



User Manual Creating Music

You can add your own music to Gloria. It can be as simple as a single song or as extensive as an entire hymnbook. This manual will give you the basics on the steps involved to get you up and running as quickly as possible, and will also explain the finer points of creating and organizing your music to get the best possible result from Gloria for your congregation.

Gloria can be used in many contexts, such as choir practice, stage productions, and personal listening. This manual will focus on Gloria's typical use in congregational singing, and the workflow and examples will support that focus. That's generally enough to cover most contexts, but the manual will note where a different type of use may require a different approach.

There are three main steps to adding music to Gloria:

1. Creating music files
2. Creating a hymnbook table of contents
3. Transferring everything to Gloria

You'll typically use a computer for the first two steps, and transfer the files to Gloria using a USB memory stick for the third step. Examples throughout this manual are based on a Windows PC, using a variety of free and commercial software. However, there are no specific requirements for the computer you need for this process: Windows PC, Mac, Linux or Chromebook can all be used to create a complete hymnbook using only free software.

This manual only applies to the Gloria 4 model.

It helps if you're a musical person and if you're comfortable around computers and new software. But you don't have to be. Music has been created for Gloria by musicians with no computer experience, by technicians with no musical ability, by musicians who are also technical wizards, and by people who are none of the above. So no matter what your current talents, you can do this if you're willing to invest the time.

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MIDI Files

Gloria music files are MIDI files. This is a standard format for storing musical performances. MIDI is different from other audio formats such as MP3 in that MIDI records the *commands* for producing music. It's not an audio recording of the music itself (e.g. MP3) so MIDI files can't be played directly. They must be played through a synthesizer, which takes commands such as Note On and Note Off and creates audio on the fly. The benefits of the MIDI format are that it is very compact, so you can store a large amount of music in comparatively very little space, and MIDI music can be changed live. Gloria takes advantage of this to allow you to change tempo, key (pitch) and instruments live, while the music is playing.

MIDI with all its uses and applications is a vast topic, and this manual will only cover the aspects that apply to Gloria.

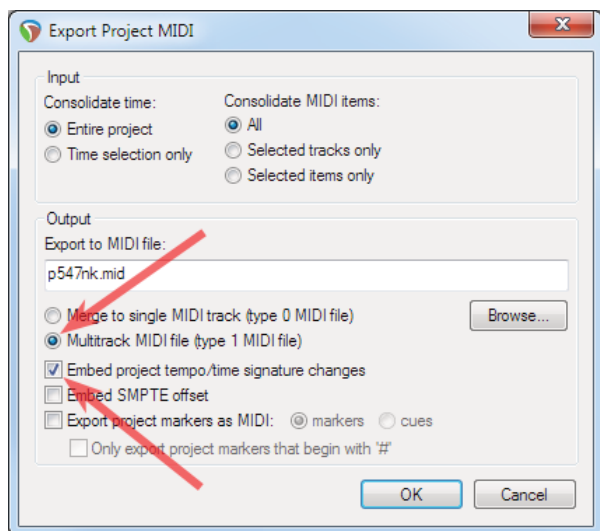
MIDI File Type 1

Save files as MIDI type 1. This is a file with one or more simultaneous tracks. Other options are type 0 (a single multi-channel track) or type 2 (one or more independent tracks). Don't use those formats. Use type 1.

Typically, MIDI type 1 files store tempo information in the first track (often labeled track 0) and music in the remaining tracks (track 1, 2, etc.). Usually each track consists of music commands on only one MIDI channel, so for example track 1 has the music for channel 1, track 2 has the music for channel 2, etc. MIDI file tracks and MIDI channels are two different things, however, and there is no obligation to have only one channel per track or even one track per channel. It's convenient (to humans) to have one track = one channel, but the computer doesn't care and Gloria doesn't care either.

Note that Gloria has a limit of 22 tracks. MIDI files with too many tracks will not play at all.

In general, tell your software to save as MIDI file type 1 and that should be enough. Here's an example from Reaper, a digital audio workstation software package that includes a comprehensive MIDI editor (<https://www.reaper.fm/>):



MIDI Channels

MIDI specifies sixteen channels. Sometimes those channels are numbered 1–16 and sometimes 0–15. It can be confusing, so make sure you know your software's channel numbering convention. This manual will number channels from 1 to 16.

MIDI channels exist so that you can separately control different parts of the music. For example, you can change the instrument on one channel while leaving the other channels alone. Or you can change the volume on only one channel to make it louder (or softer). Or you can mute a channel, or solo a channel (mute all the others).

You can create music for Gloria that only uses one channel. For example, if you connect a MIDI keyboard to your computer and record a musician playing a song then the entire song will typically be recorded on a single channel (say, channel 1), stored on a single track in a MIDI file (say, track 1). The computer software will probably add a tempo track (track 0) with nothing in it other than an initial default tempo that probably bears no relation to the actual tempo of the song. And it will most likely work in Gloria with no further modifications.

However, there are advantages to using multiple channels. While creating the music you can independently assign a different instrument to each channel. Flute for the melody part, acoustic bass guitar for the bass line, strings for the orchestra, for example. Also, users can themselves assign a different instrument to each channel in Gloria using the track keys (Melody, Alto, Tenor, Bass, Accompaniment) and the instrument keys. Users can also turn each channel on or off, or alter its volume relative to the other channels.

By MIDI convention, percussion lives on channel 10. Gloria has a complete General MIDI percussion set. All music commands on channel 10 are interpreted as percussion events (drums, cymbals, etc.). Instrument changes are ignored on channel 10.

The table on page 7 shows how MIDI channels are used in Gloria.

A typical MIDI file created to accompany congregational singing will use six channels: melody, alto, tenor and bass on channels 1–4, accompaniment on channel 5 and percussion on channel 10. Simpler arrangements will sometimes skip accompaniment and percussion (channels 5 and 10).

MIDI Channel	Gloria Key	User can change instruments
1	Melody	Yes
2	Alto	Yes
3	Tenor	Yes
4	Bass	Yes
5	Accompaniment	Yes
6	Accompaniment	Yes
7	Accompaniment	Yes
8	Accompaniment	Yes
9	Accompaniment	Yes
10	Percussion	No
11	Melody	Yes
12	Alto	Yes
13	Tenor	Yes
14	Bass	Yes
15	Accompaniment	Yes
16	Accompaniment	Yes

You'll note that two channels (1 and 11) are assigned to the Melody key, two channels to the Alto key, two to Tenor, two to Bass and seven channels to the Accompaniment key. Having two channels for Melody means you can use two different instruments simultaneously on the melody line for that song. MIDI only allows one instrument per channel at any given time. You can change instruments as often as you like on each channel, but each channel can only play using one instrument at a time. Multiple channels allow multiple instruments, which allow richer, more complex arrangements.

Keep in mind that those richer, more complex arrangements favor *listening* (a passive activity) but hinder *singing* (an active engagement). So consider your goals as you create the music: is it primarily for people to listen to, is it for backing tracks for professional, technically competent singers, or is it for

accompanying the congregation at large? Gloria is often used at informal gatherings (e.g. hospital visits, retirement homes), so keep in mind the singing talent (or lack thereof) at such events.

A good arrangement is to record a single line of notes (monophonic) on each channel 1–4, chords of up to four notes (polyphonic) on channel 5, and (optionally) one to four percussion instruments at a time on channel 10. This allows users to listen to just one channel at a time (say, Alto) and learn their part.

A further consideration is that if you do use two melody channels to enable two different simultaneous instruments, if the user presses the Melody key on Gloria followed by an instrument key then both channels will be changed to the same user-selected instrument. The same applies to the other Gloria track keys, and most of all to the Accompaniment key: seven different channels using seven different instruments, suddenly all playing the same instrument. Having sixteen channels gives you a lot of flexibility in arranging your music, as long as you understand the limitations of Gloria's user interface.

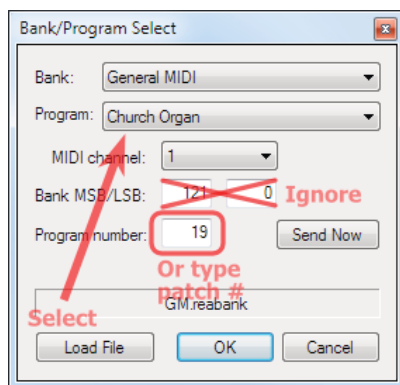
Instruments

Gloria uses the General MIDI set of instruments, commonly called patches. MIDI channels use the Program Change command to change instruments. The instrument change only applies to that channel. If you want to change the instruments on all channels then each channel will need its own Program Change command. By convention the default is to start each channel set to patch #0 (Acoustic Grand Piano). If there are no Program Change commands in the file then the entire song will play using Acoustic Grand Piano. All the same, it's good practice to include a Program Change command at the start of

each channel, even if you actually want Acoustic Grand Piano.

Keep in mind that at the start of every file the Gloria synthesizer is reset to Acoustic Grand Piano. Let's say you start with a MIDI file that includes intro, main verse, bridge and final verse all in one file, and then split the file into multiple files (intro, main, second version). While the music was in one single file, instrument changes remained in place on each channel until the next instrument change. If the Melody on channel 1 was set to Flute in the intro, the main verse would continue with Flute. When split into multiple files, the intro file would contain the Flute instrument change but the main file would not. So on playback the song would start with the Melody set to Flute during the intro, and then abruptly switch to Piano at the start of the verse. Thus, when splitting a MIDI file into multiple files for Gloria (and when creating those files from scratch), be sure to include a Program Change command at the start of every channel for every file such that instruments are correctly carried over from one file to the next.

Changing instruments will affect new notes on the same channel following the change. It has no effect on notes currently playing.



MIDI editing software will typically add a Bank Select controller command ahead of the Program Change command. For example, instead of simply having Program Change: 19 (Church Organ), there will be Bank Select: 0, Program Change: 19 (Church Organ). Technically Bank Select 0 is correct. In practice Gloria ignores all Bank Select commands.

Index	Position	Length	Channel	Type	Parameter	Value
31	7.4.00	0.2.00	1	Note	A4	75
32	8.2.50	0.0.50	1	Note	A4	75
33	8.3.00	0.2.67	1	Note	D5	75
34	9.4.50		1	CC	Bank Select 14-bit (0/32)	15488
35	9.4.50		1	PC	Church Organ	19
36	9.4.50	0.0.67	1	Note	D4	79
37	10.1.00	0.0.67	1	Note	B4	79

Some software (Reaper, for example) will always add a Bank Select command alongside the Program Change command. Delete the Bank Select afterwards to save space or just don't worry about it.

Index	Position	Length	Channel	Type	Parameter	Value
31	7.4.00	0.2.00	1	Note	A4	75
32	8.2.50	0.0.50	1	Note	A4	75
33	8.3.00	0.2.67	1	Note	D5	75
34	9.4.50		1	PC	Church Organ	19
35	9.4.50	0.0.67	1	Note	D4	79
36	10.1.00	0.0.67	1	Note	B4	79
37	10.2.00	0.0.33	1	Note	B4	79

Channel 10, Percussion, ignores all Program Change and Bank Select commands.

At all times the user has the option of making their own instrument choices while playing music on Gloria. They can change the instrument on a single track, on multiple tracks, or on the whole song. User instrument selections override any subsequent instrument changes within the MIDI files until the end of the song, and persist through all stanzas. Starting a new song (or stopping and restarting the same song) reverts to using the instrument changes in the MIDI file. Pressing and

holding the Play key while a song is playing will revert all tracks to the original instruments specified in the MIDI file.

Different instruments vary in overall loudness. Some instruments work well with others. Some combinations clash. Instruments with a well-defined attack, a punchy, almost percussive start to each note, work well on lead tracks such as Melody and Bass because they give good cues to the singers and help keep everybody on tempo. Instruments with gradual, mushy attack and release, the lead-in and lead-out of each note, are better suited to background tracks such as Accompaniment. Experiment with the instrument keys on Gloria to get a feel for how each instrument sounds. Hold down the Synthesizer key for three seconds to access an on-screen selection of any instrument within the General MIDI set, including instruments that can't be directly selected using the normal instrument keys.

Most Gloria instruments mimic a real-world physical instrument, and in the real world most instruments are limited in the range of notes they can produce. A synthesized instrument can be played at any pitch, at least in theory. But you'll get some strange results if you play high notes with a bass instrument such as a cello or bass guitar, or if you play low notes with a flute. You'll get the best results if you keep to the ranges typical of each instrument.

The instruments from 81 to 104 are entirely artificial, so the names and sounds are somewhat arbitrary. Apply according to taste.

Pages 22–25 include a table of the instruments available in Gloria. Note that patch numbers are sometimes started at 1. This manual uses the convention of starting the patch numbers at 0. The General MIDI instrument set extends to patch #127, but patches #120–127 are not implemented in Gloria.

Things to Keep in Mind

Gloria can synthesize up to 42 voices at once. In a common scenario the Melody, Alto, Tenor and Bass tracks are playing one note each. The Accompaniment track is playing four notes and the Percussion track is playing four drums (or cymbals, maracas, etc.). At one voice per note, that's a total of 12 voices. However, each voice usually continues to play after the note has ended. The release portion of the note trails off even as the next note begins, so at the very least there are now 24 voices playing: the current set of notes plus the remains of the notes that went before. And notes often overlap, even when there's only one note per track, adding to the total number of active voices.

Some of the instruments are synthesized with more than one voice, as noted in the instruments table. Each note uses two voices (or more) when playing with one of these instruments. Now the example above is using 16 voices for eight notes, plus four for percussion, for a total of 20 voices. Include the overlap from the previous notes to get 40 voices playing at once. So you see how quickly you can reach the limit.

Some of the instruments have a longer than usual release (two seconds or longer), as noted in the instruments table. The release phase is the part of the note that continues to sound after the note has ended. Think of a bell continuing to ring after it has been struck, or a guitar string continuing to vibrate after it has been plucked. Notes with a long release continue to use a voice long after the note has ended, while other notes come and go. So instruments with a long release are more taxing on the system than others.

Gloria uses various tricks to get around this problem. About half the percussion instruments can be replaced outright by other percussion instruments (eliminating the overlap) without the listener noticing. If there are no free voices Gloria

will cancel the quietest voices, the ones that have had the most time to trail off into silence, that contribute the least to the overall sound. Again, the listener doesn't notice.

Some of the instruments create a stereo sound, as noted in the table above. They have a different but complementary sound for the left and right audio channels on the Line Out connector. The stereo audio is mixed into one mono channel when using the built-in speaker (Gloria only has one speaker), but you can enjoy the full stereo effect when using headphones or when connected to an external stereo system.

Most of the instruments are marked "Refined" in the table above. Those instruments have been individually tailored and fine-tuned to work well with Gloria music. The few remaining instruments have not been tested in live accompaniment. You may use them, of course, but you may want to evaluate their suitability before committing to active use.

Percussion

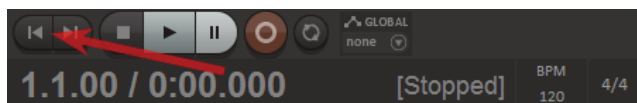
The table on page 21 lists the percussion instruments available in Gloria. They are played from channel 10.

Tempo and Timing

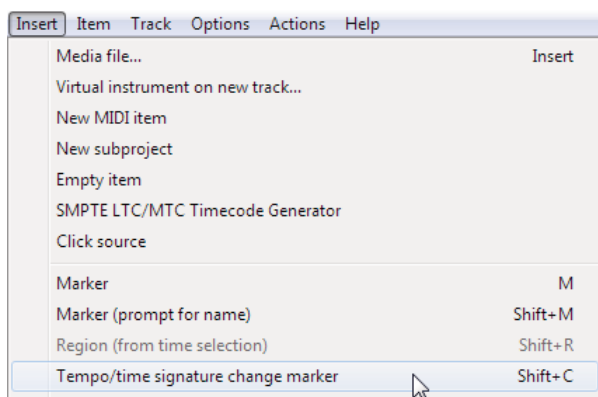
It's good practice to include the correct time signature and tempo in your MIDI files. By convention, the default time signature is 4/4 and the default tempo is 120 beats per minute. That's what Gloria will assume if a MIDI file doesn't include a specific time signature or tempo. That will play fine if the software that recorded the music also assumed a default tempo of 120 bpm, otherwise the music will play too fast or too slow. To eliminate any doubt, some MIDI editors will automatically add 4/4 and 120 bpm at the start of each file. You should set the time signature and tempo appropriate to the song at the very beginning of the file.

The process varies by program. Here is a sequence from Reaper.

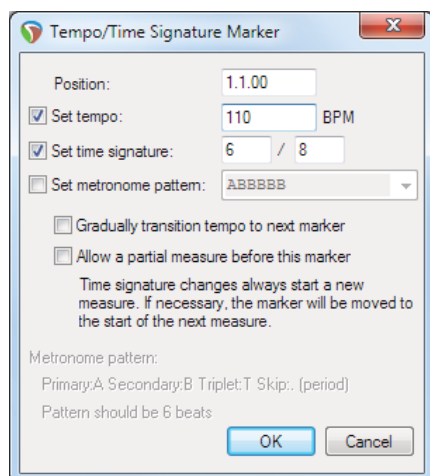
1. Click the Go To Start button. Check that the time display indicates the beginning (measure 1, beat 1, fraction 0). Note the default of 120 bpm and 4/4.



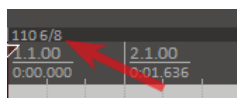
2. Select <Tempo/time signature change marker> from the Insert menu.



3. Check both the <Set tempo> and <Set time signature> check boxes. Enter the new tempo and time signature (say, 110 and 6/8). Click OK. Even if the default tempo and / or time signature is what you actually want, set them here anyway. That way the MIDI file will have a definite, unambiguous tempo.



4. Check the project timeline and confirm your new settings.



Setting the initial tempo in the MIDI file ensures the file will play back at the same tempo as it was recorded. Setting the initial time signature helps you keep time during recording, particularly if the editing software has a metronome function. It also alters the way Gloria uses the tempo setting during play. A “beat” means something different at 4/4 than it does at 6/8, informing what 110 beats per minute actually translates to.

If you have no idea what the time signature or tempo is supposed to be, insert a tempo / time signature marker at the start of the file for 120 bpm and 4/4 (the default). Record the music free-form, with no regard to measures or beats. It might look odd in the MIDI editing software and it’ll be a total mess if you try sheet music transcription (converting the recorded music into printed notes on a page). But Gloria will play it just as you recorded it.

Keep in mind that the tempo and time signature are reset at the start of every file. Let's say you start with a MIDI file that includes intro, main verse, bridge and final verse all in one file, and then split the file into multiple files (intro, main, second version). While the music was in one single file, the current tempo remained in place until the next tempo change. If the tempo was set to 76 bpm in the intro, the main verse would continue with 76 bpm. When split into multiple files, the intro file would contain the 76 bpm tempo setting but the main file would not. So on playback the song would start with the intro at the expected 76 bpm, and then abruptly speed up to the default 120 bpm at the start of the verse. Thus, when splitting a MIDI file into multiple files for Gloria (and when creating those files from scratch), be sure to include tempo and time signature markers at the start of every file such that the timing is correctly carried over from one file to the next.

Upbeat

Sometimes a song will start on the upbeat (the last note of the previous measure). Here's an example. Normally in 3/4 time each measure has three beats, but in this example the first measure only has one beat.



To represent this in the MIDI file, add a tempo / time signature marker at the start of the file (at 1.1.00) with a time signature of 1/4. Then one beat later (at 2.1.00) add a time signature marker of 3/4. Now the measure and beat numbers in the software will match the sheet music.

1101/4				
1.1.00	3/4	2.2.00	2.3.00	3.1.00
0:00.000	0:00.545	0:01.090	0:01.636	0:02.181

This is what it looks like on the timeline. Measure 1 has one beat, measures 2 and on have three beats.

This is not strictly necessary for Gloria. An initial tempo and time signature of 3/4 is sufficient for this example. However, adding the upbeat measure will help you match the MIDI file to the sheet music, as an aid to correctly transcribing the music into MIDI. It will also improve the results when converting the MIDI file into sheet music later on, if that's something you might want to do.

Slowing Down

Music sometimes has "rit." or "rall." written above the staff to indicate a slowing of the tempo. "rit." for *ritardando* (an Italian musical term) is often used in the middle of the song to slow it down temporarily, while "rall." for *rallentando* is used at the end of the song to slow it to a close. People naturally slow down at the end of a song anyway (specifically at the end of each verse / chorus) even when there's no such indication in the music.

The way to properly represent that in a MIDI file is to insert a series of tempo markers to gradually slow down the tempo of the song. Here's an example, where the song's normal tempo of 168 bpm is slowed to 105 bpm over the course of four measures.

157.5	153	150	144	138	133.5	129	126	118	120	117	112.5	109.5	105
19.100				20.100				21.100		21.500		22.100	
0:25.750				0:27.350				0:29.163		0:30.084		0:31.112	

Again, this is not strictly necessary for Gloria. If you slow down while recording the music, then that's what will happen when you play back the music. But adding the rit. / rall. as a tempo change will help with proofreading the MIDI file because the notes will line up with the measures and beats. It will also help get better sheet music from the MIDI file. If you're taking

a sheet music file from another program and exporting it as MIDI, inserting a series of tempo markers to the MIDI file is the quickest way to add rit. / rall.

You can follow the same process on a smaller scale for a fermata, where only one note is lengthened.



End of File Marker

MIDI files have a specific, definitive, accurate way to indicate when the music ends. It's important to know when, in time, the music should end, as opposed to running out of data and stopping there. With Gloria it's especially important because files are chained together, played one after the other. The intro file flows into the main file. The main file loops back to the beginning at the end of each verse. All of these transitions depend on the end of file marker to be on the beat, to prevent faltering or unexpected silences between verses. Tempo must be maintained throughout with seamless transitions between files. If not, the user will have difficulty singing along.

Fortunately, all MIDI editor programs include a required end of track marker. Unfortunately, none of them consistently get it right. Thus, the MIDI end of track marker is not generally suitable for Gloria. You will have to add a Gloria-specific end of file marker to each MIDI file you create.

This marker is MIDI Continuous Controller (CC) 22, with value 0. Place this command on only one channel (any channel will do, but it's typically placed on channel 1, Melody) at the beat following the last note in the music, usually the start of the next measure. Here's an example of how to add the Gloria end of file marker (using Reaper):

Event Properties

Type: Control Change (CC)

Position: 23.1.00

Channel: 1

Controller: 22

Value: 0

Use +./ for relative changes in any field.
Use +1o2 to add 1 octave and 2 semitones.

OK Cancel Apply

The event type is CC; the position (in time) is measure 23, beat 1; the event is on channel 1; it's controller 22 with value 0. This means that the next file will start (measure 1, beat 1) at exactly measure 23, beat 1 of this file. This is what it looks like in the event list for channel 1:

Index	Position	Length	Channel	Type	Parameter	Value
87	20.3.00	0.1.00	1	Note	G4	79
88	20.4.50	0.0.29	1	Note	C5	79
89	21.1.00	0.0.23	1	Note	D5	79
90	21.1.50	0.0.29	1	Note	E5	79
91	21.2.00	1.0.50	1	Note	G5	79
92	23.1.00		1	CC	22	0
93	23.1.00		1	(end) All Notes Off		

Note that the MIDI end of track marker is also at measure 23, beat 1 (it can never come before the last event in the track). Compare with the event list for channel 2:

Index	Position	Length	Channel	Type	Parameter	Value
64	20.1.50	0.1.33	2	Note	A3	75
65	20.3.00	0.0.67	2	Note	B3	75
66	20.4.00	0.0.67	2	Note	B3	66
67	20.4.50	0.0.67	2	Note	C4	75
68	21.1.50	0.0.67	2	Note	C4	66
69	21.2.00	1.0.50	2	Note	B3	75
70	22.3.46		1	(end) All Notes Off		

Here the MIDI end of track marker is at measure 22, beat 3 and a half (roughly). That's half a beat too soon. The current verse would end and the next verse would start playing before

the listeners expected it. Singers would hesitate before re-aligning with the new timing and the congregation would falter. Thus, it's important to add a Gloria end of file marker at the right place.

Gloria will stop playing a file and immediately move on to the next file as soon as it encounters the CC 22 event. There may be more events still to play later in that track and there may be more events on other tracks. They are all discarded. If the file does not have a CC 22 event Gloria will play everything in the file until the final (latest) MIDI end of track marker, before moving on to the next file.

Table of Percussion Instruments

Note #	Percussion	Note #	Percussion
27	Laser	58	Vibraslap
28	Whip	59	Ride Cymbal 2
29	Scratch Push	60	High Bongo
30	Scratch Pull	61	Low Bongo
31	Stick Click	62	Mute High Conga
32	Metronome Click	63	Open High Conga
33	Metronome Click 2	64	Low Conga
34	Metronome Bell	65	High Timbale
35	Acoustic Bass Drum	66	Low Timbale
36	Bass Drum 1	67	High Agogo
37	Side Stick	68	Low Agogo
38	Acoustic Snare	69	Cabasa
39	Hand Clap	70	Maracas
40	Electric Snare	71	Short Whistle
41	Low Floor Tom	72	Long Whistle
42	Closed Hi-Hat	73	Short Guiro
43	High Floor Tom	74	Long Guiro
44	Pedal Hi-Hat	75	Claves
45	Low Tom	76	High Wood Block
46	Open Hi-Hat	77	Low Wood Block
47	Low Mid Tom	78	High Cuica
48	High Mid Tom	79	Low Cuica
49	Crash Cymbal 1	80	Mute Triangle
50	High Tom	81	Open Triangle
51	Ride Cymbal 1	82	Shaker
52	Chinese Cymbal	83	Sleigh Bell
53	Ride Bell	84	Bell Tree
54	Tambourine	85	Castanets
55	Splash Cymbal	86	Surdu Dead Stroke
56	Cowbell	87	Surdu
57	Crash Cymbal 2		

Table of Instruments

Patch	Instrument	Gloria Details
0	Acoustic Grand Piano	Refined
1	Bright Piano	Same as #0
2	Electric Grand Piano	Refined
3	Honkytonk Piano	Refined, two voices
4	Electric Piano 1	Refined
5	Electric Piano 2	Refined, two voices
6	Harpsichord	Refined
7	Clavinova	Refined
8	Celesta	Refined, long release
9	Glockenspiel	Refined, long release
10	Music Box	Refined, long release
11	Vibraphone	Refined
12	Marimba	Refined, long release
13	Xylophone	Refined, long release
14	Tubular Bells	Refined, long release
15	Dulcimer	Refined, long release
16	Drawbar Organ	Refined
17	Percussive Organ	Two voices
18	Rock Organ	Refined
19	Church Organ	Refined
20	Reed Organ	Refined, three voices
21	Accordion	Refined, two voices
22	Harmonica	Refined
23	Tango Accordion	Same as #21
24	Nylon Guitar	Refined
25	Steel Guitar	Refined
26	Jazz Guitar	Refined
27	Clean Electric Guitar	Refined
28	Muted Electric Guitar	Refined
29	Overdriven Guitar	

Patch	Instrument	Gloria Details
30	Distortion Guitar	Same as #29
31	Guitar Harmonics	
32	Acoustic Bass	Refined
33	Fingered Bass	Refined
34	Picked Bass	Refined
35	Fretless Bass	Refined
36	Slap Bass 1	
37	Slap Bass 2	Refined
38	Synth Bass 1	
39	Synth Bass 2	Refined
40	Violin	Refined
41	Viola	Same as #40
42	Cello	Refined
43	Contrabass	Refined
44	Tremolo Strings	
45	Pizzicato Strings	Refined
46	Orchestral Harp	Refined, long release
47	Timpani	Long release
48	String Ensemble 1	Refined
49	String Ensemble 2	Refined, long release
50	Synth Strings 1	Refined
51	Synth Strings 2	Refined, two voices, long release
52	Choir Aahs	Refined
53	Choir Oohs	
54	Synth Voice	Refined, long release
55	Orchestra Hit	Two voices
56	Trumpet	Refined
57	Trombone	Refined
58	Tuba	Refined, two voices (stereo)
59	Muted Trumpet	
60	French Horn	Refined, two voices (stereo)
61	Brass Section	Refined, two voices

Patch	Instrument	Gloria Details
62	Synth Brass 1	Two voices
63	Synth Brass 2	Refined, two voices (stereo)
64	Soprano Sax	Refined
65	Alto Sax	Refined
66	Tenor Sax	Refined
67	Baritone Sax	Refined
68	Oboe	Refined
69	English Horn	Refined
70	Bassoon	Refined
71	Clarinet	Refined
72	Piccolo	Refined
73	Flute	Refined
74	Recorder	Refined
75	Pan Flute	
76	Blown Bottle	Refined
77	Shakuhachi	
78	Whistle	Same as #79
79	Ocarina	Refined
80	Square Lead	Refined, two voices
81	Whisper	Refined, two voices
82	Calliope	Two voices
83	Chiffer	Three voices
84	Charang	Two voices
85	Voice Lead	Refined
86	Fifths Lead	Two voices
87	Bass + Lead	Two voices
88	Daybreak	Refined
89	Warm	Long release
90	Polysynth	Refined
91	Reflections	Refined, two voices, long release
92	Bowed Glass	Two voices, long release
93	Back Home	Refined

Patch	Instrument	Gloria Details
94	Halo	Refined, two voices
95	Sweep	Four voices, long release
96	Rain	Two voices, long release
97	Soundtrack	Two voices (stereo), long release
98	Crystal FX	Refined, two voices (stereo), long release
99	Atmosphere	Refined, long release
100	Brightness	Two voices, long release
101	Darkness	Two voices, long attack & release
102	Echoes & Drops	
103	Sci-fi FX	Refined, two voices, long release
104	Sitar	Refined, long release
105	Banjo	Refined
106	Shamisen	
107	Koto	Refined, long release
108	Kalimba	
109	Bag Pipes	Refined, two voices above note #85
110	Fiddle	Same as #40
111	Shanai	Refined
112	Tinkle Bell	Long release
113	Agogo	
114	Steel Drums	Refined, long release
115	Woodblock	
116	Taiko Drums	Long release
117	Melodic Tom	
118	Synth Drums	
119	Reverse Cymbal	Two voices below note #55

File Naming Convention & Structure

There is a specific format for the names of MIDI files to be loaded into Gloria. This file naming convention conforms to the way Gloria structures songs, which in turn is arranged to favor traditional hymns. A hymn typically has a lead-in or intro, followed by the first verse, the chorus (if there is one), the second verse and chorus, and so on until all the verses are sung.

All files names start with “p”, followed by a four-digit song number. Use leading zeros if the number is less than 1,000 (e.g. 0005). All files end with the extension “.mid”. Letters can be upper or lower case.

At the very least a song needs a main file. This file contains one verse and chorus. It is played from beginning to end and repeated as many times as there are verses in the song. Example: “p0128.mid”.

Usually the song will have an intro file. This file is only played once, at the beginning before the main file. The song transitions directly from the intro file into the main file, therefore there must be a main file. The intro cannot be the only file for the song. The user can optionally bypass the intro and start with the main file directly. The intro file name has the suffix “in”. Example: “p0128in.mid”.

The song can have up to two additional renderings of the main file. One of those is typically a “second version” of the song, often with a different instrumental arrangement or a slower tempo. If this v2 file is the only additional rendering it will play on the last verse. If there are two additional renderings (see new key, below), the v2 file will play on the second to last verse. The v2 file plays only once. The second version file name has the suffix “v2”. Example: “p0128v2.mid”.

The second additional rendering of the song typically changes key, with a key-change transition at the beginning of the file. This new key file is played on the last verse, and once it is playing (i.e. the key-change transition has started) the user can't manually increase the number of verses to play. The new key file will always play only once, and it will be the last file played in the song. The new key file name has the suffix "nk". Example: "p0128nk.mid".

The user has the option of enabling or disabling the additional renderings. Selecting "Plain" will only play the main file and ignore the v2 and new key files. Selecting "Special" will play all available files.

So a minimal file arrangement will look like this:

p0128.mid

A basic file arrangement will look like this:

p0220in.mid

p0220.mid

A complete file arrangement will look like this:

p0078in.mid

p0078.mid

p0078v2.mid

p0078nk.mid

A partial arrangement could be:

p0004in.mid

p0004.mid

p0004nk.mid

Or also:

p0323in.mid

p0323.mid

p0323v2.mid

The intro can be omitted:

p0131.mid

p0131v2.mid

p0131nk.mid

There is an optional fifth type of file: fanfare. This is typically a snippet of the song, often the chorus, and can be selected and played by the user as a musical interlude. The fanfare file exists independently of the other files in the song, although it cannot be the only file for the song. There must be at least a main file. The fanfare file name has the suffix “f”. Example: “p0128f.mid”.

Hymnbook Table of Contents

Gloria groups music into hymnbooks. There can be up to ten hymnbooks in Gloria and the user can switch between them at any time. Hymns are organized by number within a hymnbook, from number 1 up to 4,500. Hymn numbers don't have to be consecutive and don't even have to start at 1. The *Celebremos Su Gloria* hymnbook, for example, starts with hymn #2, skips #14, skips #29 and 30, and so on. The hymnbook officially ends at #652, but there are a few extras starting at #901, plus a few tuning scales starting at #951. So you can arrange hymns in whatever order you like. The only restriction is that you can't duplicate numbers. There can only be one hymn per number.

Hymnbooks are made up of a collection of MIDI files, with a table of contents file to bring all the MIDI files together. These files all live together in a single folder, copied to a USB memory stick to import into Gloria. Even if you only want to import one song on one MIDI file, you will also need a hymnbook table of contents file to anchor the song to. Orphan MIDI files are ignored by Gloria.

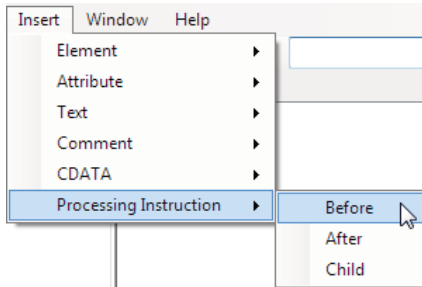
A hymnbook table of contents is maintained as an XML file. An XML file (eXtensible Markup Language) is a plain text file in a standard format with a lot of free tools available on the internet. The examples in this manual will focus on XML Notepad (free at <http://www.lovettssoftware.com/downloads/xmlnotepad/readme.htm>) with Notepad++ (free at <https://notepad-plus-plus.org/>) as an alternative. XML Notepad will ensure the table of contents file is correctly formatted and makes it easier to see the overall layout of the file, but it's somewhat slower to use than Notepad++. If you know what you're doing Notepad++ is fast to use, but it doesn't do any checks on the content of the file. It's up to you to make sure everything is correct. A good compromise is to use Notepad++

to create and edit the table of contents file and afterwards load the file into XML Notepad for a sanity check.

This manual will explain in detail how to put together a table of contents from scratch, but in real life it's easier to enter the details into a spreadsheet and have the spreadsheet automatically create the table of contents for you. Skip to the end to go the easy route if you don't care about the details.

New Hymnbook

Run XML Notepad. In the new blank document, insert a couple of processing instructions. From the Insert menu select Processing Instruction and click Before:



On the left hand side (the instruction name) type:

```
xml
```

On the right hand side (the instruction value) type or paste:

```
version="1.0" encoding="utf-8"
```

If you've clicked outside the program and there's no longer a cursor (you went to copy the text above), select the field you want to edit and press F2.

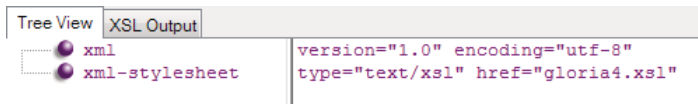
Insert another processing instruction (Insert menu / Processing Instruction / After). On the left type or paste:

```
xml-stylesheet
```

On the right type or paste:

```
type="text/xml" href="gloria4.xml"
```

The document will look like this:



Select Save As from the File menu and save the file. Use a three- or four-character file name that represents the hymnbook, typically the initials of the hymnbook. In this example the hymnbook is saved as “Test.xml”. There will be further details later about naming and organizing files.

Hymnbook Element

XML files are made up of one or more elements. Each element may itself contain more elements in a nested hierarchy (these are called child elements), and it may contain plain text (called the element content). Each element may also include attributes that inform or alter the element.

A Gloria hymnbook table of contents XML file is made up of a single “hymnbook” element, which in turn contains one or more “title” elements plus a series of “hymn” elements.

Start by adding a hymnbook element. From the Insert menu select Element and click After. On the left hand side (the element name) type:

```
hymnbook
```

Leave blank the right hand side (the element value).

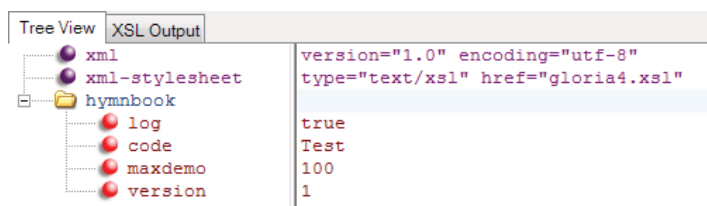
With the hymnbook element selected, add some attributes. From the Insert menu select Attribute and click Child. On the left (the attribute name) type:

```
log
```

And on the right (the attribute value) type:

true

Add another attribute (Insert / Attribute / After). Set the attribute name to “code” and the value to “Test” (without the quotes). Add another attribute named “maxdemo” with value “100”. And add a final attribute named “version” with value “1”. The document so far will look like this:



Hymnbook Attributes

This is what you have now: a Gloria table of contents XML file with a single hymnbook element. That element has four attributes that define its behavior. This is what those attributes mean:

log attribute

The “log” attribute is optional. If you include it and set its value to “true”, Gloria will generate a log file with any errors or warnings encountered while importing the hymnbook. The log file is a text file with a series of error messages including the line number in the XML file where the error was encountered. It’s helpful to have a record of errors, especially at the beginning, to troubleshoot problems with a new hymnbook. The log file is stored on the USB memory stick in the same folder as the hymnbook XML file. New entries are added to the end of the log file if the same hymnbook is imported multiple times. The log file won’t be created (or extended) if there are no errors at all while importing the hymnbook.

Any value for the log attribute other than “true” is interpreted as false. A false log attribute, or no log attribute at all, means Gloria will not generate a log file while importing the hymnbook.

The log attribute is only allowed in the hymnbook element, and for maximum benefit should be the first attribute listed.

code attribute

The “code” attribute is required. If you don’t include it Gloria will not import the hymnbook. This is the identification code that represents the hymnbook internally in Gloria, and uniquely differentiates it from other hymnbooks. Its value must be three or four characters. Upper or lower case ASCII letters (unaccented) and digits are accepted. The code is case sensitive: “Test”, “test” and “TEST” are all different. Typically the code is made up of the initials of the hymnbook. For example, *Celebremos Su Gloria* is “CSG”. *The Celebration Hymnal* is “TCH”. *Himnos de Fe y Alabanza* is “HFyA”.

If you’re creating a collection of songs for your own personal use, you can more or less make up any code you want. If you intend to distribute the hymnbook (say, to a denomination of churches), contact Gloria Music to make sure the code you’ve chosen won’t conflict with another hymnbook. If a user installs a hymnbook with the same code as a hymnbook already on their Gloria, the new hymnbook will overwrite the existing hymnbook.

Hymns within a hymnbook may reference hymns in another hymnbook (more on that later). They use the hymnbook code as part of that reference.

The code attribute is only allowed in the hymnbook element.

maxdemo attribute

The “maxdemo” attribute is optional. Its value is a number in the range 1 to 4500. If you don’t include it Gloria will use a

default value of 4500. This number is the highest-numbered hymn Gloria will play while in Demo mode. In this example the value is set to 100. That means that in Demo mode Gloria will go back to the beginning of the hymnbook after playing hymn #100. If there is no hymn #100 Gloria will only demo hymns below 100. Setting the value to 4500 (or using the default) means every hymn in the hymnbook will be included in Demo mode.

It's useful to set maxdemo to the last official number in the hymnbook and then use higher numbers for utility files such as tuning sequences or musical bridges. That way odd files and musical snippets are not included in the demo.

The maxdemo attribute is only allowed in the hymnbook element.

version attribute

The "version" attribute is optional. Its value is a number in the range 0 to 9999. If you don't include it Gloria will use a default value of 0 (no version). Start with a version number of 1 and increase the value every time you redistribute the hymnbook with modifications. The hymnbook version appears on the Gloria System Info screen in the setup menu. It's a useful way for the user to see if they have the latest update for that hymnbook. If you don't use the version number (or forget to increase it) it may be hard for users to tell if they have the correct version of the hymnbook.

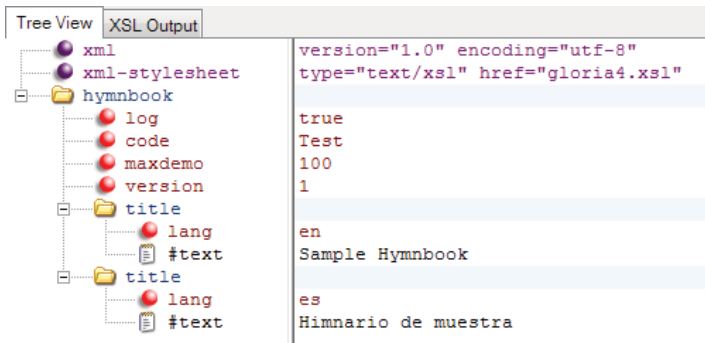
The version attribute is only allowed in the hymnbook element.

Title Element (Hymnbook)

Next add some titles to the hymnbook. Click the "version" attribute to select it (if it's not already selected) and from the Insert menu select Element and click After. Set the element

name to “title” and the value to “Sample Hymnbook” (without the quotes). Add an attribute to the title (Insert / Attribute / Child) named “lang” with value “en”.

Add another title element. Click to select the title element you just created and select Insert / Element / After. Set the element name to “title” again, and the value to “Himnario de muestra”. Add an attribute “lang” with value “es”. The document so far will look like this:



You’ve added two titles to the hymnbook, one in English (language code “en”) and one in Spanish (language code “es”). The title will be displayed to the user during Gloria startup and while selecting a hymnbook from the setup menu. If you don’t add a title to the hymnbook, Gloria will display the hymnbook code (“Test” in this example), which is less useful.

You can add titles in as many languages as you like. If the hymnbook has a title in the language selected by the user, then Gloria will display that title. If there is no matching title language, Gloria will display the first title in the list (English in this example). So make the first title your default title and then add additional languages as required. Note that the title language doesn’t even have to be a language supported by Gloria, although it does have to conform to the character set

supported by Gloria (unsupported characters will display as *, see later for the table of supported characters).

There can only be one title per language. Only the first title will be used if you add more than one title in the same language. Technically titles are limited to 280 characters, although in practice only the first 20 characters of a hymnbook title will be displayed on the Gloria screen. So keep titles brief. Unicode accented characters are supported. See the table of supported characters.

Title elements must be child elements of a hymnbook element or a hymn element.

Title Attributes

lang attribute

The “lang” attribute is optional. Its value is a two-character code according to ISO 639-1. If you don’t include it Gloria will use a default value of “en” (English).

Language	ISO 639-1 code
English	en
Spanish	es
Romanian	ro
Portuguese	pt
German	de
Malay	ms
French	fr
Turkish	tr
Italian	it
Polish	pl
Tagalog	tl
Yoruba	yo
Dutch	nl

See the table on the previous page for some examples. The Wikipedia page (at https://en.wikipedia.org/wiki/List_of_ISO_639-1_codes) has a complete list of language codes.

The lang attribute is only allowed in the title element.

Extended Character Support

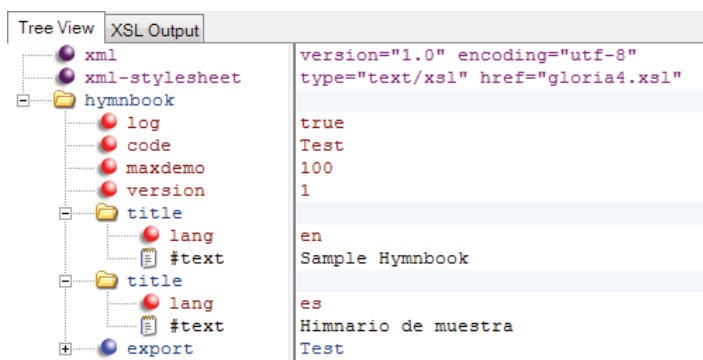
These are the characters supported by Gloria, in addition to the standard ASCII character set. Supported characters will be displayed correctly. Unsupported characters will be displayed as *. Contact Gloria Music if you would like to use extended characters outside this set.

ı	©	ı	À	Â	Ä	Ç
È	É	Ê	Ë	Î	Ï	Ô
Ö	Ù	Û	Ü	ß	à	á
â	ä	ç	è	é	ê	ë
ì	í	î	ï	ñ	ò	ó
ô	ö	ù	ú	û	ü	ÿ
Ă	ă	Ÿ	Ş	ş	Ț	ț

Export Element

You have the option of exporting a hymnbook. This creates a single file containing an entire hymnbook, including the table of contents and all the MIDI files. This file can then be distributed to other Gloria users.

To generate a hymnbook distribution file, select the hymnbook element and select Insert / Element / Child. Set the element name to “export” and the value to “Test” (without the quotes). The document so far will look like this:



The export element value (on the right) is the file name for the hymnbook export file. It's limited to 8 characters and must conform to basic filename requirements (e.g. start with a letter, only letters and digits, no spaces or punctuation). The export file will be saved to the "Music" folder on the USB memory stick.

When the export element is present, Gloria will create a hymnbook export file after it has finished importing the hymnbook. If there were errors in the importing process there may not be a hymnbook to export at all, in which case the export process will fail. Import errors may also result in a partial hymnbook, in which case the exported hymnbook will also be incomplete. You may want to go through the hymnbook creation and importing process without an export element at first, until the log file shows no import errors. Then add the export element to create a complete hymnbook file.

A special case is where the table of contents XML file has an export element but no hymn elements. In this case Gloria will not go through the import process at all. It will simply export the hymnbook that matches the code that already exists in Gloria. Hymnbooks supplied by Gloria Music cannot be re-exported using this no-hymn technique. You can only do this with hymnbooks you've created yourself.

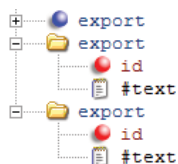
You can add multiple export elements to export the same hymnbook to multiple files. See below for an example on how to use this feature.

Export elements must be child elements of a hymnbook element.

Export Attributes

id attribute

The “id” attribute is optional. Its value is a Gloria serial number formatted as “XXXXXXX-XX-XXXX-XXXX”. This is the number displayed on the System Info screen of the Gloria setup menu. If the export element includes an id attribute then the resulting export file will be keyed to that specific serial number. It will only load on a Gloria with that serial number. If you don’t include the id attribute the resulting export file will load on any Gloria. Here’s an example:



```
Test
Q334007-61-00AF-0087
Test0087
Q228530-75-0041-00E7
Test00E7
```

In this example Gloria will export the hymnbook into three separate files. File “Test.enc” will load into any Gloria. File “Test0087.enc” will only load into the Gloria with serial number Q334007-61-00AF-0087. And file “Test00E7.enc” will only load into the Gloria with serial number Q228530-75-0041-00E7. This provides a way of limiting distribution to specific users, particularly if you’re distributing the files over the internet. Note that all the filenames must be unique, otherwise an export element may overwrite a file created by a previous export element.

To create the example, select the existing export element and add a new element (Insert / Element / After) named “export”

with value “Test0087”. Add a child attribute named “id” with value “Q334007-61-00AF-0087”. Repeat for as many serial numbers as necessary.

The id attribute is only allowed in the export element.

Hymn Element

The bulk of a hymnbook table of contents file will be hymn elements. Each hymn element represents one hymn or song and includes its reference number, one or more titles (possibly in a variety of languages), the MIDI files used for the hymn, the number of verses to repeat, what kind of dynamic profile to use, and whether the music is copyright and used under license.

Add a hymn element to the Test hymnbook. Select the last element in the hymnbook (export, if you’ve been following along) and select Insert / Element / After. Set the element name to “hymn” (without the quotes) and leave the value blank. Now add some attributes. Select Insert / Attribute / Child and set the attribute name to “num” and the value to “001”. Add another attribute (Insert / Attribute / After) named “stanzas” with value “3”.

Tree View	XSL Output
xml	version="1.0" encoding="utf-8"
xml-stylesheet	type="text/xsl" href="gloria4.xsl"
hymnbook	
log	true
code	Test
maxdemo	100
version	1
title	
title	
export	Test
export	
export	
hymn	
num	001
stanzas	3
profile	cs
copyright	true

Add another attribute named “profile” with value “cs”, and a final attribute named “copyright” with value “true”. This is the beginning of a hymn.

Hymn Attributes

num attribute

The “num” attribute is required. Its value is a number in the range 1 to 4500. If you don’t include it Gloria will not add the hymn to the hymnbook. This is the number the user enters to select this hymn. Hymn numbers don’t have to be in order in the table of contents file. You can have a hymn element with number 36 immediately followed by hymn number 17, although for general sanity you should probably add hymns in ascending order by number. Hymn numbers can go unused. You can have numbers 85, 86 and 88, with no number 87, for example.

Each number must be unique within the hymnbook. If more than one hymn element has the same number, the later element will replace the earlier one.

The num attribute is allowed in the hymn element and the external element.

altfor attribute

The “altfor” attribute is optional. Its value is a number in the range 1 to 4500. If present, the attribute indicates that this hymn is an alternative tune for another hymn. The attribute value is the hymn number of the default tune.

For example, hymn #45 in the *Celebremos Su Gloria* hymnbook is “A Mighty Fortress Is Our God”. The user can press the Pause key until “OTHER” is displayed on the screen. Pressing Play will then play the hymn with an alternative timing. In the hymnbook table of contents, hymn #45 has the MIDI files for the standard tune. Hymn #745 has the MIDI files for the alter-

native timing, plus an altfor attribute with value 45. That is, hymn #745 is an alternative tune for hymn #45.

There may be more than one alternative tune for a hymn (multiple hymns would have altfor attributes with the same value), where the user would see “OTHER 1”, “OTHER 2”, etc. displayed while rotating through the alternatives with the Pause key. There is an overall limit of 1000 alternative tunes per hymnbook.

The altfor attribute is only allowed in the hymn element and must be preceded by a valid num attribute.

stanzas attribute

The “stanzas” attribute is required. Its value is a number in the range 1 to 15. If you don’t include it Gloria will use a default of 1 and add a warning message to the log file (if enabled). The resulting hymn will be valid. The stanzas value is the number of times the verse / chorus is repeated. Generally this is the number of times the main MIDI file is repeated, although the presence of a second version and / or new key MIDI file will distribute the repetition over multiple files. See the section on File Naming Convention and Structure for further discussion on how this works.

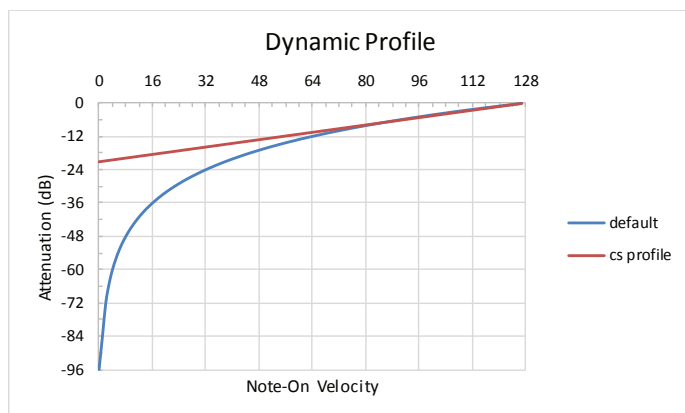
The stanzas attribute is only allowed in the hymn element and must be preceded by a valid num attribute.

profile attribute

The “profile” attribute is optional. Its value is the name of an alternate profile for the dynamic range of played notes. The only recognized value is “cs”. All other values (or omitting this attribute altogether) will apply the default dynamic range to this hymn.

The MIDI note-on velocity specifies how loud the note should be played. It has a range of 1 to 127 (0 means note off). The cs profile covers about 21dB over the full MIDI velocity range.

The quietest notes will be 21dB below the loudest notes. On the other hand, the default profile covers the full 96dB range provided by Gloria's 16-bit audio system. Above the midpoint (velocity 64) the two profiles are roughly equivalent. But below velocity 64 the default profile quickly gets very quiet. This chart illustrates the difference between the default and cs profiles:



If you know how to take advantage of an extended dynamic range then by all means do so. But for most applications you'll get the best results by always using the cs profile.

The profile attribute is only allowed in the hymn element and must be preceded by a valid num attribute.

gain attribute

The "gain" attribute is optional. Its value is a number in the range -24 to 24. Decimals are allowed. The gain value is the amount in dB of additional amplification applied to the hymn. Positive values make the hymn louder, negative values make it quieter. Adding small amounts of gain to all the hymns is a convenient way to balance loudness across a hymnbook.

The gain attribute is only allowed in the hymn element and must be preceded by a valid num attribute.

copyright attribute

The “copyright” attribute is optional. Include it and set its value to “true” to indicate hymn elements where the music is held under copyright. You must have a license from copyright holders to distribute such music. The presence or absence of the copyright attribute doesn’t affect the operation of Gloria in any way. Gloria has no way of knowing what licensing agreements are in place. The attribute exists as a means of record-keeping and accounting for royalties. If you distribute copyright music you are responsible for securing the necessary mechanical licenses and for paying the royalties. Without licensing you may be liable for expensive infringement claims.

Any value for the copyright attribute other than “true” is interpreted as false.

The copyright attribute is only allowed in the hymn element and must be preceded by a valid num attribute.

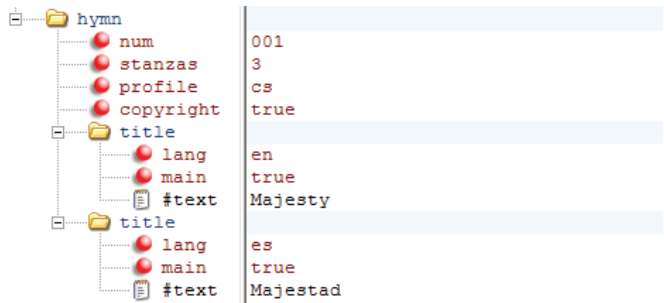
Title Element (Hymn)

Next, add some title elements. Select the hymn element and select Insert / Element / Child. Set the element name to “title” and the element value to “Majesty”. Add an attribute (Insert / Attribute / Child) named “lang” with value “en”, and another attribute (Insert / Attribute / After) named “main” with value “true”. The hymn now has an English title that is also the main title for the hymn, and the file looks like this:

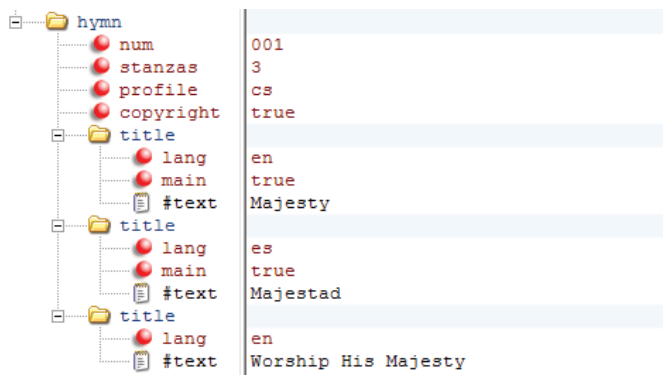
hymn	
num	001
stanzas	3
profile	cs
copyright	true
title	
lang	en
main	true
#text	Majesty

Add another title. Select the title element and insert another element named “title” with value “Majestad”. Add an

attribute “lang” with value “es” and an attribute “main” with value “true”. The hymn now has both an English and a Spanish main title. The file looks like this:



Finally, add a third title. Add an element named “title” with value “Worship His Majesty”. Add an attribute “lang” with value “en” (but no main attribute). Now the hymn has a main title in both English (language code “en”) and Spanish (language code “es”), plus an additional English title. The file looks like this:



Hymn titles with the main attribute are displayed briefly when the user enters a hymn number, and displayed continuously while in Demo mode. Hymn titles also allow the user to do an alphabetical search. If a hymn has no titles at all, no title will be displayed during entry or demo and the hymn won’t be searchable.

You can add titles in as many languages as you like. If the hymn has a main title in the language selected by the user, then Gloria will display that title. If there is no matching title language, Gloria will display the first main title in the list (English in this example). So make the first title your default title and then add additional languages as required. Note that the title language doesn't even have to be a language supported by Gloria, although it does have to conform to the character set supported by Gloria (unsupported characters will display as *, see Title Element (Hymnbook) for the table of supported characters). Gloria will set the first title in each language to be a main title if there is no explicitly designated main title. If more than one title in the same language is designated as main, later titles will replace earlier titles as main.

Typically there is one title per hymn, in the language of the hymnbook. That title is tagged as main. Add other main titles in additional languages if desired. Adding more titles beyond the main title(s) helps users doing an alphabetical search. Only the main title is displayed during hymn entry or demo, but all titles are used for alphabetical search. Additional titles are often titles the hymn is commonly known by, though different from the official title. Sometimes an additional title is the start of the chorus, as something the user is more familiar with. Or the start of the first verse (if different from the official title), or the start of other verses, or the name of the tune (often capitalized). Adding more titles makes the hymn easier to search for. In the example above, the user would find hymn #1 when searching under "M" or under "W" if Gloria is set to English. The user would only find hymn #1 under "M" if Gloria is set to Spanish.

Titles are limited to 280 characters. Titles longer than the 20 characters of the Gloria screen will be scrolled the full length once, followed by a fixed display of the first 20 characters.

Titles on the search screen are never scrolled. So main titles benefit from including the complete title (you don't have to truncate or abbreviate) but keep the secondary titles brief. Unicode accented characters are supported. See the table of supported characters.

Title elements must be child elements of a hymnbook element or a hymn element. When part of a hymn element, the hymn must have a valid num attribute.

Title Attributes

See Title Element (Hymnbook) for the lang attribute.

main attribute

The “main” attribute is optional. Include it and set its value to “true” to flag a hymn title as the main title for that hymn in that language. A hymn should only have one main title per language. If more than one title in the same language is designated as main, later titles will replace earlier titles as main.

Any value for the main attribute other than “true” is interpreted as false. This has the same effect as not including the main attribute at all.

The main attribute is only allowed in the title element within a hymn element.

Part Element

To complete the hymn, add some parts. These correspond to the MIDI files that make up the actual hymn, one part element per MIDI file. The hymn in the example (“Majesty”) has three MIDI files: intro, main and new key. See File Naming Convention and Structure for a description of how the parts fit together.

hymn	num	001
	stanzas	3
	profile	cs
	copyright	true
title	lang	en
	main	true
	#text	Majesty
title	lang	es
	main	true
	#text	Majestad
title	lang	en
	#text	Worship His Majesty
part	type	intro
part	type	main
part	type	newkey

Add an element named “part” to the hymn and leave the value blank. Add a child attribute named “type” to the part element, with value “intro”. Add another part element, and add a “type” attribute with value “main”. Add a final part element, and a “type” attribute with value “newkey” (note there’s no space). The hymn now looks like the screenshot above.

And that completes the hymn. Repeat the process for each hymn in the hymnbook, and the table of contents will be ready to import into Gloria.

Gloria will always play in the order (1) intro, (2) main, (3) second version, (4) new key, and for general sanity it’s good to add them in the same order to the table of contents file. But part elements can be listed in any order. Add as many part elements as there are MIDI files for the hymn, as few as one and as many as five.

Part elements must be child elements of a hymn element, and the hymn must have a valid num attribute.

Part Attributes

type attribute

The “type” attribute is required. If you don’t include it Gloria can’t add an unknown part to the hymn. Its value is one of the items from the following list:

- intro
- main
- v2
- newkey
- fanfare

Only one part per type is needed in a hymn. Multiple parts with the same type are redundant and will be ignored.

The type attribute is only allowed in the part element.

External Element

Typically each hymn element in the table of contents is connected to some MIDI files containing the actual music. During the import process Gloria will load the table of contents file plus all the MIDI files for each hymn. It’s possible, however, to source MIDI files for this hymnbook from another hymnbook on Gloria. That’s done with the external element. When importing, MIDI files for external hymns don’t have to be supplied and Gloria won’t look for them on the USB memory stick.

During import Gloria doesn’t actually check to see if the other hymnbook exists, or if the hymn referenced by the external element exists, or if the MIDI files required by this hymn are present in the other hymnbook. It merely adds the hymn as a reference to an external hymnbook.

During play Gloria has to find the actual MIDI files. The hymn will play if the external hymnbook is present, the referenced

hymn exists and the required MIDI files also exist. Otherwise the user will get a message informing them that the hymn they've selected is not present.

External references are a good way to create a hymnbook cross-reference. It's possible to create a hymnbook that is completely made up of external references to other hymnbooks. When a user selects this hymnbook, the numbering and titles are all sourced from the new hymnbook, whereas the music is pulled from one or more other hymnbooks. This only works when Gloria already has the other hymnbooks installed.

To do this, add an element to the hymn, name it "external" and give it the value "CSG". Add an attribute named "num" with the value "009".

The value of the external element, "CSG" in this example, must match the hymnbook code of the external hymnbook (here it's the *Celebremos Su Gloria* hymnbook). The num attribute is the hymn number in that external hymnbook. So in this example, hymn #9 in the *Celebremos Su Gloria* hymnbook has been re-purposed as hymn #1 in the Sample Hymnbook.

Only the MIDI files are sourced from the external hymnbook. So the hymn element still has to include a complete set of details, including a hymn number, number of stanzas, dynamic profile, gain, title (or titles) and parts.

External elements must be child elements of a hymn element, and the hymn must have a valid num attribute.

Here's that process applied to the example in this manual:

hymn	num	001
	stanzas	3
	profile	cs
	copyright	true
title	lang	en
	main	true
	#text	Majesty
title	lang	es
	main	true
	#text	Majestad
title	lang	en
	#text	Worship His Majesty
external	num	009
	#text	CSG
part	type	intro
part	type	main
part	type	newkey

External Attributes

num attribute

The “num” attribute is required. Its value is a number in the range 1 to 4500. If you don’t include it Gloria will add the hymn as a regular hymn (where MIDI files are required) instead of as an external hymn. This is the number in the external hymnbook where the MIDI files will come from. The external hymnbook must be present on Gloria, and this number must be a valid hymn in that hymnbook.

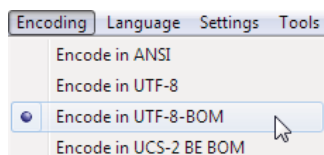
The num attribute is allowed in the external element and the hymn element.

Table of Contents Spreadsheet

So far the examples have used XML Notepad to create the table of contents. Notepad++ may be a faster alternative once you have some experience with the process. And using a spreadsheet is probably the fastest of all, although not as flexible.

Notepad++

Notepad++ is a popular text editor that includes tools to work with XML files. When creating a Gloria table of contents file, the first thing you should do is set the correct character encoding for the file. From the Encoding menu select Encode in UTF-8-BOM.



The default encoding (ANSI) will not represent accented characters correctly, nor other special Unicode characters. You can change the encoding at any time, but if you've already used accented characters throughout the file they will be garbled if you switch to UTF-8-BOM. In that case select Convert to UTF-8-BOM in the Encoding menu. It's easiest to set it right at the beginning.

It's not the purpose of this manual to explain the inner workings of XML. If you're interested, Google is your friend. You can find a good introduction at w3schools (https://www.w3schools.com/xml/xml_what_is.asp).

The screenshot below from Notepad++ is the same file from XML Notepad shown in the previous section. However, with Notepad++ it's faster to select an entire hymn (the portion

between <hymn ...> and </hymn>) and copy and paste to quickly create dozens of blank hymn elements.

```
<?xml version="1.0" encoding="utf-8"?>
<?xml-stylesheet type="text/xsl" href="gloria4.xsl"?>
<hymnbook log="true" code="Test" maxdemo="100" version="1">
  <title lang="en">Sample Hymnbook</title>
  <title lang="es">Himnario de muestra</title>
  <export>Test</export>
  <export id="Q334007-61-00AF-0087">Test0087</export>
  <export id="Q228530-75-0041-00E7">Test00E7</export>
  <hymn num="001" stanzas="3" profile="cs" copyright="true">
    <title lang="en" main="true">Majesty</title>
    <title lang="es" main="true">Majestad</title>
    <title lang="en">Worship His Majesty</title>
    <external num="009">CSG</external>
    <part type="intro" />
    <part type="main" />
    <part type="newkey" />
  </hymn>
</hymnbook>
```

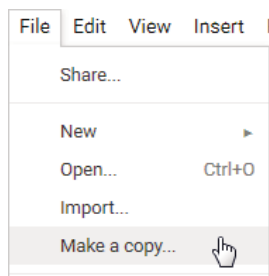
If you use Notepad++, save the file (with “.xml” extension) and load it into XML Notepad anyway. XML Notepad will check the file to make sure it is properly formatted according to XML rules and notify you of any errors. Keep in mind that it will not know nor care about Gloria-specific formatting. You will need to refer to the import log file to catch any of those errors.

Saving the file from XML Notepad will rearrange the layout into a standard profile (what you see above), which can be useful to tidy up the contents of the file.

Spreadsheet

There is a Gloria table of contents spreadsheet template on Google Sheets [at this link](https://docs.google.com/spreadsheets/d/149vIX6nNuu3GbvH5z-oFDXirgcRtoEUI67oiQSGz6MM/edit?usp=sharing)*. From the File menu select Make A Copy and create your own spreadsheet from the template. You’ll be doing all the editing in your copy.

* For readers of a paper copy, the link is <https://docs.google.com/spreadsheets/d/149vIX6nNuu3GbvH5z-oFDXirgcRtoEUI67oiQSGz6MM/edit?usp=sharing>



Step 1: General Info

Add some basic information about the hymnbook. The green cells are where you add or edit your data.

	A	B	C
1	Hymnbook Table of Contents: Test Hymnbook		
2			
3			
4	Code:	TEST	
5	Version:	1	
6	Max demo:	100	
7	Log:	<input checked="" type="checkbox"/>	
8	Export:	<input checked="" type="checkbox"/>	
9	Export name:	TEST	

The most important field is the **hymnbook code** (cell B4). This is the identification code that represents the hymnbook internally in Gloria, and uniquely differentiates it from other hymnbooks. Its value must be three or four characters. Upper or lower case ASCII letters (unaccented) and digits are accepted. The code is case sensitive: “Test”, “test” and “TEST” are all different. Typically the code is made up of the initials of your hymnbook. If you intend to distribute the hymnbook, contact Gloria Music to make sure the code you’ve chosen won’t conflict with another hymnbook.

The **version** field (cell B5) is a number between 0 and 9999. Start with a version number of 1 and increase the value every time you redistribute the hymnbook with modifications. The hymnbook version appears on the Gloria System Info screen

in the setup menu. It's a useful way for the user to see if they have the latest update for that hymnbook.

The **max demo** field (cell B6) is a number between 1 and 4500. It's the highest-numbered hymn Gloria will play while in Demo mode. It's set to 100 in the template, which means that in Demo mode Gloria will go back to the beginning of the hymnbook after playing hymn #100. Set the value to 4500 so that every hymn in the hymnbook is included in Demo mode.

Check the **log** checkbox (cell B7) to generate a log file with any errors or warnings encountered while importing the hymnbook into Gloria. It's helpful to have a record of errors, especially at the beginning, to troubleshoot problems with a new hymnbook. The log file is stored on the USB memory stick in the same folder as the hymnbook XML file. It won't be created if there are no errors at all while importing the hymnbook.

Check the **export** checkbox (cell B8) to create a single file containing an entire hymnbook, including the table of contents and all the MIDI files, while importing the hymnbook into Gloria. This file can then be distributed to other Gloria users. Add an export file name (cell B9) for the hymnbook export file. It's limited to 8 characters and must conform to basic filename requirements (e.g. start with a letter, only letters and digits, no spaces or punctuation). The export file will be saved to the "Music" folder on the USB memory stick.

Step 2: Hymnbook Languages and Titles

Next, set the languages you want to use for the titles in your hymnbook. There is space for two languages in the template (columns B and C). If you only want one language, use column B and leave column C blank. If you want more than two languages contact Gloria Music for an expanded template.

	A	B	C
12		Title (first language is default)	
13	Hymnbook	en	es
14	TEST	Test Hymnbook	Himnario de prueba

Set the language codes in cells B13 and C13 according to ISO 639-1. See the Wikipedia page on ISO 639-1 for a list of language codes. If there is a title in the language selected by the user, then Gloria will display that title. If there is no matching title language, Gloria will display the first title in the list (column B). So make the first title your default title and then add additional languages as required.

Enter the hymnbook title in cells B14 and C14. This title will be displayed to the user during Gloria startup and while selecting a hymnbook from the setup menu. This title doesn't scroll, so the cell turns orange to warn if the title length is more than will fit on the Gloria screen.

Step 3: Hymn Titles

For each hymn number in column A, enter a hymn title in column B (and optionally column C) according to the languages you selected in the previous step. The cells turn dark green if the title length is over 20 characters, and thus will scroll on Gloria's screen. Place an "X" in column D for each hymn with a title.

	A	B	C	D
17	No.	en	es	Main
18	1	Wonderful Grace of Jesus	Maravillosa Gracia	X
19	2	They'll Know We Are Christians	Somos uno en espíritu	X
20	3	A Mighty Fortress Is Our God	Castillo Fuerte	X
21	4	God Of Our Fathers	Señor Jehová, omnipotente Dios	X

Hymn numbers can go unused. You can add titles to numbers 85, 86 and 88, and leave number 87 blank, for example.

Step 4: Hymn Info

For each hymn number in column A, enter the hymn's properties in columns F–J.

	A	F	G	H	I	J	K	L
16				Alt of	External	Velocity		
17	No.	Stanzas	Copyright	No.	Source	No.	Profile	Gain dB
18	1	3	X				CS	11.7
19	2	4	X				CS	12.3
20	3	4					CS	13.4

The **Stanzas** field (column F) is a number between 1 and 15. It's the number of times the verse / chorus is repeated. Generally this is the number of times the main MIDI file is repeated, although the presence of a second version and / or new key MIDI file will distribute the repetition over multiple files (see File Naming Convention and Structure).

Place an "X" in the **Copyright** field (column G) for hymns where the music is held under copyright. You must have a license from copyright holders to distribute such music. This field helps with record-keeping and accounting for royalties. If you distribute copyright music you are responsible for securing the necessary mechanical licenses and for paying the royalties. Without licensing you may be liable for expensive infringement claims.

If this is an alternate tune for another hymn, enter the hymn number of the original hymn (from column A) in the **Alt of No.** Field (column H), a value between 1 and 4500.

If the hymn is sourced from another (external) hymnbook, enter the hymnbook code of the external hymnbook in the **External Source** field (column I). This is the other hymnbook's three- or four-character identification code. Enter the hymn number in that external hymnbook in the **External No.** field (column J), a value between 1 and 4500. Both fields must be filled for a hymn to be taken from an external hymnbook.

Enter “CS” in the **Velocity Profile** field (column K) for the hymn to use a compressed dynamic range profile. Leave the field blank to use the extended dynamic range profile. “CS” is usually the best choice for music intended to accompany singing.

Enter a value in the **Gain dB** field (column L) between -24 and +24 to apply an overall volume decrease (for negative values) or increase (for positive values) for the entire hymn. Leave blank for no volume change. This is useful to balance the loudness between hymns across a hymnbook.

Step 5: Hymn Music Files

For each hymn number in column A, place an “X” in columns L–P for each MIDI file available for the hymn. At the very minimum a hymn must have a Main file. See the discussion on File Naming Convention and Structure to understand how MIDI files can be used.

	A	N	O	P	Q	R
16	MIDI Files					
17	No.	Intro	Main	V2	New key	Fanfare
18	1	X	X		X	X
19	2	X	X	X	X	
20	3	X	X		X	

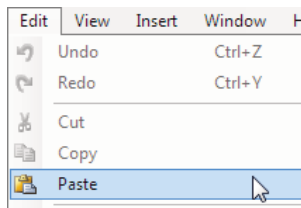
Step 6: Create Table of Contents XML File

The spreadsheet automatically creates the correct XML code. When you’ve entered all the necessary hymnbook and hymn data in the green cells, copy the yellow cells into a Gloria table of contents file.

	W	AF
15	<?xml version="1.0" encoding="utf-8"?>	
16	<?xml-stylesheet type="text/xsl" href="gloria4.xsl"?>	
17	<hymnbook log="true" code="TEST" maxdemo="100" version="1">	
18	<hymn num="1" stanzas="3" copyright="true" gain="11.7" profile="cs">	</hymn>
19	<hymn num="2" stanzas="4" copyright="true" gain="12.3" profile="cs">	</hymn>
1016		
1017	</hymnbook>	

Copy the entire yellow section from the spreadsheet. This includes columns W through AF and rows 15 through 1017. The screenshot above has most of the rows and columns hidden to show the entire range in a small space. Most of the contents of the spreadsheet may be blank but copy the entire range anyway. Wait for the selected area to show a dashed line around it. It may take a few seconds depending on your internet connection speed.

Open a blank document in XML Notepad and paste the data into it.



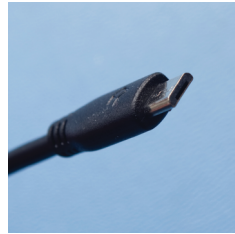
From the File menu in XML Notepad select Save As and save the file with a filename the same as the hymnbook code ("Test" in the example above).

Load Music on Gloria

Music is loaded onto Gloria using a USB flash memory stick and adapter cable. The cable can be any generic USB 2.0 adapter with a Type A socket on one end and a micro plug on the other end.



The plug end connects to Gloria:



The socket end is for connecting a USB memory stick:



Most memory sticks will work fine, although you'll get the best results from recent, small memory sticks.

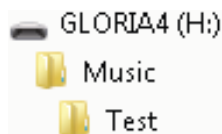


Gloria has a relatively low amount of power it can provide to the USB port to power the memory stick, so older devices that require higher power may not work. Format the memory stick as FAT32.

An alternative to the adapter cable is a micro adapter, although this can be flimsy and finicky to use. It has the micro plug and the Type A socket built into one device, with no cable.



Create a Music folder on the memory stick. Create a hymnbook folder inside the Music folder with the name of the four-letter hymnbook code.



Copy the hymnbook table of contents XML file and all the MIDI files into the hymnbook folder inside the Music folder.

Start with Gloria off. Connect the memory stick to the adapter cable and connect the cable to Gloria. Turn Gloria on. Wait for the update menu to appear.



```
< Load Software >
Push Play to Select
```

Press # (#) to go to the next menu, and * (*) to go to the previous menu. Press Play (▶) to select the displayed menu item. Press Stop (◻) to go back up to the main update menu.

Load Music

Press # to go to the Load Music menu on the Gloria screen and then press Play.

```
< Load Music >
Push Play to Select
```

The screen will display the first file or sub-folder in the Music folder on the USB memory stick. Press # to cycle through the files and folders to find the one you want if there are several in the folder. Music can be loaded as a complete hymnbook in a single file, or as a collection of individual MIDI files plus a table of contents file in a folder. Hymnbooks from Gloria Music will have the extension “.gmc”. Hymnbooks from other sources will have the extension “.enc”. Folders of MIDI files will have no extension.

```

Load Music
TEST      >

```

Press Play when the intended file or folder is displayed.

Replace Music?
Push Play to Confirm

If the selected hymnbook already exists on Gloria then a confirmation message appears. Press Play to update the Gloria hymnbook with the selected file or folder. There is no confirmation message if the hymnbook is new. Gloria must remain powered for the update process. Use reasonably fresh batteries or an external power source. If power is lost partway through the update then that hymnbook will not be usable, but you can attempt the same update and will be able to recover by successfully completing the update. You will not need to send Gloria for servicing.

Press Stop to return to the previous step without performing the update.

Gloria will display the following message while the hymnbook is being updated. The progress bar fills while loading the files. **Do not turn off the power or remove the memory stick during the update!**

```

Loading Music
TEST.XML ██████████

```

If the file (or set of files) is small the loading progress screen may flash by too fast to see. Gloria will display a confirmation message once the process has completed successfully, and then return to the Load Music menu.

```
 Loading Music
 Complete
```

If the hymnbook was loaded from a folder of MIDI files, connect the USB memory stick to a computer and check the hymnbook folder for a log file in case there were any loading errors.

Remove the USB adapter cable if there are no more updates. Gloria will proceed with the normal startup process. Leave the cable connected if you have more music files to update.

Verify

Gloria will continue with the normal startup process once the USB adapter cable is removed.

```
 ** G L O R I A **
 Celebremos Su Gloria
```

Press # while the startup screen is displayed to access the setup menu. If the startup screen is replaced by the hymn prompt with flashing cursor, press and hold # for three seconds to access the setup menu. In the setup menu press # repeatedly to get to the System Info menu and then press Play.

```
< System Info >
Push Play to Select
```

Press # to cycle through the various System Info screens and note the version numbers.

```
< Hymnal >
CSG v5.7 14%
```

If you updated the music, does the hymnbook version match the file you selected? Note that if there is more than one hymnbook on Gloria, the System Info menu will only show the currently selected hymnbook. You may need to go back to the <Select Hymnal> menu to change hymnbooks in order to verify a specific hymnbook version. The percentage displayed is the amount of flash memory used by all the installed hymnals.

Press Stop to go back up to the main setup menu. Press Stop again to return to the normal hymn prompt. The setup menu will automatically revert to the hymn prompt after several seconds of inactivity.

The final check is to enter a hymn number and press Play. If you hear music, congratulations! You're done.

MIDI Editor

If you're looking for a program to create MIDI files, MIDI Editor might be a good place to start (free at <https://www.midieditor.org/>). Be aware that this program numbers MIDI channels from 0, whereas the manual numbers MIDI channels from 1. So you'll have to subtract one from the channel numbers in the manual to get the correct channel numbers in MIDI Editor.

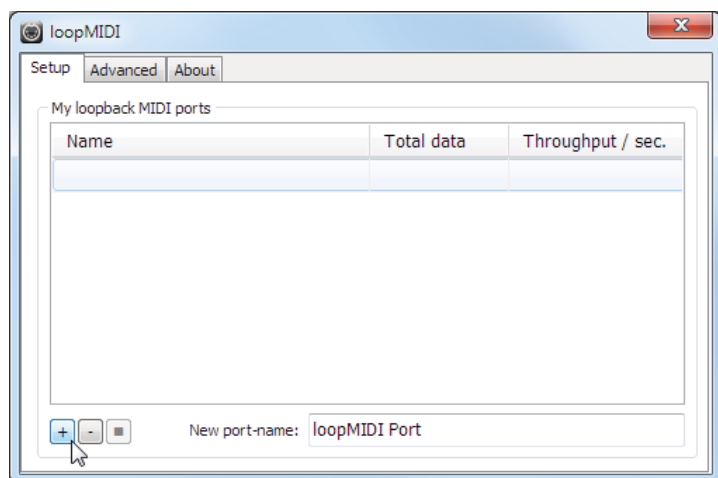
MIDI Editor won't synthesize music audio itself. That's typically done by an external synthesizer (a piece of hardware) connected to the computer. However, it's possible to create a working, music-playing setup using only software. The following steps use MIDI Editor as an example, but apply in general to most MIDI-capable programs. If you end up using a different MIDI program this process will still work. These instructions only apply to a Windows PC.

Download and install MIDI Editor (from the link above). This is the software for creating and editing MIDI files.

Download and install MIDI Player 5.5 (free at <http://falcsoft.hu/softwares.html#midiplayer>). Download the Bass-midi + Soundfont edition. This is the software for synthesizing and playing audio from MIDI.

Download, install and run loopMIDI (free at <https://www.tobias-erichsen.de/software/loopmidi.html>). This program acts as a virtual "cable" to connect the editing program with the playing program.

Click the + button at the bottom of the loopMIDI Setup tab to create a new port.

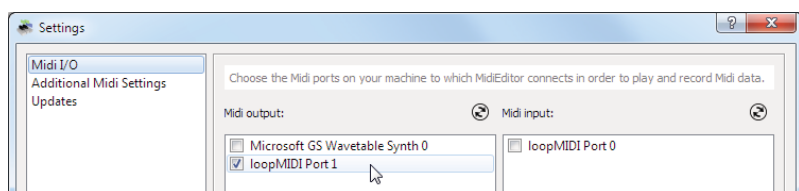


The new port will look like this:

My loopback MIDI ports		
Name	Total data	Throughput / sec.
loopMIDI Port	0	0 Byte

Close the loopMIDI window.

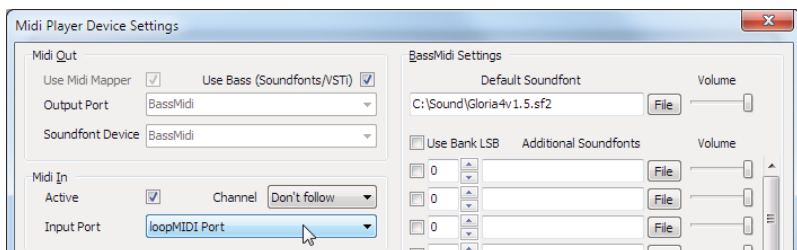
In MIDI Editor, select Settings from the Midi menu. In the Midi I/O section, check the box for loopMIDI Port 1 and leave all other boxes unchecked. Click Close.



In MIDI Player, select Device Settings (the gear icon):



Check the box for Midi Out / Use Bass (Soundfonts/VSTi). Check the box for Midi In / Active. Set Channel to Don't follow. Set Input Port to loopMIDI Port (see the screenshot below).



MIDI Player comes with a default set of instruments, as a Soundfont file. You can use your own instruments (or download from many places, such as <https://www.polyphone-soundfonts.com/en/soundfonts>) by selecting Default Soundfont / File and choosing your Soundfont file.

While MIDI Player is running you will be able to play music from MIDI Editor. Shut down loopMIDI when you've finished using the MIDI tools. Right-click the loopMIDI icon in the system tray, and click Stop loopMIDI.

