Accordion

March 16, 2013

On the 28th of April 2012 the contents of the English as well as German Wikibooks and Wikipedia projects were licensed under Creative Commons Attribution-ShareAlike 3.0 Unported license. An URI to this license is given in the list of figures on page 39. If this document is a derived work from the contents of one of these projects and the content was still licensed by the project under this license at the time of derivation this document has to be licensed under the same, a similar or a compatible license, as stated in section 4b of the license. The list of contributors is included in chapter Contributors on page 37. The licenses GPL, LGPL and GFDL are included in chapter Licenses on page 43, since this book and/or parts of it may or may not be licensed under one or more of these licenses, and thus require inclusion of these licenses. The licenses of the figures are given in the list of figures on page 39. This PDF was generated by the LaTeX typesetting software. The LaTeX source code is included as an attachment (`source.7z.txt`) in this PDF file. To extract the source from the PDF file, we recommend the use of `http://www.pdflabs.com/tools/pdftk-the-pdf-toolkit/` utility or clicking the paper clip attachment symbol on the lower left of your PDF Viewer, selecting `Save Attachment`. After extracting it from the PDF file you have to rename it to `source.7z`. To uncompress the resulting archive we recommend the use of `http://www.7-zip.org/`. The LaTeX source itself was generated by a program written by Dirk Hünniger, which is freely available under an open source license from `http://de.wikibooks.org/wiki/Benutzer:Dirk_Huenniger/wb2pdf`. This distribution also contains a configured version of the `pdflatex` compiler with all necessary packages and fonts needed to compile the LaTeX source included in this PDF file.

Contents

1 Preface

The accordion is a portable box-shaped musical instrument of the hand-held bellows-driven free-reed aerophone family, colloquially referred to as a squeezebox. A person who plays the accordion is called an accordionist.

The instrument is played by compressing or expanding its bellows, while pressing buttons or keys, causing valves called pallets to open which allow air to flow across strips of metal called reeds that vibrate to produce sound inside the body, which then escapes through grilles.

There are three major types of accordion: the diatonic button accordion, the chromatic button accordion (sometimes called a bayan), and the unisoric chromatic piano accordion.

Although the accordion has a reputation in some circles of being cheap, wheezy instruments capable of playing only polkas and folk music, this is not always the case! A full-sized, properly-maintained accordion in the right hands can play almost any type of music, ranging from classical music like Bach and Chopin all the way to jazz and pop, and quite convincingly too. Indeed, many European conservatories and universities regard it as a serious concert instrument, and allow it to be studied at the same level as a piano or string instrument.

This book is currently only about playing the Piano Accordion, although there are many similarities in function to similar instruments, so playing skills such as Bellows, Stradella Bass and Register Switches will transfer to other instruments.

Not all parts will be introduced at first, only sufficient to get you started playing tunes.

2 Brief History of the Accordion

The accordion is one of several European inventions of the early 19th century that used free reeds driven by a bellows; notable among them were:

- The Aeoline, by German Bernhard Eschenbach (and his cousin, Caspar Schlimbach), 1810.
  - Was a piano with added aeoline register.
  - Aeoline Harmonika and Pysharmonika are very similar names at that time.
    - Aeoline and Aura ware first without bellows or keyboard. This originals eventually evolved in Harmonica
- The Hand Physhamonika Anton Haeckel 1818 Hand type mentioned in music newspaper 1821.
- The flutina, by Pichenot Jeune, ca. 1831
- The concertina, patented in two forms (perhaps independently):
  - Carl Friedrich Uhlig, 1834.
  - Sir Charles Wheatstone, examples built after 1829, but not patented until 1844

An instrument called **accordion** was first patented in 1829 by Cyrill Demian in Vienna. (Interestingly, the original patent shows the name "eoline" crossed out and replaced with "accordion" in different handwriting). Demian's instrument bore little resemblance to modern instruments: It only had a left hand keyboard; the right hand simply operated the bellows. One key feature for which Damian sought the patent was the sounding of an entire chord by depressing one key. His instrument also could sound two different chords with the same key: one for each bellows direction (press, draw); this is called a *bisonoric* action.

At that time in Vienna, mouth harmonicas with "Kanzellen" (chambers) had already been available for many years, along with bigger instruments driven by hand bellows. The diatonic key arrangement was also already in use on mouth-blown instruments. Demian's patent thus covered an accompanying instrument: an accordion played with the left hand, opposite to the way that contemporary chromatic hand harmonicas were played, small and light enough to for travellers to take with them and use to accompany singing. The patent also described instruments with both bass and treble sections, although Demian preferred the bass-only instrument owing to its cost and weight advantages.

The musician Adolph Müller described a great variety of instruments in his 1833 "Schule für Accordion". At the time, Vienna and London had a close musical relationship, with musicians often performing in both cities in the same year, so it is possible that Wheatstone was aware of this type of instrument and may have used them to put his key-arrangement ideas into practice.

Jeune's flutina resembles Wheatstone's concertina in internal construction and tone colour, but it appears to complement Demian's accordion functionally. The flutina is a one-sided bisonoric melody-only instrument whose keys are operated with the right hand while the

bellows is operated with the left. When the two instruments are combined, the result is quite similar to diatonic button accordions still manufactured today.

Further innovations followed and continue to the present: Various keyboard systems have been developed; voicings (the combination of multiple tones at different octaves) have been developed, with mechanisms to switch between different voices during performance; different methods of internal construction to improve tone, stability and durability, and so on.

3 Introducing the Piano Accordion

3.1 Introducing the Piano Accordion

This module currently draws heavily on text from the Wikipedia Accordion[1] article.

Figure 1   A piano accordion

The **piano accordion** is the instrument most often indicated by the term "accordion", but it is one of the most recent inventions among accordion types, appearing late in the 19th century and not accepted worldwide until the early 20th century. It has a right-hand keyboard similar to a piano. This is great news for you if you ever took piano lessons!

The left hand keyboard is usually configured in the Stradella system, a combination of chords and single notes, arranged in a uniform series by harmonic relationship. This is the system we'll be focusing on throughout this book.

Occasionally, a *free bass* left hand is used, which has a series of single buttons in an arrangement similar to the chromatic button accordion. The free bass system facilitates the playing of bass melodies and counterpoint over a melodic span greater than one octave. It also allows for chord inversion and invention of chords not present in the Stradella system, although the Stradella system also allows creation of extra chords and inversions using simultaneous multiple chord buttons.

---

1   http://en.wikipedia.org/wiki/Accordion

Converter bass systems allow an instrument to be readily converted from a Stradella system to a free-bass system with a switch.

4 Technique

As with any instrument, technique varies between those who play the accordion. Technique is what makes accordionists stand out between one another. Bad technique will logically create a bad player. Though there are no rules "set in stone" on what should and shouldn't be done, the following techniques and positions are accepted by the general public of accordionists. Consider it "accordion common-sense".

5 Body Position

Figure 2   How to hold the accordion standing up.

Since your left arm is moving horizontally and vertically, and your right hand is moving vertically, body position is very important. The main goal is to be comfortable yet exercise as much control as possible over the motions of the instrument. Some players prefer sitting, while others like to stand (although this can be easily tiring, especially with a big instrument).

When playing the accordion, the shoulder straps should be fairly tight so that the instrument doesn't move all over the place when playing. Don't slouch - it looks ugly and causes you to lose control. Your left arm should be between the bellow-strap and the board; tighten that strap (usually via a notch on top of the bellows mechanism, very rarely Velcro might be used) so that it won't cut off your arm circulation, but not so loose that your hand will slip all over the place.

Resist the temptation to bend your right wrist and play with your elbow close to the side of your body. Instead, try to hold your entire arm from the elbow down more or less parallel with the keyboard - although it may seem awkward at first, in the long run it will help you achieve better accuracy because the circulation to your hand is unimpeded. (None of this applies to the left arm.)

If playing standing up, adjust the shoulder straps so that the bottom of the accordion is more or less parallel with the floor. Keep your back straight, so that the accordion won't move around too much.

If playing seated, adjust the straps so that the instrument rests lightly on your left leg (but is not too loose). The bottom of the keyboard should be between the legs, and not moved too far to one side. You might need to move your right leg out of the way a little bit so the right hand can reach the bottom keys on the accordion unimpeded. Sit up straight in your chair - don't lean backwards against the back of the chair or slump; it looks bad and can results in poorer accuracy.

You might want to consider investing in a *backstrap*, a small hook-and-eye device that connects the two shoulder straps from behind when you're wearing the instrument. It's useful for bigger instruments because it stops the straps from slipping off your shoulders.

6 Operating the Bellows

The bellows are the engine for making the sound in an accordion. They are the lungs of the instrument - depending on how hard the bellows are pulled, the sound will be softer or louder. A well-maintained accordion can have a good dynamic range from *pianissimo* to around a *forte*. When totally stationary, the instrument is silent. With accordions that also have inbuilt electronic synthesizers, the electronic sound will continue as long as keys are depressed (but this is beyond the scope of this book).

The bellows should be operated with your left hand. Bellows can be somewhat fragile, so don't pull them too hard or too far out. When pulling or pushing, avoid jerky motions and move them cleanly.

Eventually you'll need to change direction and move the bellows back in to keep playing. This can be a bit tricky to do correctly. When changing direction, try to move smoothly yet quickly so avoid a break in the melody or make the dynamics change suddenly. Resist the temptation to jerk the accordion. It's advisable not to pull the bellows out too far, because it's uncomfortable for the left hand to be extended like that and it affects accuracy.

If you're finding you have to move your bellows a lot, check to see if they aren't leaking by letting the bellows fall open on your lap without touching them or depressing any keys. If they move quickly (or you hear a "whoosh" noise), there's likely a leak, which means the instrument consumes more air than is necessary. (If they just creep out slowly, that's okay. Most accordions naturally let out very small amounts of air.) Find a reputable accordion repairman and have it fixed - you can't play properly with leaking bellows!

7 Keyboard

The top of the keyboard where the bellows join should be roughly in the centre of the body. Too far either side of that interferes with the comfort and the ability to play properly.

8 How to Handle the Accordion

Many accordions have a reputation for being manufactured exceedingly well, and with proper maintenance and preventative measures, it can last decades. Aside from the cost of repairs, you might have difficulty finding someone skilled enough to repair the instrument! A little bit of care goes a long way.

- When lifting up and putting down your accordion, always be careful; hold the instrument with both hands (by the straps, if they are sturdy). Dropping an accordion even from a small height can be disastrous. When transporting the instrument, it is advisable to lock the bellows straps on the top and bottom (usually found on all but the oldest accordions) so the bellows don't come out. Be careful not to push in the bass buttons when carrying your accordion; it can damage the bass mechanisms.

- Always store your accordion in a case if you can. This helps keep it away from humidity and other things that might damage the instrument. Try to keep it out of too much heat, cold, or humidity. The reeds inside the accordion might bend out of tune if there's too much humidity.

Figure 3   How to store the accordion properly on a table.

- If you can't store the accordion in a case, then **always place it on a hard flat surface** (like a table), with the keyboard facing up perpendicular to the floor. (The bass side of

the instrument usually little protrusions at the corners so you and put it down safely.) Make sure to **always** store it the right way up. An accordion is constructed with leather flaps (valves) that seal the back pressure from the reed that is not sounding in the current direction of bellows movement. Storing the instrument upright allows the valves to be preserved. Storing in other orientations will cause one set of valves to be bent under gravity, ruining the tone and needing more early refurbishment.

- **Avoid extreme temperatures.** If you would be uncomfortable in the room, so would your accordion. Parts of your accordion are held together by wax or glue joints that can melt in heat. Don't leave the instrument near a ventilator, heater, or near a sunny window, and especially don't leave it in the trunk of a car, because the temperature is uncontrollable and unstable. Also, the accordion may suffer from jolts while in the trunk, especially if not stored the correct way up.

- If you've just taken the accordion in from from the cold, take it out of its case and let it "warm up" before playing for at least half an hour. Moisture may collect on the reeds from the sudden temperature change, and you want to give it time to dissipate or else the water might harm the reeds.

- **Avoid moisture.** Do not play your accordion in the rain, or take it to the beach. The salty air can cause the reeds to rust rapidly.

- **Don't store in an attic or basement.** Be aware that older accordions found in attics may contain harmful mould in the bellows. When played, the mould is propelled towards the player's face.

9 Right hand (Chromatic button accordion)

Figure 4   A button accordion.

A chromatic button accordion is a type of button accordion where the right side keyboard has rows of buttons arranged chromatically. They have three to five (rarely, some Serbian accordions have six) diagonal rows. Each row can play successive chromatic notes.
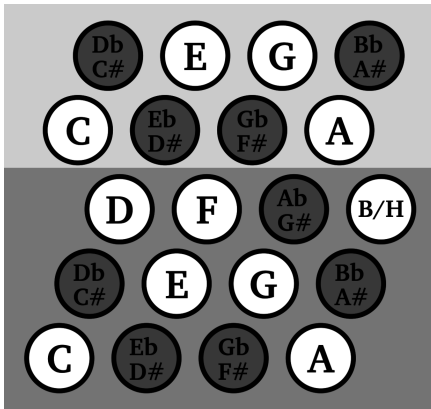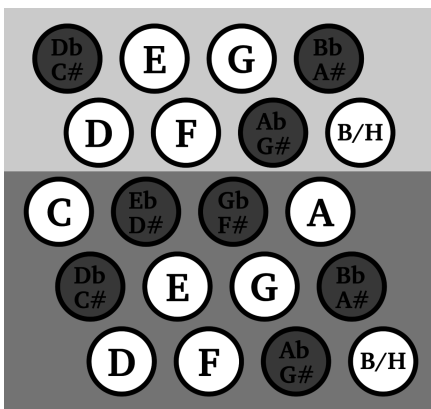
Figure 5 Chromatic button system (C system)

Figure 6 Chromatic button system (type system)

Chromatic accordions are most popular in Europe and in Russia. In Russia, this instrument is usually called a "bayan" (in Russian: баян).

There are two main types of button accordions. In both types, the further away from the top of the keyboard you go, the higher the notes; the closer to the top, the lower.

Both systems are mirrors of each other, as you can see by the chart to the left. In the "C system" accordion, the middle "C" is on the row furthest to the right. In the "B system", the "C" is located on the third row from the right. The B system is primarily played in eastern Europe and Russia, while the C system is played

Most chromatic accordions have two extra rows located to the left of the main rows. They play the same notes as the same buttons of the 1st and 2nd rows. This can be helpful when playing a difficult melody, because you do not have to change fingerings when playing in a different key, but only move your hand to the left a row or two and play with the same fingering.

Chromatic accordions have a much larger range than their piano equivalents (they generally go a seventh higher and up to an octave lower). Also, it is possible to use the same fingering

for playing almost any melody in any key - whereas on the keyboard you have to learn twelve individual fingerings for each key. Because the notes are positioned much closer together, large leaps and stretches are easier (you can easily stretch two octaves, compared to about a tenth or twelfth on a piano accordion). For these reasons, many professionals prefer playing button instruments. However, depending on where you live, they may be hard to find (in Australasia and North America, they are particularly rare, and even then usually only available in "C system"). Note that this book does not currently cover playing on the button accordion.

10 Right hand (Diatonic button accordion

Figure 7　A diatonic button accordion

A **diatonic button accordion** is a type of button accordion where the right keyboard only has the notes of diatonic scales in a small number of keys. The left, or bass side, usually contains the main chords of the instrument's key and their root notes.

Because diatonic accordions have only a few keys they can play in, and usually cannot play accidentals, they are very restricted in what they can play. Usually they can only play folk music and classical music that doesn't contain many accidentals or changes of key signature.

11 Right hand (Piano accordion)
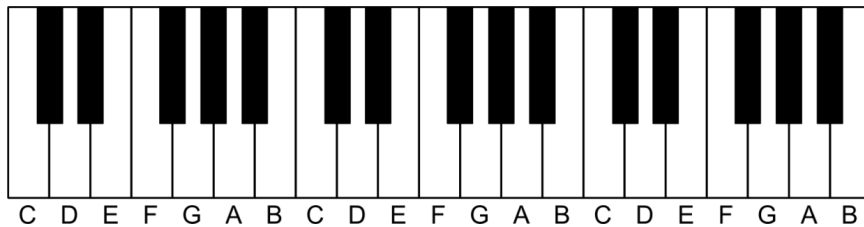
Figure 8   This is how a piano accordion keyboard looks.

The right hand of a piano accordion is played the same way as you would play a piano, with usually the same fingerings. You can use all fingers, including the thumb, to play on this keyboard.

On a standard, full-sized, the range of the keyboard goes from the "F" below the middle "C", all the way up to the third "A" above middle "C" (41 notes). Some large instruments have 44 or even 45 keys, going from an "E" or "F" to a high "C".

12 Left hand
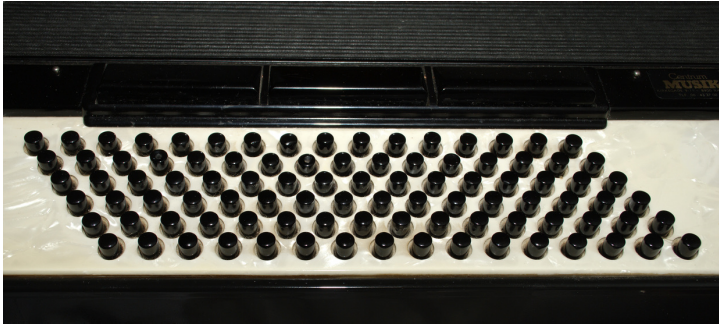
Figure 9 A 96-button Stradella bass layout on an accordion

The **Stradella bass system** (also called the *standard bass* sometimes) is a type of button layout you find on the left (or bass) side of almost all accordions. It uses columns of buttons arranged in a circle of fifths.

Each diagonal column has, in order from the innermost to outermost buttons:

- The major third above (or minor sixth below, depending on which note) the root ("counter-bass")
- The root note
- The root note's major chord
- The root note's minor chord
- The root note's dominant seventh chord
- The root note's diminished seventh chord

Small accordions sometimes lack some of these rows, but for the purposes of this guide, we'll assume you have the full complement of buttons.

This is a chart of how a standard, 120-button bass layout will look like:
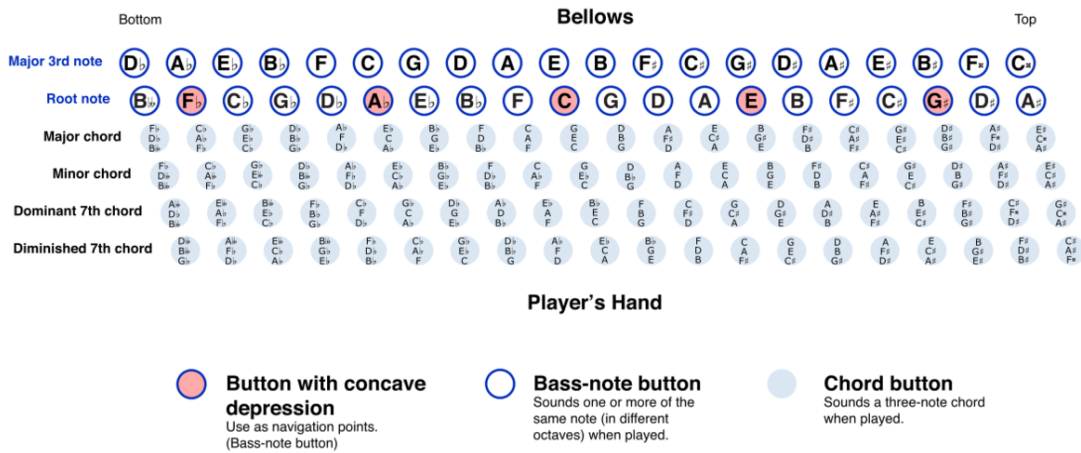
Figure 10

Tip: *Consider printing out this chart and referring to it as you continue with this guide. You might find it helpful to have a visual representation of the directions described.*

The middle "C" usually has a bump or hole in it for you to feel, to make it easier to find your way around the left buttons without looking at them. The A flat and E will also have some sort of marking sometimes.

Horizontal columns are arranged in a different order: every column goes up a fifth as you move up the bass board. So a "G" would be below middle "C", and a "F" would be above the middle "C", a "D" would be above the "G", and so on.

Most full-size accordion basses have either 120, or, less commonly, 96 buttons. All notes in an octave are covered by both systems, so you can play in any key.

When playing with the bass buttons, you use all fingers but your thumb, which should stay on the board on the side of the accordion.

Most accordions also have an *air button* on the side of the instrument that doesn't play any notes, but instead lets air in and out of the instrument.

If you have a large enough instrument, chances are there will be one or more switches next to the innermost row of buttons (near to the bellows). By pressing these, you can control which reeds in the left hand manual are sounding to create different timbres appropriate for the music you're playing, similar to the switches on the right hand.

In the next few pages, we'll learn the basics of playing either a simple accompaniment or melody on the basses. Just use the navigation below to go backward or forward.
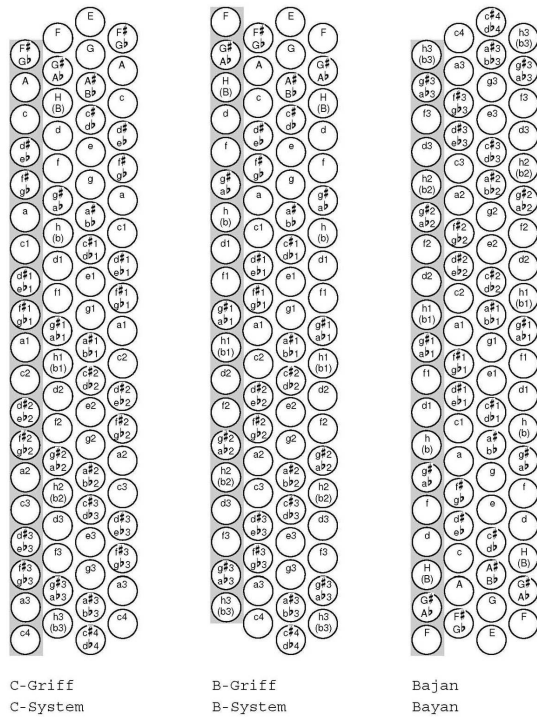
13 Free Bass

C-Griff
C-System

B-Griff
B-System

Bajan
Bayan

Figure 11 Three systems

The **free-bass** is a type of keyboard system that is found on some accordions. Unlike the Stradella-bass system, all of the buttons on a free-bass keyboard play single notes, not chords. The free-bass also has a bigger range of notes than the Stradella system, and it is easier to play out a tune with it. Due to this, the free bass system is used more often to play serious classical music with less transcription involved.

Most bass systems can switch between the Stradella and free-bass systems, while some accordions have free-bass only or auxiliary free-bass rows in addition to the Stradella buttons (sometimes called a *bassetti*).

There are two common free-bass systems: one is the *chromatic free bass*, where the notes move in a chromatic pattern upwards or downwards (see chart at right). The other is the *quint bass* system, which has a note system similar to the Stradella bass layout, but spread over several octaves. The former system gives you around five octaves of range in the left hand, and the latter about three. Usually, only big and expensive accordions have free-bass

and it is still a relatively new concept; chances are the instrument you have, or are looking to buy, does not have it. As a beginning accordionist, you should not be too worried about it.

The study of free bass is currently beyond the scope of this module, although it may be covered at a later date. Knowing the free-bass system is not essential to becoming a professional accordionist; many pieces can be played just as well on the Stradella system, although free bass is useful for complex pieces like piano music or three/four voice counterpoint (which can frequently be played note-for-note without any transcription even necessary).

14 Reed Ranks and Switches

Figure 12 A few right-hand manual register switches on a piano accordion. This one has three different voices.

A **reed rank** inside an accordion is a full set of the reeds that are used to make different timbres. These reed ranks are located in the reed chamber. Most accordions usually have two to four reed blocks in the treble and four or five in the left.

They can be used by themselves or in different combinations to make different sounds by allowing or shutting off the flow of air to certain ranks. These combinations are sometimes classified by the instruments they imitate, for instance the clarinet, oboe, and bassoon stops.

The reed ranks can be changed by pressing buttons usually found on the side of the accordion. A full-sized instrument usually will also have a "master" or "palm bar" on the right side of the instrument that can be depressed with the palm to turn on all the reed blocks for the fullest accordion sound.

Large instruments might also rarely have chin switches, which are positioned on top of the instrument and can be changed with the performer's chin. This is useful for if you want to change the timbre without having to take your hand off the keyboard.

Figure 13 Listen to a simple scale played with five different reed combinations. This accordion has three treble reed ranks and has *musette* tuning (note the "French"-type flavour on the second scale).

In a full-sized, four-reed-rank accordion, you will usually have these reeds:
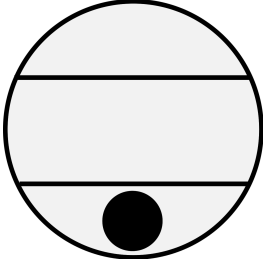
- Two eight-foot (8') or *clarinet* reeds, or reeds that sound at pitch. They are sometimes tuned differently from each other to create a European, French-style sound (sometimes called *musette* or *wet* tuning in accordion parlance). Sometimes they are tuned at the same pitch for a sound more appropriate for classical music (called *dry* tuning).

- A sixteen-foot (16') or *bassoon* reed, which sounds an octave below the eight-foot reeds.

- A four-foot (4') or *piccolo* reed, which sounds an octave above the eight-foot reeds.
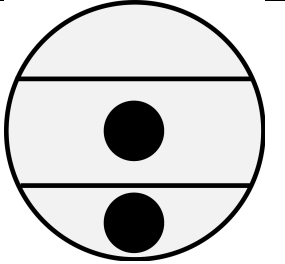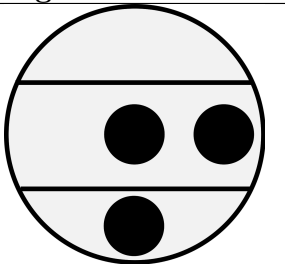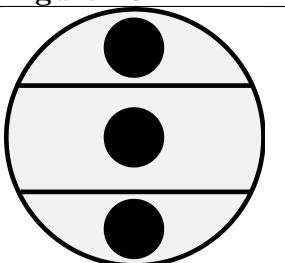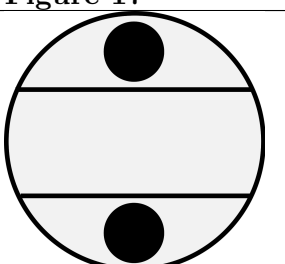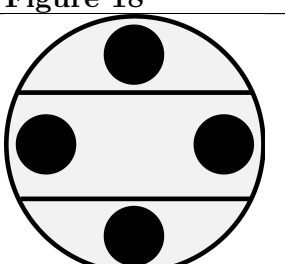
Smaller, three-reed accordions are usually missing either the piccolo reed or one of the clarinet reeds.
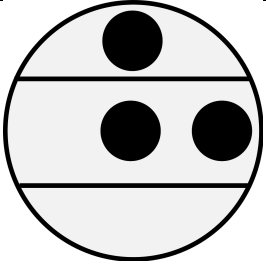
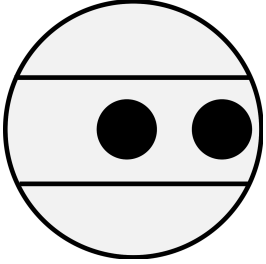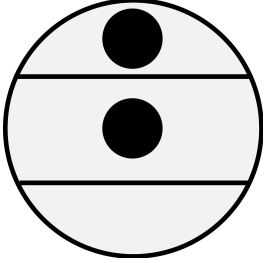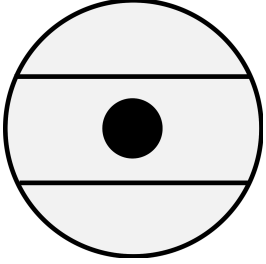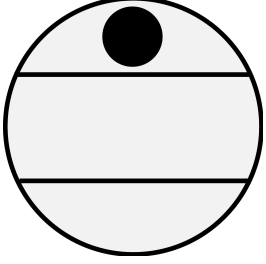Sometimes, instead of a four-foot reed there will be a third eight-foot reed that is tuned differently from the other two clarinet reeds. This creates an even more out-of-tune, French-styled sound, but gives you fewer sound possibilities.

On an average instrument, you can use almost any combination of the reeds to produce different sounds suitable for what you're playing.

Following is a table of all eleven possible combinations on a four-voice accordion as well as their names and a short description of their sound quality. Depending on the size of your instrument, you may not have all of these reeds available.

Reed name	Image	Description
Bassoon	 **Figure 14**	16': Rich, meaty sound, especially in the lowest octave. Good for jazz.

Reed name	Image	Description
Bandoneon	**Figure 15**	16', 8': Like Bassoon, but a little more powerful because of the octave doubling.
Accordion	**Figure 16**	16', 8', 8': Like Bandoneon, but a bit thicker.
Harmonium	**Figure 17**	16', 8', 4': Like Bandoneon, but brighter due to the high piccolo reed.
Organ	**Figure 18**	16', 4': Bright tone, imitative of an organ in its middle range.
Master	**Figure 19**	16', 8', 8', 4': Loudest and fullest accordion sound.

Reed name	Image	Description
Musette	**Figure 20**	8', 8', 4': Pleasant, bright sound. If you have a *wet* tuned accordion, this will have a French flavour.
Violin	**Figure 21**	8', 8': Pleasant, medium-volume sound. If you have a *wet* tuned accordion, this will have a French flavour.
Oboe	**Figure 22**	8', 4': Like Violin, but a touch softer and brighter.
Clarinet	**Figure 23**	8': Soft, pure tone free of harmonics.
Piccolo	**Figure 24**	4': Shrill sound, rarely used by itself except for special effects.

15 Getting Ready to Play Your First Song

15.1 Picking Up The Accordion

You may lift the accordion by the straps, but do not carry the accordion by the straps. If the strap breaks, your accordion will fall. While falling will not damage your accordion, the sudden stop after it hits the ground may. You put it on like a reverse backpack. The *treble keyboard* (the one that looks like a piano) will be played with your right hand. The *bass keyboard* (the one with rows of buttons) will be played with your left hand.

15.2 A Word About Notes

An octave goes from a C note to the next C note and contains 8 notes: C, D, E, F, G, A, B, C. Since you only have five fingers, you will only be able to play five notes without moving your hand. (Don't worry, our first lesson won't require you to do that.) If you happen to have more than five fingers, congratulations! Many great musicians have made use of their extra digits to play pieces that would be difficult or even impossible for those with only five.

15.3 Fingering

For the time being, each finger on your hand will strike one and only one key in a given song. Later in the course, you will learn how to smoothly move your hands across the keys to play a greater range of notes.

To help you play these early songs accurately, each note in the song will be numbered. Starting with your *right* hand, count from your thumb to your pinkie. Your thumb will be "1", and your pinkie will be "5". Any "1" note will be played by your thumb, and "5" note by your pinkie, and any "3" note by your middle finger.

We'll do the same thing on your left hand. Your thumb will be a "1" and your pinkie will be a "5".

Note: More advanced musicians do not refer to notes this way. Starting from the "1" note, the notes would be C, D, E, F, and G. After you get more practice, we'll phase out the use of this numbering system. Our main concern right now is to get your fingers moving and making music!

Look on the *treble keyboard* (right hand) for the first grouping of two black keys. Place your thumb on the white key to the left of the first black key. The remaining fingers should be placed on the adjacent white keys.

Look on the *bass keyboard* (left hand). You want to place your "4" finger on C. (Some people prefer to use "3".) The C key will have a jewel, bump, or indentation on it so you can feel it, instead of looking for it. If you have a large accordion, you may have a few keys like this. The one in the middle is usually C. Don't feel daunted by the number of keys on the bass keyboard! Most songs we will be playing will only use a few that will be easy to reach.

Getting Ready to Play Your First Song[1]

---

1   http://en.wikibooks.org/wiki/Category%3AAccordion

16 Contributors

Edits	User
1	Addihockey10[1]
30	Adrignola[2]
1	Avicennasis[3]
1	CommonsDelinker[4]
8	Cprompt[5]
1	Ericfassbender[6]
10	Foolestroupe[7]
2	George Leung[8]
1	Hagindaz[9]
5	Jguk[10]
1	Jomegat[11]
1	Lugarshz[12]
4	Nonny1ad[13]
6	QuiteUnusual[14]
53	Tempodivalse[15]
3	Xxagile[16]

1   http://en.wikibooks.org/w/index.php?title=User:Addihockey10
2   http://en.wikibooks.org/w/index.php?title=User:Adrignola
3   http://en.wikibooks.org/w/index.php?title=User:Avicennasis
4   http://en.wikibooks.org/w/index.php?title=User:CommonsDelinker
5   http://en.wikibooks.org/w/index.php?title=User:Cprompt
6   http://en.wikibooks.org/w/index.php?title=User:Ericfassbender
7   http://en.wikibooks.org/w/index.php?title=User:Foolestroupe
8   http://en.wikibooks.org/w/index.php?title=User:George_Leung
9   http://en.wikibooks.org/w/index.php?title=User:Hagindaz
10 http://en.wikibooks.org/w/index.php?title=User:Jguk
11 http://en.wikibooks.org/w/index.php?title=User:Jomegat
12 http://en.wikibooks.org/w/index.php?title=User:Lugarshz
13 http://en.wikibooks.org/w/index.php?title=User:Nonny1ad
14 http://en.wikibooks.org/w/index.php?title=User:QuiteUnusual
15 http://en.wikibooks.org/w/index.php?title=User:Tempodivalse
16 http://en.wikibooks.org/w/index.php?title=User:Xxagile

List of Figures

- GFDL: Gnu Free Documentation License. `http://www.gnu.org/licenses/fdl.html`

- cc-by-sa-3.0: Creative Commons Attribution ShareAlike 3.0 License. `http://creativecommons.org/licenses/by-sa/3.0/`

- cc-by-sa-2.5: Creative Commons Attribution ShareAlike 2.5 License. `http://creativecommons.org/licenses/by-sa/2.5/`

- cc-by-sa-2.0: Creative Commons Attribution ShareAlike 2.0 License. `http://creativecommons.org/licenses/by-sa/2.0/`

- cc-by-sa-1.0: Creative Commons Attribution ShareAlike 1.0 License. `http://creativecommons.org/licenses/by-sa/1.0/`

- cc-by-2.0: Creative Commons Attribution 2.0 License. `http://creativecommons.org/licenses/by/2.0/`

- cc-by-2.0: Creative Commons Attribution 2.0 License. `http://creativecommons.org/licenses/by/2.0/deed.en`

- cc-by-2.5: Creative Commons Attribution 2.5 License. `http://creativecommons.org/licenses/by/2.5/deed.en`

- cc-by-3.0: Creative Commons Attribution 3.0 License. `http://creativecommons.org/licenses/by/3.0/deed.en`

- GPL: GNU General Public License. `http://www.gnu.org/licenses/gpl-2.0.txt`

- LGPL: GNU Lesser General Public License. `http://www.gnu.org/licenses/lgpl.html`

- PD: This image is in the public domain.

- ATTR: The copyright holder of this file allows anyone to use it for any purpose, provided that the copyright holder is properly attributed. Redistribution, derivative work, commercial use, and all other use is permitted.

- EURO: This is the common (reverse) face of a euro coin. The copyright on the design of the common face of the euro coins belongs to the European Commission. Authorised is reproduction in a format without relief (drawings, paintings, films) provided they are not detrimental to the image of the euro.

- LFK: Lizenz Freie Kunst. `http://artlibre.org/licence/lal/de`

- CFR: Copyright free use.

- EPL: Eclipse Public License. `http://www.eclipse.org/org/documents/epl-v10.php`

Copies of the GPL, the LGPL as well as a GFDL are included in chapter Licenses[17]. Please note that images in the public domain do not require attribution. You may click on the image numbers in the following table to open the webpage of the images in your webbrower.

---

17   Chapter 17 on page 43

1	Henrydoktorski[18], Henry Doktorski[19]	cc-by-sa-3.0
2		
3	Henrydoktorski[20], Henry Doktorski[21]	cc-by-sa-3.0
4		GFDL
5		GFDL
6		GFDL
7		GFDL
8	Tobias R. - Metoc	cc-by-sa-2.5
9	Necz0r[22]	
10	Necz0r[23]	GFDL
11	Waldgyst[24]	GFDL
12	Necz0r[25]	GFDL
13	Necz0r[26]	PD
14	Necz0r[27]	PD
15	Necz0r[28]	PD
16	Necz0r[29]	PD
17	Necz0r[30]	PD
18	Necz0r[31]	PD
19	Necz0r[32]	PD
20	Necz0r[33]	PD
21	Necz0r[34]	PD
22	Necz0r[35]	PD
23	Necz0r[36]	PD
24	Necz0r[37]	PD

---

18 `http://en.wikibooks.org/wiki/User%3AHenrydoktorski`
19 `http://en.wikibooks.org/wiki/%3Aen%3AHenry%20Doktorski`
20 `http://en.wikibooks.org/wiki/User%3AHenrydoktorski`
21 `http://en.wikibooks.org/wiki/%3Aen%3AHenry%20Doktorski`
22 `http://en.wikibooks.org/wiki/User%3ANecz0r`
23 `http://en.wikibooks.org/wiki/User%3ANecz0r`
24 `http://en.wikibooks.org/wiki/User%3AWaldgyst`
25 `http://en.wikibooks.org/wiki/User%3ANecz0r`
26 `http://en.wikibooks.org/wiki/User%3ANecz0r`
27 `http://en.wikibooks.org/wiki/User%3ANecz0r`
28 `http://en.wikibooks.org/wiki/User%3ANecz0r`
29 `http://en.wikibooks.org/wiki/User%3ANecz0r`
30 `http://en.wikibooks.org/wiki/User%3ANecz0r`
31 `http://en.wikibooks.org/wiki/User%3ANecz0r`
32 `http://en.wikibooks.org/wiki/User%3ANecz0r`
33 `http://en.wikibooks.org/wiki/User%3ANecz0r`
34 `http://en.wikibooks.org/wiki/User%3ANecz0r`
35 `http://en.wikibooks.org/wiki/User%3ANecz0r`
36 `http://en.wikibooks.org/wiki/User%3ANecz0r`
37 `http://en.wikibooks.org/wiki/User%3ANecz0r`

17 Licenses

17.1 GNU GENERAL PUBLIC LICENSE

Version 3, 29 June 2007

Copyright © 2007 Free Software Foundation, Inc. <http://fsf.org/>

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed. Preamble

The GNU General Public License is a free, copyleft license for software and other kinds of works.

The licenses for most software and other practical works are designed to take away your freedom to share and change the works. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change all versions of a program—to make sure it remains free software for all its users. We, the Free Software Foundation, use the GNU General Public License for most of our software; it applies also to any other work released this way by its authors. You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps: (1) assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow. TERMS AND CONDITIONS 0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays "Appropriate Legal Notices" to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion. 1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The "System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work. 2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output, given its content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law.

You may make, run and propagate covered works that you do not convey, without conditions so long as your license otherwise remains in force. You may convey covered works to others for the sole purpose of having them make modifications exclusively for you, or provide you with facilities for running those works, provided that you comply with the terms of this License in conveying all material for which you do not control copyright. Those thus making or running the covered works for you must do so exclusively on your behalf, under your direction and control, on terms that prohibit them from making any copies of your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed; section 10 makes it unnecessary. 3. Protecting Users' Legal Rights From Anti-Circumvention Law.

No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work's users, your or third parties' legal rights to forbid circumvention of technological measures. 4. Conveying Verbatim Copies.

You may convey verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee. 5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

* a) The work must carry prominent notices stating that you modified it, and giving a relevant date. * b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to "keep intact all notices". * c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it. * d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an "aggregate" if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate. 6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

* a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange. * b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge. * c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b. * d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements. * e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

A "User Product" is either (1) a "consumer product", which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, "normally used" refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

"Installation Information" for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying. 7. Additional Terms.

"Additional permissions" are terms that supplement the terms of this License by making exceptions from one or more of its conditions. Additional permissions that are applicable to the entire Program shall be treated as though they were included in this License, to the extent that they are valid under applicable law. If additional permissions apply only to part of the Program, that part may be used separately under those permissions, but the entire Program remains governed by this License without regard to the additional permissions.

When you convey a copy of a covered work, you may at your option remove any additional permissions from that copy, or from any part of it. (Additional permissions may be written to require their own removal in certain cases when you modify the work.) You may place additional permissions on material, added by you to a covered work, for which you have or can give appropriate copyright permission.

Notwithstanding any other provision of this License, for material you add to a covered work, you may (if authorized by the copyright holders of that material) supplement the terms of this License with terms:

* a) Disclaiming warranty or limiting liability differently from the terms of sections 15 and 16 of this License; or * b) Requiring preservation of specified reasonable legal notices or author attributions in that material or in the Appropriate Legal Notices displayed by works containing it; or * c) Prohibiting misrepresentation of the origin of that material, or requiring that modified versions of such material be marked in reasonable ways as different from the original version; or * d) Limiting the use for publicity purposes of names of licensors or authors of the material; or * e) Declining to grant rights under trademark law for use of some trade names, trademarks, or service marks; or * f) Requiring indemnification of licensors and authors of that material by anyone who conveys the material (or modified versions of it) with contractual assumptions of liability to the recipient, for any liability that these contractual assumptions directly impose on those licensors and authors.

All other non-permissive additional terms are considered "further restrictions" within the meaning of section 10. If the Program as you received it, or any part of it, contains a notice stating that it is governed by this License along with a term that is a further restriction, you may remove that term. If a license document contains a further restriction but permits relicensing or conveying under this License, you may add to a covered work material governed by the terms of that license document, provided that the further restriction does not survive such relicensing or conveying.

If you add terms to a covered work in accord with this section, you must place, in the relevant source files, a statement of the additional terms that apply to those files, or a notice indicating where to find the applicable terms.

Additional terms, permissive or non-permissive, may be stated in the form of a separately written license, or stated as exceptions; the above requirements apply either way. 8. Termination.

You may not propagate or modify a covered work except as expressly provided under this License. Any attempt otherwise to propagate or modify it is void, and will automatically terminate your rights under this License (including any patent licenses granted under the third paragraph of section 11).

However, if you cease all violation of this License, then your license from a particular copyright holder is reinstated (a) provisionally, unless and until the copyright holder explicitly and finally terminates your license, and (b) permanently, if the copyright holder fails to notify you of the violation by some reasonable means prior to 60 days after the cessation.

Moreover, your license from a particular copyright holder is reinstated permanently if the copyright holder notifies you of the violation by some reasonable means, this is the first time you have received notice of violation of this License (for any work)

from that copyright holder, and you cure the violation prior to 30 days after your receipt of the notice.

Termination of your rights under this section does not terminate the licenses of parties who have received copies or rights from you under this License. If your rights have been terminated and not permanently reinstated, you do not qualify to receive new licenses for the same material under section 10. 9. Acceptance Not Required for Having Copies.

You are not required to accept this License in order to receive or run a copy of the Program. Ancillary propagation of a covered work occurring solely as a consequence of using peer-to-peer transmission to receive a copy likewise does not require acceptance. However, nothing other than this License grants you permission to propagate or modify any covered work. These actions infringe copyright if you do not accept this License. Therefore, by modifying or propagating a covered work, you indicate your acceptance of this License to do so. 10. Automatic Licensing of Downstream Recipients.

Each time you convey a covered work, the recipient automatically receives a license from the original licensors, to run, modify and propagate that work, subject to this License. You are not responsible for enforcing compliance by third parties with this License.

An "entity transaction" is a transaction transferring control of an organization, or substantially all assets of one, or subdividing an organization, or merging organizations. If propagation of a covered work results from an entity transaction, each party to that transaction who receives a copy of the work also receives whatever licenses to the work the party's predecessor in interest had or could give under the previous paragraph, plus a right to possession of the Corresponding Source of the work from the predecessor in interest, if the predecessor has it or can get it with reasonable efforts.

You may not impose any further restrictions on the exercise of the rights granted or affirmed under this License. For example, you may not impose a license fee, royalty, or other charge for exercise of rights granted under this License, and you may not initiate litigation (including a cross-claim or counterclaim in a lawsuit) alleging that any patent claim is infringed by making, using, selling, offering for sale, or importing the Program or any portion of it. 11. Patents.

A "contributor" is a copyright holder who authorizes use under this License of the Program or a work on which the Program is based. The work thus licensed is called the contributor's "contributor version".

A contributor's "essential patent claims" are all patent claims owned or controlled by the contributor, whether already acquired or hereafter acquired, that would be infringed by some manner, permitted by this License, of making, using, or selling its contributor version, but do not include claims that would be infringed only as a consequence of further modification of the contributor version. For purposes of this definition, "control" includes the right to grant patent sublicenses in a manner consistent with the requirements of this License.

Each contributor grants you a non-exclusive, worldwide, royalty-free patent license under the contributor's essential patent claims, to make, use, sell, offer for sale, import and otherwise run, modify and propagate the contents of its contributor version.

In the following three paragraphs, a "patent license" is any express agreement or commitment, however denominated, not to enforce a patent (such as an express permission to practice a patent or covenant not to sue for patent infringement). To "grant" such a patent license to a party means to make such an agreement or commitment not to enforce a patent against the party.

If you convey a covered work, knowingly relying on a patent license, and the Corresponding Source of the work is not available for anyone to copy, free of charge and under the terms of this License, through a publicly available network server or other readily accessible means, then you must either (1) cause the Corresponding Source to be so available, or (2) arrange to deprive yourself of the benefit of the patent license for this particular work, or (3) arrange, in a manner consistent with the requirements of this License, to extend the patent license to downstream recipients. "Knowingly relying" means you have actual knowledge that, but for the patent license, your conveying the covered work in a country, or your recipient's use of the covered work in a country, would infringe one or more identifiable patents in that country that you have reason to believe are valid.

If, pursuant to or in connection with a single transaction or arrangement, you convey, or propagate by procuring conveyance of, a covered work, and grant a patent license to some of the parties receiving the covered work authorizing them to use, propagate, modify or convey a specific copy of the covered work, then the patent license you grant is automatically extended to all recipients of the covered work and works based on it.

A patent license is "discriminatory" if it does not include within the scope of its coverage, prohibits the exercise of, or is conditioned on the non-exercise of one or more of the rights that are specifically granted under this License. You may not convey a covered work if you are a party to an arrangement with a third party that is in the business of distributing software, under which you make payment to the third party based on the extent of your activity of conveying the work, and under which the third party grants, to any of the parties who would receive the covered work from you, a discriminatory patent license (a) in connection with copies of the covered work conveyed by you (or copies made from those copies), or (b) primarily for and in connection with specific products or compilations that contain the covered work, unless you entered into that arrangement, or that patent license was granted, prior to 28 March 2007.

Nothing in this License shall be construed as excluding or limiting any implied license or other defenses to infringement that may otherwise be available to you under applicable patent law. 12. No Surrender of Others' Freedom.

If conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot convey a covered work so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not convey it at all. For example, if you agree to terms that obligate you to collect a royalty for further conveying from those to whom you convey the Program, the only way you could satisfy both those terms and this License would be to refrain entirely from conveying the Program. 13. Use with the GNU Affero General Public License.

Notwithstanding any other provision of this License, you have permission to link or combine any covered work with a work licensed under version 3 of the GNU Affero General Public License into a single combined work, and to convey the resulting work. The terms of this License will continue to apply to the part which is the covered work, but the special requirements of the GNU Affero General Public License, section 13, concerning interaction through a network will apply to the combination as such. 14. Revised Versions of this License.

The Free Software Foundation may publish revised and/or new versions of the GNU General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies that a certain numbered version of the GNU General Public License "or any later version" applies to it, you have the option of following the terms and conditions either of that numbered version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of the GNU General Public License, you may choose any version ever published by the Free Software Foundation.

If the Program specifies that a proxy can decide which future versions of the GNU General Public License can be used, that proxy's public statement of acceptance of a version permanently authorizes you to choose that version for the Program.

Later license versions may give you additional or different permissions. However, no additional obligations are imposed on any author or copyright holder as a result of your choosing to follow a later version. 15. Disclaimer of Warranty.

THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION. 16. Limitation of Liability.

IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MODIFIES AND/OR CONVEYS THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. 17. Interpretation of Sections 15 and 16.

If the disclaimer of warranty and limitation of liability provided above cannot be given local legal ef-

fect according to their terms, reviewing courts shall apply local law that most closely approximates an absolute waiver of all civil liability in connection with the Program, unless a warranty or assumption of liability accompanies a copy of the Program in return for a fee.

END OF TERMS AND CONDITIONS How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively state the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the program's name and a brief idea of what it does.> Copyright (C) <year> <name of author>

This program is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program. If not, see <http://www.gnu.org/licenses/>.

Also add information on how to contact you by electronic and paper mail.

If the program does terminal interaction, make it output a short notice like this when it starts in an interactive mode:

<program> Copyright (C) <year> <name of author> This program comes with ABSOLUTELY NO WARRANTY; for details type 'show w'. This is free software, and you are welcome to redistribute it under certain conditions; type 'show c' for details.

The hypothetical commands 'show w' and 'show c' should show the appropriate parts of the General Public License. Of course, your program's commands might be different; for a GUI interface, you would use an "about box".

You should also get your employer (if you work as a programmer) or school, if any, to sign a "copyright disclaimer" for the program, if necessary. For more information on this, and how to apply and follow the GNU GPL, see <http://www.gnu.org/licenses/>.

The GNU General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Lesser General Public License instead of this License. But first, please read <http://www.gnu.org/philosophy/why-not-lgpl.html>.

17.2 GNU Free Documentation License

Version 1.3, 3 November 2008

Copyright © 2000, 2001, 2002, 2007, 2008 Free Software Foundation, Inc. <http://fsf.org/>

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed. 0. PREAMBLE

The purpose of this License is to make a manual, textbook, or other functional and useful document "free" in the sense of freedom: to assure everyone the effective freedom to copy and redistribute it, with or without modifying it, either commercially or noncommercially. Secondarily, this License preserves for the author and publisher a way to get credit for their work, while not being considered responsible for modifications made by others.

This License is a kind of "copyleft", which means that derivative works of the document must themselves be free in the same sense. It complements the GNU General Public License, which is a copyleft license designed for free software.

We have designed this License in order to use it for manuals for free software, because free software needs free documentation: a free program should come with manuals providing the same freedoms that the software does. But this License is not limited to software manuals; it can be used for any textual work, regardless of subject matter or whether it is published as a printed book. We recommend this License principally for works whose purpose is instruction or reference. 1. APPLICABILITY AND DEFINITIONS

This License applies to any manual or other work, in any medium, that contains a notice placed by the copyright holder saying it can be distributed under the terms of this License. Such a notice grants a world-wide, royalty-free license, unlimited in duration, to use that work under the conditions stated herein. The "Document", below, refers to any such manual or work. Any member of the public is a licensee, and is addressed as "you". You accept the license if you copy, modify or distribute the work in a way requiring permission under copyright law.

A "Modified Version" of the Document means any work containing the Document or a portion of it, either copied verbatim, or with modifications and/or translated into another language.

A "Secondary Section" is a named appendix or a front-matter section of the Document that deals exclusively with the relationship of the publishers or

authors of the Document to the Document's overall subject (or to related matters) and contains nothing that could fall directly within that overall subject. (Thus, if the Document is in part a textbook of mathematics, a Secondary Section may not explain any mathematics.) The relationship could be a matter of historical connection with the subject or with related matters, or of legal, commercial, philosophical, ethical or political position regarding them.

The "Invariant Sections" are certain Secondary Sections whose titles are designated, as being those of Invariant Sections, in the notice that says that the Document is released under this License. If a section does not fit the above definition of Secondary then it is not allowed to be designated as Invariant. The Document may contain zero Invariant Sections. If the Document does not identify any Invariant Sections then there are none.

The "Cover Texts" are certain short passages of text that are listed, as Front-Cover Texts or Back-Cover Texts, in the notice that says that the Document is released under this License. A Front-Cover Text may be at most 5 words, and a Back-Cover Text may be at most 25 words.

A "Transparent" copy of the Document means a machine-readable copy, represented in a format whose specification is available to the general public, that is suitable for revising the document straightforwardly with generic text editors or (for images composed of pixels) generic paint programs or (for drawings) some widely available drawing editor, and that is suitable for input to text formatters or for automatic translation to a variety of formats suitable for input to text formatters. A copy made in an otherwise Transparent file format whose markup, or absence of markup, has been arranged to thwart or discourage subsequent modification by readers is not Transparent. An image format is not Transparent if used for any substantial amount of text. A copy that is not "Transparent" is called "Opaque".

Examples of suitable formats for Transparent copies include plain ASCII without markup, Texinfo input format, LaTeX input format, SGML or XML using a publicly available DTD, and standard-conforming simple HTML, PostScript or PDF designed for human modification. Examples of transparent image formats include PNG, XCF and JPG. Opaque formats include proprietary formats that can be read and edited only by proprietary word processors, SGML or XML for which the DTD and/or processing tools are not generally available, and the machine-generated HTML, PostScript or

PDF produced by some word processors for output purposes only.

The "Title Page" means, for a printed book, the title page itself, plus such following pages as are needed to hold, legibly, the material this License requires to appear in the title page. For works in formats which do not have any title page as such, "Title Page" means the text near the most prominent appearance of the work's title, preceding the beginning of the body of the text.

The "publisher" means any person or entity that distributes copies of the Document to the public.

A section "Entitled XYZ" means a named subunit of the Document whose title either is precisely XYZ or contains XYZ in parentheses following text that translates XYZ in another language. (Here XYZ stands for a specific section name mentioned below, such as "Acknowledgements", "Dedications", "Endorsements", or "History".) To "Preserve the Title" of such a section when you modify the Document means that it remains a section "Entitled XYZ" according to this definition.

The Document may include Warranty Disclaimers next to the notice which states that this License applies to the Document. These Warranty Disclaimers are considered to be included by reference in this License, but only as regards disclaiming warranties: any other implication that these Warranty Disclaimers may have is void and has no effect on the meaning of this License. 2. VERBATIM COPYING

You may copy and distribute the Document in any medium, either commercially or noncommercially, provided that this License, the copyright notices, and the license notice saying this License applies to the Document are reproduced in all copies, and that you add no other conditions whatsoever to those of this License. You may not use technical measures to obstruct or control the reading or further copying of the copies you make or distribute. However, you may accept compensation in exchange for copies. If you distribute a large enough number of copies you must also follow the conditions in section 3.

You may also lend copies, under the same conditions stated above, and you may publicly display copies. 3. COPYING IN QUANTITY

If you publish printed copies (or copies in media that commonly have printed covers) of the Document, numbering more than 100, and the Document's license notice requires Cover Texts, you

must enclose the copies in covers that carry, clearly and legibly, all these Cover Texts: Front-Cover Texts on the front cover, and Back-Cover Texts on the back cover. Both covers must also clearly and legibly identify you as the publisher of these copies. The front cover must present the full title with all words of the title equally prominent and visible. You may add other material on the covers in addition. Copying with changes limited to the covers, as long as they preserve the title of the Document and satisfy these conditions, can be treated as verbatim copying in other respects.

If the required texts for either cover are too voluminous to fit legibly, you should put the first ones listed (as many as fit reasonably) on the actual cover, and continue the rest onto adjacent pages.

If you publish or distribute Opaque copies of the Document numbering more than 100, you must either include a machine-readable Transparent copy along with each Opaque copy, or state in or with each Opaque copy a computer-network location from which the general network-using public has access to download using public-standard network protocols a complete Transparent copy of the Document, free of added material. If you use the latter option, you must take reasonably prudent steps, when you begin distribution of Opaque copies in quantity, to ensure that this Transparent copy will remain thus accessible at the stated location until at least one year after the last time you distribute an Opaque copy (directly or through your agents or retailers) of that edition to the public.

It is requested, but not required, that you contact the authors of the Document well before redistributing any large number of copies, to give them a chance to provide you with an updated version of the Document. 4. MODIFICATIONS

You may copy and distribute a Modified Version of the Document under the conditions of sections 2 and 3 above, provided that you release the Modified Version under precisely this License, with the Modified Version filling the role of the Document, thus licensing distribution and modification of the Modified Version to whoever possesses a copy of it. In addition, you must do these things in the Modified Version:

* A. Use in the Title Page (and on the covers, if any) a title distinct from that of the Document, and from those of previous versions (which should, if there were any, be listed in the History section of the Document). You may use the same title as a previous version if the original publisher of that version gives permission. * B. List on the Title

Page, as authors, one or more persons or entities responsible for authorship of the modifications in the Modified Version, together with at least five of the principal authors of the Document (all of its principal authors, if it has fewer than five), unless they release you from this requirement. * C. State on the Title page the name of the publisher of the Modified Version, as the publisher. * D. Preserve all the copyright notices of the Document. * E. Add an appropriate copyright notice for your modifications adjacent to the other copyright notices. * F. Include, immediately after the copyright notices, a license notice giving the public permission to use the Modified Version under the terms of this License, in the form shown in the Addendum below. * G. Preserve in that license notice the full lists of Invariant Sections and required Cover Texts given in the Document's license notice. * H. Include an unaltered copy of this License. * I. Preserve the section Entitled "History", Preserve its Title, and add to it an item stating at least the title, year, new authors, and publisher of the Modified Version as given on the Title Page. If there is no section Entitled "History" in the Document, create one stating the title, year, authors, and publisher of the Document as given on its Title Page, then add an item describing the Modified Version as stated in the previous sentence. * J. Preserve the network location, if any, given in the Document for public access to a Transparent copy of the Document, and likewise the network locations given in the Document for previous versions it was based on. These may be placed in the "History" section. You may omit a network location for a work that was published at least four years before the Document itself, or if the original publisher of the version it refers to gives permission. * K. For any section Entitled "Acknowledgements" or "Dedications", Preserve the Title of the section, and preserve in the section all the substance and tone of each of the contributor acknowledgements and/or dedications given therein. * L. Preserve all the Invariant Sections of the Document, unaltered in their text and in their titles. Section numbers or the equivalent are not considered part of the section titles. * M. Delete any section Entitled "Endorsements". Such a section may not be included in the Modified Version. * N. Do not retitle any existing section to be Entitled "Endorsements" or to conflict in title with any Invariant Section. * O. Preserve any Warranty Disclaimers.

If the Modified Version includes new front-matter sections or appendices that qualify as Secondary Sections and contain no material copied from the Document, you may at your option designate some or all of these sections as invariant. To do this, add their titles to the list of Invariant Sections in the Modified Version's license notice. These titles must be distinct from any other section titles.

You may add a section Entitled "Endorsements", provided it contains nothing but endorsements of your Modified Version by various parties—for example, statements of peer review or that the text has been approved by an organization as the authoritative definition of a standard.

You may add a passage of up to five words as a Front-Cover Text, and a passage of up to 25 words as a Back-Cover Text, to the end of the list of Cover Texts in the Modified Version. Only one passage of Front-Cover Text and one of Back-Cover Text may be added by (or through arrangements made by) any one entity. If the Document already includes a cover text for the same cover, previously added by you or by arrangement made by the same entity you are acting on behalf of, you may not add another; but you may replace the old one, on explicit permission from the previous publisher that added the old one.

The author(s) and publisher(s) of the Document do not by this License give permission to use their names for publicity or to assert or imply endorsement of any Modified Version. 5. COMBINING DOCUMENTS

You may combine the Document with other documents released under this License, under the terms defined in section 4 above for modified versions, provided that you include in the combination all of the Invariant Sections of all of the original documents, unmodified, and list them all as Invariant Sections of your combined work in its license notice, and that you preserve all their Warranty Disclaimers.

The combined work need only contain one copy of this License, and multiple identical Invariant Sections may be replaced with a single copy. If there are multiple Invariant Sections with the same name but different contents, make the title of each such section unique by adding at the end of it, in parentheses, the name of the original author or publisher of that section if known, or else a unique number. Make the same adjustment to the section titles in the list of Invariant Sections in the license notice of the combined work.

In the combination, you must combine any sections Entitled "History" in the various original documents, forming one section Entitled "History"; likewise combine any sections Entitled "Acknowledgements", and any sections Entitled "Dedications". You must delete all sections Entitled "Endorsements". 6. COLLECTIONS OF DOCUMENTS

You may make a collection consisting of the Document and other documents released under this License, and replace the individual copies of this License in the various documents with a single copy that is included in the collection, provided that you follow the rules of this License for verbatim copying of each of the documents in all other respects.

You may extract a single document from such a collection, and distribute it individually under this License, provided you insert a copy of this License into the extracted document, and follow this License in all other respects regarding verbatim copying of that document. 7. AGGREGATION WITH INDEPENDENT WORKS

A compilation of the Document or its derivatives with other separate and independent documents or works, in or on a volume of a storage or distribution medium, is called an "aggregate" if the copyright resulting from the compilation is not used to limit the legal rights of the compilation's users beyond what the individual works permit. When the Document is included in an aggregate, this License does not apply to the other works in the aggregate which are not themselves derivative works of the Document.

If the Cover Text requirement of section 3 is applicable to these copies of the Document, then if the Document is less than one half of the entire aggregate, the Document's Cover Texts may be placed on covers that bracket the Document within the aggregate, or the electronic equivalent of covers if the Document is in electronic form. Otherwise they must appear on printed covers that bracket the whole aggregate. 8. TRANSLATION

Translation is considered a kind of modification, so you may distribute translations of the Document under the terms of section 4. Replacing Invariant Sections with translations requires special permission from their copyright holders, but you may include translations of some or all Invariant Sections in addition to the original versions of these Invariant Sections. You may include a translation of this License, and all the license notices in the Document, and any Warranty Disclaimers, provided that you also include the original English version of this License and the original versions of those notices and disclaimers. In case of a disagreement between the translation and the original version of this License or a notice or disclaimer, the original version will prevail.

If a section in the Document is Entitled "Acknowledgements", "Dedications", or "History", the requirement (section 4) to Preserve its Title (section 1) will typically require changing the actual title. 9. TERMINATION

You may not copy, modify, sublicense, or distribute the Document except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, or distribute it is void, and will automatically terminate your rights under this License.

However, if you cease all violation of this License, then your license from a particular copyright holder is reinstated (a) provisionally, unless and until the copyright holder explicitly and finally terminates your license, and (b) permanently, if the copyright holder fails to notify you of the violation by some reasonable means prior to 60 days after the cessation.

Moreover, your license from a particular copyright holder is reinstated permanently if the copyright holder notifies you of the violation by some reasonable means, this is the first time you have received notice of violation of this License (for any work) from that copyright holder, and you cure the violation prior to 30 days after your receipt of the notice.

Termination of your rights under this section does not terminate the licenses of parties who have received copies or rights from you under this License. If your rights have been terminated and not permanently reinstated, receipt of a copy of some or all of the same material does not give you any rights to use it. 10. FUTURE REVISIONS OF THIS LICENSE

The Free Software Foundation may publish new, revised versions of the GNU Free Documentation License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns. See http://www.gnu.org/copyleft/.

Each version of the License is given a distinguishing version number. If the Document specifies that a particular numbered version of this License "or any later version" applies to it, you have the option of following the terms and conditions either of that specified version or of any later version that has been published (not as a draft) by the Free Software Foundation. If the Document does not specify a version number of this License, you may choose any version ever published (not as a draft) by the Free Software Foundation. If the Document specifies that a proxy can decide which future versions of this License can be used, that proxy's public statement of acceptance of a version permanently authorizes you to choose that version for the Document. 11. RELICENSING

"Massive Multiauthor Collaboration Site" (or "MMC Site") means any World Wide Web server that publishes copyrightable works and also provides prominent facilities for anybody to edit those works. A public wiki that anybody can edit is an example of such a server. A "Massive Multiauthor Collaboration" (or "MMC") contained in the site means any set of copyrightable works thus published on the MMC site.

"CC-BY-SA" means the Creative Commons Attribution-Share Alike 3.0 license published by Creative Commons Corporation, a not-for-profit corporation with a principal place of business in San Francisco, California, as well as future copyleft versions of that license published by that same organization.

"Incorporate" means to publish or republish a Document, in whole or in part, as part of another Document.

An MMC is "eligible for relicensing" if it is licensed under this License, and if all works that were first published under this License somewhere other than this MMC, and subsequently incorporated in whole or in part into the MMC, (1) had no cover texts or invariant sections, and (2) were thus incorporated prior to November 1, 2008.

The operator of an MMC Site may republish an MMC contained in the site under CC-BY-SA on the same site at any time before August 1, 2009, provided the MMC is eligible for relicensing. ADDENDUM: How to use this License for your documents

To use this License in a document you have written, include a copy of the License in the document and put the following copyright and license notices just after the title page:

Copyright (C) YEAR YOUR NAME. Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.3 or any later version published by the Free Software Foundation; with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts. A copy of the license is included in the section entitled "GNU Free Documentation License".

If you have Invariant Sections, Front-Cover Texts and Back-Cover Texts, replace the "with ... Texts." line with this:

with the Invariant Sections being LIST THEIR TITLES, with the Front-Cover Texts being LIST, and with the Back-Cover Texts being LIST.

If you have Invariant Sections without Cover Texts, or some other combination of the three, merge those two alternatives to suit the situation.

If your document contains nontrivial examples of program code, we recommend releasing these examples in parallel under your choice of free software license, such as the GNU General Public License, to permit their use in free software.

17.3 GNU Lesser General Public License