATO AND SHAKES.

### Activities

- Participants will use performance techniques to create expressive music when performing live and when recording music for notation and music production projects.
- PARTICIPANTS WILL PLAY THEIR “LET’S DANCE” IMPROVISATIONS FOR EACH OTHER AND FOR THE CLASS.

### Procedures

The instructor will explain and demonstrate the following:

1. Changing sounds (bank select, footswitch, program chains)
2. Adding dynamics (velocity, volume controls, foot pedal)
3. Adding vibrato (modulation control, aftertouch)
4. Basic pitch bending techniques
5. Foot switch functions (sustain, program advance, effect on/off, etc.)
6. Foot pedal assignments (volume, timbre, effect amount, etc.)

#### Pitch bending

Pitch bending using a pitch bend wheel: place your left hand on the edge of the instrument and use your thumb to control the wheel.





# Electronic Musical Instruments

## Unit 5 – Electronic Instrument Performance Techniques

Pitch bending using a pitch bend joystick: place your hand on the instrument and use your thumb and forefinger to control the joystick.




The symbol for bending a note up is . The symbol for bending a note down is .

*Suggested GM sound for "Rock On!" – 81 (Square Lead)*

### Rock On!

Pitch Bend Exercise

Don Muro




Excerpt from "Concert Suite" for recorders and CD accompaniment  
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# Electronic Musical Instruments

## Unit 5 – Electronic Instrument Performance Techniques

### Vibrato

The symbol for adding vibrato is .

(Note: in some cases the abbreviation “vib.” is used to indicate vibrato.)

*Suggested GM sound for “The Secret Stairway” – 83 (Synth Calliope)*

### The Secret Stairway

Vibrato Exercise

Don Muro



21

*mf*

*f*

Excerpt from "8 More Easy 8 Songs" for recorders and CD accompaniment  
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# Electronic Musical Instruments

## Unit 5 – Electronic Instrument Performance Techniques

The next piece features the use of pitch bending and vibrato at the same time.

*Suggested GM sound for “Into The Future!” – 82 (Saw Lead)*

**Into The Future!**  
Pitch Bend and Vibrato Exercise

Don Muro

The musical score consists of four staves of music in treble clef, 4/4 time. The first staff begins with a 4-measure rest, followed by a repeat sign and a melody starting on a middle C. The melody is marked with a mezzo-forte (mf) dynamic and includes several wavy lines indicating vibrato. The second staff continues the melody with more vibrato. The third staff starts at measure 37, marked with a box containing the number 37, and continues the melody. The fourth staff ends the piece with a forte (f) dynamic and a final wavy line. The score is enclosed in a rectangular box.

Excerpt from "7 Switched - On Songs" for recorders and CD accompaniment  
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After mastering *Into The Future*, try performing *The Secret Stairway* again, this time playing only the note “A” on the keyboard and bending up for the “B” and down for the note “G.” Experiment with bending at different speeds (slow slides vs. fast scoops). Continue to add vibrato to the notes as marked.

### Shakes

A shake effect can be produced by rapidly sliding the pitch bend wheel/joystick up and back a few times.

The symbol for adding a shake is  $\wedge$ .

# Electronic Musical Instruments

## Unit 5 – Electronic Instrument Performance Techniques

Suggested GM sound for “Sanctuary” – 108 (Koto)

### Sanctuary

D. Muro

Excerpt from "8 More Easy 8 Songs" for recorders and CD Accompaniment  
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### BASIC IMPROVISATION USING PITCH BENDING, VIBRATO AND SHAKES

PRACTICE ADDING PITCH BENDING, VIBRATO AND SHAKES WHILE IMPROVISING A SOLO. PLAY ALONG WITH THE MP3 FILE “LET’S DANCE IMPROV.” THE SONG IS HARMONICALLY STRUCTURED SO THAT ANY WHITE KEYS CAN BE PLAYED WITHOUT SOUNDING “WRONG.” THE ACCOMPANIMENT IS 64 MEASURES LONG, GIVING EACH OF 16 PARTICIPANTS A FOUR MEASURE IMPROVISATION.

(NOTE: A DEMO SOLO USING ONLY WHITE KEYS CAN BE HEARD ON THE MP3 FILE “LET’S DANCE IMPROV DEMO.”)

# Electronic Musical Instruments

## *Unit 5 – Electronic Instrument Performance Techniques*

### Using Program Chains

By Don Muro

In the days before keyboards with internal memory, the performer's ability to change sounds in live performance was determined by programming skills. My colleagues and I spent many hours practicing so that we could change sounds quickly by tweaking the sliders and knobs on instruments such as the Minimoog and the ARP Odyssey. The arrival of instruments with internal memory (such as the Prophet 5 and the Oberheim OBX) was considered a miracle at the time. With the capacity of storing all of 40 sounds, we knew we were living large with these instruments.

Today's electronic keyboards are capable of storing many sounds. These sounds are usually called *programs*. Inexpensive keyboards may store several dozen programs; more expensive keyboards might store several hundred programs in groups (or "banks") of 100 or 128 programs. Most sequencing and notation software makes it easy to access these sounds. In live performance, however, attempting to access several sounds spread over different banks can be a challenge. For example, switching from Program A11 to Program B127 requires pressing at least four buttons on most keyboards. This can be difficult for younger students, especially if the music allows only a few beats for the sound change.

This problem can be solved on almost every electronic keyboard used in labs today. Here is a step-by-step procedure to create a program chain – a grouping of user-selected programs into an incremental order for a specific song. The only programming skill needed is the ability to copy programs to different memory locations. (Consult your keyboard's owner's manual to learn how to copy or "write" programs. Also, be sure that you have the ability to restore the programs you will erase.)

1. Select the programs you want to use for the song and write the program numbers on paper in the desired order. Figure 1 shows a list of sounds I want to use as an example for my song, "My Theme".

PROGRAM ORDER FOR "My Theme"	
	B63 Magical Bells
	D51 Syn Pipes
	A115 Watcher Of The Sky
	D51 Syn Pipes
	C12 Sine Switcher

*Fig. 1*

# Electronic Musical Instruments

## Unit 5 – Electronic Instrument Performance Techniques

7. Select the program numbers that will be used to create the chain. For this example we will need five adjacent program locations. Try to find programs that you don't use very often and that aren't used in any combinations you may be using in the same performance. For this example I will choose programs A50 through A54. Write these new program locations on paper next to the original program list. See Figure 2.

PROGRAM ORDER FOR "My Theme"	
<u>SOUNDS</u>	<u>NEW LOCATION</u>
B63 Magical Bells	A50
D51 Syn Pipes	A51
A115 Watcher Of The Sky	A52
D51 Syn Pipes	A53
C12 Sine Switcher	A54

*Fig. 2*

3. Select the first program and copy it to the new location. First, select Program B063. Access the screen that allows you to save (or write) the program to memory and save it to Program A50. When you do this you will erase the original sound stored in Program A50 and replace it with "Magical Bells". (Bear in mind that you now have two copies of "Magical Bells" – the original version in B063, and the copied version in A50.)
4. Repeat Step 3 and copy the remaining programs in the list. Using the same method, copy Program D51 to A51, A115 to A52, D51 to A53, and C12 to A54. It's easy to get confused, especially if you are copying several programs. Remember to first select the sound to be copied and then copy it to the desired location. Place a check mark on the paper after each operation so that you know where you are. Fig. 3 shows the completed program chain as it will appear on the Triton.

PROGRAM ORDER FOR "My Theme"	
<u>SOUNDS</u>	<u>NEW LOCATION</u>
B63 Magical Bells	A50 Magical Bells
D51 Syn Pipes	A51 Syn Pipes
A115 Watcher Of The Sky	A52 Watcher Of The Sky
D51 Syn Pipes	A53 Syn Pipes
C12 Sine Switcher	A54 Sine Switcher

*Fig. 3*

# **Electronic Musical Instruments**

## ***Unit 5 – Electronic Instrument Performance Techniques***

5. Save the chain. Back up your new program chain either to an internal drive, a USB drive, or to another MIDI device using System Exclusive.

You can now step through the proper sequence of programs for the song by using the program advance button on the keyboard (usually the “UP/YES button). On most keyboards you can also assign a footswitch to advance programs incrementally. By placing a simple cue mark in a score, an elementary student can step through several sound changes in a song quickly and easily.



# Electronic Musical Instruments

## *Unit 6 – Electronic Musical Instrument Ensembles*

### Objectives

Upon completion of this unit, you will be able to:

- Demonstrate basic arranging, rehearsal and performance techniques for electronic instrument ensembles.
- PLAY EXISTING BAND AND ORCHESTRA ARRANGEMENTS AND LEAD THE CLASS IN THE PERFORMANCE OF SUCH A PIECE.

### Activities

- Perform a three or four part piece with multiple timbres
- Perform a multi-part piece with a percussion accompaniment
- Read the articles “Using Program Chains” and “Setting Up a Keyboard for Two Students”
- ARRANGE AND PERFORM AN EXCERPT FROM AN EXISTING BAND OR ORCHESTRA PIECE USING ELECTRONIC INSTRUMENTS

### Procedures

The instructor will lead the class in the performance of an ensemble of electronic instruments.

#### EXERCISE #1

*(Note: if possible, divide the class into four quartets.)*

Perform *Celestial Garden* using the following sounds: Part I – oboe; Parts II and III – clarinet; Part IV – bassoon. Try to play as idiomatically as possible, adding vibrato to sustained notes on the oboe and bassoon sounds. Note the dynamic changes and don't forget to breathe.

# Electronic Musical Instruments

## Unit 6 – Electronic Musical Instrument Ensembles

3

### CELESTIAL GARDEN

DON MURO

$\text{♩} = 104$

The musical score is written for four parts, labeled I, II, III, and IV. The key signature is one sharp (F#), and the time signature is 4/4. The tempo is marked as  $\text{♩} = 104$ . The score is divided into two main sections, [A] and [B].

Section [A] begins with a rest for part I, followed by a melody in part II starting on G4. Part III and IV provide a harmonic accompaniment. Dynamics include *mp* (mezzo-piano) for parts II, III, and IV, and *mf* (mezzo-forte) for part I.

Section [B] continues the musical development, with part I entering with a melody. Dynamics include *mp* for parts I, II, and III, and *mf* for parts IV and I.

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# Electronic Musical Instruments

## Unit 6 – Electronic Musical Instrument Ensembles

4

The musical score consists of four staves in G major (one sharp). The first system (measures 1-4) shows a melodic line in the first staff, a harmonic accompaniment in the second, a bass line in the third, and a bass line in the fourth. The second system (measures 5-8) includes a [C] marking above the first staff, with dynamics *mf* and *mp* indicated. The third system (measures 9-12) features dynamics *mf*, *mp*, and *p* across the staves. The fourth system (measures 13-16) includes dynamics *dim.*, *pp*, and *cresc.* at the bottom.

# Electronic Musical Instruments

## Unit 6 – Electronic Musical Instrument Ensembles

[D] 5

The musical score is written for three systems of electronic musical instruments, each consisting of four staves (treble and bass clef). The key signature is D major (two sharps). The first system begins with a [D] chord symbol and a page number 5. The first staff of the first system has a *mp* dynamic marking. The second system features a *mp* dynamic marking on the first staff. The third system includes a variety of dynamics: *p* on the first staff, *pp* on the second staff, and *ppp* on the third staff. It also includes *dim.* (diminuendo) and *rit.* (ritardando) markings. The score concludes with a double bar line.

# Electronic Musical Instruments

## Unit 6 – Electronic Musical Instrument Ensembles

### EXERCISE #2

Divide the class into four quartets and assign each group member one of the following four parts. After rehearsing the parts, play the piece along with the “Let’s Dance Piano/Percussion” MP3 file.

(Note: The following keyboard parts have been notated so that they can be read by beginning keyboard players. “Let’s Dance” is excerpted from the Music Expressions MIDI Keyboard Curriculum, published by Alfred Music. Used by permission.)

*Suggested GM sound for “Melody” – 83 (Calliope Lead)*

**Let’s Dance**  
(Melody)

By DON MURO

♩ = 128  
Fingering: 2  
vib.  
mf

2 3 4 5 4 3 2 2

(pitch bend)

vib.  
2 2 3 4 5 4 3 2 2

9 vib.  
2 2 3 4 5 etc.  
f

vib.

17 vib.  
ff

vib.

> >

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(Note: the melody can be played one octave higher beginning at measure 17.)

# Electronic Musical Instruments

## Unit 6 – Electronic Musical Instrument Ensembles

Suggested GM sound for “Chords” – 03 (Electric Grand Piano)

**Let's Dance**  
(Chords)

By DON MURO

♩ = 128

Fingering:  $\begin{smallmatrix} 5 \\ 3 \\ 1 \end{smallmatrix}$  *Play one octave lower than written*  $\begin{smallmatrix} 5 \\ 3 \\ 1 \end{smallmatrix}$   $\begin{smallmatrix} 5 \\ 3 \\ 1 \end{smallmatrix}$  etc.

*mf*

*f*

*ff*

*vib.* *vib.* *vib.* *vib.*

*vib.* *vib.* *vib.* *vib.* *>*

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# Electronic Musical Instruments

## Unit 6 – Electronic Musical Instrument Ensembles

Suggested GM sound for “Bass” – 33 (Acoustic Bass)

**Let's Dance**  
(Bass)

By DON MURO

♩ = 128 *Play in the lowest octave on the keyboard*

Fingering: 5 5 5 2 2 2 1 1 1 etc.

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# Electronic Musical Instruments

## Unit 6 – Electronic Musical Instrument Ensembles

Suggested GM sound for “Brass” – 62 (Brass Section)

**Let's Dance**  
(Brass)

By DON MURO

♩ = 128  
Fingering: 2 2 2 2 1 2 etc.

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ADDITIONAL EXERCISE: PARTICIPANTS WILL ARRANGE AN EXCERPT FROM A BAND OR ORCHESTRA PIECE FOR ELECTRONIC INSTRUMENT ENSEMBLE PERFORMANCE.



# **Electronic Musical Instruments**

## ***Unit 6 – Electronic Musical Instrument Ensembles***

### **Setting Up a Keyboard for Two Students**

By Don Muro

*(Almost every electronic keyboard used in labs can be set up as two different instruments. Here's how to make it easier for your students to hear what they are playing.)*

More and more schools are incorporating keyboard labs into the music curriculum. Ideally, each student should have his/her own workstation consisting of either a keyboard or a keyboard connected to a computer via MIDI. In many cases, however, labs are designed to accommodate two students at each keyboard. This setup poses no problems when students are learning basic sequencing or notation skills. However, it does present problems when students are involved in any type of performance, either when playing along with a recorded accompaniment or playing together as part of an ensemble. The two students at each keyboard usually use the same sound and play musical parts separated by two or possibly three octaves. This setup has the following limitations:

*The musical arrangement will sound different* – doubling any musical part at the octave changes the texture of the music. Playing a melody two or three octaves higher or lower than written creates an effect quite different from playing the melody as written. This problem becomes more serious when students are octave doubling an inner voice such as an alto part or tenor part.

*The students will have difficulty determining what they are playing* – both students are hearing the same sound with no difference in timbre or left-right location. The only available audio cue is the octave displacement – something that can be difficult to discern through headphones, especially for younger students.

*Musical expression will be limited* – adding expressive details such as vibrato or volume changes will affect both notes identically. This limitation becomes even more apparent if the two students are playing different musical parts.

These problems can be solved on almost every electronic keyboard used in labs today. Here is a step-by-step procedure to create a setup allowing each student to use a unique sound, to hear the sound clearly, and to add expressive qualities to the sound. (Consult your owner's manual to locate the specific parameters described below.)

*Step 1: Enter the combination mode on your keyboard and select a “split” type combination such as Piano/Bass or Acoustic Guitar/Bass. Although you can start with any combination,*

# Electronic Musical Instruments

## *Unit 6 – Electronic Musical Instrument Ensembles*

it's usually much easier to begin with a combination that is close to the setup you want to create.

*Step 2: Select the split point for the two sounds.* In most cases, what appears to be “middle C” on the keyboard should be used as the split point.

*Step 3: Select the sound for each split section.* Let's suppose that you want both students to play a melody using two different sounds – oboe (GM69) and clarinet (GM72). If you want the student on the left side to use the oboe sound, select GM69 for the left (or lower) split section and select GM72 for the right (or upper) split section.

*Step 4: Transpose the sounds as needed.* In most cases you will have to transpose the sound used in the lower split section up by two octaves. You will also have to transpose the sound used in the upper split section down by one or two octaves, depending upon the size of the keyboard. As I mentioned earlier, it's very important to play musical parts in their proper octave.

*Step 5: Edit the output assignment for the sounds.* Using the pan assignment controls, set the lower split sound so that it emanates primarily from the left headphone. Set the upper split sound so that it emanates primarily from the right headphone. If your keyboard lets you define pan positions as ratios (where 50:50 indicates a center position between the left and right headphones), use a ratio of 80:20 for the lower sound and 20:80 for the upper sound.

*Step 6: Assign appropriate controllers to each split section.* Some keyboards allow you to assign controllers to either split section. For example, you might want the student playing the oboe sound to use the modulation controller to add vibrato occasionally, but you don't want the vibrato to affect the clarinet. This performance effect can be created by disabling the modulation controller for the upper split section. Other controllers such as aftertouch, assignable sliders/knobs, and damper pedals can also be enabled or disabled for each split section.

*Step 7: Save the combination:* Rename your combination and save it to a new memory location. You can easily create a library of sound combinations for specific pieces simply by editing the program numbers in the combination and then saving the edited combination to a new memory location.

Using these setups, your students will have a much easier time hearing themselves play – just be sure they aren't wearing their headphones backwards.

# Electronic Musical Instruments

## *Unit 7 – Electronic Musical Instruments in the Music Classroom*

### Objective

Upon completion of this unit, you will be able to describe ways in which electronic instruments can be used in the classroom.

### Activities

- Participants will discuss the use of electronic instruments at various levels of K-12 teaching
- Participants will complete a worksheet on applications of electronic musical instruments and learning
- Participants will create a lesson plan incorporating electronic musical instruments.

### Procedures

The instructor will explain and demonstrate the following

1. Areas of musical study such as keyboard classes and performing ensembles of electronic instruments.
2. Where to find music for electronic ensembles.
3. Instructional materials available for using electronic instruments in the classroom.

### Notes

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# Electronic Musical Instruments

## *Unit 7 – Electronic Musical Instruments in the Music Classroom*

### Activity Sheet

#### **Electronic Instruments, the National Standards and the TI:ME Strategies for Music Education**

1. Which national standard(s) can be addressed using electronic instruments?

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2. What specific ways can electronic instruments be used to address these standards?

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#### **MENC Standards:**

1. Singing, alone and with others, a varied repertoire of music.
2. Performing on instruments, alone and with others, a varied repertoire of music.
3. Improvising melodies, harmonies, and accompaniments.
4. Composing and Arranging Music within specified guidelines.
5. Reading and notating music.
6. Listening to, analyzing and describing music.
7. Evaluating music and music performances.
8. Understanding relationships between music, the other arts, and disciplines outside the arts.
9. Understanding Music in Relation to History and Culture.

3. Review the Teaching Strategies listed in the TI:ME technology strategies document. See Appendix A of the *Technology Strategies for Music Education*. Which ones from the electronic instruments area are most applicable to your teaching position?

TI:ME Tech. Strategy #

Teaching Application

- |          |       |
|----------|-------|
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |

Describe how you could implement TI:ME teaching strategies in your teaching position.

# Technology Institute for Music Educators

## **Basic Skills in Music Technology (TI:ME 1A)**

Notation, Music Production, and Electronic Musical Instruments

### **Section 3: Music Production Software**



By Marc Jacoby

Course Editor: Don Muro

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# Music Production Software

## *Syllabus*

### Description

The purpose of this section of Basic Skills in Music Technology is to instruct participants in basic skills in using a music production program and its integration into both classroom and performance-based music instruction. The instructor will also provide participants with the information they need to make critical judgments about the appropriateness of selected music production programs for particular educational applications. The format of this course alternates presentations with class activities, many of which serve to assess student progress. In addition to satisfactory participation in class activities, a final project in music production is required for certification.

The participant demonstrates basic skills in using a music production program to edit and mix pre-recorded files as well as to create original recordings from model arrangements. The majority of musical examples in this section are drawn from commercial or pop music genres.

### Prerequisite Skills

The prerequisites for this course are basic computer skills and basic piano keyboard skills. These include:

- using a computer keyboard
- using a mouse for pointing, clicking, and dragging
- opening and saving files
- music reading in treble and bass clefs
- playing rhythms, melodies and/or chords on a piano or other keyboard instrument

### Additional Information

**Basic Skills in Music Technology** may be offered as a two-credit or three-credit graduate course. Unit Topics listed in ALL CAPS within the module outline need not be included in the course when it is offered for two graduate credits only. The instructor of the course should be approved by TI:ME and experienced in teaching technology to in-service music teachers. It is highly recommended that the class size be limited to allow for one participant per computer and no more than 16 participants per instructor. Additional participants may be accommodated if computer workstations and assistants are available. Each participant will need approximately 20 hours working alone on a workstation in order to complete the final projects and class activities.

# Music Production Software

## *Syllabus*

### Final Production Project

Participants will complete a final music production project of at least 24 measures in length, 5 or more tracks, with at least 5 different timbres. Participants are free to select their own projects that meet the criteria. *Participants are encouraged to select their own project that meets the criteria as well as being applicable to their personal teaching assignment. In the absence of an expressed preference, participants may record any Bach Fugue.* This project will be submitted to the instructor as an MP3.

### Hardware Requirements

A computer lab/classroom consisting of multimedia computers connected to MIDI keyboards is the standard recommended configuration. The teacher's station should have a projection device and sound system to allow the instructor's screen to be viewed by the entire class.

When possible, a sound system connecting all MIDI devices in the room should be used to allow for class activities in keyboard performance.

### Software Requirements

While the use of professional-grade Music Production software such as Apple Logic, Steinberg Cubase, or Avid ProTools is encouraged, programs such as Apple GarageBand or Acoustica Mixcraft or other software designed for amateur musicians and students can be used as well.

*Please Note: The activities in this syllabus often specify the use of specific scores that are provided in the course materials. Instructors may choose other pieces for these activities.*

**SUPPLEMENTAL SOURCE MATERIAL ARE AVAILABLE  
IN THE INSTRUCTOR'S SECTION OF TIME'S WEBSITE**

# Music Production Software

## *Unit 1 - An Overview of Music Production Programs*

### Objectives

Upon completion of this unit, you will be able to:

- Understand basic navigation and operation features of music production software
- Effectively operate the software's transport controls

### Activities

- Open and navigate around documents
- Operating the software's transport controls
- Navigate within the song's timeline and arrangement window

### Materials

The instructor will provide a music production software document for participants to use for hands-on navigation. The provided document must contain multiple tracks.

### Procedures

The instructor will explain and demonstrate the following:

1. Definition of Music Production software
2. Opening song files in the music production software
3. Song playback features using the transport controls
4. Tempo and metronomic controls
5. Navigation of the software environment
6. Importing .MID files into the music production software

### Notes

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# Music Production Software

## *Unit 2 - Using Loops to Produce a “pop/commercial” Music Project*

### Objectives

Upon completion of this unit, you will be able to:

- Understand the concept of loops and their uses in music production software.
- Effectively browse and select loops.
- Insert loops into a song’s arrange window.
- Edit loops

### Activities

Participants will use loops to create a short (approx. 16 bars) musical phrase based upon a “popular” or “commercial” style (i.e. rock, country, techno, latin, etc.).

### Materials

Participants will chose from the selection of loops installed on the institution’s platform and software package.

### Procedures

- 1.The instructor will explain and demonstrate the following:
- 2.Creating a new file from templates or blank document
- 3.Mechanics of loops (i.e. what distinguishes a loop file from any other audio file)
- 4.Browsing or Searching for Loops within the program
- 5.Importing loops into the music production program
- 6.Characteristics of audio loops versus MIDI/Software Instrument loops
- 7.Placing audio and/or MIDI loops into a song’s arrangement environment
- 8.Adjusting loop playback speed, length and pitch
- 9.ADVANCED PLAYBACK FEATURES USING THE TRANSPORT CONTROLS (REGION LOOPING, MARKERS)

### Notes

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# Music Production Software

## *Unit 3 - Multi-Track Mixing And Final File Preparation*

### Objectives

Upon completion of this unit, you will be able to:

- Understand the basic signal flow of virtual mixers and their uses in music production software.
- Mix a multiple-track recording to a two-track file
- Export to a file format appropriate for the distribution model

### Activities

Participants will work with a multi-track file setting volume, pan and effects to create a final mixed file in MP3 format.

### Materials

Participants will use the multi-track loop composition created in *Unit 2* to create a final mixed file.

### Procedures

The instructor will explain and demonstrate the following:

1. Introduction to mixers and signal flow
2. Basic procedures for mixing a multi-track recording
3. Track settings (volume, pan, mute and solo)
4. Adding audio effects (to individual tracks or master track)
5. Track automation (Volume and Pan)
6. TRACK AUTOMATION (EQUALIZATION AND EFFECTS)
7. Exporting the final mix to various file formats (MP3, AAC, WAV)

### Notes

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# Music Production Software

## *Unit 4 – Recording Using MIDI and Software Instruments*

### Objectives

Upon completion of this unit, you will be able to:

- Understand the concept software-based instruments and their uses in music production software.
- Adding new tracks to a project
- Fundamentals of real-time multi-track recording
- Creating parts in non real-time (Step Entry)

### Activities

Participants will record a short multi-track drum set groove from a provided notated example. Tracks should contain at least 4 percussion parts simulating a live drummer's performance.

### Materials

The instructor will provide notated drumset examples for students to choose. Some participants may be interested and able to create their own custom recordings. Tracks should contain at least 4 percussion parts simulating a live drummer's performance.

### Procedures

The instructor will explain and demonstrate the following:

1. Fundamentals of MIDI recording (i.e. track and MIDI channel assignment)
2. Latency and preference settings to ameliorate delay
3. Arming tracks for recording
4. Metronome and count-off settings
5. Recording in real-time
6. Basic quantizing techniques
7. Recording in step-time
8. ADDING EVENTS WITH DRAWING TOOLS

### Notes

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# Music Production Software

## *Unit 4 – Recording Using MIDI and Software Instruments*

### Grooves for Drumset

*Key*



HiHat Foot   Bass Drum   Snare   Rim Click   HiHat w/Stick   Open HiHat w/Stick

*♩ = 98*



*♩ = 115*



*♩ = 104*



*♩ = 110*



*♩ = 116*



*♩ = 180*



# Music Production Software

## *Unit 5 – Editing Techniques, Part I*

### Objective

Upon completion of this unit, you will be able to edit tracks originally recorded using software instruments to fix timing and pitch errors

### Activities

Participants will use a sequence provided by the teacher that contains wrong pitches and rhythms. Participants will then correct the wrong notes using any of the editing techniques demonstrated.

### Materials

Instructor will supply a short musical example in both notated and Standard MIDI File (.MID) for importing into the Music Production software.

### Procedures

The instructor will explain and demonstrate the following:

1. Correcting wrong pitches (re-recording, punch-in, notation-based point/click, EVENT EDITING)
2. Correcting rhythmic errors (re-recording, punch-in, notation-based point/click, selective quantization, EVENT EDITING)
3. Correcting dynamics (velocity - notation-based point/click, EVENT EDITING; volume - graphic view of controller data, EVENT EDITING)
4. Adding global tempo changes

### Notes

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# Music Production Software

## *Unit 6 – Editing Techniques, Part II*

### Objective

Upon completion of this unit, you will be able to edit global tempo settings to create instant and gradual tempo changes

### Activities

Participants will use pencils to write tempo changes into the score as indicated by the teacher. Participants will then add tempo changes to the file using any of the editing techniques demonstrated.

### Materials

Instructor will supply a short musical example in both notated and Standard MIDI File (.MID) for importing into the Music Production software.

### Procedures

The instructor will explain and demonstrate the following:

1. Using the global track settings for creating instant tempo changes
2. Using the global track settings for creating gradual tempo changes

### Notes

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# Music Production Software

## Unit 7 - Recording a Multi-Track Passage (Quintet arrangement)

### Objectives

Upon completion of this unit, you will be able to:

- Use MIDI recording techniques and software instruments to record an ensemble arrangement
- Identify characteristics of recording digital instruments

### Activities

Participants will record an excerpt originally arranged for woodwind quintet of *The Sorcerer's Apprentice* by Paul Dukas. They will record in a style inspired by the Wendy Carlos recording, *Switched on Bach*. Students will mix down and save to disk as an MP3 file.

### Materials

An excerpt of *The Sorcerer's Apprentice* arranged for five instruments is provided in this workbook.

### Procedures

The instructor will explain and demonstrate the following:

1. Using Music Production software to re-orchestrate classical literature
2. Listening and evaluating electronic timbres
3. EDITING SOFTWARE INSTRUMENTS

### Notes

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# Music Production Software

## Unit 7 - Recording a Multi-Track Passage (Quintet arrangement)

**The Sorcerer's Apprentice**

Paul Dukas

**Allegro**

The image displays a musical score for 'The Sorcerer's Apprentice' by Paul Dukas, specifically the 'Allegro' section. The score is presented in a multi-track format, with five parts labeled Part 1 through Part 5. Part 1 is the main melody, while Parts 2 through 5 provide harmonic support. The music is in 3/8 time, key of B-flat major, and marked 'Allegro'. The score includes dynamics such as 'mp' (mezzo-piano) and 'mf' (mezzo-forte). The notation shows various musical elements like notes, rests, and articulation marks. The score is divided into measures, with measures 5 through 9 visible. The score is written for a quintet arrangement, with each part on its own staff.



# Music Production Software

## Unit 7 - Recording a Multi-Track Passage (Quintet arrangement)

The image displays a multi-track musical score for a quintet arrangement, organized into three systems. Each system contains five staves, labeled P1 through P5 from top to bottom. The notation is as follows:

- System 1 (Measures 10-11):** Measures 10 and 11 are shown. P1-P5 have various notes and rests. P1 has a measure rest in measure 11. P2-P5 have notes in measure 11.
- System 2 (Measures 12-13):** Measures 12 and 13 are shown. P1-P5 have various notes and rests. P1 has a measure rest in measure 13. P2-P5 have notes in measure 13.
- System 3 (Measures 14-15):** Measures 14 and 15 are shown. P1-P5 have various notes and rests. P1 has a measure rest in measure 15. P2-P5 have notes in measure 15.

Dynamic markings include *p* (piano) and *f* (forte) across the staves.

# Music Production Software

## *Unit 8 - Recording An Audio Track*

### Objectives

Upon completion of this unit, you will be able to:

- Use music production software to record an audio track.
- Understand the mechanics of podcasting and RSS feeds

### Activities

Participants will record a podcast excerpt describing the processes they used to record *The Sorcerer's Apprentice* from Unit 5. Students will mix down and save to disk as an MP3 file.

### Procedures

The instructor will explain and demonstrate the following:

1. What is a podcast
2. Possible uses in music education
3. Using Music Production software to record audio
4. Microphone types and applications
5. Setting levels for recording
6. Mixing and final file formats
7. ADVANCED PODCAST MIXING (DUCKING, ETC.)

### Notes

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# **Music Production Software**

## ***Unit 9 - Recording A Commercial Groove***

### **Objective**

Upon completion of this unit, you will be able to use music production software for recording musical phrases that include both loops and custom created and recorded tracks

### **Activities**

Participants will record a short excerpt of a groove selected from an example below or provided by the instructor. The recording should include: multi-track drum set/percussion, bass, piano, and solo or lead line.

### **Materials**

Example grooves are provided on the following pages or the instructor may provide one of their own. Some participants may be interested and able to create their own custom recordings.

### **Procedures**

1. Record a multi-track percussion part
2. Record bass
3. Record piano
4. Record remaining tracks
5. Create and Record a solo part either via MIDI or live recorded performance
6. Edit as necessary
7. Mix down to single MP3 file

# Music Production Software

## Unit 9 - Recording A Commercial Groove

*Cuban Descarga*

$\text{♩} = 90 - 132$

The musical score is arranged in a multi-staff format. The top staff is for the Clavé, followed by Cowbell, Timbales, Congas, Guiro, Maracas, Piano, and Bass. The Clavé part is written in a single-staff notation with a key signature of one sharp (F#) and a 4/4 time signature. The tempo is marked as 90-132 beats per minute. The Piano part is written in a grand staff (treble and bass clefs) with a key signature of one sharp (F#) and a 4/4 time signature. The Bass part is written in a single-staff notation with a key signature of one sharp (F#) and a 4/4 time signature. The Congas, Guiro, and Maracas parts are written in a single-staff notation with a key signature of one sharp (F#) and a 4/4 time signature. The Timbales part is written in a single-staff notation with a key signature of one sharp (F#) and a 4/4 time signature. The Cowbell part is written in a single-staff notation with a key signature of one sharp (F#) and a 4/4 time signature. The Clavé part is written in a single-staff notation with a key signature of one sharp (F#) and a 4/4 time signature. The Piano part is written in a grand staff (treble and bass clefs) with a key signature of one sharp (F#) and a 4/4 time signature. The Bass part is written in a single-staff notation with a key signature of one sharp (F#) and a 4/4 time signature.

# Music Production Software

## Unit 9 - Recording A Commercial Groove

### GOSPEL GROOVE

$\text{♩} = 72$

Piano

Bass Guitar

Drum Set

Org.

Pno.

Bass

Dr.

The musical score is arranged in two systems. The top system contains staves for Piano, Bass Guitar, and Drum Set. The bottom system contains staves for Organ, Piano, Bass, and Drums. The Piano part features complex chordal textures with many beamed eighth and sixteenth notes. The Bass Guitar part provides a steady accompaniment with eighth-note patterns. The Drum Set part includes a consistent bass drum and snare pattern. The Organ and Piano parts in the bottom system play sustained chords and moving lines. The Bass part in the bottom system has a more active eighth-note pattern. The Drums part in the bottom system shows a more complex pattern with triplets. The tempo is marked as 72 beats per minute.

# Music Production Software

## Unit 9 - Recording A Commercial Groove

Dr. Bass Pno. Org. CODA

The musical score is written for four instruments: Drums (Dr.), Bass, Piano (Pno.), and Organ (Org.). The score is organized into four systems, each containing a measure for each instrument. The first system is marked with a double bar line and a repeat sign. The second system is marked with a double bar line and a repeat sign. The third system is marked with a double bar line and a repeat sign. The fourth system is marked with a double bar line and a repeat sign. The score includes various musical notations such as eighth notes, quarter notes, and half notes, as well as rests and accidentals. The organ part features a prominent melodic line in the first system, while the piano part provides harmonic support. The bass and drums parts provide a steady rhythmic foundation. The score concludes with a CODA section.

# Music Production Software

## Unit 9 - Recording A Commercial Groove

### C&W GROOVE

$\text{♩} = 114$  Texas Shuffle (swing 8ths)

*f*

Piano/  
Guitar

Bass Guitar

Drum Set

Pro.

Bass

Dr.

To Casa (Last 8)

8

4

# Music Production Software

## Unit 9 - Recording A Commercial Groove

**R&B GROOVE**

$\text{♩} = 80$

Electric Piano

Bass Guitar

Drum Set

E. Pno.

Bass

Dr.

Chords:  $A\flat^{\flat 3}$ ,  $C^{\flat}/D$ ,  $G^{\flat}m^{\flat 3}$ ,  $E\flat^{\flat 3}$ ,  $G^{\flat}m^{\flat 3}/D$ ,  $G^{\flat}m^{\flat 3}$ ,  $E\flat^{\flat 3}$ ,  $G^{\flat}m^{\flat 3}$

To Coda (Last X)

8

4

The musical score is for an R&B groove. It features six staves: Electric Piano, Bass Guitar, Drum Set, E. Pno., Bass, and Dr. The tempo is 80 beats per minute. The key signature has one flat (Bb). The score includes various chords and a 'To Coda' section. The Electric Piano part has a melody with eighth and sixteenth notes. The Bass Guitar part has a steady eighth-note pattern. The Drum Set part has a simple four-beat pattern. The E. Pno. part has a melody with eighth and sixteenth notes. The Bass part has a steady eighth-note pattern. The Dr. part has a simple four-beat pattern. The score includes various chords and a 'To Coda' section.



# Music Production Software

## *Discussion -Seven Suggestions for Improving Sequences*

### Seven Suggestions for Improving Sequences

Don Muro

When I evaluate students sequences, I often find that the students could have profited by utilizing one or more of the suggestions listed below. The suggestions are designed to make the process of sequencing more efficient and more musical.

**Suggestion #1:** *Be familiar with the music to be sequenced.* A great deal of recording time and editing time can be saved by familiarizing yourself with the score and by slowly practicing each part before beginning to record. If possible, listen to a recorded version of the composition. Examine the frequency range, the dynamic range, and the timbral range of the score. Know where musical climaxes occur so that you will be able to adjust volume levels and sound combinations appropriately. Be aware of the articulation idiosyncrasies of each instrument you will be emulating. In other words, try to overcome the limitations of a keyboard and think like a violinist when recording a violin part; think like a clarinetist when recording a clarinet part.

**Suggestion #2:** *Number the measures in the score.* Using a score with all of the measures numbered will make it easy to locate specific measures for rerecording, for editing and for playback. Be sure to number repeated measures correctly. For example, if the first sixteen measures of a piece repeat, measure 1 will also be measure 17, measure 2 will also be measure 18, and so on.

**Suggestion #3:** *Set the metronome at a comfortable tempo.* If you can't play the music at the indicated tempo, choose a slower tempo for the recording process. For example, suppose that the tempo indication for a difficult melody is 120 bpm (beats per minute). If you feel more comfortable playing the melody at a metronome marking of 80 bpm, set the tempo indicator to 80 bpm and record the melody at this tempo. After you finish recording, change the tempo indicator to 120 bpm, and the sequencer will play back at the correct tempo.

**Suggestion #4:** *When recording a punch-in, start playing along with the music before the punch-in point, and continue to play after the punch-out point.* One of the audible signs of a punch-in is a sudden change in the phrasing of a musical line. Playing the part a little before the punch-in point and a little after the punch-out point will often make the punch-in less obvious by maintaining the flow of the musical line.

**Suggestion #5:** *Match the dynamics of the punch-in music with the rest of the musical line.* Another audible sign of a punch-in is a sudden change in dynamics in the middle of a musical line. Be sure to match the dynamic level of the new musical material with the rest of the phrase.

# Music Production Software

## *Discussion -Seven Suggestions for Improving Sequences*

**Suggestion #6:** *Use quantization correctly and sparingly.* There are two points to consider before you use quantization. The first point to consider is that in quantizing a track, you might produce rhythms that sound unnatural or unmusical compared to unquantized parts of your music. It is important to understand that rhythmically perfect music is usually not a desired goal in musical performance. Sequences with every track quantized usually become rhythmically uninteresting; therefore, use quantization sparingly. Second, quantization will work only if you have recorded your tracks by playing along with the sequencer's metronome. Quantizing a track that was not recorded with the metronome will produce unpredictable and, in most cases, disastrous musical results.

**Suggestion #7:** *Understand the difference between velocity and MIDI volume.* It is important to understand the difference between controlling dynamics through velocity data and controlling dynamics through MIDI volume. When you lower the values of note velocities, in most cases you are lowering the volume level as well as making the tone quality darker. When you lower the MIDI volume, you are lowering only the volume level. This difference can be compared to a trumpet player who plays a melody very softly during a recording session, as opposed to a recording engineer who lowers the volume of a trumpet part after it has been recorded. When the trumpet player plays softly, the lower harmonics of the sound dominate, producing a darker tone quality. When the trumpet player plays loudly, the upper harmonics dominate, producing a brighter tone quality. Therefore, if the volume level of the recorded trumpet melody is lowered, the notes will be softer but the tone quality will not change. For this reason, the editing of dynamics through velocity values is usually used to control the dynamics of individual notes in a track; the editing of dynamics through MIDI