

IS586 Digital Preservation  
Institutional File Inventory  
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## **Michael Manion Collection - Institutional File Inventory Draft**

### **I. Introduction: Client and Problem**

The client for this project is the UIUC University Library, Digital Preservation department, and the Sousa Archives & Center for American Music. For this project we will be consulting on the born-digital collection of Michael Manion. The Sousa Archives acquired this collection, and Manion's digital files were recovered from the composer's Mac PowerBook. This paper constitutes a 'report of work' as a preliminary consultation to the client.

The "Michael Manion Music and Papers, 1965-2008" (ID: 26/20/188) collection at The Sousa Archives and Center for American Music comprises 5.0 cubic feet of manuscripts that were acquired 02/04/2013 and have already been processed and arranged into 4 series.

Michael Lawrence Manion (1952-2012), percussionist and American composer of electro acoustical music, earned his Bachelor of Music degree in composition and percussion performance from the Oberlin Conservatory of Music in 1977 and Master of Music in composition from the University of Illinois at Urbana-Champaign 1983. He studied composition with Randolph Coleman, Dary John Mizelle, and Gary Lee Nelson at Oberlin and Salvatore Martirano and Ben Johnston at the University of Illinois. In addition, he studied with Robert Ashley at Mills Collection from 1977 to 1978, Mauricio Kagel at the Musikhochschule Koln from 1980 to 1981, and Jonathan Harvey at the University of Sussex from 1985 to 1988. Between 1984 and 1987 he served as an assistant to Karl Heinz Stockhausen for the publication of such works *Kindheit*, *Nausenflugeltanz*, *Wochenkreis*, and *Madchenprozession*. He remained an active composer and performer throughout his career in Europe and the United States until a stroke in 2008.<sup>1</sup>

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<sup>1</sup> Biographical Note, "Michael Manion Music and Papers, 1965-2008," *The Sousa Archives and Center for American Music, The University of Illinois at Urbana-Champaign*, <https://archon.library.illinois.edu/index.php?p=collections/controlcard&id=11091&q=manion#>

## II. File Overview in the Manion Collection—Germeck Inventory

The Manion collection is an interesting case for digital-preservation considerations due to the varied nature of file formats, extensions, and rendering software that the creator used. We have been asked by the digital preservationists at UIUC to offer consultation on files that have been pending file-format identification. As the Manion collection is still in the accession phase, this identification will be useful in providing consultation to the future storage, access, and preservation stewardship of the files. Our primary contact for this consultation has been Professor Karl Germeck, visiting preservation resident librarian to UIUC. In introducing us to the Manion digital collection and its background, Germeck wrote in an email to us:

Manion's born digital collection was recovered from his Mac Power Book 3400c laptop (manufactured in 1997), on which he used various electronic music composition and editing software to create his compositional works. I have selected a significant portion of the collection for your IS 586 group to investigate—mainly the folders that consist of the most interesting content and, thus, those that contain files that present the most challenges (in terms of format identification and rendering). This selected portion of the collection contains 45 top-level folders, 7,479 files, approximately 250 different file extensions, and is roughly 3.5 GB on disk.

When we met with Germeck to learn more about the project, Germeck described the collection, walked us through some of the Digital Preservation department's workflows and concerns, and introduced us to the tool Treecize, which is used for reviewing files in a database.<sup>2</sup> He also shared with us *Fig. 1*, a visual analysis of the file extensions, created by this tool. Significantly when the collection was recovered from Manion's Mac Power Book much of the original file metadata (including file hierarchies and last-accessed timestamps) have been preserved. This chart shows that the Manion digital collection includes a mixture of text documents, audio file documents, images, and a variety of software files.

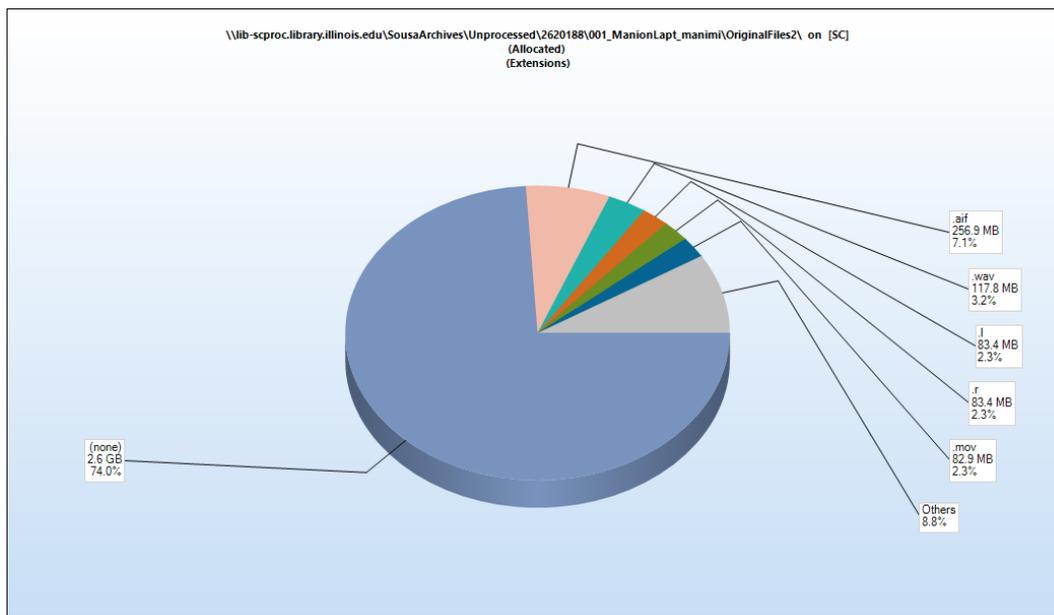
File identification is a crucial part of digital archiving and preservation which starts at accession; critical information is gathered during this review process that lets the archive assess what sort of digital objects are in the collection, how many files are included, how much storage space needs to be allotted, and what sort of formats have been identified. This information allows the archive to appraise how the digital objects will be managed and begins to give a picture of what sort of preservation work will need to be done to facilitate the collection.<sup>3</sup>

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<sup>2</sup> "TreeSize Free," *Jam Software*, [https://www.jam-software.com/treesize\\_free](https://www.jam-software.com/treesize_free)

<sup>3</sup> J. Gordon Daines III, *Module 2: Processing Digital Records and Manuscripts* (SAA, 2013).

*Fig. 1: Manion Files, allocated disk space by extension (graphic visualization by Germeck)*



While some of the files in the Manion collection are immediately identifiable and amenable to standard-preservation formats, many of the files in the selected folders that Germeck shared with us derive from specialized-software programs that are specific to his Manion’s work as an experimental composer. We also found it noteworthy that this collection is being preserved through a cross-departmental collaboration between the Sousa Archives (under the curatorial guidance of Professor Scott Schwartz) and the Digital Preservation department (in its digital-archiving capacity). Given the cross-department nature of this collection, our consultation will only provide a limited assessment of best practices for long-term preservation of the collection, and instead focus on an examination of a sample of file formats that the client has identified as either being nonstandard or requiring special rendering procedures. Our primary tasks are to identify the client-identified files, provide background information and context of the software used (in order to facilitate the creation of Representation Information needed to render and interpret the digital objects), and offer some recommendations for these specialized-software formats.

### **III. Software Discussion**

While conducting the file overview, there were two general concerns that we observed with the preservation of this collection (and with born digital-audio collections more generally) related to

the diversity of data formats: 1) the issue of proprietary-software programs, and 2) the variety of ways that proprietary-software programs may categorize and store information.

Building off of the emergence of sound recording in the twentieth century, the past several decades has seen an explosion of digital-composition programs that allow for the construction and circulation of digital music under a variety of formats. This includes 1) born-digital music, audio, notation, and encoded notation, 2) born-analog music that has undergone digitization, and 3) the elements of composition that went into a final version or song during the composition process, but are not represented by the “final” recorded composition. In this context, as the activity of digital composition has become more common, so has the use of proprietary software to compose music (as a matter of notation) as well as to mix and record audio files. Largely prompted by the emergence of consumer-available recording equipment and storage, the multiplication of digital-music opportunities has also been accompanied by a variety of music-producing computer platforms and formats. Many of the platforms used to create music are commonly available and widely distributed, and thus have developed a degree of interoperability—utility programs can be used to translate between non-proprietary formats. However, file formats that are specific to proprietary programs, are problematic for interoperability, and also for preservation. This concern leads us to the issue of file formats more generally, and the significant properties that are required by the preservation-information representation for the audio files.

In terms of the Representation Information needed for audio files, Brent L. Lee (X) has noted in his paper “Issues Surrounding the Preservation of Digital Music Documents” that this issue can be broken into three main categories. In the first category one finds “file formats that represent actual sound (digital recordings).”<sup>4</sup> These contain numbers that represent changes “in the amplitude of sound pressure over time,” where for digital recordings the amplitude of the sound is recorded and measured as thousands of times each second. The measurement of the amplitude is called a sample, and the sampling rate, and sampling size, “affects the recordings fidelity to the original sound.”<sup>5</sup> In the second category, Lee finds notation formats—file formats used to represent music notation in graphical format. For this category of file format, you generally find formats for drawing music on a screen, as a font or other graphic, which are then employed to either print music, or in some cases, allow for “file playback via Musical Instrument

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<sup>4</sup> Lee, Brent L.. “Issues Surrounding the Preservation of Digital Music Documents.” *Archivaria* 50 (2006): 193-204.

<sup>5</sup> Lee, 195

Digital Interface.”<sup>6</sup> Finally, Lee argues that the third category is “control formats” that are used and generated by a variety of software in the composition of notation and sound. This category includes formats used in the control of “software synthesis, algorithmic composition files, synthesizer patches and samples, and audio edition files.”<sup>7</sup>

One particular variant of these control files—of particular relevance to the Manion Collection, and an example of a ubiquitous element of the field of digital composition—is MIDI (Musical Instrument Digital Interface) formats. Originally designed as a standard industry-communication protocol in the field of synthesizers, MIDI files allow one digital synthesizer to communicate with another—allowing one synthesizer to play sounds stored in another synthesizer. Since the eighties, this usage has expanded to be paired with a variety of other programs, particularly control formats (such as algorithmic compositions where programmed sequences can be exported as midi-sound files). These issues will continue to structure our discussion in this report and our final general recommendations for preservation. We turn now to the issue of identification for the client-identified sample.

#### **IV. File Identification**

During our file analysis, we identified four file formats created by four different software programs, that all of the 14 unidentified file extensions fell into: Band in a Box, FreeHand (MusicPad), MakeMusic (Finale), and X-Plane. In order to learn more about these files and how their role in the collection, we began researching these file formats and their technical environment. *Fig. 2* (on the following page) provides an overview of the formats by extension, number of files, software format, and classification.

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<sup>6</sup> Lee, 196

<sup>7</sup> Lee, 198

*Fig. 2: File extension by Software Format*

Extension	PUID	Size MB/KB	# of files	Software Format / Version	Classification
.mgu	N/A	2.5 MB	526	Band in a Box	Audio
.mg1	N/A	689.9KB	197	Band in a Box	Audio
.sty	N/A	1.5MB	166	Band in a Box	Data(?)
.sgu	N/A	56.8KB	154	Band in a Box	Audio
.dk	N/A	74.8 KB	97	Band in a Box	Audio
.mg4	N/A	226.0 KB	61	Band in a Box	Audio
.mgh	N/A	48.6KB	19	Band in a Box	Audio
.sg1	N/A	11.1KB	17	Band in a Box	Audio
.mg9	N/A	37.8KB	8	Band in a Box	Audio
.fh	N/A	15.5 MB	95	Freehand, Version Unspec.	Image (Vector)
.fh5	x-fmt/53	3.3 MB	12	Freehand, Version 5	Image (Vector)
.fh8	fmt/545	7.6 MB	19	Freehand, Version 8	Image (Vector)
.mus	fmt/397	4.3 MB	50	Enigma Binary File (Finale)	Audio
.acf	N/A	2.8 MB	110	X-Plane	Data

### **Band in a Box:**

Band in a Box constitutes the largest storage size and file count of the selected unidentified file extensions; making up [5.1 MB] of the collection with 1245 files. Band in a Box (BIAB, amongst users) is a proprietary-software program used for the composition, exploration and development of music and musical ideas. It is marketed to musicians that need accompaniment, but are not working with other musicians, and to composers who would like to hear their compositions as they compose.<sup>8</sup>

This program has been in continuous production since 1990, and has developed a small but dedicated user base. Originally introduced for PC computers and the Atari ST, the software package now runs on Windows and Mac OS platforms, and has been continuously updated to include new features. Its features include notation and lyrics capabilities, 16- channel MIDI multitrack features, harmonization, and style generating and live-performance options.<sup>9</sup>

<sup>8</sup> FileExtension.org, Band in a Box, <https://www.file-extensions.org/band-in-a-box-file-extensions>

<sup>9</sup> Band in a Box Wiki, 'About Band in a Box' [https://bandinabox.fandom.com/wiki/About\\_Band\\_in\\_a\\_Box](https://bandinabox.fandom.com/wiki/About_Band_in_a_Box)

Billed as an “auto-accompaniment” program, BIAB creates computer-generated backing tracks. These tracks were originally designed to accompany musicians playing their own music, but increasingly BIAB has become a tool for composition, as well as music recording; These expanded usages have been prompted by its capabilities to integrate MIDI files, vocals, and acoustic instruments. Later versions of BIAB allow recordings to be manipulated and integrated into compositions. These later versions enable recorded composer-initiated sampling as well as over 100 session-played recordings. BIAB compositions can be exported as mixed compositions or individual tracks, burned to CD, or exported under a variety of standard-audio formats. Additionally, BIAB compositions can be printed out or saved as graphic files that denote lyrics, chords, DC markings, codas, and other musical compositions.

The 9 file extensions in our sample that were created by BIAB include: .mgu, .mg1, .sty, .sgu, .dk, .mg4, .mgh, .sg1, and .mg9. In addition to the file extensions illustrated in *Fig 2*, we also identified 15 additional file extensions that start with .mg\* in the digital collection, and 23 total file extensions that start with .sg\* in the digital collection; It is highly likely that all 45 .sg\* and .mg\* file extensions were created by Band in a Box, which (with the .sty and .dk extensions) brings our identified file extensions related to this program to 47, bringing the total identification of Band in a Box files to about 3.8 MB of the collection with 1310 files.

In the BIAB file-format scheme, different file extensions are used to designate saved MIDI sequences, or different composed-song files, with each slot on the three-space sequence of the extension designating different aspects of the file composition. For example, file extensions with ‘G’ in the second slot of the sequence designates a song file, where ‘M’ designates if a song has a melody. By contrast, if a song does not have a melody the file extension begins with an ‘S,’ the song is primarily rhythmic, or percussion based. In the third part of the extension sequence, the designations in this place refer to the style in which the composition was composed.

Following this sequence, the extension ‘mgu’ for example refers to a song with a melody constructed with a user’s style, and not a supplied style file. We compare this to the ‘.mg1’ extension which refers to a song with a melody but utilizing a pre-formatted style, in this case, style #1, ‘jazz swing’ (ZZJazz). By contrast, the files with the ‘.sgu’ extension consists of chord progressions, or song sequences without melody constructed with user styles, rather than preformatted style sequences. Additionally, those files with the ‘.STY’ extension consist of encapsulated music files that are provided by BIAB with installation. These style files can be midi only, or some combination of midi only, or some combination of proprietary formats called

‘RealStyles’ which includes ‘Real Tracks,’ and ‘Real Tracks/Drums only.’ Real tracks replace the MIDI track for the instrument, and while they can be controlled just like a MIDI instrument, they are full recordings of music played by session musicians. Further, some of the file extensions consist of MIDI patches that bridge from synthesizer files to BIAB system files.<sup>10</sup> This is the case for .dk file formats, for example, which as MIDI patches bridge between Kwai, Korg, Panasonic, Roland, Yamaha, synthesizer systems.<sup>11</sup> Finally, we note that some of the extensions, such as .mgh, were introduced in older versions of BIAB, but subsequently replaced in later versions. For the identified BIAB files, the following table illustrates the range and volume of files.<sup>12</sup>

**Fig. 3: Band in a Box files by extension, BIAB functional file format, and number of files on the collection:**

<b>File Extension</b>	<b>BIAB File Format</b>	<b># Files</b>	<b>Categorization</b>
.mgu	Song with melody and user styling	526	BIAB Audio Sound file Composed MIDI Sequence
.mgl	Song with melody and Style #1, Jazz	197	BIAB Audio Sound file Composed MIDI Sequence
.sty	Formatted Style	166	BIAB Audio Sound file
.sgu	Song with rhythm and user styling	154	BIAB Audio Sound file Composed MIDI Sequence
.dk	MIDI patch	97	Audio Sound file: Composed MIDI Sequence / MIDI Patch for non-GM (General Midi synth)
.mg4	Song with melody and Style #4	61	BIAB Audio Sound file Composed MIDI Sequence
.mgh	Song with melody and user styling	19	BIAB Audio Sound file Composed MIDI Sequence
.sgl	Song without melody and BIAB styling	17	BIAB Audio Sound file Composed MIDI Sequence
.mg9	Song without melody and BIAB styling	8	BIAB Audio Sound file Composed MIDI Sequence

<sup>10</sup> Mac (Veteran), “Band-in-a-Box for Macintosh » File extension explanation?,” (post #32222) PG Music, (08/15/09), <https://www.pgmusic.com/forums/ubbthreads.php?ubb=showflat&Number=32222>

<sup>11</sup> PGMusic, Band-in-a-Box®, ‘RealBand, and PowerTracks Patch Maps’  
[https://www.pgmusic.com/support\\_miscellaneous.htm](https://www.pgmusic.com/support_miscellaneous.htm)

<sup>12</sup> PGMusic, User Forums, ‘.Midi, .SGU...’ File Formats’  
<https://www.pgmusic.com/forums/ubbthreads.php?ubb=showflat&Number=528561>

## FreeHand:

FreeHand was another prevalent file format of the selected unidentified file extensions, making up 26.4 MB of the collection with 126 files.

Created in 1988 by Aldus Corporation (California), FreeHand was an application that specialized in vector graphics (comparable to such as Adobe Illustrator and CorelDRAW).<sup>13</sup> Aldus was bought by Macromedia in 1995; the same year Version 5 was released.<sup>14</sup> Later, Version 8 was released in 1998.<sup>15</sup> In 2001 FreeHand established FreeHand Systems, Inc. dedicated to developing hardware and software for dedicated digital-notation viewer. As they evolved they became known as the “world leader in the development, manufacture, and marketing of its digital sheet music tablet and accessories, as well as the leading Internet-based provider of sheet music and digital files.”<sup>16</sup> In 2003 FreeHand released what would be its final Version, MX;<sup>17</sup> This same year FreeHand Systems, Inc. released what would be recognized as its flagship products—the hardware **MusicPad Pro Plus** and the software MusicPad Manager.<sup>18</sup> It is most likely that the FreeHand files in Michael Manion were created and used with MusicPad Pro Plus; Supporting this theory is a .png image file that has the same name as a .fhX file and shows what appears to be a selection from the notational page as viewed in MusicPad Pro Plus.

*Fig. 5 meta5.fh8.png file located in same folder as meta5.fh8 file*

<sup>13</sup> “Aldus FreeHand 1.0,” *Macintosh Garden*, <http://macintoshgarden.org/apps/aldus-freehand>

<sup>14</sup> “Macromedia FreeHand 5.0.2,” *Macintosh Garden*, <http://macintoshgarden.org/apps/freehand-502>

<sup>15</sup> “Macromedia FreeHand 8.0.1,” *Macintosh Garden*, <http://macintoshgarden.org/apps/freehand-801>

<sup>16</sup> “FreeHand Systems Announces Release of Its 4.0 Software,” *Businesswire*, (Jan, 20, 2005)

<https://www.businesswire.com/news/home/20050120005159/en/FreeHand-Systems-Announces-Release-4.0-Software-Company>

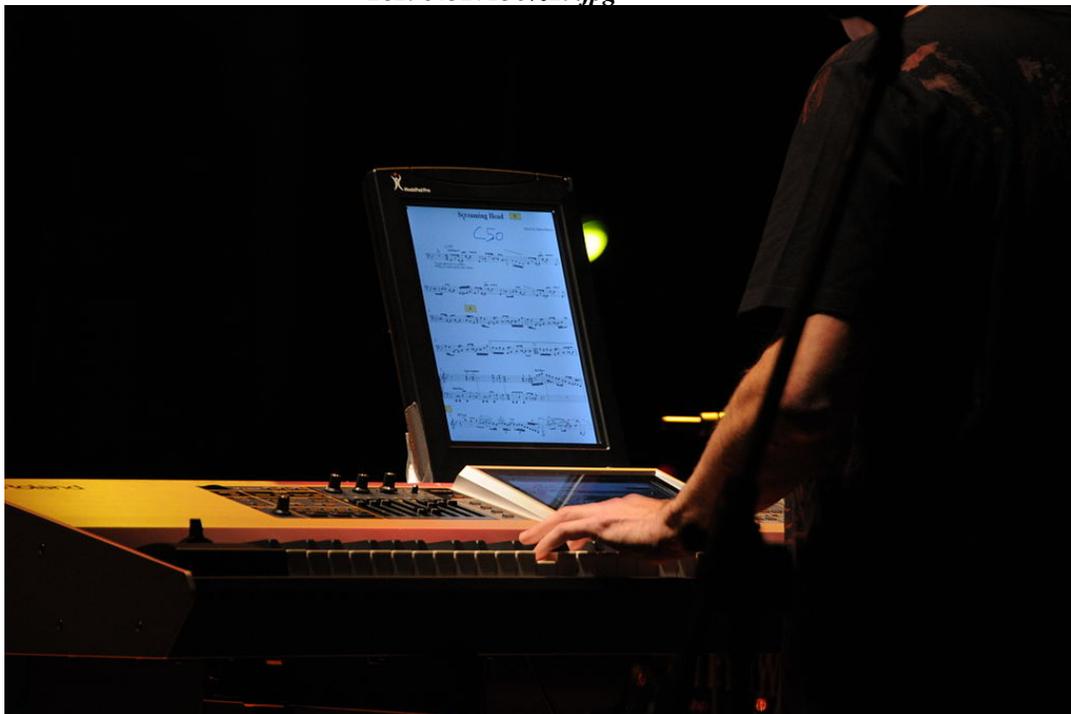
<sup>17</sup> “Macromedia FreeHand MX,” *Macintosh Garden*, <http://macintoshgarden.org/apps/freehand-mx>

<sup>18</sup> Suggested retail prices in 2004 were \$1,199 for the hardware and software, or \$899 for the hardware alone.

MusicPad Pro Plus was a PC tablet (13.3 inch. x 9.9 inch. x 1.8 inch., about 4lb.) with a 12-inch back-lit, color, liquid-crystal-display touchscreen (1024 x 768 resolution) that was used for representing, displaying, organizing, and storing sheet music in a computer-readable format. The tablet connected to one's computer via USB cable. MusicPad Manager was a cross-platform software used to store, import, and convert files. This digital sheet-music library and tablet, described as a "digital-music portfolio," was marketed to composers, performing musicians, and educators. Although it was compared to an iPod, MusicPad had specialized capabilities—the tablet could also be used to mark up the digital scores by using annotation features to add or erase musical notations, highlight and crop sections, add text comments, annotate sheets with rehearsal marks and teleport pads (aka "shortcuts"). It could also transpose and offer audible MIDI format playback.<sup>19</sup> Common accessories included a music stand with a foot pedal that enabled handless turning of pages. Its competitors included MuseBookScore (released in 2004) and eStand (released in 2005).

*Fig 6: MusicPad Pro Plus in use,*

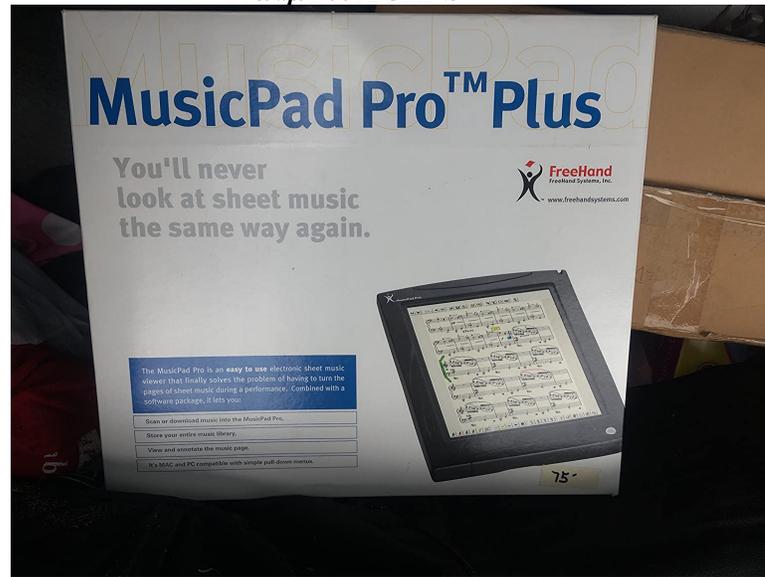
*[https://upload.wikimedia.org/wikipedia/commons/5/5c/FreeHand\\_MusicPad\\_Pro\\_%2B\\_Roland\\_Fantom\\_G8\\_%28282964327136%29.jpg](https://upload.wikimedia.org/wikipedia/commons/5/5c/FreeHand_MusicPad_Pro_%2B_Roland_Fantom_G8_%28282964327136%29.jpg)*



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<sup>19</sup> Adam Baer, "At the Ready, Sheet Music Minus the Sheets," *New York Times* (May 20, 2004), <https://www.nytimes.com/2004/05/20/technology/at-the-ready-sheet-music-minus-the-sheets.html>

Fig 7: MusicPad Pro packaging, <https://www.amazon.com/Gerber-BabyNes-Freehand-Musicpad-Pro/dp/B001LG2K7S>



The MusicPad Pro hardware and software only read and wrote files in the Freehand (.fh) format. According to its user manual, “Files could be added by purchasing them through the FreeHand digital-music store,<sup>20</sup> converting files via the print driver (from Sibelius, Finale, Cakewalk, Word, PDF, JPEG, GIF, PNG, TIFF, BMP, or PCX to FreeHand format, scanning printed sheet music, or printing to FreeHand from your computer.”<sup>21</sup>

In 2005 Macromedia was acquired by Adobe, which merged FreeHand’s vector-tool functions mostly with its Illustrator software program, and ceased support and development of the FreeHand format.<sup>22</sup> This fact of obsolescence increases the known vulnerability of the file format, and is a major concern for continued preservation of this digital file.

The 3 file extensions that our project has been tasked to identify that were created by this software include: .fh, .fh5, and .fh8. When researching this file extension we learned that the FreeHand software used the formula .fhX with “X” being the version number.<sup>23</sup> Part of the reason given by online forums for the file extension changes was due to the frequent changing of

<sup>20</sup> Over 95,000 digital scores were offered in 2004 already formatted for MusicPad Pro and were available directly from freehandmusic.com. This digital-sheet music database was enhanced by FreeHand’s acquisition of Sunhawk in 2003. Sunhawk was established in 1992 and specialized in digital rights and asset management and digital publishing. It had held a webstore that specialized as “the world’s largest collection of digital sheet music titles” at that time.

<sup>21</sup> MusicPad Pro Plus user manual, <https://www.yumpu.com/en/document/read/7795170/musicpad-protm-tablet-computer-users-guide-floridamusiccom>

<sup>22</sup> “FreeHand,” *Wikipedia*, [https://en.wikipedia.org/wiki/Adobe\\_FreeHand](https://en.wikipedia.org/wiki/Adobe_FreeHand)

<sup>23</sup> Arthur Cole, “What to Do if You Have Lost Your FH8 Files,” *Disk Drill Blog*, <https://www.cleverfiles.com/howto/recover-deleted-fh8.html>

hands that FreeHand suffered as it was traded by different companies; This advice may suggest that conversions of .fhX files between different versions of the software could be inconsistent and unreliable.

The .fh\* formula is used by a total of 7 file extensions in the Michael Manion collection. Analysis of these files—using DROID and reviewing their file-structure relationships—revealed that .fh\* files were frequently stored in folders with other FreeHand files with the extension .inst and that frequently individual pages of sheet music were also stored in these folders; the names of these pages ended with one or two integers following a period, such as “.16” or “.1” with .16 referring to page 16 and .1 referring to page 1. Further analysis in DROID revealed that these files were also created by FreeHand; These are not file extensions but rather less-than-ideal naming conventions.

*Fig. 8 Files analyzed through DROID, revealing additional FreeHand formats*

File name	Extension	Size	Format	Version	PUID
CELLO.SETUP.fh4	fh4	55.1 KB	Macromedia Freehand	5	x-fmt/53
constellations3.fh	fh	77.7 KB	Macromedia Freehand	5	x-fmt/53
inst.fh4	fh4	63.4 KB	Macromedia Freehand	5	x-fmt/53
islands. 26	26	514.6 KB	Macromedia Freehand	5	x-fmt/53
meta5.fh8	fh8	680.7 KB	Macromedia FreeHand	8	fmt/545
meta5.fh8.png	png	43.3 KB	Portable Network Graphics	1	fmt/11
wheels 1a.fh	fh	244 KB	Macromedia Freehand	5	x-fmt/53

These revelations bring the total identification of FreeHand files to about 42 MB of the collection with 202 files. It is clear (with 75% of the files in this collection lacking file extensions in their name) that Michael Manion rarely included file extensions in the file names that he created; additional files that lack file extensions may be added to this group at a later date.

### **MakeMusic:**

MakeMusic is another significant file format that comprises a substantial number of files (4.3 MB and 50 files). MakeMusic is a music-technology software company that offers a suite of popular programs including **Finale**, “the world’s best-selling and most powerful music notation software used for composing, arranging, teaching and publishing music, developed by

MakeMusic, Inc.”<sup>24</sup> Make Music also offers three other popular programs: SmartMusic, Garritan and MusicXML.

SmartMusic is “award-winning interactive music software that provides the ideal practice environment for students in band, orchestra, and choir”<sup>25</sup> featuring the world’s largest accompaniment library, and is prevalently utilized by high-school music educators and music students. Garritan is a leading provider of virtual software instruments. MusicXML is the standard open format for exchanging digital-sheet music.

**Fig. 9 Shown here: MakeMusic SmartMusic feature which assesses more current Finale files "C:\Program Files (x86)\SmartMusic\SmartMusic.exe"**



MUS files contain music notation, but does not store actual audio data. Further, MUS to PDF conversion is used to convert music sheets, notations, or tablatures as PDF documents. Typically, this can be done in various notation software and default PDF export function, and through the standard printing function (for example, with a virtual PDF printer installed). Upon preliminary attempts to open the MUS files in Manion’s collection, it is clear that they are Finale files, as indicated by “ENIGMA BINARY FILE Finale(R) 2002 Copyright (c) 1987-2002 Coda Music Technology.” However, other applications for the MUS file extension include music-audio files for MusicTime and SCORE Music Publishing System, some generic music audio files, and interactive music-audio data files from gaming company Electronic Arts.

The MUS file is a Finale Legacy 2012 music notation document file that is no longer in use; following the release of Finale 2014, the program began to use MUSX extension type. MUS files save data in a MIDI format (similar to a MID file) which contains additional information

<sup>24</sup> FileExtension.org, file-extensions.org <https://www.file-extensions.org/mus-file-extension>

<sup>25</sup> MakeMusic.com, 15<https://www.makemusic.com/>

that can be read by MakeMusic software only. As we know, Manion's files were retrieved from his personal MacBook; with that in mind, one MakeMusic forum recommended "your best bet may be to find a really early version of the software running on a really old Mac and attempt to open and update the files that way" adding that one "might have to open and save the file in Finale 2001 (for instance), then in Finale 2003, then Finale 2005, etc."<sup>26</sup>

The file extensions in our selection that were created by this software are straightforwardly those that end in the file extension .mus, though we also located 30 files (using 1.2 MB) that were copied .mus files with the extension ".mus copy." Other files that do not have file extensions may be added to this group at a later date.

### **XPlane:**

The final file format that we identified was .acf, which consists of 110 files that use 2.8 MB of storage space. This file extension belongs to the aircraft files for X-Plane (developed by Laminar Research), a realistic flight-simulator software that was also kept on Manion's laptop. These files contain data about properties of particular aircraft, such as engine power, flight physics, mass properties, and limitations.<sup>27</sup> Because this software, nor any of its parts are directly seem related to the value and identity of this collection nor the composer (outside of noting the antidotal fact that it was included on his laptop), we are not recommending that these files for continued storage or long-term preservation.

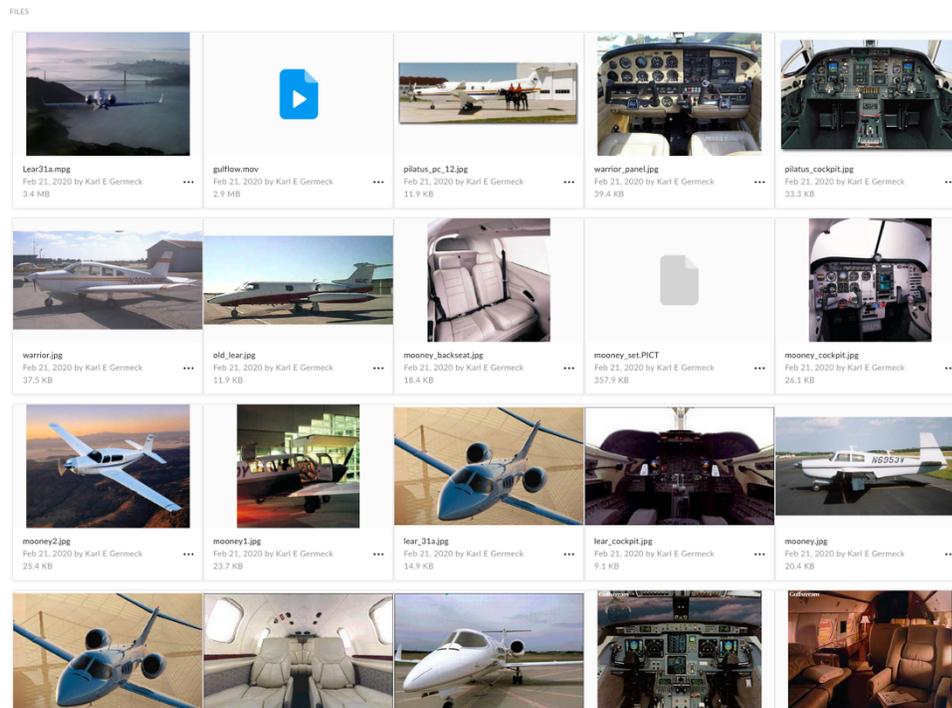
Further, upon analysis of folder structure (X-System Classic 2), the .sit extension (43 files at 14.5 MB) and the .bmp files (52 files at 11.7 MB), as well as the .box and .out files (3 files at 10.3 KB) are also affiliated with this software's' files, and are not recommended for preservation.

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<sup>26</sup> MakeMusic, User Forums, 'MakeMusic, Finale, Macintosh'  
<https://forum.makemusic.com/default.aspx?f=6&m=34444>

<sup>27</sup> "File Type 2X-Plane Aircraft File," *FileInfo*, <https://fileinfo.com/extension/acf>

*Fig. 10: Preview views of Manion's X-Plane files*



**Summation:**

Together our analysis has identified 107 out of the 256 file formats documented in the selection of this collection that the Digital Preservation department had shared with us.

The remaining 149 extensions include a larger sum of files in common formats such as .gif, .mp3, .pdf, .jpg, .html, .txt, .doc, .wav, .mov, .txt which are more easily to identify and preserve.

**IV. General Preservation Recommendations:**

Following Lee, we have identified three general areas for concern for the preservation of audio files, readability, intelligibility, and adequacy of representation or authenticity. On this account, readability refers to the presentation of digital materials such that the “data is readable in years to come,” whereas intelligibility refers to an “ability to understand the meaning of the preserved file.”<sup>28</sup> Adequacy of representation, by contrast, concerns our ability to preserve the integrity or identity of an object over time, where, for audio files concerns whether “the retrieved documents represent the music as imagined by the musician?”<sup>29</sup>

<sup>25</sup> Lee, 20-21

<sup>26</sup> Lee, 201

For the files identified in this report of work, identification is the first step in an ongoing process of preservation, involving strategies such as normalization of formats and migration of files, emulation, and the refreshing of the medium of storage. For the Manion collection, and the formats identified in this report, these issues are saliently illustrated in the use of specialized, proprietary software. Taking up Band in the Box as an illustration, this software is used not only as part of the notation composition process, and hence in the production of encoded text, but as a constituent feature of many completed audio compositions. It helps to form an iterative context in composition process that, in order to retain the meaning and sense of this work, the BIAB files must be retained in formats that are both accessible, and hence readable, in order to be meaningful as an archival information object.

Currently, there are a few best-standard practices for the preservation of BIAB files. While the .mgu and .sgu formats can be converted to midi files, and hence migrated to a normalized pathway to file preservation, the remaining files cannot be rendered outside of the BIAB environment.<sup>30</sup> For these file format, there are two primary recommendations. First, to normalize the .gmu and .sgu formats through migration to accessible MIDI formats,<sup>31</sup> as samples of Manion's work, and then to further convert these to a preservation standard format.<sup>32</sup> and to consider investing in an emulated version of the BIAB software to make accessible his compositional documents.

### **Sample AIP Recommendations:**

#### **3 sample AIP for FreeHand files, by Amelia:**

```
<simpledc xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xsi:noNamespaceSchemaLocation="http://dublincore.org/schemas/xmls/qdc/2008/02/11/simpledc.xsd">
```

```
[...]
  <dc:title>CELLO.SETUP.fh4</dc:title>
  <!-- Repository Storage Location: "\\lib-
  sproc.library.illinois.edu\SousaArchives\Unprocessed\2620188\001_ManionLapt_manimi\OriginalFiles2\Projects\old verlag\ManionStuff\Cello\" -->
  <dc:format>55.1 KB</dc:format>
  <dc:format>Macromedia Freehand, Version 5</dc:format>
  <dc:date>1996-06-12T14:08</dc:date>
```

---

<sup>27</sup> 'SGU Download, BIAB Files,' The Guitar Band.com, <https://www.theguitarband.com/sgu-files-2/>

<sup>28</sup>Sustainability of Digital Formats: Planning for Library of Congress Collections, 'Standard MIDI File Format' <https://www.loc.gov/preservation/digital/formats/fdd/fdd000119.shtml>

<sup>29</sup>Cool Utils, 'What is Midi' <https://www.coolutils.com/Formats/MIDI>

```
<!--date refers to last modification -->
<dc:type>Image (Vector)</dc:type>
<dc:creator>Manion, Michael</dc:creator>
<dc:relation>Composition: Music for Cello and Electronic Sounds.</dc:relation>
<dc:description>This file includes notations for Michael Manion's composition Music for Cello
and Electronic Sounds, written in 1991. Parts may include for instruments cello and fixed media.
</dc:description>
<!-- MD5 Checksum: "7ef4c963ec3b72560b1584eaf9792cef" -->
</simpledc>
```

[...]

```
<dc:title>constellations3.fh</dc:title>
<!-- Repository Storage Location: "\\lib-
sproc.library.illinois.edu\SousaArchives\Unprocessed\2620188\001_ManionLapt_manimi\Ori-
ginalFiles2\Projects\old verlag\ManionStuff\ConstellationsScore\" -->
<dc:format>77.7 KB</dc:format>
<dc:format>Macromedia Freehand, Version 5</dc:format>
<dc:date>1996-07-07T16:05</dc:date>
<!--date refers to last modification -->
<dc:type>Image (Vector)</dc:type>
<dc:creator>Manion, Michael</dc:creator>
<dc:description>Possibly related to composition: Michael Manion Constellations (1974)
Graphic score, live electronics</dc:description>
<!-- MD5 Checksum: "aa63002b08f89e9bd30dbb5f4bb2a3a5" -->
</simpledc>
```

[...]

```
<dc:title>meta5.fh8</dc:title>
<!-- Repository Storage Location: "\\lib-
sproc.library.illinois.edu\SousaArchives\Unprocessed\2620188\001_ManionLapt_manimi\Ori-
ginalFiles2\Projects\Music\meta\" -->
<dc:format>680.7 KB</dc:format>
<dc:format>Macromedia Freehand, Version 8</dc:format>
<dc:date>1999-06-19T01:36</dc:date>
<!--date refers to last modification -->
<dc:type>Image (Vector)</dc:type>
<dc:creator>Manion, Michael</dc:creator>
<dc:description>Possibly related to composition: Meta, marimba, ensemble for 2 synthesizers
and 3 percussion (1977)</dc:description>
<!-- MD5 Checksum: "8bdf4cea5e8b4b680e8700a70e3bcb1d" -->
</simpledc>
```

### 3 sample AIP for MusicMaker, by Jeanie:

I selected three of Manion's MUS files and attempted to create an AIP for each using Bagger and DROID, but was unsuccessful as I continued to get various "error" messages during the processing phase. The best I could do (perhaps as a reflection of my novice digital archiving skills or, more optimistically, due to other factors) was to create a checksum for each file:

text\_perc004G [Group 4].mus9 (21 KB)  
 <!--MD5 Checksum: 40ed445caed6c1df9804c2b9c03057e6 text\_perc004G [Group 4].mus  
 txt - 005 Clarinet in Bb 1.mus(16.5 KB)  
 <!--MD5 Checksum: df74fdb6c597a339403678b0ce8fd088 txt - 006 Clarinet in Bb 2.mus  
 textures - 002 Flute 2.mus(19.3 KB)  
 <!--MD5 Checksum: 1b4dae528bb46dda521a1a59a682f051 textures - 002 Flute 2.mus

**Fig 11: DROID info for those three files (credit: Amelia)**

| Resource   | Extension | Size    | Last modified  | Ids | Format                      | Version | Mime type | PUID    | Method    | Hash |
|--|-----------|---------|----------------|-----|-----------------------------|---------|-----------|---------|-----------|------|
| /Users/weltall2/Desktop/manionfiles/jeanie/txt - 005 Clarinet in Bb 1.mus  | mus       | 16.5 KB | 5/2/20 5:34 PM |     | Enigma Binary File (Finale) |         |           | fmt/397 | Signature |      |
| /Users/weltall2/Desktop/manionfiles/jeanie/text_perc004G [Group 4].mus     | mus       | 21 KB   | 5/2/20 5:34 PM |     | Enigma Binary File (Finale) |         |           | fmt/397 | Signature |      |
| /Users/weltall2/Desktop/manionfiles/jeanie/textures - 002 Flute 2.mus copy | mus copy  | 19.2 KB | 5/2/20 5:36 PM |     | Enigma Binary File (Finale) |         |           | fmt/397 | Signature |      |

file:/Users/weltall2/Desktop/manionfiles/jeanie/txt - 005 Clarinet in Bb 1.mus mus 16848 5/2/20 5:34 PM 1 Enigma Binary File (Finale) fmt/397 Signature  
 file:/Users/weltall2/Desktop/manionfiles/jeanie/text\_perc004G [Group 4].mus mus 21500 5/2/20 5:34 PM 1 Enigma Binary File (Finale) fmt/397 Signature  
 file:/Users/weltall2/Desktop/manionfiles/jeanie/textures - 002 Flute 2.mus copy mus copy 19630 5/2/20 5:36 PM 1 Enigma Binary File (Finale) fmt/397 Signature

## V. Reflections and concerns:

**Amelia:** This project has helped me learn a lot about the relationship between digital archiving and digital preservation, and helped me to draw attention to areas that I would like to increase my knowledge in. As an archivist in training, I am particularly concerned with the separation between the digital archive and the manuscript archive, and how important curatorial input is during the Accession stage, and how the ideal SIP recommended by the OAIS framework is compromised when the creator is deceased. In order to create a preservation recommendation, it seems required that we know more about these files, the entire Manion collection, and Sousa Archives & Center for American Music’s interest in this collection. In the situation that I explored pertaining the case of MusicPad Pro Plus files, these files are currently inaccessible. This prompts a number of questions: Should we recommend that the Archives purchase surviving copies of the software? The answer to this question seems to depend on numerous factors: Does the working and performance technology for the compositions have enduring research value? Are these the only working copies of these compositions in with manuscript or digital archive? And larger concerns: Does the Sousa Archives contain more FreeHand format files that would benefit from acquiring some sort of emulation environment? Would the Sousa

Archives include consumer digital-sheet music works that was potentially purchased online rather than created by the composer who is the subject of the archival collection, or would the Archives only be interested in original works? (This question could expand to my recommendations of the X-Plane files as well.) Furthermore, how would the Archive increase access to technology-based files such as those dependent on the obsolete MusicPro Plus tablet?

**Nathan:** I learned a lot about the amount of background knowledge one needs to adequately prepare a sufficient appraisal of digital files. Similarly, I was impressed by the disconnect between the recommend best practices in the preservation of audio files and the limitations of those practices for preserving the documents produced by some of the more prevalent music composition programs. I also really appreciate the curatorial questions involved in selecting which files to focus on in the preservation process, but also how to think about integrating them into the body of a larger collection. Manion's broader collection consists of manuscripts and other materials that if integrated with the audio files would require a high degree of curatorial effort to integrate, but if stored apart would equally require a high level of description, both at the level of finding aid, and at the level of metadata, in order to capture the relationships between the two aspects of archive in a meaningful way.

**Jeanie:** This project revealed to me many of the multidimensional, often complex, sometimes problematic processes involved in digital archiving. I learned that, most likely, there is more than one way to go about the archival process. Older collections, particularly, present problems such as lack of access to specific programs due to – for example – proprietary properties and versioning. I came to appreciate that sorting out the various issues in a digital archiving project such as this requires – optimally – familiarity with the context and subject matter of the files as well as technical expertise. Manion's collection is multidimensional, containing a heterogeneous assortment of dated music and text files, many that do not include readily identifiable or current/easily accessible file types. Some files, unfortunately, may not be recoverable without a good degree of effort and, possibly, expense. This was a valuable learning experience for me on both a personal and professional level because it emphasized to me that the process of effective archiving truly begins with the initial process of storing files, which requires thoughtfulness, time and effort, and – in reality - no guarantees about future accessibility.