

Experiencing Music Technology

Annotated Table of Contents Draft for the Proposed 4th Edition

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August 13th Version

Preface

Rev Notes: See the newly revised Preface for the 4th Edition

- So, What's New with the Update?
- Book Content and Goals

Rev Notes: Revised to reflect the changes in the 4th Edition Preface. Prominent new features include an emphasis on core competencies in music technology based on the authors' research and materials keyed to desktop-laptop, web-based, and mobile (tablets and smartphones) software and hardware where appropriate.

- Experiencing Music Technology Support Website

Rev Notes: Completely redesigned support site through OUP that features news, software and hardware changes; third-party, free-access tutorials relevant to the topic in each Viewport; and material archived from previous versions of this book. These "Webports" will be noted with a new icon in the margins and will be updated bi-annually.

- Icons in the Margin of the Book
- Definitions
- Acknowledgments
- About the Authors

Rev Notes: The above would be updated to reflect the new 4th Edition.

Viewport I: Musicians and Their Use of Technology

- Overview
- Objectives
- Core Competency Projects (NEW) (was "Online Software Projects")

Rev Notes: As in all the beginning material for each Viewport, quotations, overview, objectives and any projects will be updated. The previous "Online Software Projects" will be expanded and refined to focus on a new thread for the

4th Edition, core competencies for music technology mastery. Relevant competencies and projects will be listed in the introduction of each Viewport.

- Webport for Viewport I: News, new products, third-party tutorials (updated bi-annually) (NEW)
- **Module 1: People Making Technology**
 - Ballet of Technology and Music
 - Five Periods of Technology History
 - Period I (1600s–mid-1800s)
 - Period II (mid-1800s–early 1900s)
 - Period III (early 1900s–mid-1900s)
 - Period IV (mid-1900s–1970s)
 - Period V (1970s–1990)
 - Period VI (1990–2010)
 - Period VII (2010–present) (NEW)
 - Important People in Music Technology’s Development

Rev Notes: This newer period would document the rise of mobile and hand-held devices, cloud-based computing, social computing and other significant developments for hardware and software (see revised preface) as well as selected people who contributed to the more current music technologies.

- **Module 2: People Using Technology**
 - The Unexpected Turn
 - Innovation and Creativity
 - Pacing

Rev Notes: Above sections would be updated as needed but most content is still excellent.

- Music Technology in Practice

Rev Notes: Both here and throughout the people featured in profiles throughout the book, examples of people using technology would be completely updated with new individuals reflecting the latest trends and applications.

- Core Competencies for Music Technology (NEW)
 1. Understand the basics of digital audio and how to edit digital audio files
 2. Demonstrate an understanding of acoustics and audiology
 3. Demonstrate a basic understanding of MIDI and its applications
 4. Record and mix a performance with digital audio software
 5. Create a streaming audio file sharing a recording or recordings
 6. Enter and edit music using notation software
 7. Create and edit a simple music video
 8. Demonstrate setting up a computer music workstation/problem solve common technical issues

9. Demonstrate an understanding of copyright and fair use
10. Create a music presentation with appropriate software and hardware
11. Use and manage a variety of social music sharing tools

Rev Notes: This new section will review the eleven core competencies developed through a four-year study by the authors to identify these as they apply to undergraduate music students. These competencies may apply to anyone interested in ensuring knowledge and skill needed to experience a broad range of music applications and apply them to real life practice. Each Viewport that follows will offer a suggested set of projects keyed, where appropriate, to these eleven competencies.

- **Module 3: People Questioning Technology**

- Ten Misconceptions
- No. 1. Does technology refer only to hardware?
- No. 2. Is there intimidating hidden “knowledge” inside the hardware?
- No. 3. Will the hardware break if something is done incorrectly?
- No. 4. Isn’t computer technology really reserved for the technical elite?
- No. 5. Doesn’t computer technology take too long to learn?
- No. 6. Isn’t computer technology only for the young?
- No. 7. Doesn’t technology remove the creative spirit, producing music that is antiseptic or sterile?
- No. 8. Aren’t computers, digital audio, MIDI, and DVDs, when used for teaching about music, just another expensive set of technological gimmicks that take time and money away from the real business of music education?
- No. 9. Doesn’t technology, not music, become the focus?
- No. 10. Isn’t it true that technology replaces musicians’ jobs?
- Resulting Attitudes

Rev Note: This module will be revised and updated since some of the misconceptions may be no longer valid and new issues have emerged.

- **Module 4: People Helping with Technology**

- People with Technical Skills
- Computer Facilities
- Print and Non-Print Materials
- Professional Associations
- Creative, entrepreneurial and community-based resources (NEW)

Rev Note: As with Module 3, this module will be revised to reflect the current resources that one may seek for computer support and training. The Webport for this Viewport will offer a rich set of online resources as well. A new section on creative, entrepreneurial and community-based collaboration and work will be added.

Viewport II: Computer and Internet Concepts for Musicians

- Overview
- Objectives
- Core Competency Projects (NEW) (was “Online Software Projects”)
- Webport for Viewport II: News, new products, third-party tutorials (updated bi-annually) (NEW)
- Music Technology in Practice

Rev Note: As in all of the overviews for each Viewport, quotations, objectives, and projects will be updated and new people/profiles will be featured. The previous “Online Software Projects” will be expanded and refined to focus on a new thread for the 4th Edition, core competencies for music technology mastery.

- **Module 5: Computer Operating Systems and Internet Software**
 - The Desktop: Your Computer and Its Operating System
 - Windows and Macintosh Operating Systems
 - Streams of Information
 - MIDI
 - Printer/Mouse/Keyboard
 - Look and Feel: Graphic and Touch User Interfaces (NEW)
 - Staying Organized with Hierarchical File Structure
 - Volumes, Folders, and Files
 - Naming Files
 - Web-based Software (NEW)
 - Web Browsers
 - Chrome OS
 - Flash, HTML 5, Java
 - Web MIDI
 - Mobile Software: Tablets, Smartphones, and Watches (NEW)
 - Android and iOS
 - Important Work Habits
 - Saving Files and Cloud Storage Options (NEW)
 - Importance of Copyright
 - Viruses, SPAM, Trojan Horses, and More (NEW)
 - Backing Up
 - Additional Good Habits for Maintaining Computing Tools
 - Connecting to the Internet
 - Types of Internet Software
 - Web Surfing and Searching
 - Email & Messaging
 - Twitter, Facebook, Pinterest, and More (NEW)
 - Digital Audio Purchasing, Sharing & Streaming (NEW)

Rev Note: The draft TOC above for this Module shows a restructuring that reflects a thread throughout the 4th Edition: making a distinction between desktop-laptop computer and applications, web-based applications, and mobile- or handheld-based apps for tablets and the like. Some technical details will be condensed or removed. These are topics that are outdated or no longer essential

to the present-day user and musician. Interestingly, many of the 3rd Edition concepts in this Module can be retained and streamlined. We have indicated (NEW) and major (REVISED) topics throughout.

- **Module 6: Computer and Networking Concepts**
 - Analog to Digital: Computers and the Analog World
 - Counting and Thinking with 1 and 0
 - Computer Bits and Bytes
 - Expressing data in streams of bits and bytes (NEW)
 - Internet Protocols: Computers Connecting to the Internet
 - Internet and Internet 2 Addressing
 - Server Internet Addresses
 - E-Mail Internet Addresses
 - Web Internet Addresses or URLs
 - Twitter Hashtags and Protocols (NEW)
 - Messaging (NEW)
 - Sharing Files over the Internet
 - Packaging and Compressing Files
 - Cloud Storage and Sharing (NEW)
 - Exchanging Documents with Universal File Formats
 - Exchanging Digital Audio and MIDI
 - Exchanging Graphics and Video
 - Streaming Options (NEW)

Rev Note: Some of the more technical issues that are not as important to the average user today will be deleted. Newer concepts related to cloud storage, streaming especially of music, and Twitter and messaging will be added.

- **Module 7: The Mechanics of Computers and Networking**
 - Computer Hardware Operations and the IPOS Model
 - Interfaces
 - Process
 - Input
 - Output
 - Storage
 - Tradeoffs Between Desktop & Laptop Computers, Tablets, and Smartphones (NEW)
 - Flash, CD and DVD Storage (REVISED)
 - Networking: Routes to Connectivity
 - Getting Access
 - Talking among Computers
 - Getting Connected

Rev Notes: General reworking on Module 7 is noted above. The section on the IPOS model will reflect differences in specifications between the variety of devices available from a traditional desktop to a tablet or smartphone. The networking section will be simplified with more emphasis on wireless, WIFI and Bluetooth. Newer methods of data storage will be introduced and older storage options removed.

Viewport III :~~Digital Audio Basics~~ Getting Started With Digital Audio and MIDI for Music Applications

Rev Note: Starting with this Viewport, the 4th Edition modifies the sequencing for introducing digital audio and MIDI concepts, software, and hardware. Given the preponderance of software, both entry and advance, that offers the integration of digital audio and MIDI, we have likewise integrated MIDI concepts and techniques starting with this Viewport. Further, DAW or digital-audio workstation software is given greater attention at the introductory level starting in Viewport IV. More advanced DAW work is now moved to the end of the text after notation, teaching-learning software, and graphics/video.

- The Big Picture for Digital Audio and MIDI (NEW)

Rev Note: As with the past editions, we will begin this section of the book with a short overview of the major content on music production software that is to come. This will include an orientation to acoustics, basic audio and MIDI data structures, how to edit and manage these data, and what to expect in entry-level digital audio workstation software (DAW's). This will serve to introduce Viewports III and IV and will make important links to more advanced Viewports on digital audio/MIDI later in the book.

- Overview
- Objectives
- Core Competency Projects (NEW) (was "Online Software Projects")
- Webport for Viewport III: News, new products, third-party tutorials (updated bi-annually) (NEW)
- Music Technology in Practice

Rev Note: As in all of the overviews for each Viewport, quotations, objectives, and projects will be updated and new people/profiles will be featured. The previous "Online Software Projects" will be expanded and refined to focus on a new thread for the 4th Edition, core competencies for music technology mastery.

- Software for Illustration in Viewport III: See the separate document with software titles for illustration.

Rev Note: Each Viewport will feature desktop-laptop, web-based, and mobile-tablet software used as illustrations. Software featured will be more common, selected titles. Additional software options will be provided in the Webport for each Viewport. See the draft list of software for illustration attached.

- **Module 8 : It All Starts with Acoustics**
 - Acoustical and Perceptual Dimensions of Sound
 - Vibrations, Frequency, and Amplitude
 - Envelopes
 - Harmonic Spectrum
 - Overtones

- Harmonic Spectrum and Fourier's Theorem
- Summary of the Acoustic Properties of Sound
- Varieties of Music Synthesis Techniques
 - Analog Synthesis: Additive, Subtractive, and Distortive
 - Physical Modeling
 - Digital Wave Synthesis
 - Granular Synthesis
- **Module 9 Digital Audio and MIDI Basics (NEW)**
 - Digital Audio Basics (*n.b. from old Mod 8*)
 - Concepts of Digital Audio and Sampling: Analog to Digital and Back
 - Sampling Rates and Quantizing
 - Optimizing the Quality of Digital Audio
 - How MIDI Works? (*n.b. from old Mod 14*)
 - MIDI Performance Language
 - Channel Messages
 - System Messages
 - General MIDI
 - WebMIDI for Web-based Software (NEW)
 - Wireless MIDI Options for Desktop and Mobile Connectivity (NEW)
 - Storing and Exchanging Digital Audio and MIDI Files (REVISED)
- **Module 10: Recording, Editing, and Storing Digital Audio and MIDI** (n.b. from old Mod 9)
 - Preparing Your Computer for Audio and MIDI (REVISED)
 - Desktop and Laptop Devices
 - Windows OS
 - Macintosh OS
 - Web-based and Chrome OS
 - Mobile Devices
 - Dealing with Audio/MIDI on the Internet (REVISED)
 - Obtaining Music Files
 - Organizing and Playing Web Music Files
 - Digital Audio Recording Software (REVISED from parts in 3rd Edition)
 - What Is Digital Audio Editing Software?
 - Capture and Display of Digital Audio Data
 - Desktop, Web-based, and Mobile Solutions
 - Basic Editing and File Management
 - MIDI Recording and Editing Software (REVISED from parts in 3rd Edition)
 - Entering MIDI Data
 - Capturing Sequences and Quantization
 - Editing and Saving Sequences

Viewport IV Digital Audio Workstations (DAWs) for Music Production (NEW)

Rev Note: 4th Edition will restructure the sequence for presenting digital audio and MIDI. The software DAW is introduced earlier with the concepts, software, and hardware for audio and MIDI tracks introduced earlier at a basic level to parallel such software as GarageBand, Mixcraft for the desktop, and similar software that is web-based (Soundation for example) or tablet based (GarageBand for iPad and Cubasis as examples).

- Overview
- Objectives
- Core Competency Projects (NEW) (was “Online Software Projects”)
- Webport for Viewport IV: News, new products, third-party tutorials (updated bi-annually) (NEW)
- Music Technology in Practice

Rev Note: As in all of the overviews for each Viewport, quotations, objectives, and projects will be updated and new people/profiles will be featured. The previous “Online Software Projects” will be expanded and refined to focus on the new thread for the 4th Edition, core competencies for music technology mastery.

- Software for Illustration in Viewport IV: See the separate planning document with a draft of software titles for illustration.
- **Module 11 Building a No-Frills Digital Audio Workstation with MIDI** (REVISED based on the merger of parts from the 3rd Edition)
 - IPOS Model
 - Basic Digital Audio Hardware: ADCs and DACs
 - Digital Audio Interface
 - Input and Output: Connecting to the Outside World
 - Desktop, Web-based, and Mobile Configurations (NEW)
 - Sound Drivers and Latency: Who’s in Charge Here?
 - Sorting Out Plugs and Jacks
 - Adding a Mixer and Performance Options with EMT-3
 - Mixer Input Controls
 - Mixer Output Controls
 - Microphones
 - Storage Devices for Digital Audio Work
 - Flash, CD/DVDs, and Cloud Storage
 - Smartphones And Smart-Watches As Music Players
 - Adding MIDI to the No Frills DAW (*n.b. Moved from Mod 16*)
 - MIDI Interfaces
 - MIDI Networks: Physical and Virtual and Wireless
 - Talking Between Mobile and Desktop Music Apps (NEW)
 - Talking Between Mobile Music Apps: Audiobus and Apple Inter-App Audio
 - Mobile to Desktop Apps
 - Audiobus Remote and other control formats
 - Using the Tablet as a Controller for the Desktop DAW

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- Basic MIDI Keyboard Controllers and Sound Modules (*n.b. Moved from Mod 16*)
 - Keyboard Controllers
 - MIDI Pads and Control Surfaces
 - MIDI Sound Modules
- Speakers and Recorders
- Workstations—In Conclusion

Rev Note: CD/DVD technology is greatly reduced with emphasis on flash-memory and cloud-based solutions. More advanced MIDI concepts are saved for the final Viewport VII. MIDI controllers are expanded given the variety of hardware tools now available for desktop and hand-held, mobile devices. Handheld dedicated music players are also removed now that most smartphones serve this purpose.

- **Module 12 Software for Entry-Level Digital Audio Workstations (DAWs) (NEW)**

- Sorting out Synths, Sequencers, and Samplers (NEW)
- What is a DAW? (NEW)
- Multiple Tracks of Digital Audio and MIDI ~~and Channels~~
 - Preparing Your Computer for Digital Audio and MIDI Input and Output
 - Desktop and Laptop Devices
 - Windows OS
 - Macintosh OS
 - Web-based and Chrome OS
 - Mobile Devices
 - Recording, Editing, and Using Built-In Effects for Audio and MIDI (NEWLY integrated)
 - Starting a Project
 - Recording Audio and MIDI Data
 - Editing
 - Using Audio and MIDI Loops (NEWLY integrated)
 - What are Sequences and Loops?
 - How to Use Loops
 - Build-in Effects for Audio and MIDI (NEWLY integrated)
 - Mixing, Mastering, and Distributing
 - Mixing and Mastering: Really the Same Thing?
 - Working with Mixing and Mastering
 - Tips for Mixing and Mastering
 - Saving DAW files (REVISED)
 - MIDI Content Only
 - Mixed Data (Audio and MIDI)

Rev Note: The sequencing software material from the 3rd Edition has been extensively reworked and is now introduced in Module 10.

Viewport V: Music Notation

- Overview
- Objectives
- Core Competency Projects (NEW) (was “Online Software Projects”)
- Webport for Viewport II: News, new products, third-party tutorials (updated bi-annually) (NEW)
- Music Technology in Practice

Rev Note: As in all of the overviews for each Viewport, quotations, objectives, and projects will be updated and new people/profiles will be featured. The previous “Online Software Projects” will be expanded and refined to focus on a new thread for the 4th Edition, core competencies for music technology mastery.

- Software for Illustration in Viewport V: See the separate document with software titles for illustration.
- **Module 13 Coding Systems for Music Notation and Performance** (*n.b. Old Module 19*)
 - How Is Notation Represented in a Computer?
 - Data Structures for Performing and Display
 - Translating between Performance and Display Data
 - A Simple Music Coding
 - Tour of Computer Music-Coding Systems
 - Pre-1950s: Mechanical Music Coding
 - 1950s to 1960s: Notation to Feed the First Computer Music Synthesizers
 - Mid-1960s to Mid-1970s: Friendlier Text-Based Music Coding
 - 1970s to Early 1980s: Experimentation and Graphic Display of Notation
 - Early 1980s: Personal Computers and Consumer Music Systems
 - Mid-1980s: The Birth of Desktop Music Publishing
 - Late 1980s and 1990s: Intelligent Rule-Based Music-Coding Systems
 - 1990s: Seeking Interchangeable Notation-Coding Systems
 - 2000s: Web-Based Notation-Coding Systems
 - Music XML, HMTL5, and W3C Web-notation Project (NEW)
 - Music Fonts for Notation
 - Bitmapped Versus Outline Fonts
 - Coding Music-Font Symbols
 - Lots of Music Fonts
 - Is WYPWYP Music Software Possible?

Rev Notes: Much of the material here will be retained with updates to reflect new developments. MusicXML will be given more prominence as it is now an industry standard for exchange of notation files.

- **Module 14 Software for Music Notation** (*n.b. old Module 20*)
 - Content and Context: What Do You Need?
 - Basic Operational Features
 - Help
 - Interface Design
 - Getting Started
 - Score Display
 - Playback, Printing, and Distribution
 - Desktop, Web-based, and Mobile Solutions (NEW)
 - Note Entry and Basic Score Design
 - Methods of Note Entry
 - Mass Editing
 - Other Basic Features for Score Design
 - Advanced Editing
 - Editing Aids
 - Transposition and Automatic Arrangements
 - Enhancing the Score
 - Text and Lyrics
 - Online options for Music Notation
 - Play, Print, and Save
 - Playback Options
 - Print Controls
 - Saving and Distribution
 - Advanced Capabilities
 - Additional Capabilities
 - Plug-Ins
 - Finale
 - Sibelius 5

Rev Notes: Material in Module 14 will be revised with special attention to web-based and mobile-tablet options and the impact of Flash solutions giving way to HTML5 and other technologies. Other new developments include webMIDI and wireless MIDI standards, improvement in notation scanning software and recognition of handwritten notation.

- **Module 15 Notation Hardware: Input Devices, Scanners, and OMR** (*n.b. old Module 21*)
 - Input Devices for Music Notation
 - Text and Key Codes from the Computer Keyboard
 - Graphic Palettes and a Mouse
 - Touch Entry for Handheld Devices (NEW)
 - MIDI Controllers
 - Scanners and OMR
 - Optical Music Recognition (OMR)
 - The Mechanics of a Scanner
 - Audio to Notation and to MIDI Translations (NEW)

Rev Notes: Material in Module 15 will be updated to reflect new notation entry and OMR and audio recognition options.

Viewport VI Sharing, Promoting, and Teaching with Music Technology (NEW content with old Viewport VIII)

Rev Notes: For the 4th Edition we are doing a major reworking of this Viewport. Our goals are to give special emphasis to the sharing of music and instructional materials through the Web and Internet clouds of information. With the prominence of digital video, we have brought back some basic material from the earliest editions of the textbook concerning video, graphics, presentation software, and web development tools.

- Overview
- Objectives
- Core Competency Projects (NEW) (was “Online Software Projects”)
- Webport for Viewport VI: News, new products, third-party tutorials (updated bi-annually) (NEW)
- Music Technology in Practice

Rev Note: As in all of the overviews for each Viewport, quotations, objectives, and projects will be updated and new people/profiles will be featured. The previous “Online Software Projects” will be expanded and refined to focus on a new thread for the 4th Edition, core competencies for music technology mastery.

- Software for Illustration in Viewport VI: See the separate document with software titles for illustration.
- **Module 16 Social Media and Music Technology (NEW)**
 - Popular Websites for Sharing, Teaching and Promotion
 - Creating video and music content for social media
 - Issues of Copyright
- **Module 17: Video Formats and Hardware (NEW)**
 - Standard Video Formats
 - Web-based Video Formats
 - Video Capture Devices
- **Module 18: Sharing Music, Graphics, and Video for Web and Presentations (NEW)**
 - Considerations for Using Music Software and Hardware for Multimedia and Website Development
 - Presentation Software Options
 - Desktop, Web-based, and Mobile Solutions
 - Simple Approaches to Personal Website Development and Maintenance
 - Development of Blogs, Podcasts, and other Approaches to Sharing, Promotion, and Teaching
- **Module 19 Music Software for Music Teaching and Learning** (*n.b. old Mod 22 and 23*)

Rev Notes: Material in Modules 19 and 20 will be condensed and restructured with selected examples to illustrate web-based and mobile-tablet solutions as well as desktop-laptop solutions. More content related to student-centered learning, social learning, independent study, music production, and other topics relevant to music in the K-12 environment will be included.

- Use of Music Production and Notation Software in Teaching (REVISED)
 - Categories and Examples of Published Software Designed Specially for Music Teaching and Learning (NEWLY revised from 3rd Edition content)
 - Drill and Flexible Practice
 - Guided Instruction
 - Game-Based
 - Exploratory/Creative
 - Internet-Based
 - Online Materials
 - Distance Learning
 - Teacher Resources for Technology-Based Instruction (NEW)
- **Module 20 New Directions for Teaching and Learning Using Technology (NEW)**
 - Encouraging Independent, Creative and Student-Centered Learning (NEW)
 - Software Applications (NEW)
 - Student Use of Video, Multimedia, and Social Networking
 - Interdisciplinary Projects
 - Logo, Scratch and Other Programming Environments
 - Online Collaboration
 - Hardware Experiments (NEW)
 - Sensors and Invention Kits
 - Mobile Devices for Music Performance

Viewport VII Doing More with Audio, MIDI, and DAWs (n.b. Combination from other old Modules & VP 4):

Rev Notes: Viewport VII moves more advanced topics of audio, MIDI, and DAWs in the 3rd Edition to the final Viewport of the book. Some technical issues that are not as critical given technology changes are moved to the Webport archives online.

- Overview
- Objectives
- Core Competency Projects (NEW) (was “Online Software Projects”)
- Webport for Viewport II: News, new products, third-party tutorials (updated bi-annually) (NEW)
- Music Technology in Practice

Rev Note: As in all of the overviews for each Viewport, quotations, objectives, and projects will be updated and new people/profiles will be featured. The previous “Online Software Projects” will be expanded and refined to focus on a new thread for the 4th Edition, core competencies for music technology mastery.

- Software for Illustration in Viewport VII: See the separate document with software titles for illustration.
- **Module 21: Expanding Your Understanding of Digital Audio and MIDI (NEW)**
 - Formats and Compression for Storing Digital Audio Files (*n.b. Moved from old Module 8*)
 - Sound Compression
 - Increasing Compression While Fooling the Ear
 - Streaming Audio Files for the Internet
 - Sonic Realism: New Developments in Compression & Surround Sound (*n.b. Moved from old Module 11*)
 - Multichannel Digital Audio Formats
 - MPEG
 - Surround-Sound Audio Formats
 - MIDI and Audio Timing: SMPTE, Word Clock, mLAN, and More (*n.b. moved from old Module 13*)
 - Who’s Conducting This Group?
 - Keeping the Tape Time
 - Keeping the MIDI Time: MIDI Time Codes
 - ADAT, Word Clock, and Digidesign Sync
 - mLAN Music Network and Word Clock
- **Module 22 Hardware for Multichannel Digital Audio** (*n.b. old Module 13*)
 - IPOS Model for Multichannel Digital Audio
 - Superheroes: The DSP Chips
 - EMT Digital Audio Workstation Goes Multichannel
 - Expanding to Multichannel Digital Sound
 - Moving up to Surround Sound
 - Desktop, Web-based, and Mobile Multichannel Solutions (NEW)
 - More On MIDI Connectivity (NEW)
 - MIDI THRU, Mergers, and Patchbays (*n.b., moved from old Module 8*)
 - Beyond 32 Channels
 - One-on-One with Digital: S/PDIF, AES/EBU, ADAT, Firewire, USB, and More
 - S/PDIF and AES/EBU: Close Cousins
 - ADAT
 - New Audio Connectivity (NEW)
 - Handheld Recording and Playback in the Digital Realm
 - Stand-Alone Digital Recorders
 - Mobile Devices as Digital Recorders
 - Surround-Sound Amplifiers and Speakers

- **Module 23** (old Module 17): **Software Adventures in Sound Shaping and Synthesis**
 - Digital Audio Workstation (DAW) Software
 - *(n.b. below move to Module 11)*
 - Advanced DAWs for Desktop, Web-based, and Mobile Setups (NEW)
 - Effects Plug-Ins for Audio and MIDI *(n.b. moved from old Module 12)*
 - Categories of Plug-Ins
 - How Plug-Ins Are Called into Action
 - Overview of Effects Plug-Ins
 - Specialized Plug-In Samplers, Synthesizers, and Virtual Instruments
 - How Specialized Plug-Ins Are Used
 - Virtual Instruments
 - Synthesizers
 - Synthesizer/Sampler Combinations
 - “All-in-One” Virtual Studios
 - Reason
 - ReWire Connections
 - The Future of “All-in-One” Virtual Studios
 - Programming Environments
 - Max/MSP
 - Other Programming Approaches

- **Module 24** (Old Module 18): **Extending MIDI: Keyboards & Controllers**
(n.b. selected material below moved to the Webport)

Rev Notes: The extensive section on hardware keyboard DAWs will be moved to the Webport archives for this Viewport. With the dominance of software solutions for DAW and of keyboard, pad, and other MIDI controllers we chose to remove the material for standalone DAW keyboards from the 4th Edition.

- Controller Cornucopia: Drums, Guitars, Winds, and More
 - Drum Controllers
 - Guitar and String Controllers
 - Voice Controllers
 - Wind Controllers
 - Do It Yourself (DIY) Controllers (NEW)
 - Mind-Expanding MIDI Controllers
- New Modes of Instrument Expression
- Subjective Factors for MIDI Controllers

Closing Notes (REVISED)

- Summary of Projects and Selected Readings
 - Expanding Your Skills and Creative Urge
 - Closing Word
- Appendix A: Selected Readings by Viewport (completely revised)
Appendix B: EMT Workstation Equipment Codes

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